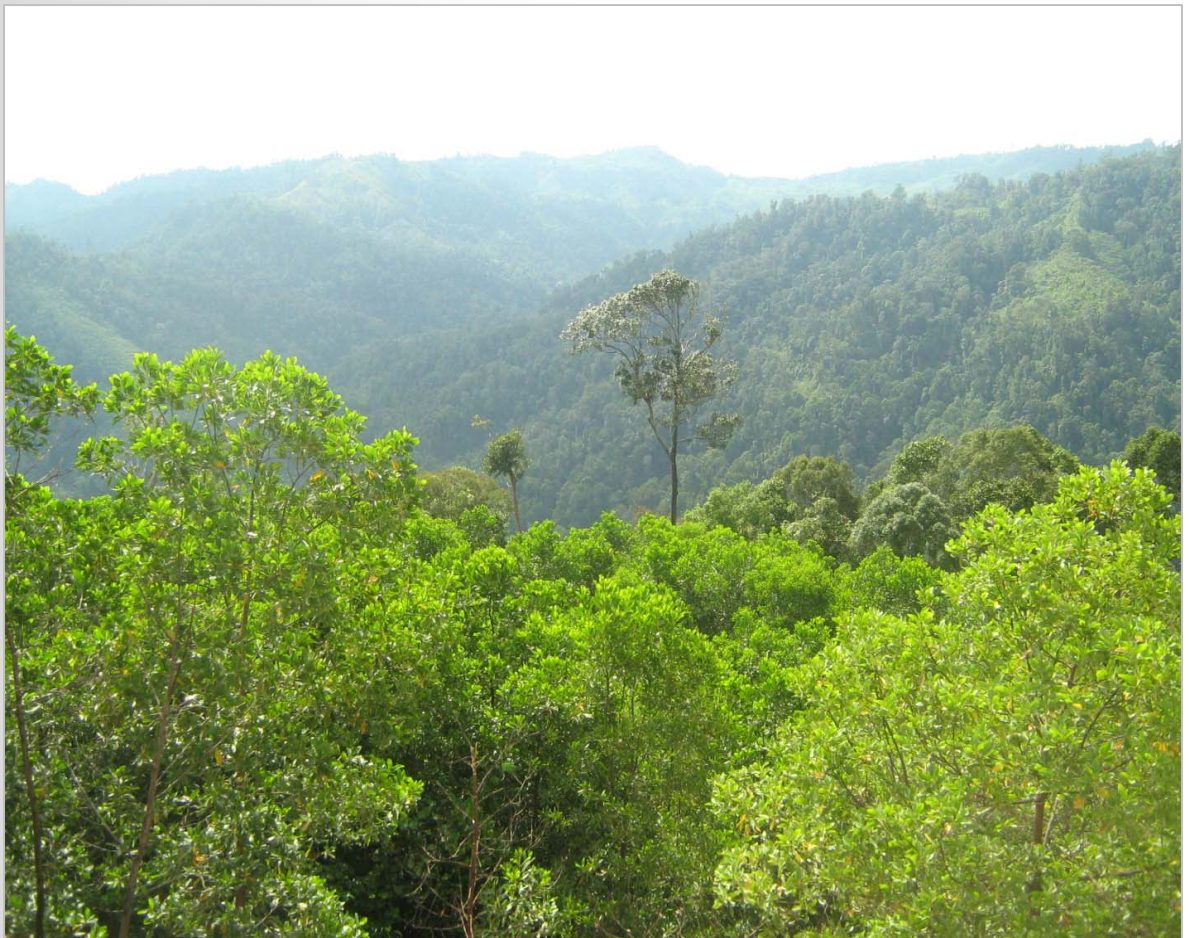




Annual Environmental Protection And Enhancement Program Year 2010

Canatuan Project



November 30, 2009

TVI Resource Development Phils. Inc



**ANNUAL ENVIRONMENTAL PROTECTION
AND ENHANCEMENT PROGRAM**

CANATUAN PROJECT

TVI RESOURCE DEVELOPMENT (PHILS) INC.

**ANNUAL REPORT YEAR 2010
REVISION 0**



**ANNUAL ENVIRONMENTAL PROTECTION AND ENHANCEMENT PROGRAM
CANATUAN PROJECT
TVI RESOURCE DEVELOPMENT PHILIPPINES INC.**

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 Introduction	
1.1 Background.....	1-1
1.2 Significant Changes for Year 2009 AEPEP.....	1-3
2.0 Project Information	
2.1 Project Name.....	2-1
2.2 Project Location.....	2-1
2.3 Company Office.....	2-1
2.4 Company Contact Persons.....	2-1
3.0 Project Description	
3.1 Project Details.....	3-1
3.1.1 General.....	3-1
3.1.2 Mining Method.....	3-1
3.1.3 Mill and Processing Plant.....	3-7
3.1.4 Sulphide Tailings Management.....	3-9
3.1.5 Production.....	3-14
3.2 Mineral Resources.....	3-16
3.2.1 Reserves and Resources.....	3-16
3.2.2 Average Grade of Ore.....	3-16
3.3 Access and Transportation.....	3-17
3.3.1 Road Acces.....	3-17
3.3.2 Air Access.....	3-17
3.3.3 Sea Based Shipping.....	3-17
3.4 Power Supply.....	3-17
3.5 Mining Equipment.....	3-18
3.6 Workforce Information.....	3-19
3.7 Operation and Development Schedule.....	3-19

**ANNUAL ENVIRONMENTAL PROTECTION AND ENHANCEMENT PROGRAM
CANATUAN PROJECT
TVI RESOURCE DEVELOPMENT PHILIPPINES INC.**

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
4.0 Strategy to Limit and Control Impacts	
4.1 Land Resources.....	4-1
4.1.1 Year 2009 Programs and Activities.....	4-1
4.1.1.1 Progressive Rehabilitation Activities.....	4-1
4.1.1.2 Revegetation/ Reforestation Activities.....	4-3
4.1.1.3 Sediment Control Measures.....	4-5
4.1.1.4 Other Land Resource Management Activities.....	4-7
4.1.2 Year 2010 Programs and Goals.....	4-9
4.1.2.1 Planned Progressive Rehabilitation Activities.....	4-15
4.1.2.2 Reforestation and Revegetation Plans.....	4-20
4.1.2.3 Sediment Control/ Neutralization Control Plans.....	4-21
4.1.2.4 Other Programs and Activities.....	4-21
4.2 Water Resources.....	4-22
4.2.1 Year 2009 Programs and Activities.....	4-22
4.2.1.1 Watersheds and Water Use.....	4-22
4.2.1.2 Water Quality Characteristics.....	4-28
4.2.2 Year 2010 Programs and Goals.....	4-32
4.2.2.1 Watersheds and Water Use.....	4-32
4.2.2.2 Meteorological Characteristics.....	4-33
4.2.2.3 Water Quality Characteristics.....	4-33
4.3 Noise.....	4-35
4.3.1 Year 2009 Programs and Activities.....	4-35
4.3.2 Year 2010 Programs and Goals.....	4-37
4.4 Air Quality.....	4-37
4.4.1 Year 2009 Programs and Activities.....	4-38
4.4.2 Year 2010 Programs and Goals.....	4-41
4.5 Conservation Values.....	4-41
4.5.1 Nature Issues Year 2009 Programs and Activities.....	4-41
4.5.1.1 Vegetation.....	4-41
4.5.1.2 Wildlife.....	4-44

**ANNUAL ENVIRONMENTAL PROTECTION AND ENHANCEMENT PROGRAM
CANATUAN PROJECT
TVI RESOURCE DEVELOPMENT PHILIPPINES INC.**

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
4.5.2 Nature Issues Year 2010 Programs and Goals.....	4-45
4.5.2.1 Vegetation.....	4-45
4.5.2.2 Wildlife.....	4-46
4.5.3 Visual Aesthetics Year 2009 Programs and Activities.....	4-46
4.5.4 Visual Aesthetics Year 2010 Programs and Goals.....	4-47
4.5.5 Recreation and Education Year 2009 Programs and Activities.....	4-47
4.5.6 Recreation and Education Year 2010 Programs and Goals.....	4-47
4.6 Heritage and Cultural Values.....	4-47
4.6.1 Year 2009 Programs and Activities.....	4-48
4.6.2 Year 2010 Programs and Goals.....	4-48
5.0 Environmental Management Plan	
5.1 Monitoring.....	5-1
5.2 Research.....	5-1
5.2.1 Tailings Rehabilitation and Reclamation.....	5-6
5.2.2 Water Quality.....	5-6
5.2.3 Hydrometeorology.....	5-7
5.3 Progressive Rehabilitation.....	5-7
5.4 Reporting.....	5-8
5.5 Land Use and Project Closure.....	5-8
6.0 Cost of Annual Environmental Plan	
6.1 Elements of the Environmental Programs.....	6-1
6.2 Cost of the AEPEP.....	6-1
6.3 Cost of Progressive Rehabilitation.....	6-4
7.0 Certification	
7.1 Certification.....	7-1

**ANNUAL ENVIRONMENTAL PROTECTION AND ENHANCEMENT PROGRAM
CANATUAN PROJECT
TVI RESOURCE DEVELOPMENT PHILIPPINES INC.**

LIST OF TABLES

Table	Page
3.1 Recommended Geotechnical Criteria for Sulphide Surface Mine.....	3-5
3.2 Summary of Annual Mine Extraction.....	3-5
3.3 PAG and NAG Materials Handling Schedule.....	3-6
3.4 Chemical Reagents for Copper Concentrate Processing.....	3-9
3.5 Annual Mill Feed and Generation of Tailings.....	3-15
3.6 Annual Copper and Zinc Concentrate Production.....	3-15
3.7 Mineral Resource Sulphide Deposit.....	3-16
3.8 Major Mining and Operations Equipment.....	3-18
3.9 Manpower Summary for the Sulphide Phase Operations.....	3-19
4.1 Summary of Progressive Rehabilitation Activities of Year 2009.....	4-2
4.2 Summary of Revegetation/ Reforestation Activities of Year 2009.....	4-4
4.3 Disturbed Area Estimates Within and Outside the MPSA Area.....	4-10
4.4 Year 2010 Rehabilitation and Reforestation Schedule.....	4-13
4.5 Upper Canatuan Creek Watershed Monthly Yield Baseflow Stream Weir Year 2009.....	4-25
4.6 Daily Rainfall Data Canatuan for Year 2009.....	4-26
4.7 Daily Evaporation Data Canatuan for Year 2009.....	4-27
4.8 Sulphide Tailings Impoundment Water and Materials Balance Parameters and Summary Results.....	4-34
4.9 24-hr Ambient Noise Level Monitoring Results (dBA).....	4-36
4.10 Stack Emission Monitoring Program Results Year 2009.....	4-39
4.11 Ambient Air Monitoring Program Results Year 2009.....	4-40
5.1 Summary of Environmental Strategies and Monitoring Programs Completed for Year 2009.....	5-2
5.2 Summary of Environmental Strategies and Monitoring Programs Planned for Year 2010.....	5-4

**ANNUAL ENVIRONMENTAL PROTECTION AND ENHANCEMENT PROGRAM
CANATUAN PROJECT
TVI RESOURCE DEVELOPMENT PHILIPPINES INC.**

<u>Table</u>	<u>Page</u>
5.3 Progressive Rehabilitation and Monitoring Schedule.....	5-9
6.1 Cost of Environmental Management Programs Year 2009.....	6-2
6.2 Cost of Environmental Management Programs for Year 2010.....	6-5

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
3.1 Project Features.....	3-1
3.2 Project Claim Blocks.....	3-3
3.3 Cross Section of the Sulphide Surface Mine.....	3-4
3.4 Sulphide Process Flowsheet.....	3-8
3.5 Plan View of the Sulphide Dam.....	3-12
3.6 Cross Section View of the Dam.....	3-13
4.1 Revegetation Program Year 2009.....	4-6
4.2 Sediment Pond Locations.....	4-8
4.3 Sulphide Phase Project Mine Plan Year 1.....	4-11
4.4 Sulphide Phase Project Mine Plan Year 2.....	4-12
4.5 Development Plan of Southeast Overburden Dump.....	4-17
4.6 Development Plan of the Southwest Overburden Dump and Lower Phase 2 Area...	4-19
4.7 Watershed Boundaries Year 2009.....	4-23
4.8 Regional Water Quality Monitoring Stations.....	4-29
4.9 MPSA Water Quality Monitoring Stations Year 2009.....	4-30
4.10 Forest Resources Map.....	4-43

APPENDIX A Photodocumentation of Environmental Management Activities Year 2009
APPENDIX B MMT Water Quality Assessment Results Year 2009
APPENDIX C Acid Mine Drainage Experimental Research Results

I.0 INTRODUCTION

I.1 Background

This report represents the **Year 2010 Annual Environmental Protection and Enhancement Program** (AEPEP) for the Canatuan Mining Project undertaken by TVI Resource Development Phils., Inc. (TVI). The activities, programs and data acquisition completed in Year 2009 are presented and discussed within this report. Planned and programmed activities for Year 2010 are also included and discussed. This report follows the format identified in MGB Form No. 16-3.

The information presented in this report is based on the updated Environmental Protection and Enhancement Plan (EPEP) previously submitted to the DENR-MGB and the Final Mine Reclamation and Decommissioning Plan (FMRDP) also previously submitted. The updated EPEP focuses on the second phase of the TVI Canatuan Mining Project known as the Sulphide Phase Project.

The TVIRD Canatuan Mining Project is a surface mine being developed in two phases. Phase 1 known as the Gossan Phase consisted of mining and processing a gold and silver orebody located near the ground surface. Phase 2 known as the Sulphide Phase consists of mining and processing a copper and zinc orebody located below the gossan orebody.

The Gossan Phase operations began in July 2004 and ended in April 2008 after nearly four years of mining and processing activities. The Sulphide Phase operation began in November 2008 and is anticipated to continue until August 2013.

An **Annual Environmental Protection And Enhancement Program** (AEPEP) was prepared for each of the Years 2003 through 2009 and submitted to the DENR-MGB for approval. Activities completed in each year were presented and activities planned for the subsequent year were discussed.

The **Year 2010 Annual Environmental Protection And Enhancement Program** presented herein discusses the activities completed in Year 2009 and activities planned for Year 2010. Year 2009 marks the full operation of the Sulphide Phase operations and continuation of Progressive Rehabilitation activities initiated in Year 2008. A **Final Mine Rehabilitation and Decommissioning Plan (FMRDP)** has been prepared and was submitted to the MGB under separate cover in January 2008. This program has been incorporated in the preparation of the AEPEP ever since.

I.0 INTRODUCTION

An **Environmental Performance Report and Management Plan (EPRMP)** was completed and submitted to the Environmental Management Bureau Central Office in Year 2008. The document was prepared as a compliance requirement for a request in the amendment of some conditions in the ECC due to changes in the Sulphide Phase Project operations. Additional feasibility studies completed for the Sulphide Phase in Years 2003 to Year 2007 identified some changes in the Project parameters. Most notable is an increase in the available ore reserve and mill production rate. This has resulted in the need for increased tailings storage capacity and increased production rates affecting conditions No. 8 and No. 15 of the Project's Environmental Compliance Certificate (ECC). Mitigating measures and management plans in line with the project changes have been incorporated in the EPRMP report and will also serve as basis for additional programs under the EPEP and AEPEP documents. The amended ECC was issued in March 4, 2009.

Some changes in project operations will be implemented in Year 2010 related to mill production. Plant and mining optimization activities undertaken during the 1st year of operation of the Sulphide Phase (2009), have resulted in some production improvements which will be implemented in Year 2010. It is planned that the maximum daily mill production capacity will be increased from 1,850 dry metric tonnes to 2,500 dry metric tonnes. The annual extraction rate will likewise be increased to 2.5 million tonnes per year but no other production parameters will be changed.

Varying weather conditions in the mine area affects quality of ore fed to the mill plant, it is thus anticipated that in some occasions identified daily mill throughput will not be attained, and thus offset in days when the weather conditions shall be desirable. Further, maximizing equipment loading reduces equipment breakdown eventually reducing operating costs. In this regard, an amendment of the production capacity stated in the ECC issued in March 2009 has been requested from the DENR-EMB. An EPRMP was submitted to the DENR-EMB in November 2009. There will be minimal changes in the environmental management program of TVIRD since no additional impacts are expected from the increase in production capacity that has not been addressed by the previous EPRMP.

I.0 INTRODUCTION

I.2 Significant Activities For Year 2010 AEPEP

Significant activities implemented based on the Year 2010 AEPEP consist of the following:

- Completion of Stage 3 of the Sulphide Tailings Dam and Impoundment with crest elevation of 320 m and spillway elevation at 314 m.
- Continued rehabilitation of the Lower Phase I mined out area.
- Continued rehabilitation of the Southeast and Southwest Overburden Stockpile area.
- Rehabilitation of the Phase II, Lower Phase II mined out area.
- Rehabilitation of Junkyard area.
- Rehabilitation of the Lumot Creek Watershed disturbed areas.
- Rehabilitation of the Gossan Northridge Area and Diversion Dam area.
- Revegetation activities within and outside the MPSA.
- Conduct of Health Studies related to heavy metal concentrations in residents within and around the MPSA.
- Conduct of Flora and Fauna Monitoring at various stations within the MPSA.
- Continued research on passive treatment using wetland technology for the treatment of acid mine drainage from surface water run off.
- Establishment of vegetation and experimental fish culture at the Sulphide Tailings Impoundment.
- Experimental research on agricultural root crop farming on tailings surfaces at the Gossan Tailings Impoundment.
- Reclamation of the Upper and Lower Tailings Impoundments as plantation crop areas..

Details of the activities implemented in Year 2009 and the proposed activities for Year 2010 are provided in the succeeding sections.

2.0 PROJECT INFORMATION

2.1 Project Name

Canatuan Mining Project Sulphide Phase

2.2 Project Location

Sitio Canatuan, Barangay Tabayo

Municipality of Siocon

Zamboanga del Norte

2.3 Company Office

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Ms. Nilda Callora

Environment Manager, Canatuan Project

Sitio Canatuan, Barangay Tabayo

Municipality of Siocon

Zamboanga del Norte

3.0 PROJECT DESCRIPTION

3.1 Project Details

3.1.1 General

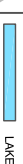







The Project area (**Figure 3.1**) is located east of Siocon Town within Barangay Tabayo, and within the central portion of the Province of Zamboanga del Norte. The terrain is hilly and mountainous and ranges in elevation between 300 meters and 550 meters. The climate is tropical with an average annual rainfall of 3,063 mm through Year 2008 and temperatures ranging from 22° C to 31° C.

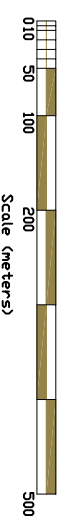
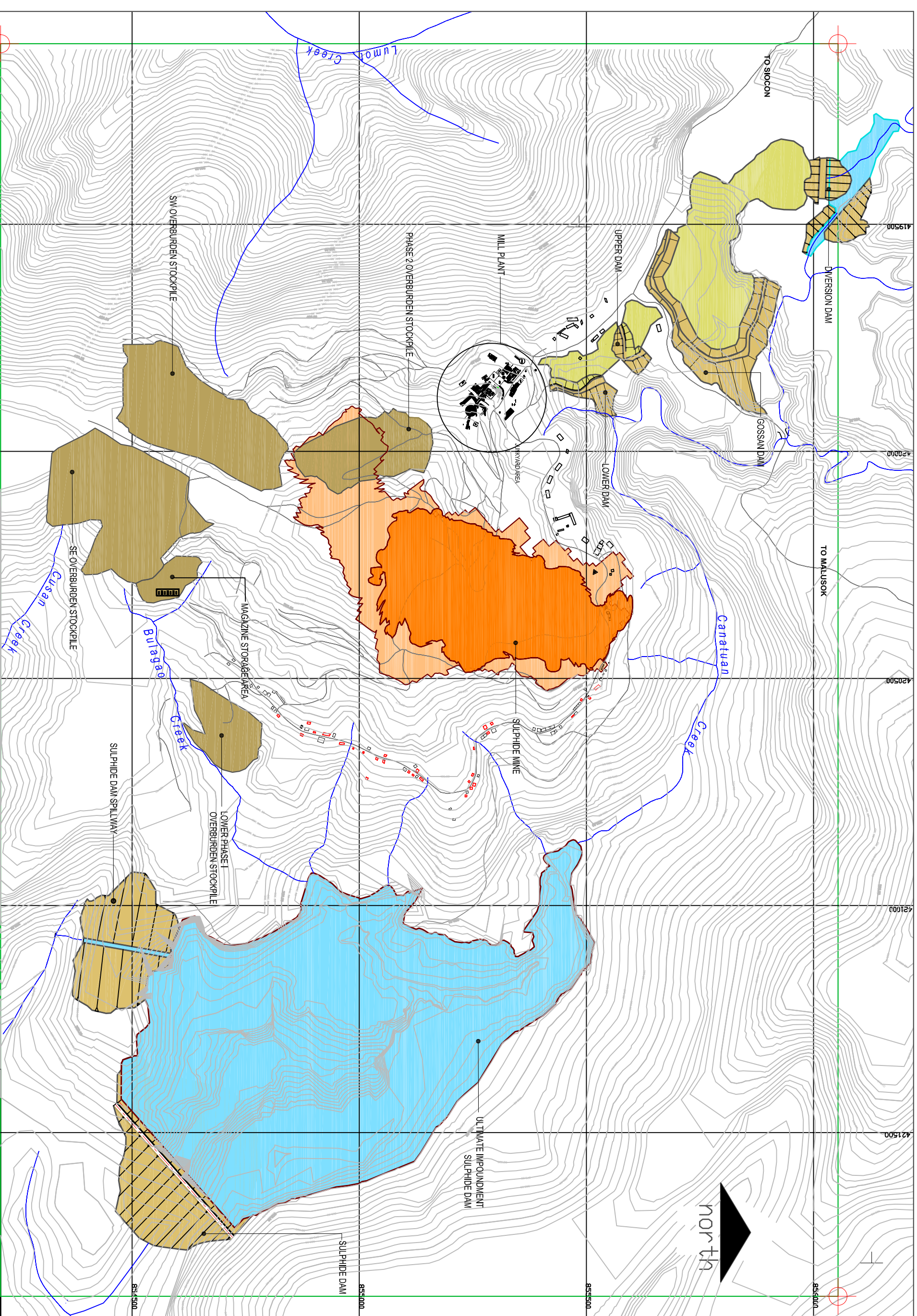
The property comprises two Exploration Permit Application (EPA) areas totaling 32,400 hectares and three claim blocks totaling approximately 4,755 hectares. These areas are shown on **Figure 3.2**. The main claim block within which the reserves have been delineated covers an area of approximately 508 hectares. This particular area is covered under a **Mineral Production Sharing Agreement (MPSA)** issued on October 23, 1996. TVI has a 100% interest in the property which is subject to a 1% royalty by a former claim owner.

3.1.2 Mining Method

Mining of the Sulphide ore deposit will be the same as surface mining method used during the Gossan Phase. The overall surface mine area will encompass approximately 26 ha. This includes portions of the Gossan Surface Mine which is outside the boundaries of the Sulphide ore reserve and the Sulphide ore reserve underlying the Gossan surface mine.

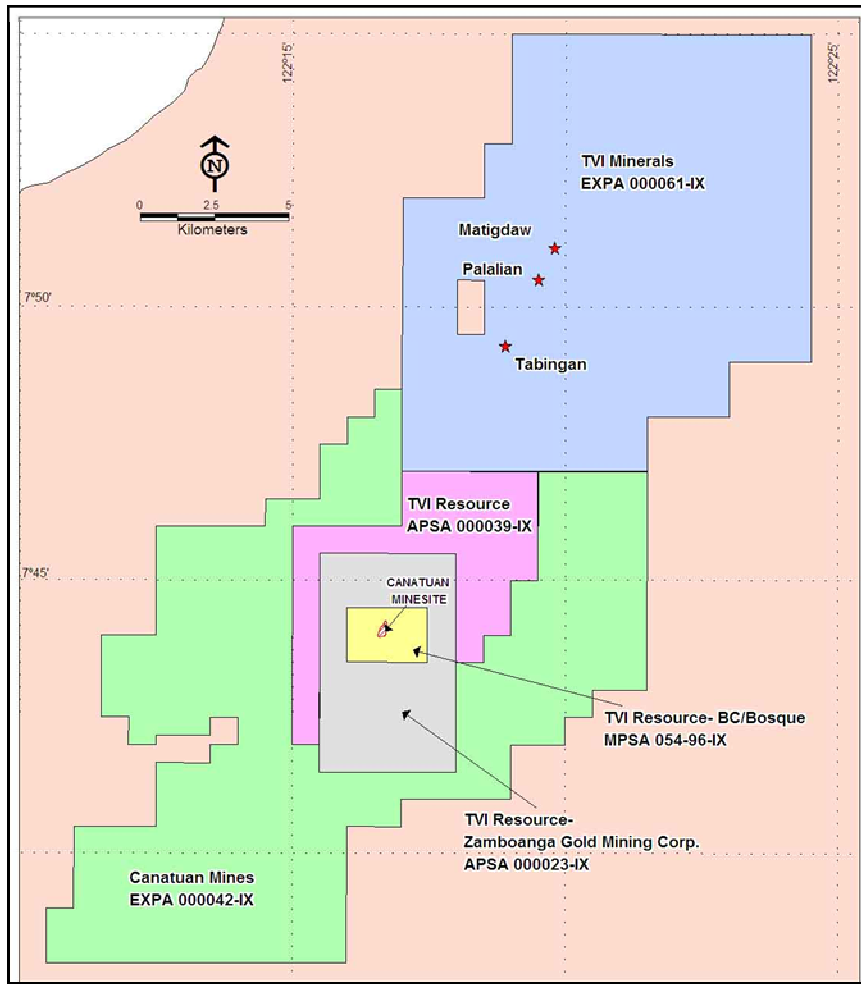
Mining of the Sulphide ore will require excavation depths ranging from less than 1 m to approximately 60 m. Benching operations practiced during the Gossan operations will continue throughout the Sulphide Phase of mining. Maximum bench wall height is planned to be from 80 to 85 m. This is consistent with the 75 m depth presented in the 1996 EIS. Geotechnical criteria for the walls and benches of the Sulphide surface mine to best maintain pit wall stabilities are shown in **Table 3.1**. A typical cross section of the surface mine for Sulphide Phase is shown on **Figure 3.3**.

