



**DRAFT ENVIRONMENTAL BASELINE STUDIES  
2006 STUDY PLANS**

**CHAPTER 5.  
GROUNDWATER HYDROLOGY**

**JULY 2006**

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## 5. Groundwater Hydrology

### 5.1 Mine Studies

This document briefly summarizes the scope of hydrogeology studies for the Pebble Project during 2006 and compares this scope to previous years in Tables 5.1-1 and 5.1-2. The scope has been divided into nine tasks, as discussed in the following task descriptions.

#### Task 1—Field Work

The field programs for 2006 include the following:

- Monthly monitoring of groundwater levels at 211 locations (Figures 5.1-1 and 5.1-2, Table 5.1-2).
- Quarterly sampling of groundwater at 34 locations (Figure 5.1-1, Table 5.1-2).
- Drilling and installation of a total of six piezometers and monitoring wells during June and July, 2006 (Figure 5.1-1).

The groundwater field work is conducted by SLR Alaska, and oversight is provided by Water Management Consultants (WMC). This work was originally described in Section 5.1.2.3 of the 2005 study plan.

#### Task 2—Input to Tasks by Others

Some studies under the direct supervision of other consultants are useful to the hydrogeology study and other studies use the findings of the hydrogeology study. WMC is providing input to these studies, which include the following:

- Streamflow monitoring.
- Meteorological data collection.
- Water balance.
- Site-wide mass balance.
- Pit lake study.
- Bench-scale attenuation testing of aquifer materials.
- Low-flow streamflow measurements.
- Reconnaissance surveys of seeps.
- Ongoing sampling and flow measurement of 24 priority seeps.
- Installation of a Westbay monitoring system in a deep bedrock drill hole.

- Mine design.

This input takes the form of occasional telephone calls, memoranda, and/or meetings. This work was originally described in section 5.1.2.4 of the 2005 study plan.

### Task 3—Data Review and Analysis

This task involves detailed review and analysis of data relevant to the hydrogeological study. These data include the following:

- Geologic characterization.
- Groundwater piezometric distributions.
- Well and piezometer test analyses.
- Meteorological correlations.
- Surface water flow correlations.
- Groundwater quality characterization.
- Groundwater, surface water, and seep water quality correlations.
- Development of hydrogeologic cross-sections.
- Time series and snapshots of piezometric elevations.
- Interpretations of groundwater quality.
- Interpretations of the relationship between groundwater, surface water, and seeps.

This work was originally described in section 5.1.2.5 of the 2005 study plan.

### Task 4—Groundwater Recharge Analysis

The groundwater recharge analysis incorporates surface water and groundwater flows into an integrated model that accounts for precipitation, runoff, evapotranspiration, sublimation, spring runoff, groundwater recharge, groundwater discharge, and interbasin transfer of groundwater. During 2006, the analysis is being updated with the latest available streamflow and precipitation data to improve current estimates of groundwater/surface water interaction. This work was originally described in section 5.1.2.6 of the 2005 study plan.

### Task 5—Pit Dewatering and Impacts

A baseline groundwater model is being developed that includes the proposed pit area. The model will simulate groundwater flow directions and surface water/groundwater interaction. The model will be calibrated so that the flows calculated by the groundwater model are consistent with the groundwater recharge analysis. The model will eventually be used to assess impacts of the pit on streamflow during operations and when the pit lake forms after closure. This work was originally described in section 5.1.2.7 of the 2005 study plan.

## Task 6—Tailings Area Hydrogeology and Impacts

The baseline groundwater model also includes the proposed tailings areas. Again, the model will simulate groundwater flow directions and surface water/groundwater interaction. The model will be calibrated so that the flows calculated by the groundwater model are consistent with the groundwater recharge analysis in the tailings area. The model will eventually be used to assess impacts of the tailings impoundment on streamflow and potential solute transport from the tailings impoundment. This work was originally described in section 5.1.2.8 of the 2005 study plan.

## Task 7—Groundwater Supply Assessment

Groundwater supply is not currently being considered, so no activities are planned for the groundwater supply assessment during 2006. This work was originally described in section 5.1.2.9 of the 2005 study plan.

## Task 8—Meetings

Meetings with NDM, regulators, and other consultants involved in the project will be attended as necessary.

## Task 9—Reporting

Formal reporting during 2006 consists of the environmental baseline document.

