Social and Environmental Impact Assessment

Big Bend Placer Gold Mining Project, Mongolia

Prepared for

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Centennial, Colorado, USA

Prepared by

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LIST OF ABBREVIATIONS AND ACRONYMS

$	US Dollars
°C	degrees Celsius
µg/L	micrograms per liter
µg/m^3	micrograms per cubic meter
µg/L	micrograms per liter
1,2-DCP	1,2-dichloropropane
2-4-D	2,4-dichlorophenoxyacetic acid
4WD	four-wheel drive
AATA	AATA International, Inc.
ACGIH	American Conference on Governmental Industrial Hygienists
ACTLABS	Activation Laboratories, Ltd.
aimag	province
airag	fermented horse milk
AMSL	above mean sea level
AOI	area of interest
APCC	Accident Prevention, Control, and Countermeasures
APPEL	Awareness and Preparedness for Emergencies at the Local Level
ARM	ambient ratio method
bag	rural district
bagh	sub-district
BATNEEC	best available technology not entailing excessive cost
BD	below detection limit
BOD	biological oxygen demand
Bq/L	Becquerel per liter
Btu	British thermal unit
Ca	calcium
$CaCO_3$	calcium carbonate
CAO	Office of the Compliance Adviser/Ombudsman
CH_4	methane
CITES	Convention on International Trade in Endangered Species (of wild fauna and flora)
Cl	chloride
cm	centimeters
CO	carbon monoxide
CO_2	carbon dioxide
CO_3	carbonate
COD	chemical oxygen demand
Comecon	Council for Mutual Economic Assistance
CPR	cardiopulmonary resuscitation
Cr	chromium
Cu	copper
dB	decibel
dBA	A-weighted sound pressure level
dBC	C-weighted sound pressure level

DOC	dissolved organic carbon
duureg	district
EAP	Environmental Action Plan
EDTA	edetic acid
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EIU	Economist Intelligence Unit
EMI	Eco-Minex International, Ltd.
EMMP	Environmental Management and Monitoring Plan
EMP	Environmental Monitoring Program
EPFI	Equator Principles Financial Institutions
EPP	Environmental Protection Plan
ESAs	Environmentally Sensitive Areas
ESRS	Environmental and Social Review Summary
Fe	iron
FPIC	Free, Prior and Informed Consultation
g	grams
GDP	gross domestic product
GHG	greenhouse gas
GIIP	Good International Industry Practice
GIS	Geographical Information System
GNI	gross national income
GPCs	ground control points
GPS	global positioning system
Gol	river
H_2SO_4	sulfuric acid
Ha	hectare
HazCom	hazard communication
HDPE	high density polyethylene
HCO_3	bicarbonate
HNO_3	nitric acid
hp	horsepower
hr	hours
HSE	Health, Safety and Environment
i-cubed	Information Integration & Imaging LLC
ICP-MS	inductively coupled plasma mass spectrometry
IFC	International Finance Corporation
ILO	International Labor Organization
ITK	Ikh Tokhiorol XXK
IUCN	International Union for the Conservation of Nature
K	potassium
khoroo	sub-district
khural	assembly
kg	kilograms

kg/person/day	kilograms per person per day
km	kilometers
km^2	square kilometers
L/s	liters per second
L/s/m	liters per second per meter
LAeq (dBA)	long-term A-weighted sound pressure level equivalent
LPA	Local Protected Areas
m	meters
m^2	square meters
m^2/day	square meters per day
m^3	cubic meters
m^3/sec	cubic meters per second
m^3/year	cubic meters per year
m/day	meters per day
MACSS	Mining and Construction Support Services Ltd.
MBDA	Mongolian Business Development Agency
mbgs	meters below ground surface
MDWS	Mongolian Drinking Water Standard
meq/L	milliequivalents per liter
Mg	magnesium
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
Minerals Law	Minerals Law of Mongolia
MLCA	maximum likelihood classifier algorithm
MLL	Mongolian Law on Labor
mm	millimeter
MMBtu	million British thermal units
Mn	manganese
MNE	Ministry of Nature and Environment (Mongolia)
MNT	Mongolian tugrug
Mo	molybdenum
MPRP	Mongolian People's Revolutionary Party
MRAM	Mineral Resources Authority of Mongolia
MRS	mean root square
MSDS	Material Safety Data Sheets
MSHA	Mine Safety and Health Administration
N_2O	nitrous oxide
Na	sodium
NAPCD	National Action Program to Combat Desertification
NCCD	National Committee for Combating Desertification
ND	no data
NGO	non-governmental organization
NH_3	ammonia
NH_4	ammonium

Ni	nickel
ninja	artisanal miner
NO_2	nitrite
NO_3	nitrate
NOx	nitrogen oxides
NTA	nitrilotriacetic acid
NTU	nephelometric turbidity unit
nuur	lake
O_3	ozone
OECD	Organisation for Economic Cooperation and Development
OH&S	Occupational Health and Safety
OP	Operational Policy
OPIC	Overseas Private Investment Corporation
P	phosphorus
Pb	lead
PCI	peripheral component interconnect
people/km^2	people per square kilometer
PM	particulate matter
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 micrometers or less
PM_{10}	particulate matter with an aerodynamic diameter of 10 micrometers or less
PO_4	phosphate
POP	persistent organic pollutant
PPAH	Pollution Prevention and Abatement Handbook
PPE	personal protective equipment
ppm	parts per million
Project	Big Bend Placer Gold Mining Project
Project area	Big Bend License Area
PS	Performance Standards
QA/QC	Quality Assurance/Quality Control
Ra	radium
RPCs	rational polynomial coefficients
RRH	riverine/riparian habitat
SACO	State Administration Central Organization
SEIA	Social and Environmental Impact Assessment
SEMMP	Social and Environmental Management and Monitoring Program
SEP	Stakeholder Engagement Program
SL	standard length
SO_2	sulfur dioxide
SO_4	sulfate
soum	district
SPCC	Spill, Prevention, Control and Countermeasures Plan

SRTM	Shuttle Radar Topography Mission
STD	sexually transmitted disease
SUV	sport utility vehicle
T&E	threatened and endangered
TBI	Tahoe-Baikal Institute
TCU	true color unit
TDS	total dissolved solids
Tg	Tugrug
TL	total length
TOC	total organic carbon
ton	metric ton (1,000 kilograms)
Tr.	trace detected
TSP	total suspended particulates
TSS	total suspended solids
U	uranium
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
US EPA	United States Environmental Protection Agency
USD	Unites States Dollars
USSR	Union of Soviet Socialist Republics
WHO	World Health Organization
WMMC	WM Mining Company
WWTP	wastewater treatment plant
Zasag Darga	governor

Part I: Executive Summary

1.0 Project Description

This Social and Environmental Impact Assessment (SEIA) of the Big Bend Placer Gold Mining Project (the "Project"), located in northern central Mongolia, was prepared to address the social and environmental requirements of the Overseas Private Investment Corporation (OPIC) on behalf of the Project sponsor, WM Mining Company, LLC. (WMMC) and its wholly owned Mongolian company, Ikh Tokhoirol, XXK. WMMC is applying for a project loan from OPIC to develop the placer gold deposit for the Project. OPIC is an independent agency of the United States (US) Government that assists US businesses to invest in overseas development projects.

WMMC intends to develop the gold resources of the Project by introducing modern, efficient placer mining methods to the Zaamar Goldfield. The Big Bend Gold Mining Project is a new placer gold mine, which will employ modern international dredging technology. The operation will also employ concurrent and continuous reclamation so that only the active mining area will be open and un-reclaimed.

The SEIA was prepared by the independent international environmental consultancy, AATA International, Inc., Denver, Colorado, USA. It should be noted that a comprehensive Environmental Impact Assessment (EIA) was conducted for the Zaamar Gold Project site (which included the Big Bend Project area) in late 2002 and 2003 by AATA. This EIA involved site observations; collection of environmental data including meteorological and hydrogeological information; remote sensing with vegetation classification, and, collection of samples of surface waters, aquatic organisms, and terrestrial flora. The original EIA was submitted to OPIC in 2004 in support of a loan application for the Zaamar Gold Project by Khan Resources, Inc. and WM Mining Company. The EIA was fully reviewed and approved by OPIC; and it was also subjected to Public Disclosure. The Project was not developed at that time. This current 2008 SEIA was developed under more recent OPIC environmental guidelines and Performance Standards of the International Finance Corporation (IFC) of the World Bank Group. It updates and augments the information contained in the 2004 EIA.

The purpose of this 2008 SEIA is to provide OPIC with: a detailed analysis of the physical, chemical, biological, and social aspects of the Project; an analysis of the potential social and environmental impacts associated with the Project; and, details on the social and environmental management and monitoring planned for the Project to protect workers, the public, and the environment. The evaluation of

Project activities included direct, indirect, cumulative and associated impact analyses.

The study methodology was comprised of the following activities:

- Obtaining all pertinent historical information on the Project from local and national sources, including mine plans and documents, aerial photography satellite images, government reports and other pertinent documents;
- Conducting a review of existing literature and data for the Project area;
- Identification of WMMC corporate social and environmental policies and guidelines; Mongolia government social and environmental regulations and legislative framework; and, international social and environmental standards with which the Project must comply or conform;
- Performance of field baseline studies (July, August, and October 2008) to obtain Project site-specific data on current social and environmental conditions;
- Describing the overall Project with an emphasis on processes that potentially could impact the environment;
- Characterization of the physical, chemical, biological and social components of the environment potentially affected by Project development;
- Analysis of historical, pre-mining disturbance air photographs; and, preparation of supervised classification of July 2008 IKONOS imagery to assist in impact analysis;
- Identification and ranking of social and environmental risks and impacts for each Project component for each phase of the project;
- Development of a social and environmental management program that describes mitigation measures designed to eliminate or minimize social and environmental impacts; and,
- Identification of net project impacts per OPIC requirements.

This SEIA is presented in standard OPIC format to include an Executive Summary, Introduction, Project Description, Regulatory Framework, Description of the Baseline (Existing) Environment, Analysis of Potential Impacts, Mitigation Methodologies and Measures, Net Environmental Impacts, and Public Consultation and Disclosure. A Social and Environmental Management and Monitoring Plan (SEMMP) has been prepared, which will satisfy Mongolian laws, OPIC requirements (including International Finance Corporation [IFC] performance standards of the World Bank), international standards of social and environmental practice, and standards of industry practice that meet with WMMC corporate social and environmental policies. Appendices are included to provide additional technical and regulatory information related to the Project.

1.1 Project Location and Background

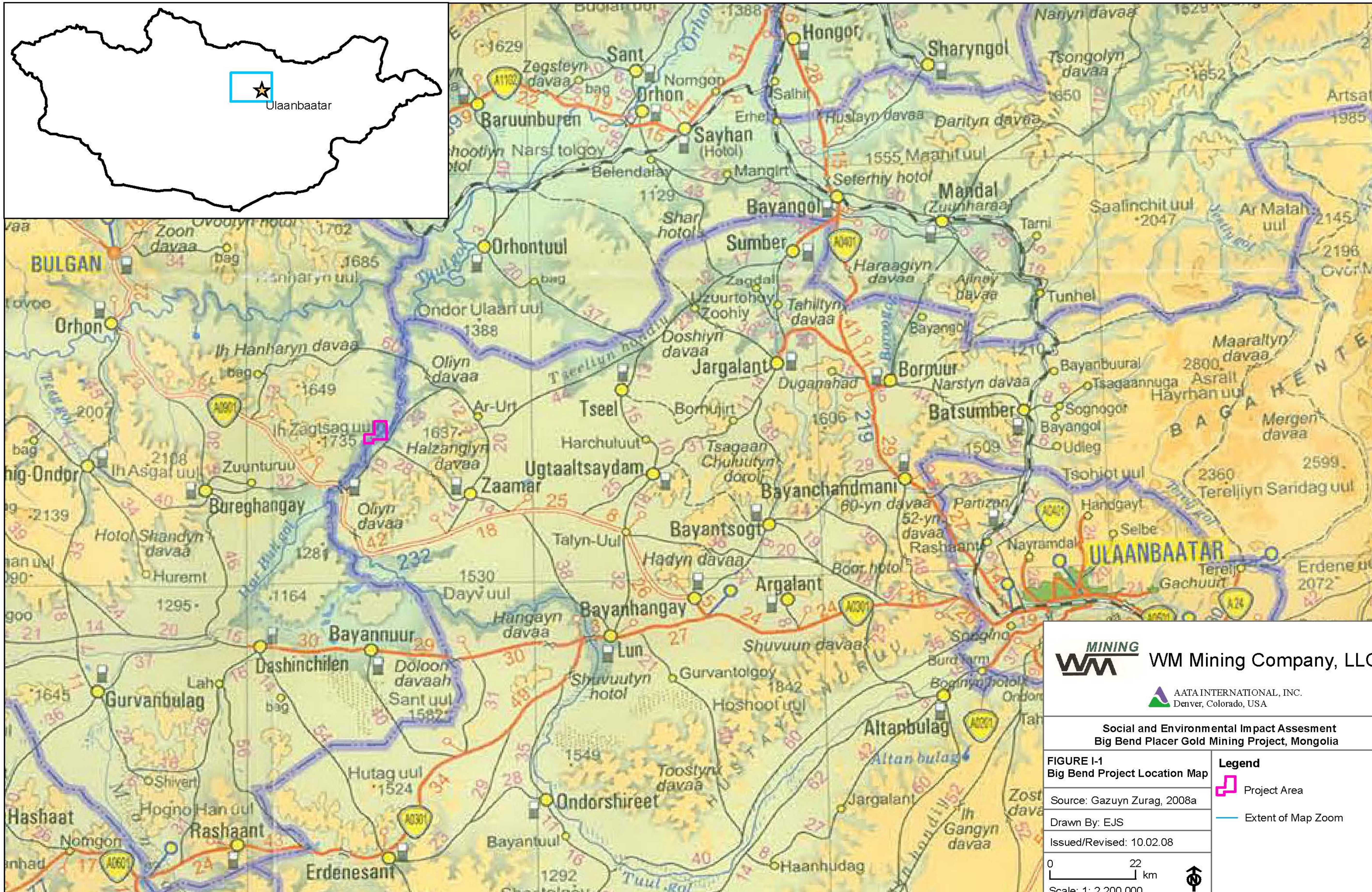
The Project is part of the Zaamar Goldfield located within the Tuul River Valley, in northern central Mongolia (48˚22' North latitude and 104˚28' East longitude). The Zaamar Goldfield is located approximately 225 kilometers (km) northwest of the capital city Ulaanbaatar, 180 km southwest of Darkhan, 100 km southeast of Erdenet and 30 km northwest of the local administrative center, Zaamar Soum, thus the name of the Zaamar Goldfield. The Tuul River takes an "S-shaped" turn in the Project area, and thus the name of Big Bend (**Figure I-1**).

The Zaamar Goldfield is Mongolia's largest producer of gold with total gold production of 147 tonnes (4.7 million ounces) in the decade from 1998 to 2007. The Zaamar Goldfield occupies approximately 90,000 hectares along the Tuul River Valley. Active gold exploration began in the 1970s and 1980s by Soviet-sponsored exploration teams, with gold resources development beginning about 1990 (Dallas, 1999). In December 1998, there were 42 licensed mines (Dallas, 1999); as of January 2003, the Mineral Resources Authority of Mongolia (MRAM) listed 80 licenses, both hard rock and placer, in the Zaamar region (MRAM, 2003).

The Tuul River forms the administrative boundary between the Tov and Bulgan Aimags (provinces). The Project area encompasses part of the Buregkhangai Soum (district) in the Bulgan Aimag and part of the Zaamar Soum of the Tov Aimag (**Figure I-2**). The Tuul River is in the Arctic Drainage Basin and is part of the Selenge International River System. The Tuul River originates in the Khentii Mountains, flows through Ulaanbaatar, past the Project area, and then joins the Orkhon River approximately 55 km north of the Project area. The Orkhon River then flows northeast for about 175 km and joins the Selenge River just north of Suhbaatar City, near the border with Russia. From there, the Selenge River flows north and then west for another 175 km and finally into Lake Baikal, the world's largest freshwater lake by volume.

The Tuul River flows in a classic meandering pattern through floodplains 0.6 to 2.5 km in width. Rounded hills of fluvial origin, many of which are gold bearing, are at the edge of the floodplain. Beyond these, the Great Zagtsag Mountains (1,200 meters above sea level) rise in the west and the Zaamar Mountains (1,300 meters above sea level) stand in the east.

The Tuul River Basin is the most agriculturally and industrially developed part of Mongolia, with a population density of 8.4 people per square km (people/km^2) compared to the national average of 1.5 people/km^2. Industrial activities are centered in Ulaanbaatar, located along the Tuul River 225 km upstream of the Zaamar Goldfield.



WM Mining Company, LLC

AATA INTERNATIONAL, INC.
Denver, Colorado, USA

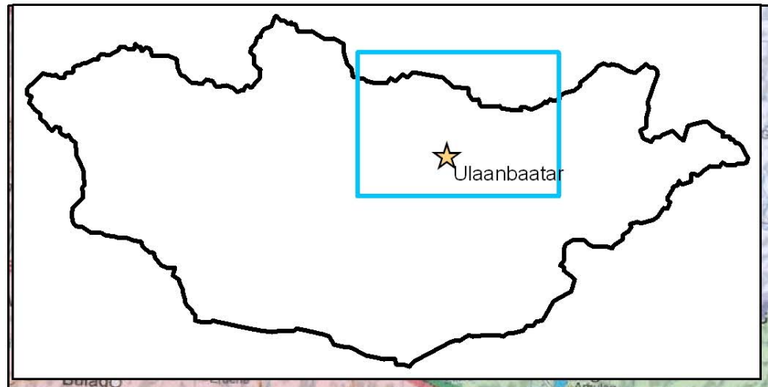
Social and Environmental Impact Assesment
Big Bend Placer Gold Mining Project, Mongolia

FIGURE I-1
Big Bend Project Location Map

Source: Gazuyn Zurag, 2008a

Drawn By: EJS

Issued/Revised: 10.02.08



Project Area

WM MINING

WM Mining Company, LLC

AATA INTERNATIONAL, INC.
Denver, Colorado, USA

Social and Environmental Impact Assesment
Big Bend Placer Gold Mining Project, Mongolia

FIGURE I-2
Administrative Boundaries of the Project Area

Source: Gazryn Zurag, 2008b

Drawn By: EJS

Issued/Revised: 10.28.08

Scale: 1: 2,000,000

Legend

Project Area

Extent of Map Zoom

1.2 Project Boundaries

As previously noted, the Project is located in the Zaamar Goldfield within the Tuul River Valley of northern central Mongolia, at 48˚22' North latitude and 104˚28' East longitude. It is approximately 225 km northwest of Ulaanbaatar, the capital of Mongolia. As shown in **Table I-1** and **Figure I-3**, the Project area comprises three mineral licenses, totaling about 3,170 hectares.

Table I-1 Summary of Mineral Licenses

Date	License Number	Aimag	Soum	Area Name	Area (hectares)	Duration (years)
29 Jan 2007	4121A	Tov	Zaamar	Tsagaan Ereg	33	30
23 Jan 2007	7712A	Tov and Bulgan	Zaamar and Buregkhangai	Ikh Tokhoirol	2,534	30
23 Jan 2007	7713A	Tov and Bulgan	Zaamar and Buregkhangai	Ikh Tokhoirol	605	30

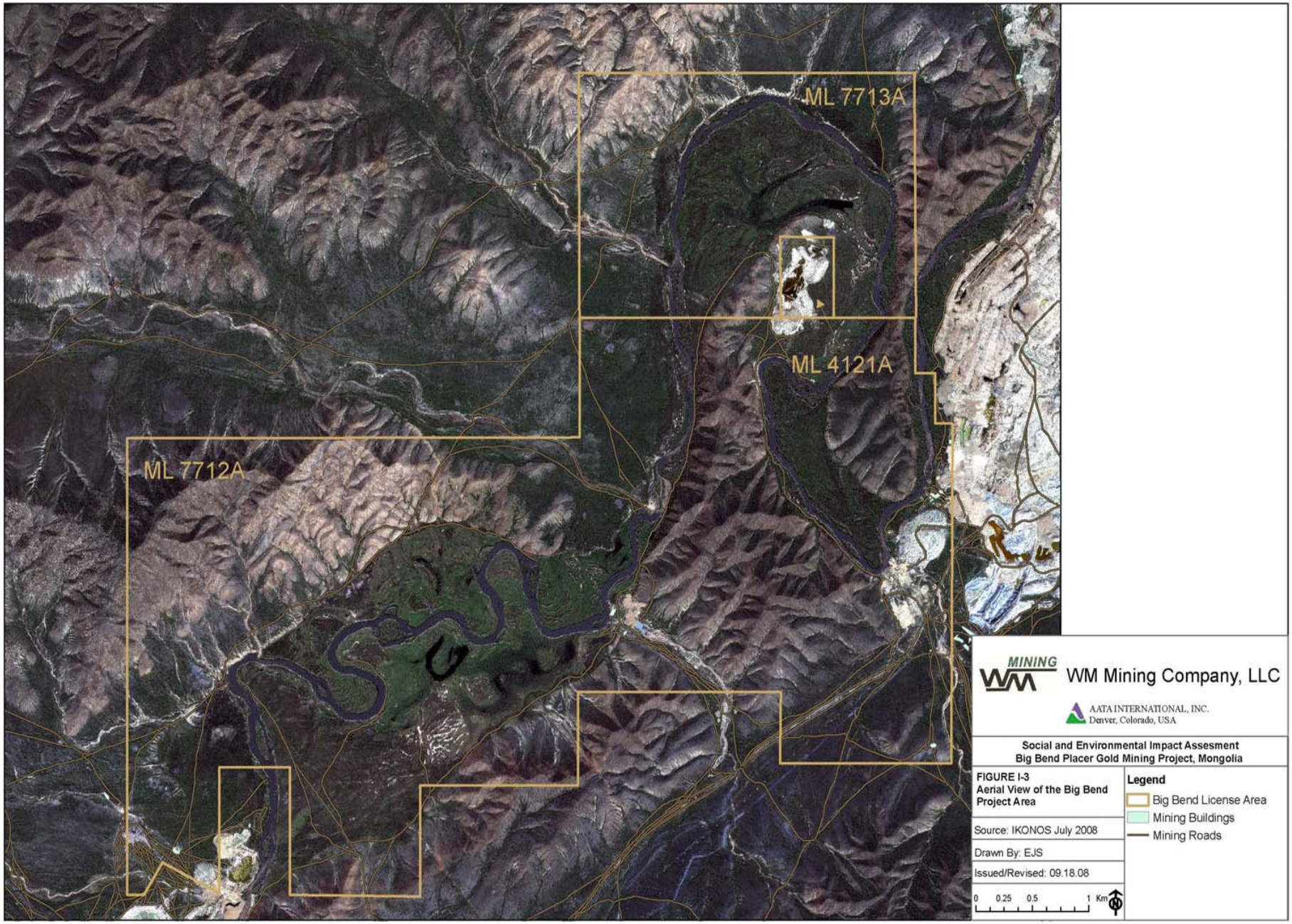
1.3 General Description of the Placer Mining Process

The placer (sand, gravel and clay materials that contain gold) deposits within the Project area are contained in the alluvial deposits of the Tuul River Valley. The depth and thickness of the placers vary, but these deposits are typically 3 to 17 meters below the surface, and 0.2 to 5 meters (m) thick, in the Project area. The material overlying the surface of the placer is referred to as overburden and must be removed to access the placer deposits containing gold.

Two methods are generally utilized to mine placer gold deposits depending on the location, depth and thickness of the placer: 1) alluvial (wet) mining; and, 2) terrace (dry) mining. Alluvial mining is used where the water table is relatively high so that a floating dredge can mine the placer. Terrace mining occurs in more upland locations, where the historic river terraces are located, and excavators are used to remove the placer. At the Big Bend Project, only wet mining techniques will be used.

When placer deposits are located below the groundwater level (as at Big Bend), wet mining (i.e., dredging) is the only applicable method to be utilized. Wet mining involves two major steps:

- Removing the overburden using draglines or cutter suction dredges; and,
- Mining the placer deposit with a floating dredge and processing the ore with a floating mineral separation unit.


ML 7713A
ML 4121A
ML 7712A
MINING
WM Mining Company, LLC
AATA INTERNATIONAL, INC.
Denver, Colorado, USA
Social and Environmental Impact Assesment
Big Bend Placer Gold Mining Project, Mongolia
FIGURE I-3
Aerial View of the Big Bend Project Area
Source: IKONOS July 2008
Drawn By: EJS
Issued/Revised: 09.18.08
0 0.25 0.5 1 Km
Legend
Big Bend License Area
Mining Buildings
Mining Roads

Wet mining in the region of the project has been designed to sustain cold weather during the winter (Dutch dredges where the mineral separation unit is enclosed can operate at temperatures as low as -40 ºC). With the introduction of a suction dredge, all-year-round gold production will be feasible but it is anticipated that seasonal operations will be practiced (April through November) at the Project area. Detailed descriptions of the proposed Project alluvial mining operations are provided later in this chapter.

1.4 Current Activities

Several relatively small exploration and test pits have been previously developed on the mining license area by other mining operations. WMMC is proposing a full-scale operational development program that includes an extensive drilling plan and a detailed "double-dredge" wet mining plan with concurrent and continuous reclamation, as described in the next section.

1.5 Proposed Activities

WMMC has initiated a well-organized, modern development program in the Big Bend Project site. This section summarizes future development activities proposed by WMMC.

WMMC plans on introducing efficient placer mining methods and reclamation procedures to Mongolia. Historically, placer mining reclamation in the project region has not been performed, or has been performed poorly (Farrington, 2000; Dallas, 1999). There has been one project (EROL site) where reclamation activity has been completed recently. WMMC will implement a modern, reclamation program that performs continuous reclamation while mining progresses.

The mining method will include the following general steps:

1) Strip and stockpile the topsoil – A bulldozer and frontend loader will be used to move topsoil to a berm within 50 to 100 m from the river, which will create a riparian buffer zone. Per the current Mongolian government request, no actual mining can occur within 100 m of the river; however, topsoil stockpiling and other mitigation measures (e.g., sediment fencing, filter fabric) may be conducted within 50 to 100 m from the river.
2) Strip the overburden – The overburden will be stripped with a cutter suction dredge.
3) Mining – First, two dredge paths will be created to the sides to allow for swelling (when sand is mined, it increases in volume by about 30 percent due to decreased compaction, so additional space will need to be created for the expanded volume). After that, the overburden will

be pumped to fill in the dredge pond behind the mining dredge and over the tailings from the floating process plant. The cutter suction dredge will pump the sand to the floating process plant to remove the gold and to place the sand tailings back on the bottom of the dredge pond.

4) Processing – A floating processing facility will be used to physically separate the gold and place the tailings. Once the dredge pond will be filled with the overburden, the topsoil will be moved back on top for reclamation.

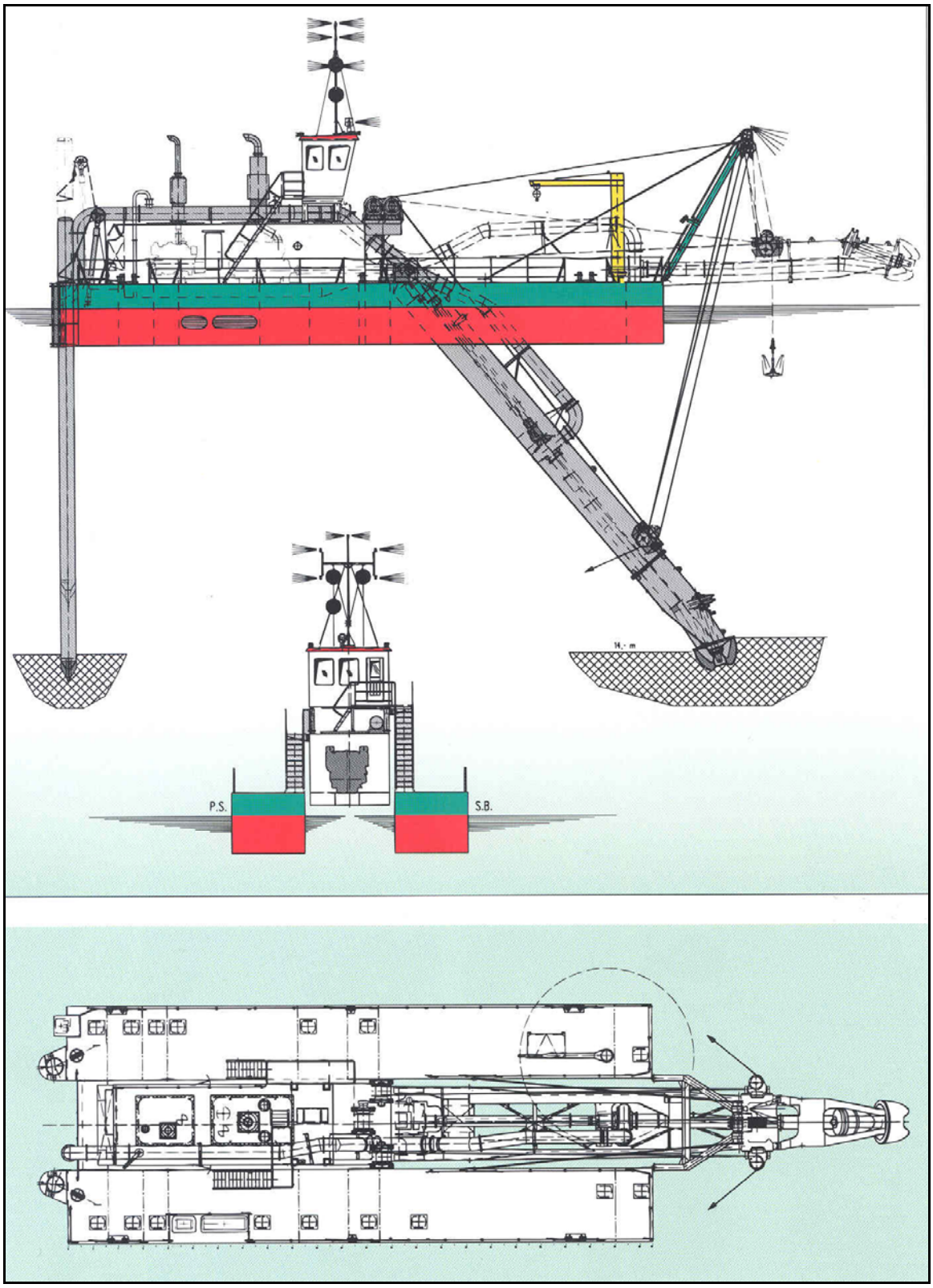
A detailed description of the mining operations is provided below.

1.5.1 Alluvial Wet Mining

The current mine plan is to utilize modern cutter suction dredge mining methods for applicable alluvial mining areas in the Project area. The dredge method uses a combination of a soil stripping and stockpiling followed by the cutter suction dredge to remove overburden and to mine the placer deposit. The dredge operates in a dredge pond that is utilized for sedimentation and is isolated from the river by an embankment. Dredges do not operate in the river. Water for the dredge pond will be supplied by the copious supply of alluvial groundwater and/or surface water (initial phases only).

The use of a cutter suction dredge (**Figure I-4**) eliminates the need for a dragline, and therefore, the characteristically high (up to 30 m), steep-sided spoil mounds of draglines currently found in the Zaamar Goldfield will not be created. Overburden is removed directly by the cutter suction dredge and pumped away via a steel pipeline as slurry (small stones, sand, silt and clay), for distances of up to a kilometer or more away, and up to several meters above the dredge pond, if necessary. Initially, the slurry is piped to a slurry deposition zone on the valley sides and then to the moving dredge pond area, on the valley floor. Land building occurs on the terraces, and with reclamation, the slurry deposits will have gentle slopes.

Figure I-4 Sketch Diagram of a Cutter Suction Dredge (IHC Beaver)



The placer material is converted into a slurry (water, silt, sand, stones) that is piped to a floating wash plant within the dredge pond via a 200-meter floating pipeline. The wash plant contains the mineral separation units that separate the gold from the tailings (**Figure I-5**). The wash plant utilizes gravity and physical means of separation; no chemicals are used in the process. The mineral separation units will contain scrubber screens and will utilize either:

- Trommel sorting and separation;
- IHC trapezoidal three-stage jigs (primary gold recovery); or
- Knelson Concentrators and Shaking Tables.

Figure I-6 shows the process flow chart of a typical wash plant with jigs, Knelson Concentrators and Shaking Tables. The advantage of these modern mineral separation units is that gold recovery is expected to be at least 93 to 95 percent (compared to the existing operations of less than 80 percent recovery).