- LEGEND:**
-  LAKE
 -  TAILINGS IMPOUNDMENT
 -  OVERBURDEN STORAGE AREA
 -  DAM AND SPILLWAY ENBANKMENT
 -  SULPHIDE SURFACE MINE (TM)
 -  SULPHIDE/GOSSAN SURFACE MINE
 -  MPSA BOUNDARY
 -  RIVERS AND CREEKS

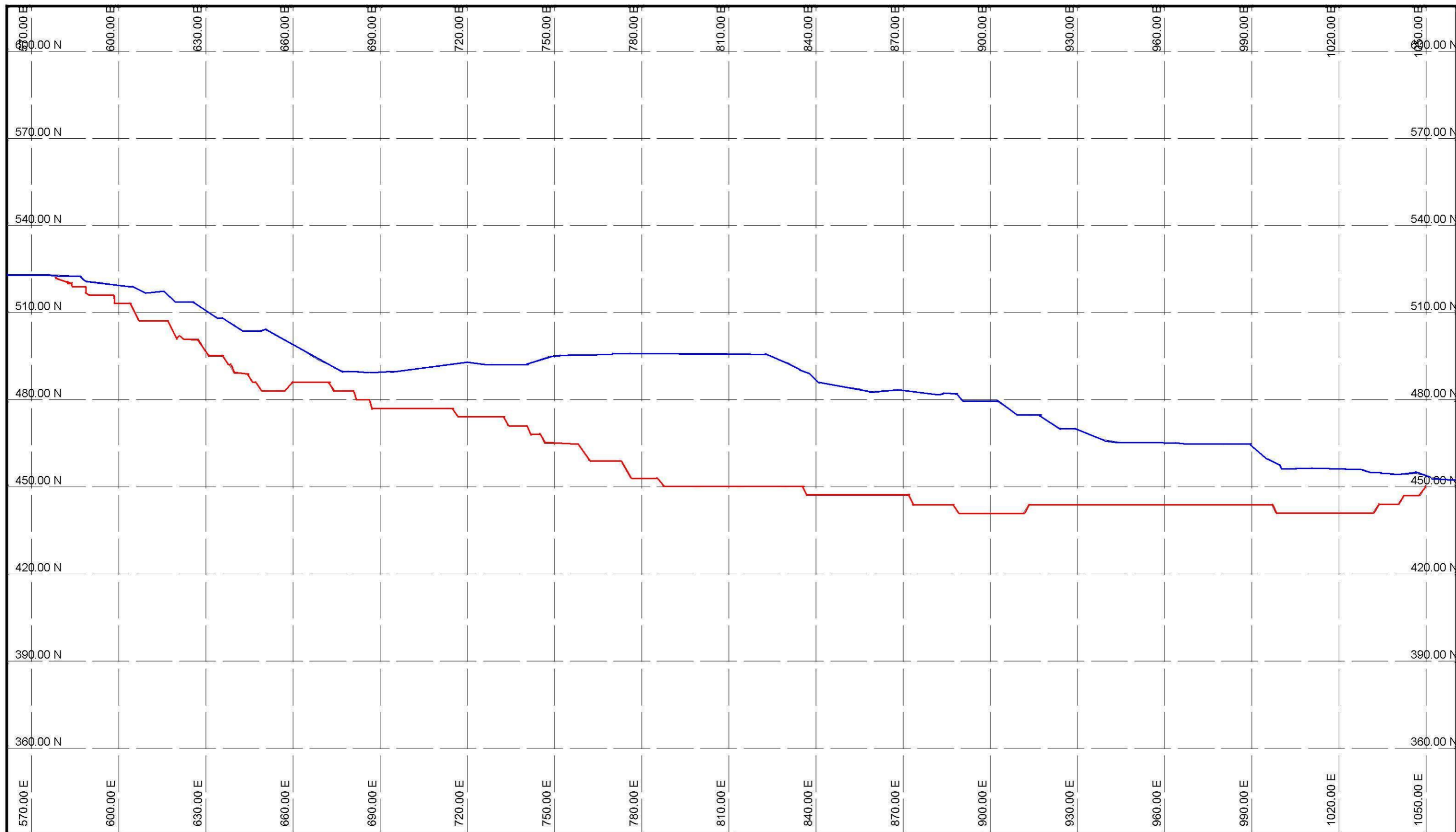


3.0 PROJECT DESCRIPTION

Figure 3.2 – Project Claim Blocks



Source: TVI Resource Development Phils., Inc.



Pit Outline as of January 26, 2009 —
 Final Pit Outline —



LAST REVISED: FEB 10, 2009

CANATUAN MPSA

SULPHIDE PHASE PROJECT
CROSS SECTION ALONG LINE 420325E

FIG NO.
3.3

3.0 PROJECT DESCRIPTION

Table 3.1 – Recommended Geotechnical Criteria for Sulphide Surface Mine

Geologic Unit	Bench Height	Dry Density (tonnes/m ³)	Inter Ramp Slope Angle	Face Angle	Bench Width
Laterite/Overburden	3m	1.58	30°	63.4°	7.4m
Saprolite	3m	1.93	30°	63.4°	7.4m
Gossan	3m	1.93	30°	63.4°	7.4m
Rubbly Gossan	3m	1.68	30°	63.4°	7.4m
Sulphide	3m	4.25	45°	65°	4.6m
Schist	3m	2.20	45°	65°	4.6m

Source: Knight Piesold, 1996 and Norwest Corporation, 2006

The daily extraction rate for the Sulphide ore will vary depending on the mine plan, weather, equipment availability and ore characteristics. An annual summary is shown on **Table 3.2**. This is based on the updated Environmental Performance Report and Management Plan (EPRMP) submitted to DENR-EMB for the request to amend the ECC issued in March 2009. The revision requests an increase in the production capacity of 1,850 tonnes per day to 2,500 tonnes per day. Annual extraction rate is likewise increased from 1.6 million tonnes to 2.5 million tonnes.

Table 3.2 - Summary of Annual Mine Extraction

Year	Total Mined (tonnes)	Sulphide Ore (tonnes)	Average Extraction (tonnes/day)	
			Total	Ore
2008	600,717	35,091	3,926	229
2009	1,362,950	674,721	3,734	1,848
2010	1,965,370	673,751	5,384	1,846
2011	2,459,820	603,610	6,739	1,653
2012	1,777,713	851,921	4,857	2,327
2013	648,504	512,215	1,776	1,403
Total	8,815,074	3,351,309		

Notes:

1. Year 2008 represents 2 months of mill operations, November and December.
2. Total Mined represents ore plus waste.
3. Source: TVI 2009

Mining of the Sulphide ore body will produce overburden waste materials which are divided into two categories: Potentially Acid Generating (PAG) material and Non Acid Generating (NAG) material.

3.0 PROJECT DESCRIPTION

The volume of material within each category is a function of the amount of pyrite within the soil and rock. Original estimates of this volume based on drilling and laboratory testing were conducted by Norwest Consulting Engineers in Year 2006. However, recent geological studies were conducted that served as input for updated mine planning and materials movement analysis. The resulting distribution and handling of PAG and NAG material is summarized in **Table 3.3**.

Table 3.3 – PAG and NAG Materials Handling Schedule

Year	Total Waste (tonnes)	PAG (tonnes)	NAG (tonnes)
2008	565,626	247,487	318,139
2009	688,229	283,147	405,082
2010	1,291,619	804,812	486,807
2011	1,856,210	1,062,825	793,385
2012	925,792	820,712	105,080
2013	136,289	132,403	3,886
2014	0	0	0
Total	5,463,765	3,351,386	2,112,379

Source: TVI 2009

These materials will be segregated and stored separately. PAG materials will be placed and stored in the Sulphide Tailings Impoundment and/or overburden stockpiles near the Surface Mine. This segregation of PAG is planned for the purpose of control and management of acid water runoff generation and prevention of oxidation of the Sulphide overburden material. Sulphide tailings produced by the mill and processing facility will also be placed within the Sulphide Tailings Impoundment and a permanent water cover maintained.

The NAG materials will be stripped from the ore body and will be placed within areas previously disturbed as part of the Gossan Phase operations. These materials may also be used as soil cover during the rehabilitation of the mined out areas and to cover the PAG materials placed within the overburden stockpiles.

3.0 PROJECT DESCRIPTION

3.1.3 Mill and Processing Plant

During the Gossan Phase operations, the mill process consisted of crushing, milling and processing of mined ore. A hybrid process consisting of a Merrill-Crowe and Carbon in Leach circuit was used for the recovery of gold and silver. The Sulphide Phase operation will use the same front end crushing and grinding process from the Gossan operation and will use a Flotation Circuit for the recovery of copper and zinc concentrates.

After extraction from the surface mine, the Sulphide ore will be transported to the head of the mill where it will be crushed and conveyed through a milling and grinding circuit. After crushing and grinding the material to the desired feed size, the product will be fed to a copper flotation circuit to produce a copper concentrate and a zinc flotation circuit to produce zinc concentrate.

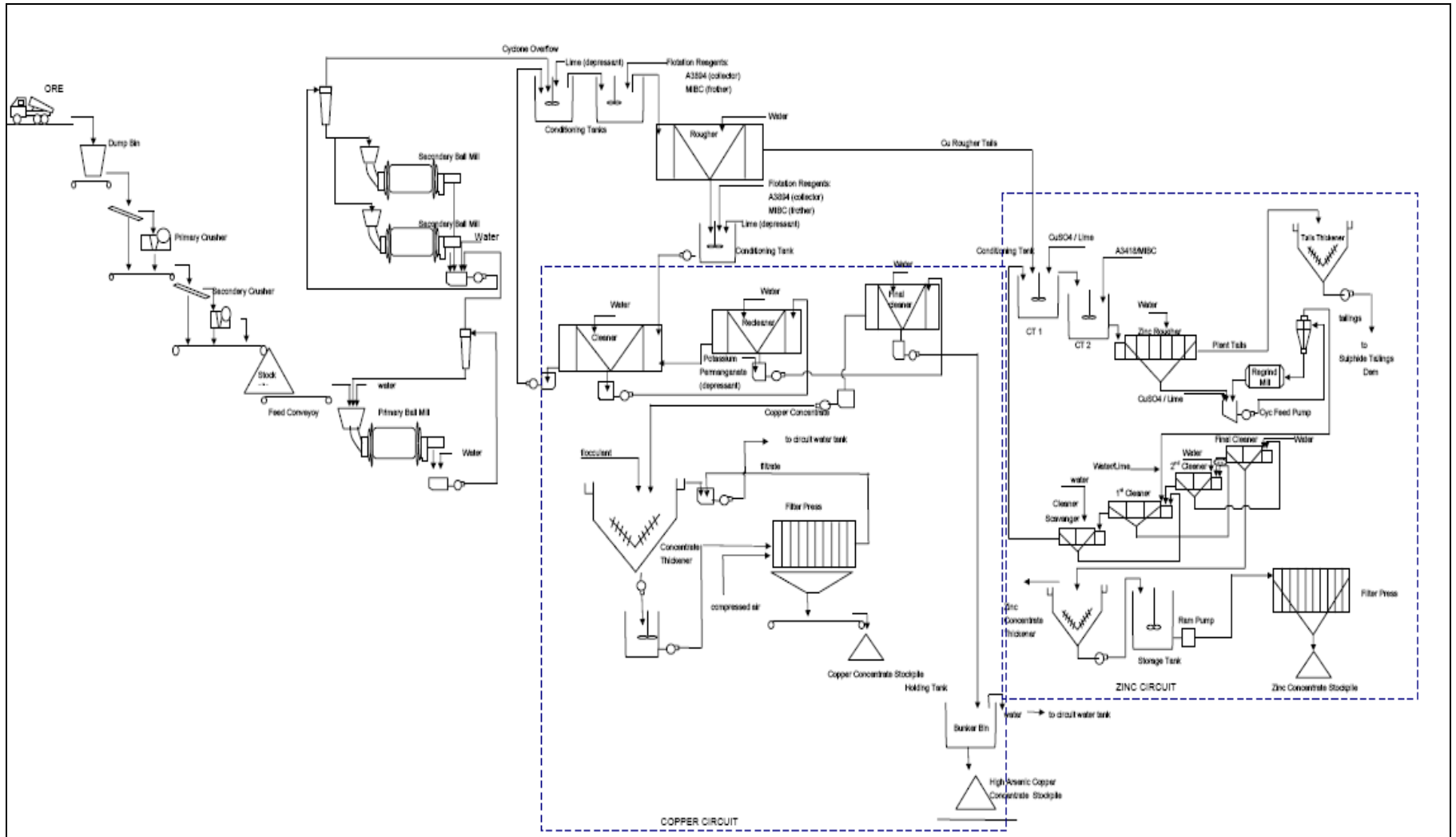
The flotation circuit will consist of an open circuit rougher and closed circuit cleaner and re-cleaner. The rougher tails will report to the flotation tail thickener while the re-cleaner concentrate will be thickened in a high rate thickener with flocculant. The thickened concentrate slurry will be filtered through a horizontal plate and frame filter press to produce a concentrated filter cake. A flowsheet of this process is shown on **Figure 3.4**. Some tankage, piping and mechanical equipment from the Gossan Processing Plant will be reused however the majority of the processing circuit following the milling circuit will incorporate new equipment.

Chemicals to be used within the plant processes will be the same as those identified in the 1996 EIS. The only exception is the deletion of sodium cyanide and the inclusion of potassium permanganate. Sodium Cyanide was included in the 1996 process but has since been deleted. Potassium Permanganate has been added to the chemicals list. Chemicals and annual quantities to be used as compared to the 1996 plan are shown on **Table 3.4**. The volume of chemicals to be used is less than identified in the 1996 EIS and is representative of an annual mill throughput of 500,000 to 600,000 tonnes.

On site storage facilities will be constructed for the chemicals that will be used for the Sulphide operations. Surface water runoff control and secondary containment will be provided to capture potential spills and separate clean and contaminated surface water runoff.

3.0 PROJECT DESCRIPTION

Figure 3. 4- Sulphide Process Flowsheet



3.0 PROJECT DESCRIPTION

Table 3.4 – Chemical Reagents for Copper Concentrate Processing

No.	Chemical	Form	1996 EIS Estimated Consumption (tonnes/year)	2008 Estimated Consumption (tonnes/year)	Difference
1	Sodium Metabisulphite	powder	1,190	300	Decreased 75%
2	Zinc Sulphate	powder	268	500	Increased 87%
3	Frother (Aero 3894)	liquid	42	25	Decreased 40%
4	Copper Sulphate	powder	104	50	Decreased 52%
5	Frother (Aero 4037)	liquid	2	15	Increased 650%
6	Aerofroth 70 (MIBC)	liquid	105	18	Decreased 83%
7	Potassium Permanganate	powder	Not used	15	Increased 100%
8	Sodium Cyanide	powder	80	Not used	-
9	Lime	powder	1,934	1,500	Decreased 22%

Source: TVIRD, 1996 and 2008

3.1.4 Sulphide Tailings Management

A Tailings Dam and Impoundment will be constructed for storage of tailings and PAG materials from the Sulphide Phase operations. This is the same tailings management program as identified in the 1996 EIS and also used during the Gossan Phase of operations.

The dam and impoundment was originally sited on Canatuan Creek within the northwest sector of the MPSA and immediately upstream of the Gossan Tailings Dam and Impoundment. This location and the impoundment characteristics were identified to best match the Sulphide ore reserve projected in 1996. Given the increase in ore reserve, the original site had insufficient storage to contain all the tailings and overburden material in an environmentally sound manner.

Three alternative dam and impoundment sites were identified and evaluated in Years 2006 and 2007. Each site was evaluated with respect to operations parameters, environmental management, social issues, economics, opportunities and constraints of each site, long term environmental management and post mining reclamation and rehabilitation plans. The best site identified was located downstream of the Gossan Tailings Dam, Sulphide Mill and Processing Plant and near the Southwest corner of the MPSA.

3.0 PROJECT DESCRIPTION

The selected site was subjected to further engineering and geotechnical studies and evaluations in Year 2007 and 2008. These studies formed the basis for the preparation of engineering designs and the Engineering Geotechnical and Geohazard Assessment Report (EGGAR) that were submitted to the Region 9 EMB and MGB.

The design of the dam is similar to the existing Gossan Tailings Dam and consists of a zoned earthfill embankment on weathered bedrock. The embankment is constructed as a zoned earthfill structure consisting of a sloping low permeability zone composed of fine-grained materials. Immediately downstream of the low permeability zone is the filter zone consisting of native sands in the area. Outside of the low permeability and filter zones are the random fill zones, which consist primarily of gravels and cobbles located in the immediate vicinity of the Project. The slope of the embankment will be protected by placing rock rip rap materials obtained from local quarries.

Tailings management and ore reserve evaluation indicate the tailings storage will require a dam of between 70 to 80 meters high with a crest length of approximately 300 meters. This is similar in size to the original Sulphide Tailings Dam however the storage capacity is significantly greater. The volume of tailings to be stored within the impoundment is anticipated to be approximately 3.0 million tonnes. An estimated 2.0 to 3.0 million tonnes of watershed sediment will also be deposited within the impoundment.

Final engineering designs and analyses were done assuming a maximum dam height of 85 m. This is consistent with the topography and maximizes the storage volume of the site. This also provides additional operations flexibility in the event tailings densities are less than projected or additional ore is identified and processed.

Design and construction management of the dam is being done by United States based consultants specialized in tailings dam design. The design criteria are based on the Philippine regulations and include analyses and designs for the Maximum Credible Earthquake and Probable Maximum Flood events. A Plan view and cross section of the dam are shown in **Figures 3.5** and **3.6**.

The operation philosophy of the dam and impoundment will be a water flow through or run-of-river type structure with an upper level spillway. This is intended to maintain a continuous water cover over

3.0 PROJECT DESCRIPTION

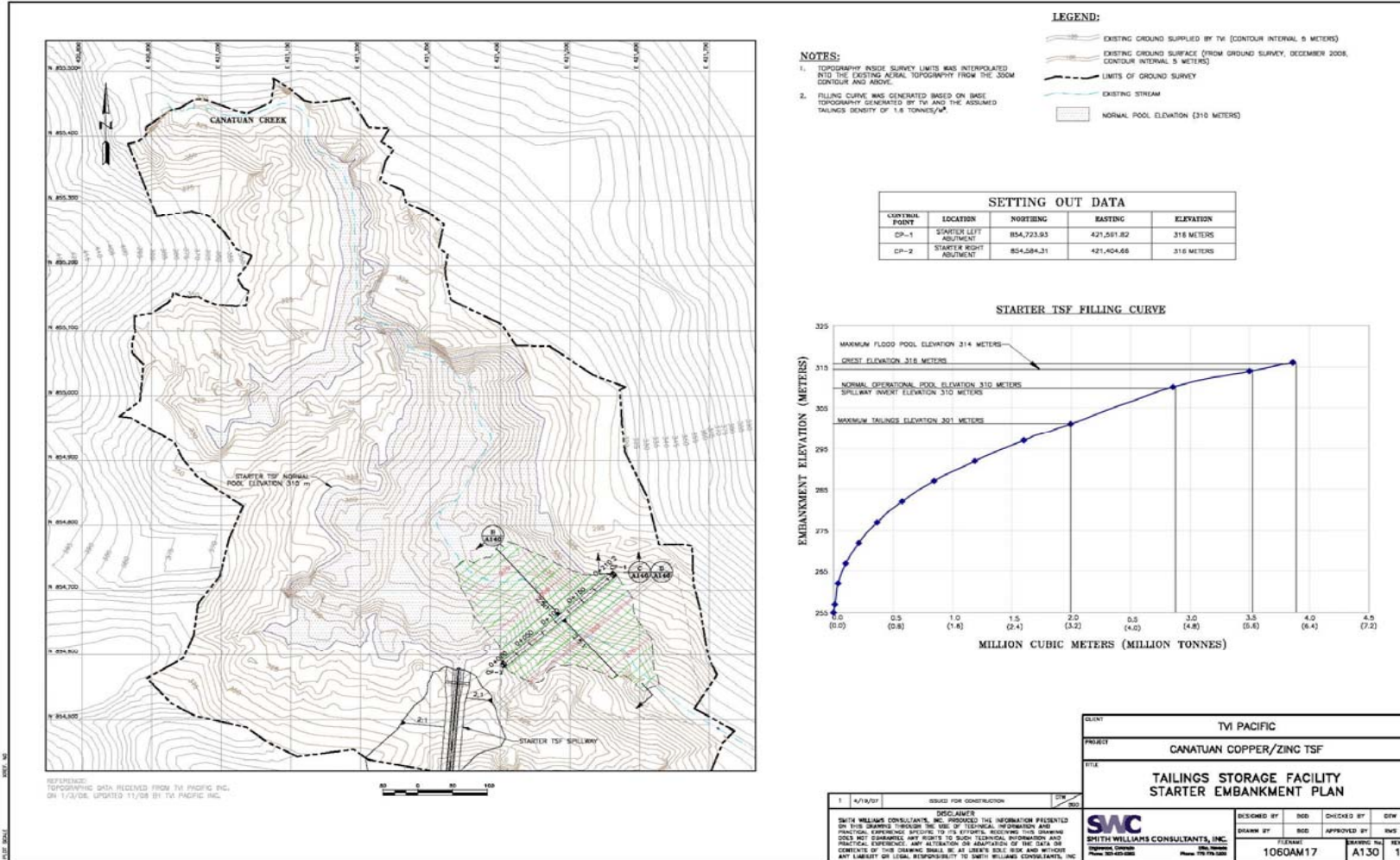
the Sulphide tailings to prevent oxidation of potentially acid generating materials. This is the same concept for tailings management incorporated within the original tailings management plan and EIS.

From the standpoint of environmental management, the dam and impoundment will provide a significant sediment capture and storage opportunity for the MPSA. Once constructed, potential water quality impacts associated with soil erosion within the MPSA and sedimentation downstream of the MPSA will be significantly reduced. Similarly the dam has significantly reduced the forest impacts expected from the original plan.

Existing tailings dams and impoundment areas used for the Gossan Phase operations (the Gossan Tailings Dam, Upper Tailings Dam and Lower Tailings Dam) will no longer be used for the Sulphide Phase operations and will undergo Progressive Rehabilitation activities during the course of the Sulphide phase operations. Detailed activities associated with the reclamation programs are provided in the Final Mine Rehabilitation and Decommissioning Plan submitted to the DENR-MGB. Yearly progressive rehabilitation activities will likewise be incorporated in this AEPEP document and future updates.

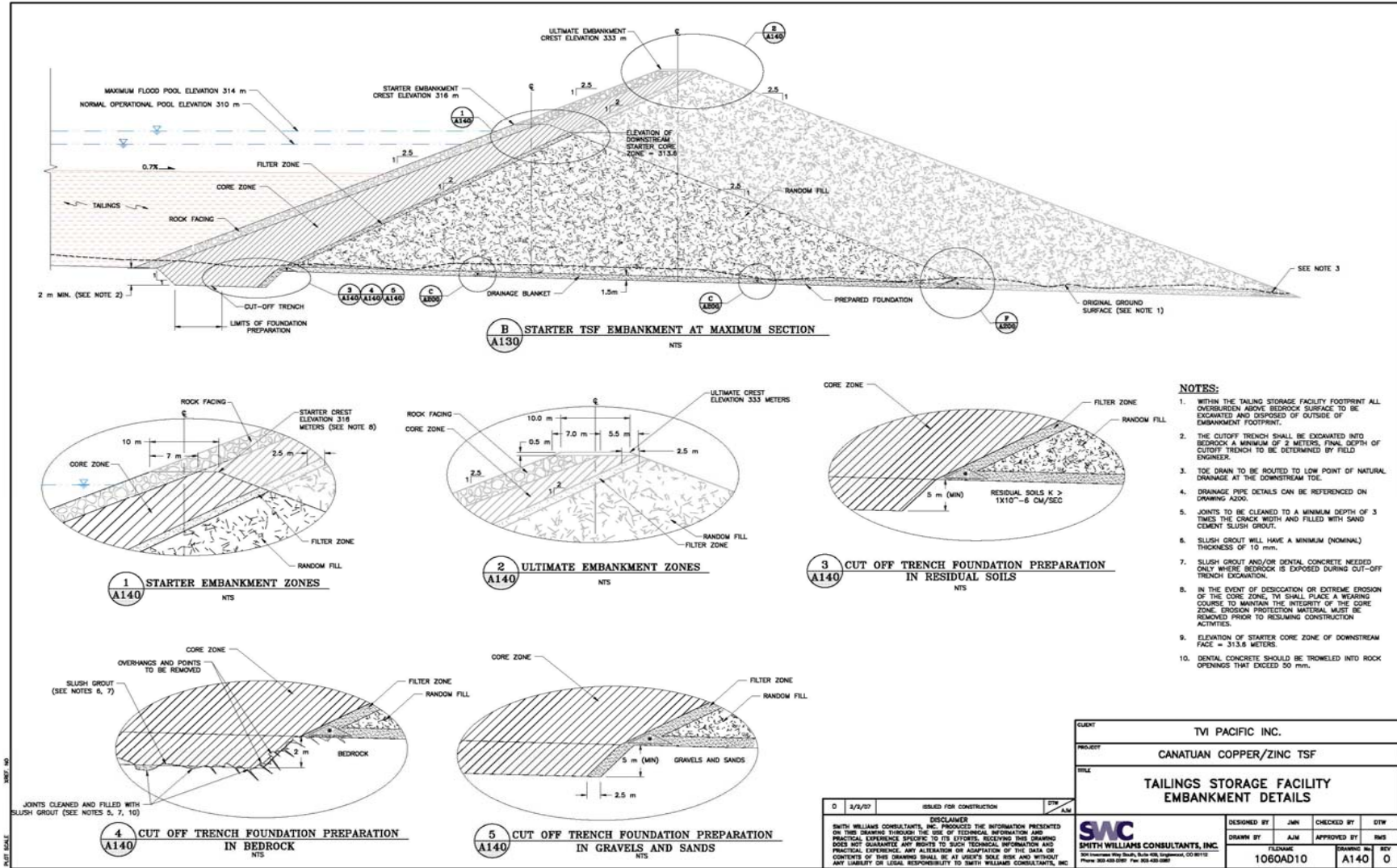
3.0 PROJECT DESCRIPTION

Figure 3.5 – Plan View of the Sulphide Dam



3.0 PROJECT DESCRIPTION

Figure 3.6 – Cross Section View of the Dam



3.0 PROJECT DESCRIPTION

3.1.5 Production

The previous Environmental Impact Study identified the Sulphide ore reserve as 1.5 million tonnes. However, additional metallurgical and geologic studies performed in Years 2006, 2007 and 2008 identified a higher ore reserve that could be mined based on metal prices for copper and zinc. This resulted in an increase in the total reserve and consequently an increase in milling rate from the original 1,200 tonnes per day to 1,850 tonnes per day. This was covered by an Environmental Performance Report and Management Plan (EPRMP) submitted in August 2008. Subsequently, a revised ECC was issued in March 2009 to incorporate the increased ore reserve and production schedules.

