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DESIGN REPORT ON

R02 Fisheries Habitat Compensation Design
All Weather Private Access Road
Meadowbank Gold Project
Nunavut

Submitted to:
Agnico Eagle Mines Ltd.
Suite 950 One Bentall Centre
Vancouver, BC
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DISTRIBUTION:

2 Copies : Meadowbank Mining Corp.
2 Copies : Golder Associates Ltd.

September 14, 2007 07-1413-0047

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1.0 INTRODUCTION

The purpose of this report is to provide detailed design guidelines for fish habitat compensation at crossing R02 of the All-Weather Private Access Road (AWPAR), Meadowbank Gold Project, Nunavut. Figure 1 and 2 show the Project location and the R02 site location, respectively.

The habitat compensation design was developed in reference to the biophysical requirements of Arctic grayling for spawning, rearing and foraging provided by Azimuth (2007a) in their technical memorandum dated July 11, 2007 and included as Appendix A. The design and accompanying construction notes detail the compensatory work aimed at modifying or replacing low to moderate value habitat and creating high value spawning habitat for Arctic grayling.

The detailed design presented herein was prepared based on limited understanding of the geotechnical conditions at the site. Actual site conditions (e.g., depth to bedrock, soil characteristics and properties) may vary and field-fitting may be required during construction.

2.0 SITE DESCRIPTION

The proposed habitat compensation works at crossing R02 are intended to provide high value habitats covering an area of 5,600 m^2. Azimuth (2007a) recommended that the fish habitat compensation design focus on the creation of spawning habitat, with some minor alterations to channel substrates and flow conditions for the creation of rearing pools.

Two potential habitat compensation areas (COA and COB) were identified by Azimuth (2007), while a third (COC) was identified during site visit by Golder Associates Ltd. (Golder) on August 18, and 19, 2007 (Golder, 2007a; included as Appendix B). The following sections summarize the habitat characteristics and hydrological conditions of the three areas as compiled from Azimuth's technical memorandum and observations made by Golder during the site visit (Golder, 2007a).

2.1 Habitat Characteristics for COA

COA is located downstream of the Golder staff gauge in a southern side channel, upstream of the bridge crossing R02 (see Figure 3). This area is described as having a moderate to high habitat value by Azimuth (2007a).

COA is characterized by boulder and cobble substrates, with pockets of spawning gravel and side pools for rearing. The D_{50} (median diameter) for this area is approximately 300 mm based on limited pebble count data (Golder, 2007a).

2.2 Habitat Characteristics for COB

COB is located in an area opposite to the Golder staff gauge (see Figure 3). This area is described as low to moderate habitat by Azimuth (2007a). The D_{50} for this area is 140 mm and the substrate is characterized by the presence of boulders and cobbles.

The creation of high value spawning habitat at COB is considered to provide greater potential return for compensation in comparison with COA.

2.3 Habitat Characteristics for COC

COC is located next to the Golder staff gauge on the channel right bank (looking downstream), opposite COB (see Figure 3). It is currently low-lying marsh land and rock. This area is submerged during flood events.

It is anticipated that the excavation in this area would provide moderate value off-channel rearing habitat; however, with the presence of the relatively large off-channel pond along the existing channel alignment (Figure 3), rearing habitat is not considered to be limiting within the reach. Furthermore, while COC may be subject to flowing water during the spawning period, there would be the potential for sediment infilling during flood recession. Some blasting would likely be required to excavate in this area.

3.0 FISH HABITAT COMPENSATION DESIGN

The fish habitat compensation design presented in Figures 1 to 6 is focused on the construction of spawning habitat at COB due to its potential higher rate of return for habitat improvements (Golder, 2007a). The works are to be constructed in winter in order to minimize the disturbance to the channel and surrounding tundra, and limit the potential release of sediment or sediment-laden water downstream.

Figure 4 shows the proposed habitat compensation layout at COB. The design consists of two types of compensation features: berms and pads. These features are intended to provide appropriate flow velocities and substrate conditions to generate moderate to high value rearing and spawning habitat over a range of flow conditions.

The construction of a series of berms is intended to provide moderate to high value rearing habitat throughout COB. The berm structures (see Figures 4 and 5) are expected to deflect high flow velocities toward the center and opposite side of the channel, dissipate peak flow energy and provide low velocities for fish rearing and foraging within the COB area. The berms also provide protection from scour during ice break up and over the expected range of flows.

High value spawning habitat would be created through the construction of several spawning pads along the length of COB. Specifically, existing channel bed substrate within the pad areas is to be removed and replaced with a mixture of 90% spawning gravel and 10% cobble. The pads are to be offset from one another and oriented facing upstream to create rearing pools and low flow areas within the pads. The offset pads positioning and upstream orientation also provides opportunities for deposition of gravel scoured from an upstream pad within a pad located downstream.

The typical spawning pad design, positioning and orientation within COB are shown in Figures 4 and 5. The pads are intended provide a minimum of 0.122 ha of total spawning habitat area. As detailed in Figure 4, different options are available with respect to the number of pads and their size depending on the construction material available at the site. Table 1 presents several options for spawning pad size and quantity. Other options are also possible providing total spawning pad area meets or exceeds 0.122 ha.

Table 1. Options for Spawning Pad Design

Spawning Pad Size	Spawning Pads Required	Estimated Total Area (ha)
6 m wide by 5 m long	41	0.123
10 m wide by 5 m long	25	0.125
12 m wide by 9 m long	12	0.130

Note: Refer to Figure 5 for spawning pad design details.

3.1 Construction Notes

General construction notes for the R02 fish habitat compensation design are provided in Figure 6. Biophysical requirements for Arctic grayling for spawning, rearing and foraging are provided in Azimuth (2007a), which is included as Appendix A.

3.2 Construction Quantities

The estimated quantities of rounded or sub-rounded stones or river rocks (D>300 mm) for each of the berms are summarized in Table 2. Table 3 provides the estimated spawning substrate and pad wall quantities required for each of the spawning pad configuration options presented in Table 1.

Table 2. Estimated Berm Quantities

Total Estimated Berm Volume (m^3)	
Berm 1	30
Berm 2	40
Berm 3	40
Berm 4	45

Table 3. Estimated Spawning Pad Quantities

Spawning Pad Size	Total Estimated Volume (m^3)	
	Spawning substrate	Pad walls
6 m wide by 5 m long (41 pads)	370	165
10 m wide by 5 m long (25 pads)	375	125
12 m wide by 9 m long (12 pads)	390	90

Note: Refer to Figure 5 for spawning pad design details.

4.0 HYDRAULIC ASSESSMENT

The R02 fish habitat compensation works are intended to provide high value habitat during the spawning, rearing and foraging period, which spans approximately from the start of spring freshet to late July. This section presents the typical hydraulic characteristics of the stream at R02 anticipated during that period.

A peak flow estimate of 96.7 m^3/s (Golder, 2007b) was assumed for design. Due to a lack of site specific and regional meteorologic and hydrometric data for the study area, the peak flow estimate was determined based on regional peak unit discharge rate reported by AMEC (2003). A preliminary hydraulic review of the peak flow rates proposed for crossing R02 was completed in November 2006 (Golder, 2006), and based on that review, it was concluded that the peak flow estimate was adequate for design given the limited site-specific data. It was strongly recommended, however, that peak flow estimates continue to be re-evaluated as additional site specific watercourse monitoring data become available.

Estimated average flow velocities and water levels associated with the peak design flow were used in the design of the fish habitat compensation works. The average stream flow velocities and water levels were estimated assuming steady flow analysis using the Hydrological Engineering Center River Analysis System (HEC-RAS) software package developed by the US Army Corps of Engineers. It should be noted that HEC-RAS is a one-dimensional analysis package, and as such, produces average cross-sectional estimates of flow characteristics. Variations in flow velocity with depth and across the cross-section cannot be estimated. Nevertheless, the model results do provide an indication of average flow characteristics expected within the compensation area at the design discharge.

The estimated average water level within COB at the peak design flow rate is approximately 68.5 metres above sea level (masl), corresponding to average cross-sectional maximum flow depth of 0.95 m, and an average cross-sectional flow velocity of 0.91 m/s. While these values exceed the values recommended by Azimuth (2007) (i.e., velocities < 0.2 m/s and water depth < 0.4 m), they do fall within the range of

biophysical conditions for spawning reported in the literature (see Table 1). It should also be noted that local hydraulic characteristics will likely vary from the estimated cross-sectional average values, and as such, the construction of the proposed berms and spawning pads are expected to create adequate hydraulic habitat conditions over varying discharges.

As discussed in Section 6.0, the habitat function of the works once constructed will be monitored and adaptively managed .

5.0 ESTIMATED HABITAT COMPENSATION GAIN

The proposed habitat compensation works at COB have been designed to exceed the AWPAR DFO Authorization requirement to create 0.80 habitat units (HU) or a net habitat gain of approximately 0.27 HU above the estimated HU loss resulting from the AWPAR bridge installations (0.53 HU; Cumberland, 2006).

The surface area of COB is estimated at 0.56 ha. Existing habitat within COB is classified as low to moderate habitat (Azimuth, 2007a), with the extent of each roughly split equally within the reach (G. Mann, pers. comm.).

The proposed habitat enhancement is expected to create high value rearing and spawning habitat throughout COB. However, if it is conservatively assumed the existing habitat will be replaced with only 0.122 ha of high value habitat (ie. Spawning pad area) while the remaining 0.41 ha (total remaining area less berm footprints) will be moderate habitat, the corresponding COB habitat would be approximately 1.69 HU based on a Habitat Sustainability Index of 9.34 HU/ha, 5.01 HU/ha and 0.43 HU/ha for high, medium and low value habitats, respectively (Cumberland 2006). This would correspond to a net habitat gain (COB HU gain less AWPAR HU loss) of 1.16 HU, roughly four times the Authorization requirement of 0.27 HU, and a compensation to loss ratio of approximately 3 to 1.

6.0 MAINTENANCE AND MONITORING

Natural adjustments to the proposed fish habitat compensation works by fluvial processes are expected following construction, and these adjustments may be beneficial to habitat function and stability over the long-term.