For transport and security reasons, all treatment of the minerals will be done in a Gold Room on the wash plant.

Tailings from the wash plant will consist of oversize material, which will be deposited in the dredge pond to the rear of the floating wash plant; and, the fine fraction, which will be pumped as slurry to the slurry settling area. This creates a more natural size distribution of materials, with fines on top and coarser materials at the bottom, which contrasts with current Russian dredge operations. Water from the slurry settling areas will be collected and recycled back to the dredge pond to prevent discharge to the Tuul River. Topsoil will be stockpiled and used to reclaim the slurry spoil areas. The slurry spoil areas will be contoured to have gentle slopes and will be revegetated.

Figure I-5 A Floating Wash Plant Used in Wet Placer Mining

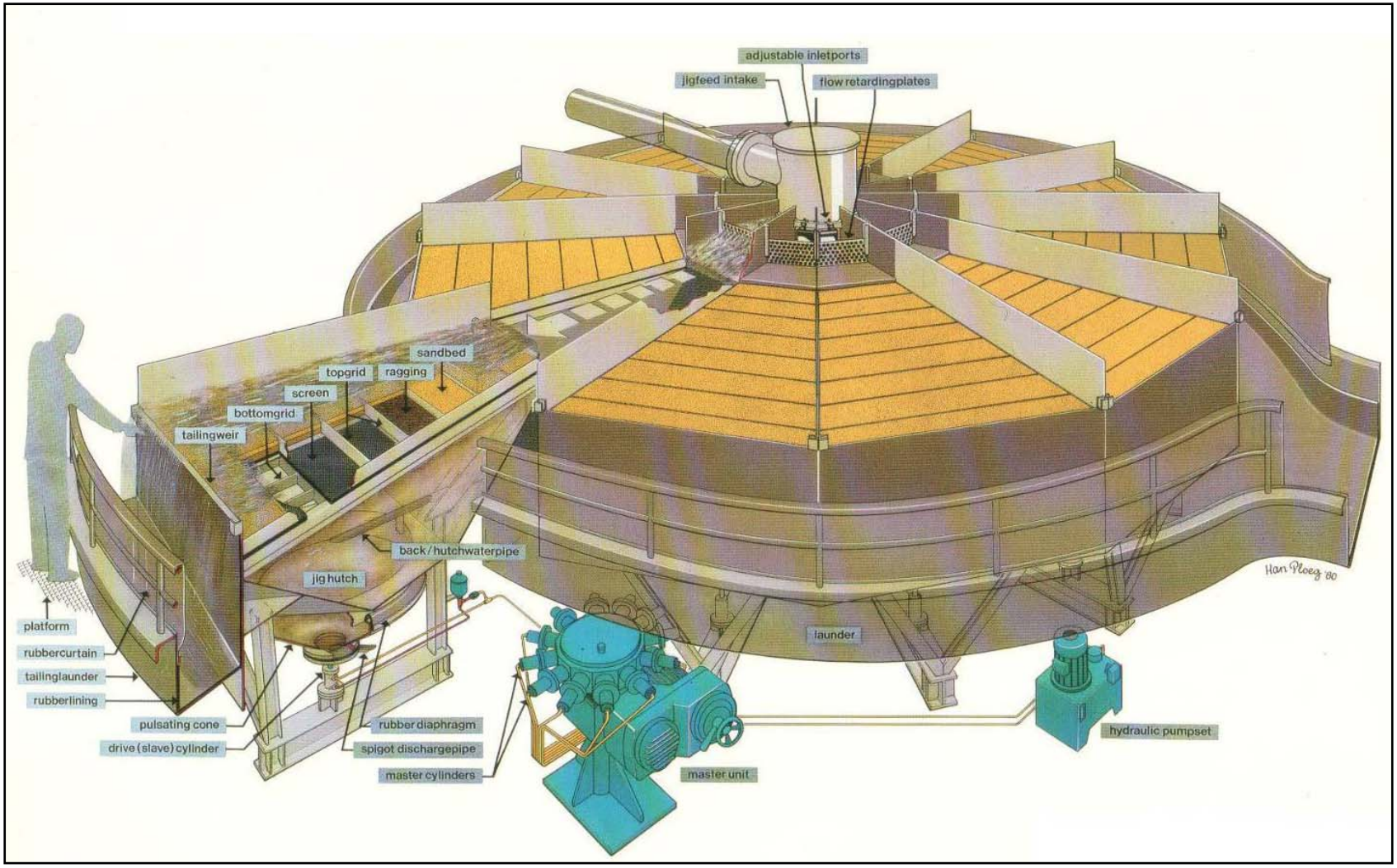
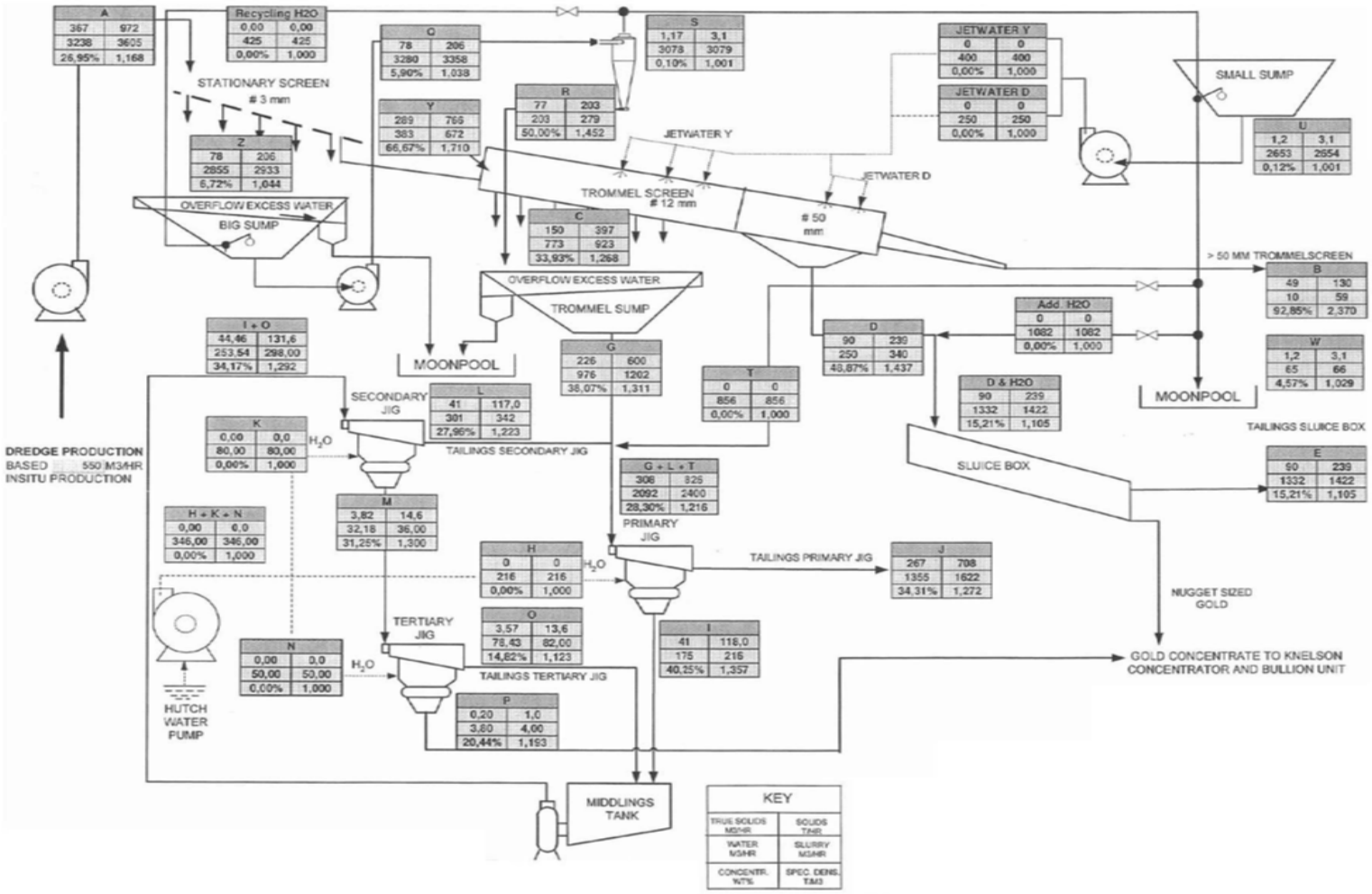


Figure I-6 Operation Flow Chart of a Typical Wash Plant



Reclamation will proceed concurrently with mining, similar to what is depicted in **Figure I-7**, a placer operation in northern Mongolia. Error! Reference source not found. presents a schematic generic drawing of the continuous reclamation process. WMMC will modify this process by using the double-dredge method instead of excavators to remove the overburden and placer; and, will slurry the overburden away from the immediate floodplain to a tailings deposition area, leaving more open water habitat.

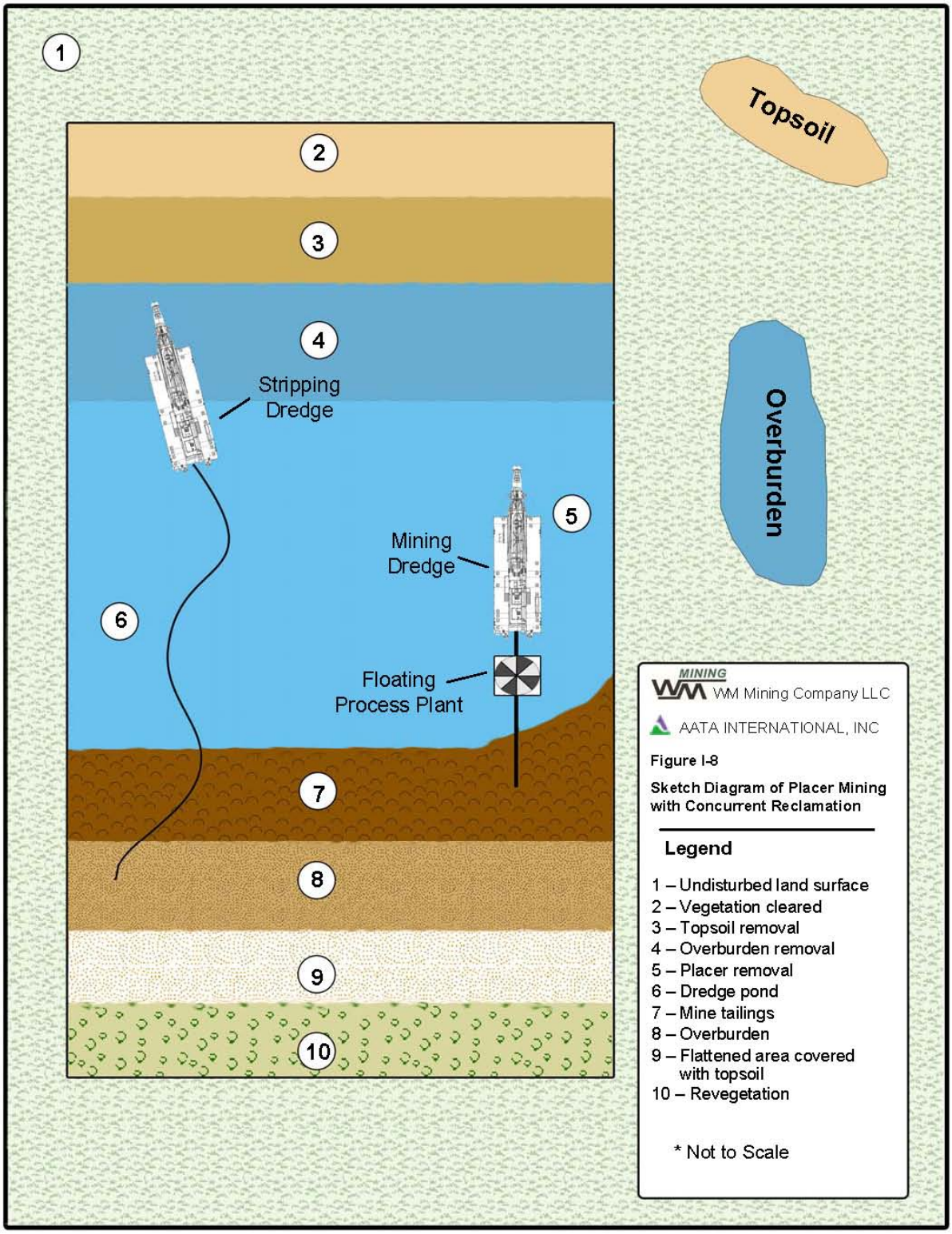
Figure I-7 Placer Mining with Concurrent Reclamation

(Note: Reclamation proceeding from left to right following mining operations. Topsoil is stockpiled and spread over newly reclaimed areas with new vegetation evident on the far left of the photograph.)

Draglines will no longer be required, which, first, eliminates environmental problems associated with large overburden mounds created by draglines; and secondly, solve the problem of draglines being not efficient in removing overburden beneath the water table. Furthermore, instead of leaving a "reversed" tailings profile as with the Russian dredges that are currently in use in the Zaamar region (i.e., fine grained tailings at the bottom and coarse grained tailings at the top), the double dredge system produces a more natural tailings profile (i.e., coarse grained fraction on the bottom and fine grained tailings on top), which makes reclamation and revegetation much easier and more effective. Therefore, the "double dredge" method proposed for this project is operationally more efficient and flexible, and environmentally more sensitive than the "dragline with single dredge" method currently used in Mongolia.

The use of modern recovery techniques, using trapezoidal jigs, is much more effective in recovering fine gold than current Russian dredging using sluices, thus improving economic recovery of Mongolian gold resources. There is more revenue to the Mongolian government using this technique.

Figure I-8 Sketch Diagram of Placer Mining with Concurrent Reclamation



Mining will proceed in a series of dredge blocks. When a dredge block is completed, the dredge pond will be contoured and reclaimed with willow cuttings sedges, rushes, and grass and some areas will be left, as open water habitat for wetland and aquatic wildlife gain. This represents high value wetland and open water habitat similar to oxbow lakes, sloughs, and marshes.

1.5.2 Mine Plan

The detailed development plan for Big Bend has been prepared by WMMC in 2008 which includes start-up operations, a detailed drilling program and a block-by-block mining plan. The development plan addresses environmental concerns (such as river protection, erosion control and water quality monitoring) and proposes a series of impact mitigation measures. In addition, mine plans for the proposed operation will incorporate modern, international reclamation practices from the beginning. Reclamation will proceed concurrently with mining. For portions of the Big Bend Project area that have been historically disturbed, reclamation of those areas will proceed to the extent practical.

A detailed drilling program, which was designed to guide initial large-scale dredging operations in blocks with proven reserves and to confirm prospected reserves in other blocks, was commenced in 2008. Full-scale dredge mining operations are expected to start in early 2009 upon approval of funding from OPIC and the completion of dredge and wash plant installations.

WMMC is proposing to mobilize two drilling teams: Team A for infill drilling to guide dredging operations in areas with proven reserve; and, Team B for confirmation drilling to prove expected reserves in "Prognosis Blocks". Results from confirmation drilling will be used to delineate placer ore grades and dimensions that are critical for the mining license application and future development. Team A will also drill to locate additional reserves that are unexplored yet easily accessible to the dredge path. In the meantime, Team B will also conduct drilling in places not suitable for dredging operations but that could be amenable to dry open pit placer mining, if such deposits are found. An ore delineation program was initiated in June 2008, beginning in Block 23, on a 50-by-50-meter grid system. This program will define the gold reserves for dredge grade control prior to dredging in each block.

WMMC has imported a complete Dutch IHC double dredging system to develop the placer at Big Bend. The system will include two cutter suction dredges with a capacity of 600 to 2,000 cubic meters per hour (m^3/hour) in situ; a floating wash plant (with 550 m^3/hour processing capacity); a minimum of 400 meters of floating rubber pipeline; and, a 500-meter steel pipeline.

WMMC also has completed detailed plans for different phases of mining operations at Big Bend, including construction of the mine camp, best dredging

paths, water supply and reclamation implementation. WMMC expects to complete the installation of the double dredge system and start production by early 2009. Estimated annual gold production from the system is 16,200 ounces on average in a conservative 240-day dredging season. **Table I-2** summarizes the planned expenditures (labor, equipment leasing, fuel, maintenance, general, and administrative) during the life of the Project.

Table I-2 Annual Capital Expenditures

Category	Annual Capital Expenditures (million USD)										
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
Labor	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	13.00
Equipment Leasing	0.75	0.75	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0	2.20
Fuel	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	36.00
Maintenance	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	3.00
General and Administrative	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	6.70
Total	6.63	6.63	5.98	5.98	5.98	5.98	5.98	5.98	5.98	5.88	60.90

1.5.3 Headquarters and Mine Camp

An office has been established in Ulaanbaatar (City Plaza, 5th Floor, Seoul Street, Sukhbaatar District, Ulaanbaatar, Mongolia) to serve as WMMC's headquarters as well as, for routine company administration. The headquarters is responsible for international and local procurement, liaison with regulatory authorities, logistics, translation, accounting, and coordination of local and international suppliers and contractors.

The existing ger-based mine camp at Big Bend will be relocated and upgraded and used as a permanent field headquarters. The field headquarters will include a field office, a warehouse, a repair shop and a communications center, septic system, on-site waste incinerator, groundwater well and other infrastructure. The groundwater well has already been installed, tested, and operated.

In the first phase of development, mine personnel (except for guards) will live in the same location in modular housing accommodations.

1.5.4 Utilities

1.5.4.1 Power Supply

All dredges and the floating process plant are diesel powered units; and, a small diesel generator will be used to power local camp operations. Solar (photovoltaic) and wind power may be used for local lighting and other purposes as may be developed.

1.5.4.2 Water Supply

A water supply well has been installed at Big Bend to provide potable water. The well was sampled and water quality analyzed in an international laboratory.

A significant amount of water is required to recover placer gold. An estimated five to seven cubic meters of water are needed to process one cubic meter of placer. All process water will be recycled to the dredge pond. It is estimated that, once in production, over 95 percent of the process water will come from recycling of previously used process water. A small amount of make-up water will be needed from surface and/or groundwater.

During the initial start-up period, a small amount of water will be required to support the cutter suction dredge operation in the small, newly created dredge pond at Big Bend. During this initial period, training of the crew will occur on cutter suction dredge operations. After the pond has been enlarged, water flowing from the shallow alluvial aquifer is projected to sustain normal operations, and consequently, direct water withdrawal from the Tuul River is expected to be minimal. The use of alluvial groundwater will also be investigated as a potential source of water supply for operations. A water use permit will be acquired.

1.5.5 Fuel Supply and Storage

Diesel fuel for the project will be provided by local suppliers from Ulaanbaatar. The fuel will be transported to the mine site by tanker trucks. A depot center consisting of diesel fuel storage tanks and associated facilities will need to be constructed. This fuel depot center will be properly sited away from the Tuul River and will be designed to avoid/minimize potential adverse environmental impacts from spills. A complete spill prevention, control, and countermeasures plan has been developed.

1.5.6 Staffing

The estimated total of 65 workers will be required to conduct the mining operations and provide administrative support for the proposed operations at Big Bend. An estimated 50 employees will be directly involved in the Big Bend mining operations. The remainder will provide mining support functions (accountants, procurement officers, managers, cooks, maintenance workers, etc.).

A total of 24 to 28 workers will be required to perform the cutter suction dredge mining operations at Big Bend, operating in two shifts per day (two 12 hr shifts of 12 to 14 people). Rotational manning levels will be set up to achieve compliance with Mongolian labor laws.

1.6 Alternatives

Various alternatives were considered in evaluating the different mining scenarios, locations, equipment, reclamation options, etc. The various alternatives considered for this SEIA include the following:

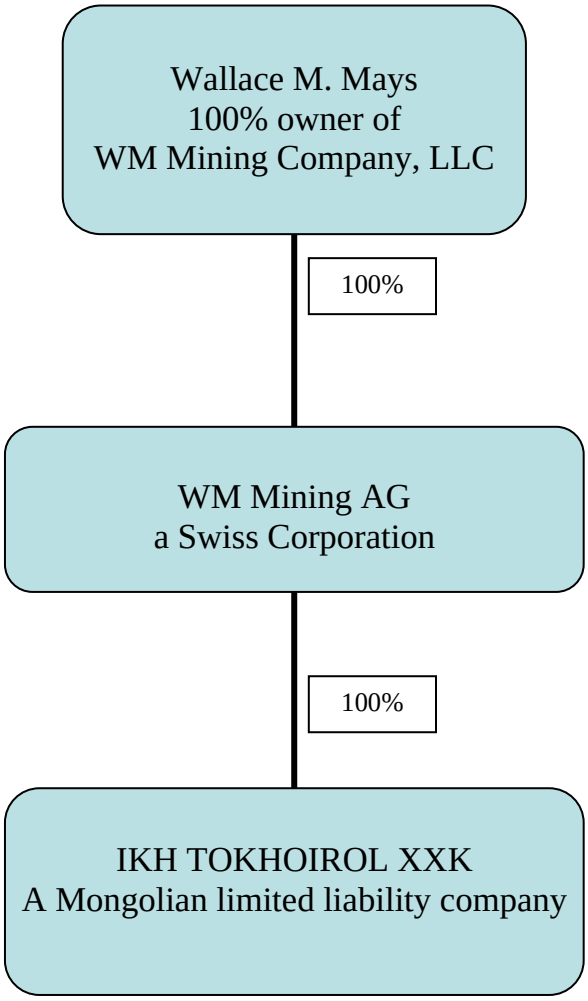
- No Action Alternative – The proposed project is not implemented and/or the current license holder develops the resources without WMMC/OPIC financing.
- Utilization of draglines to remove overburden – Draglines have been used in placer mining in Mongolia for 35 years. It is a mature technology in Mongolia in that many skilled workers are available. Many draglines are already in use in the Zaamar field so little extra capital is needed. However, removing overburden with draglines creates large overburden piles, which are vulnerable to erosion if they are not reclaimed properly. The cutter suction dredge technology eliminates the need for draglines and dramatically can improve reclamation efficiencies and results.
- Utilization of cutter suction dredges to remove overburden – It is more flexible in operations in overburden placement and has environmental and economic advantages when used in the proper situations. It is a proven technology, but new in Mongolia, thus training will be required. There will also be a need for capital to purchase or rent equipment.
- Using excavators or bulldozers to remove overburden and placer – Limited to small-scale deposits with dry mining which is not planned for use at Big Bend.
- Utilization of Russian-made bucket line dredges to remove alluvial placers – Mature technology with more skilled workers available. Less environmental options for disposing of tailings than the wheel dredge.
- Using wheel or grab miner dredges to remove alluvial placers - Environmentally more flexible in operations. A new technology that requires training of workers. Need capital to purchase or rent from international market.

- Wet mining versus dry mining of placer deposit – Ore body location, size and depth of water table are major factors in determining which method to use.
- Bridge construction – a Bailey bridge across the Tuul River was considered. There is no need for a bridge during the initial phase of the project.

2.0 Identification of Project Sponsors, Operators, and Contractors

The mining licenses of the Project are held by Ikh Tokhiorol XXK (ITK), a 100-percent-owned subsidiary of WMMC (**Figure I-9**). ITK is a limited liability company organized under the laws of Mongolia. WMMC will be the sponsor and operator of the Project.

Figure I-9 Ikh Tokhoirol Ownership Chart



2.1 On-site Investigations

An AATA Environmental Team worked in Mongolia from July 10 to July 21, 2008 to collect project information / data in support of the SEIA effort. AATA was assisted in the data gathering effort by local associates from EcoTrade LLC. EcoTrade is a Mongolian environmental consulting company that provided AATA with local logistical support and liaison with the Mongolian government. The objectives of the Mongolian field expedition were to:

- Collect as much existing information as possible on the Zaamar Goldfield environment in support of the SEIA effort;
- Conduct a field trip to the Project area to become familiar with the Zaamar region and obtain site-specific, current data on the physical, chemical, biological and social environment, including collection of samples;
- Interview key government officials in the Ministry of Mining and Energy and Ministry of Nature and the Environment (MNE) to discuss the proposed Project and obtain additional data; and,
- Interview local inhabitants, miners and other stakeholders.

2.2 Field Inspections and Surveys

Physical, chemical, biological, and social data were obtained during the July 2008 field effort (additional follow-up work was also conducted in August and October 2008). Water, soil and some biological samples were collected at various sites within the Project area and nearby region.

The field team performed inspections of Big Bend, and other mining license and exploration areas along the Tuul River corridor, to obtain information on current social and environmental conditions, make relevant observations, collect data, collect environmental samples, and identify potential social and environmental constraints and sensitive areas. The site visit focused mainly on the Big Bend concession, although other concessions were visited to inspect existing and cumulative impacts in the region.

The field visit was conducted with ground transportation using four-wheel drive (4WD) sport utility vehicles (SUVs) to reach accessible sites of interest in the Zaamar region. Site observations on the physical, chemical, biological and social baseline were thoroughly documented in field notebooks; and utilized global positioning system (GPS) technology, and digital cameras. The field team visited existing mining facilities, mining camps, mining disturbances (overburden and tailings piles; pits and sediment ponds; and, stream diversions), ger (portable dwelling structure used by nomads) communities and other areas of Project activities. The AATA team also visited locations upstream and downstream of the Project area.

Baseline surveys on socioeconomics, archaeology, hydrology, soil, aquatic ecology and water quality were conducted during the 2008 field surveys.

- The field team collected 10 water samples and 12 soil samples from the Project area. (It should be noted that during the first site visit in December 2002 [discussed in **Section 1.0** above], AATA collected seven water samples, two sediment samples and one fine tailings sample.) Field observations on vegetation and wildlife were also conducted. The existing social conditions within the mine camps, concessions, gers, and nearby areas were investigated. A detailed pedestrian archaeological survey of the entire Project area was conducted. Details of these social and archaeological investigations are described in Part III, Baseline Conditions; and, these reports are included in their entirety in **Appendix E** of this SEIA .

2.3 List of SEIA Contributors

The following individuals contributed to the preparation of the Big Bend Placer Gold Project SEIA.

AATA International, Inc.:

- Mr. John G. Aronson, President
- Dr. Ping Wang, Vice President & Senior Geologist
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- Mr. Bob Clark, Senior Geologist / Program Manager
- Ms. Carmia Fiechtner, SEIA Specialist / Coordinator
- Ms. Amanda Huffer, Environmental Specialist
- Ms. Heidi Netter, Environmental Specialist
- Mr. Justin Seweryn, Environmental Specialist /GIS Specialist
- Ms. Jill Chodak, Desktop Publishing
- Ms. Rini Kirkpatrick, Report Coordination
- Mr. Ethan Brown, GPS, Mapping
- Ms. Orgiltuya Dashzevge, Technical Translations

Associates of AATA:

- Mr. Wayne Forman, Senior SEIA Specialist and CEO of The Forman Group Consultancy, LLC
- Mr. Chris Zier, President of Centennial Archaeology, Inc.
- Mr. Hal Brundage, Senior Biologist
- Dr. Mikhail Skopets, Senior Aquatic Ecologist
- Dr. Caleb Wall, Senior Socioeconomist
- Dr. D.Dorjsuren, President, EcoTrade LLC

ACT Labs, Ulaanbataar, Mongolia and Toronto, Canada

3.0 Baseline Environmental Conditions

Analysis of existing environmental and social/economic data for the Project area was performed; and, a field trip to sample water, sediments, soil, as well as social and archaeological conditions, was conducted during July 2008 (with follow-up work in August and October 2008). In addition, the data from samples and information collected during the late 2002 baseline study in the Project area (as discussed in **Section 1.0** above) were also incorporated into this present SEIA. Finally, historical data from other environmental impact assessments that have been conducted in the Zaamar Goldfield were reviewed and analyzed for this current evaluation. Much is known of the local conditions in the Zaamar Goldfield, including the impacts of existing operations.

Highlights of the Big Bend SEIA findings with respect to the existing environment are provided here in bulleted form. This information is discussed in detail in Part III of this SEIA.

3.1 Physical - Environment

- The placer deposits of the Project area were created by fluvial processes of the Tuul River during the Quaternary, and include well -sorted large particles as well as paleoplacers of red Neogene clays. Average overburden depths are depth is 8.8 m, and the average thickness of the gold deposits is 3.1 m. The gold content averages between 0.14 g/m^3 to 0.98 g/m^3. Considerable exploration has been conducted in the area, and the estimated gold reserve at the Big Bend is 6.12 tonnes with current value of US$157.4MM (@ $USD (at 800/oz). USD per ounce).
- The risk of moderate - to strong seismic events is present in this region of Mongolia as evidenced by historical epicenters of large earthquakes nearby.
- The climate is strongly continental with relatively cool summers and long, bitterly cold winters. The annual average temperature is 0.8 ˚C. January is coldest (-21 ˚C on average) and July is warmest (+19.2 ˚C on average). Precipitation averages between 200 to 220 mm annually. A winter phenomenon called “dzud” is a humid air mass that freezes upon vegetation and causes hardship to livestock. Wind is highest during springtime and can exceed 15 m/s. Dust storms can occur during dry windy periods.
- The Tuul River dominates local hydrology, flowing from south to north with a catchment area of 49,840 km^2. River depths vary generally between 0.5 m to 4.0 m, with flow rates of 0.5 m/s to 1.7 m/s. The long-term average discharge is about 35.6 m^3/s. A discharge of 54.2 m^3/s was measured during a high flow event in July 2008. The river freezes over in the winter, with ice depths in excess of 58cm. High flows occur in spring

from snowmelt, and also following summer thunderstorms that can be intense. There have been a number of catastrophic floods in the Tuul River. Limited geohydrological testing has been performed in the region. The alluvial aquifer of the Tuul River is the principal groundwater source.

3.2 Biological - Environment

- The Project area lies in an area that represents a combination of typical riparian and steppe vegetation, with some highland differentiation of grassland and forest. Detailed satellite imagery analysis was performed and an excellent classified image was developed that illustrates the various vegetation types and land uses. The semi-desert steppe dominates the area, while the riparian vegetation represents the highest productivity and diversity. Grasses are the most ecologically important family of vegetation in the area. Willow thickets of the riparian are important as wildlife habitat and as stabilizing features of the riparian zone. They are being routinely cut and utilized for fuel by local inhabitants.
- Mammals, birds, and herpetofauna are described in the SEIA for the terrestrial environment, and fishes are described for the aquatic environment of the Tuul River. Little is known of the invertebrate fauna, but some research has been done on the more important fauna, such as insect vectors (ticks, horseflies, etc.).
- There are 12 species of mammals, 13 species of amphibians and reptiles, 28 species of fish, and 91 species of resident and migratory birds reported from the Project area or deemed potentially occurring. There are some species deserving special attention, and some which have been identified as threatened, rare, or endangered by Mongolia and the International Union for Conservation of Nature and Natural Resources (IUCN), The Redbook of Mongolia, and The World Conservation Union. Consideration of all of these species is provided in the SEIA. The historical and contemporaneous influx of thousands of miners (artisanal miners and organized) in the Zaamar Goldfield has undoubtedly caused displacement of wildlife due to human habitation, light, traffic, noise, dogs, livestock, hunting, poaching, and general human activity, including the mining activities.

3.3 Social - Human Environment

- The Tuul River is the administrative boundary between the Tov and Bulgan Aimags (provinces), and Zaamar Buregkhangai Soums (districts) in the Project region.
- The main economic activities of the Project region include herding, mining and services to the mining industry. Mining has become an important industry in the local area; the Zaamar Soum alone has designated more than 30 percent of its land area to mining concessions.
- A detailed socioeconomic study was conducted in the Project region in 2008 and the results of the study are presented as **Attachment 1** within **Appendix E** of this SEIA.

3.4 Chemical - Environment

The geochemistry, water quality (surface and groundwater), and air quality were evaluated as part of this SEIA baseline study.

- The geochemistry of the area and local soil types showed a slightly alkaline chemical composition for most samples, including water sampled from a local spring.
- The surface water quality of the Tuul River varies seasonally, and is affected by local mining activities. Water quality fluctuations of more than 20 fold in total suspended sediments have been documented from summer to winter, and the range can be expected to be much greater during large flood events. The pH of the Tuul River is slightly alkaline ranging from 7.22 to 8.39, and conductivity ranges from 306 to 368 µS/cm. Turbidity in the Tuul River is high (especially during the active mining season), and exceedances of the total suspended solids (TSS) standards are obvious. Although it was anticipated, there has been very little evidence of water pollution from Ulaanbaatar, which is more than 300 km upstream. There has been some reported use of mercury in the Mongolian mining industry, which has been detected once during historical monitoring in the Project area, but there is no current evidence of any mercury contamination in the Project area. The heavy metal concentrations of local Tuul River samples were very low to non-detectable.
- Background air quality can be considered as close to pristine due to the lack of industrial sources, although mining and other human disturbance (colonization and grazing) have had some effect on increased particulate concentrations due to wind erosion. Fuel, lubricants, clay dispersants, and flocculants may be used by the Project.

