



Compliance Coal
CORPORATION
DBA Comox Joint Venture

918

550 – 800 West Pender Street,
Vancouver, British Columbia V6C 2V6
Tel: (604) 689-0489 Fax: (604) 681-5910

REPORT ON GROUNDWATER PUMPING TEST FOR HYDROGEOLOGY STUDY - 2012

RAVEN PROJECT

(TSABLE RIVER COALFIELD)

COVERING COAL EXPLORATION LICENCE

TENURE No. 392561

and

FEE SIMPLE COAL RIGHTS HOLDINGS

(Southern Comox Coal Basin)

Prepared By:
Owen Cullingham P.Geo.
O.R.Cullingham Resource Consultant Ltd.
Consultant to Compliance Coal Corporation
March 28, 2013

Received BC Ministry of EMNG
March 28, 2013

TABLE OF CONTENTS

	<u>Page No</u>
1.0 INTRODUCTION	1
2.0 LOCATION	1
3.0 PROGRAM OVERVIEW	1
4.0 DETAILS OF HYDROGEOLOGICAL GROUDWATER PUMPING PROGRAM	4
4.1 Introduction	4
4.2 Equipment and Process	4
4.3 Discharge Water	5
4.4 Pump Well	6
5.0 ENVIRONMENTAL PROTECTION AND RECLAMATION PROGRAM	7
6.0 STATEMENT OF EXPLORATION EXPENDITURES – 2012	7

TABLES

TABLE 1 Location of Pumping and Adjacent Monitoring Drill Holes (2012)	2
TABLE 2 Summary of Piezometer Configuration in Pump Test and Monitoring Holes ...	2
TABLE 3 RAV-11-07a Pump Discharge Field Measurements	6
TABLE 4 Statement of Exploration Expenditures	7

PLATES

PLATE 1 Flow Meter Camera and Discharge Water Monitoring Apparatus	4
PLATE 2 Flow Through Cell for Measuring Pump Discharge Water Conductivity and Temperature	4
PLATE 3 Flow Through Cell in 20 L PVC Pail Showing Aqua Troll 200 LTC sensor And Discharge Point	5

FIGURES

Figure 1 Location Map (follows text)	
Figure 2 General Infrastructure and Site Layout (follows text)	
Figure 3 Location Map of Pumping Well RAV-11-07a (follows text)	
Figure 4 RAV-11-07a Pump Test Water Elevation and Pump Discharge Rate	6
Figure 5 RAV-11-07a Water Temperature 247 m below surface during pump test	7

1.0 INTRODUCTION

The purpose of this report is to document the hydrogeological field program carried out in July 2012 on the Raven Coal Project. The program was carried out under the terms of Exploration Permit CX-8-008 issued by the Mining and Minerals Division of the Ministry of Energy and Mines. The program was an extension of the hydrogeological field program carried out in 2011 and was comprised of a single pump test and associated ground water measuring and sampling. This report deals only with the pump test carried out in 2012; details of the 2011 hydrogeological drilling are to be found in 'Report on Hydrogeological Drilling Program – 2011, Raven Project (Tsable River Coalfield) Covering Coal Exploration Licence Tenure No. 392561 and Fee Simple Coal Rights Holdings (Southern Comox Coal Basin)' filed with the Coal Administrator, Ministry of Energy and Mines on March 30, 2012.

2.0 LOCATION

The Raven Project occurs in the Tsable Coalfield at the southern end of the Comox Coal Basin which lies parallel to and along the east coast of Vancouver Island. The property is directly west of Baynes Sound separating Denman Island from Vancouver Island and extends from the communities of Union Bay in the north to Fanny Bay in the south – Figure 1.

The area is located on NTS map sheets (1:50,000) 92F10W and 92F7W or within BCGS (1:20,000) map sheets 092F056 (north) and 092F046 (south). The area lies within the Nanaimo Mining Division and the Nanaimo, Nelson & Newcastle Land Districts. Coordinates at the centre of the project footprint are 49° 30' 8.0742" latitude and 124° 52' 36.4074" west longitude.