For the purposes of this design, it has been assumed that the habitat function and stability (including channel bed and bank erosion) of the works will be monitored and adaptively managed following the detailed monitoring and maintenance programs presented in:

- *Meadowbank Gold Project Aquatics Effects Management Program (AEMP)* (Cumberland, 2005);
- *Meadowbank Gold Project No-Net-Loss Plan (NNLP)* (Cumberland, 2006);
- *Monitoring Plan for Meadowbank Project All-Weather Private Access Road (AWPAR) HADD Crossings for Condition 5 of Authorization NU-03-0190 (2)* (Azimuth, 2007b); and,
- *Report on All-Weather Private Access Road Stream Crossings, Meadowbank Gold Project, Nunavut* (Golder, 2007b).

7.0 CLOSING

We trust the information contained in this document meets your requirements at this time. Should you have any questions relating to the above, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

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YAA/DRW/lw

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8.0 REFERENCES

AMEC, 2003. *Baseline Hydrology Study*. AMEC Earth and Environmental, December 2003.

Azimuth, 2007a. Azimuth Technical Memorandum *Fisheries Criteria for Habitat Compensation in Support of Hydrological Assessment R02*, July 11, 2007.

Azimuth, 2007b. Azimuth Technical Memorandum *Monitoring Plan for Meadowbank Project All-Weather Private Access Road (AWPAR) HADD Crossings for Condition 5 of Authorization NU-03-0190 (2)*, 29 June 2007.

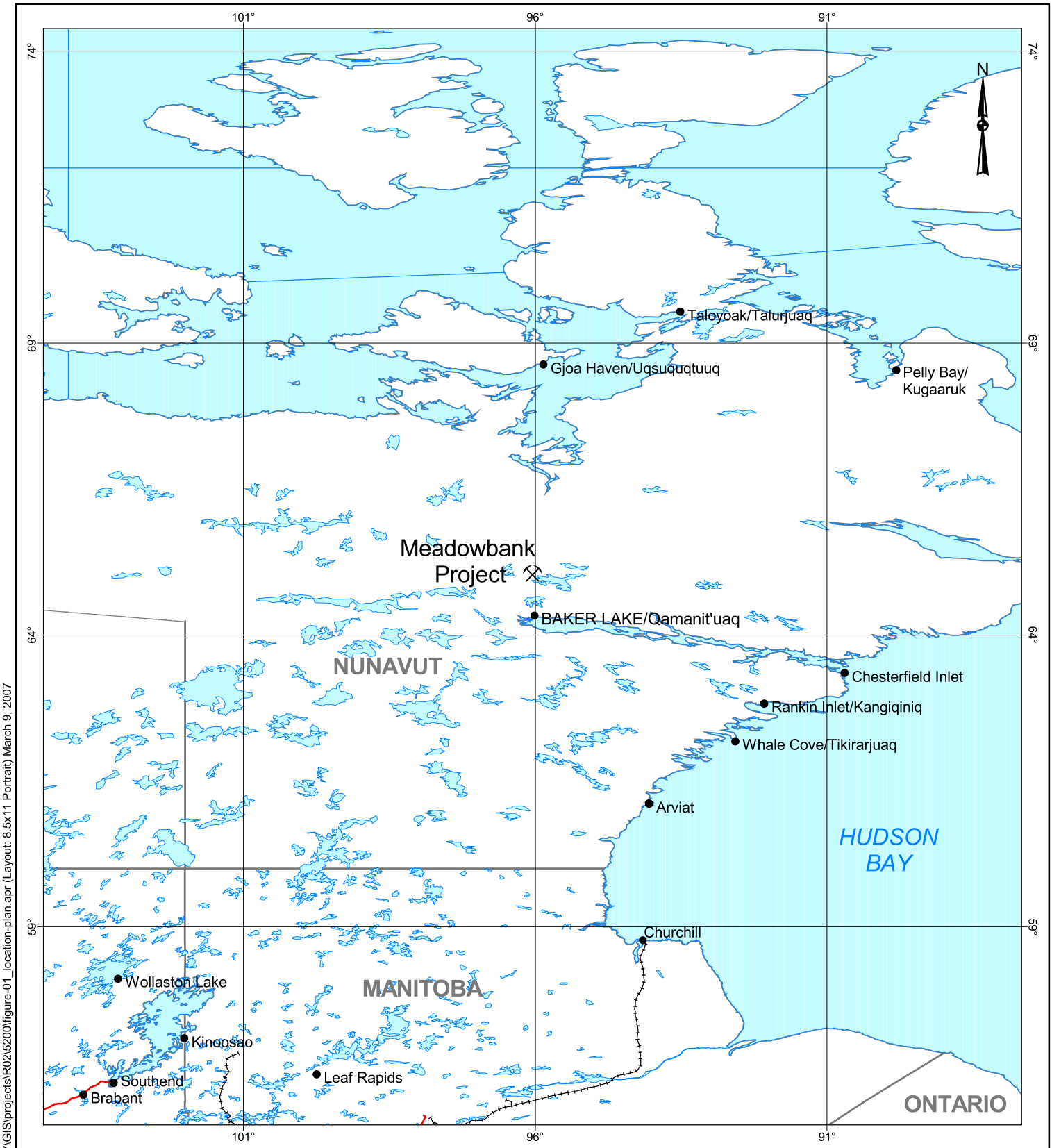
Cumberland Resources Ltd. (Cumberland), 2005. *Meadowbank Gold Project Aquatic Effects Management Program (AEMP)*. October 2005.

Cumberland Resources Ltd. (Cumberland), 2006. *Meadowbank Gold Project No-Net-Loss Plan (NNLP)*. November, 2006.

Golder Associates Ltd. (Golder), 2006. Golder Technical Memorandum *Meadowbank Bridge Hydraulic Review – R02/B01*, November 6, 2006.

Golder Associates Ltd. (Golder), 2007a. Golder Technical Memorandum *Meadowbank Fish Habitat Compensation Design Site Visit, Crossing R02, All-Weather Private Access Road, Meadowbank Gold Project, Nunavut – JULY, 2007*, August 27, 2007.

Golder Associates Ltd. (Golder), 2007b. *Report on All-Weather Private Access Road Stream Crossings, Meadowbank Gold Project, Nunavut*. June 29, 2007.



LEGEND

- Meadowbank Project
- Town/Village
- Provincial Border
- Water
- Primary Highway
- Railroad

200 0 200 Kilometers

Scale - 1:10,000,000

REFERENCE

Base digital data obtained from ESRI Inc.,
DATUM: WGS84 PROJECTION: Geographic

PROJECT

MEADOWBANK
MINING CORPORATION

TITLE

MEADOWBANK PROJECT
LOCATION PLAN

Golder Associates

PROJECT No. 07-1413-0047		SCALE AS SHOWN	REV. 0
DESIGN	CJC	09 Mar. 2007	FIGURE 1
GIS	CDB	09 Mar. 2007	
CHECK			
REVIEW			

N:\Bur-Graphics\Projects\2007\1413\07-1413-0047\GIS\projects\R02\5200\figure-01_location-plan.apr (Layout: 8.5x11 Portrait) March 9, 2007

Whitehills Lake

MEADOWBANK PROJECT

BAKER LAKE

Thelon River

Baker Lake

R00A R02 R03 R04 R05 R05A R06 R07

0 1 2 3 4 5 6 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37

N

628000 630000 632000 634000 636000 638000 640000 642000 644000 646000 648000 650000

7166000 7164000 7162000 7160000 7158000 7156000 7154000 7152000 7150000 7148000 7146000 7144000 7142000 7140000 7138000 7136000 7134000 7132000

R02
SITE LOCATION
FOR FISH HABITAT
COMPENSATION

LEGEND

- Meadowbank Project
- Kilometre Marker
- Proposed Route
- Watercourse
- Waterbody
- Contour (10 m interval)
- Watershed Boundary
- Stream Crossing (30 m bridge)
- Stream Crossing (12 m bridge)
- Stream Crossing (multiple culverts at bottom)
- Stream Crossing (single culvert at bottom)

REFERENCE
Cumberland Resources Ltd.
Datum: NAD 83 Projection: UTM Zone 14

2,000 1,000 0 2,000 Metres
Scale - 1:100,000

PROJECT
MEADOWBANK
MINING CORPORATION

TITLE
ALL-WEATHER PRIVATE ACCESS ROAD
R02 STREAM CROSSING LOCATION

Golder Associates
Burnaby, B.C.

PROJECT No. 07-1413-0047			SCALE AS SHOWN	REV. 0
DESIGN	JH	21 Nov. 2006		
GIS	CDB	24 Aug. 2007		
CHECK				
REVIEW				

FIGURE 2

N:\Bur-Graphics\Projects\2007\1413\07-1413-0047\GIS\projects\R02\5200\figure-02_r02-stream-crossing-location.mxd

643400 643500 643600 643700 643800 643900

7143600 7143500 7143400 7143300 7143200

Off Channel Pond

Compensation Alternative B (COB)

Compensation Alternative C (COG)

Compensation Alternative A (COA)

Construction Access Road

AWPAR

Construction Access Road

R02 Bridge Crossing

N

LEGEND

- R02 Staff Gauge
- Fish Habitat Compensation Area
- Bridge
- Road
- Grass Patch
- Turf Island
- Vegetation Limit

Contour

- Index (1 m interval)
- Intermediate (0.25 m interval)

NOTE

Vegetation limits modified from survey based on field observations.

REFERENCE

Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 14

40 0 40

SCALE 1:2,000 METRES

PROJECT

MEADOWBANK
MINING CORPORATION

TITLE

R02 SITE PLAN SHOWING PROPOSED FISH HABITAT COMPENSATION AREAS

Golder Associates
Burnaby, B.C.

PROJECT No. 07-1413-0047			SCALE AS SHOWN	REV. 0
DESIGN	DW	02 Aug. 2007		
GIS	CDB	24 Aug. 2007		
CHECK				
REVIEW				

FIGURE 3

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Coordinates Table for COB Area

Corner of COB area	Northing	Easting
A – NW on Shore	643455	7143480
B – SW Mid Stream	643481	7143455
C – NE on Shore	643573	7143589
D – SE Mid Stream	643590	7143565

Total Estimated Volume for Berms

Berm 1	30 m^3
Berm 2	40 m^3
Berm 3	40 m^3
Berm 4	45 m^3

Total Estimated Volumes for Three Spawning Pad Options

Spawning Pad Size	Spawning substrate	Pad walls
6 m wide by 5 m long (41 pads) Shown on Figure 5	370 m^3	165 m^3
10 m wide by 5 m long (25 pads)	375 m^3	125 m^3
12 m wide by 9 m long (12 pads)	390 m^3	90 m^3

NOTES

1. Field Conditions may vary from shown.
2. Berm crest elevation shall be at approximately elevation 68.5m asl.

REFERENCES

Survey date: Golder Associates Ltd., July 18-20, 2007.
NAD 83 UTM Zone 14.