The Sulphide Phase Project was commissioned in November 2008 with a daily mill throughput of 200 tonnes and slowly increased to 1,500 tonnes during the succeeding months. Commercial commissioning occurred in March 2009 and the first copper concentrate shipment occurred at that time. Approximately 5,000 tonnes of copper concentrate had been produced and was shipped to a smelter in China as part of the offtake agreement.

Based on experience from the first year of operation of the Sulphide Phase Project, simultaneous with increasing metal prices, an increase in the maximum daily production capacity was requested from the DENR-EMB in late 2009. This has been requested to maximize plant efficiency and potential gains from high metal prices as opposed to what had been originally identified. The amendment requested an increase in the maximum daily production capacity of 1,850 tonnes to 2,500 tonnes. Likewise, the maximum annual extraction rate was proposed to be amended from 1.6 million tonnes to 2.5 million tonnes.

Approximately 180,000 tonnes of copper concentrate and 40,000 tonnes of zinc concentrate are expected to be produced over the updated mine life. This translates into approximately 75 million pounds of copper and 60 million pounds of zinc.

Copper and zinc concentrate production will be divided into three different production campaigns; high copper concentrate only, combination of copper and zinc concentrate production and high zinc concentrate. The high copper concentrate production will generally cover the period November 2008 through mid Year 2010. Production of copper and zinc concentrates simultaneously will occur during

3.0 PROJECT DESCRIPTION

the period mid Year 2010 through end of Year 2010 and mid Year 2011 through early Year 2013. The high zinc concentrate production will occur during late 2010 through mid Year 2011.

The production schedule summary is provided in **Table 3.5**. The revised estimated annual production of copper and zinc concentrate is provided in **Table 3.6**. The daily average throughput rate is approximately 1,300 tonnes.

Table 3.5 – Annual Mill Feed and Generation of Tailings

Year	Total Mined (tonnes)	Sulphide Ore (tonnes)	Milled Ore	Stockpile Ore (tonnes)	Product Concentrates (tonnes)	Tailings Generated (tonnes)
Year 2008	600,717	35,091	25,564	9,527	1,310.66	24,253.34
Year 2009	1,362,950	674,721	527,114	157,134	50,085.71	477,028.29
Year 2010	1,965,370	673,751	693,499	137,386	57,463.28	636,035.72
Year 2011	2,459,820	603,610	693,500	47,496	47,404.68	646,095.32
Year 2012	1,777,713	851,921	695,400	204,017	31,627.15	663,772.85
Year 2013	648,504	512,215	684,991	31,241	32,315.17	652,675.83
Total	8,815,074	3,351,309	3,320,068	31,241	220,206.65	3,099,861.35

Note:

1. Total Mined is ore plus overburden waste materials.
2. Source: TVIRD, 2009

Table 3.6 – Annual Copper and Zinc Concentrate Production

Year	Milled Ore (tonnes)	Average Mill Throughput (tonnes/day)	Copper Concentrate (tonnes)	Zinc Concentrate (tonnes)	Total Product Concentrate (tonnes)
2008	25,564	167	1,310.66	-	1,310.66
2009	527,114	1,444	50,085.71	-	50,085.71
2010	693,499	1,899	46,760.05	10,703.23	57,463.28
2011	693,500	1,900	34,729.55	12,675.13	47,404.68
2012	695,400	1,900	24,121.36	7,505.79	31,627.15
2013	684,991	1,876	22,431.10	9,884.07	32,315.17
Total	3,320,068		179,438.43	40,768.23	220,206.65

Source: TVIRD, 2009

3.0 PROJECT DESCRIPTION

3.2 Mineral Resources

3.2.1 Reserves and Resources

Original estimates of the Sulphide ore resource indicated approximately 1.5 million tonnes were available for mining and processing. Feasibility studies completed in May 2006 identified a potential resource of slightly over 3 million tonnes. Although it is a significant increase, the ore body and surface mine horizontal boundaries remain the same as those identified in the 1996 EIS.

3.2.2 Average Grade of Ore

Grades and associated tonnage for copper, zinc, gold and silver in the Sulphide deposit are shown in **Table 3.7**. The copper cutoff grade based on Project optimization studies completed in Year 2007 is approximately 0.25% copper.

Table 3.7 - Mineral Resource Sulphide Deposit

Grade Group	Tonnage	Cu Grade	Zn Grade	Au Grade	Ag Grade
	T	%	%	(grams/tonne)	(grams/tonne)
> 2.00% Cu	606,644	3.28	1.59	1.48	68.70
1.00 – 2.00	826,251	1.42	1.43	0.86	41.10
0.50 – 1.00	930,114	0.72	0.72	0.50	20.82
0.40 – 0.50	257,017	0.45	0.45	0.33	15.54
0.30 – 0.40	276,920	0.35	0.37	0.29	21.83
0.20 – 0.30	244,637	0.25	0.33	0.23	14.25
0.10 – 0.20	346,165	0.14	0.28	0.13	12.40
0.05 – 0.10	273,809	0.08	0.29	0.09	5.26
0.00 – 0.05	26,412	0.01	0.03	0.01	0.33
Total	3,787,969	1.1	0.87	0.62	30.17

Source: Excerpt from Independent Review and 43-101 Technical report by PJLGeo-Conseil Inc. (Work during 2007, Filed on April 5, 2008)

3.0 PROJECT DESCRIPTION

3.3 Access and Transportation

3.3.1 Road Access

Road access to the Project area by land is year round although the travel time depends on the weather conditions. The primary route to Canatuan is a 45 km route through RT Lim. Access to Siocon town is also available from Canatuan and has been upgraded along the 28 km length of road. Both access roads are open to the public. Completion of the roads and continuous maintenance activities has resulted in the establishment of regular bus service between Siocon and Zamboanga City.

Under normal weather conditions land travel from Canatuan to Zamboanga City is 3 ½ to 4 hours and 1 to 2 hours from Canatuan to Siocon.

3.3.2 Air Access

Air access is available by small fixed wing aircraft from Zamboanga City to Siocon and Ipil. Flight time is approximately 40 to 35 minutes.

3.3.3 Sea Based Shipping

Product concentrate from the Sulphide Phase operations is intended to be shipped to off-take buyers through the port of Santa Maria in Siocon. The port is located approximately 7.0 km north of Siocon and 34.0 km from Canatuan. It has been upgraded as part of the USAID programs within Mindanao in the past years. Roll-on and Roll-off (RORO) facilities have also been provided. The area of the bay and published soundings indicate ships up to 20,000 DWT may be able to navigate the harbor. Plans for improvements and provision of additional facilities such as concentrate storage warehouse were completed in Year 2009 and other improvements are planned for Year 2010.

3.4 Power Supply

The estimated power requirement for the Sulphide Phase operations is 53,000 kWh/day. This is about the same as the recently concluded Gossan Phase operations.

3.0 PROJECT DESCRIPTION

The Sulphide Phase operations will be powered by mobile diesel engine generator sets during the start up and early operations period of the Project. Power during the latter period of the Project will be provided by the Zamboanga Electric Cooperative (ZAMSURECO). Connection to the power grid through the ZAMSURECO is currently on going. Once completed the existing generator sets will only be used for standby power.

3.5 Mining Equipment

Equipment related to the mine operations are generally provided by an outside contractor. The company owned equipment is limited and any additional equipment required is leased. A list of equipment owned by TVI and leased from the outside contractor is shown in **Table 3.8**.

Table 3.8 – Major Mining and Operations Equipment

Equipment	Owner	Number of Units
D7 Bulldozer	TVI	1
D4 Bulldozer	TVI	1
Crane	TVI	1
Mini Dump Truck	TVI	1
Skidster, Bobcat	TVI	1
Excavator	Contractor	9
Haul Truck	Contractor	54
Dozer	Contractor	4
Road Grader	Contractor	4
Compactor	Contractor	4
Rock breaker	Contractor	1
Loader	Contractor	4
Lube Truck	Contractor	4
Service Truck	Contractor	4

3.0 PROJECT DESCRIPTION

3.6 Workforce Information

Operation of the Sulphide Phase requires approximately 540 to 550 staff and personnel to perform administrative, technical and support functions. There will be approximately 90 employees for administration and 450 rank and file including mill personnel. Manpower summary for the Sulphide Phase operations are shown in **Table 3.9**.

Table 3.9 – Manpower Summary for the Sulphide Phase Operations

Department	Number Required	Department	Number Required
Senior Staff	22	Security Force	174
Project Management	3	Civil Engineering Services	19
Mine Operation	29	Environmental/ Permitting	25
Mill Operation	80	Safety	5
Assay Laboratory	25	Finance	5
Mill Maintenance		Human Resource/ Administration	37
Mobile Section	22	Community Development Office	6
Electrical Section	22	Materials Management	14
Mill Maintenance	51	Public Affairs	2

3.7 Operation and Development Schedule

Based on the updated mine plans prepared early 2009, the Phase 2 operations are projected until September 2013. Final Decommissioning and Mine Closure is anticipated starting in late year 2013 or early Year 2014.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.1 Land Resources

Impact control strategies for the land resources represent commitments to environmental management of the resources during mining, reclamation, and closure operations. Strategies and mitigation measures have previously been developed with the intent that they be implemented throughout the Project operations. These strategies focus primarily on soil erosion control, rehabilitation and revegetation of the disturbed lands.

4.1.1 Year 2009 Programs and Activities

4.1.1.1 Progressive Rehabilitation Activities

The Gossan Phase ceased operation in April 2008. Progressive rehabilitation of disturbed areas from this phase of the mining operation was initiated in 2008 simultaneous to the construction of the Sulphide Mill Plant for the Sulphide Phase operations. Little improvement was done in Year 2008 due to limitation of use of equipment and other resources. However, in Year 2009, rehabilitation activities were strengthened and increased.

The following are the disturbed areas that underwent progressive rehabilitation in Year 2009. Specific activities implemented per area are provided in **Table 4.1**.

- a.1 Southeast Overburden Stockpile
- a.2 Southwest Overburden Stockpile
- a.3 Lower Phase I Mine area
- a.4 Lower Phase II and Phase II areas as part of the Lumot Creek Rehabilitation
- a.5. Lower Tailings Dam
- a.6 Gossan Dam Northridge Area
- a.7 Magazine Storage Area
- a.8 Junkyard Storage Area

Locations of these areas relative of the MPSA are identified in **Figure 3.1** and **Appendix A** presents the detailed Progressive Rehabilitation Activities conducted in Year 2009. The majority of Progressive Rehabilitation activities focused on erosion management.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.1 - Summary of Progressive Rehabilitation Activities of Year 2009

Area	Specific Activity Implemented	Estimated Area Rehabilitated	2009 Planned Schedule of Implementation	Actual Date of Implementation	Status	Remarks
1. Southeast Overburden Stockpile	- Backfill with NAG materials, compaction and benching activities	5.0 ha	January-April	February	on going	For completion in Year 2010
2. Southwest Overburden Stockpile	- Loosening of soil prior to lime broadcasting alternate with fertilizer application on 4 benches. - Collection of soil samples for soil analysis - Backfilling and rebenching of the remaining slope of the waste dump	3.0 ha	May- August	May	on going	For completion in Year 2009
				June	completed	
				not done	not done	For completion in Year 2010
3. Lower Phase I Mine Area	- Filling, compaction and construction of benches - Provision of drainage canals - Collection of soil samples prior to soil conditioning - Soil conditioning activities: lime application alternate with fertilizer application.	5.0 ha	January	December 2008 to January 2009	on going	Reshaping of benches to be completed in Year 2009 continuing activity
				June	reshaping of benches completed	
				June to December	progressive soil fertilization activities	
4. Phase II Mine Area (Lumot Creek Watershed)	- Benching of Phase II and Lower Phase II area - Collection of soil samples prior to soil conditioning	8.0 ha	June to December	March	completed	completed Follow with revegetation
				June	completed. On going soil conditioning	
5. Lower Tailings Dam	- Placement of soil cover on top of tailings. - Tailings consolidation	3.33 ha	February	February	on going tailings consolidation	For completion in Year 2010
6. Gossan Northridge Repair	- Installation of gabions at the toe line of the northridge of the dam	0.5 ha	Additional activity	August	on going	For completion in Year 2010
7. Magazine storage area	- Benched the slopes adjacent to the magazine storage area and compacted the soil with heavy equipment	2.0 ha	Additional activity	April	completed	
8. Junkyard Area	- Benching of slopes. - Soil conditioning activities: lime application alternate with fertilizer application.	0.33 ha	Additional activity	June	completed	
Total Estimated Area Rehabilitated, ha.		27.16				

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Soil loss from disturbed areas was reduced by compacting the materials and creating 3 m to 5 m bench heights with slopes of at least 2:1. Drainage canals were constructed at the toe line of each bench for runoff water management.

4.1.1.2 Revegetation/ Reforestation Activities

After stabilizing eroded portions of the disturbed areas, soil samples were collected to determine viability for vegetative growth. Samples were collected at a depth of at least 30 cm with an estimated weight of 1.0 kg. These samples were sent to the Bureau of Soils of the Department of Agriculture for soil characterization and testing. Soil testing was done in June and August and will continue throughout the progressive rehabilitation period. The Southeast Overburden Stockpile, Southwest Overburden Stockpile, Lower Phase I, Phase II and Lower Phase II Mine area were determined to have only trace amounts of elements like, Nitrogen (N), Potassium (K), Phosphorous (P), which are required for growth of vegetation. Some areas also exhibited low pH readings.

Based on the results of the soil testing, the degree of soil conditioning activities on the rehabilitated areas will vary. General programs focused on lime application on the soil surface followed by fertilizer application. The process is repeated until a better soil quality is achieved.

Areas that have been revegetated for Year 2009 following the stabilization and soil conditioning activities are the following:

- b.1 Southwest Overburden Stockpile
- b.2 Lower Phase I Mine Area
- b.3 Lower Phase II area as part of the Lumot Creek Rehabilitation
- b.4 Magazine Storage Area
- b.5 Junkyard Storage Area
- b.6 other areas within and outside the MPSA

Activities at the Southeast and Southwest Overburden Stockpiles, Lower Phase I and Phase II mine area shall be moved to Year 2010 due to changing weather conditions on site as well as the availability of soil materials for the establishment of additional benches.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

As of the end of Year 2009, approximately 39,300 trees were planted within and outside the MPSA. This is 11,000 tree seedlings short of the 55,00 targeted for 2009. The quantity of seedlings already planted as of the end of Year 2009 represents approximately 23.0 hectares that were placed into active reclamation during the year. In addition to the trees planted, various grasses and shrubs were also planted.

Some of the species of trees planted for the year incorporates types identified during initial consultation activities conducted in Year 2008 as preparation for the Final Mine Rehabilitation. These include income generating species such as rubber trees and mahogany.

Details of the revegetation activities for Year 2009 are provided in **Table 4.2** and illustrated in **Figure 4.1**.

Table 4.2 – Summary of Revegetation/ Reforestation Activities of Year 2009*

Area	Number of Trees Planted	% Survival	Breakdown of Type/ Species Planted	Equivalent Area Covered, ha
Lower Phase I Mine Area	3,659	60	2,380 Acacia Mangium 1,200 White Lauan Vetiver slips Flamengiah	2.19
Ambaan Area (revegetation)	1,041	90	950 Acacia Mangium 46 Mahogany 45 Rattan	0.62
Junkyard Area	2,707	60	2,232 Acacia Mangium 17 Manggasinoro 15 Talisay 100 Rubber 120 Tiger Grass 4,700 Vetiver slips 285 Indigofera 1.5 kgs monggo 1 kg flamengiah	1.62
Lower Phase II and Phase II Mine Area	5,057	82	4,607 Acacia Mangium 400 Auri 50 Rubber 2,450 vetiver slips 8 kgs monggo	3.42
Southwest Overburden Stockpile	2,787	80	2,710 Acacia Mangium 77 Manggasinoro 8 kgs monggo 1 kg flamengiah	1.67

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

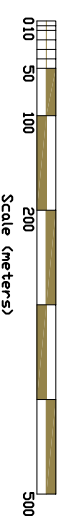
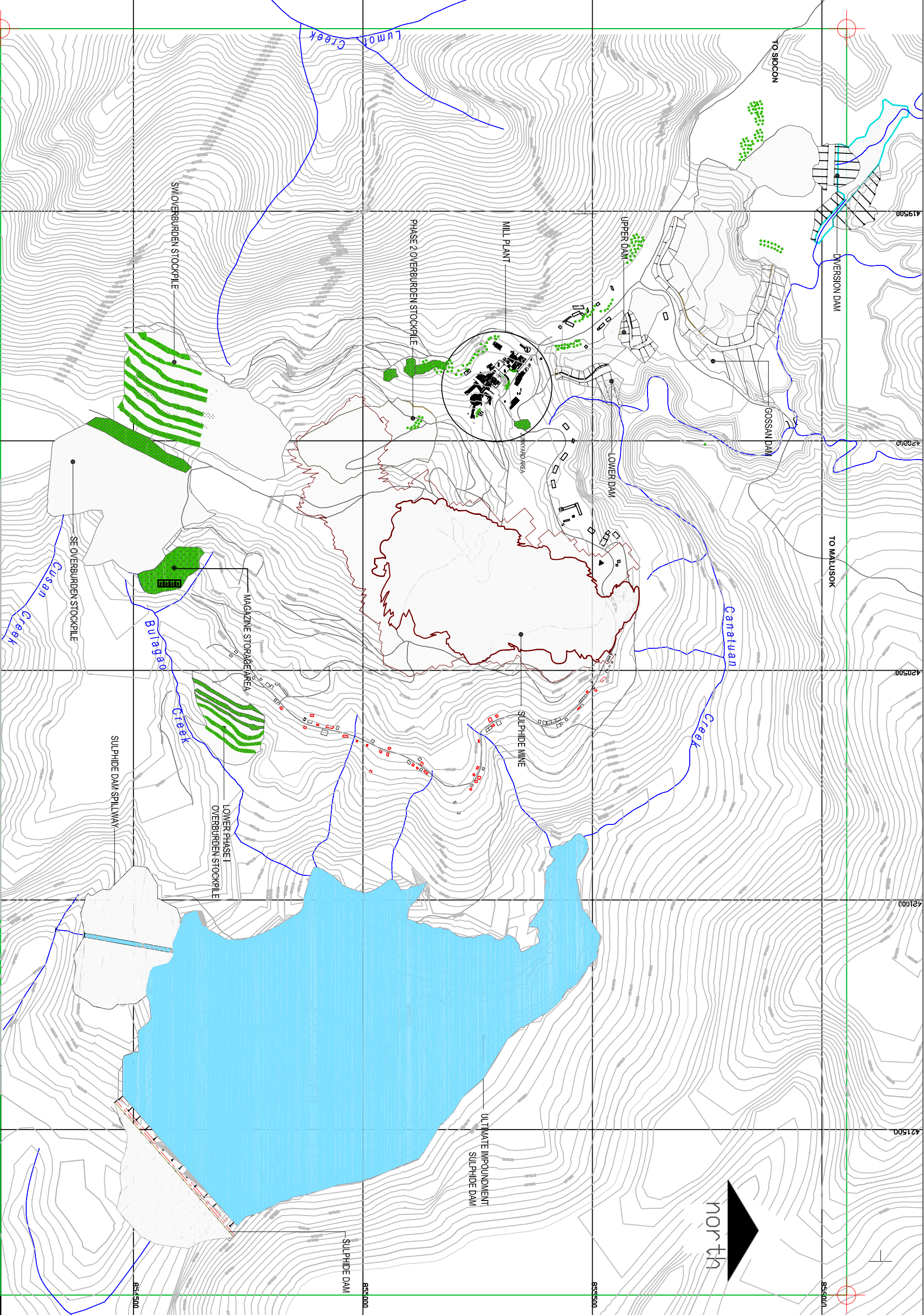
Magazine Area	5,450	85	3,100 Acacia Mangium 300 Auri 50 Gmelina 1200 Mahogany 800 White Lauan 1500 Vetiver grass	3.27
Gossan Dam spillway area	250	80	250 Acacia Mangium	0.15
Nursery Area	1,125	87	950 Acacia Mangium 125 Mahogany 50 Rubber 1,200 Vetiver	0.67
Landfill Area	2,200	90	2,000 Manggasinoro 200 Mangium	1.32
Lower Dam boundary	1,259	70	1,200 Acacia Mangium 34 Coffee 25 Mahogany 2800 vetiver slips	0.76
Agolo Village	1,500	70	1,500 Acacia Mangium	0.90
SSAI area boundary	6,150	60	6,150 Acacia Mangium	3.69
Monark Area	400	50	400 Acacia Mangium	0.24
Malusok Area	2,960	90	1,000 Manggasinoro 1,960 Acacia Mangium	1.78
Warehouse boundary	1,750	80	500 Acacia Mangium 250 Mahogany	1.05
Backroad	700	80	250 Mahogany 250 White Lauan 70 Rubber (donated) 130 Coffee (donated)	0.42
Mill Plant Area	300	85	50 Mahogany 250 White Lauan	0.18
TOTAL	39,295			22.61

Note: Equivalent Area computed based on 3m x 2m planting distance where 1 Ha = 1,667 trees

4.1.1.3 Sediment Control Measures

During Year 2009, five sediment ponds were maintained within the MPSA. These ponds serve as control strategies to mitigate the impacts of soil erosion and sediment conveyed by surface water runoff to Canatuan Creek and Lumot Creek. This does not include the Sulphide Tailings Impoundment which serves as a large sediment pond to control sediment materials within the Canatuan Creek watershed that are not captured by the smaller sediment ponds.

LEGEND:
 MPSA BOUNDARY
 RIVERS AND CREEKS



4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

An additional sediment pond was constructed in Year 2009 at the toe line of the Southeast Overburden Stockpile. This is intended to reduce prevents impacts of siltation to Cusan Creek Area which drains a portion of the Southeast Overburden Stockpile area.

A neutralization pond was also constructed in series with a sediment pond currently maintained downstream of the Nursery Area. This pond serves as a treatment pond during instances when acid mine drainage is observed. These series of ponds drain run off water from the Phase II Mine Area where acid mine drainage is anticipated to occur.

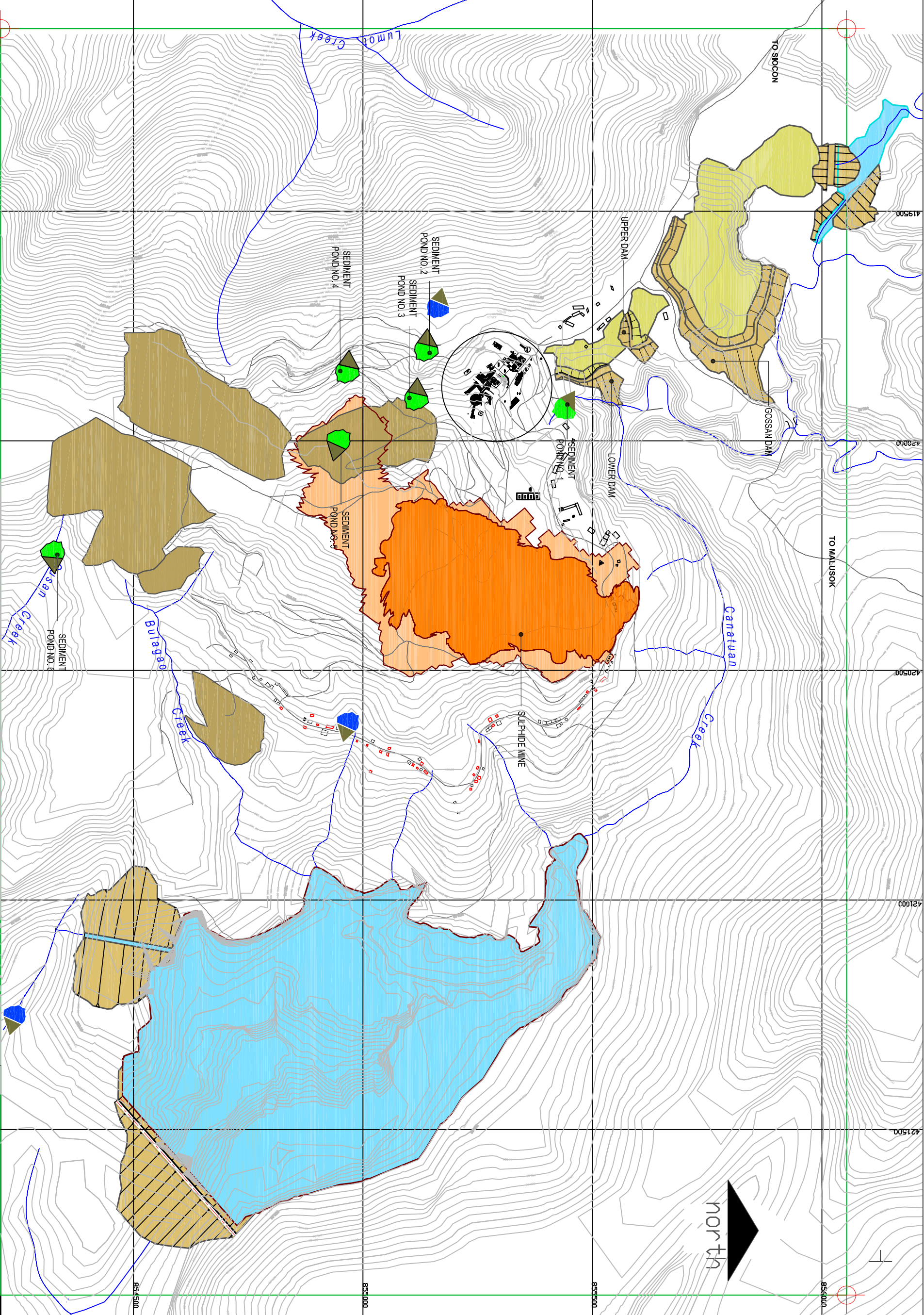
Locations of the sediment ponds maintained and constructed in Year 2009 are illustrated in **Figure 4.2**.