The closest city is the city of Courtenay approximately 20 km to the north on the east coast of Vancouver Island. Access to the area is via the Inland Highway which runs parallel to and in part crosses the eastern limits of the area. Local access to all parts of the property is provided by forestry roads and private logging and resource roads. Figure 2 is a general infrastructure and site layout map.

3.0 PROGRAM OVERVIEW

One of the principle goals of the 2011 field program was to install and test one pumping well, install one grouted-in vibrating wire transducer equipped piezometer. The pilot and monitoring hole (RAV-11-07a) encountered good water flow; however, the targeted pumping well (RAV-11-07c) drilled 6.7m away failed to encounter significant water flow. It was therefore decided to make RAV-11-07a the pumping well and use the larger diameter RAV-11-07c as the monitoring well with the installation of four 2" pvc standpipe piezometers rather than grouted in vibrating wire transducer piezometers.

Following a step test to determine pumping parameters, recovery of the ground water in drill hole RAV-11-07a was slow and it was decided to forego the pumping test until water levels had recovered sufficiently to carry out a viable test. This was finally scheduled for late July 2012 and is the only field work carried out in 2012.

The pump test was conducted at RAV-11-07a on 21 to 23 July 2012. Total length of the test was 52.5 hours. Water level response during the test was measured in RAV-11-07b and the four RAV-11-07c piezometers.

Table 1 presents the location of the pumping drill hole and the adjacent monitoring drill holes; and Table 2 summarizes the piezometer configurations in the holes.

918

Table 1: Location of Pumping and Monitoring Drill Holes (2012)

DrillHole ID	Location UTM Zone 10 NAD 83			TD (m)	Bedrock Depth (m)
	Easting (m)	Northing (m)	Elevation (m)		
RAV-11-07a	365,828.94	5,485,086.78	61.83	352.6	18.5
RAV-11-07b	365,820.37	5,485,090.01	61.89	11	na
RAV-11-07c	365,822.73	5,485,088.27	61.90	276	22.5

Table 2: Summary of Piezometer Configuration in Pump Test and Monitoring Holes

Drill Hole ID	Date Finished Drilling	Date Piezometer Installation Completed	Screen or TR interval				Formation/Member/Lithology Tested	Piezometer Type	
			Name	Depth From (m)	Depth To (m)	Elev Top (mamsl)			Elev Base (mamsl)
RAV-11-07a	August 11, 2011	September 13, 2011	W Strike	0.00	278.00	61.83	-216.17	Cougar Smith Slt and Dunsmuir 5 SS contact	open hole (prepared for pump test)
RAV-11-07b	August 12, 2011	August 12, 2011	Piezo	7.90	10.90	53.99	50.99	Surficial Overburden - gravel	2" Standpipe
RAV-11-07c	August 24, 2011	September 26, 2011	PZ1	188.00	191.10	-126.10	-129.20	Cowie Sandstone	2" Standpipe Sched 40
			PZ2	235.00	238.10	-173.10	-176.20	Cougar Smith Siltstone	2" Standpipe Sched 80
			PZ3	260.90	264.00	-199.00	-202.10	Cougar Smith Siltstone & Dunsmuir 5 Sandstone	2" Standpipe Sched 80
			PZ4	272.70	275.80	-210.80	-213.90	Dunsmuir 5 Sandstone	2" Standpipe Sched 80

The pump test was carried out by McGill's Well Service out of Cumberland, Vancouver Island. Hydrogeological field work was carried out under the supervision of Rob McLean P.Eng., of Artifex Engineering Hydrology Inc. of Victoria, B.C.

4.0 DETAILS OF HYDROGEOLOGICAL GROUNDWATER PUMPING PROGRAM

4.1 Introduction: The pump test was carried out in drillhole RAV-11-07a commencing Saturday July 21 at 13:00hrs, and was terminated Monday July 23 at 17:30hrs for a duration of 52.5 hrs. Pumping rate was started at 35 litres per minute but was reduced to 13 l/m in order to maintain a test of at least 48 hrs. Water level response during the test was measured in one surficial overburden piezometer established in hole RAV-11-07b and the four bedrock piezometers established in hole RAV-11-07c.

