Anvil Range Mining Corporation
(Interim Receivership)
Rose Creek Tailings Facility

2001 Hydrogeological and Geochemical Investigation
Faro Mine, Yukon

Prepared For:

Deloitte & Touche

Prepared By:

Gartner Lee Limited

March, 2002

BACKGROUND

Mill tailings were deposited in three separate surface impoundments: the Original Impoundment, the Second Impoundment and the Intermediate Impoundment as follows:

1. The Original Impoundment contains tailings that were deposited between 1969 and 1975.

2. Tailings were deposited in the Second Impoundment from 1975 until 1982, and for approximately 5 months in 1986. Mine production was suspended from 1982 to 1986 and, therefore, no tailings were deposited.

3. The Intermediate Impoundment contains tailings that were deposited between 1986 and 1992. From 1992 to mine closure in 1998, tailings were deposited under water in the mined-out Faro Pit and not in the surface impoundments.

BACKGROUND

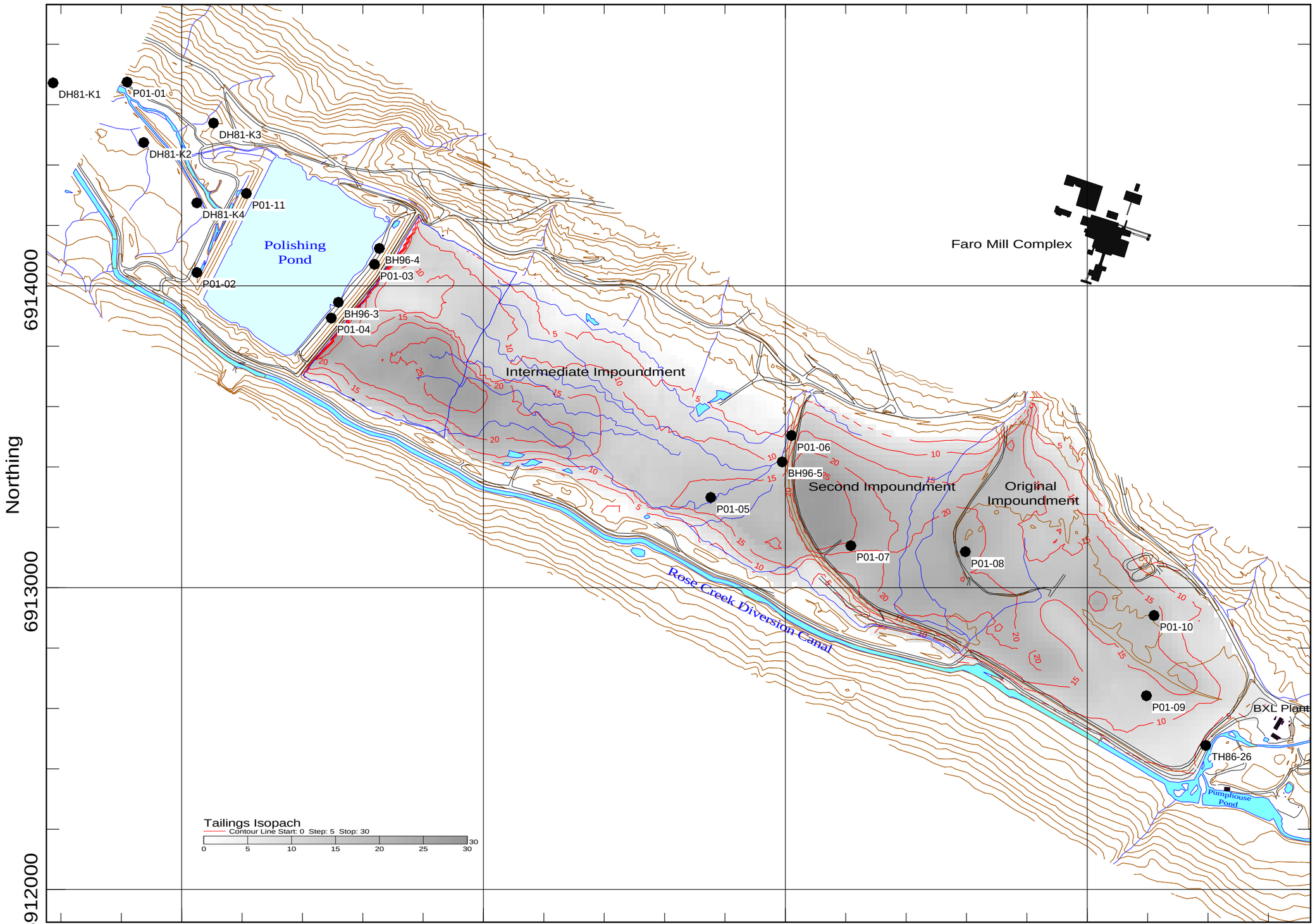
In total, the surface impoundments hold an estimated 54.4 million tonnes of tailings. The tailings are up to 25 metres thick and overlie native soils comprised largely of sand/gravel of glacial outwash origin with some glaciolacustrine sediments. Native soils may extend to 60 m below ground surface. A basal silt till unit overlies bedrock beneath the sand and gravel.

The primary concern regarding the chemical stability of the tailings solids is the potential for oxidation and acid generation and the subsequent flushing of contaminants from the tailings into the sand and gravel aquifer that underlies the tailings impoundment area.

BACKGROUND

Oxidation of the tailings is observed on surface and previous studies have identified oxidation below surface in the unsaturated tailings.

Current groundwater quality monitoring results indicate that oxidation products (represented by sulphate and zinc) are entering the sand and gravel aquifer underlying the tailings deposit but that these products are not observed in significant concentrations downgradient where they might impact surface water quality.



LEGEND

- Groundwater Monitoring Locations

SOURCE:

- Top of tailings surface generated from Figure 4-74 ICAP (Robertson Geoconsultants Inc. 1996) plus supplemental survey information of Intermediate Tailings surface by YES, 2001.
- Base of tailings from Figure 4-8 ICAP (Roberson Geoconsultants Inc. 1996) supplemented with borehole statigraphic information.
- Surfaces generated and tailings thickness calculated using Viewlog Well Analysis System ver. 2.2.91

SCALES

1:12500. Scale

0 200 400

metres

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Rose Creek Tailings Facility

Tailings Thickness Isopachs

Drawn By:	F.K.P.	Reviewed By:	E.J.D.
Version No.:	1	Project No.:	21-906
Date Issued:	30/01/2002	Projection:	UTM z8 NAD27
Site Name:	FARO	File Name:	FARO2.MAP

Gartner Lee Limited

Drawing No.

2.2

STUDY OBJECTIVES

The general purpose of the study is to provide a more detailed characterization of the physical and geochemical characteristics of the Rose Creek tailings impoundments.

STUDY OBJECTIVES

The specific project objectives are:

1. Investigate the possible presence of preferential pathways where contaminated groundwater could be passing through the aquifer undetected.

2. Assess groundwater quality immediately below the tailings/native soil interface.

3. Assess groundwater quality at the deepest part of the bedrock valley.

STUDY OBJECTIVES

4. Provide information that may determine if the tailings impoundments are near the brink of a geochemical "breakthrough". Such a breakthrough would represent a time when the system would release significantly greater quantities of contaminants (heavy metals and acidity) into the aquifer than are currently observed.

5. Determine the scale of dilution of tailings pore water that enters the aquifer.

6. Provide a hydrogeological model that simulates the current flow regime and that could be used in the future as a tool for simulating remedial options.

METHODOLOGY

1. Compile and review the available historical information.

2. Identify gaps in the historical information that hinder the ability to achieve the project objectives.

3. Design and execute a field program to fill the identified gaps in the available information.

4. Design and conduct a geochemical test program for samples collected from the tailings and native sediments including an analytical program for groundwater samples to characterize the current chemical condition of the system.

5. Interpret the results of the field and laboratory programs and incorporate relevant historical information.

METHODOLOGY

6. Develop and calibrate a hydrogeological model of the Rose Creek Valley aquifer for use in interpreting the current flow system and for future use in assessing reclamation options.

7. Provide a project report.

GAP ANALYSIS

1. The existing knowledge regarding the insitu geochemistry of the tailings and native soils is based upon one data set that is approximately ten to fifteen years old.

2. The existing geochemical information is limited in two areas: spatial extent and temporal extent.

3. The low number of operable monitoring wells prevents a good interpretation of groundwater quality.

4. The contour map of the Intermediate Impoundment shows elevations in the Intermediate impoundment prior to the final raising of the Intermediate Dam in 1991, which are incorrect.

GAP ANALYSIS

5. The possible influences on groundwater quality from the two surface ponds (Intermediate and Cross Valley) are not understood.

6. Groundwater quality information upstream of the tailings impoundments has not been monitored sufficiently.

7. The possibility that preferred flowpaths exist in the aquifer that may passing contaminated groundwater into the environment undetected can not be assessed with the available data.

