

ATTACHMENT E

EVALUATION OF BACKWASH WATER  
IN THE HUMBOLDT TAILINGS DISPOSAL FACILITY

To be conservative, Eagle evaluated the maximum potential backwash water volume (based on actual capacity of domestic well pump) to determine if backwash would affect the expected quality of the WTP influent water. This evaluation included the following assumptions:

1. Worst case volume of backwash water: 8,820 gpd (expected volume: 3,000 gallons every 60 days)
2. Arsenic concentration: 119 ppb
3. Manganese concentration: 19 ppm
4. Volume for mixing: 1.1 billion gallons (top 50 feet of HTDF)

Utilizing these numbers provided a very conservative water quality estimate for the WTP influent resulting in an arsenic concentration increase from 2.1 ppb in the original application to 2.5 ppb, and a manganese increase from 646 ppb to 701 ppb. Because this is an estimate of influent concentration, and because this extremely minimal increase is within the WTP design capabilities, the quality of the predicted effluent will be unchanged.

These expected concentrations are being calculated conservatively based on the assumption that all metals are in the dissolved phase. More realistically, metals in the backwash will be in the solid phase and settle in the HTDF as solids instead of acting as dissolved concentrations.

February 19, 2014

Michigan Department of Environmental Quality  
Water Resources Division; Permits Section  
P.O. Box 30458  
Lansing, MI 48909-7958

**RE: Eagle Mine, LLC. NPDES Permit MI0058649 Renewal  
Humboldt Mill Facility**

Eagle Mine, LLC (Eagle) was granted a National Pollutant Discharge Elimination System (NPDES) permit (MI0058649) for the Humboldt Mill Facility on February 9, 2010. This permit was issued in response to an application submitted by Eagle in 2008 which was developed based on conceptual design detail. As you are aware, the permit authorized discharge from a water treatment plant (WTP) located at the north end of the Humboldt Tailings Disposal Facility (HTDF) through a pipeline to a receiving wetland adjacent to the facility and contiguous to the Middle Branch of the Escanaba River.

Although Eagle has not yet commenced discharge of process wastewater under MI0058649, a new permit application is required prior to April 4, 2014. The WTP is currently under construction, and the facility is scheduled to begin commissioning in May 2014 with full operation and process discharge beginning in August 2014.

The purpose of this letter is to transmit a renewal application and identify design changes from the original 2008 NPDES permit application that are relevant to the permit renewal. To that end, I have attached the following information to assist the Department in evaluating a renewal of NPDES permit MI0058649:

- Application form EQP 4659
- Fee, \$750
- Revised wastewater treatment additives listing and safety data sheets (**Attachment A**).
- Attached analysis: HTDF surface water quality samples collected within the previous 3 years (**Attachment B**).
- Antidegradation statement for increased discharge rate (**Attachment C**).
- Copy of the water treatment plant process design (**Attachment D**).
- Supplemental analysis of backwash/assay laboratory water discharge to the HTDF waste stream (**Attachment E**).

The following provides a summary of some of the changes/updates reflected in the renewal permit application. (Please note that the original 2008 NPDES permit application has not been re-produced in full here, but is unchanged with the exceptions noted below.)

#### *Process Description*

As described below, the Humboldt Mill will generate three process wastewater streams<sup>1</sup> that will be conveyed to the HTDF for management and then discharged following treatment by the WTP under NPDES permit #MI0058649.

#### *Stream 1: Tailings Slurry*

The mill process will generate a waste stream in the form of tailings which will then be discharged to the HTDF via subaqueous tailings disposal lines. The ore concentrating process will result in a non-economic

<sup>1</sup> There are other wastewater streams generated at the mill facility, but these are not subject to NPDES permit requirements. All sumps in maintenance areas which could have a hydrocarbon component are self-contained and emptied to a vacuum truck for disposal at a local wastewater authority. All sanitary wastewater is discharged to a septic system.



ground host rock, referred to as tailings. Tailings will be thickened to a slurry, which have previously been permitted for disposal in the HTDF. Building sumps and floor drains in each facility will be either re-directed to the milling process for concentrating, or connected to the tailings thickening process. Additional details on the nature of the Humboldt Mill process operations can be found in Eagle's 2008 NPDES permit application. The quality and quantity of this waste stream is unchanged from the previous NPDES application.

#### *Stream 2: Assay Laboratory Water*

Previously, the assay laboratory sinks and floor sump were planned to be plumbed to the tailings thickener line, and this waste stream was included in the expected tailings quantity/quality analysis of the 2008 NPDES discharge permit. During rehabilitation of the mill, the existing sump line from the laboratory to the tailings thickener area was abandoned, and reinstatement of this line may not be feasible, although Eagle's engineers are still exploring the possibility. Another method of directing this waste stream to the HTDF is through the backwash water waste disposal for which Eagle is also seeking a permit (see below). As such, Eagle has provided information on this waste stream for the Department's consideration because the method of conveying the assay laboratory water to the HTDF may change.