A trench was excavated in an unused road bed in October 2011, to act as a sump for the discharge water. The trench was located approximately 400m north northwest of the pump site and discharged water was conveyed through a pipe to the east end of the trench. The pump test site and discharge sump locations are shown in Figure 3.

The pump test was carried out by McGill's Well Service out of Cumberland, Vancouver Island. Hydrogeological field work was carried out under the supervision of Rob McLean P.Eng., of Artifex Engineering Hydrology Inc. of Victoria, B.C. Rob is also a contributor this report.

4.2 Equipment and Process: The submersible pump consisted of an A.Y. McDonald Mfg. Co. Model 26500P - 5 HP pump with serial number L10. The pump well (RAV-11-07a) consisted of a 6" (0.1524 m) diameter drillhole completed by air rotary drilling. The volume of water in the well at the start of the pump test was 4640 L. The pump well was open hole. The water level in RAV-11-07a was monitored with a RST 3.0 MPa vibrating wire piezometer (VWP) connected to a single channel data logger at surface. The VWP was installed 4.5 m above the top of the pump (247 m below surface) when the equipment was installed on 14 October 2011. The VWP was connected to a computer, at the start and end of the pump test as well as periodically throughout the test, to observe the real time display of the water level in the well.

RAV-11-07b was drilled using a 6" air rotary drill and was completed with a 2" Sched 40 piezometer.

RAV-11-07c was drilled using a 12" (0.3048 m) air rotary drill. PZ1 consisted of a 2" Sched 40 piezometer and PZ2, PZ3 and PZ4 consisted of Sched 80 piezometers.

The flow meter consisted of a 5/8" Sensus meter with gradations of 1 L. Calibration of the flow meter was confirmed by measuring the rate of discharge at the pipe discharge.

A Richo G700SE camera was used to take photographs of the flow meter at selected intervals. Saw horses and core boxes were used to construct a camera holder above the flow meter as shown in Plate 1.



Plate 1: Flow meter camera and discharge water monitoring apparatus (arrow indicates Location water samples were collected from discharge water quality monitoring tube)

The battery lost power much quicker than expected and a continuous series of photographs of the flow meter were not available throughout each night of the pump test. However, use of the camera did add numerous flow meter readings to the data set.

Water samples were collected by disconnecting the discharge water quality hose at the location shown by the arrow in Plate 1. Pump discharge water conductivity and temperature were measured both in a field manufactured flow through cell (Plate 2) and in the 20 L white pail the flow through cell was installed in (Plate 3). A Solinst Level-Temperature-Conductivity (LTC) data logger was used to monitor water conductivity and temperature of the water in the flow through cell. An In-situ AquaTroll 200 LTC logger was used to monitor discharge water conductivity and temperature in the pail. Two conductivity sensors were used due to the large amount of gas within the discharge water and the effect gas has on conductivity measurements.



Plate 2: Flow through cell for measuring pump discharge water conductivity and temperature

Note the holes drilled in the top of the flow through cell (Plate 3) to allow water and gas to discharge from the top of the cell. Also note in Plate 1 that the pail containing the LTC sensors was placed at the same elevation as the pump discharge line to prevent vapour lock in the water quality hose leading to the flow through cell. Plate 1 shows how the discharge water entered the pail and flow through cell at the base of the pail. The plate also shows the discharge line was located at approximately 2/3 of the height of the pail.



Plate 3: Flow through cell in 20 L PVC pail showing Aqua Troll 200 LTC sensor and discharge point

Water pH was measured using a Hanna Instruments Model 98130 pH meter. Water levels in the RAV-11-07c piezometers were monitored using Solinst 10 m water level range level and temperature (LT) sensors. An Insitu AquaTroll 200 LTC logger with a 341 m range was used to initially monitor the recovery in RAV-11-07c-PZ4. After one day of recovery the AquaTroll was replaced with a 100 m range Solinst LT sensor. Water level data was recorded at 15 minute intervals in the RAV-11-07c piezometers during the pump test and subsequent initial recovery. Atmospheric pressure was measured at 15 minute intervals during the pump test and initial subsequent recovery using a Solinst Barologger installed inside the RAV-11-07c casing. A 300 m Solinst Model 101 water level tape was used to monitor water levels in RAV-11-07b and periodically in the RAV-11-07c piezometers.