0 5 10 15 20 25
Scale in Meters

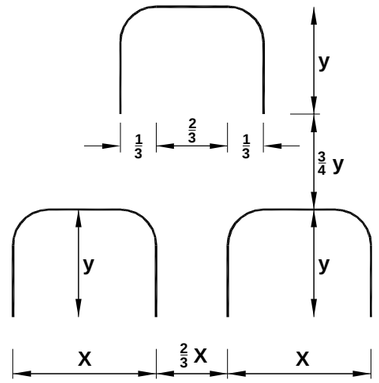
PROJECT
MEADOWBANK
MINING CORPORATION

TITLE
COB AREA - PLAN LAYOUT
R02 FISHERIES HABITAT COMPENSATION

Golder Associates

PROJECT No. 07-1413-0047			FILE No.	0714130047-5200-A_1
DESIGN	DW	07SEP07	SCALE AS SHOWN	REV. 0
CADD	MJH	07SEP07		
CHECK				
REVIEW				

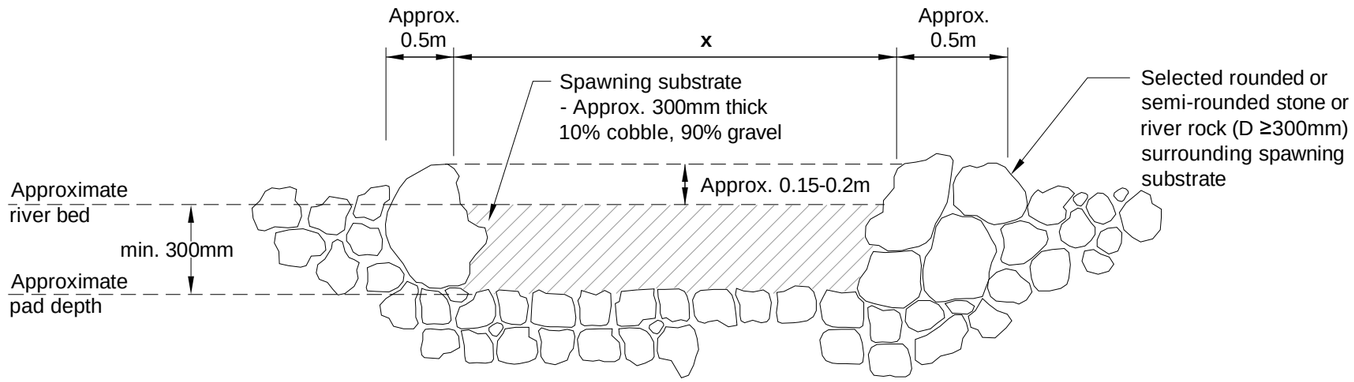
FIGURE 4



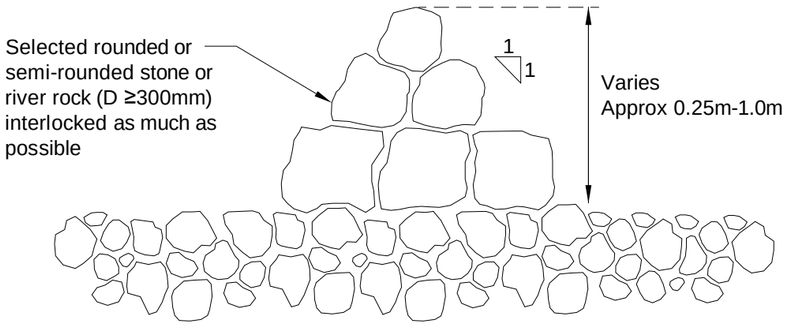
1 **TYPICAL PAD OFFSET**

NOTES

1. Pads are dug approx. 300mm into river bed.
2. Pad wall shall be large rounded or semi-rounded stone or river rock having a D ≥300mm.
3. The spawning substrate layer shall be min. 300mm thick.
4. Pad walls shall extend approx. 200mm above gravel surface.
5. Pad length is calculated in "**y**" and pad width in "**x**".



2 **TYPICAL PAD CROSS-SECTION**



3 **TYPICAL BERM CROSS-SECTION**

NOTES

1. Crest of berm shall be approximately at elevation 68.5m.
2. Berm material shall be composed of locally sourced boulders or large rocks of size D ≥300mm.
3. Berms side slope approx. 1H:1V.

PROJECT
MEADOWBANK
MINING CORPORATION

TITLE
TYPICAL BERM AND PAD CROSS-SECTIONS
R02 FISHERIES HABITAT COMPENSATION

Golder Associates

PROJECT No. 07-1413-0047			FILE No.	0714130047-5200-A_2	
DESIGN	DW	07SEP07	SCALE	N.T.S.	REV. 0
CADD	MJH	07SEP07	**FIGURE 5**		
CHECK					
REVIEW					

Construction Notes

Access to Site: shall be through the already built AWPAR. A temporary access road will be required to connect the AWPAR to the proposed compensation areas. All traffic on and off of the site shall be restricted to stabilized construction entrances/exits to minimize disturbance to the tundra. Traffic within the site shall also be limited to stabilized construction roads.

Construction Window: Instream work shall occur between fall freeze-up and spring freshet (approximately mid October to mid May). Instream work and channel bed disruptions shall not occur during the active spawning, rearing and foraging window (spring freshet to July 31). Instream work should also be coordinated to minimize the duration of instream work. A qualified environmental monitor shall be on site at all times during construction.

Sediment and Erosion Control: All work shall be conducted in such a manner that will prevent the release of sediment or sediment-laden water into the channel. Provisions shall be made for monitoring, maintaining and repairing sediment and erosion control measures implemented on-site until completion of the compensation work. General sediment and erosion control practices applicable to the prevailing site conditions during the construction period include:

1. Construction activities within the channel areas shall be kept to a practical minimum and shall be completed in the dry where practical.
2. Any required stockpiles of materials shall be located away from watercourses and stabilized against erosion as soon as possible by temporarily covering with a geotextile or by placement of a perimeter sediment control structure.
3. Disturbed areas shall be minimized as much as possible.
4. Any disturbed soils and slopes within or near the channels shall be stabilized when possible with a permanent covering of clean shot rock underlain by geotextile to prevent loss of fines.
5. Silt fencing shall be placed along the edges of all areas where soils are disturbed or material is stockpiled, until completion of all compensation works. Silt fences shall follow the contour as much as possible and shall be removed upon completion of works.
6. Eroded sediments shall be contained on site with additional erosion and sediment control structures as required.
7. Upon completion of construction, all accumulated sediment, debris and work related material shall be removed for proper disposal in completed borrow pits.
8. During periods of moderate to heavy precipitation, work may need to be altered or shut down as necessary to avoid silting of the channel and receiving environment.
9. Regular construction site inspections shall be conducted to determine compliance with the above protocols.

Berm Construction: shall be positioned from the estimated water shoreline towards the middle of the stream, stopping at the edge of the COB area. The berms shall be angled by approximately 30° to the length of the COB area. The berm crest shall be at approximately 68.5 masl. Berm side slope shall be approximately 1 Horizontal :1 Vertical

Berm material: shall be composed of locally found rounded or subrounded stones or river rocks of diameter greater than or equal to 300 mm. Berm material shall be placed directly on the river bed substrate in a manner to minimize the release of suspended sediments.

Spawning Pad Construction: The spawning pads shall provide a total habitat area of 0.122 ha. Pad number and plan size may vary (see Figure 4). Pad construction shall involve replacing minimum 300 mm depth of existing river substrate with a spawning gravel pad surrounded by a wall of large river rocks. The elevation of the pad wall shall extend approximately 200 mm above the river bed. The spawning substrate top elevation shall coincide with the existing river bed such that adequate water depths and velocities are maintained within the pads during the active spawning, rearing and foraging window (spring freshet to July 31). The spawning substrate shall have a minimum thickness of 300 mm. The pad shape shall resemble that of a horseshoe or a U, with the opening facing upstream. The pads shall be placed offset from one another, spaced laterally by a distance equivalent to approximately 2/3 of their width, and longitudinally by a distance of approximately 3/4 of their length.

Spawning Pad material: The pad wall shall consist of locally found and selected rounded or subrounded stones or river rocks of diameter greater than or equal to 300 mm placed along the pad periphery. The spawning substrate layer shall consist of a mix of approximately 90% gravel (clean, 50 mm minus, found locally or imported) and 10% cobble (100 mm minus, found locally). Spawning gravel substrate gradation shall general comply with the following gradation: 10% passing 10 mm, 30% passing 17.5 mm, 50% passing 25 mm, 70% passing 35 mm, and 90% passing 50 mm. The spawning substrate shall be free of all rocks, stones, sticks, roots, sharp objects or debris of any kind. Spreading of the spawning substrate layer shall be done horizontally across the pad.

Estimated Quantities: for berms, and spawning pad substrate and walls are provided on Figure 4.

PROJECT
MEADOWBANK
MINING CORPORATION

TITLE
CONSTRUCTION NOTES
R02 FISHERIES HABITAT COMPENSATION

Golder Associates

PROJECT No. 07-1413-0047			FILE No.	071413004 7-5200-A_3	
DESIGN	DW	07SEP07	SCALE	1:750	REV. 0
CADD	MJH	07SEP07	**FIGURE 6**		
CHECK					
REVIEW					

APPENDIX A

FISHERIES CRITERIA FOR HABITAT COMPENSATION IN SUPPORT OF HYDROLOGICAL ASSESSMENT AT R02

Technical Memorandum

Date: 11 July 2007

To: **Dan Walker, Golder Associates**

Cc: **Louise Grondin (Meadowbank Mining Corp.)**

From: **Gary Mann and Ryan VanEngen (Minnow)**

RE: **Fisheries Criteria for Habitat Compensation in Support of Hydrological Assessment at R02**

Overview

The DFO Authorization for the All Weather Private Access Road (AWPAR) requires the detailed design of fish habitat compensation at crossing R02 by 15 August 2007. Pursuant to this requirement, Azimuth and Golder had planned on undertaking joint studies in late June/early July to select an appropriate location and configuration for the compensation works tailored to Arctic grayling. As logistical issues precluded this joint undertaking, Azimuth is providing this technical memorandum to document the biophysical requirements of Arctic grayling for spawning, rearing and foraging.