8. The absence of any wells installed in the upper zone of the aquifer just below the tailings is of particular concern because it is in this zone that the greatest opportunity for detecting contaminated groundwater is thought to lie.

FIELD PROGRAM

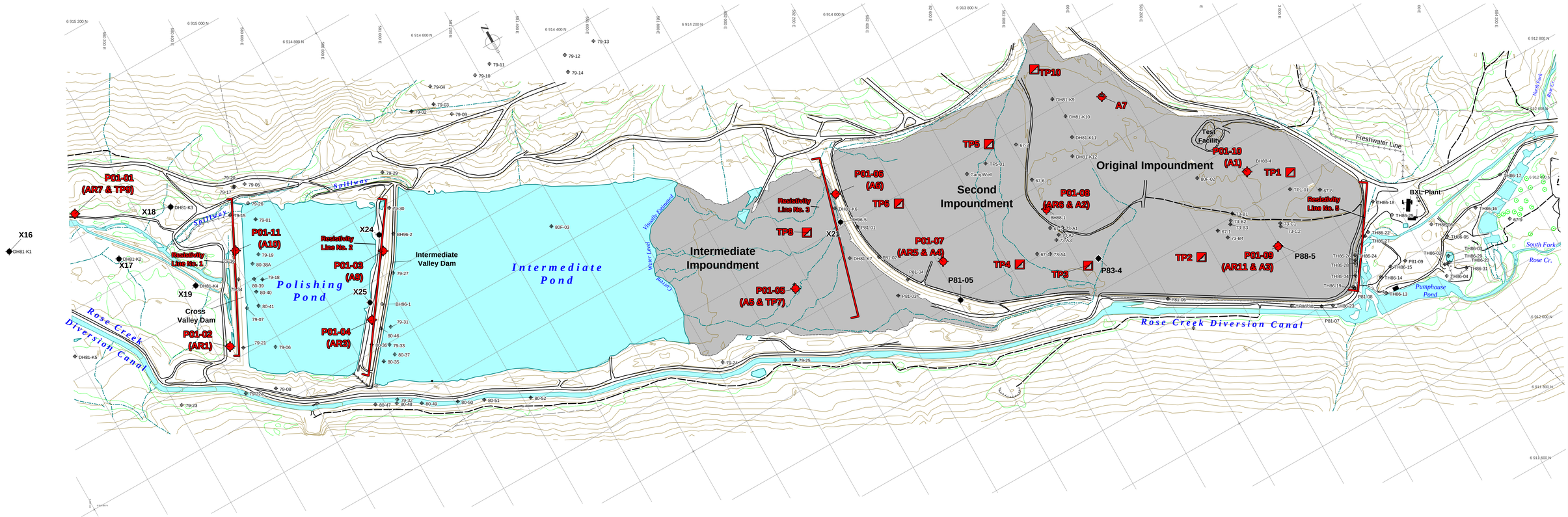
a) Surface resistivity survey to investigate for preferential flow paths in the tailings and the native soils.

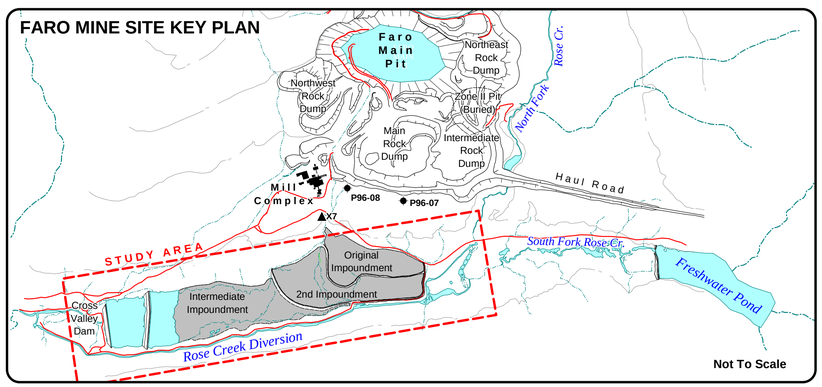
b) Soil sampling, visual observations and field measurements of the condition of the tailings solids.

c) Extensive borehole drilling and monitoring well installation program.

d) Downhole gamma and conductivity logging survey for new boreholes.

e) Survey, develop, purge and sample new and pre-existing groundwater monitoring wells.





100 0 100 200 300

Meters

Scale: 1:6,000

Contour Interval: 5 metres (ASL)
UTM (NAD27), Zone 8 Projection

LEGEND:

- Former Borehole Location
- Existing Groundwater Monitoring Location
- 2001 Drill Hole Location (Numbers in brackets indicates temporary field identification)
- 2001 Test Pit Location
- Resitivity Survey Line

NOTE: This map shows Intermediate Dam elevation prior to 1991 dam raising. 1975 to 1978 geotechnical boreholes not shown.

SOURCES:

Basemap: Orthoshop, Calgary, AB, January 1991. Based on aerial photography September 17, 1990 at 1:10,000 scale. Base supplied by Robertson Geoconsultants Inc.

Completed 2001 Field Program

Rose Creek Tailings Facility 2001 Hydrogeological and Geochemical Investigation

Deloitte & Touche Inc.

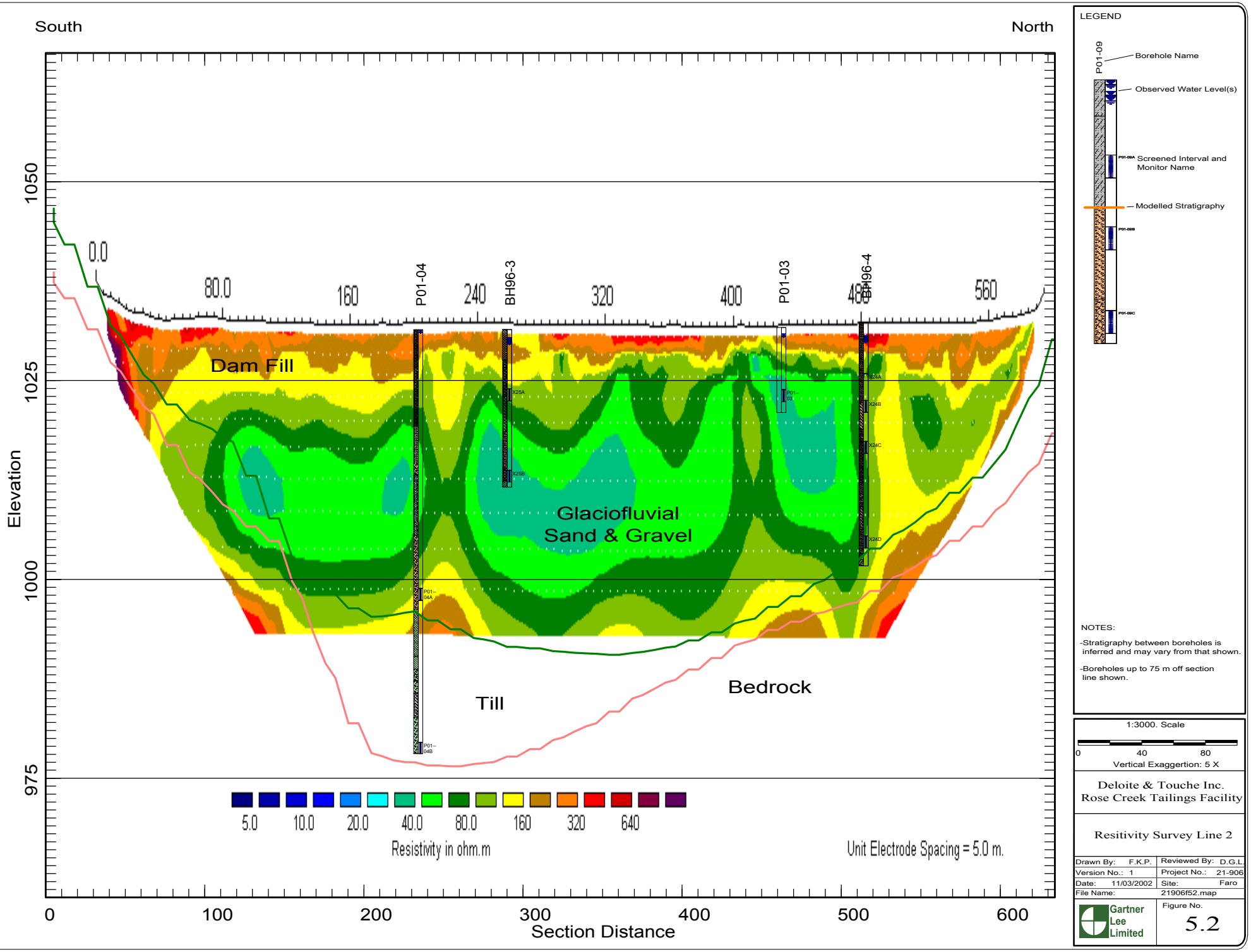
DATE ISSUED: FEB. 2, 2002	DRAWN BY: FKP
PROJECT NO.: 21-906	FILE NAME: 21906-F3_1.WOR
Gartner Lee Limited	FIGURE NO. 4.1

RESISTIVTY SURVEY

Four Lines Completed.