- 4.3 Discharge Water: A trench was excavated in an unused road bed in October 2011, to act as a sump for the discharge water. The water was discharged into the sump located approximately 400 m to the north-northwest of the pump test site. The pump test site and discharge sump locations are shown on Figure 3.

Five groundwater samples were recovered during the duration of the pump test. The time of the sampling occurred at approximately 3.75, 22.75, 32.25, 46.25 and 52.50 hours into the pump test. The time, sample identification, conductivity, temperature, and pH of the discharge water for each sample collected are presented in Table 3. Note, the specific conductivity values are presented for both the flow through “Cell” as well as the “Pail”. The temperature values presented in Table 3 are that measured in the flow through cell. Note the sample identification is consistent with the volume of water that was discharged from the well during the test.

Ground water in a seep down slope of the disposal trench was monitored at the conclusion of the test and measured at 0.06mS/cm indicating no leakage from the sump.

Table 3: RAV-11-07a Pump Discharge Field Measurements

Sample ID	Pump Time (hours)	Volume Discharged (m ³)	Specific Conductivity (mS/cm)		Temperature (C)	pH
			Cell	Pail		
RAV-11-07a-4.6 m ³	3.75	4.6	37.79	33.85	11.0	6.8
RAV-11-07a-15.8 m ³	22.75	15.8	48.07	51.49	12.1	6.7
RAV-11-07a-20.2 m ³	32.25	20.2	50.11	56.57	12.5	6.7
RAV-11-07a-26.3 m ³	46.25	26.3	52.70	62.01	12.8	6.6
RAV-11-07a-29.0 m ³	52.50	29.0	54.66	61.07	13.0	6.7

4.4 Pump Well: The drawdown observed in RAV-11-07a and the measured pump discharge are presented in Figure 4. The initial pump rate was 35 L/min and was quickly adjusted to 25 L/min. After 2.5 hours of pumping it was determined the drawdown rate was too large to sustain a pump test over 24 hours. The pump rate was subsequently reduced to 13 L/min and no further adjustments to flow rate were made. Note that the discharge rate gradually decreased to 6 L/min by the end of the pump test due to the decrease in RAV-11-07a water level. The maximum drawdown observed during the pump test was 201.27 m. The temperature of the water in RAV-11-07a at a depth of 247 m below grade (4.5 m above the pump) during the pump test is presented in Figure 5. Note the temperature of the water in the well at the sensor increased sharply the first 5 hours of the pump test and continued to rise gradually the remainder of the pump test.