## Comparison with Other Years

Tables 5.1-1 and 5.1-2 compare the scopes of work for groundwater hydrology in 2004, 2005, and 2006. Most of the data are being analyzed in 2005 and 2006. Similarly, the number of groundwater monitoring points has increased over these three years (Table 5.1-3).

Table 5.1-3  
Comparison of Groundwater Monitoring Points

Year	Water Level Monitoring		Sampling	
	No. of Stations	Frequency	No. of Stations	Frequency
2004	68	Once	18-20	Twice
2005	90-169 <sup>(1)</sup>	Monthly	21-34	Quarterly
2006	211 <sup>(2)</sup>	Monthly	34	Quarterly

Notes:

1. Number of monitoring stations increased between 2004 and 2005 as a result of installing additional monitoring points. During 2005, the number of monitoring points varied depending on accessibility and weather conditions.
2. Stations increased to 211 as a result of the wetlands groundwater monitoring program. An additional six monitoring points will be installed during the 2006 field season.

## 5.2 Transportation Corridor

See Section 5.2 of the 2005 study plan.

**Table 5.1-1**  
**Pebble Project Environmental Studies**  
**Study Summary for Groundwater Hydrology, Mine Studies, 2004-2006**  
**Consultant: WMC**

Discipline	2004 Data Collected or Tasks	2005 Data Collected or Tasks	2006 Tasks to be Completed
Groundwater Hydrology--Mine	Field Work	Field Work	Field Work
	Input to Tasks by Others	Input to Tasks by Others	Input to Tasks by Others
	Meetings	Data Review and Analysis	Data Review and Analysis
		Groundwater Recharge Analysis	Groundwater Recharge Analysis
		Pit Dewatering and Impacts	Pit Dewatering and Impacts
		Tailings Area Hydrogeology and Impacts	Tailings Area Hydrogeology and Impacts
		Groundwater Supply Assessment	Meetings
		Meetings	Reporting
	Reporting		







**Table 5.1-2, Sample Site Period-of-Record Index, 2004-2006**  
**Groundwater Monitoring Locations**  
**Mine Area**

Monitoring Site	Year <sup>1</sup>	Period of Record by Task																								Notes
		Sampling												Water Levels												
		Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	
I-172	2004																									
	2005													X	X	X	X	X	X	X	X	X	X	X	X	
	2006													X	X	X	X	X	X	X	X	X	X	X	X	
I-192	2004																									
	2005													X	X	X	X	X	X	X	X	X	X	X	X	
	2006													X	X	X	X	X	X	X	X	X	X	X	X	
I-201	2004																									
	2005													X	X	X	X	X	X	X	X	X	X	X	X	
	2006													X	X	X	X	X	X	X	X	X	X	X	X	
KP-P1/SRK-2	2004																									
	2005				X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006				X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	
KP-P3D / SRK-5D	2004								X	X												X				
	2005			X	X			X					X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006				X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
KP-P3M / SRK-5M	2004								X	X												X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
KP-P3S / SRK-5S	2004								X	X												X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
KP-P4	2004																									
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
M-110	2004																									
	2005												X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006												X	X	X	X	X	X	X	X	X	X	X	X	X	
M-12	2004																									
	2005												X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006												X	X	X	X	X	X	X	X	X	X	X	X	X	
M-21	2004																									
	2005												X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006												X	X	X	X	X	X	X	X	X	X	X	X	X	
M-62	2004																									
	2005												X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006												X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-1D	2004												X	X												
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-1M	2004												X	X												
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-1S	2004												X	X												
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-2D	2004												X	X								X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-05-2M	2004																					X			Well was scheduled to be sampled, but excessive silt prevents sampling.	
	2005												X	X	X	X	X	X	X	X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
MW-2S	2004																					X			Well was scheduled to be sampled, but excessive drawdown (due to silt) prevents sampling.	
	2005												X	X	X	X	X	X	X	X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
MW-05-2SR	2004																					X			Well was scheduled to be sampled, but excessive silt prevents sampling.	
	2005												X	X	X	X	X	X	X	X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
MW-3D	2004																					X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-4 (Stand 1)	2004																								Well was scheduled to be sampled, but lack of water precludes sampling.	
	2005												X	X	X	X	X	X	X	X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
MW-5D	2004												X	X								X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-5M	2004												X	X								X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-5S	2004												X	X								X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
MW-6D	2004												X	X								X				
	2005			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	