Gary Mann and Ryan VanEngen performed a reconnaissance at R02 in late June 2007 to map out general substrate and flow characteristics in support and identification of potential AWPAR compensation. As outlined in the No-Net-Loss Plan (November 2006), the conceptual plan for compensation is to modify or replace low or moderate value habitat to create high value spawning habitat for Arctic grayling. This memo briefly outlines the biological criteria, rationale for design criteria and suggested compensation locations so that Golder can complete their hydrological assessment and subsequent detailed design of compensation works. Given the preliminary nature of the site-specific data, there is substantial latitude in the location/configuration aspects of this memo; further refinement and interaction with Golder may be necessary upon completion of their hydrological assessment.

The biophysical criteria for substrate, stream flow/velocity and water depth for relevant life history stages of Arctic grayling are presented in **Tables 1 and 2**. This information, in conjunction with the discussion on spawning and development timing, should be used to guide detailed design of compensatory works.

Timing (paraphrased from NNLP)

Spawning migrations typically start in early spring, prior to or at ice breakup on over-wintering lakes. This would correspond to water temperatures in the streams of approximately 3 to 5°C. Spawning takes place over a two to three-week period (as temperatures rise), with young hatching within 16 to 18 days at 9°C. Newly hatched alevin spend three to five days within substrate prior to emerging as fry, which are typically first collected in late June/early July.

Given this information, optimal conditions supporting both spawning and early development should last approximately 6 weeks (three for spawning and three more to reach emergence) from the onset of spawning. Based on our 2005 and 2006 results, optimal conditions should persist until late July to maximize productivity of the compensation works.

Table 1: Biophysical criteria for Arctic grayling riverine life history stages.

Life Stage	Substrate	Flow/ Velocity	Water Depth	Source
Spawning	Unembedded gravel about 25 mm diameter	<1.4 m/s	Varying depths	Evans et al., 2002
	Clean gravel		0.3 - 0.8 m	Williston, 2002
	< 80 mm gravel	<0.21 m/s	Pools nearby	Beauchamp, 1990
		0.15- 0.25 m/s		Deegram et al. 2005
Rearing	Fry reside in pools and side channels over boulder, cobble, silt sand substrates.	0.8 m/s	Semi deep	Evans et al., 2002
	Sand and coarse pebbles	0 - 0.1m/s	0 – 0.4 m	Sempeski and Gaudin, 1995
Foraging	Post spawning in rubble and gravel, fine-coarse grain substrates.		Semi deep pools	Evans et al. 2002
	Boulder to gravel (32 - 64mm)	0.3 m/s	0.5 m	Vehemen 2004

(Complete citations will be provided in the final report)

Region-specific Data on Spawning Areas

The biophysical criteria listed in **Table 1** are corroborated by evidence seen in the field. Arctic grayling spawning behaviour was observed at R06 between June 27 and 30, 2007, in an area adjacent to the present bridge dominated by < 25 mm gravel. In 2005, numerous (20) Arctic grayling larvae were also collected in drift traps set at the present R06 bridge crossing. Azimuth representatives Ryan VanEngen and Tom Mannik (Baker Lake) documented the flow, depth and substrate preferences observed within this spawning reach. Velocities in upstream pools, dominated by boulder and cobble were <0.10 m/s (depth 0.2 - 0.7m), gravel dominated glides were 0.11 - 0.27 m/s (depth 0.25 – 0.6m) and riffle dominated by cobble and boulder were 0.3 – 0.8 m/s (depth 0.15 – 0.25) at representative cross sections.

Rationale for Spawning Design Criteria

The above information provides a range of biophysical conditions for spawning. Our recommendations for optimal Arctic grayling habitat are clean gravel substrate in about 0.3-m deep water flowing 0.1 - 0.2 m/s (**Table 2**). This type of spawning habitat will be the primary goal in the design and construction of the compensation area at R02, with few alterations for the creation of pools for rearing. Interestingly, the spawning observed at R06 was on substrate introduced during bridge construction. This area may serve as a good reference location to view known spawning substrate.

Table 2: Summary of Design Criteria

Life Stage	Substrate	Flow/ Velocity	Water Depth
Spawning	10% cobble, 90% gravel	0.1 - 0.2 m/s	0.2 - 0.4m
Rearing	33% boulder, cobble, gravel	0 - 0.1 m/s	0 – 0.8m
Foraging	40% boulder, 40% cobble, 20% gravel	< 1.0 m/s	0 – 0.8m

Possible Locations at R02 for Compensation:

The DFO Authorization, based on the No-Net-Loss Plan and discussions with Azimuth, stipulates that compensation for all five HADD bridges occurs upstream of the bridge crossing at R02. Two areas were identified: the southern side channel just upstream from the bridge (Compensation Option A – COA) and an area opposite the Golder staff gauge (COB). See photos for location and specific details at COA and COB.

Table 3: GPS coordinates (14W NAD83) for rough boundaries for Compensation Option A and B at R02.

Compensation Area	Corner of Area	Northing	Easting
Staff Gage (COB)	NW on Shore	643432	7143458
	SW Mid R.	643452	7143438
	NE on Shore	643566	7143583
	SE Mid R.	643579	7143565
Side Channel (COA)	NW on Shore	643655	7143498
	NE Mid R.	643683	7143522
	SW on Shore	643704	7143401
	SE Mid R.	643744	7143429

Based on the No-Net-Loss Plan HADD area total of 0.53 habitat units[1], this would entail modifying 900 m^2 of low value habitat to high value habitat to achieve the 1.5:1 gain-to-loss ratio agreed to with DFO. The approximate area (m^2) calculated from the provided GPS Coordinates (see **Table 3**) is (350m x 30m) 10,500 at C0B and C0B.

[1] Actual HADD areas associated with AWPAR can only be determined once all bridges are completed. The August deadline for detailed habitat compensation design precludes knowing HADD areas exactly. Consequently, consideration should be given to increasing the areas by 25 to 50% to account for potential unauthorized variances related to "field fitting" the bridges.

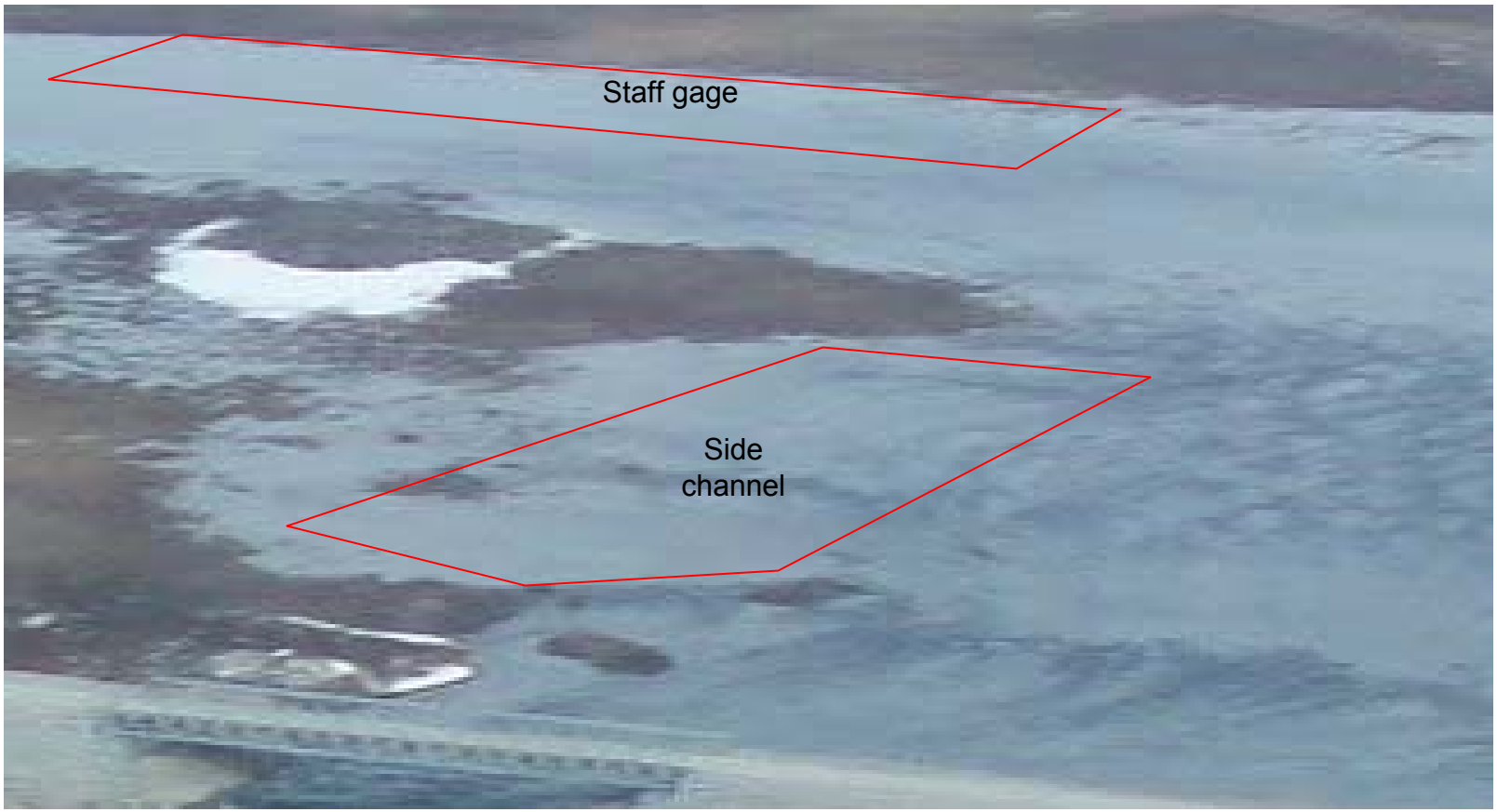
Azimuth representatives completed depth and velocity flow measurements on 3 transects across COB (upstream riffle portion, mid-channel glide and downstream glide) and 4 transects across C0A (upstream riffle, midstream glide, midstream riffle and downstream pool) on June 29, 2007 (immediately post spawning). While both areas appear to offer suitable depth, flow, complexity, morphology, preliminary drift data indicates that COA may already be used as spawning habitat (high value habitat) and already provides ideal pooling for rearing (moderate value habitat, with possible exposed boulder areas that could be altered to provide high value). In comparison, the preliminary data collected at COB indicates that it may provide greater returns for compensation as most of it is low to moderate valued habitat with significantly fewer fish larvae collected through this reach. Given the much higher rate of return for improvements to low value habitat, we recommend that priority be give to the staff gauge area (COB) or similar-featured locations nearby.