4.1.1.4 Other Land Resource Management Activities

Agricultural Root Crop Farming at the Gossan Tailings Dam

Results of the initial Final Mine Closure consultation conducted with the Subanon Community in Year 2008 identified final land use plans for certain disturbed areas within the MPSA. Fruit-bearing trees such as marang, lanzones, durian among others were requested. In this regard, an experimental study was initiated to identify heavy metal absorption potential of certain root crops on tailings surface and later determine whether these root crops are safe for human consumption. The study will further determine the final land use plan of the Tailings impoundment areas, whether it be suitable for fruit-bearing trees and other cash crop species or will instead be turned into agro-forestry areas or other purpose. For this study, the Gossan Tailings Impoundment was established as the experimental site.

Three systems were set up for the agricultural root crop experimental farming. Each system will have 9 plots for 9 different edible species. These include rice, corn, radish, taro, cassava, carrots, radish, ginger, potato and sweet potato. One system will have plots directly planted on the tailings surface, the other system will have a 15 cm top soil cover The final system will be planted directly on natural soil located adjacent to the Gossan Tailings Dam. Comparison of growth and metal absorption potential of each specie in the three systems will later be monitored. Monitoring and data gathering will be continued through Year 2010.



- LEGEND:**
- LAKE
 - TAILINGS IMPONUMENT
 - OVERBURDEN STORAGE AREA
 - DAM AND SPILLWAY EMBANKMENT
 - SULPHIDE SURFACE MINE (TNI)
 - SULPHIDE/GOSSAN SURFACE MINE MPSA BOUNDARY
 - RIVERS AND CREEKS
 - SEDIMENT PONDS
 - NEUTRALIZATION PONDS

NOTE:
 SEDIMENT PONDS WILL CONTINUE TO BE MAINTAINED AND CONSTRUCTED FOR EROSION CONTROL MEASURES. NEUTRALIZATION PONDS WILL BE CONSTRUCTED IN SERIES TO THE SEDIMENT PONDS TO MITIGATE ACID MINE DRAINAGE IMPACTS.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.1.2 Year 2010 Programs and Goals

Sulphide Phase operations will continue in Year 2010 with copper concentrate production and the commissioning of the Zinc Concentrate Circuit. Approximately 2 million tonnes of ore and waste materials are expected to be mined and 700,000 tonnes are anticipated to be processed during the year. This translates to the production of approximately 180,000 tonnes and 40,000 tonnes of copper and zinc concentrate, respectively.

Overburden waste materials will continue to be extracted at the mine pit. Approximately 1.6 million tonnes of waste will be generated, with more Potentially Acid Generating (PAG) materials to be placed at the waste dump areas. Approximately 800,000 tonnes of PAG material will be generated in Year 2010. PAG and NAG materials will be used in the rehabilitation of disturbed areas and previously mined out areas.

Mine Plans for Year 1 (2008-2009) and Year 2 (2009-2010) are shown in **Figures 4.3** and **4.4**. Disturbed area estimates within and outside the MPSA are provided in **Table 4.3**.

Year 2010 Programs and Goals with respect to Land Management of Resources will focus on the following activities: Progressive Rehabilitation with the primary focus on slope stabilization and erosion control, Revegetation and Reforestation activities including soil conditioning and Sediment Control. A summary of the rehabilitation and revegetation/ reforestation schedule is provided in **Table 4.4**. Details of these activities are provided in the sections below.

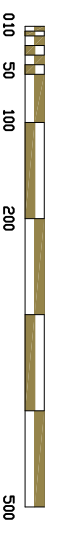
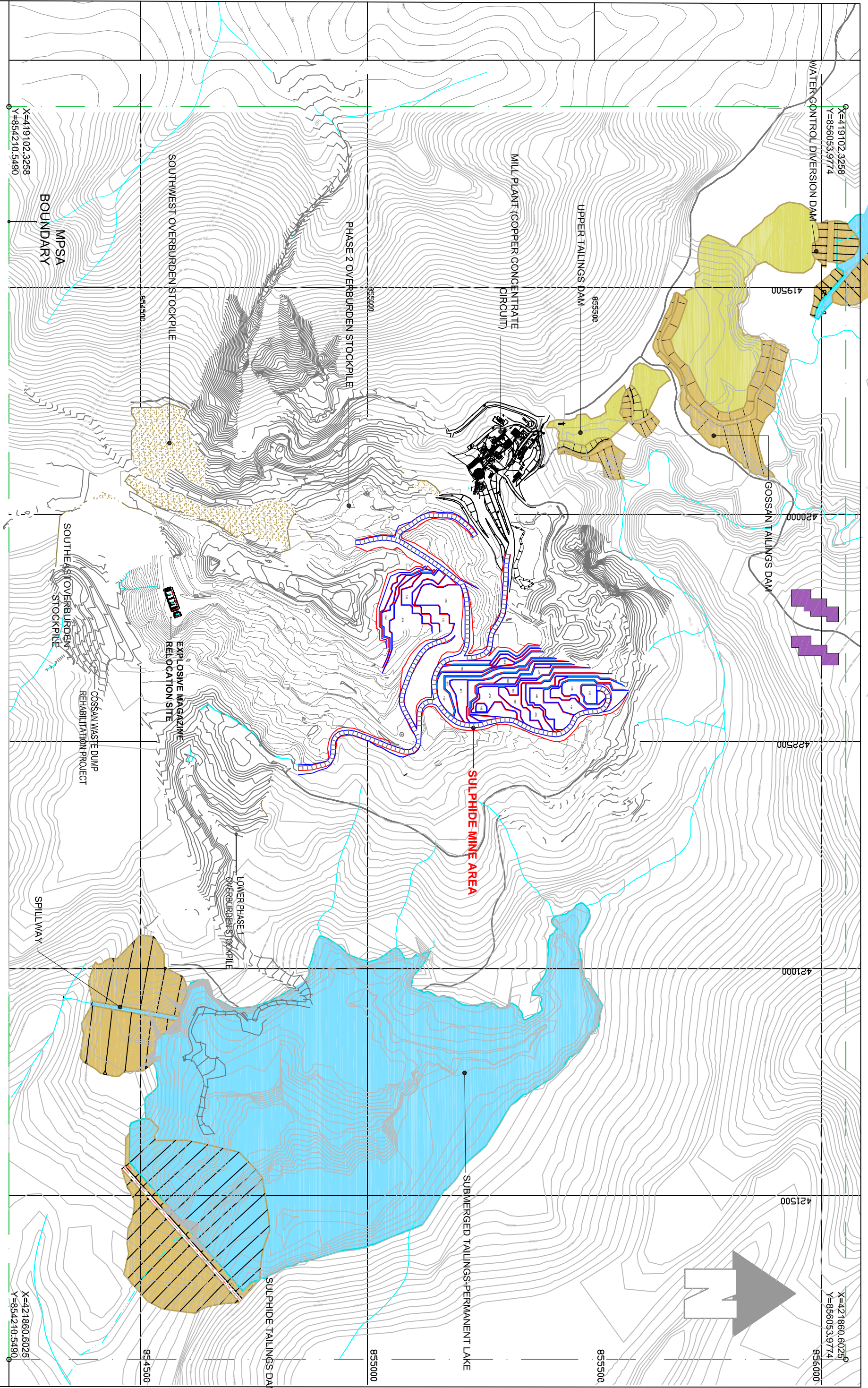
4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.3 - Disturbed Area Estimates Within and Outside the MPSA Area


Parcel	Land Use	Maximum Disturbed Area (ha)	Adjustment Factor	Adjusted Disturbed Area (ha)	Decommissioning and Reclamation Period		Estimated Annual Disturbance (ha)													
							2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total	
A	Gossan Mill Plant Area	4.00	0.95	3.80	2008	2015	3.04	0.38	0.38											3.80
B	Nursery/Fuel Storage Area/Warehouse	2.00	1.00	2.00	2014	2015	0.40	0.80	0.80											2.00
C	Lower Tailings Dam and Impoundment	3.50	0.95	3.33	2008	2010		2.49	0.83											3.32
D	Upper Tailings Dam and Impoundment	2.50	0.95	2.38	2008	2010	1.20	0.59	0.59											2.38
E	Gossan Tailings Dam and Impoundment	12.50	0.95	11.88	2008	2010		4.75	7.13											11.88
F	Diversion Dam and Spillway	6.00	0.50	3.00	2008	2009		1.80	1.20											3.00
G	Worker Housing	5.00	0.90	4.50	2007	2015	0.45	1.35	1.35	1.35										4.50
H	Ambaan Village	1.50	0.90	1.35	2008	2009	0.94	0.41												1.35
I	Agolo Housing Area	1.87	0.90	1.68	2015	2015	1.18	0.50												1.68
J	Manhattan Housing Area	3.00	1.00	3.00	2007	2008	0.90	1.50	0.60											3.00
K	<i>Sulphide Mill Plant Area</i>	<i>3.50</i>	<i>0.95</i>	<i>3.33</i>	<i>2014</i>	<i>2015</i>				<i>2.66</i>	<i>0.67</i>									<i>3.33</i>
L	<i>Sulphide Tailings Dam and Impoundment</i>	<i>82.00</i>	<i>0.75</i>	<i>61.50</i>	<i>2008</i>	<i>2015</i>				<i>45.00</i>	<i>9.00</i>		<i>7.50</i>							<i>61.50</i>
M	<i>Mine Pit (Gossan and Sulphide)</i>	<i>31.00</i>	<i>1.00</i>	<i>31.00</i>	<i>2008</i>	<i>2015</i>	<i>7.20</i>	<i>7.20</i>	<i>3.60</i>	<i>5.00</i>	<i>4.00</i>	<i>4.00</i>								<i>31.00</i>
N	Southeast/Southwest Overburden Stockpile	23.50	1.00	23.50	2006	2009	4.70	9.40	4.70	4.70										23.50
O	Future Relocation Siocon Road	3.00	0.25	0.75	2008	2009														0.75
P	Back Road Area	3.00	0.25	0.75	2005	2008			0.38	0.37										0.75
Q	Canatuan Small Scale Mining Area	8.00	0.70	5.60	2008	2015	4.48	1.12												5.60
R	<i>East Overburden Stockpile (Lower Phase I)</i>	<i>12.00</i>	<i>1.00</i>	<i>12.00</i>	<i>2014</i>	<i>2015</i>				<i>6.00</i>	<i>6.00</i>									<i>12.00</i>
S	Lumot Creek Watershed Lower Phase 2 Mine	27.30	0.85	23.21	2009	2010							23.21							23.21
Total MPSA Area Only		235.17	0.84	198.54	2005	2015	24.49	32.67	21.55	59.46	42.88	10.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	198.55
Annual Gossan Phase Disturbance		79.37	1.43	113.71	2005	2015	24.49	32.67	21.55	11.80	23.21	0.00								113.72
Annual Sulphide Phase Disturbance		128.50	0.66	84.83	2014	2015				47.66	19.67	10.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	84.83
Cumulative MPSA Disturbance							24.49	57.16	78.71	138.17	181.05	191.05	191.05	198.55	198.55	198.55	198.55	198.55	198.55	198.55
Offsite Parcels	Malusok Housing Area	10.00	0.85	8.50	2014	2015	2.50	2.50	2.50	1.00										8.50
	Malusok Access Road Strip	10.00	0.85	8.50	2014	2015	4.00	3.00	1.00	0.50										8.50
	Skyline and School Area	5.00	0.95	4.75	2014	2015			2.50	2.25										4.75
	Landfill Area	5.00	0.90	4.50	2014	2015			2.25	2.25										4.50
Total Annual Disturbance Outside MPSA Area Only		30.00	0.88	26.25	2014	2015	6.50	5.50	8.25	6.00										26.25
Cumulative Disturbance Outside MPSA		265.17	0.85	224.79	2005	2015	6.50	12.00	20.25	26.25	26.25	26.25	26.25	26.25	26.25	26.25	26.25	26.25	26.25	26.25
Total Annual Disturbance Within and Outside MPSA							30.99	38.17	29.80	65.46	42.88	10.00	0.00	7.50	0.00	0.00	0.00	0.00	0.00	224.80
Total Cumulative Disturbance Within and Outside MPSA							30.99	69.16	98.96	164.42	207.30	217.30	217.30	224.80	224.80	224.80	224.80	224.80	224.80	224.80

Notes:

1. Based on Land Use Map prepared for the 2007 and 2008 AEPEP and the 2008 FMRDP.
2. Sulphide Tailings Impoundment assumed to remain a permanent lake. Lake area not subject to reclamation.
3. Maximum Disturbed Area represents the gross area subject to disturbance. It is unlikely the entire area within some Parcels will be disturbed. An Adjustment Factor is included to account for this.
4. Red italics represent specific Sulphide Operations reclamation items.
5. Year 2008 Revisions - (a) Added Parcel S disturbed area. (b) Increased disturbed area of Parcel L in 2011. (c) Extended decommissioning period Parcel A.

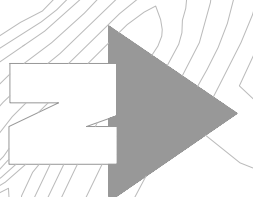
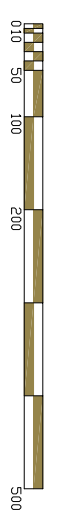
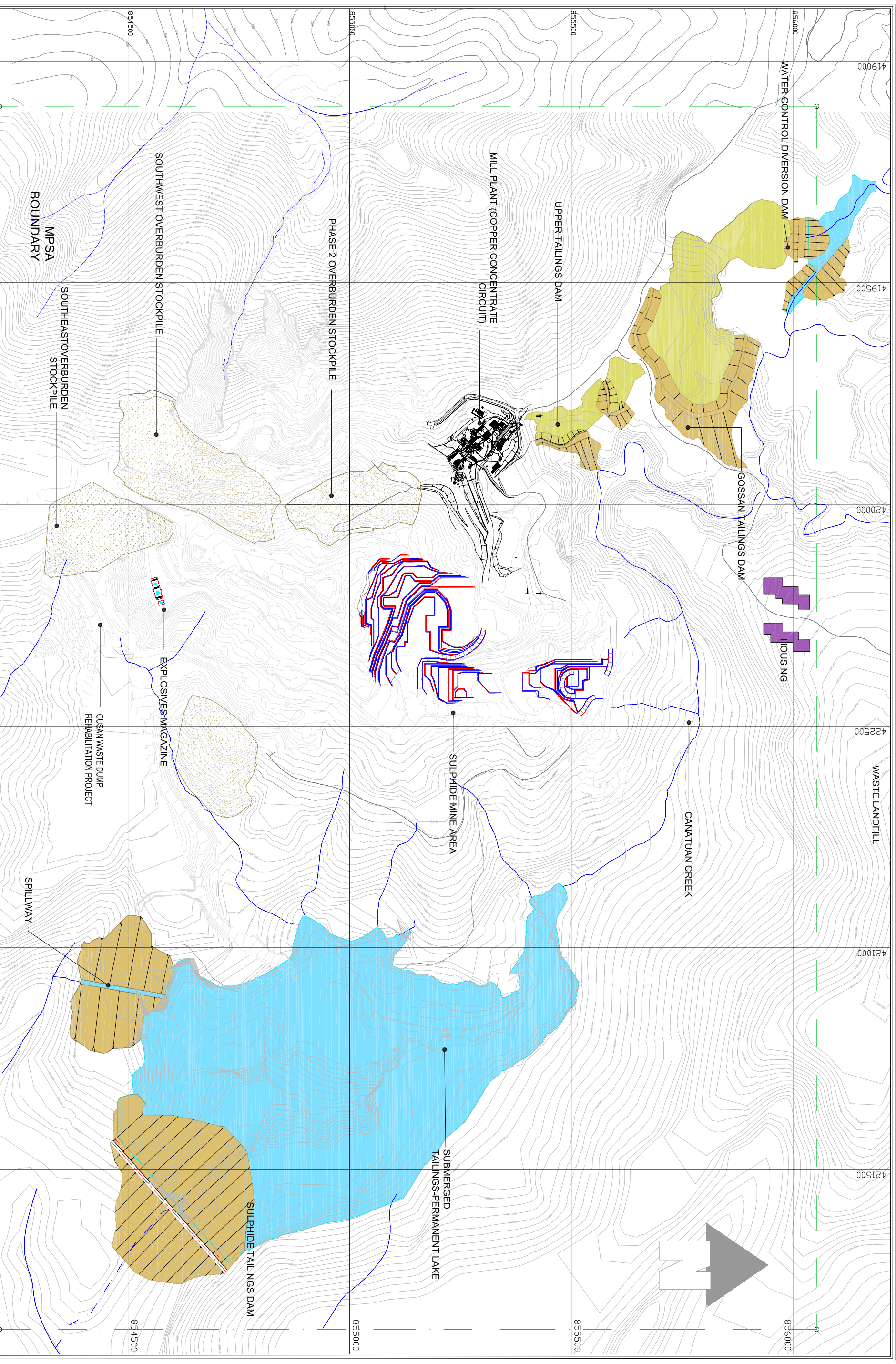


LEGEND:
 — Crest
 — Toe


 TVI Resource
 Dev. (Phillips) Inc.
 Sulphide Project

MINE PLAN YEAR 1

FIG NO.
4.3





 TVI Resource
 Dev't. (Philis) Inc.
SIZE SCALE
LIST NUMBER

MINE PLAN YEAR 2011

FIGURE NO.
4.4

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.4 - Year 2010 Rehabilitation and Reforestation Schedule

Area	Activity	Estimated Area Coverage, ha	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	No. of Trees to be planted
Upper Phase I Mine Area	a. Soil Conditioning b. Repair of benches c. Soil Conditioning d. Revegetation e. Maintenance	5.0	■	■	■	■	■	■	■	■	■	■	■	■	2,000
Lower Phase I Mine Area	a. Additional Planting	5.0	■	■	■	■	■	■	■	■	■	■	■	■	3,000
Southwest Overburden Stockpile Area	a. Source out materials b. Soil conditioning c. Repair of benches d. Soil Conditioning e. Reforestation f. Maintenance	5.0	■	■	■	■	■	■	■	■	■	■	■	■	4,000
Southeast Overburden Stockpile Area	a. Repair of benches b. Soil Conditioning c. Revegetation/ Reforestation d. Maintenance	7.0	■	■	■	■	■	■	■	■	■	■	■	■	8,000
Upper Phase II Mine Area	a. soil conditioning b. Repair of benches c. Soil Conditioning d. Reforestation e. Maintenance	7.0	■	■	■	■	■	■	■	■	■	■	■	■	7,000
Lower Phase II Mine Area	a. Source out materials b. Benching c. Soil Conditioning d. Soil Test e. Reforestation f. Maintenance	8.0	■	■	■	■	■	■	■	■	■	■	■	■	10,000
Upper Tailings Dam	a. Final Spillway channel construction b. Topsoil Placement c. Revegetation	2.50	■	■	■	■	■	■	■	■	■	■	■	■	depends on research program

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.4 - Year 2010 Rehabilitation and Reforestation Schedule

Area	Activity	Estimated Area Coverage, ha	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	No. of Trees to be planted	
Lower Tailings Dam	a. Final Spillway channel construction	3.5			■	■									depends on research program	
	b. Reshaping of the impoundment					■	■	■	■	■	■	■	■	■		
	c. Vegetation												■	■		■
Gossan Tailings Dam	a. Vegetation of slopes	3.0					■	■	■	■	■	■	■	■		
	b. Reshaping of slope at Northridge									■	■	■	■	■	■	
Diversion Dam	a. Final Spillway construction	6.0			■	■									na	
	b. Rebenching of slopes around the area					■	■	■	■	■	■	■	■	■		■
Explosive Magazine Slope	a. Revegetation	3.0	■	■											10,000	
Roads																
- Going to Sulphide Dam	a. Vegetation of roads	3.0							■	■					2,000	
- Malusok to Canatuan										■	■					1,000
- SSAI Office to Canatuan School											■	■				1,000
- Canatuan School to Sapijan												■	■			500
- Quarry Area at Backroad													■	■		1,000
Previously planted areas	a. Interplanting with endemic species			■	■	■	■	■	■	■	■	■	■	■	3,000	
Other Areas	a. Revegetation activities									■	■	■	■	■	2,500	
	TOTAL	58.0													55,000	

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.1.2.1 Planned Progressive Rehabilitation Activities

Gossan Dam, Upper and Lower Tailings Dam

The Gossan Dam and Impoundment plus the Upper and Lower Tailings Dam Impoundments directly disturb approximately 18 hectares of the Canatuan Creek watershed. These facilities are no longer used for tailings disposal. Progressive Rehabilitation activities were initiated during the second half of Year 2008 and continued through Year 2009. The activities were limited to structural improvements related to the spillways and dam embankments and water management within the impoundments while the tailings consolidate. Approximately 15 to 30 cm of soil cover material was placed on top of the tailings at the Lower Tailings Dam while waiting for further tailings consolidation. In Year 2010, topsoil cover will be placed on the tailings surface in preparation for planting. This will occur after the construction of the final spillway at the Lower Tailings Dam.

In Year 2009, water management within the impoundment area of the Gossan Tailings Dam was initiated to hasten tailings consolidation. An experimental program to determine if planted root crop species on the tailings surface are safe for human consumption was initiated. Monitoring and data gathering will continue through Year 2010.

Year 2010 activities at the Upper Tailings Dam will focus on the construction of the final spillway and water management controls within the impoundment. Cover material will be placed and compacted on top of the tailings surface similar to what was done at the Lower Tailings Dam. Revegetation within the impoundment is planned to occur during the last quarter of Year 2010 depending on the tailings consolidation, results of additional consultation with the Subanon community and results of the experimental agricultural root crop farming at the Gossan Dam impoundment.

Southeast Overburden Stockpile

Progressive Rehabilitation of the Southeast Overburden Stockpile will continue through Year 2010. The Southeast area encompasses approximately 10 to 15 hectares of which nearly 50% has already been subject to Progressive Rehabilitation activities in the previous years. Additional controls and rehabilitation programs need to be implemented to reduce the erosion and soil transport to the nearby

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

drainages. Activities for this year will focus on continuing the improvement to the slopes and benches, primary drainage ways and construction of diversion canals.

The previous rehabilitation plan for the Southeast Overburden Stockpile remains applicable throughout Year 2010. The bottom to top construction of benches was initiated in Year 2009 and will continue in Year 2010. NAG materials from the mine pit area will be used to construct a wide series of benches. The completion schedule of the rehabilitation activities will depend on the availability of NAG materials from the mine area. Revegetation activities will soon follow after the completion of the rehabilitation programs. The development plan for the rehabilitation of the Southeast Overburden Stockpile is shown in **Figure 4.5**.



4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Southwest Overburden Stockpile and Lumot Creek Watershed

Rehabilitation of the Southwest Overburden Stockpile and the Lumot Creek Watershed will be another key activity for Year 2010. These areas have been the focus of rehabilitation activities in the past years. The major challenge of greening the area focus on the acidic conditions of the material dumped during the Gossan Phase operations and the Sulphide materials exposed during the Gossan Phase operations.

The overall area of activity encompasses approximately 20 to 25 hectares. The Lumot Creek Watershed area consists of the Phase II (Upper and Lower) mining area and the Back Road, access road going to Solonsangan. The Southwest Overburden Stockpile encompassed approximately 10 ha and is located adjacent to the Phase II (Upper) mining area.

The Phase II (Upper and Lower) mining area were benched and stabilized in Year 2009. Initial revegetation activities were likewise conducted at Lower Phase II and portion of the Southwest Overburden Stockpile area during Year 2009. The rehabilitation activities for Year 2010 will focus on the following:

- Benching of steep slopes using 3m to 4 m wide benches and 3m to 5m high benches at the remaining slopes of the Southwest Overburden Stockpile area.
- Re-establishment and/or relocation of primary drainageways within the Phase II (Upper and Lower) Mining area. These will be structural improvements to better convey rainfall runoff with reduced erosion potential.
- Construction of additional interception and diversion canals to limit the exposure of the benched areas to surface water runoff.
- Soil conditioning of benched portions at the Southwest Overburden Stockpile, Upper Phase II and Lower Phase II area.
- Establishment of benches at the eroded portion downstream of the Lower Phase II area draining to Lumot Creek by installation of gabions and rock foundation.
- Installation of silt fences downstream of the Lower Phase II area while awaiting growth of vegetation at completed benches.

The rehabilitation and development plan of these areas is shown on **Figure 4.6**.