4.0 Applicable Environmental Standards

Since first becoming a parliamentary republic in 1990, Mongolia has adopted a new Constitution and established new laws, policies, international agreements, and standards relating to its environment. Many of the fundamental environmental laws were enacted in 1995. These include:

- the Mongolian Law on Air;
- the Mongolian Law on Toxic and Hazardous Chemicals;
- the Mongolian Law on Environmental Protection;
- the Mongolian Law on Fees for Timber and Firewood Harvesting;
- the Mongolian Law on Land;
- the Mongolian Law on Special Protected Areas;
- the Mongolian Law on Natural Plants;
- the Mongolian Law on Natural Plants Use Fees;
- the Mongolian Law on Water;
- the Mongolian Law on Water and Mineral Water Use Fees;
- the Mongolian Law on Hunting; and
- the Mongolian Law on Hunting Resource Use Payments and on Hunting and Trapping Authorization Fees.

The Project proponent fully intends to follow is committed to compliance with applicable Mongolian environmental regulations, as well as, conformance with international environmental and social guidelines. Applicable international guidelines include the policies of the OPIC, the IFC Performance Standards and the Equator Principles. **Part II of this SEIA**, *Legal and Administrative Framework*, provides greater detail of these applicable laws, regulations, standards and guidelines.

5.0 Potential Impacts

This section discusses the potential environmental and social consequences associated with placer gold mining of the Big Bend Project area in the Zaamar Goldfield. The potential impacts described herein do not consider the use of mitigation measures designed to reduce or eliminate Project impacts. The proposed prevention and mitigation measures for the Project are presented in **Part V of this SEIA**. Net Project impacts, as a result of the use of the proposed mitigation measures, are presented in **Part VI**.

A summary of the Big Bend SEIA findings with respect to the potential environmental and social impacts from the Project is provided here in bulleted form. This information is discussed in detail in **Part IV of this SEIA**.

5.1 Physical Environment

- The scale of disturbance of natural topographic features by placer mining and related activities is small compared with typical open pit hard rock mining (USEPA, 1989). Such disturbance is confined principally to redistribution of unconsolidated geologic materials, which is amenable to subsequent reclamation.
- The 3,170-hectare Project area includes a prognosis block area and reserve block area. The prognosis block area may be mined after exploration drilling. Operations in the prognosis block area will have minimal impact on geology and topography during exploration.
- Portions of the current Tuul River floodplain and riparian areas in the areas of the mining license will be subject to intensive short-term disturbance. Direct effects may be significant during actual mining due to disturbance and redistribution of gravel, overburden, and related materials. Indirect effects include the possibility of increased erosion of these materials during and after such disturbance, although concurrent and continuous reclamation will minimize the extent of these potential impacts.
- The proposed Project development will result in short-term and some long-term unavoidable impacts to the soil resources in areas disturbed by mining. Accounting for the reserve blocks, the prognosis blocks, and the mine camp, no more than ten percent of the Project area is anticipated to be disturbed from Project activities. The initial direct impact to soils from placer mining is the alteration of the soil profile in the mining area. There are abundant existing roads in the Project region and only a limited number of new roads will be constructed. Therefore, soil disturbance and compaction from new road construction is considered insignificant.
- The main sources of potential impacts from the Big Bend placer mining operations on surface water and groundwater hydrology in the Tuul River

Valley include: stripping topsoil and overburden; dredging operations extracting gold-bearing gravels and sands; constructing and operating settling ponds; installation of water supply wells/groundwater extraction; and, mine closure and reclamation. Potential surface water impacts include: increased sedimentation; alteration of flow patterns; and, changes in sediment size distribution in channels and floodplains. Potential physical impacts to the groundwater hydrology include: changes in recharge-discharge relationships; declines in floodplain groundwater levels; possible groundwater mounding under the dredge ponds; and, changes in groundwater flow direction.

- Water for mine operations will be sourced mainly from the natural recharge of the alluvial aquifer and possibly some from the Tuul River. At times, small amount of water may need to be pumped from the Tuul River to reach or maintain the required water level in the dredge pond. The pumping may lower water levels in the river. This would most likely happen once or twice each year during the first two weeks of a new dredge pond construction, when water demand is highest. As the dredge pond becomes enlarged, more water will be recycled from the dredge pond and less water will be required from the alluvial groundwater. Eventually, the dredge pond will provide nearly all of the water requirements from the alluvial groundwater and recycling. No more than 3 percent of the Tuul River flow will be withdrawn for the proposed mining operations at any time. Water use will be recycled at an estimated 93- to 95-percent efficiency to minimize water withdrawn from the Tuul River. Pumping groundwater from the alluvial aquifer as a water source for mining operations is also being evaluated.
- There is one water supply well on-site which may be utilized for camp drinking water. Other wells may be installed on-site to supply water during the initial phases of the Project. Results from several pumping tests conducted in the past by the Soviet and Mongolian specialists indicated that the Tuul River alluvial aquifer is characterized by high hydraulic conductivity and transmissivity values. Therefore, potential impact on the alluvial aquifer from groundwater extraction should be insignificant. It is possible that localized cones of depression and possible induced infiltration from the Tuul River can result from excessive pumping.
- The current mine plan does not involve any river diversions; and, mining activities will remain 100 m from the river channel per the Government of Mongolia's current request (but this is under review on a site-specific basis). Because of this, the impact on surface water upon closure is expected to be minimal, including through the eventual closure stage of the mine.
- The closure of the mining operations and backfilling of disturbed areas is likely to have a short-term impact on groundwater by introducing sediment and temporarily altering the natural groundwater flow.
- Topsoil will be stripped and stockpiled prior to removal of overburden. Since the topsoil will not be removed or disposed with the overburden,

soil chemistry will be minimally impacted, although bio-degradation may occur when large piles of topsoil are stacked together. In addition, topsoil will be utilized in reclamation that will be conducted concurrently with mining operations. The impacts of topsoil removal, if any, will be short-term and reversible.

- The physical impacts of these mining activities will be temporary and will be mitigated by concurrent reclamations plans that are fully discussed in **Part V of this SEIA**.

5.2 Biological Environment

- Potential Project-related impacts to floral and faunal components of terrestrial and aquatic ecology are numerous and diverse; additionally, impacts can be both direct and indirect in nature. Direct impacts include changes that occur as a result of actual mining operations, while indirect impacts describe changes that occur resulting from non-mining activities in, and immediately adjacent to, the Project area. Farrington (2000) cites impacts to the steppe grassland and riparian wetland communities as the largest environmental problems in the Zaamar Goldfield. Impacts to terrestrial ecology are expected to be greatest in wetland and riparian areas where mining activity is greatest.
- Most potential impacts relate to significant landscape level changes in vegetation as follows: loss of vegetation cover/removal of native steppe vegetation from roads, lay-down areas, construction and other field-related activities (actual); loss of species (potential); chronic and self-perpetuating erosion prone areas owing to embankment and slope disturbance, lay-down areas, roads, and deposition of overburden and tailings (actual); removal of critical habitat of potentially existing Threatened and Endangered (T&E) species (potential); introduction of invasive species from affiliated settlements and agriculture (potential); increased human activity, pets, hunting, and gathering (actual); and, changes in vegetation structure/composition (potential).
- Impacts to riparian vegetation along the Tuul River and associated drainages in the Project area are also considered potentially significant on a landscape level. Four principal potential and actual impacts include: cutting and removal of willow (*Salix*) thickets in field operations (i.e., deposition of overburden and tailings) and for firewood by local residents associated with the goldfield (actual); chronic river bank erosion and bare areas caused by previous and current dredging and operational disturbances, settling ponds and lay-down of tailings and overburden (actual); removal of habitat of potentially existing T&E species (potential); and, increased disturbance through livestock grazing pressure and settlement activity in willow thickets (actual). As discussed in **Part V of the SEIA**, WMMC plans to establish a riparian protection zone where

mining will not occur; and, riparian areas will be protected by a buffer zone which will be established for the entire mining area.

- In Mongolia, 90 percent of the total land area is prone to desertification (FAO, 2000). It is estimated that five to nine percent of all pasture land is currently degraded in Mongolia from inappropriate land uses practices combined with natural disasters, such as drought, low levels of precipitation, dust storms and steppe fires (World Bank, 2002). These anthropogenic and climatic factors account for the desertification problem in Mongolia (FAO, 2000). Animal husbandry, specifically livestock grazing, is considered the most important and widespread cause of rangeland degradation and desertification in Mongolia (Batjargal, 1997). All of these anthropogenic and climatic factors already exist and contribute to risk of desertification processes in the Tuul River Valley and regionally, in the Selenge River Basin. Any mining and non-mining activity deleteriously impacting the steppe and riparian vegetation cover can potentially contribute to desertification processes.
- Several potential impacts to fauna at the Project area may come directly from mining activities, as well as, indirectly from non-mining related activities. Potential impacts to fauna include: reduction in population sizes across an undetermined number of species; increase in population sizes of an undetermined number of species; decline in individual health due to stress; and, introduction of new and alien species.
- Potential causal factors of impacts to fauna with respect to direct Project activities and indirect activities in the Zaamar Goldfield include: habitat loss in steppe and wetland areas; noise; vehicle/road kills; illegal hunting and dogs; decline in individual health due to stress as a result of disturbance as well as increased competition for resources; and, change in population size or community structure on a local level for an undetermined number of species. Three of the likely causal factors of impacts – habitat loss, noise, and vehicle accidents – are considered to have the most significant impact from mining activities and Project-related settlements and support services. In contrast, potential impacts caused by illicit hunting and dogs from settlements in the Zaamar Goldfield are anticipated to be sporadic and insignificant.
- Positive impacts will occur for some species of wetland flora and fauna, including aquatic birds, due to increased habitat from dredge pond reclamation and wetland creation that is planned by WMMC.
- Potential impacts to fish species relate to potential increased sedimentation of the Tuul River from mining related activities. High sediment loads can have an adverse effect on fish habitats by causing changes in channel morphology, producing deposition of fine sediment on spawning beds and reducing biological productivity and diversity (Platts et al., 1989). High sediment concentrations may interfere with feeding for sight-feeding fishes and can cause gill abrasion. Although macroinvertebrates are relatively poorly known from the Tuul River and drainages, species populations are expected to be subjected to the same kinds of impacts

associated with fish. The ecology of the Tuul River in this area has been altered significantly by historical and contemporaneous mining activities. Only relatively high sediment tolerant fish species remain in this riverine ecosystem.

- General findings related to impacts to fish species:
    - Natural (climate change) and anthropogenic impacts during the last 20 years have resulted in considerable changes in the fish fauna of most waters (both rivers and lakes) of the Mongolian part of the Selenge River drainage. The Tuul River is with no doubt the most impacted river within the drainage, affected by urban waste discharges, sedimentation from mining, and extensive erosion caused by overgrazing in the watershed.
    - In the rivers with impacts from previous and current mining operations, the layer of deposited sediment may be as much as 70 cm thick. This makes the rivers unsuitable for spawning of lithophilic fish species, including important species such as taimen, lenok, and grayling.
- Potential sources of direct, indirect, and cumulative impacts to sensitive or T&E species of flora and fauna may include: loss of habitat; disturbance from noise and general activity; hunting, illegal capture or collection; direct predation or competition by exotic or invasive species; and, pollution.
- A total of 12 T&E Red Book plant species are listed that "potentially could occur in the Project area," with approximately one half of these associated with wetland or riparian habitat typical of the Tuul River and tributaries. Thus, impacts to floral species are expected to be potentially most significant in these areas. Expected impacts include loss of steppe and wetland habitat, habitat degradation, loss of species and reduction in population size of some species. Causal factors of potential impacts are expected to be both direct (tailings/overburden deposition and sediment pond construction) and indirect (settlement activities such as wood cutting of willow thickets and wild collection of showy species by residents in the Zaamar Goldfield).
- Approximately 25 T&E Red Book faunal species potentially could occur in the Project area based on their habitat requirements and distribution. These include two mammal, twelve bird, nine invertebrate, and two fish species. Expected impacts include loss of steppe and wetland habitat, habitat degradation, loss of species and reduction in population size of some species. Causal factors of potential impacts are expected to be both direct (tailings/overburden deposition and sediment pond construction) and indirect (settlement activities by residents in the Zaamar Goldfield, road traffic, noise, hunting, etc.).

5.3 Human Environment

The Project-related impacts, both temporary and permanent, must also be related to changes in the overall economic picture of the area, including continued mining exploration, potential expansion, and development. Cumulative impacts of other neighboring projects (for instance, environmental impacts, employment issues, legacy and reputational risks) have an impact on the Big Bend Placer Gold Mining Project. These cumulative impacts may compound or offset one another, and may vary through different phases of development. Future changes in employment and phasing of other projects may result in changes to the impacts presented.

The potential socioeconomic impacts of the Project include: employment opportunities; purchase and/or utilization of Mongolian supplies, equipment and services; increased tax base; land improvements; social program and budgetary contributions; decreased grazing area; short-term increased land disturbance; and short-term increased risk to human health and safety.

The short-term benefits of the Project will generally be economic. Project operations will require both skilled and unskilled labor, supplies, equipment, and support services. The economic benefit from these expenditures and associated taxes will magnify as funds are dispersed locally and nationally.

Approximately 65 individuals will be employed during the Project. About 50 employees will be directly involved in the mining operations, and another 15 employees are anticipated for mining support functions (e.g., procurement officers, cooks, etc.). A total of 24 to 28 workers will be required to perform the cutter suction dredge mining operations, operating in two shifts per day (two 12-hour shifts of 12 to 14 people). The Project will employ local and national Mongolian workers to operate the dredges. Through supervisory training, these workers will acquire technical skills that will be applicable at other mines when mining operations at this Project are complete.

Salaried workers will be paid on a monthly basis throughout the year. Estimated employment and labor costs are provided in **Table I-3**.

Table I-3 Estimated Employment and Labor Costs

Positions	Number of Individuals	Monthly Income (USD)	Annual Income (USD)
OPERATIONS			
Supervision	**6**	**58,000**	**696,000**
General Manager	1	15,000	180,000
Operations Advisor	1	10,000	120,000
Maintenance Advisor	1	10,000	120,000
Electrical – Mechanical Advisor	1	3,000	36,000
Dredge Master	2	20,000	240,000
Mongolian Operating Personnel	**28**	**25,600**	**307,200**
Operations Manager	1	5,000	60,000
On-Site Project Manager	1	2,000	24,000
Engineer	1	1,700	20,400
Electrician	1	1,700	20,400
Dredge Master	2	3,000	36,000
Dredge Process Operators	12	6,000	72,000
Maintenance	4	3,200	38,400
Dozer Operators	2	1,000	12,000
Backhoe/Front End Loader Operators	2	1,000	12,000
Excavator Operators	2	1,000	12,000
Income/Social Taxes		**25,080**	**300,960**
Total Labor Operations	**34**	**108,680**	**1,304,160**
ADMINISTRATIVE			
General Director/Management Fee	**1**	**50,000**	**600,000**
Office Manager	**1**	**700**	**8,400**
Accountant	**1**	**700**	**8,400**
Assistant Accountant	**1**	**500**	**6,000**
Secretary	**1**	**300**	**3,600**
Field Warehouse Manager	**1**	**300**	**3,600**
Supply Coordinator	**1**	**300**	**3,600**
Drivers	**4**	**2,000**	**24,000**
Income/Social Taxes		**1,440**	**17,280**
Total Labor Administrative	**12**	**56,240**	**674,880**

The Project will require supplies, diesel fuel, and other materials that will come primarily from urban areas within proximity of the Project area. Additionally, WMMC is committed to procuring local meat and dairy products.

The improvement of the local and national tax base will benefit other local and national jobs, businesses, and infrastructure. WMMC estimates 61 million USD in capital expenditures over the ten-year life of the Project (**Table I-2**).

Taxes are additional to these planned capital expenditures. The taxes applicable to the Project include corporate income taxes, social taxes/personal income taxes, and royalties on production sales; these annual taxes are estimated as 3 million USD. Other taxes may include windfall profit taxes, value added taxes, excise taxes, and local taxes (for resource use, water use, and land use). The expected annual gold production is approximately 16,200 ounces on average.

The Project has established a voluntary social program (that provides hospital supplies to the Buregkhangai Soum Center hospital) in addition to the mandatory direct budgetary contributions made to the soums for resource use (especially land use).

The Project will reduce current grazing impacts significantly. As much as 3,170 hectares (equivalent to the Project area) will be excluded from grazing pastures. On-site security will ensure that reclamation areas are not disturbed in order for successful revegetation. Reclamation activities will be performed contemporaneously with operational activities. In order to compensate for this impact, WMMC paid the soumon governments for the land-use right of the Project area and is negating a resettlement agreement with the few families who live within the Project area during the grazing season on. In the long term, the reclaimed areas will benefit wildlife with its successful revegetation in a region experiencing much overgrazing.

The economic pressures in the past ten years have led to increased grazing pressure on the Tuul River Valley. There has evolved an interdigitation of ger units and mining activities along both banks of the Tuul River Valley. Some ger units have year-round occupancy, but most are seasonal. All five ger units of the Project area are seasonal. Sheep and goats graze over the entire mining area, including areas where natural revegetation is occurring. The impact of this process is that larger grazing numbers are leading to unsustainable land use practices – and the Project wishes for one of its lasting impacts on the environment to be a re-introduction of sustainable land use practices within the Project area, including ultimate designation upon reclamation and closure as a wildlife nature reserve.

Where economic displacement will occur, and to fit in with the overall company plan to establish a wildlife sanctuary and refuge, compensation will be negotiated directly with herder households. In July 2008, meetings with each ger unit were held and the general project and project timeline explained. There was concern expressed by the families that mining would have an impact on their preferred location for seasonal ger use. It was reported that some of the older children have been employed by local mining companies and had moved away. One of the ger units was supplying meat to their extended family (and occasionally to the Big Bend Project), but there was no organized plan for marketing of meat, milk, wool, cashmere, or live animals. Total annual income from grazing of 900 sheep and goats was estimated by WMMC at approximately 1,000 USD. Resettlement will involve the equitable negotiation of cash settlements and relocation assistance for the five ger units who were located in the Project area in 2008.

Potential impacts may occur from accidents during construction and operation activities. Accidents and emergencies are inevitable consequences of human error and unpredictable / uncontrollable natural events even where there is an

awareness of their occurrence and where response procedures are in place. Given the remoteness of the Project area and the general lack of industrial accident and emergency awareness in Mongolia, the consequences of such events could be more acute. Other potential impacts relate to the effects of oil spillage on terrestrial and aquatic biota and potential losses to herders from drowning of animals in ponds.

In the long term, the Project will improve the land for wildlife watering areas and habitat. During reclamation, disturbed areas will be contoured to match the existing landscape, and successfully revegetated through the replacement of topsoil and selection of appropriate plant species. This beneficiation also extends to creating wetlands, marshlands and un-grazed rangelands to promote biodiversity, which in turn benefits grazing areas in the long-term.

5.4 Chemical Environment

- A potential source of impact to air quality will be due to increases in the emissions of fugitive dust (particulates) as a result of mining activities, which can result from the following: stripping of overburden by excavators; wind erosion from overburden and tailings piles, roads, the mine camp, and soils exposed during construction /restoration/ reclamation activities; and, vehicle traffic. The amount of fugitive particulate emissions generated from the proposed mining operations has not been quantified, but is estimated to be small compared to background levels. Site-specific 24-hr particulate sampling was conducted at Big Bend in October 2008.
- Potential impacts from fugitive dust generated from these sites include a reduction in air quality for human and wildlife health immediately downwind of the site. The health significance of fugitive dust to people and wildlife depends on many factors including wind direction, proximity to the source, concentration of particulates, size of particulates, frequency and duration of exposure, etc. Some disturbed areas that are particularly vulnerable to wind erosion may serve as chronic sources of fugitive dust, and, if left unclaimed, could result in some level of desertification. These potential impacts generated by the Project will be temporary and reversible; and, are judged to be relatively small in magnitude.
- The potential sources of point-source gaseous emissions from the Project operations that could impact local air quality are the following mobile and fixed sources: diesel-operated equipment, including cutter dredges, floating process plant, excavators, bulldozers and transport vehicles; coal-fired boilers for heating; and, diesel generators, used as a source of back-up power. These sources generate SO_2, NO_X, CO, hydrocarbons, and particulates that can potentially degrade local air quality for humans, wildlife, and vegetation. Potential impacts depend on the gas concentrations, duration and frequency of exposure, among other factors.

A computer model analysis of these emissions was conducted and the impacts were judged as not significant due to the generally excellent dispersion characteristics of the region, low human population, lack of other significant emission sources in the Project area, and the small amount of emissions generated.

- Surface water and groundwater quality impacts from fuel and lubricant spills could occur as a result of an accident during transportation, storage, or use at the mine camp. Refueling of the cutter suction dredges within the dredge ponds may result in diesel fuel spillage directly in the ponds, which could contaminate the ponds and the alluvial aquifer with petroleum hydrocarbons.
- No chemicals will be used to recover the gold; physical or gravitation methods will be used to sufficiently recover the gold. This reduces the potential impacts of chemical contamination within the Tuul River.
- Noise impacts have been assessed as not significant to humans, due to the very sparse population and distance to receptors.
- The over-all existing landscape will not be dramatically changed by the Big Bend proposed mining activities. However, upon completion of mining, reclamation of the Project site may significantly improve the visual integrity of the mined area at Big Bend, with additional open water, riparian and wetland habitats.

5.5 Archaeological, Historical and Cultural Resources

A potential operational constraint is the likelihood of encountering archaeological features that require excavation and site resolution before the area may be mined. In certain circumstances, which are likely in the Zaamar region, this could result in impacts to a project from development delay or in possible total exclusion from the area.

AATA conducted an archeological study of the Project area as part of this SEIA development. Impacts to these sites will be eliminated or minimized during the planning for the Project. Should the Project disturb such areas, the appropriate regulators and/or institutes will be contacted in order to implement mitigation measures in accordance with local and national regulations. The entire Archaeological Report of this study is contained in **Attachment 2 of Appendix E** to this SEIA; a summary of this study is contained in **Part III**; and, mitigation measures related to the study findings are discussed in **Part V**.

5.6 Cumulative Impacts

The analysis of cumulative, associated, and indirect impacts of the WMMC Big Bend Placer Gold Project is a general requirement of OPIC when dealing with projects that may have direct or indirect linkages to other projects or activities

within a region. Although a comprehensive detailed analysis of the entire Zaamar Goldfield is beyond the scope of this SEIA, an analysis of the relative contribution of the WMMC Big Bend Placer Gold Mining Project to the regional social and environmental situation was performed. This analysis was based upon social and environmental reviews of the proposed Big Bend Project mining plans; field inspection of the Project area and surrounding region; remote sensing analysis; and, review of existing environmental information for the region. In order to understand the cumulative impacts from the proposed Project to the surrounding region, it is important to review the current environment in the region

Large-scale development of placer gold mining in the Zaamar region of Mongolia began around 1990 (Dallas, 1999). Currently a total of 135 mining and exploration licenses have been issued (covering 87,000 hectares) in the Zaamar Soum. The Project covers approximately 3,170 hectares.

In the early 1960's, there were no significant mining activities occurring in the Zaamar region as shown by the air photo mosaic compiled by AATA as part of this SEIA. The image shows that mining has had a significant and cumulative impact on the environment in the Zaamar region of the Tuul River Valley.

Farrington (2000), Dallas (1999), and Jadamba and C. Doloonbayar (1998) have documented the environmental impacts with some of the previous and current operations associated with placer mining in the Zaamar Goldfield which include:

- Destruction to riparian, riverine, aquatic and grassland habitats along the Tuul River by mine extraction activities;
- Introduction of large amounts of silt and sediment in the Tuul River from poorly operated wash plants and settling ponds;
- Sediment laden runoff from improperly designed open mine pits, mine roads, and unreclaimed or poorly reclaimed areas when mining is finished;
- High levels of airborne dust from open mine pits, roads, the mine camp and overburden piles;
- Hydrocarbon spills;
- Sewage and solid waste disposal;
- Coal and woodsmoke emissions from the mine camp; and,
- Possible historical mercury use.

Most of these environmental problems relate to poor environmental management practices, inefficient gold recovery from old placer technologies, and lack of enforcement of existing environmental regulations.

WMMC intends to introduce modern, environmentally sensitive placer mining operations that utilize Good International Industry Practices (GIIP), as defined by IFC; and, modern international environmental management practices to minimize short-term impacts and reduce or eliminate long-term environmental impacts.

WMMC plans to demonstrate that placer mining can be a relatively clean industry by conducting it properly. The proposed mining operations will not use chemicals (i.e., mercury or cyanide) to process the ore, will not result in acid mine drainage, nor will emit smelter emissions common to mining and processing of other metal deposits. WMMC intends to employ modern, placer mining methods in this Project with full concurrent reclamation of mined lands. WMMC will also reclaim historical mine disturbances to the extent practical on its mineral leases.

There are not anticipated to be any significant adverse cumulative effects of placer mining on surface water or groundwater resources due to the Project. Water for mine operations will be sourced from groundwater in the alluvial gravels or from the Tuul River. Water use will be recycled at an estimated 93- to 95-percent efficiency to minimize water withdrawn from groundwater or the Tuul River.

Wet mining operations to be conducted at the Project area will occur in dredge ponds physically isolated from, and protected from the Tuul River. Suspended sediments created in the dredge pond by mining operations will remain in the pond as a zero discharge, closed system, with no significant impact to surface water in the river.

No river diversions are planned with the proposed mining operations and thus no impact to the aquatic life in the Tuul River will occur from river diversion.

Stripping of vegetation, topsoil and removal of overburden and processing of placer will result in changes in the local topography and landscape in the floodplain and terraces that are mined in the Project area. Dredge ponds will be contoured with appropriate slopes and will be revegetated with willow cuttings to establish wetland vegetation. Wet placer mining will result in a net increase in aquatic and wetland habitats with a potential for positive net wildlife gain. The overburden piles will be recontoured to gentle rolling hills away from the riverbanks and will be reclaimed and revegetated with native grasses, as practical. This is in stark contrast to the existing dragline overburden mounds in the region that are excessively steep and high (up to 30 m in height), and mostly barren.

There are no expected significant cumulative impacts related to camp waste from the Project. Sewage waste from the mine camp will be treated on-site in an engineered septic system. Greywater will be treated in a leach field at the mine camp. Solid waste will be disposed of in a mine camp landfill.

Project operations will result in an increase in dust from earth-moving equipment and road transport, but the cumulative effects will be minor due to implementation of a dust control program. Emissions of SO_2, NO_X, CO and particulates are not expected to be significant based on screening modeling results and airshed dispersion characteristics.

Placer mining activities in the Zaamar region have been occurring for many years now. The proposed Project is one of many placer operations in the area. An infrastructure has been developed in the nearby concessions to deal with the types and numbers of personnel, operations, impacts and emergencies associated with this type of development. The workforce for the Project will come primarily from Ulaanbaatar, and to a lesser extent from the towns of Darkhan, Erdenet and Bulgan, and possibly Russia.

The mine camp will be the largest permanent settlement within the region. There are no permanent settlements directly within the Project area; however, there remain a few artisanal miners in the region that primarily rework the tailings to extract fine gold left over from previous inefficient gold recovery. Historical placer mining operations in the Zaamar region were inefficient in using older, Russian dredges and mineral separation units such as sluice boxes, which failed to recover the fine gold fraction, often representing up to 40 percent of the gold reserve. As a result, the historical tailings still contain sizeable amounts of gold, which attract artisanal miners. There is no artisanal mining activity at Big Bend.

Indirect environmental impacts associated with the artisanal miners include: improper location of gers; cutting riparian willows and mountain forests for fuel; lack of sanitation and potable water; and, water quality impacts to the Tuul River from washing the ore and human waste, etc.

Since WMMC will use modern methods to extract 95 percent of the gold from the placer, and perform concurrent reclamation while mining operations are ongoing, there will not be enough gold left over in tailings worth mining by the artisanal miners, or it will be buried by overburden and reclaimed.

There are not anticipated to be any adverse socioeconomic or socio-cultural impacts. On the contrary, the benefits to the local community and Mongolia should be significant based upon increased employment and taxes. It is unknown what the economic multiplier effect will be for the Project, but secondary services and support should be significant based on the number of jobs created by the Project. In 2008, there were a total of 5 seasonal families occupying gers on the project site. A Resettlement Action Plan was prepared for the management of these inhabitants, taking into account both international and Mongolian social and cultural considerations.

A conclusion of the regional and cumulative impact assessment is that the basic physical, chemical, biological and social impacts as a result of this Project are judged to be manageable and not significant. Cumulative contributions of air and water pollutants, waste, etc. are of such volumes and in such locations that their cumulative effects are judged to be not significant. Internationally accepted social and environmental management and reclamation practices will minimize any long-term impacts from the Project.

6.0 Mitigation Measures

A detailed discussion of the proposed prevention and mitigation measures for placer gold mining operations at the Project area is presented in **Part V of this SEIA**. A Social and Environmental Management and Monitoring Program or SEMMP has been developed to assure that any negative social and environmental impacts are minimized or mitigated during construction and operation of this Project; and, that the site can be reclaimed to stable conditions following final decommissioning and closure. Implementation of environmental protection measures will enhance the capability of the Project to operate in an environmentally sound manner. The prevention and mitigation measures will be incorporated into the final design, construction, operation and closure of the Project.

WMMC is committed to conformance with IFC Performance Standards and relevant EHS Guidelines (discussed in **Part II of this SEIA**) in the design, operation and eventual closure of the Big Bend Project. This includes the adoption of GIIP, as defined and evaluated in the IFC General EHS Guidelines and EHS guidelines for mining, for prevention and mitigation measures to be employed, as well as, for management practices. The proposed mitigation measures are subject to change during the life of the mine Project based on management requirements, regulatory requirements, and experience gained while implementing the various phases of the Project, which can result in improved performance of these measures.

WMMC will employ the prevention and mitigation measures listed below to address the potential impacts (discussed in **Part IV**) to each of the major components of the surrounding environment at the Project area:

- Water Management – Mine process water will be recycled to conserve the water resource, thereby minimizing impacts to the Tuul River and groundwater hydrology. WMMC will work with the MNE to complete a water analysis program that defines the relationship between placer mining, local groundwater levels and the Tuul River. A water permitting procedure will be required to meet Mongolian regulations.
- Water Quality – There will be no mining in the Tuul River and thus no direct impacts to water quality and aquatic life from the mining operations. WMMC will engage modern sediment and erosion control techniques, and will isolate all mining activities from the river proper using sediment fencing and other advanced techniques;
- Land Disturbance – Land disturbance will be minimized by employing erosion and sediment control practices which minimize erosion and maintain a stable environment. Multiple track roads will be consolidated and modern road building standards employed in all areas. The main access road will be maintained to modern standards;

- Land Reclamation - Reclamation will be concurrently performed while mining is progressing to restore land productivity. It is the intent of WMMC to reclaim the entire mining area to a higher land use, as an ecological reserve with wetland and open water habitats, along with much reduced grazing pressure;
- Tuul River / Wetland / Pond Restoration – Wetland and aquatic habitat will be enhanced and increased through proper reclamation of dredge and sediment ponds. The Dutch dredging process results in a normally distributed tailings deposit, with coarse materials on bottom and fines on top;
- Waste Management – The amount of solid and liquid wastes generated from the Project will be minimized and the wastes will be disposed of in a manner that has minimal environmental impacts;
- Fuel/Chemical Storage – Proper design and management practices will be employed in the location, storage, containment and use of fuels and chemicals;
- Air Quality – Air emissions will be minimized to reduce impacts to human health, wildlife, vegetation, and general quality of life;
- Socioeconomics – Socioeconomic benefits of the Project will be maximized, and disruptions to traditional livelihoods (i.e., herding) will be minimized. It is anticipated that local herding will be removed from the property to reduce existing overgrazing impacts, and that transparent, negotiated settlements with local herders will proceed immediately; and,
- Biodiversity Offset – The creation of wetland and open water habitats which exceed the current area, along with elimination of grazing, improved sediment controls, and reclamation of riparian areas represents a significant biodiversity offset to the Project area. The value of wetland, riparian, and open water habitats in Mongolia is very high, and increases in these habitats are considered significant. Reduction of grazing pressure will be utilized to increase biodiversity of upland habitats which are included in the mining area, but will not be mined.