As indicated previously, Golder's hydrological assessment is needed to ensure that any areas are suitable to create and maintain productive spawning habitat through all hydrological conditions. Thus, these locations are flexible and we are open to exploring other options.

R02 Proposed Compensation Areas

Option staff gage (COB) and side channel (COA), photo taken on July 7, 2006

R02 Proposed Compensation Areas

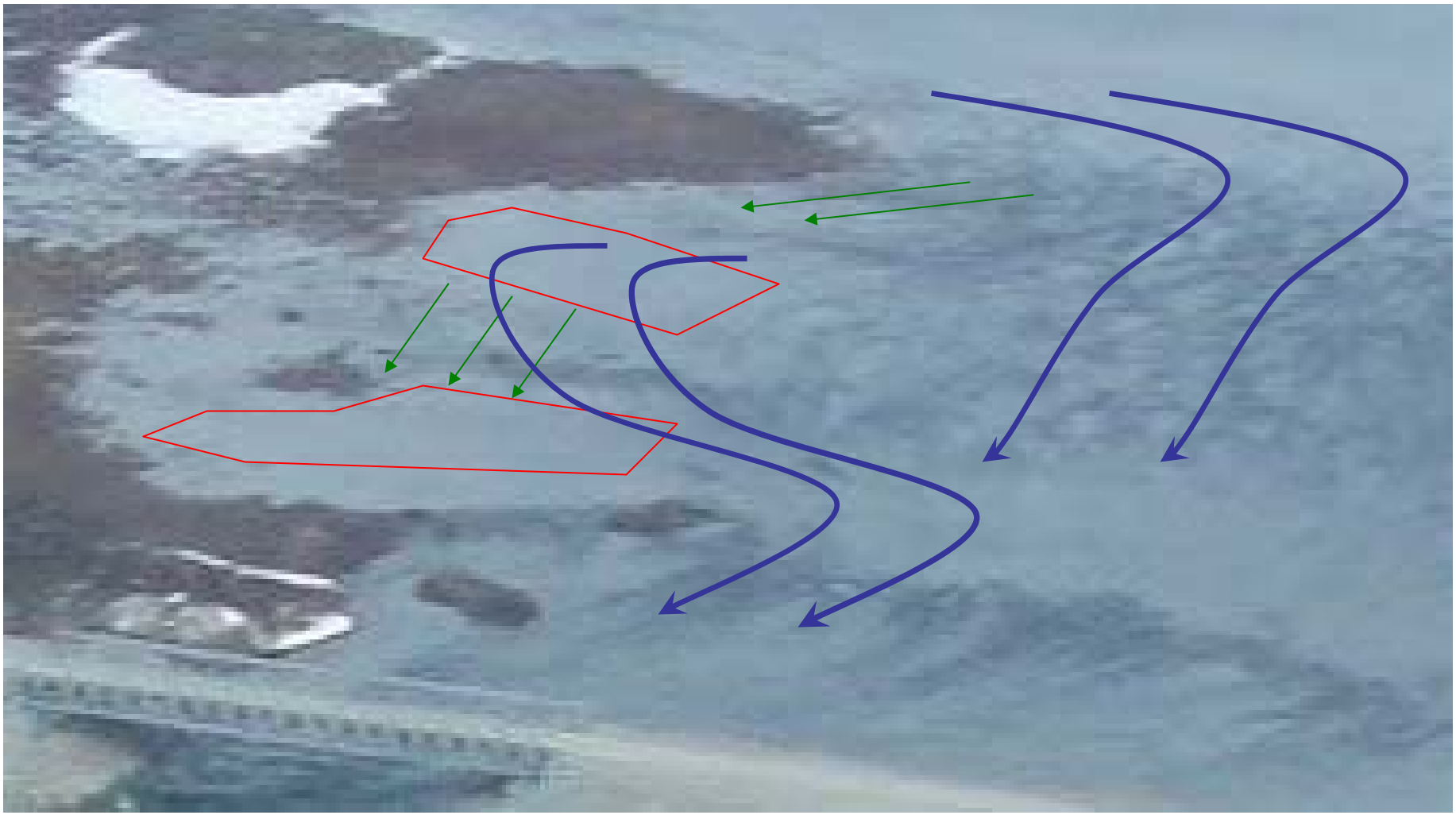


Option Staff Gage: characterized by its laminar flow with large boulder cobble substrate (presently low value habitat).

Option Side Channel: characterized as riffle- run with boulder and cobble substrate with spawning areas with gravel and side pools for rearing. Some exposed boulder and sedge that could be altered (presently moderate with some high value habitat).

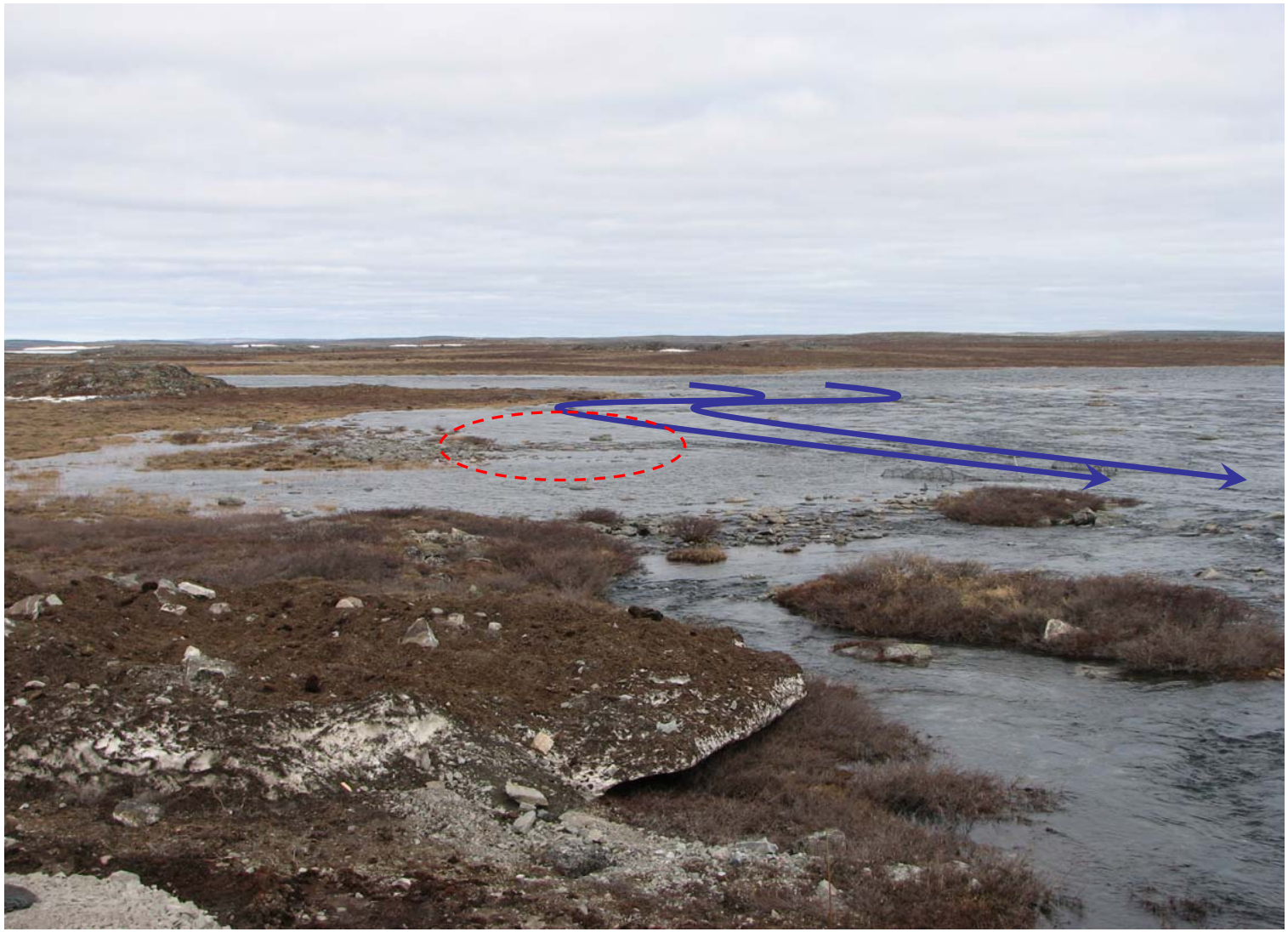
(photo taken June 18, 2007)

Compensation Option Side Channel (COA)