No preferential flowpaths identified.

Results corresponded to Stratigraphy and Groundwater Quality.


South
North
Elevation
1050
1025
1000
975
0.0
80.0
160
240
320
400
480
560
P01-04
BH96-3
P01-03
BH96-4
Dam Fill
Glaciofluvial
Sand & Gravel
Till
Bedrock
5.0
10.0
20.0
40.0
80.0
160
320
640
Resistivity in ohm.m
Unit Electrode Spacing = 5.0 m.
0
100
200
300
400
500
600
Section Distance
LEGEND
P01-09
Borehole Name
Observed Water Level(s)
Screened Interval and
Monitor Name
Modelled Stratigraphy
NOTES:
-Stratigraphy between boreholes is inferred and may vary from that shown.
-Boreholes up to 75 m off section line shown.
1:3000. Scale
0
40
80
Vertical Exaggertion: 5 X
Deloite & Touche Inc.
Rose Creek Tailings Facility
Resitivity Survey Line 2
Drawn By: F.K.P.
Reviewed By: D.G.L.
Version No.: 1
Project No.: 21-906
Date: 11/03/2002
Site: Faro
File Name: 21906f52.map
Gartner Lee Limited
Figure No.
5.2

TAILINGS SAMPLING

Nine test pits.

Six auger hole locations (split spoon sampling).

Field measurements: paste rinse pH, temperature, conductivity and moisture content.

Ponded Water – Original Impoundment

Test Pit Excavation – Location TP4

Saturated Tailings – Location P01-10

Saturated Tailings – Location TP2

Unsaturated Tailings – Location TP2

Tailings Profile – Location TP2

MONITORING WELL INSTALLATION

Upper zone of aquifer at six locations (auger drill).

Deeper in aquifer beneath tailings at three locations (air rotary drill).

Within basal till unit at one location (Intermediate Dam).

Bedrock at two locations (Cross Valley Dam and downstream).

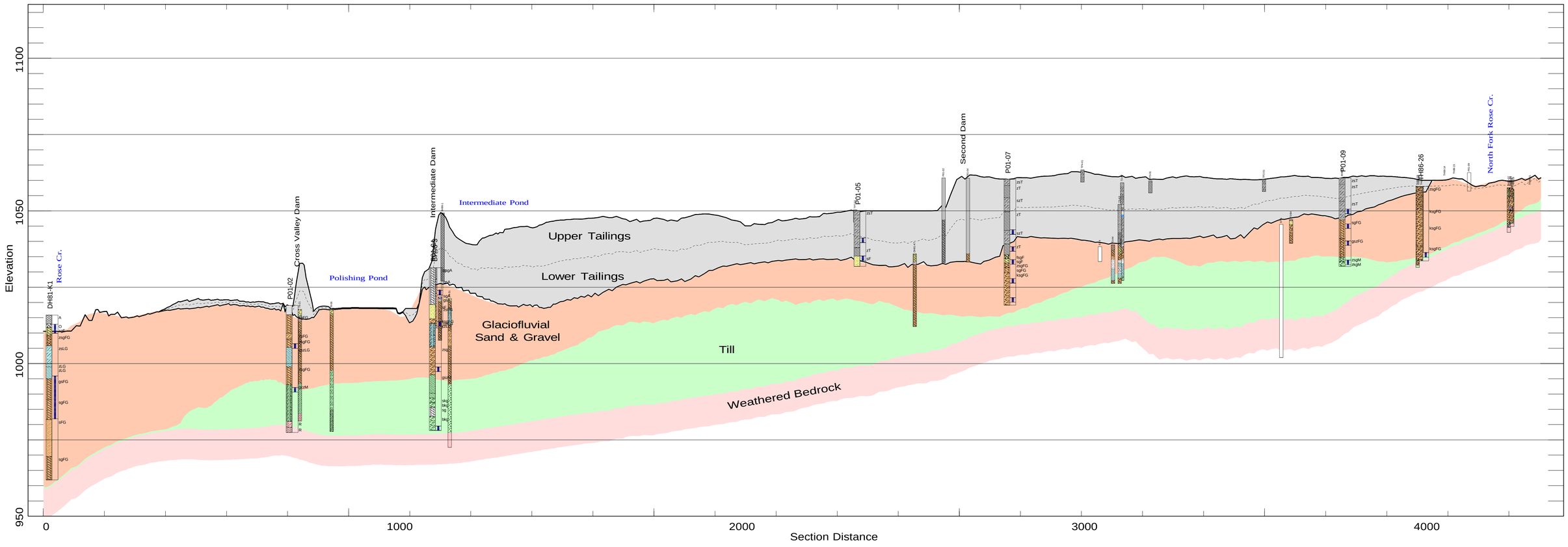
Ice lens encountered in 2nd Impoundment.

Auger Drill Rig – Location P01-10

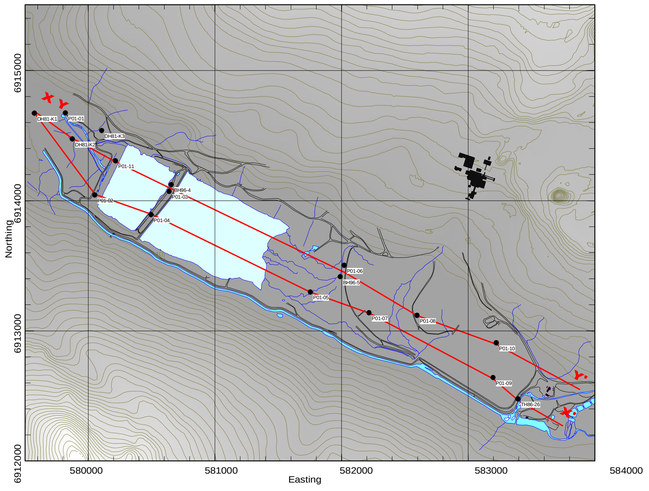
Placement of Sand – Location P01-10

X
Northwest

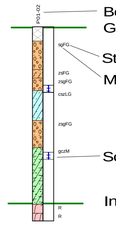
X'
Southeast



SECTION LOCATION MAP



BOREHOLE SYMBOLOGY



Borehole Name
Ground Surface
Stratigraphic Unit
Material Texture
Screened Interval
Interpreted Statigraphic Contact

BOREHOLE GEOLOGY

STRATIGRAPHIC UNIT (INTERPRETED)

- Stratigraphic unit unknown or not assigned
- T - Anthropogenic (Tailings, dam fill, etc.)
- O - Organic (Topsoil, peat, etc.)
- F - Fluvial
- LG - Glaciolacustrine
- FG - Glaciofluvial
- M - Morainal (Till)
- R - Bedrock

MATERIAL TEXTURE (REPORTED)*

- Clay (c)
- Silt (z)
- Sand (s)
- Gravel (g)
- Cobble (k)
- Boulder (b)
- Dimicton (till)

* Up to three textures may be reported for each interval. Textures are listed in order of increasing abundance (e.g. "zsg" is "silty sandy gravel")

DATA SOURCES

SURFACE TOPOGRAPHY: Figure 4-74 ICAP (Robertson Geoconsultants Inc.)
Based on Sept. 1990 aerial photography by Orthoshop.
Intermediate Dam elevation correct to reflect 1991 dam raising.
Additional spot height elevations from YES survey, Dec. 2001.

NATIVE SOIL CONTACT: Figure 4-8 ICAP (Robertson Geoconsultants Inc.)
Based on 1986 site plan by Lodwood Survey Contractors Ltd.
Elevations converted from Mine Datum (in feet) to m ASL.
Supplemental contact data from borehole logs.

BEDROCK TOPOGRAPHY: Kriged from reported bedrock contacts in drill logs and known surface outcrops/subcrops.

NOTES

- Interpolated statigraphy shown based on modelled surfaces used in MODFLOW model.
- Boreholes up to 75 m off section shown.
- Surfaces are developed from kriging of available data sources using Viewlog 2.2.78 Well Log Analysis System.
- Original drawing produced in colour.