Figure 4: RAV-11-07a Pump Test water elevation and pump discharge rate

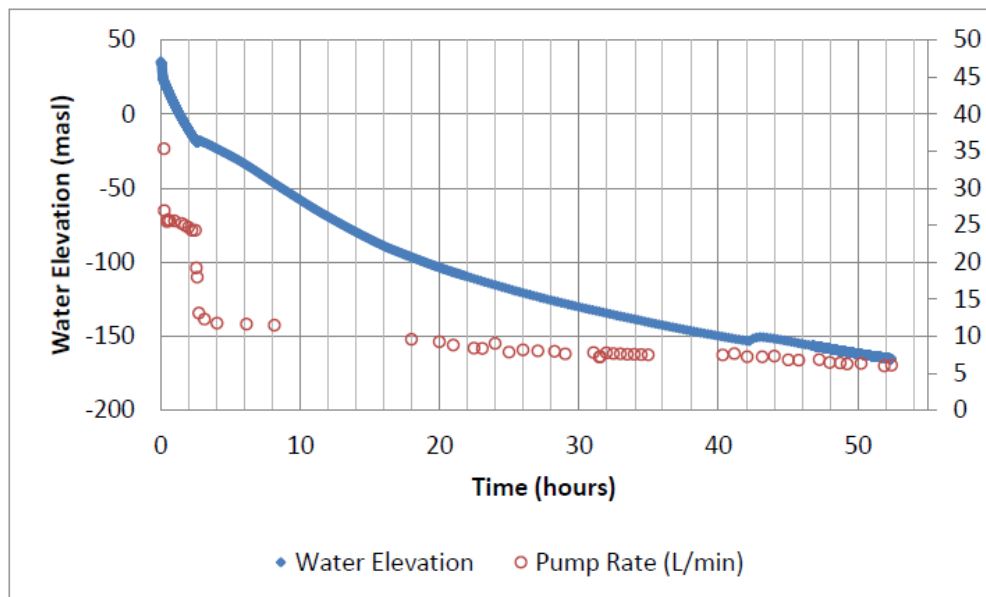
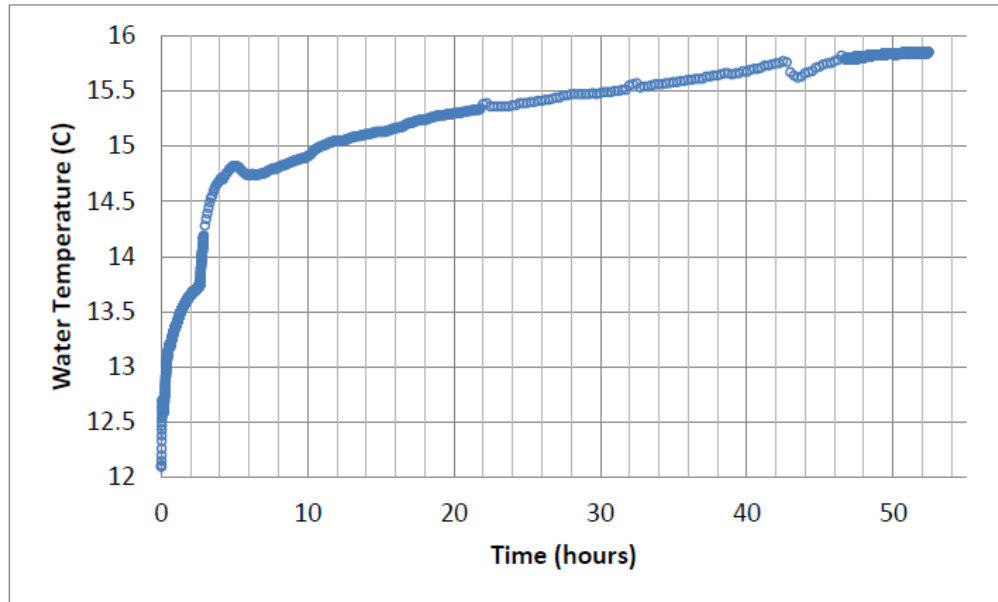


Figure 5: RAV-11-07a water temperature 247 m below surface during pump test



5.0 ENVIRONMENTAL PROTECTION AND RECLAMATION PROGRAM

Drillsites were constructed to meet the smallest foot print for drill set up and operation as was safely possible. Set ups varied from a widening of access roads requiring push backs to the construction of larger sites to accommodate equipment and extra sumps where necessary. Normal practice was to construct drillsites with maximum dimensions of approximately 30m x 15m (including area for sumps). Sumps for drilling fluid return and drill cuttings were dug along one side. The pumping well required an additional sump which was excavated along an old road bed approximately 400m north-northwest from the pumping wellsite. Ground water was conveyed through a 3” pipe to the discharge point at the east end of the trench.

Drillsites were cleared of all trees, shrubs, plant growth, deadfall and any other combustible material down to mineral soil.