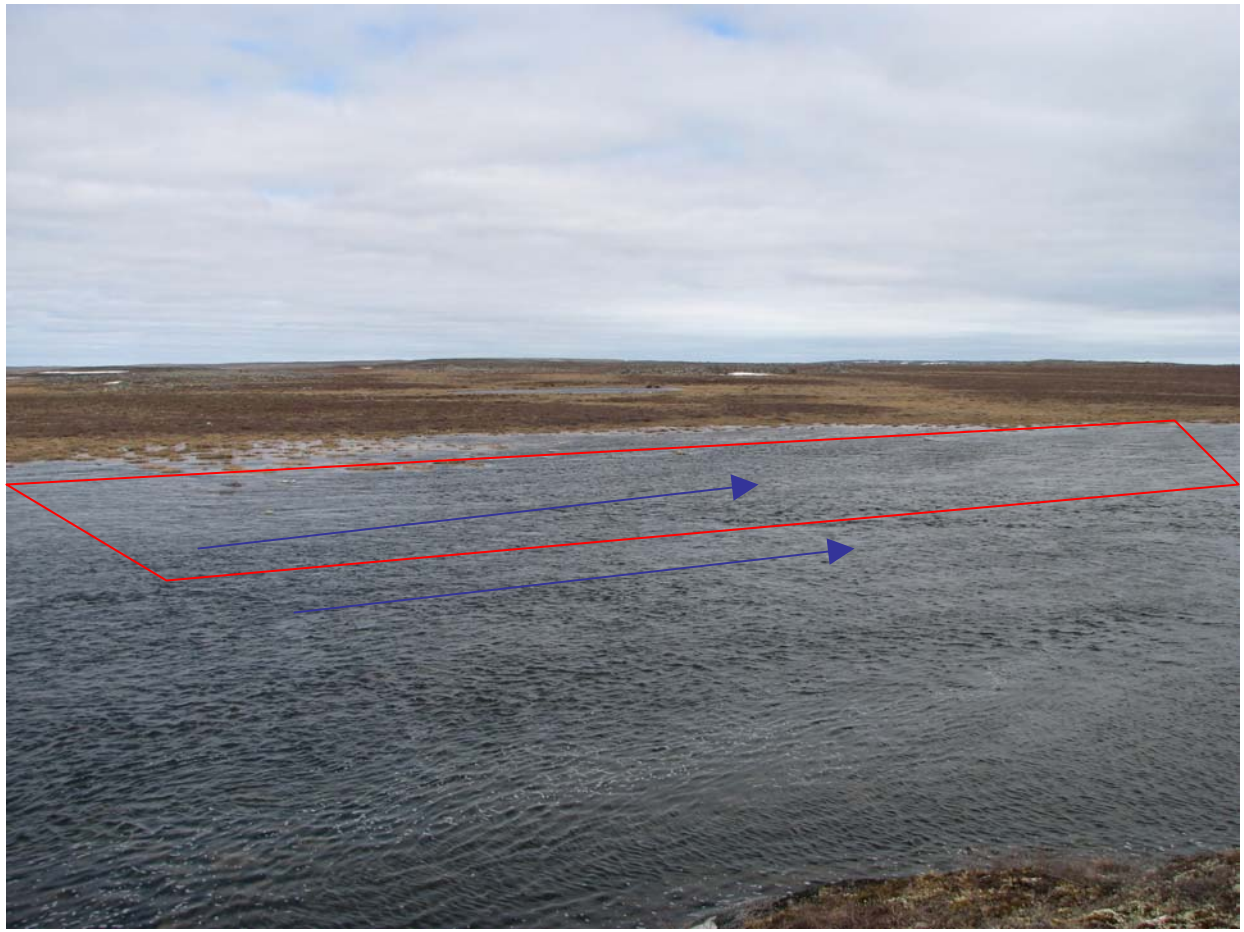
Possibly alter flow and substrate to support Arctic Grayling spawning at compensation option “Side Channel”. Boulder and cobble in red lines would be selectively removed and replaced with 0.5- 2.0cm gravel. Possible alteration of flow (represented in green arrows) to accommodate seasonal flow characteristics. Blue arrows represent present flow characteristics.

Compensation Option Side Channel



Alter flow regime and substrate to support Arctic Grayling spawning at compensation option side channel (COA). Blue lines represent existing main stream flow. Boulder and cobble in red dashed circle area would be selectively removed and replaced with 0.5- 3.0 cm gravel maintaining complexity and creating ideal flows. This might replace moderate value habitat with high value habitat. (photo taken June 27,2007)

Compensation Option Staff Gage (COB)



Alter substrate in compensation area Staff Gage (COB) by selectively removing large boulders and cobble, and replacing with 0.5- 3.0 cm gravel substrate. Possible alteration of shoreward zone to accommodate rearing pools. Improvement of the present riffle portions US and mid channel.

(photo taken June 27,2007)

APPENDIX B

MEADOWBANK FISH HABITAT COMPENSATION DESIGN SITE VISIT, CROSSING R02, ALL-WEATHER PRIVATE ACCESS ROAD, MEADOWBANK GOLD PROJECT, NUNAVUT – JULY, 2007

TECHNICAL MEMORANDUM

Golder Associates Ltd.
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Abbotsford, B.C., Canada V2T 4S8

Telephone: 604-850-8786
Fax Access: 604-850-8756

TO:	Louise Grondin	**DATE:**	August 27, 2007
CC:	Stephane Robert, Martin Bergeron and Gary Mann	**JOB NO:**	07-1413-0047
FROM:	Mike Paget and Dan Walker	**DOC NO:**	504
EMAIL:	**mpaget@golder.com; drwalker@golder.com**	**VERSION:**	**0**

RE: MEADOWBANK FISH HABITAT COMPENSATION DESIGN SITE VISIT, CROSSING R02, ALL-WEATHER PRIVATE ACCESS ROAD, MEADOWBANK GOLD PROJECT, NUNAVUT – JULY, 2007

1.0 INTRODUCTION

This memo provides details of the site visit to Crossing R02 on the Meadowbank All-Weather Private Access Road (AWPAR) by Dan Walker and Fern Webb of Golder Associates between July 18, and July 20, 2007. The purpose of the site visit was to:

- Characterize hydraulic/fish habitat conditions by visual inspection in order to evaluate potential fish habitat compensation alternatives;
- Perform a topographic survey of the channel banks upstream and downstream of the bridge crossing using an RTK system; and
- Evaluate substrate material sizes by visual inspection and pebble count methods to assist with fish habitat compensation design.

2.0 FISH HABITAT COMPENSATION ALTERNATIVES

Based on the DFO Authorization for the AWPAR, the habitat compensation plan is to replace approximately 900 m^2 of low or moderate value Arctic grayling habitat upstream of bridge crossing R02 with high value spawning habitat (Azimuth, 2007). It is understood that habitat compensation is to be focused upstream of the bridge crossing to limit potential adverse affects on the compensated area should there be a bridge failure

and/or loss of the AWPAR.

Two potential habitat compensation areas, COA and COB, were identified previously by Azimuth (2007); while a third, COC, was identified during the site visit (Figures 1 and 2). The following sections describe the habitat characteristics and hydrological conditions of the three areas as compiled from Azimuth (2007) and observations made by Golder during the site visit (Golder, 2007). Photographs of proposed habitat compensation areas taken during the site visit are provided in Appendix A.

2.1 Proposed Habitat Compensation Area COA

COA is located downstream of the R02 staff gauge in a southern side channel upstream of the bridge crossing R02 (Figures 1 and 2). This area is described as having a moderate to high habitat value by Azimuth (2007) as the area currently provides suitable rearing habitat (moderate habitat value) and preliminary drift data suggest the area may already be used for spawning (high value habitat).

COA is characterized by boulder and cobble substrates, with pockets of spawning gravel and side pools for rearing. The D_{50} (median diameter) for this area is approximately 300 mm based on limited pebble count data (see Section 4).

Selective removal and replacement of substrate, including exposed boulder areas, would augment the extent of spawning habitat within the reach. The site may also require flow path alterations to optimize water depths and velocities during the spawning season (Azimuth, 2007).

2.2 Proposed Habitat Compensation Area COB

COB is located opposite the R02 staff gauge location (Figures 1 and 2) and is described by Azimuth as having low to moderate habitat. Preliminary drift data collected by Azimuth indicate fewer fish larvae in this reach compared to COA, signifying that the creation of spawning habitat within COB may provide greater returns for compensation.

The substrate through this reach is characterized by the presence of large boulders and cobbles, with a D_{50} of approximately 140 mm (see Section 4). The site will require the selective removal and replacement of existing substrate with spawning gravels in order to achieve recommended spawning habitat conditions. The suitability of flow velocities and depths within the COB reach during the spawning season will need to be determined during detailed design. Azimuth (2007) also suggest habitat design consideration be given to flow path and substrate alterations to create rearing pools in the shoreward zone.

2.3 Proposed Habitat Compensation Area COC

A third potential fish habitat compensation area, COC, was identified during the Golder site visit. COC is located on the channel right bank (facing downstream) downstream of the R02 staff gauge, opposite to COB (Figures 1 and 2). It is currently low-lying marsh land; however, variations in vegetation observed on site suggest that this area is submerged during flood events.

Fish habitat compensation works within this area would consist of excavating overburden to create off-channel pool rearing habitat over a range flows. As it possible that this area would also be subject to flowing water during the spring melt/spawning period, the excavated area would be lined with a mixture of spawning gravels and cobble substrates. Given the proximity of bedrock outcrops, some blasting may be required to achieve the final grade.

3.0 TOPOGRAPHIC SURVEY

A topographic survey of the channel upstream of crossing R02 was completed to assist with detailed design of the fish habitat compensation works. The survey included a GPS survey to delineate the channel banks (vegetation line), and a combined level and RTK survey to measure variations in ground elevation over several cross-sections (Figure 3). Logistical issues (RTK survey equipment delayed in transit) precluded a detailed cross-sectional survey of the off-channel pond along the study reach, or the channel downstream of the stream crossing.

The survey data were used to compile a topographic map of the channel upstream of R02 (Figure 2). The map will be used during detailed design of the fish habitat compensation works to evaluate water depths and average velocities over a range of flows within the channel.

4.0 PEBBLE COUNT

Pebble counts were performed in four general locations upstream of R02 (labeled A to D) in order to characterize bed material substrate within the fish habitat compensation reach (Figure 1). Additional pebble counts were also focused within the COA area. Each of the pebble counts consisted of measuring the b-axis diameter of random samples of bed substrate materials across the entire sample area. The data were then used to estimate the gradation of the bed surface material.

The pebble count results are summarized in Table 1, where D_x is the grain size at which x% of the sampled bed material is finer. In general, the bed material substrate is characterized by large cobbles and boulders. As previously noted however, pockets of finer grained materials were visually observed in areas A to C during the site visit.

TABLE 1: Pebble Count Results[a]

Station	Sample Count	D_{10} (mm)	D_{30} (mm)	D_{50} (mm)	D_{70} (mm)	D_{90} (mm)
A	24	70	100	113	143	200
B	32	120	180	195	230	480
C	35	80	130	160	260	610
D (COB area)	203	70	110	140	180	590
A to C Combined	91	85	130	160	200	490
A to D Combined	294	80	120	140	190	550
COA area	258	100	150	300	400	700

[a]D_x – estimated diameter D at which x% of the bed material is finer

5.0 RECOMMENDED FISH HABITAT COMPENSATION PLAN

Azimuth (2007) recommends that design and construction of fish habitat compensation at R02 focus on the creation of spawning habitat, with some minor alterations to channel substrates and flow conditions for the creation of pools for rearing. Optimal Arctic grayling spawning habitat is characterized by clean gravel (5 to 30 mm diameter) substrate located in approximately 0.3 m deep water flowing at roughly 0.1 - 0.2 m/s. While Azimuth (2007) indicates that both COA and COB appear to offer suitable depth, flow, complexity, and morphology, they recommend that priority be given to COB, given the comparatively higher rate of return for improvements to low value habitat.