Through the implementation of a series of modern environmental management programs, WMMC will endeavor to eliminate, reduce, or otherwise manage all areas presenting potentially significant impacts to human health, social and cultural resources, and the environment. WMMC has committed to a comprehensive SEMMP with the following components:

- Public Consultation and Disclosure Plan;
- Community Development Plan;
- Environmental Management and Monitoring Plan;
- Cultural Resources Management Plan;
- Occupational Health and Safety Plan;
- Emergency Response Plan;
- Waste Management Plan; and
- Mine Reclamation and Closure Plan.

The following is a summary of the measures that will be employed to avoid, minimize or mitigate potential environmental and social impacts associated with placer gold mining of the Project area in the Zaamar Goldfield. The proposed prevention and mitigation measures for the Project are discussed in detail in **Part V of this SEIA**. The "Net Project" impacts, as a result of the use of the proposed mitigation measures, are presented in **Part VI**.

6.1 Air Quality Mitigation Measures

A fugitive dust control plan will be implemented during the life of the Project. Fugitive dust will be periodically monitored to ensure compliance with Mongolian and international standards.

Mitigation measures will include the following:

- Use of haul routes that minimize hauling distances.
- All mining equipment and vehicles will be kept in good mechanical order and will be tuned-up regularly to maximize efficiencies and minimize fuel consumption and exhaust emissions.
- Periodic application of water to the roads as necessary to reduce dust. The source of the water will be from groundwater or from pits.
- Reclamation and revegetation of overburden, tailings, pits, and other disturbed areas will be conducted as soon as mine activities in that area are finished, with appropriate grading and contouring of soil material, and potential application of water sprays as necessary to minimize the amount of disturbed land exposed to wind.

6.2 Water Quality Mitigation Measures

The Project will incorporate appropriate mitigation measures designed to prevent, or minimize alteration of surface water and groundwater hydrology, and degradation of water quality in the Tuul River and in the alluvial aquifer. Two principal goals of this mitigation are: (1) zero discharges of process water to the Tuul River; and, (2) water recycling. Water permitting for use from either surface or groundwater will be required.

The following is a list of proposed water quality and sediment control mitigation measures:

- Dredge ponds will be isolated from the Tuul River by an embankment that prevents mixing of these waters.
- Dredge and sediment ponds will be maintained as a zero-discharge, closed circuit system.

- No surface water discharges to the Tuul River from mine operations is anticipated.
- Recycling of mine process water will be a key mitigation measure for Project operations.
- GIIPs, which will be used to control surface erosion and suspended solids in stormwater runoff, will include structural (e.g., sediment ponds) and non-structural (e.g., maintenance and management measures) approaches. These practices will be employed wherever soils are disturbed and construction activities occur.
- Sediment ponds will be used to manage large volumes of water (rainfall and snowmelt) and mitigate any flooding and erosion issues on-site and downstream.
- Proper design, construction and maintenance and operation of the settling ponds and overburden stockpiles are the keys for erosion and sedimentation control. Planning for erosion and sedimentation control will start together with mine design in the early phase of development of the Project.
- Settling ponds and dredge ponds will be designed and constructed to ensure that there will be no uncontrolled discharge of any process water even during storm events. Turbidity and pH of the process water will be monitored. Other parameters (salts and metals) will be analyzed regularly. Since no chemicals will be added to process water during the entire mining and ore processing procedure, water quality of the process water should not be much different from the source water (higher turbidity is an exception).
- Process water in abandoned settling ponds and dredge ponds will be allowed to evaporate and percolate in place. In case discharge to surface water drainage is required, water quality samples will be taken and analyzed before releasing to ensure no impact to natural water quality will occur.
- Overburden and topsoil storage sites will be at least three meters from any visible surface water drainage and will always be isolated using modern sediment fencing. A 50-m buffer strip of undisturbed land surface with vegetation will be maintained between the soil stockpiles and the active stream channel to capture and trap escaped sediments, with no mining occurring without MNE approval within 100 m of the active stream channel. Sediment fencing will be installed between all mining activity and the Tuul River proper.
- A minimum of five meters will be kept between settling ponds and any surface water drainage.

6.3 Waste Minimization Measures

- Site management will include standard waste minimization practices. Wherever possible, reuse of recoverable material in all operations will be considered. The waste generating potential of all materials to be employed at the site will be assessed prior to ordering or contracting. The evaluation will be directed at waste minimization and control of all hazardous materials that might be required.
- Reuse of process water at the Project area will be a major application of waste minimization. Dredge ponds and settling ponds will be constructed with special engineering design to ensure suitable water quality will be achieved before process water is reused.
- Other opportunities to achieve significant waste volume reduction, however, are limited because waste volumes are primarily a function of activity level and characteristics of the placer deposits to be mined. This includes eliminating unnecessary crating and packaging materials prior to delivery to the site; segregating certain scrap materials from the waste stream for reuse in other aspects of the operation; using combustible materials as a supplemental local heating fuel; and using non-toxic organic wastes as a soil amendment to facilitate reclamation success or as a fertilizer.
- Recycling and reusing the refused materials will be a routine practice at all WMMC facilities. An on-site sanitary landfill will be constructed according to MNE requirements, and inspected regularly.

6.4 Liquid Waste Mitigation Measures

- Sewage generated at the Project site (mine camp, and on-board dredges) will be collected and properly treated. A septic system will be established at the mine camp with enough capacity to treat all incoming wastes and used as the major treatment facility for domestic sewage. Periodic pumping of the septic tank may be required on a contract basis. Wastes will be disposed of in a local landfill or on non-edible agricultural pastureland in an MNE-approved manner.
- There will be minor amount of other industrial wastewaters from mining operations at the Project area, which include wastewaters from machinery cleaning / washing at the maintenance shop, dredges and wash plant. These wastewaters will be collected and transported to the treatment facility at the mine camp for treatment and disposal. If required, oil/water separation will be performed to reclaim hydrocarbons which may be incinerated or disposed of in an approved land application area. Land farming of organic wastes at the site is not anticipated.

6.5 Solid Waste Mitigation Measures

- A large proportion of typical domestic solid wastes (about 60 to 70 percent) will be combustible and could be disposed of by incineration, although the non-combustible fraction would need to be segregated and buried at a landfill site either prior to or after incineration.
- Overburden and tailings are the most significant solid wastes generated from placer mining. Since no chemicals will be added in the placer mining operations and no any other chemical processes (such as oxidization) are expected to occur, the composition of the overburden and tailings are almost identical to their natural un-mined counterparts. Concurrent reclamation of the overburden and tailings stockpiles will be conducted by WMMC to eliminate long-term impacts.
- The management of industrial wastes includes minimization, recycling and source separation between non-hazardous solid wastes and hazardous chemical wastes. Scrap metal and packing materials will be collected and stored for recycling. A handling procedure for used drums and oil filters will be established to prevent spillage, loss or damage. All used containers, construction materials, and equipment will be returned to the suppliers, if possible. Other non-hazardous solid wastes will be separated and disposed of by incineration or landfill.
- Hazardous wastes will be characterized and stored in a designated area remote from surface water and groundwater, and human habitation. A special bermed area with an impervious liner will be used for segregation of all hazardous wastes including oily debris, cleaning rags, waste oil and lubricants (recyclable), containers for paint, and other materials. All containers with hazardous waste will be clearly marked and posted with warning signs. Hazardous wastes will be properly segregated, labeled and stored in a properly secured location. There are no public or private hazardous waste disposal facilities in Mongolia. Hazardous materials will be stored, then disposed of by incineration as may be permissible under Mongolian Law on-site, or transported to a future site for permissible disposal. Some potential may exist for disposal of hazardous wastes in high temperature kilns, asphalt and/or paving plants, power plants, boilers, or other facilities as may be in alignment with international best practices and approved by Mongolian authorities.
- One of the key factors in effective waste management is comprehensive classification and identification of hazardous wastes so that appropriate waste management procedures can be followed. The procedure for correct use, handling and disposal of paint, solvents, pipe adhesives, thread cleaning solvents, waste chemicals and batteries will be established according to Mongolian regulations and OPIC guidelines, taking into consideration the remote location of the site.

6.6 Reclamation and Revegetation Measures

Reclamation and revegetation is one of the most important parts of the general decommissioning and closure program (see the **Reclamation and Closure Plan in the SEMMP**). In general, the overall goals for reclamation and revegetation in the Project area are to provide both short- and long-term erosion control; ensure land-use compatibility with surrounding lands; and to leave the reclaimed areas at least as a self-supporting ecosystem. There will be potential enhancement of wildlife habitat in constructed wetland system that will be integrated with the greater Tuul River Valley as a result of reclamation of former dredge/sediment ponds and spoils stockpile areas. The goal is to return the mining area to a higher level of environmental integrity, as an ecological preserve with enhanced riparian, wetland, open water and upland pasture values. Increases and improvements in upland, wetland, riparian, and open water habitats represent a significant biodiversity offset for the Project.

Direct activities of the operations that will require reclamation include mining sites and overburden/tails stockpile areas; indirect activities include settlement/ contractor services, waste dumps and willow thickets.

In spite of the many complex direct and indirect impacts that will require a reclamation/revegetation program, mining activities also present a high potential for habitat enhancement of the Tuul River floodplain system for both wildlife and vegetation through the creation of a wetland system in former dredged areas. The areas of wetland, riparian, and open water habitats will increase biodiversity of the area, and represent a significant biodiversity offset. Elimination of grazing also supports the biodiversity offset by increasing vegetation species, and viable terrestrial habitats of the entire Project area.

The following is a list of proposed reclamation and revegetation measures:

- WMMC plans to incorporate these planning activities into the Company's reclamation program:
    - Planning in identifying preliminary goals and the general approach;
    - Assessment of the baseline conditions;
    - Assessment of feasibility of accomplishing set reclamation goals;
    - Development of a reclamation Health, Safety and Environment (HSE) checklist;
    - Evaluation for assurance in compliance with engineering designs; and
    - Monitoring program of variables important to goals and objectives.
- The most significant reclamation will involve the mining features, which will be modified to create an artificial wetland and open water complex with a view to enhancing wildlife habitat and terrestrial/aquatic ecology in general. The creation of functional wetland habitats and ponds through

enhancement of dredged areas in the Tuul River floodplain is a general reclamation goal of the Big Bend Project.

- In addition, reclamation of the previous mining and exploration impacts within the Project will be implemented to the extent practical.
- Reclamation will proceed concurrently with mining. WMMC will modify this process by using the double-dredge method instead of excavators to remove the overburden and placer; and, will slurry the overburden away from the immediate floodplain to a tailings deposition area, leaving more open water habitat.
- Topsoil will be stockpiled and used to reclaim slurry spoil areas. The slurry spoil areas will be contoured to have gentle slopes and will be revegetated.
- Mining will proceed in a series of dredge blocks. When a dredge block is completed, the dredge pond will be contoured and reclaimed with willow cuttings and grasses, and left as open water habitat for wetland and aquatic wildlife gain. This represents valuable habitat similar to oxbow lakes, sloughs, and marshes.
- Reclamation design protocols will follow standard recognized practices adaptable to the Project site conditions as outlined in the Placer Mining Reclamation Handbook (Interfluve, 1990).
- In planning for restoration of the floodplain areas disturbed by mining activities, the following nine initiatives will be used in drafting the master reclamation plan:
    - Pre-site assessment;
    - Reestablishment of wetlands planning;
    - Dirtwork planning;
    - Bank stabilization considerations;
    - Assessment for subsurface dams;
    - Grading plans;
    - Geotextile and sediment fencing installation and usage;
    - Revegetation; and
    - Cost estimation.
- From a reclamation standpoint, there are four relevant impacts associated with the mine camp, these include roads, derelict buildings, waste dumping areas and riverbank erosion. A reclamation plan, engaging the following pre-planning steps, will be carried out to reclaim these sites:
    - Pre-site assessment;
    - Grading planning;
    - Waste;
    - Geotextile usage;
    - Revegetation; and
    - Cost estimation.

6.7 Measures for the Protection of Flora and Fauna

Protection of flora and fauna and mitigation of terrestrial and aquatic ecology systems will be important initiatives for the Project. These initiatives may include establishing a voluntary conservation zone for the Project area, eliminating and/or minimizing grazing in Project area, and support of a periodic environmental monitoring program for certain key organism groups.

WMMC has committed to follow accepted international practices and required national environmental standards to ensure the successful inclusion of methods and techniques that will produce a sound biodiversity management program, which is aimed at minimizing environmental degradation. WMMC also has taken all reasonable steps to gather and develop substantial baseline information that incorporate non-protected species, as well as organisms with special conservation status, into a functioning ecosystem framework. The following mitigation and protection measures will serve as a framework under which WMMC can measure its progress toward ensuring that biodiversity challenges are met:

- In addition to updating the baseline environmental data, a number of measures for mitigating impacts to terrestrial and aquatic ecosystems are being considered for the Project area, including: establishing voluntary conservation zones and biological corridors within the Project area; supporting terrestrial and aquatic refuges in the vicinity of the Project; the application of a comprehensive and effective reclamation and revegetation plan; and, support of a periodic environmental monitoring program for certain key groups of organisms to make ongoing adjustments to the biodiversity management and mitigation strategy, if needed.
- The Project area is currently a designated rangeland conservation area with grazing livestock. This activity will be limited to the extent possible. Protecting the concession rangeland areas against livestock grazing will help mitigate erosion significantly through protection of the grassland cover and increase biodiversity of the steppe environment.
- Revegetation of sites will use accepted technology in the interest of a cost effective and efficient program. GIIPs will be used to facilitate and shorten the time period necessary to stabilize the soils and potential sources of sediment input to the aquatic ecosystem. The topsoil will be removed and stored using appropriate and proven techniques to facilitate revegetation. In addition, efforts will be made to improve habitat, such as retaining wetland areas for wildlife refuge for waterfowl and mammals, and, planting willows for bank stabilization.
- The essential features of the SEMMP monitoring plans provide for the flexible assessment of ongoing social and environmental impacts, accounting for connectivity, fragmentation, disturbance, and hydrologic processes of aquatic and terrestrial ecosystems. The plan considers a strategy aimed at providing an ongoing evaluation of a full range of

impacts that include direct, indirect, cumulative, and induced impacts. The management strategy includes participation of outside stakeholders, institutions, NGOs and the government; and, also includes a way to incorporate the importance of indigenous knowledge of local biodiversity aspects into the management and monitoring strategy.

6.8 Human Mitigation Measures

WMMC believes that the high need to achieve and maintain a social license to operate also requires considerable understanding, knowledge and coordination with local, national and international stakeholders. Broad community support not only facilitates the mine operation, but it also serves as the social license to operate as required by OPIC, IFC Performance Standards and EPFIs (as discussed in **Part II of this SEIA**).

As part of the AATA baseline study for this SEIA, a socioeconomic study was conducted in July 2008, in and near the Project area, in accordance with national and international guidelines of OPIC and IFC. **Attachment 1 of Appendix E** contains the full, detailed report of this study, which is briefly described below.

The socioeconomic report discusses the cultural background as well as the human environment and legal framework in which the Project will operate. In addition, the potential impacts from the Project and the proposed mitigation measures are identified. In compliance with IFC Performance Standards, a Social Engagement Program is defined and will be implemented by WMMC in order to efficiently involve stakeholders on issues potentially affecting them.

As noted, mitigation measures are included in the full socioeconomic report. A list of these measures is as follows:

- The Project intends to reduce pressure on grazing areas by eliminating livestock grazing and successfully reclaiming the Project area. The Project area will exclude livestock grazing from the Project area primarily with on-site security personnel. For health and safety purposes, the Project area will have a gate at the entrance to control access and, if necessary, the mine camp will be fenced. Ultimately, the Project's goal is to preserve local biodiversity by implementing sustainable land-use practices and reclaiming the Project area as a wildlife sanctuary and refuge.
- The voluntary relocation and economic displacement of the local ger herding units will be accomplished through negotiated cash settlement and with care to locate more suitable steppe habitat nearer to their original winter residences. In addition, WMMC paid and will continue to pay the soum governments for the land-use right of the Project area.
- The Project will perform reclamation activities contemporaneously with operation activities to minimize land disturbance and expedite the

reclamation process. Disturbed areas will be contoured to match the existing landscape, and successfully revegetated through the replacement of topsoil and selection of appropriate plant species. This beneficiation will also extend to creating wetlands, marshlands and rangelands to promote biodiversity, which in turn benefits grazing areas in the long-term.

- To eliminate or minimize risks to health and safety, WMMC will implement the following:
    - Provide 40 hours of MSHA-based general and site-specific safety training to all employees, including proper storage and transport of materials (e.g., petroleum products), the necessity for excluding livestock from operational areas, and emergency response;
    - Frequently conduct and maintain records on health and safety meetings;
    - Provide on-site access to medical personnel, supplies, communications, and vehicle transport in case of accidents;
    - Perform Occupational Health and Safety (OHS) Investigations, Incident Reports, Inspections, Audits, and compliance monitoring;
    - Provide monthly OHS statistical reports;
    - Establish and enforce an employee code of conduct as well as OHS policies and procedures; and
    - Compensate herders for accidental animal injuries or fatalities related to Project activities.
    - Provide a Grievance Mechanism for local residents of the Project area, conduct regular meetings with the Governor and other Soum representatives, provide updated information on the Project at regular intervals, and conduct regular meetings with local residents.

6.9 Archaeological, Historical and Cultural Resource Protection Measures

- WMMC will endeavor to eliminate or minimize impacts to archaeological sites during the Project development and operation. Should the Project disturb these areas, the appropriate regulators and/or institutes will be contacted in order to implement mitigation measures in accordance with local and national regulations. A cultural resources mitigation planning process is being engaged with MNE and the Institute of History of the Mongolian Academy of Sciences.
- To protect cultural resources, WMMC will:
    - Request the Institute of History of the Mongolian Academy of Science to identify and designate potentially sensitive areas within which particular care should be taken to avoid disturbance of valuable sites.

- Propose and enforce regulations prepared under the Mongolian Law on Protection of Cultural Heritage, which will ensure the proper protection of cultural and historic sites.
- Prepare documentation that no significant sites or artifacts would be disturbed prior to exploration or mining in a designated area.
- Implement a cultural resources management program.

6.10 Safety and Health Measures

A sound Health, Safety, and Environment (HSE) Program starts with the formation of a company HSE Policy. Such a policy formalizes the focus that HSE matters are important – and are an integral part of the company's goals. A key objective of an HSE policy is that there should be accountability for performance at each level of management and by the workers themselves. This goal can be achieved through training of management and the workforce in occupational health, safety and environmental matters. Development and adoption of safe work practices and procedures should be done; workforce health should be monitored on a regular basis with annual checkups; and, steps should be taken to make sure that working and living conditions at the mine site are healthy and safe. Key elements of the WMMC health and safety policy include:

- Provide a safe and healthy workplace for all employees including employees, contractors and visitors;
- Train and motivate all employees to work in a safe and responsible manner;
- Make health and safety a part of all business decisions;
- Integrate the highest safety standards through exploration, construction, operations and closure;
- Apply "best practices" to ensure that company's health and safety performance is recognized as a world leader;
- Comply with relevant legislation and exceed community expectations;
- Strive for continual improvement in the company's health and safety performance by setting and reviewing achievable targets;
- Hold all employees accountable for health and safety; and
- Ensure all employees understand that no task is so important that time cannot be taken to complete work safely.

Fulfillment of a company's HSE objectives starts by an effective employee selection and training procedure. In addition, contract terms for contractors must include environmental protection and accountability clauses. Having environmental protection clauses that contractors must adhere to will ensure that the company's policies will be followed. There should be ongoing visible management participation in the program to ensure that momentum is developed and maintained. At least one person, who has the necessary training and backing from the company to ensure that HSE policies are followed, shall be responsible

for mine occupational health and safety coordination. Hazards that cannot be eliminated and/or removed must be controlled. Emergency procedures to deal with injury, fire, rescue and other situations of risk must be developed and implemented. Proper reporting procedures must also be put in place.

WMMC will prepare and implement a set of Guidelines on Protection of Health and Safety at Work. For each job position, a Program of Safety at Work and a Program of Training at the Workplace will be developed. These programs will cover health, safety and environmental protection related to their duties.

The following safety practices will be adopted by WMMC and will be observed by all personnel, contractors, and visitors:

- All visitors will be escorted at all times and will receive a safety briefing before visiting the site.
- All personnel will wear hard-hats and steel-toe boots in the vicinity of the dredge and other operating machinery.
- There will be absolutely no smoking within the perimeter of the dredge, or within 200 m of fuel and lube storage facilities.
- There will be no drinking of alcoholic beverages while on duty. Personnel reporting to work intoxicated will be immediately fired and escorted from the site by security.
- There will be no burial of flammable or hazardous wastes.
- Safety rules will be posted and prominently displayed at all Project work areas.

6.11 General Safety Features

General safety features will be incorporated into the construction and operation of all facilities at the Project site. The company will ensure that protective gear and special work clothes (if needed) will be provided, and that the gear will be cleaned and repaired when necessary, following the stipulations in the Mongolian Law on Labor. Specific safety and health measures are presented in detail in the **SEMMP**.

7.0 Net Environmental Impacts

The predicted net environmental impacts for the Project presented in this section are based on an impact analysis conducted for this SEIA with the following assumptions.

- Mongolian laws and regulations applicable to the Project will be complied with in the design, construction, operation and closure of the Project;
- Internationally recognized criteria and standards (e.g., OPIC, IFC Performance Standards, Equator Principles, International Council on Mining and Metals [ICMM], World Health Organization [WHO], etc.) will be adopted in the design, construction, operation and closure phases of the Project;
- GIIPs, as defined by IFC, will be employed to minimize potential social and environmental impacts; and
- Proper mitigation measures will be implemented during all phases of the Project.

Many adverse effects that could occur from the Project will be eliminated or minimized by proper design, maintenance, management constraints, and mitigation measures. The net social and environmental analysis, presented in detail in **Part VI of this SEIA**, assumes that the social and environmental management, monitoring, and reclamation measures will be implemented as discussed in **Part V**, Proposed Prevention and Mitigation Measures, and the SEMMP.

Potential impacts to the environment from the Big Bend Placer Mining Project will be generally related to: (1) surface disturbance (i.e., excavations, removal of vegetation, and displacement of soil and placer deposits); (2) air emissions from the dredges and mobile equipment; and, (3) by disposal of sewage, greywater, and solid wastes.

Surface disturbances will be related primarily to removal of overburden and placers from alluvial mining operations, and disposal of tailings. Additional surface disturbances will be related to construction of a few short access roads, on-site electric power lines and the mine camp infrastructure.

The following emissions, discharges and wastes will be generated as a result of Project development. Air emissions will result from the diesel-powered cutter suction dredges, excavators, bulldozers, trucks and vehicles and backup diesel generators. Liquid effluent sources from the Project operations will include sewerage and greywater from the mine camp and operations. All water from the placer processing (physical separation) will be recycled, hence no discharge is anticipated. The major solid waste sources will be construction wastes (e.g., wood and metal scrap, packaging); domestic wastes (e.g., putrescent wastes, plastic,

glass, paper). The Project will generate a limited amount of hazardous wastes (i.e., batteries, spent oil, used lubricants, paint, etc.). Hazardous wastes will be properly segregated, labeled and stored in a properly secured location. There are no public or private hazardous waste disposal facilities in Mongolia. Hazardous materials will be stored, then disposed of by incineration as may be permissible under Mongolian Law on-site, or transported to a future site for permissible disposal. Some potential may exist for disposal of hazardous wastes in high temperature kilns, asphalt and/or paving plants, power plants, boilers, or other facilities as may be in alignment with international best practices and approved by Mongolian authorities.

Table I-5 summarizes the potential net social and environmental impacts of the Project. Net impacts were calculated based on worst-case impact scenarios (i.e., gross impacts), minus the effects of all proposed prevention and mitigation measures. This provides an estimate of the net impacts, both short and long term, that can be anticipated as a result of Project operations. The net impact analysis table is not intended to provide a comprehensive list of all possible impacts, but is designed to highlight those risks and associated impacts that could potentially occur.

This analysis indicates that implementation of the social and environmental management, mitigation, monitoring, and reclamation measures that have been proposed by WMMC, and employment of GIIP that WMMC has committed to, will eliminate or minimize the potential negative social and environmental impacts of the Project; and, will provide economic and social benefits to the region.

Table I-4 Summary of Net Social and Environmental Impacts from the Project

Environmental Parameter	Potential Gross Impacts	Mitigation Measures	Potential Net Impacts
Topography and Landscape	Excavation of overburden and placer; disposal of overburden and tailings; and new landforms created (ponds and small islands); Topsoil stockpiling. Construction of new roads and field camp. .	Concurrent reclamation of disturbed areas, including overburden and tailings; recontouring of dredge ponds and creation of wetlands for enhanced wildlife habitat; use of geotextile when grade >20 percent; and re-vegetation to stabilize new landforms. Utilize existing field camps and roads.	Short-term changes can be significant with newly constructed ponds, topsoil / overburden stockpiles, mine camp and other facilities brought to the site. Long-term changes in topography and landforms with net beneficial habitat for wildlife, especially riparian, wetlands and open water habitats.
Air Quality	Fugitive dust from roads, camps and other disturbed areas;. Gaseous emissions of SO_X, NO_X, CO, soot, hydrocarbons from diesel engine dredges and vehicles.	Implementation of fugitive dust control (water spraying) as needed. Routine maintenance of equipment.	Short-term: slight increases in dust. Long-term: no significant impacts from dust. No significant impact from gaseous emissions.
Surface Water	Increased sedimentation in the Tuul River from dredging operations. Contamination with polluted (diesel fuel, oil) surface runoff. Contamination with improperly treated sewage.	Dredge ponds isolated from Tuul River by protected embankment, concurrent reclamation of dredged materials; Secondary containment of all fuel storage facilities and SPCC program. Mine camp sewage treated in engineered septic system.	No significant negative impacts anticipated. Increased wetland and open water habitats due to advanced reclamation.
Groundwater	Depletion of groundwater if wells used for water supply for dredge ponds. Contamination from fuel / lubricant spills. Contamination from sewage.	Monitor cone of depression from groundwater wells. Fuel storage areas have secondary containment and lined bottom to protect groundwater;\. SPCC program. Mine camp sewage treated in engineered septic system.	No significant impacts anticipated.

Environmental Parameter	Potential Gross Impacts	Mitigation Measures	Potential Net Impacts
Soils	Large areas/volumes of soils removed during mining. Erosion.	Strip topsoil and stockpile, for use in reclamation. Erosion and sediment control plan. Reclamation of soils / overburden while mining progresses (concurrent reclamation) with re-use of topsoil.	Short-term: significant direct impact from soil displacement. Long-term: no significant impact due to restoration.
Vegetation	Direct vegetation removal from riparian areas that are mined.	Revegetation of disturbed areas; sprigging of willows along margins of dredge ponds. Decrease or eliminate grazing.	Short-term: significant impact to vegetation from removal. Long-term: no significant impacts; positive net gain in riparian and wetland vegetation due to an increase in wetland and aquatic habitat from reclaimed dredge ponds, improved upland habitat
Wildlife	Removal of some riparian and grassland habitat. Displacement and destruction of some species of terrestrial wildlife.	Plan operations to minimize impacts to terrestrial species. Reclamation and revegetation of disturbed habitats. Reduction of grazing pressure..	Short-term: possible reduction in some terrestrial wildlife populations in areas of disturbance. Long-term: no significant impacts; net positive impact for wetland wildlife due to an increase in habitat from the reclaimed dredge ponds. Improved upland habitats, increased productivity.
Aquatic Ecology	Indirect impacts of increase sediment on aquatic life populations.	Erosion and sediment control program to eliminate sediment inputs to the Tuul River. Concurrent reclamation of overburden and tailing to prevent sedimentation to the Tuul River. No discharge of process water to the Tuul River (it will be recycled).	No significant impact. net positive impact for aquatic species due to an increase in habitat from the reclaimed dredge ponds.

Environmental Parameter	Potential Gross Impacts	Mitigation Measures	Potential Net Impacts
Socioeconomic Conditions	Increased employment opportunities. Purchase and/or utilization of Mongolian supplies, equipment, and services. Increased tax base. Land improvements. Social program and budgetary contributions. Decreased grazing area. Short-term increased land disturbance. Short-term increased health and safety risk.	Negotiated monetary compensation and careful relocation planning for impacted herders; and continued land-use payments to the soum governors. Reclamation/revegetation of disturbed habitats while mining progresses. Employee safety training; on-site access to medical personnel, supplies, communications, and vehicle transport in case of an accident; and compensation for accidental animal injuries or fatalities related to Project activities.	Short-term: Increased job availability; increased tax revenues; improved medical services; no significant impact to herders; increased land disturbance. Long-term: Promotion and protection of biodiversity; increased wildlife habitat.
Archaeological Resources	Disturbance of archaeological site(s) in the proposed mining area.	Cultural Resources Management Plan.	Excavation of archaeological site(s) and analysis/curate in Mongolian museum. Improve anthropological understanding of the project region.

Part II: Legal and Administrative Framework

This section presents the legal and administrative framework that applies to the Big Bend Placer Gold Mining Project. The Mongolian environmental legal framework is briefly discussed as well as various international standards, such as the policies of the Overseas Private Investment Corporation (OPIC), the International Finance Corporation's (IFC) Performance Standards and the Equator Principles. This Social and Environmental Impact Assessment (SEIA) was prepared as part of the OPIC financing requirements for the Project. Under current OPIC guidelines, this is a Category A project; and, an SEIA document must be prepared to determine the potential impacts of the Project on the existing environment. The SEIA is coupled to a Social and Environmental Management and Monitoring Program (SEMMP).

Prior to commencing placer mining activities, various environmental permits and documents will be obtained and/or submitted with the appropriate Mongolian authorities, such as:

- submission of a detailed Mine Plan in support of the Mining License applications to the Minerals and Oil Authority;
- submission of a detailed EIA to the Ministry of Nature and Environment (MNE) prepared by a consultancy approved by MNE in support of the Mining License applications; and
- consultations with local administrators in the Buregkhangai Soum and Zaamar Soum, Environmental Inspectors and other stakeholders.

The Project proponent fully intends to follow Mongolian environmental regulations and international guidelines that apply to the Project. Mitigation plans will minimize Project impacts; and, regular monitoring activities will provide compliance data to compare with the guidelines and regulations. The SEMMP describes the management and monitoring measures that will be implemented to ensure compliance with all standards applicable to the Project.

1.0 Mongolian Legal and Institutional Framework

A summary and overview of the Mongolian legal and institutional framework under which the Project will be developed is discussed in the following. This framework governs exploration, design, construction, operation and closure activities of the Project; and, it is based on numerous environmental, mining and commercial laws, regulations, decrees and resolutions as well as the Constitution of the Republic of Mongolia. Additionally, international environmental agreements have been ratified by the Mongolian government.

The Project is subject to a complex regulatory environment and involves a diverse range of activities. The Project area is subject to a number of regulatory entities, such as MNE and the Ministry of Mining and Energy.

The following provides a general overview of the Mongolian government as well as the constitutional context, legal framework and procedural outline in which the Project will operate. This is followed by a listing and analysis of key laws, regulations and decrees that are most relevant to specific Project activities.

1.1 Mongolian Government Background

Despite its long, rich history dating back thousands of years, Mongolia has only recently established its current government. Largely inspired by the reforms of the Soviet Union and Eastern Europe in the late 1980s, Mongolia experienced a revolution in 1990 that shifted the government from a 70-year period of socialism to the present-day democracy.

In July of 1990, Mongolia held its first free general election and became a parliamentary republic. On February 12th of 1992, a new Constitution was adopted that:

- established Mongolia as an independent, sovereign republic;
- guaranteed individual rights and freedoms;
- restructured the legislative branch, creating the State Great Khural; and
- changed the presidential election from legislative vote to popular vote.

Since 1990, Mongolians have exercised democratic voting in five successive general elections for the State Great Khural (1992, 1996, 2000, 2004, 2008) and elections for President (1993, 1997, 2001, 2005). The country continues transitioning to a more industrialized nation with a self-sustaining economy, a political system based on democratic values, and a cultural and spiritual society. Reforms (e.g., social, economic) are still occurring. The latest general election (July 2008) was marred by violence and claims of wrongdoing, followed by a state of emergency in the capital, Ulaanbaatar.

1.2 Mongolian Government Overview

The Republic of Mongolia has four bodies of government:

- the State Great Khural;
- the President;
- the Government; and,
- the Judiciary.

These bodies of government as well as the Mongolian administrative system are discussed below.