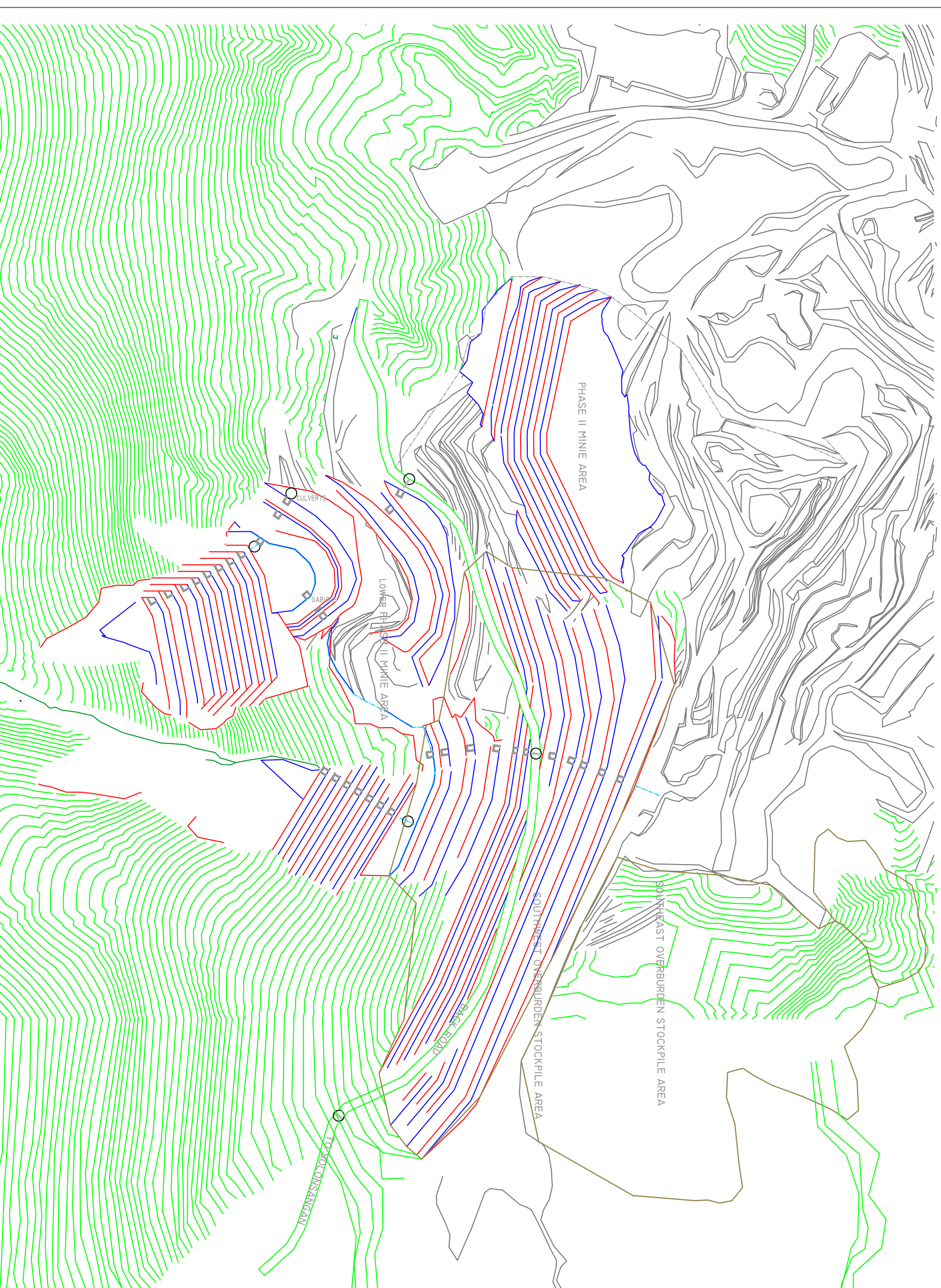
LEGEND:




GABIONS



CULVERTS



 TVI Resource Devt. (Phts) Inc. <small>DATE REVISION: 21 January 2008</small>	CANATUAN MPSA	FIG. NO.
	REHABILITATION PLAN FOR SOUTHWEST OVERBURDEN DUMP AND LOWER PHASE II AREA	4.6

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Upper Phase I Mining Area

The Upper Phase I Mine area is part of the 23.0 ha surface area disturbed during the Gossan Phase operations. This covers approximately 5.0 ha that is outside the current Sulphide Surface Mine operations. Progressive Rehabilitation of this portion is scheduled for Year 2010 and activities will focus on the following:

- Benching of slopes using 3m to 4 m wide benches and 3m to 5m high benches.
- Establishment of drainage canal in each bench directed to the primary drain canal within the current mine pit area to limit the exposure of the benched areas to surface water runoff.
- Soil conditioning of benched portions depending on the soil testing and characterization results. Soil conditioning consists of alternate application of lime, fertilizer and manure.
- Revegetation with endemic species interplanted with agricultural cash crop species.

Diversion Dam Area

Progressive rehabilitation activities for Year 2010 will focus on the final construction of a permanent spillway for the Diversion Dam that will be connected with Canatuan Creek. Slopes will be benched and stabilized in lifts as what is practiced in other disturbed areas. Once rehabilitated, the area will be planted with fruit-bearing trees and other ornamental species. Some changes may be implemented during the rehabilitation and revegetation process depending on the result of additional consultation with the community.

4.1.2.2 Reforestation and Revegetation Plans

Re-vegetation and reforestation plans for Year 2010 will focus on planting approximately 55,000 trees within and outside the disturbed areas of the MPSA. This includes areas affected by current mining operations and areas identified for Progressive Rehabilitation. Nearly 55.0 hectares of disturbed areas will be under active reclamation and rehabilitation during the year. Various fruit trees and indigenous species will be planted this year in preparation for Final Mine Rehabilitation. A schedule of reforestation activities for Year 2010 is incorporated in the Rehabilitation and Reforestation schedule shown in **Table 4.4**. This schedule has been coordinated with the Progressive Rehabilitation Programs as identified in the FMRDP.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.1.2.3 Sedimentation Control / Neutralization Control Plans

Sediment control plans for Year 2010 will focus on maintenance of sediment ponds that will be strategically located around the Surface Mine and the Overburden Stockpile areas. Drainage and diversion canals and waterways will continue to be constructed and maintained to ensure that water runoff is initially contained in the sediment ponds. This will be developed in accordance with the mine plans. In total, approximately 30 to 40 hectares of the mine, overburden stockpiles and mill areas will be controlled by sediment ponds.

Additional sediment control ponds may be constructed within the year in series with neutralization control ponds. Neutralization ponds will be placed around the mine area to control acid mine drainage. These ponds may employ a passive treatment system of removing acid mine drainage from the water run off similar to the successful experimental study in removing AMD from mine pit run off at the Small Scale Mine area.

Benching, compaction, placement of abaca nets and silt fences and vegetation planting will continue to reduce potential erosion issues. Sediment control ponds that will be maintained in Year 2010 is shown in **Figure 4.2**.

4.1.2.4 Other Programs and Activities

Solid Waste Management and Landfill Area Improvement

A Solid Waste Management Facility (SWMF) is planned to be constructed in Year 2010. This facility will consist of a landfill, a leachate collection pond, a Material Recovery Facility for segregated wastes and composting cells for applicable wastes that shall be collected from the mine operations and the Canatuan community.

The landfill area used during the Gossan Phase operations and early stage of the Sulphide Phase operation is planned to be closed and rehabilitated in Year 2010. The area is planned to be converted into an agroforestry plantation with an area of approximately 1.0 ha.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.2 Water Resources

Control strategies associated with impacts to the water resources of the area focus on changes to the drainage patterns, changes in water yields of the affected watersheds and potential water quality degradation due to Acid Mine Drainage. Of particular interest are impacts to Canatuan Creek which drains the majority of the Project Area, Lumot Creek and Paduan Creek. Watershed boundaries and hydrologic information associated with each of these waterways relative to the MPSA are shown on **Figure 4.7**. The downstream Litoban and Siocon Rivers are also shown on **Figure 4.7**.

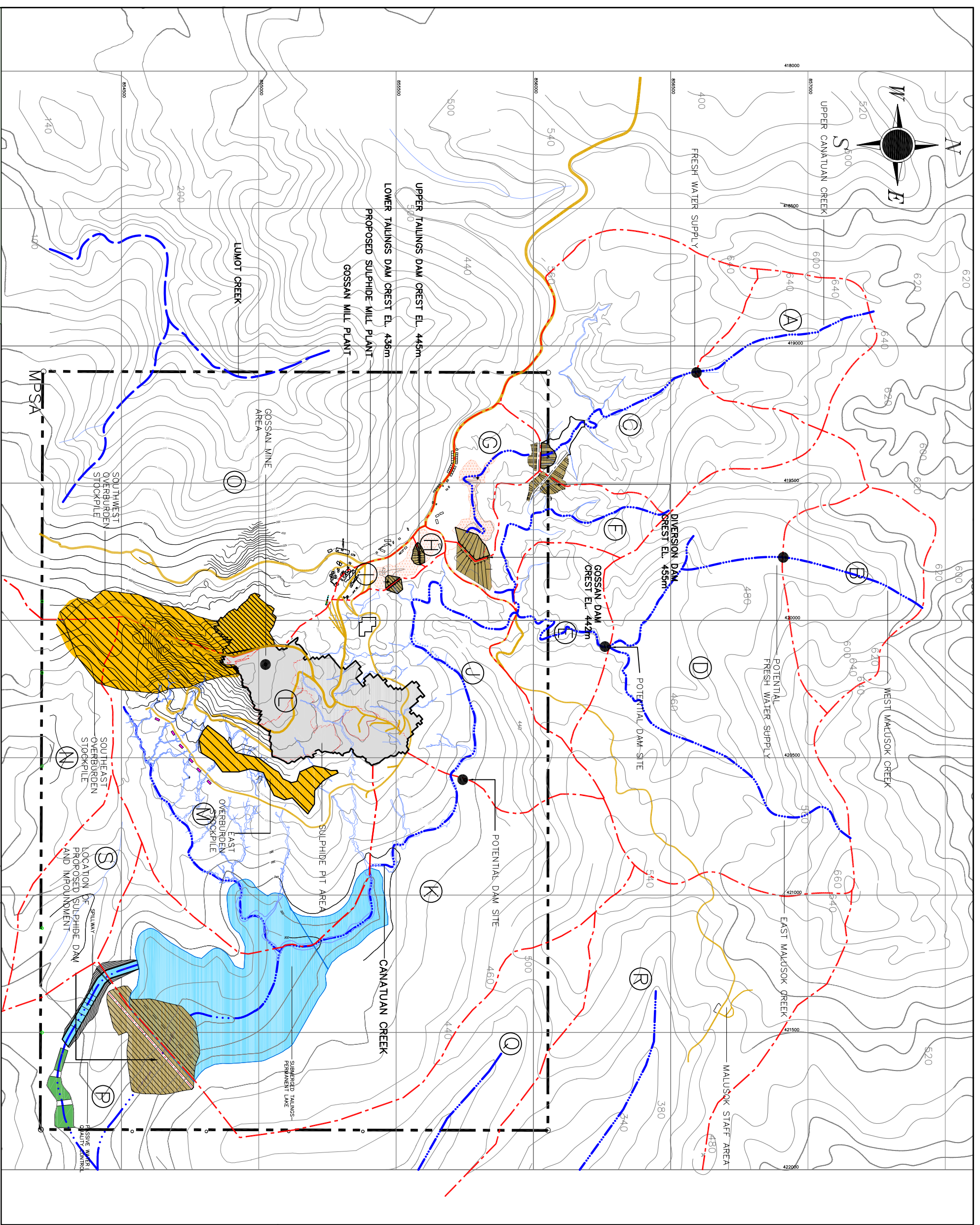
4.2.1 Year 2009 Programs and Activities

4.2.1.1 Watersheds and Water Use

Minimal changes to the water resources of the area have occurred during Year 2009 operations. This is primarily due to the continuation of the construction of the Sulphide Tailings Dam. Watershed boundaries within the MPSA at the end of Year 2009 remain the same as those at the beginning of the year. These are shown on **Figure 4.7** and will remain as indicated throughout the remaining Project life. Each watershed shown is specific to a mine or operations facility and will be evaluated as separate management units for reclamation and closure.

Construction of the diversion canals and sediment ponds as part of the open pit mine operations has not altered the tributary area of the Canatuan Creek watershed. The stream flow response of the basin to rainfall events however has been changed. Removal of the vegetation and exposure of the underlying soil increases the volume of runoff and increases the peak flow rates during rainfall events. This however is mitigated by the sediment ponds which act as retention and detention ponds as well as water quality management features. The Sulphide Tailings Dam and Impoundment also mitigates the upstream changes in watershed and streamflow response.

Freshwater and process makeup water for the Sulphide Phase operations as well as water supplied to the surrounding communities is also provided by the base flow within Upper Canatuan Creek. Base flow within the Upper Canatuan Creek watershed have been monitored since Year 2004. Streamflow data is collected weekly and was used in the development of a Sulphide Dam Water Balance model.



WATERSHED DESIGNATION	DRAINAGE AREA (ha)
A	24.03
B	30.65
C	68.31
D	112.61
E	21.46
F	16.74
G	12.95
H	1.13
I	3.36
J	54.52
K	140.82
L	23.76
M	75.14
N	19.98
O	130.26
P	25.95
Q	22.78
R	2.25
S	16.11

LEGEND

- ROADS
- WATERSHED BOUNDARIES
- WATERSHED DESIGNATION
- CONTOURS
- SULPHIDE PIT AREA
- EXISTING DAMS
- CREEKS/RIVERS
- PRIMARY WATERCOURSE
- MPSA BOUNDARY
- TAILINGS SURFACE
- LAKE OR POND
- MINE OVERBURDEN STOCKPILE

NOTES

1. THIS DRAWING REPRESENTS THE SULPHIDE MINING OPERATIONS.
2. DRAINAGE AREAS N,O,P,Q,R AND S REPRESENT AREAS WITHIN THE MPSA AND NOT THE TOTAL WATERSHED ARE.

0 100m 200m 500m 750m
SCALE IN METERS

WATERSHED BOUNDARIES
YEAR 2010

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Data collected for Year 2009 is shown in **Table 4.5**.

Meteorology Characteristics

A meteorology station is located near the Mill Plant and is maintained by the environmental operations staff. Rainfall data for the Years 1998 through Year 2009 have been recorded and are available. Daily rainfall data for Year 2009 are shown in **Table 4.6**. The mean annual rainfall through Year 2009 is 3,030 mm. Year 2009 had a total recorded rainfall depth of 3,134 mm. The wettest month was July (528 mm) and the month of December (63 mm) was the driest.

Daily evaporation data are also available through Year 2009. Data for Year 2009 is shown in **Table 4.7**. The mean annual evaporation for the period Year 2003 through Year 2009 is 1,203 mm. Total annual evaporation for 2009 was 1,651 mm.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.5 – Upper Canatuan Creek Watershed Monthly Yield Baseflow Stream Weir Year 2009

Month	No. Days	Mean Flow Rate			Total Daily Yield			Total Monthly Yield				Unit Yields/Month		
		gpm	liters/sec	m3/sec	gallons	liters	m3	gallons	ft3	liters	m3	m3/m2	m3/ha	liters/ha
January	31	95.81	6.04	0.006	137,969	521,524	522	4,277,045	571,841	16,167,231	16,167	0.067	674	673,635
February	28	52.95	3.34	0.003	76,242	288,196	288	2,134,786	285,421	8,069,490	8,069	0.034	336	336,229
March	31	134.28	8.46	0.008	193,362	730,908	731	5,994,221	801,427	22,658,154	22,658	0.094	944	944,090
April	30	170.62	10.75	0.011	245,697	928,735	929	7,370,912	985,491	27,862,047	27,862	0.116	1,161	1,160,919
May	31	194.35	12.24	0.012	279,864	1,057,884	1,058	8,675,772	1,159,951	32,794,418	32,794	0.137	1,366	1,366,434
June	30	187.67	11.82	0.012	270,248	1,021,536	1,022	8,107,426	1,083,963	30,646,069	30,646	0.128	1,277	1,276,920
July	31	213.21	13.43	0.013	307,022	1,160,544	1,161	9,517,686	1,272,515	35,976,852	35,977	0.150	1,499	1,499,035
August	31	275.77	17.37	0.017	397,103	1,501,050	1,501	12,310,198	1,645,873	46,532,548	46,533	0.194	1,939	1,938,856
September	30	297.62	18.75	0.019	428,578	1,620,024	1,620	12,857,335	1,719,026	48,600,726	48,601	0.203	2,025	2,025,030
October	31	304.27	19.17	0.019	438,150	1,656,205	1,656	13,582,636	1,815,998	51,342,365	51,342	0.214	2,139	2,139,265
November	30	202.00	12.72	0.013	290,840	1,099,376	1,099	8,725,207	1,166,560	32,981,284	32,981	0.137	1,374	1,374,220
December	31	165.38	10.42	0.010	238,150	900,208	900	7,382,661	987,062	27,906,460	27,906	0.116	1,163	1,162,769

Note:

1. Source: TVIRD, 2009
2. Total Daily Yield is equal to the mean streamflow multiplied by the time.
3. Total Monthly Yield is equal to the Total Daily Yield multiplied by the number of days.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.6 – Daily Rainfall Data Canatuan for Year 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Days	31	28	31	30	31	30	31	31	30	31	30	31
1	50.0	4.0	7.0	1.5	30.5	11.5	38.5	0.5	65.5	0.0	0	0.0
2	0.0	0.0	0.0	0.0	7.0	7.5	8.0	0.0	25.5	10.0	30.5	0.0
3	0.0	0.0	0.0	0.0	0.0	22.5	2.0	0.0	14.0	3.5	0	0.0
4	0.0	0.0	22.0	16.5	0.0	0.0	1.5	0.0	0.0	0.0	49.5	0.0
5	0.0	0.0	1.0	0.0	0.0	0.0	3.5	0.0	0.0	3.5	0.5	0.0
6	0.0	0.0	25.0	11.5	0.0	5.0	10.5	0.0	0.0	5.0	4.0	0.0
7	8.0	0.0	0.0	25.0	0.0	16.0	58.5	0.0	0.0	101.5	0.0	0.0
8	0.5	25.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0	4.5	7.0	0.0
9	7.0	8.0	1.5	0.0	0.0	0.0	4.5	0.0	0.0	0.0	3.0	1.5
10	5.5	2.0	0.0	6.0	13.5	0.0	33.0	0.0	0.0	9.0	4.5	6.5
11	0.0	0.0	0.0	3.5	6.5	0.5	16.5	20.5	0.0	0.0	10.5	0.0
12	0.0	1.0	31.0	0.0	12.0	0.5	1.0	0.0	0.0	0.0	28.5	0.5
13	8.0	0.0	0.0	6.5	12.0	2.0	22.5	0.0	0.0	2.0	5.0	14.5
14	1.0	0.0	0.0	8.0	0.0	15.5	0.5	22.5	2.5	20.5	0.5	0.5
15	0.0	0.0	9.0	3.0	75.0	0.5	1.5	54.0	6.0	1.5	3.5	0.0
16	1.0	0.0	31.5	10.5	31.0	0.0	0.0	4.0	30.0	0.5	0.0	0.0
17	2.0	0.0	72.5	84.0	47.0	42.0	11.5	0.0	0.0	0.0	0.0	0.0
18	0.0	2.0	4.0	32.0	31.0	9.0	0.0	5.0	2.5	0.0	1.0	0.0
19	3.0	0.0	22.5	26.5	17.5	2.0	21.0	9.5	46.5	0.0	1.5	0.0
20	24.5	0.0	11.0	6.0	1.5	21.5	13.0	0.0	50.0	3.0	0.0	0.5
21	1.0	0.0	2.5	2.0	0.0	2.0	4.5	7.5	85.5	1.0	0.0	0.0
22	0.0	0.0	3.0	2.5	2.0	20.0	0.5	13.5	5.0	25.5	0.0	0.0
23	6.5	0.0	0.0	10.5	13.5	7.5	0.0	9.5	0.0	11.0	14.5	0.0
24	1.5	3.5	17.5	0.0	0.0	3.5	10.5	34.5	9.5	7.0	31.5	0.0
25	0.0	8.0	0.0	0.0	0.0	11.5	71.0	10.5	52.5	0.0	17.5	0.0
26	9.0	11.5	0.0	0.0	23.5	8.5	23.5	0.5	55.5	0.0	1.0	0.0
27	1.5	8.0	0.0	0.0	1.0	35.0	2.5	0.0	2.5	0.0	0.0	0.0
28	0.0	0.0	1.5	4.0	0.0	0.5	13.5	24.0	15.5	2.5	5.5	0.0
29	5.0		5.0	6.0	0.0	0.5	20.5	14.5	0.0	10.5	0.0	0.0
30	0.0		12.0	25.0	22.5	1.0	52.0	0.0	2.0	0.0	0.0	39.0
31	0.0		2.0		10.0		82.0	15.5		0.0		0.0
Statistics												
Total For Month	135.00	73.00	281.50	290.50	357.00	247.50	528.00	246.00	470.50	222.50	219.50	63.00
Mean Daily	4.35	2.61	9.08	9.68	11.52	8.25	17.03	7.94	15.68	7.18	7.32	2.03
Maximum Day	50.00	25.00	72.50	84.00	75.00	42.00	82.00	54.00	85.50	101.50	49.50	39.00
Minimum Day	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Monthly Rank	10	11	5	4	3	6	1	7	2	8	9	12
% Of Annual	4%	2%	9%	9%	11%	8%	17%	8%	15%	7%	7%	2%
Cumulative	135.00	208.00	489.50	780.00	1,137.00	1,384.50	1,912.50	2,158.50	2,629.00	2,851.50	3,071.00	3,134.00

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.7 – Daily Evaporation Data Canatuan for Year 2009 (mm)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Days	31	28	31	30	31	30	31	31	30	31	30	31
1	4.0	6.0	6.0	6.5	0.5	6.5	3.5	4.5	2.5	5.0	5.0	5.0
2	5.0	5.0	5.0	5.0	7.0	2.5	0.0	5.0	0.5	5.0	5.5	5.0
3	5.0	5.0	5.0	5.0	5.0	5.0	2.5	2.0	5.0	9.0	3.5	5.0
4	5.0	5.0	0.0	0.0	10.0	5.0	2.5	6.0	5.0	5.0	4.5	5.0
5	5.0	5.0	2.0	5.0	5.0	5.0	2.5	5.0	5.0	3.5	5.5	5.0
6	5.0	5.0	0.0	6.5	10.0	7.0	3.5	5.0	5.0	5.0	4.0	5.0
7	0.0	5.0	5.0	10.0	5.0	2.0	10.5	5.0	5.0	3.0	5.0	5.0
8	4.5	0.0	5.0	5.0	5.0	6.5	5.0	5.0	5.0	4.5	2.0	7.0
9	0.0	3.0	1.5	5.0	5.0	5.0	0.0	5.0	6.0	5.0	8.0	2.5
10	3.5	3.0	5.0	6.0	3.5	5.0	3.0	5.0	5.0	4.0	0.0	4.5
11	3.0	4.0	5.0	6.5	3.5	5.0	6.5	0.5	5.0	5.0	10.5	6.0
12	3.0	4.0	4.0	5.0	0.0	5.0	1.0	5.0	5.0	5.0	3.5	5.5
13	1.0	1.0	5.0	3.5	2.0	2.0	9.5	5.0	5.0	2.0	6.0	4.5
14	3.0	5.0	5.0	3.0	10.0	2.5	0.0	0.0	0.0	0.5	4.5	7.5
15	5.0	5.0	4.0	5.0	35.0	3.5	6.5	7.0	2.0	11.5	0.0	5.0
16	5.0	5.0	0.0	3.5	1.0	5.0	5.0	0.0	0.0	5.5	5.0	6.0
17	2.0	5.0	0.0	0.0	12.0	7.0	0.5	1.0	5.0	5.0	5.0	6.0
18	5.0	2.0	0.0	7.0	1.0	4.0	5.0	5.0	6.5	5.0	6.0	5.0
19	6.0	5.0	0.0	6.5	2.5	2.0	3.0	5.0	3.5	5.0	6.5	6.0
20	6.5	5.0	3.0	1.0	3.5	6.5	3.0	4.5	45.0	0.0	5.0	4.5
21	4.0	5.0	0.0	1.0	5.0	4.0	0.0	5.0	40.5	6.0	5.0	5.0
22	4.0	5.0	3.0	2.5	5.0	5.0	4.5	2.5	5.0	0.0	5.0	5.0
23	0.5	5.0	5.0	10.5	3.5	0.5	6.0	3.5	5.0	1.0	0.0	5.0
24	2.5	1.5	0.0	5.0	5.0	8.5	1.5	4.5	0.0	2.0	6.5	6.0
25	4.0	0.0	5.0	5.0	5.0	1.5	10.0	9.5	7.5	5.0	2.5	5.0
26	0.0	0.0	5.0	5.0	0.0	3.5	0.5	0.5	10.5	5.0	5.0	5.0
27	4.5	3.0	5.0	5.0	6.0	0.0	5.5	5.5	0.0	2.5	6.0	5.0
28	5.0	5.0	1.5	0.0	4.0	5.5	3.5	5.0	0.5	7.5	0.5	6.0
29	3.0		5.0	1.0	6.0	3.5	0.5	2.5	5.0	0.5	5.0	6.0
30	5.0		7.0	5.0	5.0	3.0	3.0	5.0	2.0	5.0	5.0	12.0
31	5.0		2.0		4.5		17.0	7.5		5.0		5.0
Statistics												
Total For Month	114.00	107.50	99.00	135.00	175.50	124.50	124.50	134.50	201.00	127.50	137.00	171.00
Mean Daily	3.68	3.84	3.19	4.50	5.66	4.15	4.02	4.34	6.70	4.11	4.57	5.52
Maximum Day	6.50	6.00	7.00	10.50	35.00	8.50	17.00	9.50	45.00	11.50	10.50	12.00
Minimum Day	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50
Monthly Rank	10	11	12	5	2	8	8	6	1	7	4	3
% Of Annual	7%	7%	6%	8%	11%	8%	8%	8%	12%	8%	8%	10%
Cumulative	114.00	221.50	320.50	455.50	631.00	755.50	880.00	1,014.50	1,215.50	1,343.00	1,480.00	1,651.00

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.2.1.2 Water Quality Characteristics

Water quality data was collected at 14 locations for different streams and rivers within and around the Project Area during Year 2009. These data were collected by the Multipartite Monitoring Team (MMT) during three sampling events conducted in the months of March, July and November. The DENR-EMB also collected water samples for TSS analysis as basis for the issuance of the renewal of Wastewater Discharge Permit for the Sulphide Tailings Dam in June 2009.

Additional data were also collected for various parameters throughout Year 2009 by TVIRD. These data were collected in support of operations management practices and quality control purpose. Sampling locations included the Sulphide Tailings Dam, Lumot Creek, Paduan Creek, Cusan Creek, Mambong River, Litoban River, Siocon River and three tributaries of Canatuan Creek. The locations of the sampling points are shown on **Figures 4.8** and **4.9**.