SCALES

1:6000. Scale

0 200 400
metres

Vertical Exaggeration: 10 X

Elevations in metres above mean sea level

Long Section X-X'

Deloitte & Touche Inc.
Rose Creek Tailings Facility

Drawn By:	F.K.P.	Reviewed By:	E.J.D.
Version No.:	4	Project No.:	GLL 21-906
Date Issued:	02/02/2002	Map Projection:	UTM Zone 8 (NAD27)
Site Name:	FARO	File Name:	LSXX_3.map

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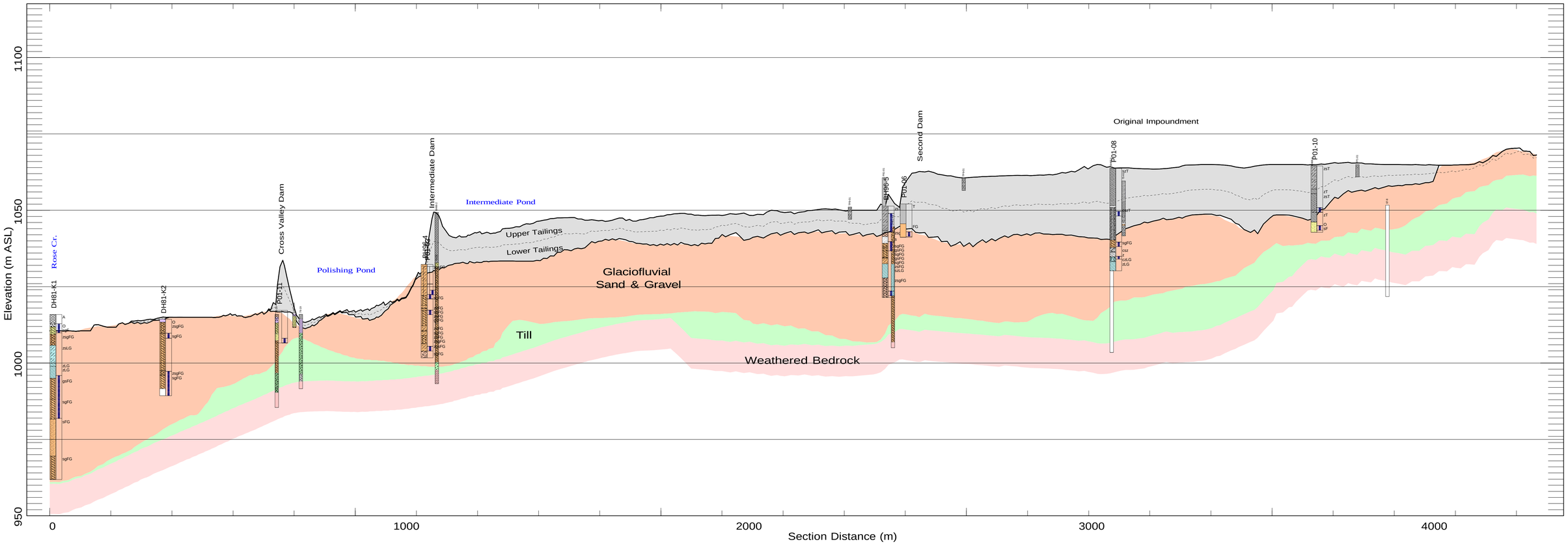
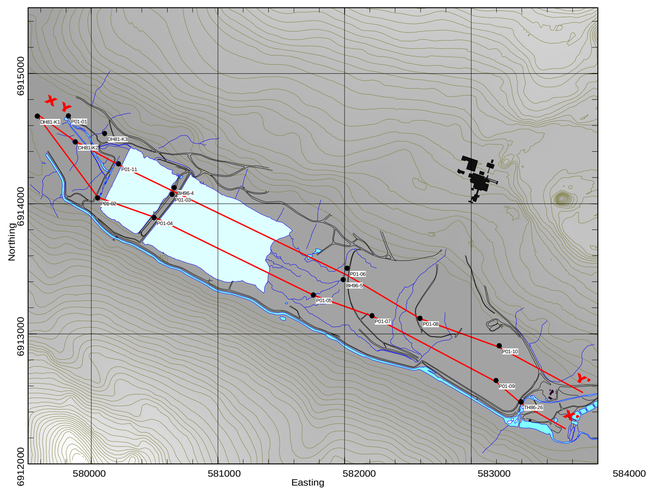
Drawing No. 4.2

Y
Northwest

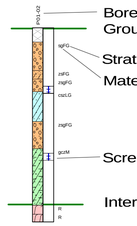
Y'
Southeast



SECTION LOCATION MAP



BOREHOLE SYMBOLOGY



BOREHOLE GEOLOGY

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- Original drawing produced in colour.

SCALES

1:6000. Scale

0 200 400
metres

Vertical Exaggeration: 10 X

Elevations in metres above mean sea level

Long Section Y-Y'

Deloitte & Touche Inc.
Rose Creek Tailings Facility

Drawn By:	F.K.P.	Reviewed By:	E.J.D.
Version No.:	2	Project No.:	GLL 21-906
Date Issued:	02/02/2002	Map Projection:	UTM Zone 8 (NAD27)
Site Name:	FARO	File Name:	21906-F3_3.map

Gartner Lee Limited

Drawing No. 4.3

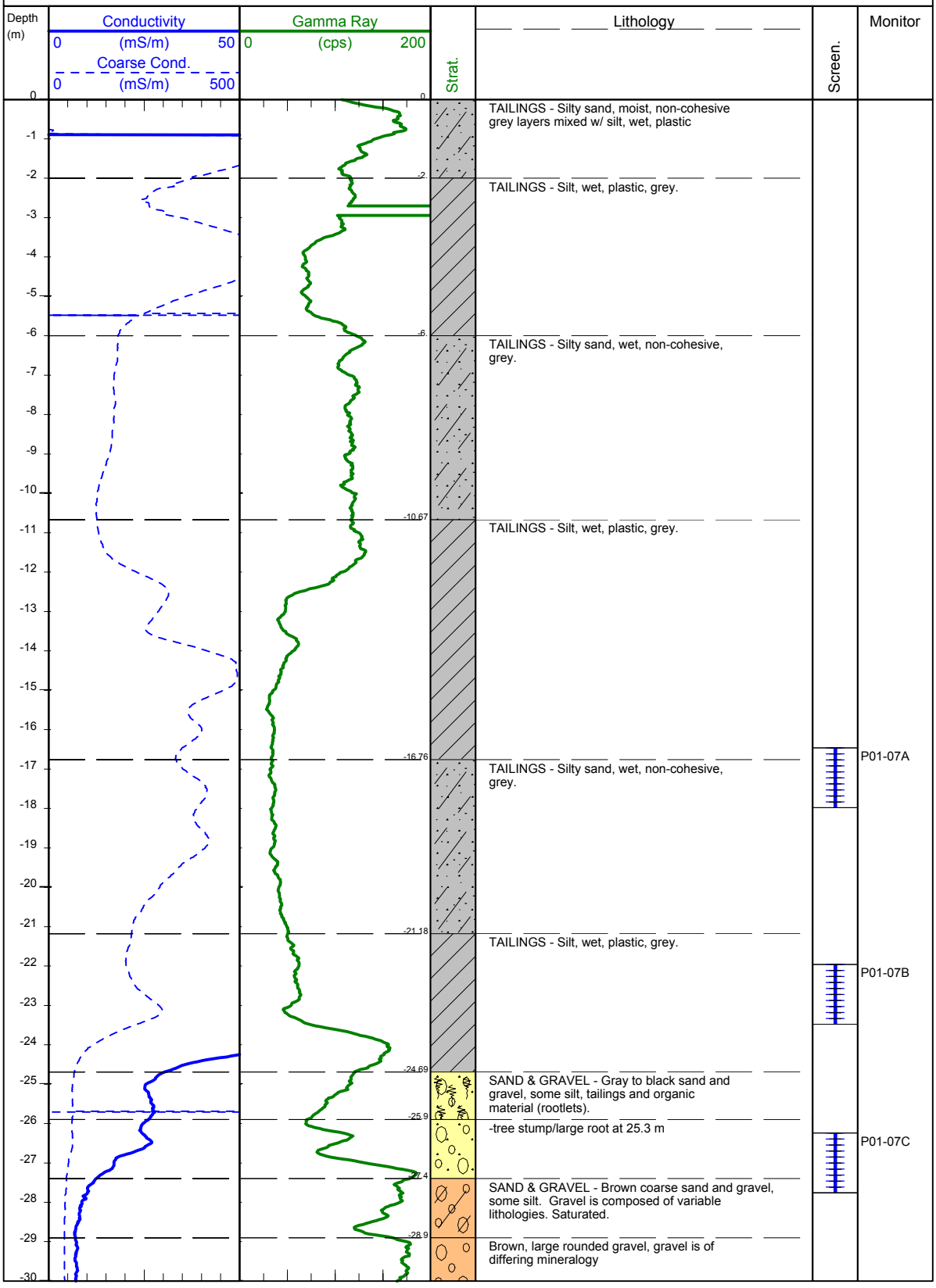
GAMMA/CONDUCTIVITY LOGGING

Did not identify any preferential flowpaths with depth.

Corresponded to stratigraphy.