It is anticipated that COC would provide high value off-channel rearing habitat; however, with the presence of the relatively large off-channel pond along the existing channel alignment (Figure 1), rearing habitat is not considered to be limiting within the reach. While COC may be subject to flowing water during the spawning period, there would be the potential for sediment infilling during flood recession.

Based on the above, Golder also recommends that habitat compensation works be focused on COB to provide the greatest potential habitat benefit or gain. Specifically, Golder recommends the design and construction of spawning beds within the COB area. The beds would be designed in a manner to protect the fine grained spawning materials from scour during ice break up and over a range of flows. Options to be considered during design include placing spawning gravels within a ring of larger boulders, and/or

constructing a berm, or series of berms, of large boulders on the bed of the channel along the length of the works to deflect high flow velocities. Consideration will also be given to the construction of several smaller pads, staggered/offset along the length of COB, such that any gravel scoured from upstream has the opportunity to deposit further downstream within the reach.

As noted above, the proposed the habitat compensation plan is to replace approximately 900 m^2 of low or moderate value Arctic grayling habitat upstream of bridge crossing with high value spawning habitat (Azimuth, 2007). It is understood that the final fish habitat compensation area requirement is subject to completion of the five bridge crossings along AWPAR that result in a "harmful alteration, disruption or destruction" (HADD) of fish habitat as defined in the No-Net-Loss Plan for the project. Actual HADD areas associated with AWPAR can only be determined once all bridges are completed, and therefore the final habitat compensation requirement will not be known for design. For this reason, Azimuth (2007) recommends increasing the habitat compensation area by 25 to 50% (i.e., to 1,125 m^2 to 1,350 m^2) to account for potential variances related to "field fitting" the bridges.

The amount of fish compensation habitat within COB will be confirmed during detailed design. Should the amount area available in COB be constrained, consideration would then be given to developing additional rearing habitat in COB or COC, and/or to selective sediment removal in COA. The preferred alternative would be developed in consultation with Azimuth and Agnico-Eagle Mining based on ease and cost of construction and potential habitat gain.

DRW/NSP/MP/JAH/lw
Attachment: Appendix A – Site Photographs July 18 – 20, 2007
O:\Final\2007\1413\07-1413-0047\504 28Aug_07 - TM Ver 0 Fish Compensation Site Visit.doc

REFERENCES

Azimuth, 2007. Technical Memorandum *Fisheries Criteria for Habitat Compensation in Support of Hydrological Assessment R02*, 11 July 2007.

REVISION DATE: BY: FILE:

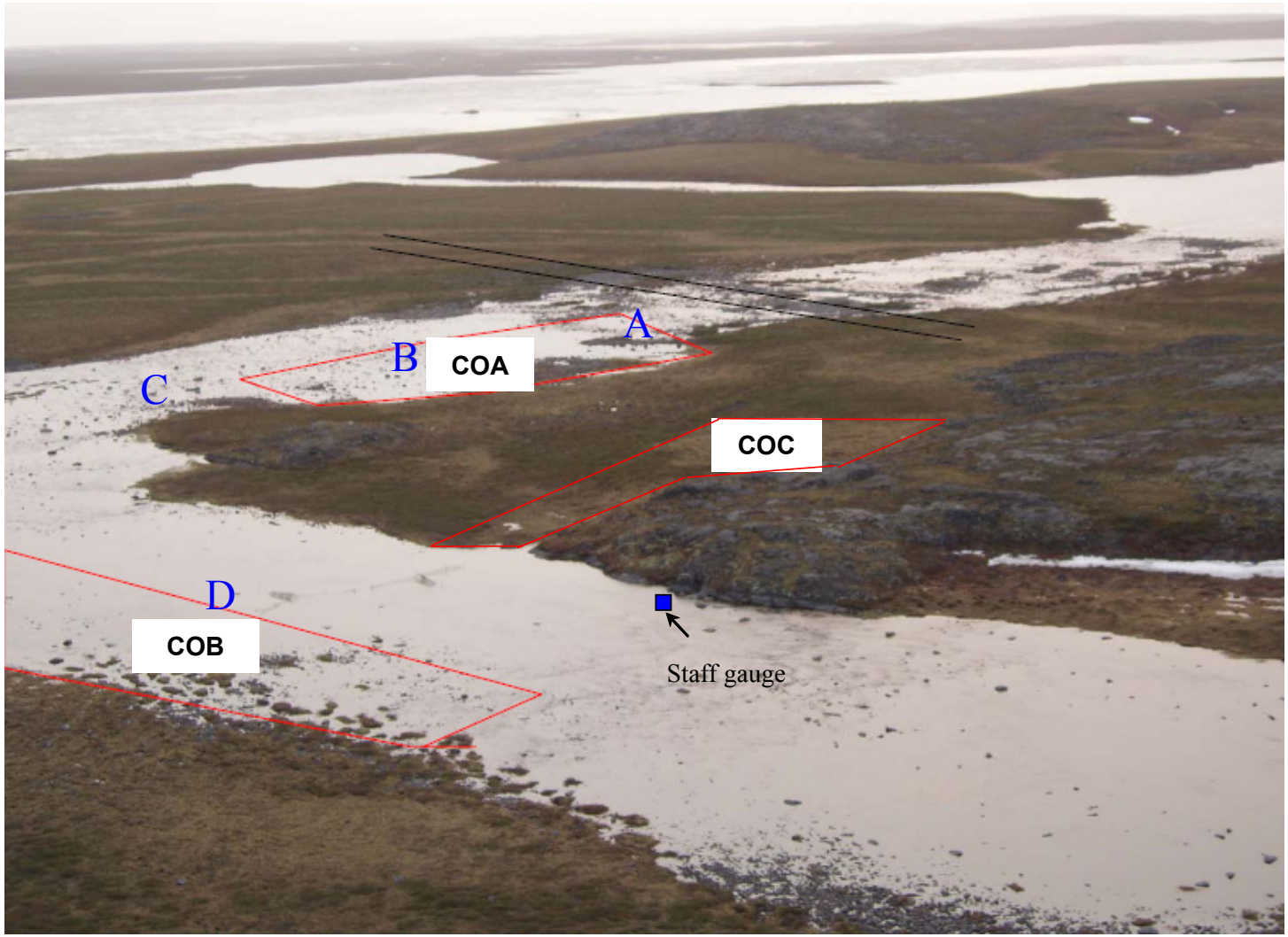


Photo source: Azimuth, 2007

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
RO2 HABITAT COMPENSATION

TITLE

Proposed Compensation Areas COA, COB and COC with Pebble Count Locations

Golder Associates

PROJECT No.	17-1413-0047		PHASE / TASK No.	5200
DESIGN	MP	08AUG07	SCALE NTS	REV.
CADD	--	08AUG07		
CHECK	DRW	08AUG07	**FIGURE 1**	
REVIEW				

643400 643500 643600 643700 643800 643900

7143600 7143500 7143400 7143300 7143200

Off Channel Pond

Compensation Alternative B (COB)

Compensation Alternative C (COG)

Compensation Alternative A (COA)

Construction Access Road

AWPAR

Construction Access Road

R02 Bridge Crossing

N

LEGEND

- R02 Staff Gauge
- Fish Habitat Compensation Area
- Bridge
- Road
- Grass Patch
- Turf Island
- Vegetation Limit

Contour

- Index (1 m interval)
- Intermediate (0.25 m interval)

DRAFT

NOTE

Vegetation limits modified from survey based on field observations.

REFERENCE

Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 14

40 0 40

SCALE 1:2,000 METRES

PROJECT

MEADOWBANK
MINING CORPORATION

TITLE

MEADOWBANK GOLD PROJECT
SITE PLAN SHOWING PROPOSED FISH HABITAT COMPENSATION AREAS

Golder Associates
Burnaby, B.C.

PROJECT No. 07-1413-0047		SCALE AS SHOWN	REV. 0
DESIGN	DW	02 Aug. 2007	FIGURE 2
GIS	CDB	02 Aug. 2007	
CHECK			
REVIEW			

N:\Bur-Graphics\Projects\2007\1413\07-1413-0047\GIS\projects\figure-02_site-plan.mxd

643400 643500 643600 643700 643800 643900

7143600 7143500 7143400 7143300 7143200

Off Channel Pond

N

Construction Access Road

AWPAR

Construction Access Road

A02 Bridge Crossing

LEGEND

- tracklines_mainroad1
- tracklines_mainroad2
- tracklines_mainroad3
- tracklines_vegetationlimits
- tracklines_waterlimit
- topo_grasspatchs
- topo_mainroadbridge
- topo_rockymargins
- topo_sharpstreambanks
- topo_sideroads
- topo_staffgauge
- topo_streamchannels
- topo_turfislands
- topo_vegetationlimit
- topo_rtklevellingsurvey
- Bridge
- Road
- Grass Patch
- Turf Island
- Vegetation Limit

Contour

- Index (1 m interval)
- Intermediate (0.25 m interval)

DRAFT

REFERENCE

Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 14

40 0 40

SCALE 1:2,000 METRES

PROJECT

MEADOWBANK
MINING CORPORATION

TITLE

MEADOWBANK GOLD PROJECT
SURVEY DATA

Golder Associates
Burnaby, B.C.