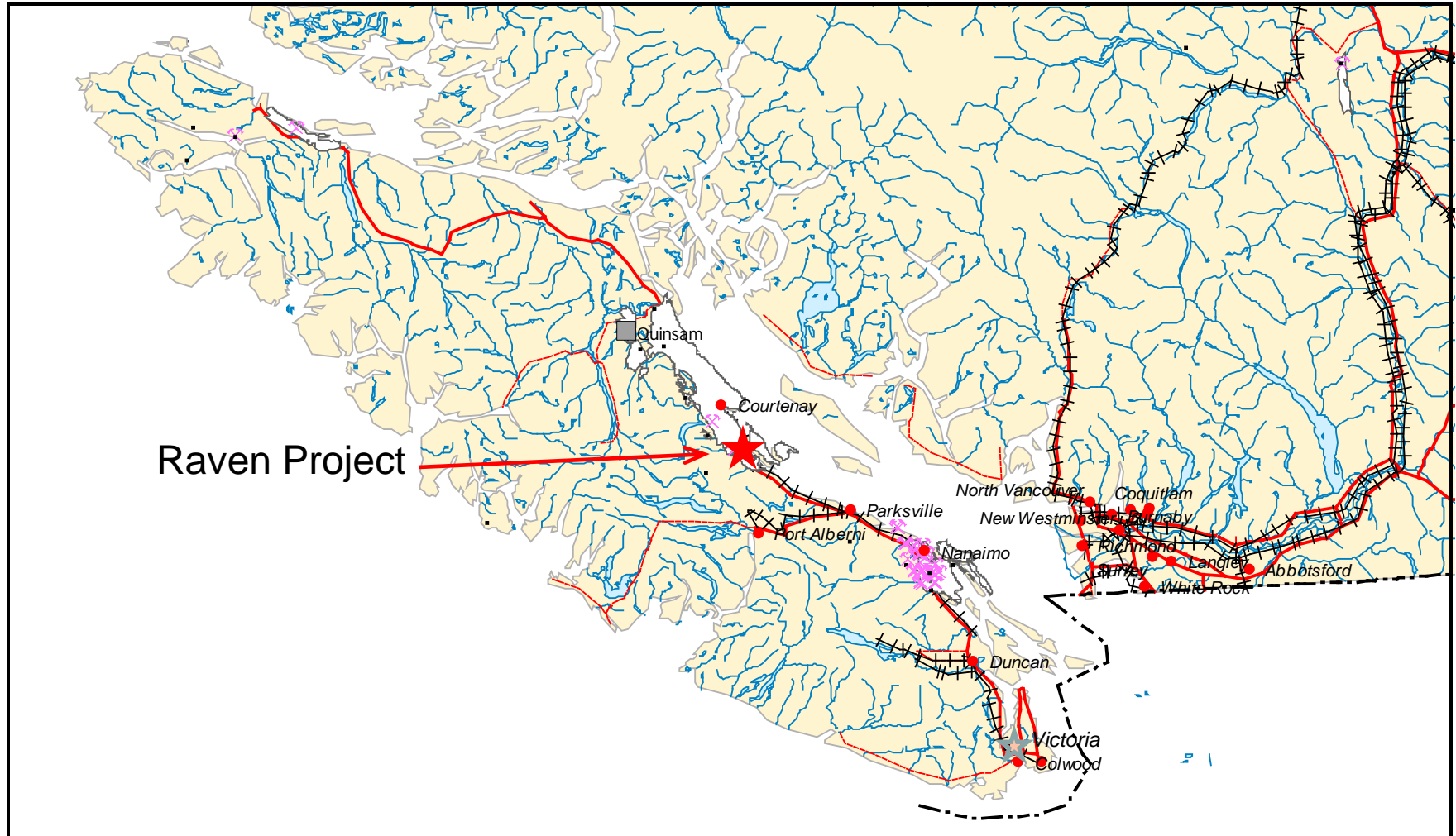
At the conclusion of the pump test the sumps were filled in, and contoured; stockpiled surface soil and forest debris were scattered preparatory for re-vegetation. The access road was left open for drill hole ground water monitoring purposes.

6.0 STATEMENT OF EXPLORATION EXPENDITURES – 2012

The following table summarizes the exploration expenditures at the RavenProject during 2012.