**Table 5.1-2, Sample Site Period-of-Record Index, 2004-2006  
Groundwater Monitoring Locations  
Mine Area**

Monitoring Site	Year <sup>1</sup>	Period of Record by Task																								Notes
		Sampling												Water Levels												
		Month	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	
MW-7D	2004									X	X													X		
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X	X	
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X	X	
MW-7S	2004									X	X												X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-8D	2004									X	X												X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-8M	2004									X	X												X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-8S	2004									X	X												X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-9D	2004									X	X												X			
	2005			X	X			X						X	X	X	X	X	X	X	X	X	X	X		
	2006				X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-10	2004																						X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-11D	2004																						X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-11M	2004																						X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-11S	2004																						X			
	2005			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-11SS	2004																						X			
	2005																						X			
	2006				X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-12D	2004																									
	2005							X			X						X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-12S	2004																									
	2005							X			X						X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-13D	2004																									
	2005							X			X						X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-13S	2004																									
	2005							X			X						X	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-14D	2004																									
	2005																	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
MW-05-14S	2004																									
	2005																	X	X	X	X	X	X	X		
	2006			X	X			X			X			X	X	X	X	X	X	X	X	X	X	X		
P-2D	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-2M	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-3	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-4AD	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-4AS	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-4MID	2004																						X			
	2005													X	X	X										
	2006																									
P-6D	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-6M	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-6S	2004																						X			
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		



**Table 5.1-2, Sample Site Period-of-Record Index, 2004-2006  
Groundwater Monitoring Locations  
Mine Area**

Monitoring Site	Year <sup>1</sup>	Period of Record by Task																								Notes
		Sampling												Water Levels												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
P-05-21D	2004																									
	2005																			X	X	X	X	X		
	2006													X	X	X	X	X	X	X	X	X	X	X		
P-05-21M	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-21S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-22D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-23	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-24D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-24S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-25	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-26D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-26M	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-26S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-27D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-27M	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-27S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-28D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-28S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-29D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-29D2	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-29M	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-29S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-30D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-30S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-31D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-31S	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-32D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-33D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-34D	2004																									
	2005																			X	X	X	X	X		
	2006												X	X	X	X	X	X	X	X	X	X	X	X		

**Table 5.1-2, Sample Site Period-of-Record Index, 2004-2006  
Groundwater Monitoring Locations  
Mine Area**

Monitoring Site	Year <sup>1</sup>	Period of Record by Task																								Notes
		Sampling												Water Levels												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
P-05-35D	2004																									
	2005																			X	X	X	X			
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
P-05-36D	2004																									
	2005																			X	X	X	X			
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
P-05-36M	2004																									
	2005																			X	X	X	X			
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
P-05-36S	2004																									
	2005																			X	X	X	X			
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
PQ-4	2004																									
	2005										X									X	X	X	X			
	2006			X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X		
PQ-8	2004																									
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
PQ-9	2004																									
	2005													X	X	X	X	X	X	X	X	X	X	X		
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
SRK-1A	2004																									
	2005											X	X	X	X	X	X	X	X	X	X	X	X	X		
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
SRK-2	2004																					X				
	2005											X	X	X	X	X	X	X	X	X	X	X	X	X		
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
SRK-2A	2004																					X				
	2005											X	X	X	X	X	X	X	X	X	X	X	X	X		
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
SRK-3	2004																					X				
	2005										X	X	X	X	X	X	X	X	X	X	X	X	X	X		
	2006			X	X			X			X	X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P01D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P01S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S01D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S01G	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S01S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P02D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P02S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S02D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S02G	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S02S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P03D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P03S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S03D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S03G	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-S03S	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		
WL-P04D	2004																									
	2005																									
	2006											X	X	X	X	X	X	X	X	X	X	X	X	X		