1.2.1 State Great Khural

According to the 1992 Constitution, "The State Great Khural is the highest branch of State power, and legislative power shall be vested solely therein." Acting as a unicameral parliament, the 76-member State Great Khural represents Mongolia's 26 constituencies and is headed by the Speaker. Each member is elected for a term of four years by proportional representation, validating the election only if at least 50-percent of the electorate vote.

The State Great Khural is responsible for:

- electing the Speaker and Deputy Speaker;
- passing and amending laws in conjunction with the Government;
- determining domestic and foreign policy;
- ratifying international agreements;
- declaring a state of emergency;
- approving the national budget;
- validating the election, and recognizing the powers, of the President;
- appointing, replacing or removing the Prime Minister or government member;
- appointing the members of the Cabinet Ministry;
- defining national borders; and,
- declaring a state of war.

The State Great Khural is organized into eleven Standing Committees:

- Budget;
- Development of Information Communication Technology;
- Economy;
- Education, Culture, and Science;
- Environment and Rural Development;
- Food and Agriculture;
- Infrastructure;
- Law;
- Security and Foreign Policy;
- Social Policy; and,
- State Structure.

1.2.2 President

The President acts as the Head of State and has the ceremonial role of embodying the unity of the people. The President is elected directly by the public for a four-year term and is limited to two terms. Among other powers, the President:

- serves as the Armed Forces Commander-in-Chief;
- chairs the National Security Council;
- issues decrees in conformity with the law;
- may wholly or partially veto legislation of the State Great Khural (who may then overrule the veto by a two-thirds majority);
- nominates a candidate for Prime Minister in consultation with the majority party (who is then approved or rejected by the State Great Khural);
- approves judicial appointments;
- represents Mongolia in foreign affairs;
- signs international treaties in consultation with the State Great Khural;
- appoints and recall heads of plenipotentiary missions in consultation with the State Great Khural;
- confers state titles, military ranks, orders and medals;
- grants pardons; and,
- declares a state of emergency or a state of war with the approval of the State Great Khural.

1.2.3 Government

The Constitution notes that, "The Government is the highest executive body of the State." The Government comprises the Prime Minister, the First Deputy Premier, the Deputy Premier, the Cabinet Secretariat of Government, and 11 Ministers as of September 2008, when the State Great Khural approved a new Government. In addition, the Government has 34 regulatory and enforcement agencies, which are listed in **Table II-1** below, to formulate and implement national policies.

As noted above, the Prime Minister is appointed by the State Great Khural and heads the Cabinet, which currently comprises 11 Ministers. The Cabinet is nominated by the Prime Minister, in consultation with the President, and confirmed by the State Great Khural.

Table II-1 Government and Regulatory and Enforcement Agencies

PRIME MINISTER
- Open Government
- Central Intelligence Agency
- State Property Committee
- Information Communication Technology Agency
- Communications Regulatory Committee

FIRST DEPUTY PREMIER
- Intellectual Property Office
- Center for Standardization and Measurement
- Unfair Competition Regulatory Authority

DEPUTY PREMIER OF MONGOLIA
- National Authority for Children
- State Professional Inspection Agency
- National Emergency Management Agency

CABINET SECRETARIAT OF GOVERNMENT
- Management Academy
- State and Governmental Service Agency

MINISTRY OF DEFENSE
- General Staff of the Mongolian Armed Forces

MINISTRY OF EDUCATION, CULTURE AND SCIENCE

MINISTRY OF FINANCE
- Mongolian Tax Administration
- General Customs Office

MINISTRY OF FOOD, AGRICULTURE AND LIGHT INDUSTRY

MINISTRY OF FOREIGN RELATIONS
- Department of Service for Diplomatic Corps of Ministry of Foreign Relations

MINISTRY OF HEALTH
- Mongolian State Committee of Physical Culture and Sports

MINISTRY OF JUSTICE AND INTERNAL AFFAIRS
- General Police Department
- General Authority for Border Protection
- State Center for Civil Registration and Information
- General Authority for Implementing Court Decisions
- National Archives

MINISTRY OF MINING AND ENERGY
- Foreign Investment Agency
- Mineral Resources and Petroleum Authority

MINISTRY OF NATURE AND ENVIRONMENT
- National Agency of Meteorology, Hydrology, and Environmental Monitoring
- Water Authority

MINISTRY OF INFRASTRUCTURE AND URBAN DEVELOPMENT
- Administration of Land Affairs, Geodesy and Cartography
- National Center of Construction, Urban Development and Public Utilities
- Civil Aviation Authority
- Railway Authority
- Transport Service Center

MINISTRY OF SOCIAL WELFARE AND LABOR
- General Authority for Social Insurance
- Labor and Welfare Service Agency

1.2.4 Judiciary

Independent of other bodies of government, the courts alone wield judicial power in Mongolia. The judicial system comprises the following 61 courts:

- 1 Supreme Court;
- 22 Aimag and Capital Courts;
- 30 Soum and Intersoum Courts; and
- 8 District Courts.

In addition, a special court may be established for criminal and civil cases and administrative affairs.

In 1998, the State Great Khural passed the Legal Reform Program to: develop a humane, civil, democratic society; define basic guidelines of State organizations and officers at all levels; and create a legal framework and favorable environment to ensure political, social and economic development and progress in compliance with the principles and concepts of the Constitution. The State Great Khural also passed a law on the courts to reform the judiciary system and structure.

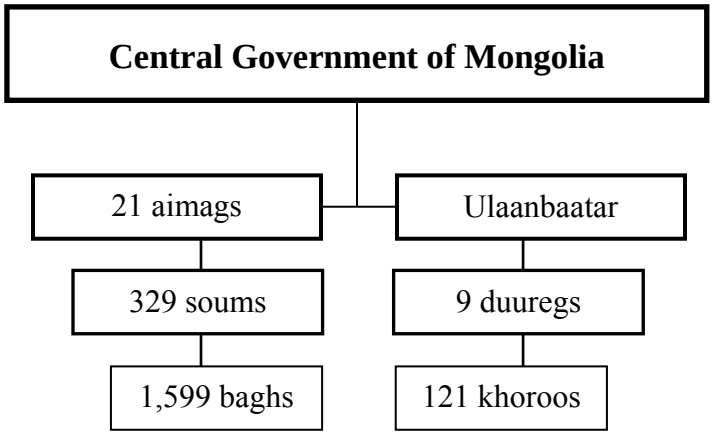
1.2.5 Administration System

According to the Constitution, "Governance of administrative and territorial units shall be organized in a combination of the principles of self government and central government." With self government, citizens directly and indirectly decide about all matters affecting their livelihoods through representative bodies, upholding the Constitution, the Law on Governance of Administrative and Territorial Units, and other related legislation.

1.2.5.1 Self Government

Mongolia has three levels of administration, comprising six types of units (**Figure II-1**). The country is divided into 22 major administrative units (**Figure II-2**): Ulaanbaatar (Capital of Mongolia) and 21 aimags (provinces). Ulaanbaatar has nine duuregs (districts) and 121 khoroos (sub-districts). Aimags are subdivided into soums, which are subdivided into baghs. Mongolia has 329 soums and 1,599 baghs (Montsame News Agency, 2008).

Figure II-1 Mongolian Administrative Units



ADMINISTRATIVE DIVISION OF MONGOLIA

R U S S I A

C H I N A

H O V D

U V S

H O V S G O L

B U L G A N

S E L E N G E

B A Y A N - O L G I Y

Z A V H A N

A R H A N G A Y

D A R K H A N - U U L

H E N T I Y

D O R N O D

G O V I - A L T A Y

O V O R H A N G A Y

D U N D G O V I

S U H B A A T A R

B A Y A N H O N G O R

D O R N O G O V I

O M N O G O V I

H

I

N

L E G E N D

ULAANBAATAR Capital city	
Centre of aymag	Centre of bag
Centre of sum	Other settlements
HOVD Name of the aymag	Boundary of state
MANDALGOW Name of the center aymag	Boundary of aymag
TES Name of the sum	Boundary of sum
Ulaan-Uul Name of the center sum	Railway
Name of the other settlements	State road

Scale 1:2 000 000

MINING
WM Mining Company, LLC

AATA INTERNATIONAL, INC.
Denver, Colorado, USA

Baseline Environmental, Socio-economic, and Community Studies for the Big Bend Project, Mongolia

FIGURE II-2
Administrative Units Map of Mongolia

Source: Gazryn Zurag, 2008b

Drawn By: EJS

Issued/Revised: 10.02.08

Legend

★ Project Area

Administrative functions are assumed by khurals (assemblies) and general citizen committees. Ulaanbaatar, aimags, soums, and duuregs are governed by khurals, comprising voter representatives. The Ulaanbaatar khural and the aimag khurals comprise five to nine members. Khurals decide on issues not addressed by higher khurals or other organizations within their administrative boundaries. Baghs and khoroos hold general citizen meetings with a three-to-five-member committee, including a chairman and a secretary. Khural meetings are typically held once each year, whereas bagh and khoroos meetings are convened up to twice each year.

Each aimag has as much as 27 soums, including an aimag center. Aimag centers serve as local administrative seats. Legal bodies, hospitals, businesses, schools, factories and theatres are situated in aimag centers. In contrast to the industrial and commercial aimag centers, baghs tend to focus on agriculture and animal husbandry.

1.2.5.2 Central Government

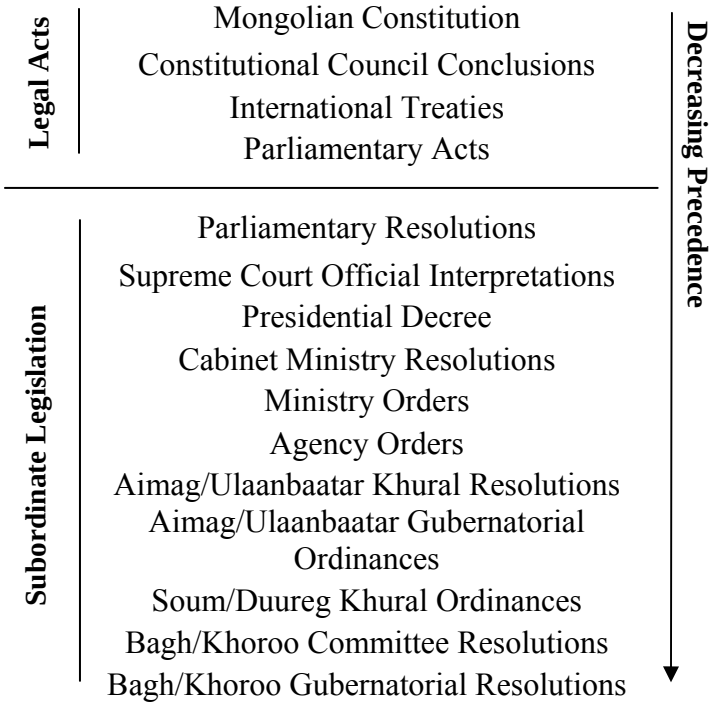
Zasag Dargas (governors) exercise State power in each administrative unit. Zasag Darga candidates are nominated by their respective administrative unit. The Prime Minister appoints the Ulaanbaatar and aimag Zasag Dargas, who appoint the soum and duureg Zasag Dargas, who appoint the bagh and khoroo Zasag Dargas. Each Zasag Darga serves a four-year term.

1.3 Mongolian Hierarchy of Law

The legislative branch of government promulgates laws and regulations. Like many other countries, laws or legal acts in Mongolia may be issued by standard legislative bodies as well as other public bodies at all levels of the government. The State Great Khural develops a comprehensive legal framework for the whole country, leaving other public authorities to develop the regulatory details of implementation and enforcement. For example, an executive branch may produce certain types of legislation in order to carry out its responsibility to implement the laws. These government entities include the President, the Cabinet Ministry, the various Ministries and their Agencies, and Governors at all levels. The types of legislation promulgated include, but are not limited to: Parliamentary Acts, Parliamentary Resolutions, Judicial Decisions of the Supreme Court, Presidential Decrees, Cabinet Ministry Resolutions, Ministry Orders, Agency Orders, Khural Resolutions, Gubernatorial Ordinances, Khural Ordinances, Committee Resolutions and Gubernatorial Resolutions.

These various types of legislation may be applied to manage the use and conservation of Mongolian natural resources and environment. **Figure II-3** presents the basic hierarchy of law.

Figure II-3 Basic Hierarchy of Law in Mongolia



Source: Wingard and Odgerel, 2001

1.4 Legal Framework of Mongolia

Due to the frequent change in the composition and number of the ministries with the restructuring of the government, Mongolian laws do not refer to a specific ministry but instead to a "State Administration Central Organization" (SACO) responsible for a certain subject matter. For example, the Law on Environmental Impact Assessments, which is applicable to the Project, refers to the SACO in charge of special protected areas, while most other environmental laws refer to the SACO in charge of nature and environment; however, both of these are references to MNE.

1.4.1 State Great Khural

The State Great Khural enacts legislation in the form of Parliamentary Acts, which are used to prescribe forms of conduct, define crimes, create and delegate responsibilities to lesser governmental bodies, appropriate public monies and generally promote the public good and welfare. **Table II-2** presents the acts related to the environment.

Table II-2 Environmental Laws of Mongolia

Resource Type	Law and Year Enacted
Air	Air Law, 1995 Meteorological and Hydrological Monitoring Law, 1997
Chemicals and Waste	Toxic and Hazardous Chemicals Law, 1995, 2006 Law on the Import, Export, and Cross-Border Transport of Hazardous Wastes, 2000 Municipal and Industrial Waste Law, 2004
Environment	Environmental Protection Law, 1995, amended in 2005 Environmental Impact Assessment Law, 1998 Law on Reinvestment of Natural Resource Use Fees for the Protection of the Environment and Natural Resource Restoration, 2000
Forest Resources	(Forest Law, 1995) Forestry Law, 2007 Law on Fees for Timber and Firewood Harvesting, 1995 Law on Prevention of Steppe and Forest Fires, 1996
Land Resources	Land Law, 1995, 2003 Land Fees Law, 1997 Geodesy and Topography Law, 1997 Cadastral Survey and Land Registration Law, 1999 Mongolian Citizens' Land Ownership Law, 2003, amended in 2008
Minerals, Oil and Gas	Subsoil Law, 1989 Petroleum Law, 1991, 1997 Mineral Resources Law, 1997, 2006
National Park Resources	Special Protected Areas Law, 1995 Buffer Zone Law, 1997
Plant Resources	Natural Plants Law, 1995 Law on Natural Plants Use Fees, 1995 Natural Plants Protection Law, 1996
Water Resources	Water Law, 1995, 2004 Law on Water and Mineral Water Use Fees, 1995
Wildlife Resources	Hunting Law, 1995, 2000, 2003 Law on Hunting Resource Use Payments and on Hunting and Trapping Authorization Fees, 1995 Fauna Law, 2000 Law on Foreign Trade of Endangered Fauna and Flora, 2002

Other laws that may affect the Project include:

- the Law on Protection of Livestock Genetics and Health (1994);
- the Law on Culture of Mongolia (1996);
- the Law on Protection of the Cultural Heritage (2001);
- the Law on Windfall Tax (2006); and,
- the Anti-Corruption Law (2006).

The State Great Khural may also produce legislation as Parliamentary Resolutions. These may regulate organizational issues, one-time orders or implement matters for the Cabinet Ministry and other organizations. An example would be Resolution No. 83 in November 12, 1993, which established several protected areas (Uvs Nuur [Lake] Strictly Protected Area, Gobi Gurvan Saikhan National Park, Gorkhi-Terelj National Park, Ugtam Nature Reserve, Sharga-Mankhan Nature Reserve and Ganga Nuur National Monument).

1.4.2 Government

The Cabinet Ministry is responsible for developing and coordinating the implementation of national policies and regulations as well as tasks, such as: regulating the use of rare plant and animal species; prohibiting the exploitation of very rare plant and animal species; setting protected area boundaries; and, restricting by law the use, import and export of natural resources.

These ministries and agencies are responsible for matters relating to environmental management:

1. Deputy Premier
   (a) State Professional Inspection Agency
2. Ministry of Mining and Energy
   (a) Foreign Investment Agency
   (b) Mineral Resources and Petroleum Authority
3. Ministry of Nature and Environment
   (a) National Agency of Meteorology, Hydrology, and Environmental Monitoring
   (b) Water Authority

1.4.2.1 Ministry of Nature and Environment

MNE is responsible for the development and enforcement of the Cabinet Ministry's environmental policies and laws, which includes, but is not limited to: implementing environmental protection legislation and stopping violations; maintaining the "Red Book" of Mongolia; organizing environmental surveys on natural conditions and environmental pollution; and, providing businesses and

other organizations with necessary information about nature and the environment. The following is a detailed description of the responsibilities of MNE (Dallas, 1999):

- Establish a policy on environmental protection (the rational use, reclamation, safety, and balance of natural resources as well as implementation of preventative measures to limit adverse impacts to nature and the environment);
- Provide for the implementation of environmental protection legislation and stop violations thereof;
- Organize and evaluate surveys of climatology, hydrology, land use, wildlife (i.e., flora and fauna), pollution, and changes to the environment to provide businesses, organizations and the public with information about nature and the environment;
- Maintain current databases concerning estimates and studies about soil, mineral wealth and other resources, such as forests, water, air, flora and fauna;
- Manage natural resource conservation and reclamation programs implemented by the government;
- Establish and approve, in collaboration with other authorities, general rules for the use, exploitation, and control of natural resources;
- Restrict the use of certain natural resources;
- Coordinate research and development for environmental protection;
- Provide citizens with environmental information;
- Provide methodological assistance to local authorities on environmental protection;
- Monitor the implementation of environmental legislation; and
- Oversee mitigation of environmental impacts incurred from regulatory violation(s).

In addition to the three agencies listed above, MNE also consists of five departments:

1. Strategic Planning and Management Department
2. State Administration Department
3. Information Monitoring and Evaluation Department
4. Policy Implementation and Coordination Department
5. Division for International Cooperation

Other ministries and agencies that indirectly impact environmental matters include the: State Customs Agency, Police Department, State Border Patrol and the Ministry of Health.

1.4.3 Judiciary

Similar to the other bodies of government, the judiciary has recently been reformed. The judiciary has a new role and faces an extreme challenge as the amount of promulgated legislation is quite large. The Mongolian court system consists of trial courts, courts of appeal and the Supreme Court (which is the ultimate judicial review level for all legal disputes not related to constitutional questions). The trial courts are the lowest level of courts in Mongolia. Trial courts typically have first instance jurisdiction over compliance with environmental law. An aimag court or the Ulaanbaatar Court has first instance jurisdiction for disputes involving more than ten million MNT. The legal system is such that any rulings, arguments or standards applied in cases are not considered for similar subsequent cases.

Environmental law generally does not establish specific citizen rights, although the Constitution is clear that citizens have the right to live in a clean and healthy environment.

1.4.4 Administration System

As previously discussed, the country is divided into administrative divisions. These divisions result in a physical division of executive authority. Although MNE has the power and responsibility to implement environmental legislation, in reality, the lower level governmental authorities implement and enforce the legislation. By law, local governments are required to: set water protection zones, hunting reserves, and plant protection zones; negotiate land use and land possession contracts; and compile primary data for natural resource management. In contrast, MNE is focused on policy development and implementation oversight, and, except for management of protected areas, ministry employees are not concerned with the day-to-day execution of the law. Effectively, the responsibility to carry out the regulatory directives falls to the aimag, soum and bagh governors with support from khurals, committees, and expert organizations (where indicated). For the Project, the Tov and Bulgan Aimags and the Zaamar and Burekhangai Soums may have these responsibilities. Only 30 to 40 percent of the funding needed for these efforts comes from the central government; the remainder comes from local sources of income, such as taxes, fines and penalties for violations and sale of natural resources. However, almost none of the local governments are truly able to cover the funding gap.

At the local government level, the professional inspection office (aimag) and an environmental inspector (in certain soums) have responsibilities related to environmental matters. Aimag governors have the following environmental responsibilities, relevant to this SEIA (Dallas, 1999):

- Develop environmental protection measures.
- Transmit ecological information to MNE.
- Coordinate activities with local environmental organizations.
- Equip the chief inspector with the necessary tools and transportation.

The following lists environmental responsibilities of the aimag and soum khurals (Dallas, 1999).

- Aimag Khural:
  - Set maximum limits for the use of natural resources in local areas.
  - Make decisions on the status of local protected areas.
  - Establish special protected area boundaries.
  - Define protection status and procedures.

- Soum Khura:l
  - Approve environmental measures.
  - Oversee the implementation of environmental monitoring.
  - Determine the annual limits on natural resources use.

1.5 Legal Compliance and Enforcement

According to the World Bank, few operations in the Zaamar Goldfield actually follow the environmental regulations of Mongolia (Dallas, 1999). As such, the regulatory sanctions are not a deterrent to poor development and operating practices (Dallas, 1999).

1.5.1 Administrative and Criminal Liability

Environmental laws are usually divided into several chapters, containing the required subject matters such as: a statement of purpose; rights and responsibilities of various parties; specific terms and conditions/ permissions/ prohibitions; and, a section on civil and criminal liability. Determination of liability is an essential component of any legal system and this differs in every country. In Mongolia, the primary form is by the imposition of administrative penalties. National laws establish the relatively precise amounts for administrative liability by setting a monetary range; and, the exact amount is determined by the authorized State Inspector or Judge when imposing the penalty. Repeated violations may result in the application of criminal sanctions and, in some laws, violators are also required to compensate the State or other private entities for the damages caused by their conduct.

1.5.2 Environmental Law Litigation

Mongolian citizens are granted a list of rights for protection of the environment, starting with the Mongolian Constitution. A number of environmental laws contain provisions on disputes. Generally, disputes involving contracts (outside of land use or ownership contract disputes with the government) are settled by the issuing Governor; appeals may be taken to the next higher level Governor and then may go to court. Complaints involving resource use fees other than land use fees are made to the same level tax office. Complaints against citizens that involve money damages may go directly to court.

1.5.3 Enforcement

Monitoring and enforcement of environmental practices is governed in Chapter 5, Articles 26 to 29 of the Mongolian Law on Environmental Protection. MNE is responsible for establishing the methodologies and implementation at the State and local levels. Different levels of inspectors are established to conduct monitoring and enforcement activities:

- State General Environmental Inspector.
- State Senior Environmental Inspectors of Environmental Protection Agency-8 persons.
- State Senior Environmental Inspectors of The Professional Inspection Agencies under aimag (administrative unit-province, there are 22 aimags in Mongolia) and city Governors-22 persons.
- State Environmental Inspectors of The Professional Inspection Agencies under aimag. And city Governors-48 persons.
- State Environmental Inspectors of Soums (administrative unit smaller, there are 400 soums in Mongolia) and Strictly Protected Areas-374 persons.
- Rangers-508 persons.
- Environment volunteer-122 persons.

There are 579 State Inspectors throughout the country, 458 salaried Rangers and 759 voluntary Rangers. MNE may delegate inspector powers to other inspectors responsible for state borders, customs, livestock, health services or mining (Wingard and Odgerel, 2001).

1.5.3.1 State Inspectors

State Inspectors are the primary enforcement arms in Mongolia. The Cabinet Ministry is responsible for appointing the State General Environmental Inspector based on the recommendation of the Minister of Environment. All other state inspectors, including the State Chief Inspector, are appointed by the Minister of

Environment without parliamentary review. Aimag and Ulaanbaatar governors are responsible for the appointment of the State Inspectors in the soum and duuregs, respectively, upon the recommendation of the State General Environmental Inspector. The four basic duties of the State Inspectors are (based on the Environmental Protection Law): monitoring; inspecting; collecting information; and, supervising and instructing rangers. The Environmental Protection Law establishes State Inspectors for each political subdivision, but their jurisdiction is not restricted to only that territory. Despite their wide powers, their enforcement powers remain limited and ill-defined. State Inspectors also do not have the power to arrest, although they are able to impose administrative penalties.

1.5.3.2 Rangers

Rangers are the other enforcement arm in Mongolia. The rights and obligations of rangers are contained in the provisions governing State Inspectors. The rangers also have the duty to monitor and may perform inspections and impose administrative penalties.

In addition to the governmental inspectors, the Environmental Protection Law also allows the private sector to assist in implementation of the laws by allowing them to request the authorities to prohibit actions that may harm the environment or prohibit the establishment of businesses that may potentially cause adverse impacts to the environment. Private citizens also have the right to present a claim against any person who has or may potentially impact the environment in an adverse manner. The establishment of non-governmental organizations (NGOs) is also permitted under law.

1.6 International Agreements

Mongolia has a long history of environmental protection. Almost a thousand years ago, laws for wildlife protection against abuse and overhunting were already in place. Now, Mongolia is also a participant in international environmental protection by its participation in various international treaties. The following are treaties that have been signed and ratified:

- Convention Concerning the Protection of the World Cultural and Natural Heritage (1990 acceptance and entry into force)
- United Nations Framework Convention on Climate Change (1992 signature, 1993 ratification, and 1994 entry into force)
- Convention on Biological Diversity (1992 signature and 1993 ratification and entry into force)
- Montreal Protocol on Substances that Deplete the Ozone Layer (1996 accession and entry into force)

- Vienna Convention for the Protection of the Ozone Layer (1996 accession and entry into force)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1996 accession and entry into force)
- International Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa (1994 signature and 1996 ratification and entry into force)
- Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (1997 accession and entry into force)
- Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat (1998 accession and entry into force)
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (1999 entry into force)
- Energy Charter Protocol on Energy Efficiency and related Environmental Aspects (1999 accession and 2000 entry into force)
- Energy Charter Treaty (1999 accession and 2000 entry into force)
- Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (2002 ratification and entry into force)
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2003 accession and entry into force)
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (1998 signature, 2001 ratification, and 2004 entry into force)
- Memorandum of Understanding Concerning Conservation Measures for the Siberian Crane (2004 signature and entry into force)
- Stockholm Convention on Persistent Organic Pollutants (2002 signature and 2004 ratification and entry into force)
- Kyoto Protocol to the United Nations Framework Convention on Climate Change (1999 accession and 2005 entry into force)

1.7 National Policies and Programs

In addition to participation in international conservation programs, the Mongolian government also has several national policies and programs for the conservation of the country's resources.

- National Program to Combat Desertification (1996)
- National Program on Biodiversity Conservation (1996)
- State Policy on the Environment (1997)
- National Program on Public Ecological Education (1997)

- National Program on Mongolian Sustainable Development (1998)
- National Program on Special Protected Areas (1998)
- National Program on Forests (1998, 2001)
- National Program on Environmental Public Awareness (1999)
- National Program on the Reduction of Natural Disasters (1999)
- National Program on Water (1999)
- National Program on Waste Reduction (1999)
- National Program on Air Protection (1999)
- National Program on Ozone Layer Protection (1999)
- National Program on Environmental Legal Reform (1999)
- National Program on Elk (2000)
- National Program on Climate Change (2000)
- National Program on Environmental Staffs (2000)
- National Program on Protection of Rare Plant Species (2000)
- National Program on Argali (Wild Sheep) (2002)
- National Program to Develop Quality Environmental Management Systems (2002)
- National Action Plan on Solid Waste Management (2002)
- National Program on Saker Falcon Conservation (2003)
- National Green Wall Program (2005)
- National Program on Environmental Health (2005)
- National Program on Snow Leopard Conservation (2005)
- MDG-Based National Development Integrated Policy (2008)

1.8 Mongolian Health, Safety and Environmental Laws

The Mongolian government has a centralized approach with regard to protection of nature and the environment, as well as the rational use of resources. This approach is implemented through annual, five-year and long-term plans and programs (Academy of Sciences MPR, 1990). In 1992, a new Constitution was enacted that guaranteed the right of all its citizens to live in a clean and healthy environment.

The Project will comply with applicable Mongolian health, safety and environmental laws, regulations and guidelines. MNE is responsible for the formulation and promotion of environmental policies, laws, procedures and conventions. It has a high level sectoral mandate to ensure that environmental concerns are incorporated in all growth and development.

1.8.1 Zoning

Zoning is a primary tool for land use and resource management. This method regulates what types of activities are permitted according to the zone designation such that the purpose of each zone is met.

Mongolia has different types of protected areas:

1. State Special Protected Areas (Mongolian Law on Special Protected Areas)
   (a) Strictly Protected Areas
   (b) National Parks
   (c) Nature Reserves
   (d) Monuments
2. Forest Zones
   (a) Strict Forest Zones
   (b) Protected Forest Zones
3. Water Zones
   (a) Protected Zones
   (b) Sanitary Zones
   (c) Community Protection Zones
4. Plant Protected Areas
   (a) Green zone
   (b) Riparian zone
   (c) Oases
   (d) Very rare animal habitat
   (e) Very rare plant habitat
   (f) Areas with degraded plant cover
   (g) Sand movement protected zones
   (h) Soil erosion strips

   These areas have not been officially mapped due to budget constraints.
5. Buffer Zones (Mongolian Law on Buffer Zones)
6. Hunting Zones

   The Law on Hunting grants soums and duuregs the right to establish hunting zones within their territory; but, in practice, this type of zone is reportedly not established or it is completely ignored. Consequently, hunting normally takes place wherever the animals happen to be.

Some areas were developed following international standards, for example, the State Special Protected Areas were developed according to the criteria of the International Union for Conservation and of Nature and Natural Resources (IUCN) and the United National Educational, Scientific and Cultural Organization (UNESCO) Man and the Biosphere Program (MAB). Others followed traditional environmental protection practices. Outside of the boundaries of the Special Protected areas, most zones are not yet officially mapped. Some zones are

established by law to be a specific distance from a certain point. For example, riparian zones are areas within a specified distance from a water body.

1.8.1.1 Protected Areas

Mongolia has one hunting reserve (Ar-Toul), 16 national conservation parks, six natural monuments, 16 nature reserves and 12 strictly protected areas (World Database on Protected Areas, 2007). **Table II-3** lists the different major protected areas in Mongolia. **Figure II-4** shows the spatial distribution of these areas. Other areas have been designated as wetlands of international importance, world heritage sites and biosphere reserves.

Currently, 11 areas have been designated as Ramsar sites for wetlands protection: Ayrag Nuur; Har Us Nuur National Park; Lake Achit and its surrounding wetlands; Lake Buir and its surrounding wetlands; Lake Ganga and its surrounding wetlands; Lake Uvs and its surrounding wetlands; Lakes in the Khurkh-Khuiten River Valley; Mongol Daguur; Ogii Nuur; Terihiyn Tsagaan Nuur; and the Valley of Lakes (Wetlands International, 2007).

Mongolia has two world heritage sites (UNESCO World Heritage Center, 2008). The Orkhon Valley Cultural Landscape was inscribed in 2004; and the Uvs Nuur Basin was designated in 2003.

Mongolia's six biosphere reserves are (UNESCO-MAB, 2007):

- the Great Gobi National Park (1990);
- the Boghd Khan Uul (1996);
- the Uvs Nuur Basin (1997);
- Hustai Nuruu (2002);
- Dornod Mongol (2005); and,
- Mongol Daguur (2007).