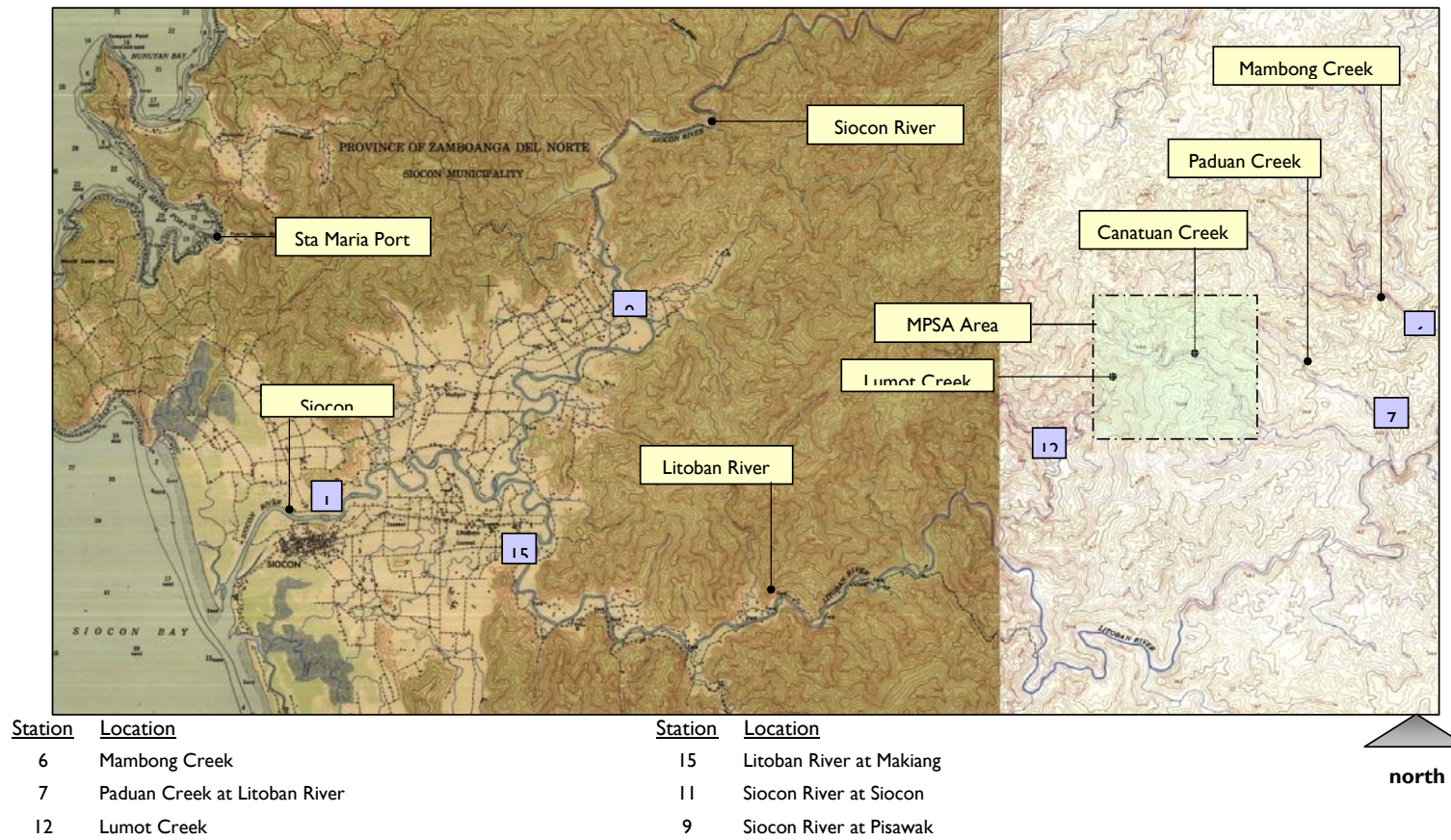
Fourteen stations were monitored during the three sampling MMT events. Split samples were collected and sent separately to DENR accredited (TVI samples) laboratory and DENR-PETROLAB (DENR samples). Parameters analyzed were Free Cyanide, Total Suspended Solids, Total Dissolved Solids, Arsenic, Cadmium, Chromium, Copper, Iron, Lead, Zinc and Mercury.

Results of Free Cyanide analysis for the sampling event conducted in March for DENR Sample labeled as Upper Canatuan Creek B identified presence of free cyanide concentration in slight exceedance of the regulatory standards. However, split TVI sample for the same station sent to a DENR accredited laboratory identified negative presence of free cyanide in the water. This result was disregarded considering there are no potential sources of free cyanide from this stream as it is not directly affected by the mining operations. All other stations during this sampling event indicated absence of free cyanide contamination.

Results of free cyanide analysis for the sampling event conducted in July for DENR and TVI sample labeled as Upper Canatuan Creek A identified presence of free cyanide concentration in slight exceedance of the regulatory standards. A resampling was conducted for the same station. This resulted in concentration of free cyanide below detection limits. All other sampling stations during this monitoring event indicated absence of free cyanide contamination.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Figure 4.8 - Regional Water Quality Monitoring Stations

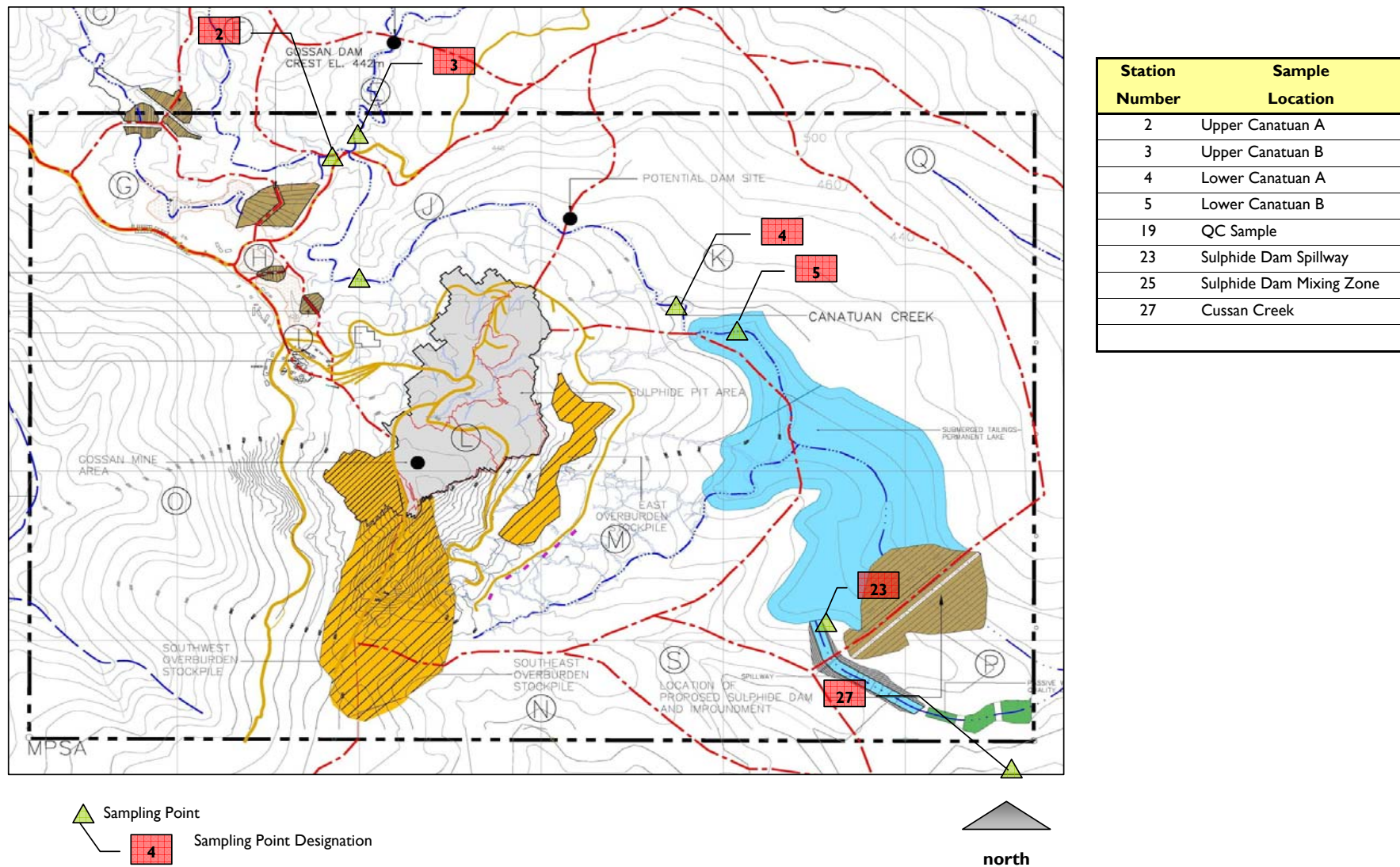


Notes:

1. Map Source NAMRIA Siocon and Tupilac Peak 1:50,000
2. Station Designations based on Year 2009 MMT monitoring.
3. See Figure 4.9 for Monitoring Stations within the MPSA
4. Location of Monitoring Station 1

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Figure 4.9 - MPSA Water Quality Monitoring Stations Year 2009



4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Heavy metals analysis on the other hand for the March and July sampling event identified compliance to regulatory standards based on the DENR samples. For TVI samples, 2 stations, the Lower Canatuan Creek A and Lower Canatuan Creek B resulted to slight exceedance in arsenic levels which is not comparable to the results of analysis for the DENR samples.

Results of analysis for the MMT sampling event conducted in November are not yet available as of this writing but will be presented at the Mine Rehabilitation Fund Committee Meeting in January 2010.

Laboratory test data during the MMT Water Quality Assessment are provided in **Appendix B**.

A research program on passive water treatment using wetland technology for the treatment of acid mine drainage was initiated in the 3rd quarter of Year 2009. Different wetland systems using aerobic and anaerobic ponds were designed, constructed and continued to be monitored for large scale application in the treatment of acid mine drainage within the Canatuan Creek, Cusan and Lumot Creek watershed.

The key objectives of this review are to optimize design and operations criteria for a passive treatment system using indigenous materials and incorporating low cost construction and minimal operations needs. Based on our review and the local AMD conditions, a Reducing and Alkalinity Producing System (RAPS) has been identified as the most promising passive treatment option. The RAPS design incorporates an anaerobic down-flow system. Water percolates downward first through organic then limestone substrate. Reduction occurs in the water and organics zone and is catalyzed by sulfate reducing bacterial processes. Subsequent dissolution of 90% CaO limestone produces alkalinity. The result is neutralization of pH and the removal of metals (As, Cd, Cu, Fe, Hg, Mn, Pb, and Zn) by (a) precipitation as metal sulfides, carbonates, and hydroxides; (b) sorption to soil substrate and plant rhizosphere; and (c) uptake into wetland plants referenced as “metal hyperaccumulators”. Based on laboratory testing eight different metal hyperaccumulator plants have been identified as indigenous to the Canatuan mining area. Of these species, metal-assay analysis and plant biomass experiments have determined Gabi (*Colocasia esculenta*), Water Hyacinth (*Eichhornia crassipes*), Bugang Reed (*Phragmites australis*), and Vetiver Grass (*Chrysopogon nemoralis*) as the most effective metal hyperaccumulators with the tolerance and biomass production necessary for AMD treatment. In addition to plant-metal uptake, experiments to assess system hydraulics, metal sorption to soil and roots, and microbial processes are ongoing, and will be used to optimize the design and operations criteria for the effective long-term treatment of AMD.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Preliminary results of the research are provided in **Appendix C**.

4.2.2 Year 2010 Programs and Goals

4.2.2.1 Watersheds and Water Use

The Mining Program for Year 2010 will directly affect the lower portion of the Canatuan Creek and Cusan Creek watershed. This will be the result of the continued construction of the Sulphide Tailings Dam and Impoundment and the final dam spillway. Located near the southeast corner of the MPSA, the dam itself will disturb approximately 4.5 hectares. The final spillway will disturb approximately 5 hectares. Sulphide tailings will continue to be deposited during the year. The resulting impoundment will cover an area of approximately 20 to 30 hectares. In total the Sulphide Tailings Dam and Impoundment will directly impact approximately 25 to 30 hectares.

The Canatuan Creek watershed will continue to be impacted in Year 2010 as associated with the extraction of the sulphide ore from the Surface Mine. Reclamation and closure activities scheduled for the Southeast overburden stockpile during the year will also impact the Cusan Creek Watershed. This is expected to be positive and will reduce soil erosion and sediment deposition within the Sulphide Dam Impoundment.

Environmental impacts to the Lumot Creek watershed from exposed disturbed areas during the Gossan Phase operations has been reduced due to the initial rehabilitation activities conducted in Year 2009. Progressive rehabilitation of the Southwest Overburden Stockpile, Phase II mining area and Back Road area, primary sources of impact to the Lumot Creek watershed, will continue in Year 2010 and is planned to be completed by the end of the 4th quarter.

The total affected area within the Lumot Creek watershed that will undergo rehabilitation in Year 2010 is estimated to be 15 hectares. This represents less than 1% of the Lumot Creek Watershed.

Both the Canatuan Creek and Lumot Creek watershed boundaries will remain the same as in Year 2010 and no significant changes to watershed yields are anticipated. These boundaries are identified on **Figure 4.7**. More extensive monitoring of these watersheds will be done in Year 2010 to better

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

quantify the hydrologic conditions. Included will be sediment yields, water quality and streamflow. This is to be done in conjunction with the Progressive Rehabilitation programs and in concert with the FMRDP.

Process water requirement for the Mill Plant during the Sulphide Phase operations is estimated at 4,400 m³/ day. An estimated volume of 1,900 m³/day will be recycled within the process while the remaining quantity of 2,500 m³/ hr will come from fresh water make up. Freshwater make up will continue to be sourced from the Upper Canatuan Creek as well as water for community and administration services supply.

A water and materials balance model was prepared to monitor water levels and materials deposition within the Sulphide Tailings Impoundment. This model also provides a predictive function to ensure continued submergence of the tailings and maintenance of the appropriate water cover and free board. The model parameters and results are shown in **Table 4.8**.

4.2.2.2 Meteorologic Characteristics

Meteorology data will continue to be collected throughout Year 2010. This will include temperature, rainfall, and evaporation. Water balance evaluation and Canatuan Creek data collection baseflow will also continue to be done throughout Year 2010.

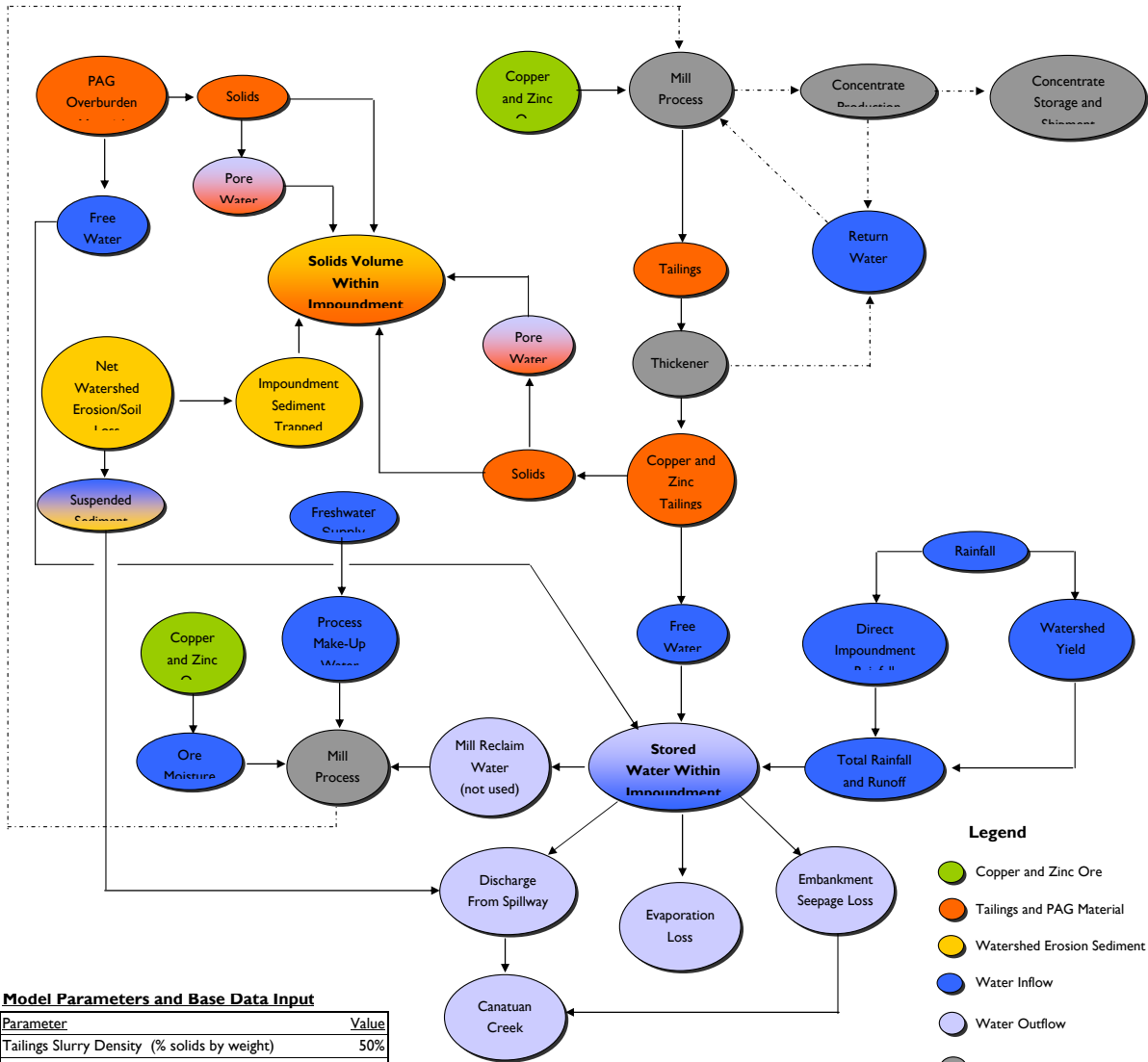
4.2.2.3 Water Quality Characteristics

Erosion control, sedimentation and potential water quality degradation are the primary environmental management concerns for the Year 2010. Erosion and sedimentation will be managed using surface erosion control structures, diversion canals, silt fences and sedimentation ponds. Water quality will be monitored by the MMT on a quarterly schedule. Internal monitoring will likewise be conducted by TVIRD on a regular basis.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.8 - Sulphide Tailings Impoundment Water and Materials Balance Parameters and Summary Results

Water and Materials Balance Component Diagram



Model Parameters and Base Data Input

Parameter	Value
Tailings Slurry Density (% solids by weight)	50%
Specific Gravity of Tailings	4.20
In Place Tailings Density (tonnes/m3)	1.60
Void Ratio Tailings	0.38
Volume of Tailings In Place (m3)	0.63
Mass of Tailings Solids + Water (tonnes)	2.00
Volume of Water In Tailings (m3)	1.00
Volume of Water In Tailings Voids (m3)	0.24
Free Water Volume from Tailings Slurry (m3)	0.76
Moisture Content of Ore	5.00%
Moisture Content of PAG	15.00%
Specific Gravity of PAG	3.40
In Place PAG Density (tonnes/m3)	1.60
Void Ratio PAG	0.47
Volume of PAG In Place (m3)	0.63
Volume of Water In PAG (m3)	0.29
Volume of Water In PAG Voids (m3)	0.29
Total Watershed Sulphide Dam (ha)	585.50
Impoundment Trap Efficiency (% range)	45% - 91%
In Place Sediment Density (tonnes/m3)	1.28
Monthly Rainfall Data Period (years)	2003 - 2008
Monthly Evaporation Data Period (years)	2003 - 2008

Dam and Impoundment Data

Dam Stage	Crest Elevation (m)	Spillway	Water Cover Criteria (m)	Solids Storage Volume (m3)	Dam Crest Freeboard (m)
1	273	270	0	167,897	3
2	292	289	4	740,087	3
3	316	310	7	2,237,648	6
4	335	327	10	4,609,137	8

Summary of Water and Materials Balance Modeling

Parameter	Stage 1	Stage 2	Stage 3	Stage 4
Operations Period	Jan 08 - July 08	Aug 08 - Dec 09	Jan 09 - Jul 11	Aug 11 - Apr 04
Solids Deposited (m3)	140,785	712,145	2,017,791	4,159,814
Solids Deposited (tonnes)	180,360	1,007,699	3,130,287	4,159,814
Water Cover (m)	1.4	4.6	9.6	12.4
% Storage Used By Stage	84%	96%	90%	90%
% Storage Used Overall	3%	15%	44%	90%

Note: Above values based on water balance rev 3.1 January 2009

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

The research program for acid mine drainage treatment will be continued in early Year 2010. Potential application of the study on a large scale basis may be implemented later in the year.

4.3 Noise

Noise impacts are associated with the heavy equipment activity of the mining operations, Mill and Processing Plant operations, and vehicle transportation activities. The primary impact area is limited to the immediate vicinity within and around the Open Pit and the Mill and Processing Plant. Mitigation measures are associated with individual noise protection equipment.

4.3.1 Year 2009 Programs and Activities

During operations, primary sources of noise impacts from the Canatuan Mine Area are from vehicles, trucks and heavy equipments going to and from the Mill Plant. Operation of the grinding circuit also contributes to the noise impact. Controls implemented on site are through provision of personal protective equipment to employees assigned in areas identified with significant noise impacts.

Noise monitoring studies were done in August 2009 by Berkman Systems Inc. as part of TVIRD compliance based on the revised ECC. A 24-hour noise level monitoring of nine sampling stations within and outside the MPSA was done for a three-day period. The Canatuan Mine area is classified as Class C section primarily identified as a light industrial area. Based on NPCC Memorandum Circular 002 Series of 1980, ambient noise level standard for Class C areas is 65 dBA for morning, 70 dBA for daytime, 65 dBA for evening and 60 dBA for night time.

Results of the Noise Monitoring Study are provided in **Table 4.9**.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.9 – 24-hr Ambient Noise Level Monitoring Results (dBA)

Sta. No.	Location	Period	Date	Time	Noise Level
N1	Front Gate	Morning	August 5, 2009	8:20 AM	68
		Daytime	August 5, 2009	9:30 AM	70
		Evening	August 5, 2009	9:00 PM	67
		Night Time	August 5, 2009	10:05 PM	66
N2	Mill Plant Area	Morning	August 5, 2009	8:35 AM	69
		Daytime	August 5, 2009	9:45 AM	68
		Evening	August 5, 2009	9:15 PM	69
		Night Time	August 5, 2009	10:20 PM	70
N3	Motorpool	Morning	August 5, 2009	8:50 AM	62
		Daytime	August 5, 2009	1:45 PM	63
		Evening	August 5, 2009	9:30 PM	61
		Night Time	August 5, 2009	10:35 PM	60
N4	Mine Pit Office	Morning	August 7, 2009	9:50 AM	43
		Daytime	August 7, 2009	1:50 PM	57
		Evening	August 7, 2009	9:50 PM	43
		Night Time	August 7, 2009	10:10 PM	43
N5	Nursery Area	Morning	August 6, 2009	8:45 AM	49
		Daytime	August 6, 2009	9:05 AM	50
		Evening	August 6, 2009	9:00 PM	44
		Night Time	August 6, 2009	10:10 PM	44
N6	Boom near the Upper Dam	Morning	August 6, 2009	8:30 AM	62
		Daytime	August 6, 2009	1:10 PM	50
		Evening	August 6, 2009	9:50 PM	46
		Night Time	August 6, 2009	10:40 PM	45
N7	Piksolabukan	Morning	August 7, 2009	8:10 AM	53
		Daytime	August 7, 2009	12:30 PM	57
		Evening	August 7, 2009	9:30 PM	45
		Night Time	August 7, 2009	10:24 PM	45
N8	Ambaan Village	Morning	August 6, 2009	8:15 AM	61
		Daytime	August 6, 2009	10:35 AM	56
		Evening	August 6, 2009	9:20 PM	52
		Night Time	August 6, 2009	10:25 PM	45
N9	Sta. Maria Port Warehouse	Morning	August 5, 2009	5:30 AM	66
		Daytime	August 5, 2009	10:10 AM	58
		Evening	August 5, 2009	8:40 PM	71
		Night Time	August 5, 2009	10:50 PM	70

Source: Berkman, 2009

Based on the study, sampling stations within the Plant area have exceeded the noise level standards for Class C. These stations are the Front Gate and Mill Plant stations. However, noise level impact of these

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

areas to adjacent housing communities are insignificant based also on the result of the monitoring. The Sta. Maria Port warehouse station, taken in Sta. Maria, Siocon was included in the monitoring to identify noise level impacts of on going shipment activities. Due to presence of trucks and heavy equipment used in loading product concentrates for shipment, short term noise impacts are eventually created. Impacts however, are minimized by concentrating shipment activities during day time.

4.3.2 Year 2010 Programs and Goals

Other than on going mine operations, short term noise impacts will result from continued construction of the Sulphide Tailings Dam and rehabilitation of roads from mine site to Siocon. Noise from the Sulphide Mine operations will be the same as experienced during the Gossan Mine operations. The exception to this will be the need for blasting operations to recover the Sulphide ore. The extent of blasting will depend on the ore material. Information, Education and Campaign programs have been implemented for the community for them to understand the method of blasting as well as its impacts. Apprehensions on the blasting practice have been communicated and discussed with the community. Blasting operations protocols have been prepared by the Mines Department and the Safety Department.

Programs and goals for Year 2010 will focus on increased use of personal protective equipment within and around the Mill area and monitoring the employee use of the equipment. This will be implemented by the Safety Department.

4.4 Air Quality

Air quality within the area was previously impacted by kaingin practices, wood fires for household use and emissions from small scale mining activities and ore processing. With the exception of wood fires for household use, the other air quality impacts attributed to this source were eliminated during Year 2004.

4.4.1 Year 2009 Programs and Activities

Project related air quality issues during Year 2009 were associated primarily with stack emissions from the generator sets and motor vehicles.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Dust generation during transportation activities and materials handling within the Surface Mine and during the Mill and Processing Plant operations is another air quality impact. Mitigation measures were primarily associated with dust control during dry periods of the year. This was accomplished by continued sprinkling of water on the roads and exposed areas using water trucks.

A stack emission and ambient air monitoring program was completed in August by Berkman Systems, Inc. to verify TVIRD's compliance with the source emission standards of DENR Administrative Order No. 81 series of 2000 or the Implementing Rules and Regulations of Philippine Clean Air Act of 1999. The pollutants monitored for the source emission were particulate matter (PM), particulate mercury (Hg), sulfur dioxide (SO₂), nitrogen oxide (as NO₂) and carbon monoxide (CO) at four generator exhaust stacks. Also, one furnace exhaust stack was monitored for PM, Total Hg, SO₂, NO_x (as NO₂) and CO. Lastly, one scrubber exhaust stack was sampled for PM, SO₂, NO_x (as NO₂), CO, Total As, Total Hg, and Total Pb. All source emission testing were conducted for three test runs.

Results of the stack emission monitoring conducted on the 6 stations based on the desired pollutant analysis identified that pollutant concentrations are within the applicable standards provided by DAO 2000-81 except for Generator Set No. 2 with a capacity of 1500 kW exceeding NO₂ standards. Maintenance of this generator set shall be scheduled to improve operating efficiency and fuel combustion. Summary of results for the stack emission monitoring is provided in **Table 4.10**.