**Table 5.1-2, Sample Site Period-of-Record Index, 2004-2006  
Groundwater Monitoring Locations  
Mine Area**

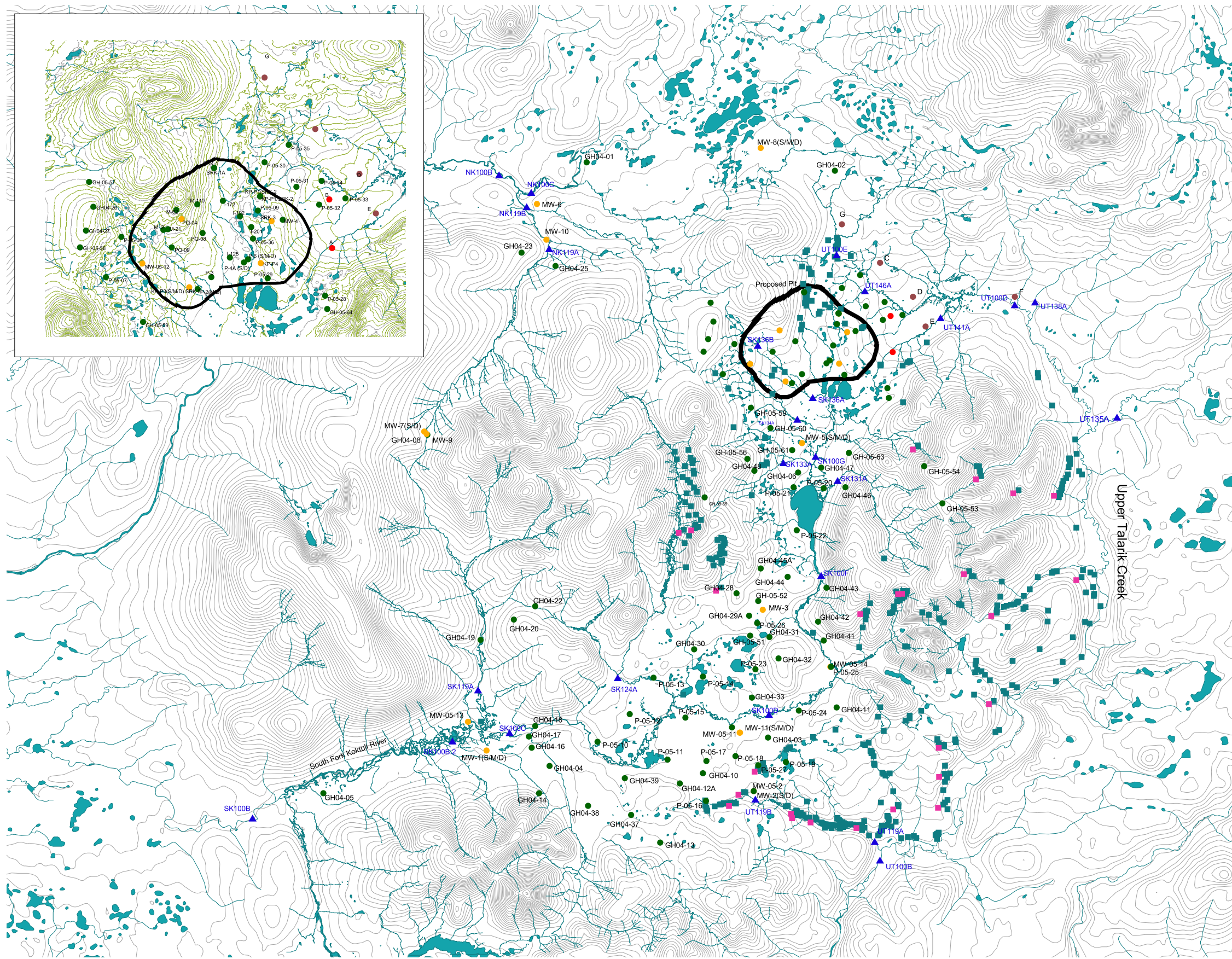
Monitoring Site	Year <sup>1</sup>	Period of Record by Task																								Notes
		Sampling												Water Levels												
		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
WL-P04S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S04D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S04G	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S04S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P05D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P05S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S05D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S05S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P06D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P06S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S06D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S06G	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S06S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P07D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P07S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S07D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S07G	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-S07S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P08D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P08S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P09D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P09S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P10D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P10S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P11D	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		
WL-P11S	2004																									
	2005																									
	2006												X	X	X	X	X	X	X	X	X	X	X	X		

**KEY:**  
 GH Geotechnical Hole  
 MW Monitoring Well  
 P Piezometer  
 WL Wetlands Location

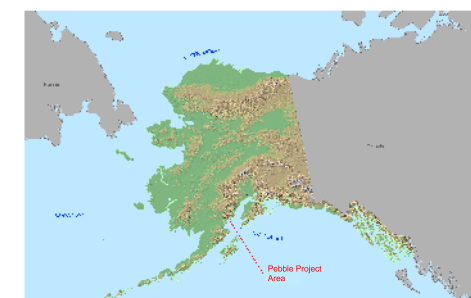
**NOTES:**  
 1 Work postdating April 2006 is planned, but not yet completed