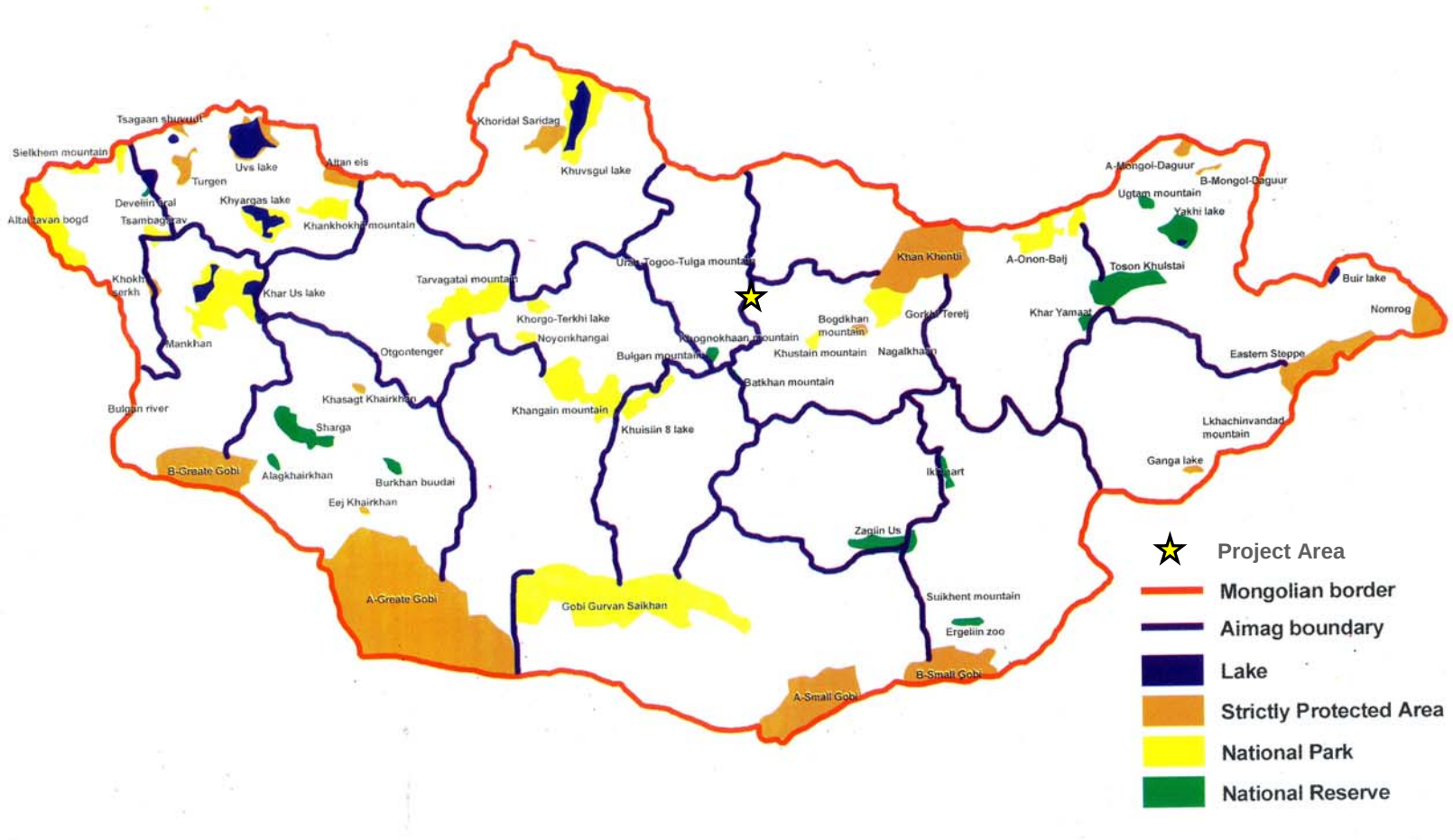
All of these protected areas are more than 100 km from the Project area.

Table II-3 Protected Areas of Mongolia, by Category

Strictly Protected Areas	National Conservation Parks	Nature Reserves	Natural Monuments
Bogdkhan Mountain	Altai Tavan Bogd	Alag Khairkhan	Bulgan Mountain
Eastern Mongolian Steppe	Gobi Gurvansaikhan	Batkhaan	Eej Khairkhan
Great Gobi	Gorkhi-Terelj	Bulgan River	Ganga Lake
Khan Khentee	Har Us Nuur	Burkhan Buudai	Khuisyn Naiman Lakes
Khasagt Khairkhan	Hustain Nuruu	Develyn Aral	Suikhent
Khoridal Saridag	Khan Khukhii-Khyragas Lake	Erglyn Zoo	Uran-Togco-Tulga Mountain
Khukh Serkhyn Nuruu	Khangai Nuruu	Ikh Nart	
Mongol Daguur	Khan-Khokhi Khyargas Mountain	Khar Yamaat	
Nomrog	Khorgo Terkh Zagaan Nuur	Khugnekhaan	
Otgontenger	Khovsgol Lake	Lkachinvandad	
Small Gobi	Noyonkhangai	Nagalkhaan Mountain	
Uvs Nuur Basin	Onon-Balj Basin A	Sharga-Mankhan	
	Onon-Balj Basin B	Toson Hulslai	
	Sylkhemyn Nuruu	Ugtam Mountain	
	Tarvagatain Nuruu	Yakhi Lake	
	Tsambagarav Mountain	Zagiin Us	

Sources: World Database on Protected Areas, 2007; UNESCO-MAB, 2007

Figure II-4 Protected Areas of Mongolia



Source: Montsame News Agency, 2008

Generally, Mongolian environmental laws permit and prohibit various activities depending on the type of resource and protected zone in which it is found. Some provisions apply to certain types of resources regardless of their location, such as the prohibition of the use of "Very Rare Plants" for any purposes other than scientific research. The primary focus of Mongolia's environmental laws is the prohibition of specific activities that are considered contrary to environmental conservation. Some of these prohibitions are very general (e.g., uses which pollute soil, air, or water) and others are specific (e.g., permanently altering a natural river channel).

The Law on Special Protected Areas (Article 29) provides authority for Soum Governors to designate certain parts of their territory as Special Protected Areas. In such events, it is prohibited (Article12) to explore for natural resources, mine and extract sand and stone. It is also prohibited to conduct any activities that pollute the soil, water and air. This authority was utilized with the passing of the "Resolution of the Zaamar Soum Residents' Representatives' Meeting," which decided that certain designated and listed areas within the mining area of the Zaamar Soum should be reserved as Local Special Protected Areas; and, ordered the Soum Governor to implement the Resolution. This was a manifestation of the dissatisfaction of the local people with the pace and extent of the mining development, although it is not clear to what extent this is allowed under the terms of the Mongolian Law on Special Protected Areas. This is an example of the determination of the local people to be heard (Dallas, 1999).

1.8.2 Protection of Flora and Fauna

Mongolian regulations on wildlife conservation are divided into two categories: hunting regulations and endangered species regulations. The Mongolian Law on Hunting (2003) regulates the hunting and trapping of game animals, as well as the proper use of their hunting reserves. Soum and duureg governors have the right to establish hunting reserves within their territories. Additionally, private parties have the right to lease land containing game animal habitat for the specific purpose of habitat conservation, commercial hunting and trapping, or the processing of animal parts derived from such activities. The Mongolian Law on Hunting also establishes hunting seasons, divides hunting purposes into three categories (industrial, household, and special purposes), and establishes hunting restrictions, such as control of firearms and ammunition, and prohibition of certain hunting methods or activities (Wingard and Odgerel, 2001).

The Mongolian Law on Fauna (2000) was promulgated to ensure adequate protection of faunal species, including those governed by the terms of the Mongolian Law on Hunting. This law classifies "Very Rare" and "Rare" animal species. However, many species that are considered endangered or threatened nationally or internationally are not listed as Very Rare or Rare under this regulation (some are listed under CITES, the Mongolian Redbook on Endangered Species and IUCN) (Wingard and Odgerel, 2001).

The Mongolian Law on Natural Plants (1995) was promulgated to regulate plant protection, restoration and proper use. Plants are classified according to their abundance and restorative capacity into the following categories: Very Rare, Rare, or Abundant. Governors and land users are required to implement and finance measures to protect plants from fire, disease, rodents, insects and negative anthropogenic impacts. This law also establishes plant protection zones to limit impacts from commercial activity (Wingard and Odgerel, 2001).

The purpose of the Mongolian Law on Forests (1995) is to manage the protection, proper use and regeneration of Mongolia's forests. Protection and conservation of forests lies with MNE while the commercial aspects are the responsibility of the Ministry of Mining and Energy. The Mongolian Law on Forests defines three zone categories: Strict, Protected, and Utilization Zones. Each zone has a separate protection regime, and any forest areas not specifically included in the first two classifications are defined as Utilization Zone forests. Forest zones require the implementation of fire, pest and disease protection programs and all local citizens are essentially community fire fighters (Wingard and Odgerel, 2001).

The Mongolian Law on Prevention of Steppe and Forest Fires (1996) was promulgated with the purpose of coordinating the prevention, suppression and restoration of forest and steppe fires. This legislation is especially important due to the recorded increase in forest fires between 1996 and 1999, in which more than 30 million hectares burned; this was more than the amount of forest area harvested in Mongolia over the last 65 years. Regeneration may take more than 200 years due to the short growing season and low growth capacity (Wingard and Odgerel, 2001).

1.8.3 Law on Land

In addition to classifying the various types of land (agriculture land, forest resources land, reserve land, etc.), the Mongolian Law on Land also has specific provisions that set land conservation requirements. The requirements are divided into categories, depending on the use, and include common requirements, sanitary requirements, pasture protection, and protection of hayfields and cultivated areas. Common requirements are to:

- preserve land characteristics and quality;
- prevent reduction of soil fertility;
- prevent overgrazing;
- prevent soil erosion and degradation;
- prevent soil saturation;
- prevent soil salinization;
- prevent soil pollution;
- immediately restore eroded or damaged land;

- prevent adverse impacts;
- preserve and protect land with forest groves; and
- preserve and protect land with rare and endangered animals and plants.

Sanitary requirements include financing for Environmental Impact Assessments (EIAs) prior to engaging in land projects or introducing technologies and chemicals that have not been previously tested in Mongolia. Land users are also prohibited from causing negative impacts to land possessed or used by others.

Specific requirements that apply to the Project include the requirement to reclaim, or to "immediately restore eroded and damaged land" (Article 49, Section 2), and "maintain and restore land changed due to tests, experiments and mineral exploration." Land users should "prevent adverse impacts to the environment and land due to use of the land, its resources and commonly distributed mineral resources." The Mongolian Law on Land also gives soum governors the authority to manage and protect pastureland thus involving them directly in the mining operation through the consequences of the substantial reduction of grazing area (Dallas, 1999).

1.8.4 Law on Toxic and Hazardous Chemicals

Besides laws on environmental and resource protection, Mongolia also has two laws that focus on pollution. One is the Mongolian Law on Protection from Toxic Chemicals. Regulation of chemicals is difficult due to special handling requirements and the predominant environmental problems related to the disposal and/or emission of chemicals into the air, soil and water. In addition, every year, new chemicals enter the market. Regulation of chemicals involves two tasks:

1. Gathering enough information about the chemical to make educated decisions for their use.
2. Establishing priorities for the regulation of chemicals. The first step should help identify priority chemicals, which are those chemicals that are more dangerous to the environment and human health.

The Mongolian Law on Protection from Toxic Chemicals was promulgated in 1995. This law focuses on establishing a framework with fixed regulatory functions. It defines "toxic chemicals" as those chemicals that have a toxic impact on humans, livestock, wild animals and the environment and further pose a risk of death or extinction. It indicates that chemicals with toxic effects that do not pose a risk of death will be excluded from the regulatory scheme. The Mongolian Law on Protection from Toxic Chemicals excludes radioactive, intoxicating and tranquilizing chemicals, and those used for household needs, food ingredients and medicine. Toxic chemicals are divided into three categories: Highly Toxic, Toxic, and Mildly Toxic. MNE and the Ministry of Health determine which chemicals

belong to each category. MNE has primary responsibility for the regulation of activities; and, is responsible for establishing a "non-staff" Toxic Chemicals Council for this purpose. Generally, the regulation of Highly Toxic chemicals is the responsibility of MNE, while Toxic and Mildly Toxic chemicals are managed by the local government.

1.8.5 Law on Air

The Mongolian Law on Air is the other Mongolian law that focuses on pollution. Air in urban areas has several primary pollutants that mix and convert into secondary contaminants, which are often more toxic. Examples of these contaminants include: sulfur and nitrogen dioxide (from power plants, industries, and incinerators), reactive hydrocarbons (from petrochemical plants, refineries, and vehicles), carbon monoxide (from vehicles), heavy metals (from vehicles, industries and metal smelters) and organic compounds (from the chemical industry). Secondary pollutants include sulfuric and nitric acid, ozone and photochemical oxidants.

The Mongolian Law on Air prohibits the pollution of urban air with "toxic and infectious substances and wastes with offensive odors;" requires EIAs prior to engaging in commercial activities that discharge polluting substances; and, further regulates five specific activities for air quality protection. These activities are: discharge and burning of wastes, construction activities, equipment emitting air pollutants, discharge of greenhouse gases and activities affecting the ozone layer.

1.8.6 Law on Environmental Protection

The Environmental Protection Law is the umbrella law for all environmental and natural resource laws in the country. This law is based on a number of principles as stated in the various chapters and provisions as follows:

1. Prevent adverse impacts.
2. Create favorable environmental conditions for human life, labor, and recreation.
3. Ensure the development of an ecologically sustainable economy.
4. Utilize natural wealth properly and through scientifically-sound means.
5. Promote public participation.

Other principles are inferred from the Environmental Protection Law provisions, the most important one being the principle of "polluter pays". This principle states that the individual who potentially pollutes or actually pollutes pays for the prevention and clean up. Therefore, polluters must compensate for, reclaim and restore environmental damages caused by the activity. However, the time frame

for this is not established, and neither are standards or a mandate for MNE to create one.

The purpose of this law, apart from requiring the preparation of EIAs, is "the regulation of the inter-relations between the State, citizens, economic entities and organizations in order to guarantee: the human right to live in a healthy and safe environment; an ecologically balanced social and economic development; the protection of the environment for present and future generations; the proper use of natural resources; and the restoration of natural resources." Its fundamental basis is the Constitution of Mongolia and it gives supremacy to any international treaties to which Mongolia is a signatory. Within the context of this SEIA, this includes the Selenge River International Agreement (Dallas, 1999).

About 210 rivers flow through Mongolia and to its neighboring countries, Russia and China (United Nations, 2006). As such, international agreements have been established to equitably utilize these transboundary waters. In 1974, Mongolia and the Former Union of Soviet Socialist Republics (USSR), signed the first international agreement on the protection of the Selenge River Basin, in which the Tuul River is located, and the use of this transboundary water resource. In 1995, an agreement was established between Mongolia and the Russian Federation. This second agreement focuses on more than 100 small rivers and streams in western Mongolia.

Under these agreements both parties cooperate on:

- the sustainable use of the Selenge waters;
- pollution control;
- flow regulation;
- research the hydrochemistry and aquatic biology;
- exchange of hydrologic information, including flood projections;
- recommendations on water quality standards;
- development of new technology to reduce negative impacts and flooding; and,
- monitoring of water quality to improve habitat for fish and other aquatic life.

The agreement is incorporated in Article 24 of the Mongolian Law on Water, which is discussed below.

In 1994, Mongolia and China signed an agreement to protect the transboundary water resources of: Lake Buir; the Kherlen, Bulgan and Khalkh Rivers; and, 87 small lakes and rivers located near the shared border.

1.8.7 Law on Water

The basic principle underlying water conservation is that private or government use that affects the quantity and or quality of water may not detract from the overriding public interest in its preservation. Mongolia applies two types of legal regimes to protect water resources:

1. Riparian rights: The land immediately adjacent to the water source is called the riparian zone. A number of zones have been established by Mongolian law at varying distances from water sources (20 to 500 meters), depending on the type of use and water source. Generally, riparian rights establish different rights and responsibilities for the proper use and protection of water, depending on type (natural streams, underground streams, lakes/ponds, and artificially created water courses) and use (natural, domestic and artificial).
2. Appropriation rights: This involves the appropriation of water use rights to individuals regardless of their location or proximity to the water source. The underlying principle is that water is a public resource and may be used by anyone subject to the constraints imposed for water conservation and preservation.

Regulation on water in Mongolia started in 1965, when the first law, the Law on Water Use, was promulgated. In 1974, the law was amended to include a requirement that expert organizations conduct a study and come to a conclusion prior to approval of water uses. As the law became more protection oriented, the name was changed to the Law on Water. The most recent version was enacted in 2004 and includes general provisions; the creation of a databank; the establishment of an institutional and managerial structure, the identification of protection measures; and, the use of water contracts and administrative penalties. This law refers to all water resources within Mongolia as the "water resources territory". This includes surface, ground and mineral waters. "Wetlands" are not specifically referred to as part of the water territory, but definitions of surface and ground waters potentially contain this concept.

One of the principal legal mechanisms in the Mongolian Law on Water is the establishment of three types of water protection zones: Protected, Sanitary and Community Protection Zones.

- Protected Zones: These zones are established with the purpose of preventing and reducing water pollution due to "economic activities". The boundaries are to be established by the local governors at all levels pursuant to research conducted by Certified Organizations, which would consider land, soil and rock formations.
- Sanitary Zones: These zones apply to settled areas to protect the local water supplies from livestock, wastewater from gers, and

other urban pollution sources. Sanitary zones are to be established not less than 100 meters from central water supply sources. Additional protection measures will be jointly determined by MNE and the Ministry of Health.

- Community Protection Zone: The aimag, Ulaanbaatar, soum and duureg khurals may establish these zones around local water sources which have "special ecological importance". The Mongolian Law on Water does not have procedural mechanisms or entity responsible for establishing these mechanisms.

These are essentially riparian zones set at varying distances, depending on the water type and use. MNE and the Ministry of Health are jointly responsible for the establishment of protection regimes for the first two zones. No lead ministry is established in the law. To date, no procedures or boundaries have been established. Community Protection Zones are established at the discretion of the local khurals.

1.8.7.1 Water Use Contracts

Commercial water use is subject to the contractual requirements of the Mongolian Law on Water. It is defined as any use of water for a "production or service" operation. The decisions regarding these water use contracts are local unless it is for an "important enterprise of economic entity of State or local significance." This latter situation would be decided by the Cabinet Ministry based on the proposals from the aimag or Ulaanbaatar khural and MNE. All other applications must be submitted to the soum or duureg governor.

1.8.7.2 Protection Requirements

The Mongolian Law on Water includes requirements for water use contractors and general protection measures. General protection measures are measures that apply regardless of the zones or whether a contract is involved. These include: the prohibition of adverse impacts to the water balance; the power to limit water use in degraded watersheds; requiring the rehabilitation of watersheds; establishing and lining wastewater removal sites; requiring the maintenance of water flow volumes; the power to stop water use in violation of the water laws and regulations; prohibiting the permanent alteration of natural and original river channels; prohibiting the discharge of wastes, garbage of polluting substances into and around water sources, riverbeds and dry ravines; and, requiring the protection of groundwater supplies during mineral exploration or extraction.

For commercial contracts, the Mongolian Law on Water establishes separate requirements for water protection. The primary requirement is the use of a wastewater treatment facility or disposal site. Technology for reusing and conserving water must also be used. Operators are prohibited from: constructing

or using a water facility, reservoir, dam, channel, lake or pond with no protection in place for fish; or, the use of water that may destroy, cause salinization or saturate the soil. The law also prohibits economic activities that do not comply with national or international water use technology. However, the Mongolian Law on Water does not indicate which law contains the national standards or which international standards are to be followed. Contract recipients are required to allocate a sum equal to at least ten percent of the water use fee for reforestation and other activities to improve the watershed. The terms of commercial contracts may be redefined where the natural restoration capacity and purification has been reduced.

The following are discussions of articles relevant to the Project (Dallas, 1999):

Article 17 Section 4 gives preferential rights to water users “where they reside”, although this right should not be grounds for “restricting the rights of others to use water." This right infers that upstream water users “shall not cause changes to the natural water balance and quality” (Article 22 Section 2). However, the author of the Dallas (1999) perceives this part as “becom(ing) turbid.”

Another relevant section is found in Article 14 (Protection against Water Reserve Depletion), stating, “Where it is necessary to change a water channel during the construction of facilities, appropriate expenses for restoring it to its natural state shall be included and implemented in the drawings and proposal preparations and improvements." Also, "it is prohibited to permanently alter natural and original river channels." In addition, the construction of a “water facility, reservoir, dam or a man-made channel, lake or pond that has no protection amenity for fish or may potentially degrade, saturate or salinize the soil" is prohibited.

1.8.8 Law on Buffer Zones

A buffer zone is an area that forms a transition between the protected area and its surroundings. It adds a level of protection while easing some of the controls in the protected area. The types of activities allowed in buffer zones are regulated and intended to preserve the integrity of the protected area. A “zone of influence” is a type of buffer zone that is established along riparian areas or migration corridors that have a direct link to a protected area. In Mongolia, buffer zone boundaries require consideration of areas, such as rivers, that may impact or have an influence on the protected area. The process for establishing a buffer zone is covered in the Law of Buffer Zones. MNE has approved the creation of 12 Buffer Zones around ten Strictly Protected Areas and two National Parks (Wingard and Odgerel, 2001)

1.8.9 Law on Mineral Resources

In August 2006, the Mongolian government amended the 1997 Law on Mineral Resources. The amended Law on Mineral Resources increases the minerals royalty, increases license fees, changes the license terms, and reduces tax incentives for mining (Pui-Kwan, 2007).

The Law on Mineral Resources allows any Mongolian legal entity to hold any number of mineral exploration licenses of up to 400,000 hectares each. An exploration license holder is afforded the right to conduct exploration for minerals within the boundaries for nine years (three years initially plus two extensions of three years each), and the exclusive right to obtain a mining license for any part of the exploration license. It also provides the right to transfer or pledge any part of the exploration license.

A pre-mining period of three years has been introduced at the expiration of the exploration license term. During this period, the Mineral Resources Law permits a feasibility study and an Environmental Impact Assessment (EIA) (with social impact assessments forming a minor part of these assessments, if at all) to be completed, which is governed by both the Environmental Impact Assessment Law and Environmental Assessment regulations promulgated by MNE. However, these requirements are generally unclear, which is why adopting international best practices is advisable.

License fees payable in years seven, eight and nine are applicable during this period. The Law on Mineral Resources now provides that the local aimag government directly benefit from the payment of license fees and royalties. The aimag government will receive 50 percent of all license fee payments and 30 percent of all royalty payments. This arrangement is set for review in the new Law on Mineral Resources, although details of the new arrangements remain unclear.

The agreement of aimag and soum governors is required to conduct exploration and mining activities, as well as to use groundwater and other natural resources. There are no legal requirements to conduct community-level consultations or disclosure.

Mining license holders have the right to engage in mining of minerals within the license area for thirty years (with the right to extend for two additional periods of twenty years), the right to sell mineral products internationally, the right to transfer or pledge all or part of the license, and the right to conduct exploration for minerals within the license area. A mining license holder must pay royalties to the government equal to five percent of the sale value of products sold (with the exception of coal and common minerals resources that are sold domestically on which the royalty is 2.5 percent).

The government is currently re-writing the Law on Minerals – this has been underway for some time and it is likely that there will be no action before the June 2008 parliamentary elections. It is possible that the presidential election in 2009 will delay this law further. While it is expected that Mongolia will continue to promote legislation which is generally supportive of mining, there are moves to increase government stakes in 'strategic' assets and the uncertain policy environment is leading to regulatory uncertainty.

This uncertainty is characterized by the continuing lack of clarity about the legal status of the massive Oyu Tolgoi copper gold project in the Gobi desert. Whilst the company (an Ivanhoe Mines and Rio Tinto joint venture) has agreed a draft text with government negotiators for over a year, the government has consistently delayed presenting this proposed deal to parliament. Whilst the Oyu Tolgoi project has attempted to continue with shaft development and exploration during this period of uncertainty, the project is close to a point where production will soon begin the company has announced that it will soon have to delay work until an agreement is reached. This new agreement will also be shaped by the new mining law under review in the new parliament of 2008.

One likely, and popular, aspect of the new mining law relates to a more direct benefit sharing of tax revenues with affected soums and aimags. The currently proposed structure would see 50 percent of all tax revenue go to the central government, 25 percent go to unaffected soums and 25 percent to be distributed amongst the affected soum(s). However, it seems unlikely that the law will proceed in its current form. Firstly, there are practical questions about how well soums and aimags could absorb and transparently disburse such large sums of money.

Secondly, there are equity issues. With large sums of money involved, many suggest that a percentage calculated based on issues like population and poverty is more appropriate. However, there is a strong feeling that this sort of revenue sharing initiative will form part of the new regulatory framework in Mongolia. This should be seen as a positive outcome for the company – making it easier to evidence the contribution of the mines to the community without making direct disbursements. However, because of the low standards of government capacity and transparency at aimag/soum/bagh levels – it would be advisable for Big Bend to support local government capacity where possible.

Another aspect of future legislation is the increased focus on companies identifying their social and community impact. It is unclear how this regulation will be implemented; however, a number of sources from within development agencies and local contacts suggest that it is likely that companies will in the future be required to produce a social impact study – in much the same way as EIAs are currently conducted. The government capacity to competently review and assess these reports will need to be strengthened before this regulatory change is implemented.

In part, these social aspects reflect a growing recognition by the government that existing mechanisms for taxing and distributing mineral wealth have not had the requisite employment creation and poverty alleviation impacts. In part, recent unrest in the capital related to the elections, reflects growing discontentment with how mineral wealth is allocated and how mining projects operate. This is driving the government to try and legislate so force mining companies to manage their environmental (and now social) impacts more carefully.

1.8.10 Law on Environmental Impact Assessment (EIA)

An Environmental Impact Assessment provides for the incorporation of environmental concerns into developmental planning. This EIA process informs the relevant authorities and stakeholders of potential environmental impacts (positive and negative). On the international level, current practice requires that social aspects receive increased attention concerning project impacts on the local populace.

The Mongolian Law on Environmental Impact Assessments defines two types of EIAs: General and Detailed. The General EIA is an initial assessment of the resource conducted within a 12-day period by an expert appointed by MNE. It is, in essence, a paper study that relies on professional experience of natural science experts within MNE. The project proponent is responsible for submitting all necessary documents to MNE, including a brief description of the project, a technical and economic feasibility study, work drawings, and other related documents for use in conducting a General EIA. No cost is associated with this type of EIA. The review may result in the following conclusions: a) no Detailed EIA necessary; b) project may be implemented pursuant to certain conditions; and, c) a Detailed EIA is necessary. A Detailed EIA is required for the Big Bend Project.

The scope of a Detailed EIA is defined by the General EIA. The Detailed EIA is conducted by a privately authorized company and must contain nine separate chapters as follows:

1. Environmental baseline data and indices
2. Appropriate project alternative
3. Recommendations for minimizing, mitigation and elimination of impacts
4. Analysis of extent and distribution of adverse impacts and their consequences
5. Risk assessment
6. Environmental protection plan
7. Environmental monitoring plan

8. Opinion of residents where project is to be implemented

9. Other issues

In Article 6, the project proponent is required to develop an Environmental Protection Plan (EPP) and an Environmental Monitoring Program (EMP) as a means of implementing the recommendations of the EIA; and, monitoring the control processes and performance of each activity. Implementation of the EPP and EMP is controlled by the aimag and soum representative bodies, together with the local MNE Environmental Inspector (Dallas, 1999).

Expenses are paid by the project proponent and vary in amount. For placer gold mining operations, it is usually 1.5 to 2.5 million MNT. For larger projects, the cost may be as much as 50 million MNT. A copy of the final version is available to the project proponent, the company that conducted the work and MNE. It is not available to the general public for review.

While the Environmental Protection Law requires parties to comply with the EIA findings, this language is missing from the Mongolian Law on Environmental Impact Assessments. Frequently, the EIA only serves to inform the public and political agencies of the environmental consequences of a decision; it tends to be procedural in nature instead of substantive. How the EIA is used to inform the public is not clear, as it is not available for review. It is possible that the public is informed during the effort to solicit public opinion on the project. Binding decisions will ultimately be made by the relevant ministry in charge of the project and MNE in the form of mitigation requirements.

A summary of the EIA procedures, as outlined in the Mongolian Law on Environmental Impact Assessments, is as follows:

1. Submission of all required and relevant material (project description) by the proponent to MNE or the local government. A complete list of all information is included in Appendix 1 of the guidelines issued under MNE Order No. 66 (1998). This section will be the determining factor of whether a Detailed EIA is required.
2. MNE or a designated local government conducts a General EIA within 12 working days. The objective is to predict the project impacts and determine what additional assessments or conditions are required, if any.
3. If a Detailed EIA is required, the following steps must be taken:
   (a) Project proponent selects an authorized EIA company to conduct the work
   (b) The EIA company conducts the work pursuant to the timeline and schedule set by the General EIA, and also develops environmental management and monitoring plans. Approval of the plans must be obtained from the government ministry that issued the permit for the project.

(c) The EIA company then prepares a report for submission to the expert who conducted the General EIA
(d) The expert has 18 working days to review and prepare a conclusion for submission to MNE.
(e) MNE issues its decision on whether or not to implement the project.

Enforcement of EIA requirements is the responsibility of the local governments. A review is required in the event that a project causes damage to human health or the environment. Often, the problem is proving that actual damages have occurred; in some instances, it may be easy to show but difficult to prove conclusively as it is generally a complicated, scientific matter. MNE is responsible for establishing a working group for the review. If the working group determines that the project proponent has failed to follow the EIA requirements, a judge or environmental inspector may suspend operations and fine the company 250,000 MNT. However, if it is determined that the assessment itself was deficient, the authorized EIA company is required to conduct a reassessment at their expense and may even have their license to conduct EIAs revoked.

1.8.11 Law on Windfall Tax

In May 2006, the Government of Mongolia passed the Law on Windfall Tax. This Law imposes a tax rate of 68 percent when copper reaches US$2,600 a tonne and when gold reaches US$500 an ounce. The new 2006 Law on Mineral Resources also raised royalty rates on metals extraction, and removed some tax holidays. The government justified the changes as an attempt to allow the government to benefit more equally from the impact of surging global metals prices. The boost to revenue from the mining sector helped to keep the budget in surplus in 2007/2008. Questions remain on whether this windfall tax will be expanded to other minerals, or if a more broad approach to taxation and control will be taken, as with Russia's focus on 'strategic' resources.

1.8.12 Law on Labor

The 1999 Law on Labor was established "to determine the general rights and duties of employers and employees who are parties to a labor relationship based on a contract of employment, collective agreement or collective bargaining, and to provide rules with respect to collective or single employee labor disputes, working conditions, management, monitoring and supervision, and liabilities for violation of this law, and to ensure the mutual equality of the parties." Under this law, the basic content of an employment contract is outlined as well as additional terms that may be specified if agreed upon by both parties.

The Law on Labor defines and provides guidance for terms of training, social insurance, compensation, hours of work and rest, dispute resolution, etc. For

instance, according to Article 70, under a normal work schedule, an employee shall not work more than 8 hours per day, 40 hours per week, and will be provided at least 12 hours of uninterrupted rest between two consecutive working days. However, if these normal daily and weekly working hours are infeasible due to the nature of the work, working hours may be calculated based on aggregate hours worked as stated in Article 73. In this case, the aggregate hours worked must not exceed the hours worked on a normal work schedule over a longer duration. The Government regulates the calculation of aggregate hours.

Working conditions, safety and sanitation standards are addressed in Article 81 through Article 99. These articles generally outline occupational health and safety requirements and do not provide specific details. The subjects discussed in these articles include, but are not limited to:

- the required classification of normal and abnormal working conditions;
- evaluation of workplace conditions by an authorized professional organization;
- establishment of labor safety and sanitation standards by the cooperative efforts of the organization in charge of standards and the administrative unit in charge of labor issues;
- general workplace requirements, including compliance with safety and sanitation requirements (toxic or hazardous chemical, physical, or biological);
- personal protective equipment;
- production buildings and facilities;
- machinery and equipment (e.g., maintenance);
- the requirement of the employer to provide:
  - a safe and sanitary workplace;
  - necessary personal protective equipment;
  - regular preventative health examinations, as applicable;
  - access to a heated place where employees may rest and warm during breaks while working in unfavorable weather conditions;
- requirements of chemical, poisonous, explosive, radioactive, and biologically active substances;
- establishment and implementation of fire safety rules; and
- the process to address, record, and mitigate industrial accidents, diseases, and acute poisonings

1.9 Mongolian Environmental Standards

In Mongolia, 3500 national standards and more than ten international standards are applied. These, are listed in the Catalogue of Standards of the Standardization and Measurement Center. Approximately 140 of these are environmental

standards, two-thirds of which were adopted before 1989. The majority of these standards defines, provides the general requirements of, or specifies the method of, environmental measurement. The mining operations of WM Mining Company, LLC will follow applicable Mongolian standards. The environmental standards applicable to the Project are summarized in **Table II-4.**

Table II-4 Relevant Mongolian Environmental Standards

No.	Environmental Standards
1	MNS 4915:2000 Environment. Rehabilitation of disturbed lands during geological exploration. Techinical requirements.
2	MNS 4916:2000 Environment. Rehabilitation of disturbed lands during open mining of ore deposits.
3	MNS 4917:2000 Environment. Requirements for determination of the fertile soil layer standard disposal while performing earth-moving activities.
4	MNS 4918:2000 Environment. Basic requirement for re-vegetation of destroyed land.
5	MNS 4919:2000 Environment. Requirements for covering soil of destroyed land for re-vegetation.
6	MNS 4920:2000 Environment. Requirements for covering soil of destroyed land for re-vegetation.
7	MNS 0017-0-0-06:1979 Environmental protection standard system.
8	MNS 0017-5-1-13:1993 Rehabilitation of destroyed lands. Terminology and determination.
9	MNS 0017-5-1-18:1983 Rehabilitation. Classification of disturbed lands.
10	MNS 0017-5-1-19:1992 General requirements for rehabilitation of disturbed lands.
11	MNS 3473:1983 Environment. Land. Land use. Terminology and determination.
12	MNS 4191:1993 Environmental protection standard system. Climate of Mongolia. Main parameters.
13	MNS 4219: 1994 Environmental protection standard system. Ecological passport for enterprises. Main rules.
14	MNS (ISO) 4226:2000 Air quality. General subject and general requirements.
15	MNS 4585:1998 Air quality parameters. General requirements.
16	MNS: 0017-2-3-16:1998 Air. Rules of air quality monitoring of city and settlements.
17	MNS 4586:1998 Indicator of water environment quality. General requirements.
18	MNS (ISO) 4867:1999 Water quality. Sampling third part. Recommendation for storage and protection.
19	MNS 3342:1982 General requirements for protection of groundwater.
20	MNS 3597:1983 General requirements for protection of surface water and groundwater from fertilizer.
21	MNS (ISO) 5667-11:2000 Water quality. Sampling. Sampling rules for groundwater.
22	MNS 0899:1992 Requirements and rules for choosing a water supply source and hygienic requirements.
23	MNS 0900: 2005 Drinking water. Hygienic requirements and quality control.
24	MNS 4943:2000 Water quality. Effluent standard.
25	MNS 4047:88 Procedures for testing the quality of surface water.
26	MNS 4288:95 General requirements for selecting a site for wastewater treatment plants and treatment technologies and effectiveness.
27	MNS 3297:1991 Soil. Volume of hygienic parameters of soil of city and settlements.
28	MNS 3298:1991 Soil. General requirements for sampling.