Table 4: Statement of Exploration Expenditures

Site Preparation, Access, and Reclamation	14,700
Hydrogeological Field Testing	21,700
Geological Supervision (personnel, room & board, travel, vehicles, core storage etc)	108,700
TOTAL	\$145,100



Raven Project

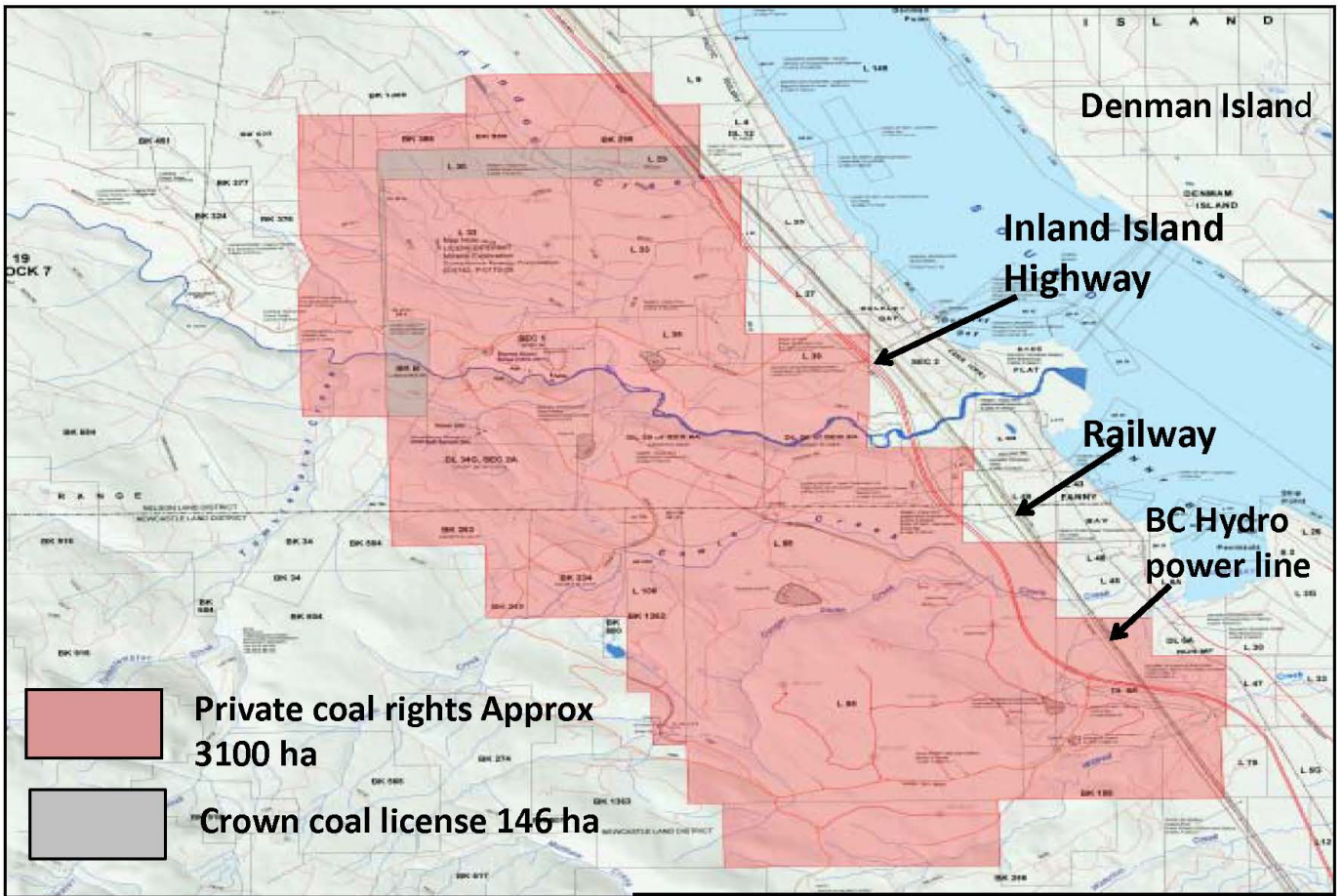


**Compliance Coal
CORPORATION**