**Figure 5.1-1**  
**2006 Hydrogeology Study Plan**  
**Monitoring Wells and Piezometers**  
**Mine Study Area**



- Piezometer
- Monitoring Well
- Proposed Baseline Monitoring Well (2006)
- Proposed Piezometer (2006)
- Seep
- Sampled Seep
- ▲ Stream Gaging Location



0 4000 8000 12000 16000 20000 Feet

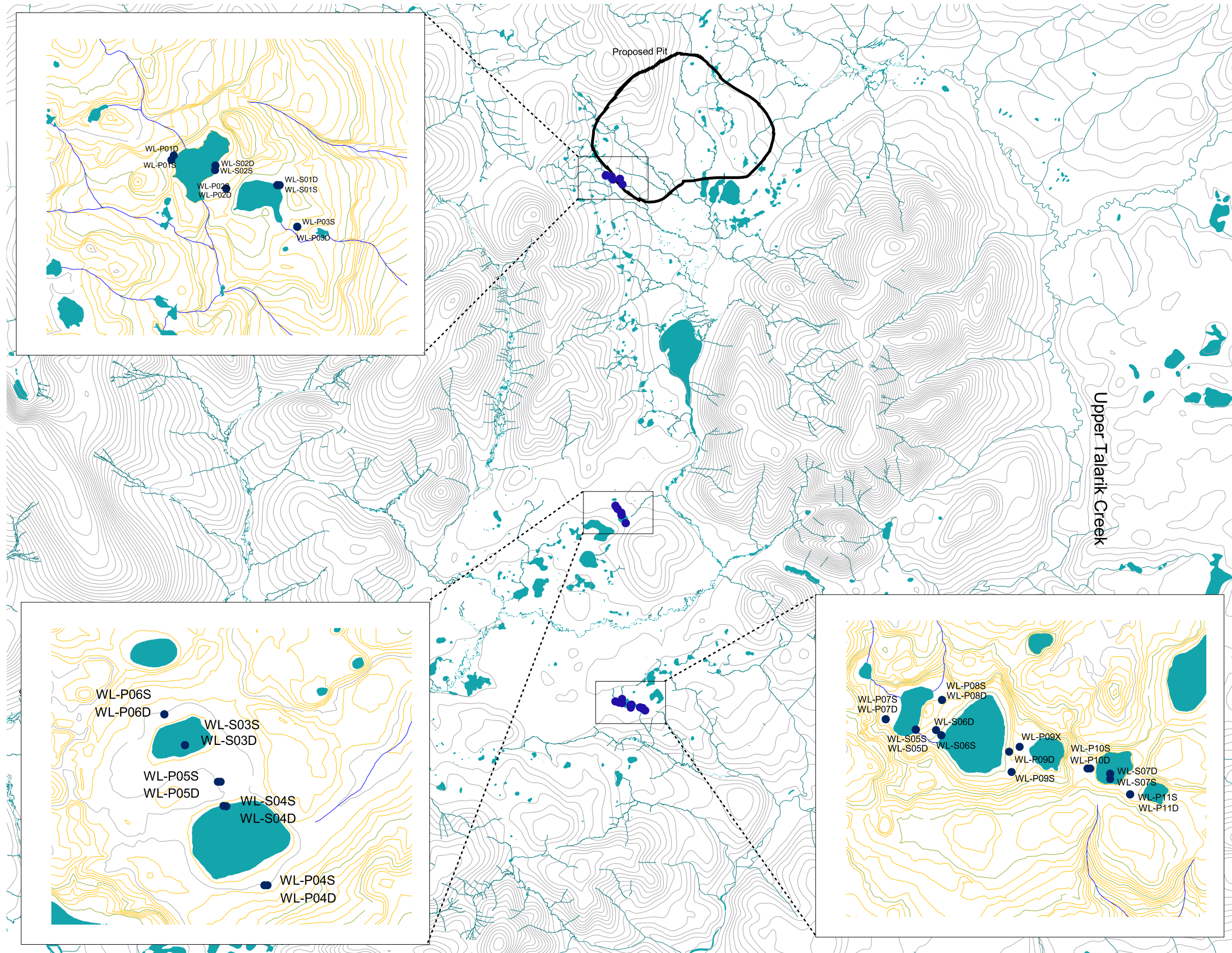
0 1000 2000 3000 4000 5000 Meters





**Figure 5.1-2**  
**2006 Hydrogeology Study Plan**  
**Wetlands Piezometers**  
**Mine Study Area**

● Wetlands Piezometer



0 4000 8000 12000 16000 Feet

0 1000 2000 3000 4000 Meters