Only eight standards are ambient or discharge standards. Ambient standards exist for air, drinking water, surface water and soil. Discharge standards exist for selected air pollution and wastewater entering centralized treatment plants.

Six national standards issued since 2000 relate to environmental reclamation and revegetation. Most of the Mongolian air ambient standards (largely copied from the USSR standards) are slightly more stringent than, for instance, the average Asian and Southeast Asian Nations' corresponding standards.

The ambient surface water quality standards specify 18 parameters [biochemical oxygen demand (BOD), total suspended solids (TSS), pH, etc.] with values similar to those used by other countries for non-drinking water.

Drinking water standards are established for 75 parameters (renewed in 2005 under MNS 900-2005). The standards for industrial wastewater discharges into sewers are very similar to those for drinking water.

Air quality monitoring in Mongolia has been carried out for over 20 years. There are three permanent monitoring stations in Ulaanbaatar, two each in Darkhan and Erdenet, and 24 in aimag centers and major settlements. Pollution limits are set for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), and particulates (**Table II-5**).

Table II-5 Permitted Levels of Pollution

Pollutant	Permitted Level	
	Daily maximum	Daily mean
CO (milligrams per cubic meter [mg/m^3])	8	3
SO_2 (micrograms per cubic meter [$\mu g/m^3$])	500	50
NO_2 ($\mu g/m^3$)	85	40
Particulates ($\mu g/m^3$)	500	150

Liquid effluent from the Project mine camp will need to meet the effluent standards of the receiving water body classification. For the Project, it is anticipated that the treated effluent will be released into the Tuul River, and the surface water treatment standard will apply (**Table II-6**).

Table II-6 Surface Water Treatment Standard

Parameters	Standard	Units
Turbidity	20	milligrams per liter (mg/L)
Color	35	degree
Odor (at 20° and 60°C)	2	point
Oxidation potential	3	mg O_2/L
Manganese	0.1	mg/L
BOD	3	mg O_2/L
Iron	1.0	mg/L
pH	6.5 to 8.5	
Phytoplankton	1.0	mg/L
Amount of lactose positive bacilli in one liter of water	1,000	

Source: Mongolian State Standard MNS 0900-1992, Water Quality Class 1

In addition, there are five surface water classifications for Mongolia, each of which has a set of standards depending on its category. The Tuul River in the Project area is classified as Class 2. Classification of the categories and their limits are presented in **Table II-7.**

Table II-7 Classification of Surface Water Quality

No.	Classification parameters	Unit	1 very clean	2 clean	3 less polluted	4 polluted	5 more polluted
A. Oxygen parameters							
1	Dissolved oxygen	m/g	9<	8	6	4	<4
Tests on samples taken during nights or before 9 AM are to be disregarded							
2	Oxygen saturation	percent	90<	75	60	40	<40
3	BOD	mg O_2/L	<3	5	10	15	15<
4	Chemical Oxygen Demand	mg O_2/L	<10	15	25	50	70<
5	Oxidation potential	mg O_2/L	<3	5	10	20	30<
6	Hydrogen Sulfide (H_2S)	mg O_2/L	No appearance		0.1	1	1.0<
B. Minerals content parameters							
7	Total hardness	H[a]	<10	15	20	30	40<
8	Calcium ion	mg/L	<45	90	150	200	300<
9	Magnesium ion	mg/L	<15	30	50	100	200<
10	Total Dissolved Solids	mg/L	<200	300	500	800	1200<
11	Chloride ion	mg/L	<50	150	250	350	500<
12	Sulfate ion	mg/L	<50	100	300	300	400<
C. Nutrient parameters							
13	Ammonium (NH_4^-)	mg/L	<0.02	0.05	0.1	0.3	0.5<
14	Nitrite (NO_2^-)	mg/L	<0.002	0.005	0.02	0.05	0.1<
15	Nitrate (NO_3^-)	mg/L	<1	3	5	10	20.0<
16	Organic nitrogen	mg/L	<0.3	0.5	1	2	2.0<
D. Other parameters							
17	Hydrogen indicator, pH		6.5-8.0	6.5-8.5	6.0-8.5	6.0-9.0	5.5-9.5
18	Total Iron (Fe^{2+}, Fe^{3+})	mg/L	<0.3	0.5	1	1.5	1.5<
19	Manganese (Mn^{2+})	mg/L	<0.05	0.1	0.3	0.8	1.5<
20	Phenol	mg/L	Absent	0.001	0.002	0.005	0.01<
21	Phosphates (PO_4^{3-})	mg/L	<0.02	0.05	0.1	0.5	0.5<
22	Total phosphorous (PO_4^{3-})	mg/L	<0.025	0.1	1	2	2.0<
23	Surface active agents	mg/L	Absent	<0.1	0.5	1	1.0<
24	Petroleum, its products	mg/L	Absent	<0.05	0.1	0.3	0.5< [a]
25	Fat	presence	Absent			None floating on surface	
E. Physical Characteristics							
26	Smell, taste		No foul odor, taste		Detectible by experts	Obvious foul odor and taste	
27	Color	quality	No color	No color	Slightly colored	Noticeable color	Noticeable color
28	Brightness	cm	35<	30	25	20	<20
29	Suspended matters [b]	mg/L	10<	20	50	100	100<
F. Bacteriological parameters							
30	E. coli titration		>10	1	0.1	0.01	<0.01
31	Disease triggering bacteria		Must not be present				
32	Total microbe amount		<5 $x10^3$	104	$3x10^6$	$5x10^6$	$5x10^6$<
G. Toxic Substances							
33	Cyanide ion (CN^-)	mg/L	Not present		<0.01	0.05	0.1<
34	Mercury (Hg^{2+})	mg/L	Not present		0.001	0.005	0.005<
35	Arsenic (As^{3+}, As^{2+})	mg/L	absent	0.01	0.02	0.05	0.05<
36	Fluorine (F)	mg/L	0.2	0.5	1	1.5	1.5<

No.	Classification parameters	Unit	1 very clean	2 clean	3 less polluted	4 polluted	5 more polluted
Only for agricultural use							
37	Boron (B)	mg/L	Must be absent		0.5	1	<1.0
38	Selenium (Se^{2+})	mg/L	Absent	0.01<	0.05	0.1	<0.1
39	Zinc (Zn^{2+})	mg/L	<0.2	1	2	5	5.0<
40	Vanadium (V)	mg/L	Must not be present			<1.0	1.0<
41	Copper (Cu^{2+})	mg/L	<0.01	0.05	0.1	0.5	0.5<
42	Cadmium (Cd^{2+})	mg/L	Absent	0.005	0.01	0.1	0.1<
43	Cobalt (Co^{2+})	mg/L	<0.01	0.02	0.05	0.1	1.0<
44	Molybdenum (Mo^{2+})	mg/L	<0.001	0.1	0.5	1	1.0<
45	Silver (Ag^{+})	mg/L	<0.001	0.01	0.02	0.05	0.05<
46	Nickel (Ni^{2+})	mg/L	<0.01	0.05	0.1	0.2	0.2<
47	Sulfate ion	mg/L	Must not be present				
48	Lead (Pb^{2+})	mg/L	<0.01	0.05	0.1	0.2	0.2<
49	Chromium (Cr^{3+})	mg/L	Absent	0.1	0.2	0.5	0.5<
50	Chromium (Cr^{6+})	mg/L	Absent	0.01	0.05	0.1	0.1<
51	Free Chlorine (Cl)	mg/L	0	0	0	0.1	0.5<
H. Saprobe quality							
52	Pantle-Buke index		<1.0	1.5	2	2.5	2.5<
53	Sladchek classification		Xeno, X	Oligo, O	Oligo-beta-meso, (o-β-m)	Alpha-meso, α - m	Poly, P

Source: 3rd Attachment to the Joint Directive of MNE and the Ministry of Health, No. 143/a/352 of 1997

Notes: a = Must not be found when the most precise chemical analysis is done.
b = Only applies during low flow.
Natural acidic, mineralized and hardened water does not fit in this surface water classification.

In addition, the Project will meet drinking water standards for domestic water consumption. This will ensure that the drinking water will not impact worker health. These standards are presented in **Table II-8.**

Table II-8 Maximum Allowable Concentration of Chemical Substances in Drinking Water

Parameters	Maximum Allowable Concentration [a]
pH	6.5-8.5
Turbidity	1.5
Total hardness	7.0
Chloride	350
Dry residue	1000
Phenol compounds	0.002
Phosphate ions	3.5
Nitrates	10.0
Polyacrylamides, residue	2.0
Sulfate	500
Fluoride	0.7-1.5
Molybdenum	0.25
Beryllium	0.0002
Cadmium	0.01
Silver	0.05
Selenium	0.001
Strontium	2.0
Lead	0.03
Total Chromium	0.05
Aluminum	0.5
Arsenic	0.05
Copper	1.0
Calcium ion	100
Magnesium ion	30
Manganese	0.1
Total iron (Fe^{2+}, Fe^{3+})	0.3
Zinc	5.0
Cyanide	0.01

[a] All units are mg/L except pH (standard units) and hardness (milliequivalents per liter).

Source: Attachment to the Directive a/11/05/A/18 of the Minister of Infrastructure, Minister of Health, and Minister of Nature and Environment, 1997 and Mongolian State Standard MNS 3900-1986.

2.0 International Performance Standards and Principles

The Big Bend Project is designed to meet Mongolian regulatory requirements and commonly accepted international environmental, social, and consultation standards. These latter standards are primarily guidelines and standards of the International Finance Corporation (IFC), a unit of the World Bank, which form the de facto standards applied to many major operations seeking investments and guarantees from multilateral, bilateral and commercial financial institutions. These guidelines and standards include IFC's Performance Standards (PS) on Social and Environmental Sustainability (April 2006a), including PS Guidance Notes (July 2007); IFC's General Environmental, Health, and Safety Guidelines (April 2007); IFC's Environmental, Health, and Safety Guidelines for Mining (December 2007); IFC's Policy on Disclosure of Information (April 2006b); the World Bank's Anti-Corruption Strategy (2008); and, the Voluntary Principles on Security and Human Rights (2000) The Project is also designed to conform to the Equator Principles (2006), a derivative of IFC/World Bank standards. All of these guidelines and standards are detailed further in the following sections.

As noted above in the Introduction to this section, the Big Bend Project is been developing with financing from the Overseas Private Investment Corporation (OPIC). As a result, this SEIA has been developed to conform to the environmental, safety, social and human rights requirements of OPIC. These matters are explained in detail below.

2.1 OPIC Requirements

The Overseas Private Investment Corporation (OPIC) was established as an agency of the U.S. government in 1971. According to its mission statement, OPIC "helps U.S. businesses invest overseas, fosters economic development in new and emerging markets, complements the private sector in managing risks associated with foreign direct investment, and supports U.S. foreign policy. Because OPIC charges market-based fees for its products, it operates on a self-sustaining basis at no net cost to taxpayers".

OPIC further states that "financing and political risk insurance also help U.S. businesses of all sizes to compete in emerging markets and meet the challenges of investing overseas when private sector support is not available. OPIC promotes U.S. best practices by requiring projects to adhere to international standards on the environment and worker and human rights".

WMMC has made an application to OPIC for financing for its Big Bend Project. As such, the Project will be required to conform to the requirements of OPIC in regards to environmental, safety, worker and human rights matters. OPIC published its latest "Environmental Handbook" in February 2004 which is

intended to provide information to OPIC's users, as well as the interested public, with respect to the general environmental guidelines, assessment and monitoring procedures that OPIC applies, in its discretion, to prospective and ongoing investment projects.

The Big Bend Project is classified as a Category A Project for which OPIC requires the applicant to submit an "Environmental Impact Assessment" (EIA) in a form that can be made public without compromising business confidential information.

An EIA is a comprehensive assessment of the diverse impacts of a project on the natural and ecological impacts on the human environment. It includes a detailed description of pre-existing conditions ("baseline assessment"), all project activities having a potential environmental impact (from pre-construction through decommissioning and site reclamation), and the net impacts of the project, taking into account alternative mitigative measures. It also considers the relationship of the project to the natural and ecological impacts on the human environment in the affected area and the cumulative impacts of those activities. The content and format for an EIA will vary depending on the industry sector, the site and other project-specific factors. A generic format for an EIA is provided in the OPIC "Environmental Handbook"; and, this SEIA document follows that format.

An Environmental Management and Monitoring Plan (EMMP), sometimes called an Environmental Action Plan (EAP), is designed to specify in detail the actions, both technical and managerial, that the applicant or sponsor must also undertake in order to mitigate anticipated adverse impacts of the project on the environment, health and safety. It also describes the technology and methodology used to monitor the actual impacts of the projects on the environment and the standards and procedures to be used for adjusting mitigative measures as necessary to maintain impacts within an acceptable range. The SEIA assessment process for the Big Bend Project has also included the development of a "Social and Environmental Management and Monitoring Plan" (SEMMP) in fulfillment of this OPIC requirement.

With the consent of the applicant, the country and industry sector involved in a Category A project (but not the name of the applicant) are listed on OPIC's Internet Web Site and the EIA is made publicly available on request for a designated comment period of 60 days prior to any final OPIC commitment to a project. No application for a Category A project can be processed without this public disclosure and review process.

Concurrent with this public notification process, OPIC conducts an internal assessment of the project based on the EIA and other available information, including any comments it receives from the public. Through this review process, OPIC environmental staff assess the impacts of the project and the standards and mitigative conditions applicable to OPIC support. These conditions are discussed

with the applicant and included as representations, warranties and covenants in the loan agreement or political risk insurance contract. OPIC monitors project compliance with contractual conditions throughout the term of the OPIC loan agreement or insurance contract. Category A projects are also required to conduct at least one independent environmental audit during the first three years of OPIC support.

In determining whether a project will pose an unreasonable or major environmental, health or safety hazard, or will result in significant degradation of national parks or similar protected areas, OPIC relies on guidelines and standards adopted by international organizations such as the World Bank. OPIC applies the most current World Bank Group guideline to every project to which such Guidelines are applicable. These World Bank and International Finance Corporation (IFC – a unit of the World Bank) guidelines are discussed in detail below in this Section.

Where there are gaps in World Bank Guidelines on a given environmental or natural resource issue, OPIC incorporates relevant and applicable U.S. federal standards, World Health Organization (WHO) standards, and standards set by other international authorities in its environmental assessment and decision-making process. Examples of such standards are included in the Handbook, as well as, prohibitions for projects financed by OPIC.

In addition to the World Bank Guidelines referenced above, all projects must comply with host country environmental regulations. Therefore, whenever possible, applicants must provide OPIC with summaries or copies of applicable host country regulations as part of their EIA for Category A projects.

OPIC does not attempt to prescribe to its potential users the choice of technologies or processes they must use to meet the applicable guidelines. However, standards of best practice developed by governments, industry and non-governmental organizations can be useful in providing guidance to OPIC and its users in assessing alternatives and their feasibility. For this purpose, OPIC makes use of international best practice guidelines for sectors of particular importance to OPIC's environmental mandate. Consistent with this approach, OPIC takes into account an applicant's track record of material compliance with US domestic and foreign environmental and occupational health and safety laws and regulations in its environmental assessment process. While evidence of material noncompliance is not in itself grounds for declining support, such information helps to identify environmental and occupational health and safety issues that merit particular attention during the EIA process, contract conditions and monitoring.

2.2 IFC Guidelines, Standards and Policies

2.2.1 IFC Performance Standards

IFC updated and consolidated existing policies and guidelines for private sector operations in its "Performance Standards on Social and Environmental Sustainability" (Performance Standards) in April 2006 (2006a). Meeting the requirements of the Performance Standards is generally viewed as meeting good international practice in the context of private sector operations. The eight Performance Standards comprise the following:

Performance Standard 1:	Social and Environmental Assessment and Management Systems
Performance Standard 2:	Labor and Working Conditions
Performance Standard 3:	Pollution Prevention and Abatement
Performance Standard 4:	Community Health, Safety and Security
Performance Standard 5:	Land Acquisition and Involuntary Resettlement
Performance Standard 6:	Biodiversity Conservation and Sustainable Natural Resource Management
Performance Standard 7:	Indigenous Peoples
Performance Standard 8:	Cultural Heritage

The key elements of the Performance Standards are highlighted below.

2.2.1.1 Performance Standard 1: Social and Environmental Assessment and Management Systems

This performance standard broadens social considerations from involuntary resettlement, indigenous peoples and cultural property to all relevant social issues. Social considerations and potential positive and negative impacts are to be integrated into a Social and Environmental Impact Assessment. It emphasizes the need to identify vulnerable or disadvantaged groups and to provide appropriate engagement of potentially affected communities.

Performance Standard 1 also utilizes the recommendations and conclusions from the SEIA to establish Action Plans to be covenanted and implemented through a Social and Environmental Management System. Furthermore, it requires a more comprehensive and on-going engagement with local communities commensurate with the nature and extent of potential impacts, and introduces the concept of Free, Prior and Informed Consultation (FPIC).

2.2.1.2 Performance Standard 2: Labor and Working Conditions

This performance standard is developed around the "Core Labor Standards" defined by the International Labor Organization (ILO). It covers forced labor, child labor, non-discrimination, and freedom of association and collective bargaining. It also addresses any involuntary or compulsory labor, such as, indentured or bonded labor that might be prevalent in certain sectors.

Provisions in Performance Standard 2 include human resources policy and grievance mechanisms appropriate to the project sponsors' size and workforce. It supports workers' right to organize and bargain collectively in a manner consistent with national law. It requires non-discriminatory practices in employment relationships and addresses large-scale retrenchment and fair treatment of contract labor. This performance standard also deals with occupational health and safety issues, and specifies working conditions and the need to inform workers about terms of employment, such as wages, benefits, and hours of work.

2.2.1.3 Performance Standard 3: Pollution Prevention and Abatement

This performance standard raises the principles of the PPAH to the policy level, explicitly requiring project sponsors to design and operate projects in compliance with the host country regulations and the IFC Environmental, Health and Safety (EHS) Guidelines, whichever is more stringent. In summary, Performance Standard 3:

- emphasizes pollution prevention, including issues of waste management, energy efficiency measures and use of renewable energy sources;
- requires quantification and monitoring of significant greenhouse gas (GHG) emissions (more than 100,000 tons per annum);
- expands the current pollution prevention focus on direct project emissions to address project impacts on ambient conditions, as these impacts have a direct effect on the environment and community health;
- requires sponsors to be prepared for responses to process upsets, accidents and emergency situations; and,
- clarifies an approach to, and provides new guidance on, integrated pest and vector management and persistent organic pollutants (POPs).

2.2.1.4 Performance Standard 4: Community Health, Safety and Security

This performance standard is in recognition of the need to manage the risks that project activities can pose to the public, including public health, public safety and emergency preparedness. It also introduces the human rights dimension associated with security considerations; and, seeks to ensure that sponsors are aware of issues outside of their project boundaries.

Performance Standard 4 specifies that an individual at senior-management level should be assigned with the responsibility and authority for the client's continuing commitment to, and support and improvement of, community health and safety, community engagement on health and safety issues, and security considerations. It specifies the following requirements in a manner appropriate to the size and nature of project activities:

- To design, construct, operate, and decommission projects such that risks to public health and safety are as low as reasonably practicable
- To ensure structural elements are certified or approved by appropriate competent professionals
- To address public use of project equipment and infrastructure as well as production and use of hazardous materials including pesticides, emergency plans, and priority health issues in the community
- To inform local communities of potential hazards and assist with their emergency preparedness

With Performance Standard 4, the Safety of Dams directive (World Bank's Operational Policy [OP] 4.37) is no longer a freestanding policy of a 15-meter threshold for dam height. Instead, the structural safety of dams is addressed through a risk-based approach to the design, construction and operation of all project equipment and infrastructure. Performance Standard 4 also addresses community health and safety aspects of pesticides, including their transport, storage and application, and community exposure to communicable diseases. The sponsor is required to assess the risks within and outside of the project site that may be posed by its security arrangements. In addition, the sponsor is expected to make reasonable inquiries: to ensure that those providing security are not implicated in past abuses; to train security staff adequately in the use of force (and where applicable, firearms) and appropriate conduct toward workers and the local community; and, to require those providing security to act within the applicable law. The sponsor is also expected not to sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat. A grievance mechanism should allow the affected community to express concerns about the security arrangements and acts of security personnel.

For operations employing government personnel for security services, the sponsor should assess the risks arising from such use and communicate its intent to such use to security personnel. The sponsor should encourage the relevant public authorities to publicly disclose the security arrangements of the facilities, subject to any overriding security concerns.

The sponsor is also expected to investigate any credible allegations of unlawful or abusive acts of security personnel, to take action (or urge appropriate parties to take action) to prevent recurrence, and to report unlawful and abusive acts to public authorities when appropriate.

2.2.1.5 Performance Standard 5: Land Acquisition and Involuntary Resettlement

This performance standard refers to physical and/or economic displacements that may be associated with the operation. Resettlement is considered involuntary when affected individuals or communities do not have the right to refuse land acquisition that results in displacement. Performance Standard 5 also refers to loss of collectively owned assets. FPIC is required prior to resettlement of Indigenous Peoples. Performance Standard 5 applies to legal landowners with recognizable claims to land as well as informal settlers. For informal settlers, the sponsor is expected to offer opportunities to settle legally in areas where they do not face the risk of eviction. Overall, resettlement should be designed to improve the livelihoods of those affected.

Performance Standard 5 requires that project sponsors explore project alternatives to minimize the need for resettlement activities and take the lead in the resettlement process wherever possible. It clarifies that cash compensation can be an acceptable alternative to the normally preferred land-for-land compensation. Cash compensation for lost assets can be appropriate where, for example, livelihoods are not land-based or where active markets exist for land, housing and labor. The sponsor is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date. However, the sponsor is expected to set up a grievance mechanism consistent with Performance Standard 1 to receive and address specific concerns about compensation and relocation that may be raised by displaced persons or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner.

2.2.1.6 Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management

Performance Standard 6 is designed to combine the principles of the World Bank's Natural Habitats and Forestry (OP 4.36) Policies and expands the existing Safeguard Policies' focus on pristine natural habitats to address all levels of biodiversity through an approach consistent with the Convention on Biological

Diversity. The sponsor is required to assess the significance of potential adverse impact to biodiversity in the project's area of influence. The assessment will focus on major threats to biodiversity, which include habitat destruction and introduction of invasive species.

Performance Standard 6 identifies Critical Habitat as a subset of both natural and modified habitat that deserves particular attention. Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or which are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic or cultural importance to local communities. The IUCN Red List of Threatened Species and national legislation can assist in defining such areas.

Performance Standard 6 also identifies mitigation measures to achieve 'no net loss' of biodiversity where feasible. These measures may include a combination of activities, such as the post-operation restoration of habitats, offset of losses through the creation of an ecologically comparable area(s) managed for biodiversity, and compensation to direct users of the impacted flora and fauna.

2.2.1.7 Performance Standard 7: Indigenous Peoples

This performance standard presupposes that indigenous peoples are often among the most marginalized and vulnerable segments of the population. Information disclosure, consultation and informed participation should be conducted in a culturally appropriate manner. Performance Standard 7 details the process of FPIC with Indigenous Peoples. Project sponsors are required to inform affected Indigenous Peoples and natural-resource-dependent communities of their options, rights and responsibilities vis-à-vis the project and its potential impacts – and obtain broad community support for the project.

The sponsor is required to foster participation of affected Indigenous Peoples in the assessment of relevant project alternatives, planning, and implementation of mitigation and development measures. Performance Standard 7 emphasizes ties to unique natural resources. The sponsor is also expected to seek to identify, through the process of FPIC with affected communities of Indigenous Peoples, opportunities for culturally appropriate development benefits. Indigenous peoples adversely affected by the project, but no longer dependent on natural resources, will be covered in the SEIA process pursuant to Performance Standard 1.

Performance Standard 7 moves away from a requirement for a free-standing Indigenous Peoples Plan to a more flexible and broader community development plan with components for indigenous peoples, where appropriate. This approach

aims to extend opportunities and benefits to all the affected communities, regardless of whether some are indigenous or not.

2.2.1.8 Performance Standard 8: Cultural Heritage

This Performance Standard is based on the Convention Concerning the Protection of the World Cultural and Natural Heritage (which aims to protect irreplaceable cultural heritage) and, in part, on standards set by the Convention on Biological Diversity. It requires clients to, as a minimum, follow national law and share the benefits of project use (e.g., commercialization) of indigenous peoples or local community knowledge, innovations, and/or practices with the indigenous peoples or local communities. Performance Standard 8 requires the application of internationally recognized practices for the protection, field-based study, and documentation of cultural heritage where international conventions on cultural heritage are not part of host country laws.

2.2.2 IFC General EHS Guidelines

The IFC General EHS Guidelines, dated April 2007, contain the performance levels and measures that IFC has determined are generally considered to be achievable at reasonable costs by existing technology. The application of these guidelines should be tailored to the hazards and risks established for each project on the basis of the results of the environmental assessment, in which site-specific variables, such as the host country context, assimilative capacity of the environment, and other project-specific factors, are taken into account. For example, the environmental assessment process may provide justification for alternative project-specific standards or requirements, such as project location, processes, or mitigation measures.

These General EHS Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). These general guidelines are designed to be utilized in conjunction with relevant industry-sector EHS guidelines. The General EHS Guidelines are organized as follows:

- Environmental
  - Air Emissions and Ambient Air Quality
  - Energy Conservation
  - Wastewater and Ambient Water Quality
  - Water Conservation
  - Hazardous Materials Management
  - Waste Management
  - Noise
  - Contaminated Land
- Occupational Health and Safety

    - General Facility Design and Operation
    - Communication and Training
    - Physical Hazards
    - Chemical Hazards
    - Biological Hazards
    - Radiological Hazards
    - Personal Protective Equipment
    - Special Hazard Environments
    - Monitoring
- Community Health and Safety
    - Water Quality and Availability
    - Structural Safety and Project Infrastructure
    - Life and Fire Safety
    - Traffic Safety
    - Transport of Hazardous Materials
    - Disease Prevention
    - Emergency Preparedness and Response
- Construction and Decommissioning
    - Environment
    - Occupational Health and Safety
    - Community Health and Safety

Effective management incorporates EHS issues into corporate- and facility-level business processes in an organized, hierarchal approach. This involves:

- identifying EHS project hazards and associated risks as early as possible in the facility development or project cycle;
- utilizing EHS professionals with the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions; and
- understanding the likelihood and magnitude of EHS risks based on:
    - the nature of the project activities,
    - the potential consequences to workers, communities, or the environment if hazards are not adequately managed;
    - prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment;
    - favoring strategies that eliminate the cause of the hazard at its source;
    - incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences when impact avoidance is not feasible;

- preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to effectively and safely control such events, and restoring workplace and community environments to a safe and healthy condition; and
- improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

The specific EHS Guidelines for Mining, to be utilized in conjunction with the General EHS Guidelines, are described in the following section.

2.2.3 IFC EHS Guidelines for Mining

The IFC EHS Guidelines for Mining, dated December 2007, provide for inclusion of results from the SEIA process. Although some specific performance standards are provided, these levels and measures can be adjusted and customized for each particular project.

The EHS Guidelines for Mining include the following topics:

- Industry-Specific Impacts
  - Environmental
    - Water use and quality
    - Wastes
    - Hazardous materials
    - Land use and biodiversity
    - Air quality
    - Noise and vibrations
    - Energy use
    - Visual impacts
  - Occupational Health and Safety
    - General workplace health and safety
    - Hazardous substances
    - Use of explosives
    - Electrical safety and isolation
    - Physical hazards
    - Ionizing radiation
    - Fitness for work
    - Travel and remote site health
    - Thermal stress
    - Noise and vibration
    - Specific hazards in underground mining
  - Community Health and Safety
    - Tailings dam safety
    - Water storage dams

        - Land subsidence
        - Emergency preparedness and response
        - Communicable diseases
        - Specific vector control and prevention strategies
    - Mine Closure and Post-Closure
        - Financial feasibility
        - Chemical integrity
        - Ecological habitat integrity
- Performance Indicators and Monitoring
    - Environment
        - Emissions and effluent guidelines
        - Environmental monitoring
    - Occupational Health and Safety Performance
        - Occupational health and safety guidelines
        - Accident and fatality rates
        - Occupational health and safety monitoring

Certain aspects of the IFC EHS Mining Guidelines are described in further detail below.

2.2.4 IFC's Disclosure of Information Policy

IFC adopted its current Policy on Disclosure of Information in April 2006 (2006b). The policy stipulates public consultation and disclosure requirements (including timing) for projects requesting IFC funding. WMMC has committed to following this policy for the Big Bend Project. The detailed information on disclosure requirements is contained in the IFC Performance Standard discussed above.

2.2.5 Performance Indicators and Monitoring

The following discusses certain performance indicators and monitoring noted in the IFC General EHS Guidelines and the IFC EHS Guidelines for Mining. Monitoring of direct and indirect indicators of emissions, effluents and resource use is project-specific. Monitoring should be conducted by trained individuals implementing appropriate monitoring procedures, utilizing properly calibrated and maintained equipment. The monitoring records should be frequently reviewed, updated and maintained; and should be compared with the applicable standards to ensure adequate measures are promptly performed when necessary to minimize adverse impacts to the environment and humans. These guidelines act as a powerful tool to avoid mistakes, reduce development cost and improve project sustainability.

These guidelines are intended to provide a standard against which the Project's performance is monitored. Compliance with the guidelines is the expected

standard, in addition to compliance with applicable local, national and international laws.

2.2.5.1 Air Quality

Air emissions should not exceed the relevant ambient air quality guidelines and standards by applying national legislated standards or the current World Health Organization (WHO) Air Quality Guidelines (2006a). Ambient air quality is to be monitored at the Project boundary and/or off-site, depending on the results of scientific methods and modeling. The current WHO Air Quality Guidelines are provided in **Table II-9**.

Table II-9 WHO Ambient Air Quality Guidelines

Parameter	Averaging Period	Guideline Value (µg/m3)
Particulate Matter $(PM)_{2.5}$	annual mean	10
	24-hour mean	25
PM_{10}	annual mean	20
	24-hour mean	50
Ozone (O_3)	8-hour mean	100
Nitrogen dioxide (NO_2)	annual mean	40
	1-hour mean	200
Sulfur dioxide (SO_2)	24-hour mean	20
	10-minute mean	500

The air quality of the workplace should follow the time-weighted average threshold limit values (e.g., eight hours per day, 40 hours per week) of the American Conference of Governmental Industrial Hygienists (ACGIH).

2.2.5.2 Water Use and Quality

Water used for drinking must meet the local and national standards or, in their absence, WHO Guidelines for Drinking Water Quality (2006b). WHO provides microbial and chemical water quality targets to protect the health of humans. **Table II-10** lists and describes these waterborne pathogens (WHO, 2006b). However, only a portion of the waterborne pathogens listed may be present at the Project area. Per WHO Guidelines for Drinking Water Quality, all water directly intended for drinking must not have E. coli or thermotolerant coliform bacteria detected in any 100-milliliter sample (2006b).