Ambient air quality monitoring was likewise completed together with the stack emission monitoring. Eight stations were monitored for total suspended particles (TSP), PM₁₀, SO₂, NO₂, CO and particulate metals (As, Hg, and Pb). The pollutant concentrations as shown in **Table 4.11** ranged from <1.6 to 941.8 ug/ Ncm for TSP, from <1.8 to <2.3 ug/ Ncm for PM₁₀, from <0.5 to 22.0 ug/ Ncm, for SO₂ and from 2.7 to 13.3 ug/ Ncm for NO_x. These values complied with the DENR National Ambient Air Quality Standards based on 60 minutes averaging time of 200 ug/ Ncm for PM₁₀, 340 ug/Ncm for SO₂ and 260 ug/ Ncm for NO₂.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.10 – Stack Emission Monitoring Program Result Year 2009

Parameter		DENR Standard (mg/ Ncm)	Average Pollutant Concentration, mg/ Ncm					
			Genset No. 4	Genset No. 2	Genset No. 3	Genset No. 1	Furnace Assay Stack	Assay Lab Digestion FH
			2.0 MW	1.5 MW	1.6 MW	1.4 MW		
Particulate Matter	PM	150	26.7	16.9	17.6	40.1	81.5	<0.1
Particulate Mercury	Hg	5	<0.000001	<0.000001	<0.000001	0.001551*	0.000723	0.007
Sulfur Dioxide	SO ₂	1500 ^a	153.9	128.8	46.7	159.1	78.6	5.6*
Nitrogen Oxides	as NO ₂	2000	1560.5	<i>2321.5</i>	58.7	153.1	33.6	<6.5
Carbon Monoxide	CO	500	277.9	179	163.7	233.6	18.7	<1.1
Total Arsenic	As	10	na	na	na	na	na	0.003
Total Lead	Pb	10	na	na	na	na	na	0.058

Note:

- a. Monitoring program conducted by Berkman Systems Inc.
- b. Average pollutant concentration based on three test runs.
- c. * - average pollutant concentration based on two test runs.
- d. ^a - existing sources installed before November 2000.
- e. Red italicized font indicates values in exceedance of standard.
- f. na- not analyzed

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Table 4.11 – Ambient Air Monitoring Program Result Year 2009

Sta. No.	Location	TSP	PM ₁₀	SO ₂	NO ₂	Particulate As	Particulate Hg	Particulate Pb	CO
A1	Front Gate	133.8	<1.8	22	7.5	<0.0003	<0.00003	0.098	<1
A2	Mill Plant Area	167	<2.1	9.1	6.7	<0.0003	<0.00003	0.033	<1
A3	Motorpool	272.3	<2.0	17.6	4.2	<0.0003	<0.00003	<0.002	<1
A4	Mine Pit Office	288.9	<2.2	6.5	2.7	<0.0003	<0.00003	<0.002	<1
A5	Nursery Area	<1.6	<2.0	6.5	10	<0.0003	<0.00003	<0.002	<1
A6	Boom near the upper Dam	<i>936.4</i>	<2.0	3.3	0.2	<0.0003	<0.00003	<0.002	<1
A7	Piksolabukan	<i>941.8</i>	<2.1	<0.5	13.3	<0.0003	<0.00003	<0.002	<1
A8	Ambaan Village (SSAI Office)	<i>363.5</i>	<2.3	9.7	3.1	<0.0003	<0.00003	<0.002	<1
A9-A	Sta. Maria Port Warehouse	58.9	<1.8	na	na	<0.0003	<0.00003	<0.002	na
A9-B	Sta. Maria Port Warehouse	<i>531.8</i>	<1.8	na	na	<0.0003	0.05285	<0.002	na
DENR National Ambient Air Quality Guideline for Criteria Pollutants		300	200	340	260	20	none	20	30

Note:

- a. Conducted by Berkman Systems, Inc. in August 2009.
- b. Na- not analyzed
- c. Red italicized values exceeded the standards.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

As for the TSP monitoring, three stations, Boom near the Upper Dam, Piksolabukan, Ambaan Village (SSAI Office) exceeded regulatory limits of 300 ug/ Ncm based on 60 minutes averaging time. The high concentrations of TSP were due to the fugitive dusts from activities in the area.

4.4.2 Year 2010 Programs and Goals

Dust generation is expected to continue during Year 2010 due to full mining operations and the continued construction of the Sulphide Tailings Dam. The exposed areas will continue to be treated by water trucks to minimize dust generation. Emissions from the gensets will be eliminated later in Year 2010 once the Zamsureco power line is constructed. Emissions from the Mill and Process Plant are identified and employees assigned are provided with personal protective equipment. This is included as part of the Safety Department activities.

4.5 Conservation Values

Conservation values focus on three sectors; Nature Issues, Visual Aesthetics and Recreation and Education. Impacts to the first two sectors are unavoidable due to the type of activities associated with mining operations. Mitigation measures are available and have been implemented during the previous operations. Rehabilitation and reclamation practices for disturbed areas are also available and have been implemented as part of the mine revegetation and reforestation programs throughout the operations period.

4.5.1 Nature Issues Year 2009 Programs and Activities

4.5.1.1 Vegetation

Approximately 10 hectares of existing vegetation was removed or impacted during Year 2009 as part of the mining and related activities and construction of the final spillway of the Sulphide Tailings Dam. The majority of this vegetation consisted of grasses and low level brush with few trees. Approximately 5 ha of the area represented forest conditions which was located at the Sulphide Tailings Dam. This was covered under a Tree Cutting Permit issued by the Forest Management Bureau and monitored by the

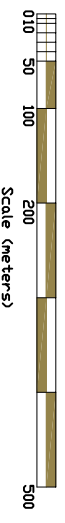
4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

PENRO and CENRO. The other 5 ha is accounted to the expansion of the previous Gossan Mine Pit for the recovery of Sulphide ore.

As indicated previously, approximately 39,300 trees were planted during Year 2009. This includes planting areas both inside and outside the MPSA area. The planted species consisted primarily of mangium, white lauan, gmelina, auri, mahogany, manggasinoro and rubber trees. Vetiver grass, various shrubs and legumes were likewise sowed in low-pH soil to improve its nitrogen and nutrient components. The overall area planted encompassed approximately 23 hectares.

Figure 4.10 illustrates the current vegetation conditions of the Canatuan Mine Area. It is a satellite image of the MPSA identifying the disturbed areas of the Canatuan Mining Project as well as remaining forest cover and vegetated portions within the MPSA. This image is dated June 2009.

Further, a forest inventory of the MPSA was conducted by CENRO personnel in September 2009. This is a survey of the MPSA conducted every 5-years as part of the compliance to the Environmental Compliance Certificate issued to TVIRD. The initial forest inventory was conducted in Year 2004. This inventory identified approximately 23% or 116 ha of the total 508 ha MPSA as forested secondary growth. The remaining 77% is open, agroforestry or grassland area. The total number of trees inventoried was 1,775 or equivalent to 1,023 m³. The results of the forest inventory conducted in September are not yet available from the CENRO. The results will be reported at the MRFC meeting in early Year 2010.




TVI Resource
Devt. (Philis) Inc.
LAST REVISED: 01 December 2009

CANATUAN MPSA
CANATUAN SATELLITE IMAGE (FOREST RESOURCES MAP)

FIG. NO.
4.10

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.5.1.2 Wildlife

Wildlife within the area is impacted by the presence of activity from both mining and support services. This has occurred since the start of mining operations in Year 2004. Animal poaching however may have been significantly reduced due to security and limited access to the Project Area.

Activities during Year 2009 appear not to have impacted the aquatic ecology of the area from a water quality standpoint. Data collected from the results of the quarterly surface water quality samples at the stream and river monitoring stations indicated levels of metals are generally at or below laboratory detection limits and below the regulatory limits for water quality standards. An aquatic species and sediment monitoring program was conducted in September 2006 by an outside consultant. The overall conclusions indicated there were no impacts to the aquatic systems relative to the heavy metals and cyanide.

The same monitoring program was duplicated in November 2009 by the same consultant to determine if there are any significant changes in the result of the study conducted in Year 2006 given the continuous operation at the mine area. Original sampling stations were retained and additional sampling stations were identified in the November 2009 monitoring program. This included sampling locations at Sta. Maria Port and Sta. Maria Bay in Siocon wherein TVIRD maintains a concentrate storage warehouse and where concentrate shipment is conducted. Samples were likewise collected within the Sulphide Tailings Impoundment, wherein, during the Year 2006 monitoring program was not yet constructed and not part of the Gossan operation. Result of the aquatic monitoring program conducted in November to this time are not available but will instead be reported to the MRFC in early Year 2010.

Construction activities of the Sulphide Tailings Dam have impacted approximately 1,000 m of Canatuan Creek and several small tributaries within the immediate vicinity of the impoundment. This is an unavoidable impact. The impacted reaches of riverine environment will be filled with tailings and overburden material from the Sulphide operations. This will eventually be replaced by a reservoir and permanent lake encompassing approximately 30 hectares.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

Terrestrial wildlife monitoring studies were also completed in November 2006 by an outside consultant. The results of these studies are detailed in separate report. The overall conclusions indicated the area remains very diverse with respect to wildlife species. Several threatened species identified in the baseline studies continue to inhabit the area and have been able to successfully coexist with the mining and operations activities.

4.5.2 Nature Issues Year 2010 Programs and Goals

4.5.2.1 Vegetation

Reforestation activity will continue through Year 2010 and will be directly affected by the start of Progressive Rehabilitation activities. The overall plan is to plant approximately 55,000 trees within and outside the MPSA area. The planting locations will be scattered throughout the MPSA. Approximately 80% of the planting will occur within the disturbed areas that have little or no forest cover or areas subject to Progressive Rehabilitation. The remaining 20% of the planting will be within previous planted areas and those areas with thin forest cover.

The Year 2010 reforestation program will include planting within all six Forest Parcels identified in the DENR June 2004 pre-mining survey. This will include previously mined opunt areas from the Gossan Phase operation, overburden stockpile areas and the tailings impoundment areas. Parcel C will likely not be planted in Year 2010 due to on going construction activities at the Sulphide Dam and spillway. Road access leading to the Sulphide Dam however will be part of the Year 2010 reforestation program.

Previously revegetated areas will likewise be interplanted with endemic species in Year 2010. These species will include lauan, apitong, medicinal and herbal species native to the Canatuan area.

A flora monitoring program will also be conducted by an outside consultant in early 2010 as was done in Year 2006.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.5.2.2 Wildlife

Construction of the Sulphide Tailings Dam and Impoundment will affect the aquatic habitat of Canatuan Creek. Formation of the impoundment behind the Sulphide Tailings Dam will also permanently alter approximately 1,500 meters of riverine habitat. This is an unavoidable impact. The riverine aquatic habitat will be replaced by a lake aquatic habitat. Mitigation measures for this impact will be implemented once the tailings impoundment has been fully used and reclamation activities are initiated. Reconstruction of Canatuan Creek and the aquatic habitat will begin at that time. This is anticipated to occur at the end of the mining operations in Years 2013 and 2014.

No additional impacts to terrestrial wildlife due to mining and milling activities are anticipated in Year 2010. The Surface Mine expansion will primarily be vertical with no significant expansion of the horizontal mine limits. Wildlife within the area has evacuated the site in the past during the Gossan Phase operations.

Habitat evaluation will also be conducted in early 2010 as part of the terrestrial flora and fauna studies to be completed by an outside Consultant. This work will be similar to that performed in Year 2006.

An aquatic environment sampling and testing program was performed by an outside Consultant in November 2009 similar to that completed in Year 2006. Various aquatic species were collected from the streams and rivers within and around the Project Area. Tissue analyses of the collected species will be conducted to determine the presence of metals and their concentrations. At the same time, bottom sediment samples were also collected at the same locations and tested for gradation characteristics and metal concentrations. Results however are not yet available and will be reported in early 2010.

4.5.3 Visual Aesthetics Year 2009 Programs and Activities

Some visual impacts have occurred during Year 2009 and are associated with expansion of the open pit, rehabilitation of the overburden stockpiles, construction of erosion control structure at the Southeast Overburden Stockpile and construction of the permanent spillway of the Sulphide Tailings Dam. These are unavoidable and will be mitigated in the long term as part of the Progressive Reclamation programs.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.5.4 Visual Aesthetics Year 2010 Programs and Goals

Continuation of the construction of the Sulphide Tailings Dam and its final spillway as well as the mine pit operation will be the primary visual impacts in Year 2010. These are unavoidable. Some mitigation of the mine pit and Sulphide Dam area will be accomplished through revegetation and reforestation activities.

4.5.5 Recreation and Education Year 2009 Programs and Activities

Recreation and education programs have been established by TVI as part of the Community Relations and Development Office. These have progressed during the past year and have included interaction and education of multiple groups. An open door policy for the mine and operations was initiated in Year 2005 to better educate the local residents, academic organizations and lay people relative to mining operations in general and the TVI Canatuan operations specifically. This has continued throughout Year 2009.

4.5.6 Recreation and Education Year 2010 Programs and Goals

The open door policy will continue throughout Year 2010. Other recreation and education goals have been identified in the Social Management and Development Plan. Details can be found in that document.

4.6 Heritage and Cultural Values

Heritage and cultural values within the Project area focus on the Subanon indigenous peoples. The Subanon are located throughout the Zamboanga peninsula and reside in several villages within the Municipality of Siocon. A Certificate of Ancestral Domain Title (CADT) has been issued to the Subanon community residing within the Canatuan area. The CADT encompasses an area of 8,213 hectares. The 508 hectare MPSA is located entirely within the CADT. As such, current and future activities associated with operations, reclamation and project closure require continuing dialogue between the Subanon and TVI.

4.0 STRATEGY TO LIMIT AND CONTROL IMPACTS

4.6.1 Year 2009 Programs and Activities

Year 2009 marks the first year of the implementation of the Sulphide Phase five-year Social Development Management Program. Implementation of the SDMP includes projects relevant to the development of the Subanon community and preservation of cultural values. Also in Year 2009, preparation for the formulation of the Ancestral Domain Sustainable Development and Protection Plan has been initiated and is expected to be completed in Year 2010.

4.6.2 Year 2010 Programs and Goals

An important activity for Year 2010 is the development and completion of the Ancestral Domain Development Sustainable Protection Plan (ADSPP) by SSAI with the assistance of the National Commission of the Indigenous Peoples (NCIP). A series of workshops, Information and Education campaigns are scheduled to be conducted within the year to further develop skills, capabilities and knowledge of the Subanon community. Details of these activities are included in the Sulphide Phase 5-year SDMP submitted to the DENR-MGB.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

5.1 Monitoring

Monitoring programs serve the need for quantifying the environmental impacts, measuring the effectiveness of mitigation measures and providing a data source of what works and what does not work. Each of the environmental sectors discussed previously, the Land Resources, Water Resources, Noise, Air Quality and Conservation values, have a certain suite of monitoring programs designed to quantify, measure and evaluate. The Heritage and Cultural values and Social issues on the other hand are monitored under the SDMP.

Between 1998 and 2002, little Project activity occurred and little if any monitoring was done. Although limited in scope, activity increased in Year 2003 which resulted in the accomplishment of some activity monitoring. This was focused within the Land Resources, Water Resources and the Conservation Value sectors.

During Year 2004 mining activity increased resulting in an increase in the monitoring activity. An independent monitoring team created by the Mine Rehabilitation Fund Committee (MRFC) was established to oversee the implementation of the environmental and social programs and other commitments of the company. The MRFC is tasked to deputize a Multipartite Monitoring Team (MMT) to serve as monitoring arm. The team is comprised of a MGB representative as the chairman, EMB representative, LGU representative, NGO's representative, IP representative, CENRO, Provincial representative and a TVI representative.

The development activities, environmental strategies and monitoring programs planned and completed in Year 2009 are summarized in **Table 5.1**. Development activities, environmental strategies and monitoring programs planned for Year 2010 are summarized in **Table 5.2**.

5.2 Research

Research programs related to Land Resources, Water Resources and Hydrometeorology were identified in the updated Environmental Protection and Enhancement Program for the Sulphide Phase. Research topics include the following:

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Table 5.1 - Summary Of Environmental Strategies And Monitoring Programs Completed For Year 2009

Sect	Component	Purpose	Locations	Sampling Method	Status
Mining and Processing Activities	Sediment Ponds and Passive AMD Water Treatment	Erosion Control Management Water Quality Management Geotechnical Controls	Mine Pit Overburden Stockpiles Mill Area	Water Samples/Testing Sediment Depth Visual Inspection	On Going Operations. Additional sediment pond constructed. Existing ponds desilted. Initiated AMD research program.
	Diversions And Interception Canals	Erosion Control Management Geotechnical Controls Water Quality Management	Mine Pit Overburden Stockpiles Mill Area	Survey Data Visual Inspection	On Going Operations. Improvement of roadside canals and drainage controls.
	Tailings Dams	Water Quality Management Dam Stability Storage Capacity Structure Integrity Discharge Quantity/Quality	Upper Tailings Dam Lower Tailings Dam Gossan Tailings Dam Water Control Diversion Dam Sulphide Tailings Dam	Instrumentation Survey Data Visual Inspection Water Samples/Testing Discharge Measurements	Ongoing Monitoring Activities. Water quality monitoring on-going. Construction of Stage 3 of the Sulphide Tailings Dam. Construction of the final spillway of the Sulphide Tailings Dam.
	Water Supply	Water Quality Discharge	Upper Canatuan Creek Malusok Springs Diversion Dam Tanuman Village	Water Samples/Testing Discharge Measurements	On Going Operations. Conducted Bacteriological testing of potable water sources.
	Meteorology Data	Climate Characteristics Hydrologic Conditions Water Balance	Mill Area	Meteorologic Station	On Going Operations. Data Summary for 2009 prepared.
	Streams And Rivers	Water Quality Sediment Quality Aquatic Habitat Hydraulic Characteristics	Canatuan Creek, Lumot Creek, Paduan Creek, Mambong Creek, Litoban River, Siocon River	Water Samples/Testing Sediment Samples/Testing	Water Sampling Completed By MMT. 3 sampling events conducted in Year 2009.
	Open Pit and Overburden Stockpiles	Stability Surface Water Quantity Surface Water Quality Erosion and Soil Loss	Gossan Open Pit Overburden Stockpiles	Survey Data Visual Inspection Water Samples/Testing Sediment Ponds Erosion Controls Revegetation	Completed. No Groundwater. Surface water runoff directed to sediment ponds. pH testing done to monitor acid mine drainage. Constructed AMD research site at the old Small Scale Mine area. Benching of stockpiles, placement of surface netting, grasses planting, tree planting.
	Access Roads	Erosion Control Management Stability Drainage Control	Mine Area Mill Area Internal Access	Survey Data Visual Inspection	On Going Operations.
	Water Supply/Tailings Discharge Pipelines	Leaks Uncontrolled Discharges	Water Supply Pipelines Tailings Discharge Pipelines	Survey Data Visual Inspection	On Going Operations Redundant Systems.
	Noise	Construction/Mining Equipment Blasting	Adverse Worker Effects Health and Safety Standards Adverse Worker Effects Health and Safety Standards	Mine Pit Mill Area Mine Pit	

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Table 5.1 - Summary Of Environmental Strategies And Monitoring Programs Completed For Year 2009

Air Quality	Process Plant Emissions	Adverse Worker Effects Health and Safety Standards	Process Plant/Mill Area		Completed. Conducted workplace Environment Measurement at the Mill Plant and Assay Lab conducted in August 2009.
	Power Supply	Air Emission Standards	Generators		Completed. Conducted Stack Emission Monitoring in August 2009 by Berkman Systems Inc.
	Dust Control	Adverse Worker Effects	Mine Pit Process Plant/Mill Area Access Roads		Completed. Conducted Ambient Air Monitoring in August 2009 by Berkman Systems Inc.
	Nearby Communities	Health Impacts Ambient Quality	Malusok Agolo Village Manhattan Village		Completed. Conducted Ambient Air Monitoring in August 2009 by Berkman Systems Inc.
Conservation Values	Vegetation	Nursery Operations Reclamation Parameters Maintain Wildlife Corridors	Nursery Reclaimed Areas Surrounding MPSA Area	Visual Examination Field Monitoring Program	On Going Operations. DENR forest inventory conducted in September 2009.
	Wildlife	Species Monitoring Maintain Wildlife Corridors Identify Threatened Species	Surrounding MPSA Area	Visual Sighting Field Monitoring Program	Terrestrial Fauna survey postponed to Year 2010.
	Aquatic Ecology	Water Quality Impacts Species Monitoring	Canatuan Creek, Lumot Creek, Paduan Creek, Mambong Creek, Litoban River, Siocon River	Visual Examination Live Species Sampling Tissue Sampling	Conducted in November 2009 by third party consultant.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Table 5.2 - Summary Of Environmental Strategies And Monitoring Programs Planned For Year 2010

Sector	Component	Purpose	Locations	Sampling Method	Schedule
Mining and Processing Activities	Sediment Ponds	Erosion Control Management	Mine Pit	Water Samples/Testing	As Needed Throughout
	Passive Treatment Ponds	Water Quality Management	Overburden Stockpiles	Sediment Depth	Year 2010
	Construct New Ponds	Structural Integrity	Mill Area	Visual Inspection	
	Diversions And Interception Canals	Hydraulic Conditions	Mine Pit	Survey Data	As Needed Throughout
	Construct New Canals	Structural Integrity	Overburden Stockpiles	Visual Inspection	Year 2010
		Leakage	Process Plant/Mill Area		
	Tailings Dam	Water Quality Management	Upper Tailings Dam	Instrumentation	Monthly Monitoring Year 2010
	Close Upper Dam	Dam Stability	Lower Tailings Dam	Survey Data	for All Dams.
	Close Lower Dam	Storage Capacity	Gossan Tailings Dam	Visual Inspection	Continue experimental root crop farming
	Close Gossan Dam	Structure Integrity	Sulphide Tailings Dam	Water Samples/Testing	at the Gossan Dam
	Continue Sulphide Dam	Discharge Quantity/Quality		Discharge Measurements	
	Final Closure/Reclamation		Tailings Relocation		
Water Supply	Water Quality	Upper Canatuan Creek	Water Samples/Testing	On Going Monitoring Monthly.	
Water Treatment Plant	Potable Water Supply	Sulphide Tailings Dam	Discharge Measurements	RO Plant Operations Continuous	
Increase Supply	Sulphide Mill Requirements	Diversion Dam			
Meteorology Data	Climate Characteristics	Upper Dam	Meteorologic Station	On Going Daily	
	Hydrologic Conditions				
	Water Balance				
Streams And Rivers	Water Quality	Canatuan Creek, Lumot Creek,	Water Samples/Testing	On Going Under MGB.	
Stations To Be Monitored	Sediment Quality	Paduan Creek, Mambong	Sediment Samples/Testing	Quarterly Sampling MMT.	
By The MMT. Add Stations	Aquatic Habitat	Creek, Litoban River, Siocon		Daily Sampling TVI.	
for Sulphide Phase	Hydraulic Characteristics	River. Add 3 or 4 Stations			
Open Pit	Stability	Gossan and Sulphide	Survey Data	On Going.	
Begin Sulphide Mining	Surface Water Quality	Mine Area	Visual Inspection		
	Surface Water Quantity		Water Samples/Testing		
Access Roads	Erosion Control Management	Mine Area	Survey Data	On Going.	
	Stability	Mill Area	Visual Inspection		
	Drainage Control	Internal Access			
Water Supply/Tailings	Leaks	Water Supply Pipelines	Survey Data	On Going	
Discharge Pipelines	Uncontrolled Discharges	Tailings Discharge Pipelines	Visual Inspection		
Noise	Construction/Mining	Adverse Worker Effects	Mine Pit	Portable Monitoring Equip.	
	Equipment	Health and Safety Standards	Mill Area		PPE usage assessment.
	Monitoring Study	Adverse Worker Effects	Residential Areas	Portable Monitoring Equip.	Minimal blasting schedule.
		Health and Safety Standards			

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Table 5.2 - Summary Of Environmental Strategies And Monitoring Programs Planned For Year 2010

Air Quality	Ambient Air Quality	Adverse Worker Effects Health and Safety Standards	Mill Area, Mine Area Residential Areas	Portable Monitoring Equip.	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.
	Power Supply Install Powerline	Air Emission Standards	Generators	Portable Monitoring Equip. Fixed Monitoring Equip.	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.
	Dust Control Continued Water Application	Adverse Worker Effects	Mine Area, Mill Area Residential Areas Access Roads	Portable Monitoring Equip. Fixed Monitoring Equip.	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.
	Mill Plant Emissions Monitoring Study	Health Impacts Ambient Quality	Mill Area Adjacent Areas, Malusok	Portable Monitoring Equip.	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.
Conservation Values	Vegetation Monitoring Study DENR (ERDS) Studies	Nursery Operations Reclamation Parameters Maintain Wildlife Corridors	Nursery Reclaimed Areas Surrounding MPSA Area	Visual Examination Sampling Program Measurement Program	Moved to Year 2010.
	Wildlife Monitoring Study	Species Monitoring Maintain Wildlife Corridors Identify Threatened Species	Surrounding MPSA Area	Visual Sighting	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.
	Aquatic Ecology Monitoring Study	Water Quality Impacts Species Monitoring	Canatuan Creek, Lumot Creek, Paduan Creek, Mambong Creek, Litoban River, Siocon River	Visual Examination Live Species Sampling Tissue Sampling	Every 2 years monitoring based on revised ECC. Next monitoring Year 2011.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

5.2.1 Tailings Rehabilitation and Reclamation

- Topsoil Requirements – Depth and nutrient content.
- Vegetation Species – Fastest growing, highest density, water and nutrient requirements.
- Minerals Uptake – Capacity of different plants to use metals and minerals present within the tailings and overburden materials.
- Monitoring Nursery Requirements – Materials needed, costs, manpower requirements, growing methods.

5.2.2 Water Quality

- Sediment Pond Effectiveness – Measurement of the effective sedimentation and settling rates for different pond configurations, particle sizes and chemical additions.
- Cyanide Degradation – Monitoring and measurement of cyanide degradation within the Gossan Tailings Impoundments due to natural mechanisms such as biological activity and ultraviolet exposure.
- Vegetation Treatment of Acid Mine Drainage – Testing and evaluation of different plant species to treat acid drainage in a passive treatment system.
- Water Balance Monitoring – Modeling of the Gossan and Sulphide Tailings Impoundments with regards to various water balance components and water quality impacts.
- Watershed Sediment Yield – Monitoring of the watershed sediment production and deposition within the Sulphide Tailings Impoundment.