PROJECT No. 07-1413-0047			SCALE AS SHOWN	REV. 0
DESIGN	DW	02 Aug. 2007		
GIS	CDB	02 Aug. 2007		
CHECK				
REVIEW				

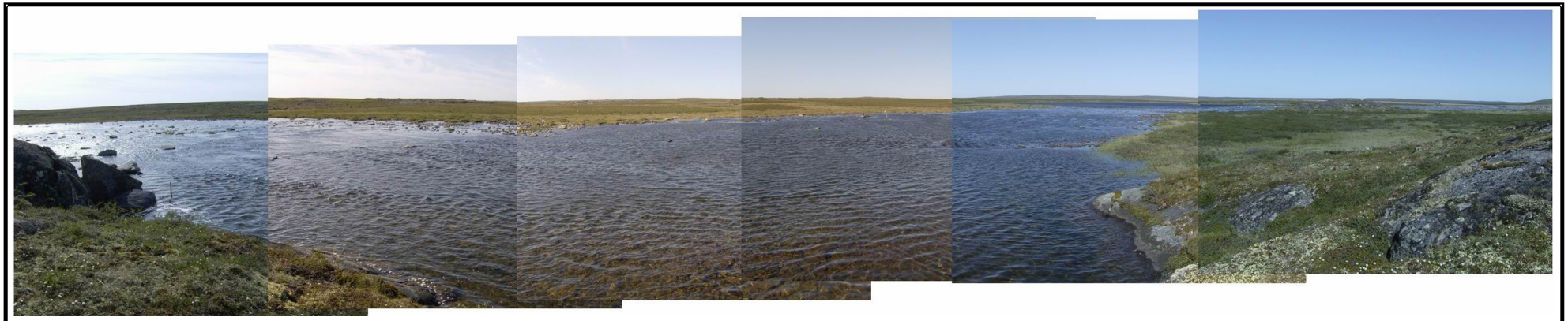
FIGURE 3

N:\Bur-Graphics\Projects\2007\1413\07-1413-0047\GIS\projects\figure-03_survey-data.mxd

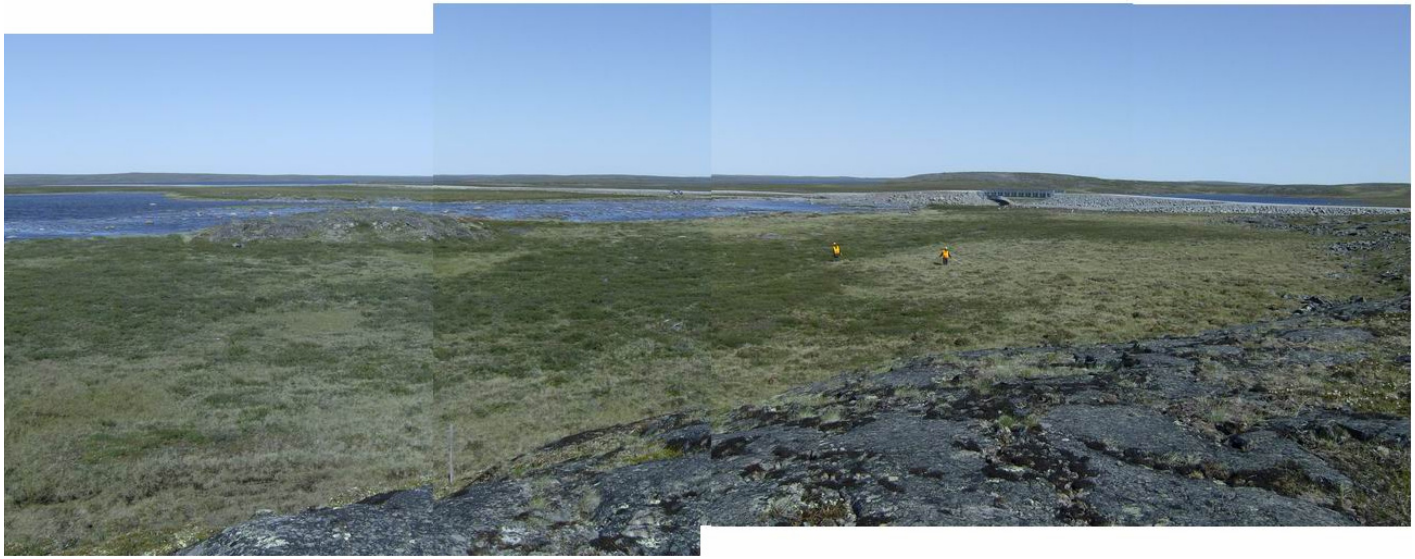
APPENDIX A

SITE PHOTOGRAPHS – JULY 18 TO 20, 2007

REVISION DATE: BY: FILE:



Panoramic standing on right bank near R02 gauge looking upstream to downstream along COB reach



Panoramic standing on right bank near R02 gauge looking downstream to COA, COC and R02 bridge crossing

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Panoramic Photos from R02 Gauge Location

Golder Associates

PROJECT No.	07-1413-0047		PHASE / TASK No.	5700
DESIGN	MP	07AUG07	SCALE NTS	REV.
CADD	--	07AUG07		
CHECK	DRW	07AUG07	**FIGURE A1**	
REVIEW				

REVISION DATE: BY: FILE:

Standing on right bank at R02 gauge facing slightly upstream

Facing COB from right bank near R02 gauge

Facing downstream to COC inlet from right bank near R02 gauge

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Photos of COB from R02 Gauge Location

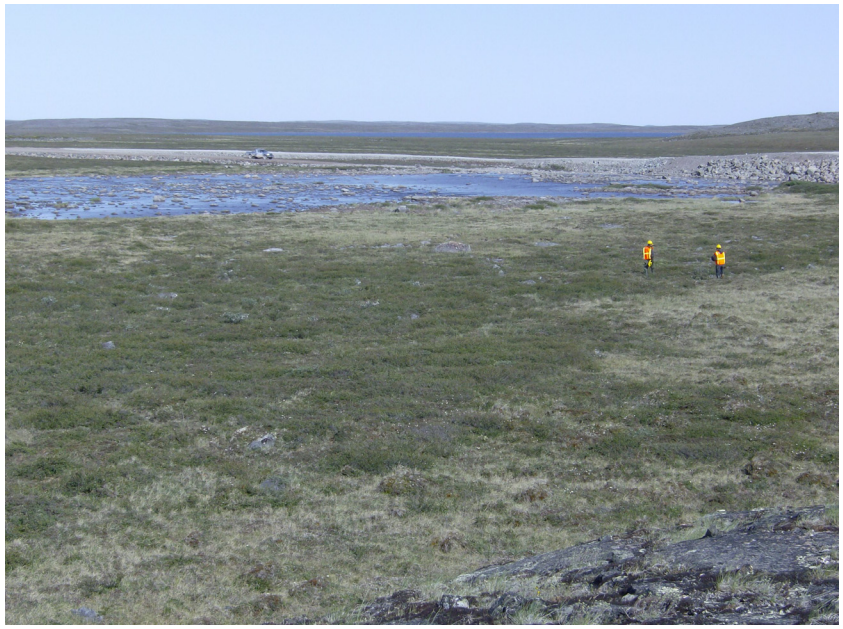
Golder Associates

PROJECT No.	07-1413-0047		PHASE / TASK No.	5200
DESIGN	MP	07AUG07	SCALE NTS	REV.
CADD	--	07AUG07		
CHECK	DRW	07AUG07		
REVIEW				

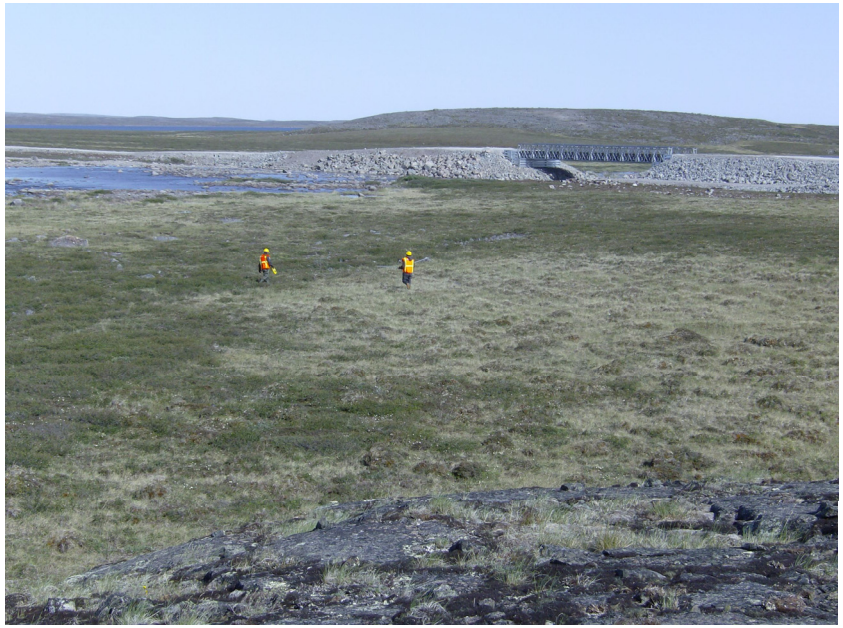
FIGURE A2

REVISION DATE: BY: FILE:

Standing on left bank opposite R02 gauge looking downstream to R02 bridge



Facing downstream to R02 bridge from right bank near R02 gauge



Facing downstream to R02 bridge from right bank near R02 gauge

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Photos from R02 Gauge Location

Golder Associates

PROJECT No. 07-1413-0047			PHASE / TASK No. 5200	
DESIGN	MP	07AUG07	SCALE NTS	REV.
CADD	--	07AUG07		
CHECK	DRW	07AUG07	**FIGURE A3**	
REVIEW				

REVISION DATE: BY: FILE:

Standing on left bank near R02 bridge facing upstream

Standing on R02 bridge facing upstream toward left bank

Standing At R02 bridge facing upstream

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Upstream Photos From R02 Bridge

Golder Associates

PROJECT No.	07-1413-0047		PHASE / TASK No.	5200	
DESIGN	MP	07AUG07	SCALE	NTS	REV.
CADD	--	07AUG07			
CHECK	DRW	07AUG07			
REVIEW					

FIGURE A4

REVISION DATE: BY: FILE:

Standing at R02 bridge facing upstream along the right bank toward COA

Facing downstream along right bank from R02 bridge

Facing downstream along right bank from R02 bridge

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Photos From R02 Bridge

Golder Associates

PROJECT No.	17-1413-0047		PHASE / TASK No.	5200	
DESIGN	MP	07AUG07	SCALE	NTS	REV.
CADD	--	07AUG07			
CHECK	DRW	07AUG07			
REVIEW					

FIGURE A5

Facing upstream along right bank from R02 bridge

Facing downstream along right bank from R02 bridge

REVISION DATE: BY: FILE:

PROJECT

MEADOWBANK MINING CORPORATION
MEADOWBANK GOLD PROJECT
R02 HABITAT COMPENSATION

TITLE

Photos From R02 Bridge

Golder Associates

PROJECT No. 07-1413-0047			PHASE / TASK No. 5200	
DESIGN	MP	07AUG07	SCALE NTS	REV.
CADD	--	07AUG07	**FIGURE A6**	
CHECK	DRW	07AUG07		
REVIEW				