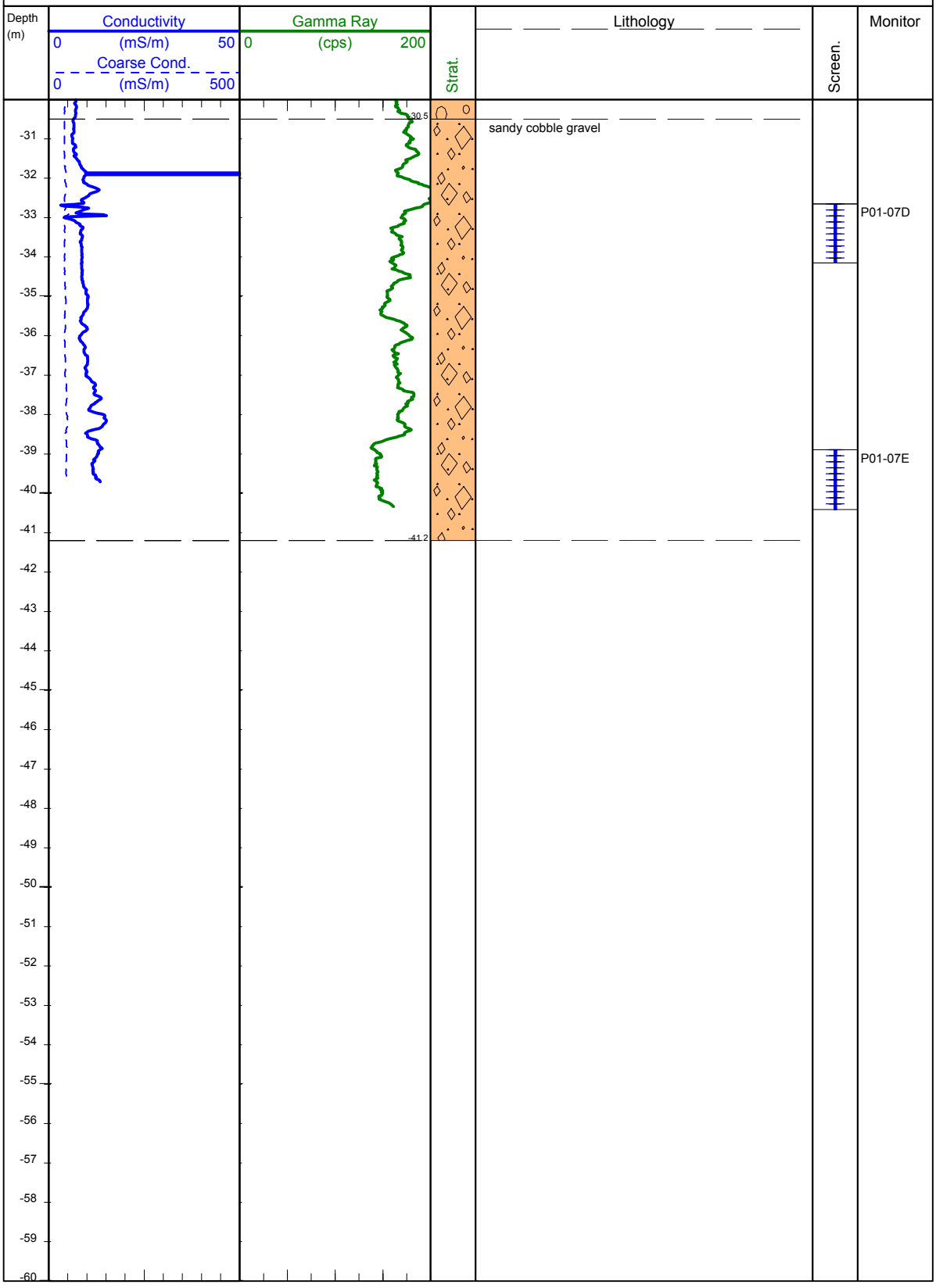
Well Name: P01-07
Location: Second Impoundment
Ground Elevation: 1060.31 m ASL

2001 Hydrogeological and Geochemical Investigations
Rose Creek Tailings Facility, Faro Yukon
Project: GLL 21-906 For: Deloitte & Touche Inc.



Well Name: P01-07
Location: Second Impoundment
Ground Elevation: 1060.31 m ASL

2001 Hydrogeological and Geochemical Investigations
Rose Creek Tailings Facility, Faro Yukon
Project: GLL 21-906 For: Deloitte & Touche Inc.



GROUNDWATER QUALITY

1. Porewater within the tailings contains elevated concentrations of zinc and sulphate.

2. Porewater migration extends downgradient of the tailings deposit to the toe of the Cross Valley Dam but has not been observed in the monitoring wells in the valley centre located approximately 1,000 metres downgradient of the tailings deposit.

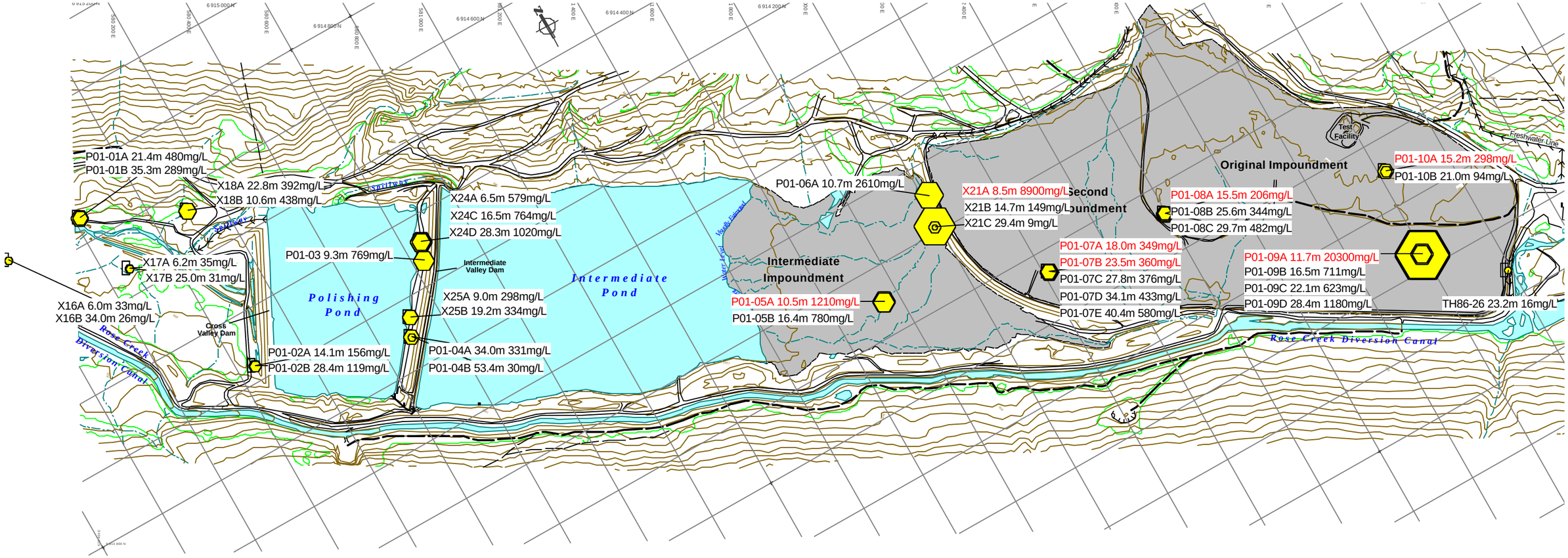
3. Zinc is not transported within the aquifer in substantial concentrations, as is sulphate. This is thought to be due to attenuation of zinc within the tailings and the aquifer.

GROUNDWATER QUALITY

4. Tailings porewater migration appears to be restricted to the sand and gravel portion of the aquifer. The basal till unit that overlies bedrock does not appear to be impacted.

5. Greater concentrations of sulphate are observed along the north side of the valley than in the valley centre. This has been observed consistently since 1996.

6. Oxidation products (represented by sulphate and zinc) are distributed throughout the aquifer beneath the tailings and concentrations in groundwater increase with depth in the aquifer at some locations.



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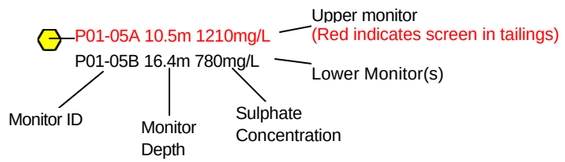
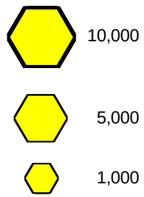


SULPHATE CONCENTRATIONS
(mg/L)



Data Sources:

- Groundwater chemistry based on samples collected Sept. 6-11, 2001

200 0 200 400 600
Meters

Scale: 1:11,500

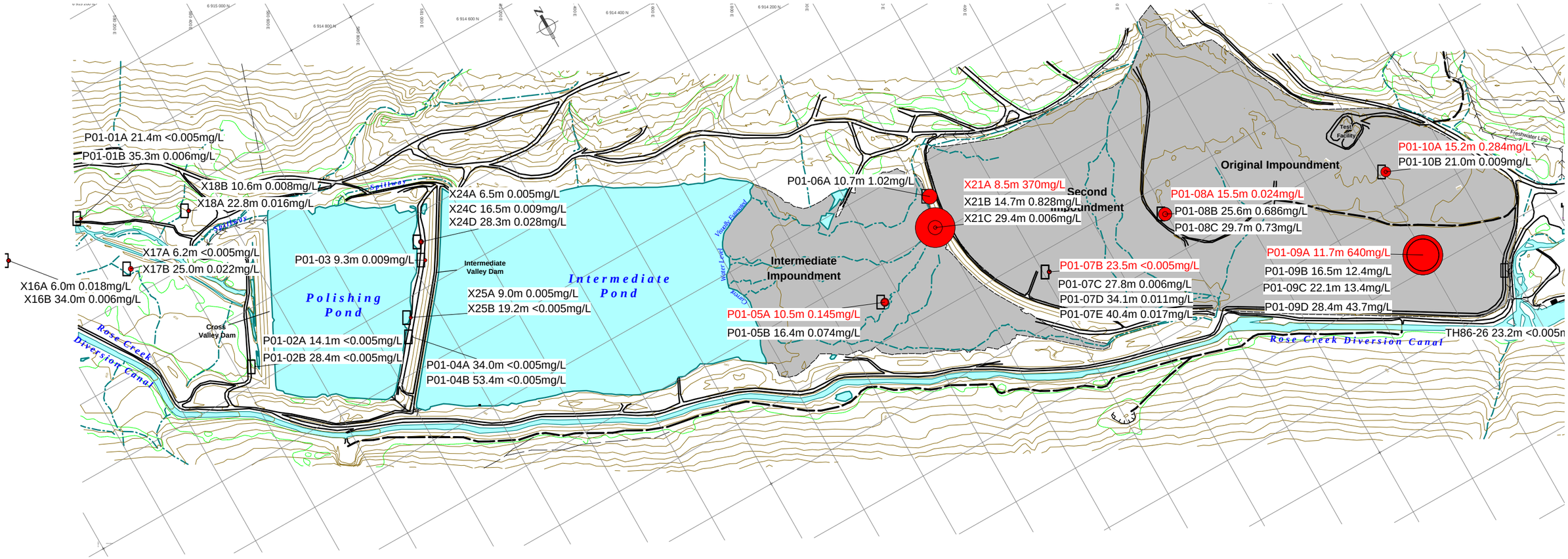
Deliotte & Touche Inc.
2001 Hydrogeological & Geochemical Investigation of the Rose Creek Tailings Facility
Faro Yukon

Sulphate Concentrations in Groundwater

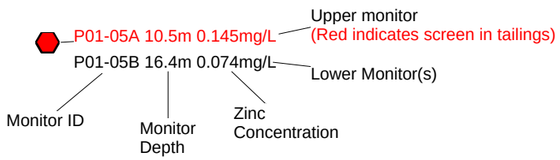
Drawn By:	F.K.P.	Approved By:	E.J.D.
Version No.:	2	Project No.:	GLL 21-906
Date Issued:	Mar. 11/2002	Projection:	UTM Z8, NAD27
Site Name:	Faro	File Name:	21906-F61_2.WOR

Gartner Lee Limited

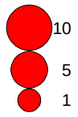
Figure No. **6.1**



EXAMPLE LABEL



ZINC CONCENTRATIONS
(mg/L)



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200 0 200 400 600
Meters

Scale: 1:11,500

Deliotte & Touche Inc.
2001 Hydrogeological & Geochemical Investigation of the Rose Creek Tailings Facility
Faro Yukon

Zinc Concentrations in Groundwater

Drawn By:	F.K.P.	Approved By:	E.J.D.
Version No.:	2	Project No.:	GLL 21-906
Date Issued:	Mar. 11/2002	Projection:	UTM Z8, NAD27
Site Name:	Faro	File Name:	21906-F61_2.WOR

Gartner Lee Limited

Figure No. **6.2**

GEOCHEMISTRY

1. Oxidation of tailings in the unsaturated zone has increased since the 1988-1990 studies as displayed primarily by lower paste pH to greater depths.

2. The water level within the tailings controls the extent of oxidation. This is an important consideration for reclamation since lowering the water elevation in the Intermediate Pond will lower the water level in the tailings upgradient of the pond.

3. Oxidation products (represented by sulphate and zinc) have reached the tailings/native soil interface at most locations. The sulphate "front" has migrated deeper than the zinc "front". This is interpreted to be due to attenuation of zinc enabled by neutral pH within the saturated zone of tailings.

GEOCHEMISTRY

4. Tailings in the southeast end of the Second Impoundment and unsaturated tailings in the northern area of the Original Impoundment are highly oxidized relative to other areas. This is considered to be due to the predominantly coarse particle size and well-drained, unsaturated conditions that have existed at times over the life of the operation.

5. The southeast end of the Second Impoundment and the northern area of the Original Impoundment are calculated to be the source of approximately 75% of the sulphate load in the aquifer. These two areas occupy only approximately 20% of the total surface area of the tailings impoundments. This suggests that surface remediation of these areas may represent an efficient means of substantially reducing contaminant loading to the aquifer.

HYDROGEOLOGICAL MODEL

1. A three dimensional hydrogeological numerical model has been developed that is calibrated to reproduce the observed hydrogeological regime of the site.

2. Flow modelling indicates that the travel paths of oxidation products is influenced by the level of saturation and the configuration of water ponds at the time of their release.

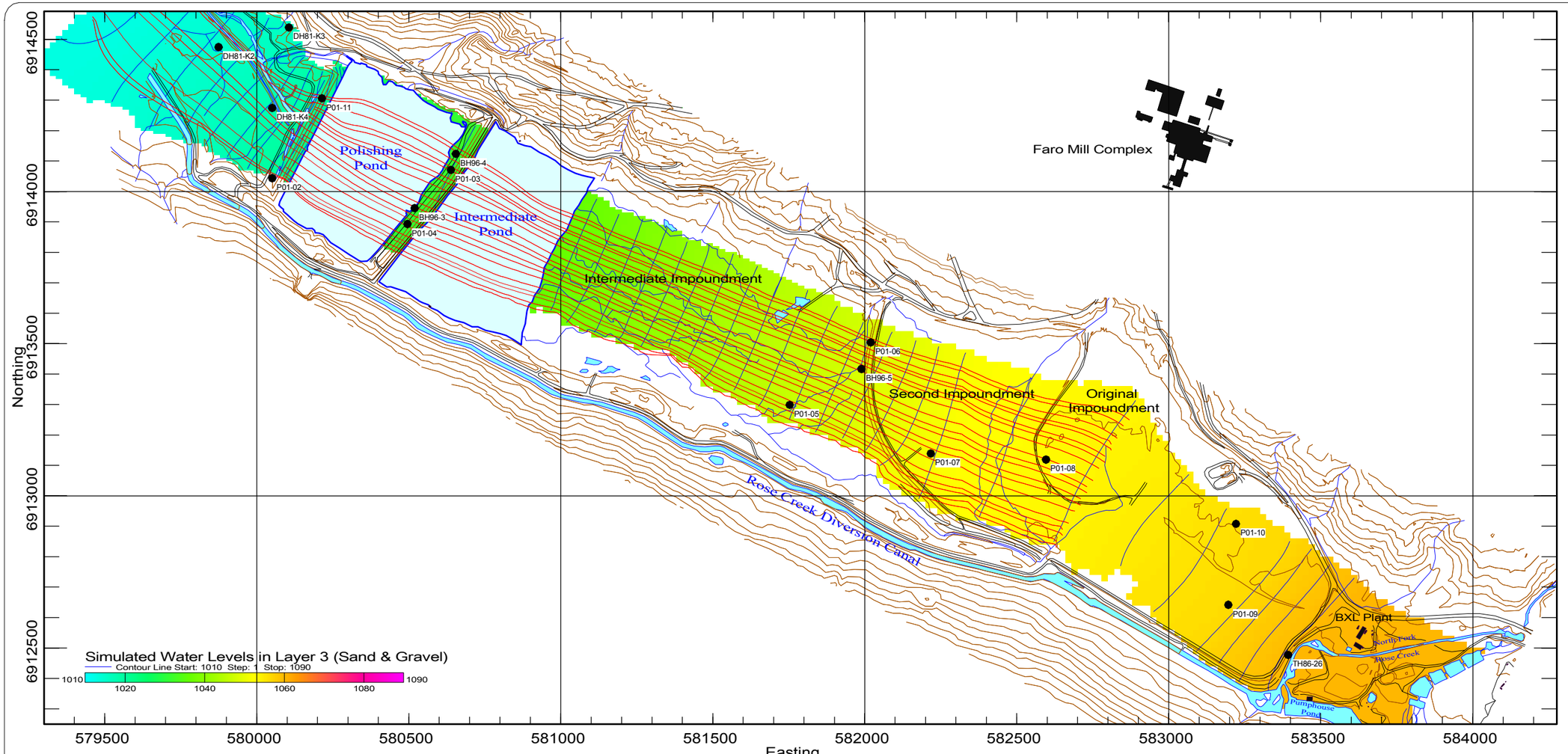
   Under current conditions, oxidation products are predicted to travel in the upper portion of the aquifer until driven deeper by other factors such as surface ponds.