DBA Comox Joint Venture

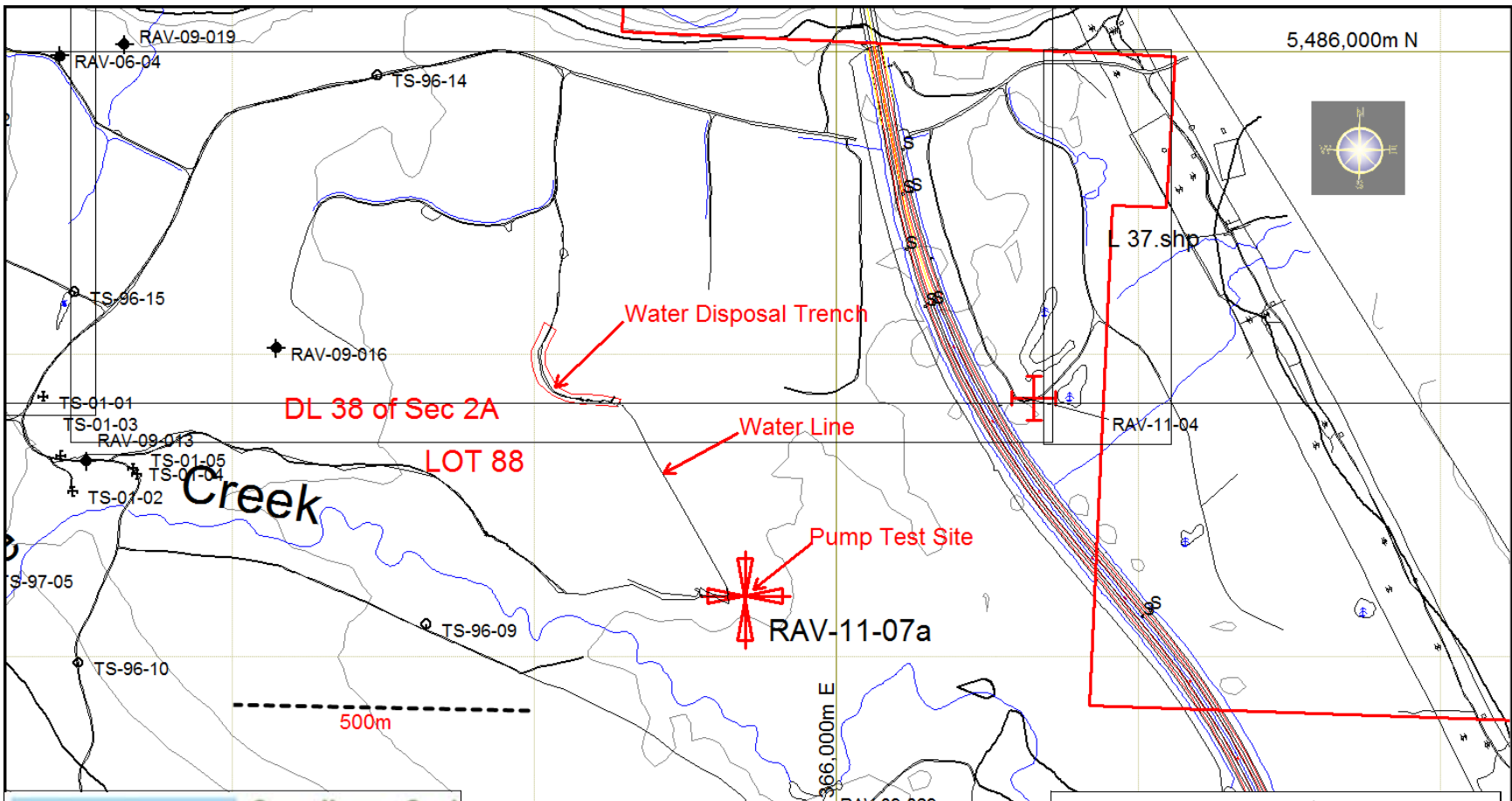
RAVEN PROJECT
Vancouver Island, British Columbia

Figure 1

918



RAVEN PROJECT
General Infrastructure and Site Layout
 Figure 2 918



Raven Project
Hydrogeological Drilling Program 2012 Location Map Pumping Well RAV-11-07a & Groundwater Disposal Trench
FIGURE 3
March, 2013