Some of the research activities mentioned above are currently on going. Experimental agricultural root crop farming have been initiated at the Gossan tailings dam to determine metal uptake of agricultural root crop species and determine effects of direct tailings planting to edible root crops. Monitoring will continue in Year 2010. The results will serve as the basis of final land use planning for the three gossan tailings impoundments.

Water balance and watershed sediment yield monitoring are also currently being conducted for the Sulphide Tailings Dam. The amount of tailings impounded in the dam is monitored including the

5.0 ENVIRONMENTAL MANAGEMENT PLAN

estimated watershed sediment runoff to the dam. These monitoring activities are important to determine if the volume of tailings and sediment impounded are within the design criteria of the Sulphide Tailings Dam.

Other activity mentioned will be done simultaneous to the Sulphide Phase operation and as Rehabilitation activities progress.

5.2.3 Hydrometeorology

Meteorological and Hydrologic monitoring are currently on going and will continue throughout the Project implementation. These activities were initiated in Year 2004 shortly after the commencement of the Gossan Phase operations.

5.2.3.1 Meteorologic Monitoring

Meteorologic monitoring will consist of continued data collection at the meteorologic station for rainfall, temperature, and evaporation data. These data will help describe the climate conditions within an area of limited information.

5.2.3.2 Hydrologic Monitoring

Stream flow measurement will be conducted at various locations within the Project area. Data from these stations will be used to characterize the rainfall-runoff relations within the local watersheds.

5.3 Progressive Rehabilitation

Progressive Rehabilitation will continue and significantly increase in Year 2010. The primary focus will be on the rehabilitation of Upper, Lower and Gossan Tailings Impoundments, the Southeast and Southwest Overburden Stockpiles, Phase I Mine Area and the Upper Lumot Creek Watershed. Additional monitoring actions and activities will be introduced. These are summarized in **Table 5.3** for Sulphide Phase operations and through the end of Project Closure.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

5.4 Reporting

Reporting is done by the TVI Environmental Manager or the Pollution Control Officer. The AEPEP will be prepared on a calendar year basis. However, interim reports are prepared on a regular basis. These include the Self Monitoring Report (SMR), ECC Compliance Monitoring Report and Environmental Report.

A Multipartite Monitoring Team (MMT) chaired by the MGB prepares and submits reports on a quarterly basis following each field investigation program. The TVI representative will also submit a report on compliance to the commitment agreed with the MMT and the company on the various concerns and observations noted by the MMT members.

5.5 Land Use and Project Closure

The overall environmental management strategy is to protect and rehabilitate the disturbed areas as much as possible such that the post Project conditions are similar to the pre Project conditions. Over the long term this can be achieved within certain areas of the Project. However, for the most part the terrain, topography and in some cases the vegetation cannot be restored to pre operation conditions. This is due in large part to mining operations. But to some extent, social and political factors will also affect the final land use disposition and Project closure characteristics. Defining a reclamation and closure plan that may be acceptable to all sectors 5 or 6 years from now is difficult at best.

Nonetheless, the developed FMRDP presents a base land use plan and development program for post mining closure. Review and revision of this reclamation and closure plan will more than likely be a continuing work in progress. Reclamation programs in the immediate and short term must be developed with respect to the longer term land use and closure plan.

5.0 ENVIRONMENTAL MANAGEMENT PLAN

Table 5.3 - Progressive Rehabilitation and Monitoring Schedule

Item	Monitoring Sector	Activity	Sulphide Operations					Final Closure and Decommissioning						Comments	
			Progressive Rehabilitation Period					Active Care		Passive Care		Evaluation			
			2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018		2019
1.0	Surface Water Quality Monitoring													X	Sampling points include pre 2008 locations within and outside the MPSA.
1.1	MPSA Field Testing	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly		
1.2	MPSA Laboratory Testing	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly		
1.3	Baseline Control Stations	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly		
1.4	Downstream Impact Stations	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly	quarterly		
2.0	Potable Water Supply Monitoring														Testing for chlorine residual and bacteria
2.1	MPSA Field Testing	weekly	weekly	weekly	weekly	weekly	weekly	weekly	weekly	weekly	weekly	weekly	weekly		
2.2	MPSA Laboratory Testing	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly		
3.0	Meteorology and Hydrology Data														Maintenance of the data base for future use by others.
3.1	Rainfall	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily		
3.2	Evaporation	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily		
3.3	Temperature	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily		
3.4	Streamflow Measurements	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily	daily		
4.0	Dam and Overburden Stockpile Monitoring													X	Structural monitoring for stability, erosion and structure performance.
4.1	Piezometers	monthly	monthly	monthly	monthly	monthly	monthly	monthly	semi annual	semi annual	semi annual	semi annual	semi annual		
4.2	Movement Hubs	monthly	monthly	monthly	monthly	monthly	monthly	monthly	semi annual	semi annual	semi annual	semi annual	semi annual		
4.3	Seepage Flow	daily	daily	daily	daily	daily	daily	daily	monthly	monthly	monthly	monthly	monthly		
4.4	Visual Inspection	monthly	monthly	monthly	monthly	monthly	monthly	monthly	semi annual	semi annual	semi annual	semi annual	semi annual		
5.0	Revegetation and Forest Assessment													X	Assess the progress and mortality of revegetation and crops. Identify wildlife activities.
5.1	Monitoring Flora	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
5.2	Monitoring Fauna	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
5.3	Disturbed Area Reclamation Evaluation	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly	monthly		
5.4	Plantation Crop Evaluation	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal	seasonal		
6.0	Aquatic Habitat Monitoring													X	Evaluate short term and long term impacts on the aquatic habitat.
6.1	Species Monitoring and Tissue Testing	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
6.2	River Sediment Sampling and Testing	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
6.3	Habitat Evaluation	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
7.0	Air Quality Monitoring														Evaluate operations impacts on air quality.
7.1	Process Air Quality Testing	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
7.2	Ambient Air Quality Testing	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual	annual		
8	Infrastructure Monitoring													X	Monitoring general infrastructure and access within the MPSA.
8.1	Transportation Corridors	daily	daily	daily	daily	daily	daily	daily	monthly	monthly	semi annual	semi annual	semi annual		
8.2	Utilities (Water and Power)	daily	daily	daily	daily	daily	daily	daily	monthly	monthly	semi annual	semi annual	semi annual		
8.3	Trails and Access Corridors	weekly	weekly	weekly	weekly	weekly	weekly	weekly	monthly	monthly	semi annual	semi annual	semi annual		

Notes:

1. Year 2019 represents an evaluation period to determine the effectiveness of the reclamation, rehabilitation and decommissioning programs. This will involve the agencies, TVIRD and the stakeholders.

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

6.1 Elements of the Environmental Programs

During the overall project operations, nine major elements of the mining and processing will be subject to environmental management programs and will be included in the AEPEP. These consist of the following:

- Surface Mine.
- Overburden Stockpiles.
- Tailings Dams and Impoundments.
- Water Supply Systems for Reclaim, Potable and Process Water.
- Processing Plant and Stockpile Areas.
- Solid and Liquid Waste Management Facilities.
- Erosion and Sedimentation Control Facilities and Structures.
- Roads and Utility Corridors.
- Administration Facilities.

6.2 Cost of the AEPEP

Operations over the past 11 months have included many of the above elements with respect to environmental management programs and expenditures. Costs for these programs have been determined and are summarized in **Table 6.1**.

The total expenditures for Year 2009 (as of November 2009) were Php 70.8 million versus the original estimated costs for Year 2009 at approximately Php 127.4 million. The Year 2009 planned expenditures included approximately Php 50.0 million for Sulphide Tailings Dam construction. Conversations with the MGB have indicated tailings dam costs should not be considered as part of the AEPEP costs. However the Sulphide Tailings Dam has acted as a sediment control feature since Year 2008 and will continue to do so throughout the Project life. This is an integral part of the erosion and sediment control program and a key component to the overall environmental protection plan. Approximately 50% of the storage volume within the impoundment is allocated to sediment storage. As such, one-half of the construction costs have been assigned to the AEPEP cost.

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

Table 6.1 - Actual Cost Of Environmental Management Programs Year 2009

Environmental Sector	Item And Activity	Actual Expenditures												Total Year 2009	
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Land Resource	1a Reforestation and Revegetation			13,210.00		12,232.60	3,450.00	81,450.00	84,500.00	295,322.00	142,574.00	510,540.00	278,800.00	1,422,078.60	
	1b Sediment Pond Construction/ Desilting		0.00	3,250.00	52,403.00	165,311.00	23,100.00	54,950.00	80,025.00	162,877.00	160,917.82	79,866.00		782,699.82	
	1c Solid Waste Management	6,930.00	32,600.00	21,350.00	25,574.00	28,549.00	23,374.00	18,425.00	46,200.00	69,208.00	77,854.00	51,425.00		401,489.00	
	1d Hazardous Waste Management			10,950.00					7,200.00					18,150.00	
	1e DENR Vegetation Studies									79,000.00				79,000.00	
	Estimated Cost Sector 1	6,930.00	32,600.00	48,760.00	77,977.00	206,092.60	49,924.00	162,025.00	210,725.00	606,407.00	381,345.82	641,831.00	278,800.00	2,703,417.42	
Water Resource	2a Sulphide Tailings Dam Construction	1,875,000.00	4,837,000.00	8,020,000.00				2,608,000.00	13,378,000.00	10,027,000.00	4,882,000.00	10,000,000.00		55,627,000.00	
	2b Cyanide Destruction and Monitoring			16,600.00										16,600.00	
	2c Water Quality Equipment					125,138.00					23,975.00			149,113.00	
	2d Internal Water Quality Sampling And Testing			3,750.00			30,240.00		32,749.00		21,978.00			88,717.00	
	2e Reverse Osmosis Operation			139,157.00	10,100.00	43,127.00	9,188.00	2,250.00		41,855.00	144,705.00	11,350.00		401,732.00	
	2f Chlorination System Operation			32,499.00		12,321.00	8,045.00	4,117.00				22,647.00		79,629.00	
	2g Acid Mine Drainage Control			50,797.00	86,434.00	6,671.00	3,850.00							147,752.00	
	2h Meteorology and Hydrology Monitoring			13,360.00										13,360.00	
	Estimated Cost Sector 2	1,875,000.00	4,837,000.00	8,276,163.00	96,534.00	187,257.00	51,323.00	2,614,367.00	13,410,749.00	10,068,855.00	5,072,658.00	10,033,997.00	0.00	56,523,903.00	
	Conservation	3a Nursery Operations			27,893.00	5,290.00	19,775.00		3,850.00	22,000.00	49,118.00	56,373.00	7,425.00		191,724.00
Values	3b Aquatic Habitat and Sediment Sampling											56,067.00	223,933.00	280,000.00	
	3c Vegetation and Wildlife Habitat Studies													0.00	
Estimated Cost Sector 3	0.00	0.00	27,893.00	5,290.00	19,775.00	0.00	3,850.00	22,000.00	49,118.00	56,373.00	63,492.00	223,933.00	471,724.00		
Noise Control	4a Site Noise Level Studies						-			-	-			0.00	
	4b Hearing Protection for Workers													0.00	
Estimated Cost Sector 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Air Quality Ma	5a Air Quality Monitoring Studies								308,520.00		294,560.00			603,080.00	
	5b Dust Suppression Activity		24,750.00	43,450.00		2,750.00								70,950.00	
	Estimated Cost Sector 5	0.00	24,750.00	43,450.00	0.00	2,750.00	0.00	0.00	308,520.00	0.00	294,560.00	0.00	0.00	674,030.00	
Permitting And Education	6a MRFC Meetings and Expenses			53,607.00	36,000.00		27,914.00	38,406.00			3,395.00			159,322.00	
	6b MMT Monitoring and Expenses	1. MMT Laboratory Expenses				107,184.00				113,907.00			194,053.00		415,144.00
		2. Honorarium for MMT Members				80,750.00									80,750.00
		3. Shipment Costs			5,262.35	54,712.00									59,974.35
		4. supplies			4,124.00	6,293.00									10,417.00
	6c CLRF Meeting				26,750.00									26,750.00	
	6d Education and Information Campaign				25,500.00					22,500.00				48,000.00	
	6e Permitting Fees			183,344.00		5,350.00		148,242.00	4,000.00					340,936.00	
	6f Research Programs	1. Fish culture										2,000.00			2,000.00
		2. Agricultural										45,740.00			45,740.00
		3. AMD Project								854,754.00	174,071.00	12,549.00	72,039.00		1,113,413.00
		6g Training				25,500.00							16,500.00		42,000.00
	Estimated Cost Sector 6	0.00	0.00	246,337.35	362,689.00	5,350.00	27,914.00	186,648.00	972,661.00	196,571.00	63,684.00	282,592.00	0.00	2,344,446.35	

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

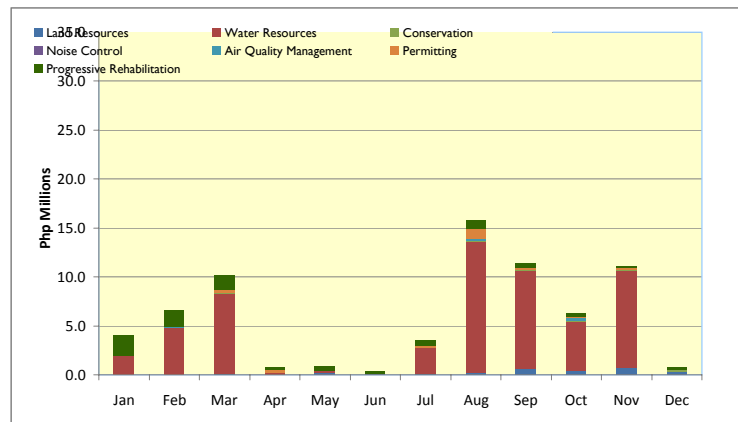
Table 6.1 - Actual Cost Of Environmental Management Programs Year 2009

Progressive Re														
7a	Lower Tailings Dam	448,200.00	186,000.00	542,662.00	43,906.00	139,927.00	53,498.00			8,400.00				1,422,593.00
7b	Southeast Waste Dump	1,669,100.00	1,554,000.00	947,150.00	182,055.00	124,263.00								4,476,568.00
7c	Phase II area				9,989.00	96,874.00	135,219.00			62,587.00			22,462.00	327,131.00
7d	Lower Phase I							92,336.00	154,634.00	98,641.00	200,140.00	99,113.00	70,246.00	201,630.57
7e	Southwest waste Dump		2,750.00										37,463.19	40,213.19
7f	Gossan Northridge							319,239.00	719,790.20	154,518.00	215,869.00	46,280.00		1,455,696.20
7g	Backroad rehabilitation			16,200.00		40,500.00		72,331.00		24,324.00	82,235.00	7,460.00		243,050.00
	Estimated Cost Sector 7	2,117,300.00	1,742,750.00	1,506,012.00	235,950.00	401,564.00	281,053.00	546,204.00	818,431.20	449,969.00	397,217.00	123,986.00	261,555.76	8,881,991.96
Total Estimated Cost Of EMPs in Php		3,999,230.00	6,637,100.00	#####	778,440.00	822,788.60	410,214.00	3,513,094.00	15,743,086.20	11,370,920.00	6,265,837.82	11,145,898.00	764,288.76	71,599,512.73

Note:

- Environmental Management Program expenses cover only until November 2009. Partial data for November 2009 expenses included.
- Stage 3 Sulphide Tailings Dam construction started in July 2009.

Figure 6.1 - Summary of Estimated Expenditures for Environmental Management Programs Year 2009



Summary	2009 Planned Expenditures (Php)	Year 2009 Total Expenditures (Php)	Remarks
Land Resources	3,652,400.00	2,703,417.42	Only 1 neutralization pond constructed in 2009
Water Resources	54,611,500.00	56,523,903.00	Increased budget in the construction of the Sulphide Dam
Conservation Values	1,069,000.00	471,724.00	
Noise Control	378,000.00	0.00	Noise control studies done with Air Quality Monitoring.
Air Quality	1,600,000.00	674,030.00	
Permitting, Education and Research	2,250,250.00	2,344,446.35	
Progressive Rehabilitation	63,859,872.00	8,881,991.96	Focused rehabilitation of critical areas.
Total Expenses with Sulphide Dam construction costs :	127,421,022.00	71,599,512.73	Actual costs = 55% of planned costs
Total Expenses without Sulphide Dam construction costs :	77,391,022.00	15,972,512.73	Actual costs = 20% of planned costs

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

The AEPEP programs planned for Year 2010 have been identified and associated costs estimated. These are shown in **Table 6.2** and indicate a total estimated expenditure of approximately Php 38.3 million. Partial cost of the Sulphide Dam construction is included.

6.3 Cost of Progressive Rehabilitation

Some of the costs identified in **Table 6.2** are also attributed to Progressive Rehabilitation as identified in the FMRDP. These costs are estimated to be approximately Php 10.2 million. Those AEPEP costs attributed to Progressive Rehabilitation are noted in **Table 6.2**.

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

Table 6.2 - Planned Cost Of Environmental Management Programs Year 2010

Environmental Sector	Item And Activity	Planned Expenditures Year 2010												Total Year 2010
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Land Resources	1a Reforestation and Revegetation	169,412.00	169,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	219,412.00	2,532,944.00
	1b Sediment Pond Construction/ Desilting	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	138,993.00	1,667,916.00
	1c Neutralization Pond Construction	22,788.00			22,788.00				22,788.00			22,788.00		91,152.00
	1d Solid Waste Management	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	57,750.00	693,000.00
	1e Hazardous Waste Management						200,000.00							200,000.00
	1f Road and Drainage Repairs		50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00				350,000.00
	Estimated Cost Sector 1	388,943.00	416,155.00	466,155.00	488,943.00	466,155.00	666,155.00	488,943.00	466,155.00	416,155.00	438,943.00	416,155.00	416,155.00	5,535,012.00
Water Resources	2a Sulphide Tailings Dam Construction	10,000,000.00	7,500,000.00											17,500,000.00
	2b Cyanide Management and Monitoring			2,500.00			2,500.00			2,500.00			2,500.00	10,000.00
	2c Water Quality Equipment			2,500.00	152,500.00	22,500.00	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00	2,500.00	195,000.00
	2d Internal Water Quality Monitoring and testing	74,000.00	47,000.00	5,000.00	73,000.00	5,000.00	5,000.00	74,000.00	5,000.00	5,000.00	74,000.00	5,000.00	5,000.00	377,000.00
	2e Reverse Osmosis Operation	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	13,702.00	164,424.00
	2f Chlorination System	20,670.00			20,670.00			20,670.00			20,670.00			82,680.00
	2g pH neutralization at the Sulphide Dam	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	33,412.00	400,944.00
	2h Meteorology and Hydrology Monitoring			10,000.00				20,000.00						30,000.00
	2i Water Quality Modeling Consultation						250,000.00	250,000.00						500,000.00
	Estimated Cost Sector 2	10,141,784.00	7,594,114.00	67,114.00	293,284.00	74,614.00	307,114.00	414,284.00	54,614.00	57,114.00	144,284.00	54,614.00	57,114.00	19,260,048.00
Conservation Values	3a Nursery Operations	55,818.00	4,818.00	38,268.00	63,078.00	4,818.00	38,268.00	63,078.00	4,818.00	38,268.00	63,078.00	4,818.00	38,268.00	417,396.00
	3b Aquatic Habitat and Sediment Sampling													0.00
	3c Health Survey (Heavy Metal) Consultation		200,000.00	200,000.00										400,000.00
	3d Vegetation and Wildlife Habitat Studies		200,000.00	200,000.00										400,000.00
	Estimated Cost Sector 3	55,818.00	404,818.00	438,268.00	63,078.00	4,818.00	38,268.00	63,078.00	4,818.00	38,268.00	63,078.00	4,818.00	38,268.00	1,217,396.00
Noise Control	4a Site Noise Level Studies													0.00
	Estimated Cost Sector 4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Air Quality	5a Installation Of Air Emissions Equipment													0.00
	5b Dust Suppression Activity	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	792,000.00
	Estimated Cost Sector 5	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	66,000.00	792,000.00
Permitting And Education	6a MRFC Meetings and Expenses	59,900.00		59,900.00	59,900.00			59,900.00			59,900.00			299,500.00
	6b MMT Monitoring and Expenses													0.00
	1. MMT Laboratory Expenses	143,000.00			143,000.00			143,000.00			143,000.00			572,000.00
	2. Honorarium, supplies and freight for MMT	109,000.00		109,000.00	109,000.00			109,000.00			109,000.00			545,000.00
	6c Education and Information Campaign				8,750.00	8,750.00	8,750.00	8,750.00	8,750.00	8,750.00	8,750.00	8,750.00	8,750.00	78,750.00
	6d Permitting Fees	4,000.00	4,000.00	4,000.00	4,000.00	4,000.00	72,000.00	4,000.00	4,000.00	30,000.00	4,000.00	4,000.00	54,000.00	192,000.00
	6e Research Programs													0.00
	1. Agricultural	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00							120,000.00
	2. AMD Project	75,000.00	75,000.00	75,000.00	75,000.00	75,000.00	75,000.00							450,000.00
	Estimated Cost Sector 6	410,900.00	99,000.00	267,900.00	419,650.00	107,750.00	175,750.00	324,650.00	12,750.00	38,750.00	324,650.00	12,750.00	62,750.00	2,257,250.00

6.0 COST OF ANNUAL ENVIRONMENTAL PLAN

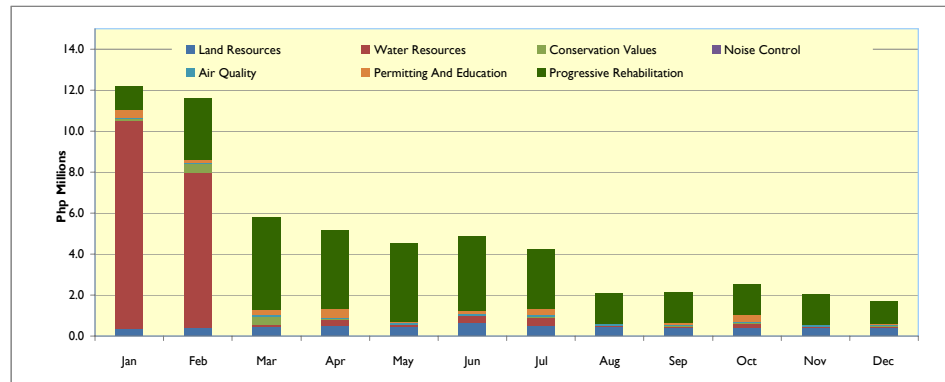
Table 6.2 - Planned Cost Of Environmental Management Programs Year 2010

Progressive Reha				400,000.00	400,000.00	400,000.00	400,000.00	400,000.00	900,000.00	500,000.00	500,000.00	500,000.00	500,000.00	500,000.00	5,400,000.00
7a	Gossan Dam														
7b	Upper Dam and Final Spillway		100,000.00	750,000.00	200,000.00	200,000.00	119,911.00								1,369,911.00
7c	Lower Dam and Final Spillway			250,000.00	200,000.00	200,000.00	36,252.00								686,252.00
7d	Diversion dam and Final Spillway closure			350,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	244,864.00		2,594,864.00
7e	Mine Area	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00		2,750,000.00
7f	Southeast and Southwest Waste Dump	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	3,000,000.00
7g	East Waste Dump (Lower Phase I)			250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	250,000.00	75,811.00	2,325,811.00
7h	Land fill Improvements				50,000.00	25,000.00	58,050.00								133,050.00
7i	Lumot Creek Watershed	670,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	1,000,000.00							11,670,000.00
	Estimated Cost Sector 7	1,170,000.00	3,000,000.00	4,500,000.00	3,850,000.00	3,825,000.00	3,614,213.00	2,900,000.00	1,500,000.00	1,500,000.00	1,500,000.00	1,500,000.00	1,070,675.00		29,929,888.00
Total Estimated Cost Of EMPs in Php			12,233,445.00	11,580,087.00	5,805,437.00	5,180,955.00	4,544,337.00	4,867,500.00	4,256,955.00	2,104,337.00	2,116,287.00	2,536,955.00	2,054,337.00	1,710,962.00	58,991,594.00

Note:

- a. Reforestation expenses include cost for rental of equipment for hauling seedlings, fertilizers, etc and organic fertilizer materials and lime for soil conditioning. Costs also include contract services for agriculturist.
- b. Sulphide Tailings Dam construction costs equivalent to 50% of monthly planned costs.
- b. Nursery operation expenses include expenses for purchase of seedling, sample bags, fertilizer, insecticide and reforestation tools.

Figure 6.1 - Summary of Planned Expenditures for Environmental Management Programs Year 2010



Summary	Year 2010 Planned Expenditures (Php)
Land Resources	5,535,012.00
Water Resources	19,260,048.00
Conservation Values	1,217,396.00
Noise Control	0.00
Air Quality	792,000.00
Permitting, Education and Research	2,257,250.00
Progressive Rehabilitation	29,929,888.00
Total Expenses with Sulphide Dam construction costs :	Php 58,991,594.00
Total Expenses without Sulphide Dam construction costs :	Php 41,991,594.00

7.0 CERTIFICATION

7.1 Certification

This is to certify that the data and information presented in this Annual Environmental Protection And Enhancement Program (APEP) are true to the best of our knowledge and that an objective and thorough assessment and program preparation was undertaken in accordance with the dictates of reasonable and sound judgment.

Should any information come to our attention that would make this AEPEP inaccurate it will be brought to the attention of the appropriate Philippine government agencies.

Proponent : TVI Resource Development Phils. Inc.

Jay Nelson
Vice President, Environment and Civil Works

Date

Nilda Callora/ Rowena Inion
Pollution Control Officer

Date

**ANNUAL ENVIRONMENTAL PROTECTION AND
ENHANCEMENT PROGRAM**

**APPENDIX A PHOTODOCUMENTATION OF ENVIRONMENTAL
MANAGEMENT PROGRAM ACTIVITIES YEAR 2009**

CANATUAN PROJECT

TVI RESOURCE DEVELOPMENT(PHILS) INC.

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**APPENDIX B WATER QUALITY MONITORING RESULTS
YEAR 2009**

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TVI RESOURCE DEVELOPMENT (PHILS) INC.

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APPENDIX C ACID MINE DRAINAGE RESEARCH RESULTS

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