Table II-10 WHO-Waterborne Pathogens and their Significance in Water Supplies

Pathogen	Health Significance	Persistence in Water Supplies	Resistance to Chlorine	Relative Infectivity	Important Animal Source
BACTERIA					
Burkholderia pseudomallei	Low	May multiply	Low	Low	No
Campylobacter jejuni, C. coli	High	Moderate	Low	Moderate	Yes
Escherichia coli – Pathogenic	High	Moderate	Low	Low	Yes
E. coli – Enterohaemorrhagic	High	Moderate	Low	High	Yes
Legionella spp.	High	Multiply	Low	Moderate	No
Non-tuberculous mycobacteria	Low	Multiply	High	Low	No
Pseudomonas aeruginosa	Moderate	May multiply	Moderate	Low	No
Salmonella typhi	High	Moderate	Low	Low	No
Other salmonellae	High	May multiply	Low	Low	Yes
Shigella spp.	High	Short	Low	Moderate	No
Vibrio cholerae	High	Short	Low	Low	No
Yersinia enterocolitica	High	Long	Low	Low	Yes
VIRUSES					
Adenoviruses	High	Long	Moderate	High	No
Enteroviruses	High	Long	Moderate	High	No
Hepatitis A virus	High	Long	Moderate	High	No
Hepatitis E virus	High	Long	Moderate	High	Potentially
Noroviruses and sapoviruses	High	Long	Moderate	High	Potentially
Rotaviruses	High	Long	Moderate	High	No
PROTOZOA					
Acanthamoeba spp.	High	Long	High	High	No
Cryptosporidium parvum	High	Long	High	High	Yes
Cyclospora cayetanensis	High	Long	High	High	No
Entamoeba histolytica	High	Moderate	High	High	No
Giardia intestinalis	High	Moderate	High	High	Yes
Naegleria fowleri	High	May multiply	High	High	No
Toxoplasma gondii	High	Long	High	High	Yes
HELMINTHS					
Dracunculus medinensis	High	Moderate	Moderate	High	No
Schistosoma spp.	High	Short	Moderate	High	Yes

The Chemical Abstracts Service has more than 36 million registered chemicals (Chemical Abstracts Service, 2007). As such, parameters or chemicals specific to the Project operations as well as the Project environment were selected for monitoring. WHO utilizes six categories to identify the sources of chemical constituents (2006b):

- Naturally occurring;
- Industrial sources and human dwellings;
- Agricultural activities;
- Water treatment or materials in contact with drinking water;
- Pesticides used in water for public health; and
- Cyanobacteria.

Drinking-water guidelines are provided in **Table II-11** and **Table II-12** from the WHO Guidelines for Drinking Water Quality (2006b).

Table II-11 WHO Drinking Water Guideline Values Significant to Health

Chemical	Guideline Value
NATURALLY OCCURRING	
Arsenic	0.01 milligrams per liter (mg//L)
Barium	0.7 mg/L
Boron	0.5 mg/L
Chromium (total)	0.05 mg/L
Fluoride	1.5 mg/L
Manganese	0.4 mg/L
Molybdenum	0.07 mg/L
Selenium	0.01 mg/L
Uranium	0.015 mg/L
INDUSTRIAL SOURCES AND HUMAN DWELLINGS	
Benzene	10 micrograms per liter (µg/L)
Cadmium	0.003 mg/L
Carbon tetrachloride	4 µg/L
Cyanide	0.07 mg/L
Di(2-ethylhexyl)phthalate	8 µg/L
Dichlorobenzene, 1,2-	1,000 µg/L
Dichlorobenzene, 1,4-	300 µg/L
Dichloroethane, 1,2-	30 µg/L
Dichloroethene, 1,2-	50 µg/L
Dichloromethane	20 µg/L
Dioxane, 1,4-	50 µg/L
Edetic acid (EDTA)	600 µg/L
Ethylbenzene	300 µg/L
Hexachlorobutadiene	0.6 µg/L

Chemical	Guideline Value
Mercury (inorganic)	0.006 mg/L
Nitrilotriacetic acid (NTA)	200 µg/L
Pentachlorophenol	9 µg/L
Styrene	20 µg/L
Tetrachloroethene	40 µg/L
Toluene	700 µg/L
Trichloroethene	20 µg/L
Xylenes	500 µg/L
AGRICULTURAL ACTIVITIES	
Nitrate	50 mg/L (short-term exposure)
Nitrite	3 mg/L (short-term exposure)
	0.2 mg/L (long-term exposure)
Alachlor	20 µg/L
Aldicarb	10 µg/L
Aldrin and dieldrin	0.03 µg/L
Atrazine	2 µg/L
Carbofuran	7 µg/L
Chlordane	0.2 µg/L
Chlorotoluron	30 µg/L
Cyanazine	0.6 µg/L
2,4-dichlorophenoxyacetic acid (2-4-D)	30 µg/L
2,4-DB	90 µg/L
1,2-Dibromo-3-chloropropane	1 µg/L
1,2-Dibromoethane	0.4 µg/L
1,2-Dichloropropane (1,2-DCP)	40 µg/L
1,3-Dichloropropene	20 µg/L
Dichlorprop	100 µg/L
Dimethoate	6 µg/L
Endrin	0.6 µg/L
Fenoprop	9 µg/L
Isoproturon	9 µg/L
Lindane	2 µg/L
MCPA	2 µg/L
Mecoprop	10 µg/L
Methoxychlor	20 µg/L
Metolachlor	10 µg/L
Molinate	6 µg/L
Pendimethalin	20 µg/L
Simazine	2 µg/L
2,4,5-T	9 µg/L
Terbuthylazine	7 µg/L

Chemical	Guideline Value
Trifluralin	20 µg/L
WATER TREATMENT	
Acrylamide	0.5 µg/L
Antimony	20 µg/L
Benzo[a]pyrene	0.7 µg/L
Bromate	10 µg/L
Bromodichloromethane	60 µg/L
Bromoform	100 µg/L
Chlorate	700 µg/L
Chlorine[1]	5 mg/L
Chlorite	700 µg/L
Chloroform	300 µg/L
Copper	2,000 µg/L
Cyanogen chloride	70 µg/L
Dibromoacetonitrile	70 µg/L
Dibromochloromethane	100 µg/L
Dichloroacetate	50 µg/L
Dichloroacetonitrile	20 µg/L
Epichlorohydrin	0.4 µg/L
Lead	10 µg/L
Monochloramine	3 mg/L
Monochloroacetate	20 µg/L
Nickel	70 µg/L
Trichloroacetate	200 µg/L
Trichlorophenol, 2,4,6-	200 µg/L
Trihalomethanes	See note below.[2]
Vinyl chloride	0.3 µg/L
PESTICIDES USED IN WATER FOR PUBLIC HEALTH	
Chlorpyrifos	30 µg/L
DDT and metabolites	1 µg/L
Permethrin	300 µg/L
Pyriproxyfen	300 µg/L
CYANOTOXIN	
Microcystin-LR	1 µg/L

[1] For effective disinfection, a concentration of free chlorine of ≥ 0.5 mg/L after at least 30 minutes at pH < 8 standard units should be residual.
[2] The sum of the ratio of the concentration of each to its respective guideline value should not exceed 1.

Table II-12 WHO Acceptable Consumer Drinking Water Guideline Values (Not Significant to Health)

Chemical	Guideline Value
Aluminum	0.2 mg/L
Ammonia	35 mg/L (taste)
	1.5 mg/L (odor)
Chloride	250 mg/L
Color	15 true color units (TCUs)
Hydrogen sulfide	0.05 to 0.1 mg/L
Iron	0.3 mg/L
pH	6.5 to 9.5 standard units
Silver	0.1 mg/L
Sodium	200 mg/L
Sulfate	250 mg/L
Taste and odor	Not observable
Temperature	Cooler
Total hardness	100 to 300 mg/L
Total dissolved solids	1,200 mg/L
Turbidity	5 nephelometric turbidity units (NTUs) (appearance)
	0.1 NTU (effective disinfection)
Zinc	3 mg/L

Wastewater quality is managed by treating and managing liquid effluent. Liquid effluent includes storm water, process effluents, drainage (from active or closed mines, disposal sites for overburden, waste rock, etc.), surface runoff from paved or unpaved areas, and sanitary wastewater (except if passing to a sewage treatment system). In addition to the mining effluent guidelines, guidelines exist for accidental discharge and prevention of groundwater pollution.

The IFC EHS Guidelines for Mining contain limitations for such parameters as pH, five-day BOD, oil and grease, TSS, and temperature. **Table II-13** displays the IFC Liquid Effluent Guidelines, which summarize the maximum contaminant concentrations in liquid effluent under normal operating conditions.

Table II-13 IFC EHS Mining Effluent Guidelines

Parameter[1]	Guideline Value
TSS	50 mg//L
pH	6 to 9 standard units
Chemical oxygen demand	150 mg/L
Five-day BOD	50 mg/L
Oil and grease	10 mg/L
Arsenic	0.1 mg/L
Cadmium	0.05 mg/L
Chromium, hexavalent	0.1 mg/L
Copper	0.3 mg/L
Cyanide	1 mg/L
Cyanide free	0.1 mg/L
Cyanide WAD	0.5 mg/L
Iron	2.0 mg/L
Lead	0.2 mg/L
Mercury	0.002 mg/L
Nickel	0.5 mg/L
Phenols	0.5 mg/L
Zinc	0.5 mg/L
Temperature[2]	< 3 degrees Celsius (ºC) differential

[1] Metal concentrations represent total metals.

[2] Effluent temperature should not result in an increase of more than 3 ºC of the ambient temperature at the edge of the scientifically established mixing zone which accounts for ambient water quality, receiving water use, and assimilative capacity among other considerations.

2.2.5.3 Waste

Waste management should be planned, designed and implemented such that geotechnical risks and environmental impacts are addressed throughout the life of the mine. Wastes may include, but are not limited to, waste rock, tailings, workshop scrap, household waste, non-process related industrial waste, and waste oils and chemicals.

Solid waste disposal must be performed in an environmentally secure manner. Recycling or reclaiming material is encouraged, and, if not practical, the waste must be disposed in an environmentally acceptable manner that complies with local laws and regulations. Waste rock deposition areas should be engineered to isolate materials with high potential for generating acid leachate from oxidation or percolating water. Solvents and other hazardous materials must not be disposed of in a manner likely to result in soil, surface water, or groundwater contamination.

2.2.5.4 Illumination

Table II-14 shows the minimum average illumination limits for travel paths and work areas of the Project area.

Table II-14 IFC Mining EHS Standards for Minimum Average Illumination for Designated Mine Locations and Activities

Location/Activity	Minimum Average Illumination (Lux)
Emergency lighting	5
Walkways and passages	5 - 10
Dynamic locations (production and development areas)	5 - 50
Areas with occasional and simple manual tasks	50 - 100
Workstations and areas with medium to high precision manual tasks	150 - 400

2.2.5.5 Noise

Noise prevention and control measures will be implemented when Project noise levels exceed the noise level guidelines (**Table II-15**, **Table II-16**, and **Table II-17**) at the most sensitive point of reception. Project noise should not result in a maximum increase of three decibels (dBs) at the nearest receptor off-site. Sound level meters (Type 1 or 2) should log data at least hourly for as much as 48 hours, and be located about 1.5 meters above the ground surface and three meters from any reflecting surface.

Table II-15 IFC General EHS Noise Guidelines

Receptor	One-Hour LAeq (dBA)	
	Day (07:00 to 22:00)	**Night** (22:00 to 07:00)
Residential, institutional, educational	55	45
Industrial, commercial	70	70

Table II-16 WHO Noise Level Guidelines

Specific Environment	LAeq (dBA) [a]	Time Base (hours)	LAmax fast (dBA) [b]
Indoor dwelling and school class room	30 to 35	variable	variable
Outdoor living area	50 to 55	16	--
Industrial, commercial shopping and traffic areas, indoors and outdoors	70	24	110

Source: WHO, 1999
[a] LAeq (dBA) = long-term A-weighted sound pressure level equivalent
[b] LAmax fast (dBA) = maximum A-weighted sound pressure level at the "fast" meter setting

Table II-17 IFC General EHS Noise Limits for Various Working Environments

Location/Activity	Eight-Hour LAeq (dBA)	LAmax fast (dBA)
Heavy industry (no need for oral communication)	85	110
Light industry (decreasing need for oral communication)	50 to 65	110
Open offices, control rooms, service counters, or similar	45 to 50	--
Individual offices (no noise disturbance)	40 to 45	--
Classrooms, lecture halls	35 to 40	--
Hospitals	30 to 35	40

Workers should utilize hearing protection capable of reducing sound levels at the ear to at least 85 dBA when:

- exposed to a sound pressure level above 85 dBA more than eight hours per day;
- exposed to an instantaneous peak sound pressure level of more than 140 C-weighted sound pressure level (dBC); and
- the average maximum sound pressure level is equal to or more than 110 dBA.

Large equipment should be equipped with a soundproof cab. Workers exposed to high noise levels should have periodic hearing assessments.

2.2.5.6 Vibration

Typically, blasting activities produce the most significant vibrations at a mine. Vibrations may be minimized by: utilizing mechanical ripping instead of explosives; developing a blast design based on the results from a blasting-surfaces survey and a drill-hole survey; utilizing specific blasting pans, correct charging procedures and blast ratios; utilizing delayed/micro-delayed or electronic detonators, and specific in-situ blasting tests; implementing good vibration and overpressure control; and, adequately designing the foundations of vibrating equipment. Vibration threshold limit values are provided by the ACGIH. Exposure levels should be monitored and recorded on a daily basis.

2.2.5.7 Occupational Health and Safety Monitoring

As part of an established occupational health and safety program, monitoring should be performed by accredited professionals (e.g., certified industrial hygienists, registered occupational hygienists, certified safety professionals). These accredited professionals design, implement, monitor, and audit health and safety throughout the workplace. Proper occupational health and safety records will be maintained throughout the life of the Project.

2.2.5.8 Emergency Preparedness and Response

An Emergency Response Plan should be established in accordance with the United Nations Environment Programme Awareness and Preparedness for Emergencies at the Local Level (APPEL) for Mining (2001). Workers as well as community emergency response personnel should be trained to apply the Emergency Response Plan.

2.3 World Bank Policies

2.3.1 Anti-Corruption Strategy

The World Bank states that corruption undermines development by distorting laws and weakening the institutional foundation on which economic growth depends. Therefore, the World Bank has identified corruption as one of the greatest obstacles to the Bank's mission and purpose, which is:

- to promote open and competitive markets in developing countries;
- to support companies and other private sector partners;
- to generate productive jobs and deliver basic services; and,
- to create opportunity for people to escape poverty and improve their lives.

The World Bank's anticorruption policy comprises five key elements:

- increasing political accountability;
- strengthening civil society participation;
- creating a competitive private sector;
- establishing institutional restraints on power; and,
- improving private sector management.

2.3.1.1 Increasing Political Accountability

Political accountability is defined as the constraints placed on the behavior of public officials by organizations and constituencies that are able to apply sanctions. This largely depends on the effectiveness of the sanctions and the monitoring of public officials by accountability institutions. Sanctions can be more effective by: maintaining political competition that exposes corruption and holds candidates accountable; establishing a well-designed mechanism for political party financing; promoting the transparency of political activities through free and vibrant media; as well as establishing and enforcing rules and legal instruments to deter corrupt behavior.

2.3.1.2 Strengthening Civil Society Participation

Civil society is composed of, but not limited to, citizens groups, NGOs, trade unions, business associations, think tanks, academia, religious organizations and the media. Civil society mediates between the state and the public with a stake in good governance. When adhering to high standards of accountability, transparency and democratic management, civil society effectively: increases public awareness, adds pressure to politicians, and incorporates the various sectors which may otherwise lack representation.

2.3.1.3 Creating a Competitive Private Sector

Broad-based economic development is supported by a fair, competitive, honest and transparent private sector. However, a few powerful economic interests can, at times, strongly influence the decisions and policies of the state. Economic policy liberalization, enhanced competition, regulatory reform, good corporate governance, transnational cooperation, and the promotion of business associations, trade unions, and concerned parties may be utilized to balance economic interests.

2.3.1.4 Establishing Institutional Restraints on Power

The state, in particular, may be institutionally restrained from committing abuses by the separation of powers (e.g., executive, legislative, judicial) and the

establishment of checks and balances among these powers. Several components need be established to create an institutionally restrained state.

A system of rules is fundamental to a functioning society. As such, an independent, competent, and clean judicial system is necessary to avoid corruption. Once established, this judicial system upholds the daily rule of law. Anti-corruption laws then deter corruption and prosecute corruptors. In addition, corruption is deterred through predictable, transparent, and accountable government decision-making as well as audits by government-supported organizations with a core of strong, independent, and credible professionals in the judicial, prosecutorial, and police arms of the state. By enforcing the anti-corruption laws, the principle of justice is instilled amongst society.

2.3.1.5 Improving Private Sector Management

Another anti-corruption strategy is to reform the internal management of public resources and administration to minimize or eliminate the incentive and opportunities for corruption. Public sector finance and management reform requires:

- the institution of meritocratic systems for appointment, promotion, and performance evaluation that promote adequate pay and regularize benefits;
- enhanced transparency and accountability with respect to budget management, taxes, and customs;
- sectoral-service-delivery policy reforms; and
- service delivery decentralization held accountable through pre-established systems of financial management and auditing.

2.4 Equator Principles

The Equator Principles are voluntary international guidelines adopted by the Equator Principles Financial Institutions (EPFI)[1]. These include many financial institutions involved in project finance in the extractive sector. The Equator Principles are intended to help investors manage environmental and social risks,

[1] Financial institutions include: ABN AMRO Bank, N.W., Banco Bradesco, Banco do Brasil, Banca Intesa, Banco Itau BBA, Bank of America, BMO Financial Group, Barclays plc, BBVA, BES Group, Caja Navarra, Calyon, COBC, Citigroup Inc., Credit Suisse Group, Dexia Group, Dresdner Bank, EKF, FMO, HBOS, HSBC Group, HVB Group, ING Group, JPMorgan Chase, KBC, Manulife, MCC, Mizuho Corporate Bank, Nedbank Group, Rabobank Group, Royal Bank of Canada, Scotiabank, Standard Cahrtered Bank, The Royal Bank of Scotland, Unibanco, Wells Fargo, WestLB AG, Westpac Banking Corporation

which may be associated with international project financing. In general, the Equator Principles are derived from the IFC/World Bank requirements, particularly IFC's Performance Standards. Some of the conditions of the Equator Principles are as follows.

- The project risk has been categorized following the environmental and social screening criteria of IFC.
- An Environmental Assessment has been completed for all Category A and Category B projects.
- The Environmental Assessment report must address compliance with applicable host country laws, regulations, and permits required by the project and, at least, reference the guidelines and safeguard policies applicable under the World Bank and IFC PPAH guidelines.
- Where appropriate, an Environmental Management Plan must be prepared to address mitigation, action plans, monitoring, management of risk and schedules.
- Where appropriate, public consultation has been conducted to make the Environmental Assessment (or its summary) available to the public for a reasonable period.

Therefore, investors who adopt the voluntary Equator Principles are making a commitment to promote environmental stewardship and socially responsible development. At the same time, investors believe that following the Equator Principles will help reduce the financial and reputational risk of the projects they wish to finance.

The Equator Principles are described below:

Principle 1 - Review and Categorization: EPFI will, as part of its internal social and environmental review and due diligence, categorize the project based on potential impacts and risks in accordance with the environmental and social screening criteria of IFC.

Principle 2 - Social and Environmental Assessment: For a project assessed as being a Category A (with potential significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented) or Category B (with potential limited adverse social or environmental impacts that are fewer in number, generally site-specific, largely reversible and readily addressed through mitigation measures), the borrower is expected to conduct a Social and Environmental Assessment process to address relevant social and environmental impacts and risks, and propose relevant mitigation and management measures.

Principle 3 - Applicable Social and Environmental Standards: For projects located in non-member countries of the Organization for Economic Cooperation and Development (OECD), like Mongolia, as well as OECD countries not designated

as high-income, the SEIA will refer to the then applicable IFC Performance Standards and applicable industry-specific EHS Guidelines. The SEIA will establish overall compliance with, or justified deviation from, the respective Performance Standards and EHS Guidelines. In addition, the SEIA process will address compliance with relevant host country laws, regulations and permits that pertain to social and environmental matters.

Principle 4 - Action Plans and Management System: For all Category A and Category B projects located in non-OECD countries, and those located in OECD counties not designated as high-income, the borrower will prepare an Action Plans to address the relevant findings and conclusions of the SEIA, and describe and prioritize the actions necessary to implement mitigation measures, corrective actions, and monitoring measures. The borrower will build on, maintain or establish a Social and Environmental Management System that addresses the management of these impacts, risks, and corrective actions required to comply with applicable host country social and environmental laws and regulations, and requirements of the applicable IFC Performance Standards and EHS Guidelines.

Principle 5 - Consultation and Disclosure: For all Category A and, as appropriate, Category B projects located in non-OECD countries, and those located in OECD countries not designated as high-income, the government, borrower, or third-party expert will consult with project-affected communities in a structured and culturally appropriate manner. For projects with significant adverse impacts on affected communities, the process will ensure their free, prior, and informed consultation and facilitate their informed participation as a means to establish whether a project has adequately incorporated the affected communities' concerns. This requires that the SEIA documentation and Action Plans, or non-technical summaries thereof, be accessible to the public for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The borrower will record and address the process and results of the consultation, including agreements. For projects with adverse social and environmental impacts, disclosure should occur early in the SEIA process and, in any event, before project construction commences, and on an ongoing basis.

Principle 6 - Grievance Mechanism: For all Category A and, as appropriate, Category B projects located in non-OECD countries, and those located in OECD countries not designated as high-income, the borrower will, scaled to the risks and adverse impacts of the project, establish a grievance mechanism as part of the management system to ensure that consultation, disclosure and community engagement continues throughout construction and operation of the project. The borrower will inform the affected communities about the mechanism in the course of its community engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible to all segments of the affected communities.

Principle 7 - Independent Review: For all Category A and, as appropriate, Category B projects, an independent social or environmental expert not directly associated with the borrower will review the SEIA, Action Plans and consultation process documentation in order to assist EPFI's due diligence and assess compliance with the Equator Principles.

Principle 8 - Covenants: For Category A and B projects, the borrower will covenant in financing documentation: (a) compliance with all relevant host country social and environmental laws, regulations and permits in all material respects; (b) compliance with the Action Plans, where applicable, during the construction and operation of the project in all material respects; and (c) delivery on at least an annual basis of periodic reports that are prepared by in-house staff or third party experts and that (i) document compliance with the Action Plans, where applicable, and (ii) provide representation of compliance with relevant local, state and host country social and environmental laws, regulations and permits; and (d) decommissionment of the facilities, where applicable and appropriate, in accordance with an agreed decommissioning plan.

Principle 9 - Independent Monitoring and Reporting: For all Category A and, as appropriate, Category B projects, EPFI will require appointment of an independent environmental and/or social expert, or require that the borrower retain qualified and experienced external experts to verify its monitoring information that would be shared with EPFI.

Principle 10 - EPFI Reporting: Relating to EPFI's own reporting commitments under the Equator Principles, each EPFI adopting the Equator Principles commits to report publicly at least annually about its implementation processes and experience of the Equator Principles, taking into account appropriate confidentiality considerations.

2.5 Voluntary Principles on Security and Human Rights

The Voluntary Principles on Security and Human Rights were developed to "guide companies in monitoring the safety and security of their operations within an operating framework that ensures respect for human rights and fundamental freedoms." These voluntary principles were developed by the governments of the United States, the United Kingdom, Norway and the Netherlands, plus companies operating in the extractive and energy sectors and non-governmental organizations, all with an interest in human rights and corporate social responsibility. The criteria for participation were finalized in 2007.

WM Mining Company, LLC will maintain its own security staff to provide security for the Project site, its activities and workers. The potential sensitivities associated with the possible presence of informal artisanal mining activities, presence of informal land users within the Project boundaries, and potential for

land-use conflicts, indicate the need to consider and adhere to good international practices on security and human rights. This includes a commitment by WMMC to follow the "Voluntary Principles on Security and Human Rights."

The Voluntary Principles recognize that governments have primary responsibility to promote and protect human rights and that all parties to a conflict are obliged to observe applicable international humanitarian law. Applicable international standards include the United Nations Code of Conduct for Law Enforcement Officials and the United Nations Basic Principles on the Use of Force and Firearms by Law Enforcement Officials.

The Voluntary Principles regarding security and human rights in the extractive sector fall into three categories: risk assessment, relations with public security, and relations with private security, as detailed below.

2.5.1 Risk Assessment

Accurate and effective risk assessments should consider the following factors:

- Identification of security risks. Security risks can result from political, economic, civil or social factors. Moreover, certain personnel and assets may be at greater risk than others. Identification of security risks allows a company to take measures to minimize risk and to assess whether company actions may heighten risk.
- Potential for violence. Depending on the environment, violence can be widespread or limited to particular regions, and it can develop with little or no warning. Civil society, home and host government representatives, and other sources should be consulted to identify risks presented by the potential for violence. Risk assessments should examine patterns of violence in areas of company operations for educational, predictive, and preventative purposes.
- Human rights records. Risk assessments should consider the available human rights records of public security forces, paramilitaries, local and national law enforcement, as well as the reputation of private security. Awareness of past abuses and allegations can help companies to avoid recurrences as well as to promote accountability. Also, identification of the capability of the above entities to respond to situations of violence in a lawful manner (i.e., consistent with applicable international standards) allows companies to develop appropriate measures in operating environments.
- Rule of law. Risk assessments should consider the local prosecuting authority and judiciary's capacity to hold accountable

those responsible for human rights abuses and for those responsible for violations of international humanitarian law in a manner that respects the rights of the accused.

- Conflict analysis. Identification of and understanding the root causes and nature of local conflicts, as well as the level of adherence to human rights and international humanitarian law standards by key actors, can be instructive for the development of strategies for managing relations between the company, local communities, company employees and their unions, and host governments. Risk assessments should also consider the potential for future conflicts.
- Equipment transfers. Where companies provide equipment (including lethal and non-lethal equipment) to public or private security, they should consider the risk of such transfers, any relevant export licensing requirements, and the feasibility of measures to mitigate foreseeable negative consequences, including adequate controls to prevent misappropriation or diversion of equipment which may lead to human rights abuses. In making risk assessments, companies should consider any relevant past incidents involving previous equipment transfers.

2.5.2 Interactions between Companies and Public Security

In an effort to reduce the risk of abuses and to promote respect for human rights generally, the following Voluntary Principles can guide relationships between companies and public security regarding security provided to companies:

2.5.3 Security Arrangements

- Companies should consult regularly with host governments and local communities about the impact of their security arrangements on those communities.
- Companies should communicate their policies regarding ethical conduct and human rights to public security providers, and express their desire that security be provided in a manner consistent with those policies by personnel with adequate and effective training.
- Companies should encourage host governments to permit making security arrangements transparent and accessible to the public, subject to any overriding safety and security concerns.

2.5.4 Deployment and Conduct

- The primary role of public security should be to maintain the rule of law, including safeguarding human rights and deterring acts that threaten company personnel and facilities. The type and number of public security forces deployed should be competent, appropriate and proportional to the threat.
- Equipment imports and exports should comply with all applicable law and regulations. Companies that provide equipment to public security should take all appropriate and lawful measures to mitigate any foreseeable negative consequences, including human rights abuses and violations of international humanitarian law.
- Companies should use their influence to promote the following principles with public security: (a) individuals credibly implicated in human rights abuses should not provide security services for companies; (b) force should be used only when strictly necessary and to an extent proportional to the threat; and (c) the rights of individuals should not be violated while exercising the right to exercise freedom of association and peaceful assembly, the right to engage in collective bargaining, or other related rights of company employees as recognized by the Universal Declaration of Human Rights and the ILO's Declaration on Fundamental Principles and Rights at Work.
- In cases where physical force is used by public security, such incidents should be reported to the appropriate authorities and to the company. Where force is used, medical aid should be provided to injured persons, including to offenders.

2.5.5 Consultation and Advice

- Companies should hold structured meetings with public security on a regular basis to discuss security, human rights and related work-place safety issues. Companies should also consult regularly with other companies, host and home governments, and civil society to discuss security and human rights. Where companies operating in the same region have common concerns, they should consider collectively raising those concerns with the host and home governments.
- In their consultations with host governments, companies should take all appropriate measures to promote observance of applicable international law enforcement principles, particularly those reflected in the United Nations Code of Conduct for Law

Enforcement Officials and the United Nations Basic Principles on the Use of Force and Firearms.

- Companies should support efforts by governments, civil society and multilateral institutions to provide human rights training and education for public security as well as their efforts to strengthen state institutions to ensure accountability and respect for human rights.

2.5.6 Responses to Human Rights Abuses

- Companies should record and report any credible allegations of human rights abuses by public security in their areas of operation to appropriate host government authorities. Where appropriate, companies should urge investigation and that action be taken to prevent any recurrence.
- Companies should actively monitor the status of investigations and press for their proper resolution.
- Companies should, to the extent reasonable, monitor the use of equipment provided by the company and to investigate properly situations in which such equipment is used in an inappropriate manner.
- Every effort should be made to ensure that information used as the basis for allegations of human rights abuses is credible and based on reliable evidence. The security and safety of sources should be protected. Additional or more accurate information that may alter previous allegations should be made available as appropriate to concerned parties.

2.5.7 Interactions between Companies and Private Security

Where host governments are unable or unwilling to provide adequate security to protect a Company's personnel or assets, it may be necessary to engage private security providers as a complement to public security. In this context, private security may have to coordinate with state forces, (law enforcement, in particular) to carry weapons and to consider the defensive local use of force. Given the risks associated with such activities, the following Voluntary Principles can guide private security conduct.

- Private security should observe the policies of the contracting company regarding: ethical conduct and human rights; the law and professional standards of the country in which they operate; emerging best practices developed by industry, civil society and governments; and promote the observance of international humanitarian law.

- Private security should maintain high levels of technical and professional proficiency, particularly with regard to the local use of force and firearms.
- Private security should act in a lawful manner. They should exercise restraint and caution in a manner consistent with applicable international guidelines regarding the local use of force, including the United Nations Principles on the Use of Force and Firearms by Law Enforcement Officials and the United Nations Code of Conduct for Law Enforcement Officials, as well as with emerging best practices developed by companies, civil society, and governments.
- Private security should have policies regarding appropriate conduct and local use of force (e.g., rules of engagement). Practice under these policies should be capable of being monitored by companies or, where appropriate, by independent third parties. Such monitoring should encompass: detailed investigations into allegations of abusive or unlawful acts; the availability of disciplinary measures sufficient to prevent and deter; and procedures for reporting allegations to relevant local law enforcement authorities when appropriate.
- All allegations of human rights abuses by private security should be recorded. Credible allegations should be properly investigated. In those cases where allegations against private security providers are forwarded to the relevant law enforcement authorities, companies should actively monitor the status of investigations and press for their proper resolution.
- Consistent with their function, private security should provide only preventative and defensive services and should not engage in activities exclusively the responsibility of state military or law enforcement authorities. Companies should designate services, technology and equipment capable of offensive and defensive purposes as being for defensive use only.
- Private security should: (a) not employ individuals credibly implicated in human rights abuses to provide security services; (b) use force only when strictly necessary and to an extent proportional to the threat; and (c) not violate the rights of individuals while exercising the right to exercise freedom of association and peaceful assembly, to engage in collective bargaining, or other related rights of company employees as recognized by the Universal Declaration of Human Rights and ILO's Declaration on Fundamental Principles and Rights at Work.
- In cases where physical force is used, private security should properly investigate and report the incident to the company. Private security should refer the matter to local authorities and/or take disciplinary action where appropriate. Where force is used,

medical aid should be provided to injured persons, including offenders.

- Private security should maintain the confidentiality of information obtained as a result of its position as security provider, except where to do so would jeopardize the principles contained herein.

To minimize the risk that private security exceed the authority as providers of security, and to promote respect for human rights generally, the following additional Voluntary Principles and guidelines have been developed:

- Where appropriate, companies should include the principles outlined above as contractual provisions in agreements with private security providers and ensure that private security personnel are adequately trained to respect the rights of employees and the local community. To the extent practicable, agreements between companies and private security should require investigation of unlawful or abusive behavior and appropriate disciplinary action. Agreements should also permit termination of the relationship by companies where there is credible evidence of unlawful or abusive behavior by private security personnel.

Companies should consult and monitor private security providers to ensure they fulfill their obligation to provide security in a manner consistent with the principles outlined above. Where appropriate, companies should seek to employ private security providers that are representative of the local population.