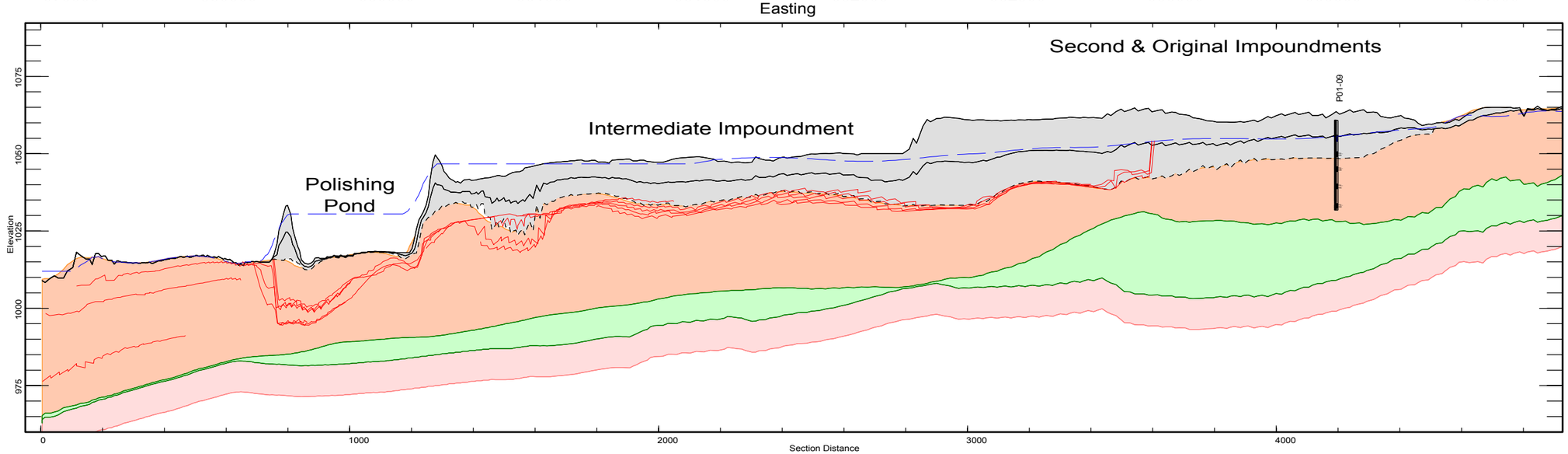
HYDROGEOLOGICAL MODEL

Oxidation products released earlier in the tailings disposal operation when the configuration of dams and ponds was different than today are interpreted to have been driven to various depths within the aquifer, as is observed in the groundwater quality data.

3. At the downgradient extent of the tailings deposit (Intermediate Dam), tailings porewater is diluted by a factor of approximately 8:1 with “clean” aquifer water.

4. The hydrogeological model predicts that a travel time of approximately 10 years is required for movement of contaminants through the saturated zone of the tailings to the aquifer and that an additional 10 years is required for movement through the aquifer to the downgradient area.





LEGEND

- Top of Bedrock Grid
- Top of Till Grid
- Native Surface Grid
- Mid tailings contact
- Post-mining Topo Grid
- Water Levels (Sept 2001)

NOTES:

- Interpolated statigraphy shown based on modelled surfaces used in MODFLOW model.
- Statigraphy interpreted from boreholes shown and may vary from that show.
- Boreholes up to 50 m off section shown.
- Surfaces are developed from kriging of available data sources using Viewlog 2.2.99 Well Log Analysis System.
- Original drawing produced in colour.

SCALES

1:15000. Scale

0 200 400 600 metres

Vertical Exaggeration: 10 X

Deloitte & Touche Inc.
Rose Creek Tailings Facility

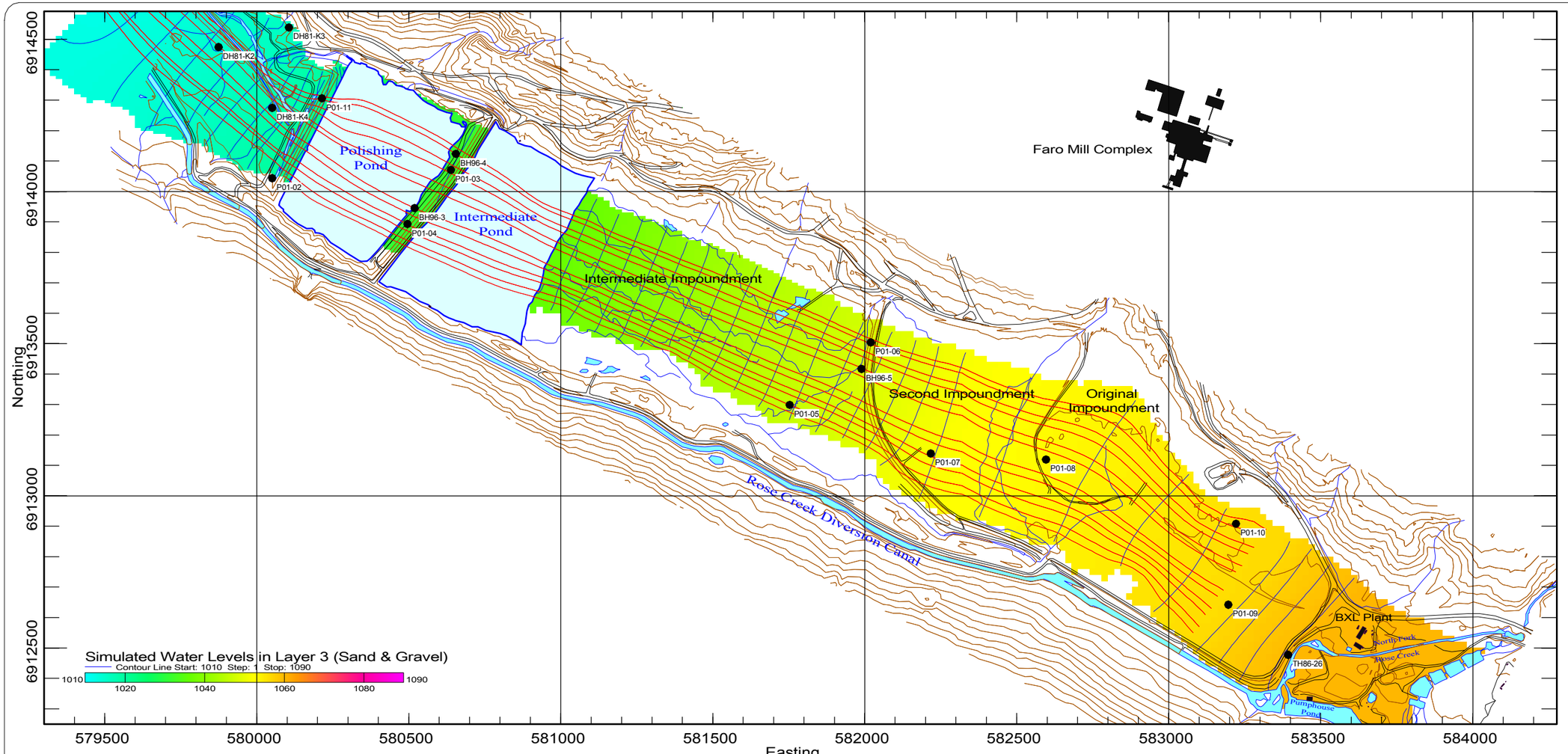
Particle Tracks from
Second & Original Impoundments

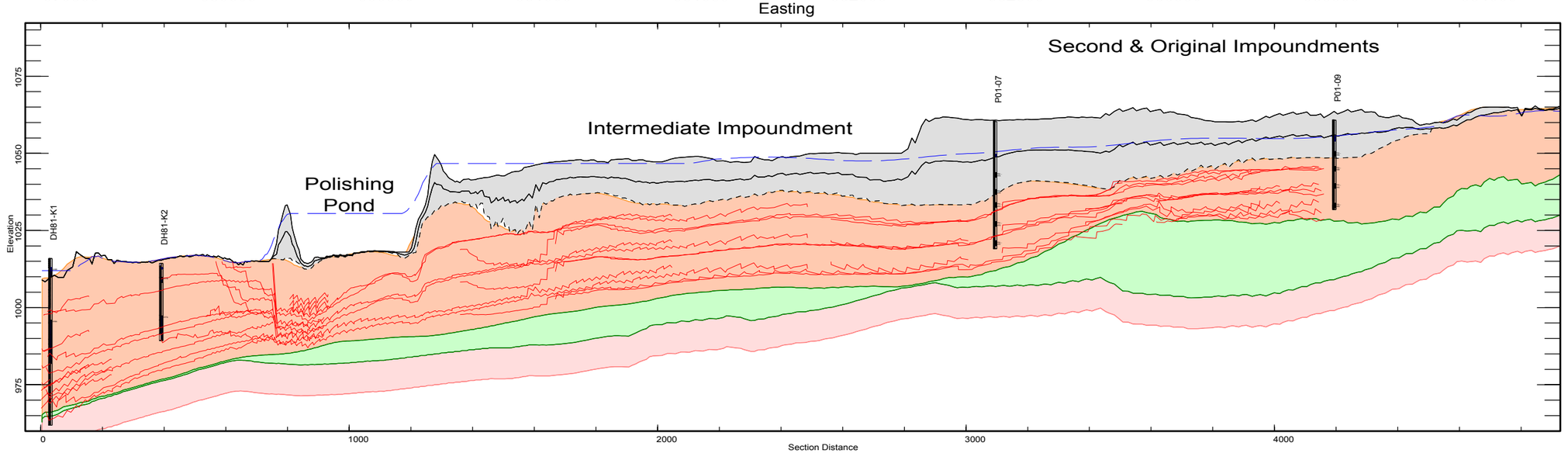
Drawn By:	F.K.P.	Reviewed By:	E.J.D.
Version No.:	1	Project No.:	21-906
Date Issued:	12/03/2002	Projection:	UTM z8 NAD27
Site Name:	FARO	File Name:	Fig81._2MAP

Gartner Lee Limited

Drawing No.

8.1





LEGEND

- Top of Bedrock Grid
- Top of Till Grid
- Native Surface Grid
- Mid tailings contact
- Post-mining Topo Grid
- Water Levels (Sept 2001)

NOTES:

- Interpolated statigraphy shown based on modelled surfaces used in MODFLOW model.
- Statigraphy interpreted from boreholes shown and may vary from that show.
- Boreholes up to 60 m off section shown.
- Surfaces are developed from kriging of available data sources using Viewlog 2.2.99 Well Log Analysis System.
- Original drawing produced in colour.

SCALES

1:15000. Scale

0 200 400 600 metres

Vertical Exaggeration: 10 X

Deloitte & Touche Inc.
Rose Creek Tailings Facility

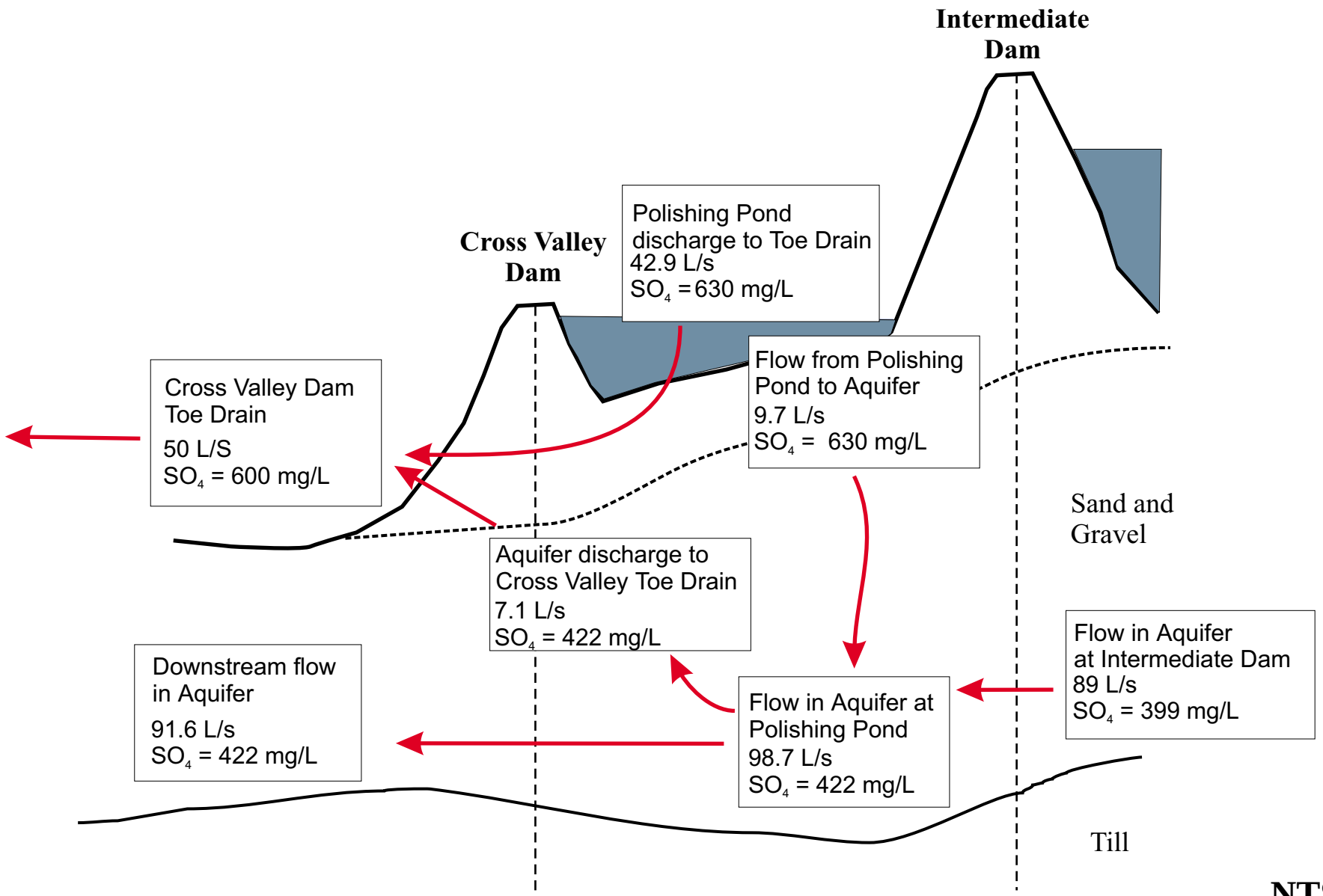
Particle Tracks from
East End of 2nd Impoundment

Drawn By:	F.K.P.	Reviewed By:	E.J.D.
Version No.:	1	Project No.:	21-906
Date Issued:	11/03/2002	Projection:	UTM z8 NAD27
Site Name:	FARO	File Name:	Fig81._2MAP

Gartner Lee Limited

Drawing No.

8.2



Site Name: FARO

File Name: FIG84.CDR

Gartner Lee Limited

DELOITTE & TOUCHE INC.

Rose Creek Tailings Facility Hydrogeological and Geochemical Investigation

Sulphate Balance at Cross Valley Dam

Project No.: 21-906

Date Issued: Mar. 2002

Figure 8.3

SPECIFIC STUDY OBJECTIVES

1. *Investigate the possible presence of preferential pathways where contaminated groundwater could be passing through the aquifer undetected.*

   Contaminated groundwater is not passing through the system undetected.

   Both survey resistivity and downhole geophysics did not identify any distinct zones of preferential contaminant transport.

   Furthermore, groundwater modelling suggests that flow in the aquifer is relatively uniform and confirms that significant concentrated preferential flow paths are not anticipated.

SPECIFIC STUDY OBJECTIVES

2. *Assess groundwater quality immediately below the tailings/native soil interface.*

   Flow modelling suggests that, under current hydrogeologic conditions, oxidation products released from the tailings would be expected to travel in the upper zone of the aquifer immediately below the tailings/original ground interface.

   Groundwater quality results indicate that oxidation products (represented by sulphate and zinc) are distributed throughout the aquifer at various depths.

   This is interpreted to be due to substantial changes in the level of saturation of the tailings over the life of the operation and due to the size differentiation of tailings.

SPECIFIC STUDY OBJECTIVES

3. *Assess groundwater quality at the deepest part of the bedrock valley.*

   Groundwater quality in the basal till unit that overlies bedrock was investigated and is not significantly affected by contamination from the tailings.

   The hydrogeological model also confirms that the majority of groundwater flow occurs in the sand & gravel aquifer and not in the till and/or bedrock.

SPECIFIC STUDY OBJECTIVES

4. *Provide information that may determine if the tailings impoundments are near the brink of a geochemical "breakthrough".*

   A comparison of current geochemical information with 1988 data indicates that oxidation has progressed in the upper, unsaturated zone of tailings and that the level of saturation effectively controls sulphide oxidation.

   Oxidation products are estimated to have advanced to the base of the tailings (and into the aquifer) in most areas. This suggests that, although metal loading into the aquifer may increase incrementally over time, a "breakthrough" that would deliver a substantially increased contaminant load is not anticipated provided that the current level of saturation is maintained.

SPECIFIC STUDY OBJECTIVES

5. *Determine the scale of dilution of tailings pore water that enters the aquifer.*

   Preliminary water balance calculations based on the hydrogeological model and observed sulphate concentrations indicate that tailings porewater is diluted by "clean" aquifer flow in a ratio of approximately 8:1.

   This calculation was in the aquifer at the downstream extent of the tailings deposit (Intermediate Dam).

SPECIFIC STUDY OBJECTIVES

6. Provide a hydrogeological model that simulates the current flow regime and that could be used in the future as a tool for simulating remedial options.

   A calibrated numerical model has been developed which adequately reproduces the hydrogeological regime of the site in three-dimensions. The model is fully documented herein and could serve as an important tool in simulating and assessing remedial options.