The onsite metallurgical assay laboratory conducts ore, concentrate, and tailings quality control analysis. These materials are finely ground and dissolved prior to analysis. After analysis, these samples are normally disposed down the laboratory sink and conveyed to a sump. The samples contain single parts per billion (ppb) levels of metals. Other laboratory activities (e.g., handwashing, etc.) will also generate water which is discharged to the sump. Approximately 50 gallons per day (or 18,250 gallons per year) of wastewater will be discharged to the sump. When the sump is full, a level switch would transfer the sump to either the backwash storage tank (explained below) or the tailings thickener line. Floor drains in the assay laboratory are planned to be plumbed to the backwash water system tank, where they will be held before being emptied to the HTDF.

#### *Stream 3: Backwash Water*

Eagle Mine is a Type IIb domestic water supplier of potable water to its facility. Raw water from a groundwater well at the site requires treatment to remove levels of arsenic, manganese, and iron. Eagle has permitted and installed a treatment system for this domestic water supply. The treatment system filters require backwashing approximately every 60 days of operation of the system. Each backwash cycle will generate approximately 3,000 gallons of backwash water, which will be conveyed to the HTDF via existing infrastructure. Under average operating conditions, approximately 20,000 gallons of backwash water will be discharged to the HTDF annually.

Eagle based the design of its WTP to treat the worst case expected effluent water quality under a scenario where all water in the HTDF would fully mix. Eagle conducted a supplemental analysis of the effect of adding backwash water plus assay laboratory water to the HTDF waste stream to ensure that the WTP design basis would not be affected. This analysis was limited to arsenic and manganese since they are the primary constituents of the backwash water. Considering that other assay laboratory constituents are in the single ppb range, they are negligible compared to the backwash water concentrations and have not been considered. The results of our analysis are included in **Attachment E**.

#### *Water Treatment Additives*

The original NPDES permit application submitted in 2008 included a list of water treatment additives that was based on a conceptual design and bench testing. Eagle's design contractor finalized the design for the WTP in the fall of 2013, and changes have been made to the scheduled water treatment chemicals. Please see the attached **Table 1.1** which details the intended water treatment chemical usage. Although the treatment additives have been changed, the treatment technology originally specified has not changed.

#### *Discharge Quantity and Outfall Location*

Eagle Mine seeks to renew MI0058649 with an increased daily maximum permitted discharge of up to 1.4 MGD. This flow rate is optimal for annual average surface water level control in the HTDF, based on Eagle's experience managing seasonal changes in surface water levels over the past 11 months. The water treatment plant has been sized to this capacity using the treatment technology originally specified.

Eagle Mine also seeks to permit a second discharge point, referenced as "Proposed Outfall 002", on the attached site layout figure. Outfall 002 would be constructed to discharge to the Escanaba River just north of Highway 41 near County Road FX (Wolf Lake Road). (See the attached figure for an approximate location.) Eagle is currently evaluating the possibility of converting an intake structure that was used by Cleveland Cliffs during its former pellet plant operations to a properly designed and constructed outfall. In addition, the existing pipeline would be rehabilitated and utilized from the intake structure to the point where the pipeline converges with Eagle property near the WTP. This proposed change will provide Eagle with the flexibility to manage some or all of the daily WTP discharge on a seasonal basis to either Outfall 001 or Proposed Outfall 002.

#### *Storm Water Discharge and Monitoring*

Eagle holds a storm water Certificate of Coverage (COC) for the land surrounding the HTDF which was obtained during property purchase after 2008. This permit (MIS210034) authorizes storm water discharge from the HTDF during construction/mill rehabilitation activities<sup>2</sup>.

Eagle is in the process of completing a required Short Term Storm Water Characterization Study (STSWCS). (Additionally, Eagle submitted a Storm Water Monitoring Plan (SWMP) in August 2010 as required by Permit #MI0058649 and to satisfy the SWMP requirements associated with Eagle's Part 632 permit.) Eagle intends to complete the STSWCS prior to the July 1, 2014 deadline. After startup of the WTP and milling operations, a termination request for MIS210034 will be submitted and the Storm Water Pollution Prevention Plan (SWPPP) for MI0058649 will be modified to reflect the HTDF so that the entire facility (mill and HTDF) are consolidated in a single SWPPP.

The Humboldt Mill site has undergone significant civil infrastructure and storm water drainage changes since the STSWCS and SWMP were developed to ensure that storm water is properly captured and directed to either the HTDF or a storm water basin on the property. These changes have resulted in changes to some of the SW outfalls identified in the STSWCS and SWMP as described below.

- Location HMWQ-001, a culvert which formerly drained the mill site, no longer receives storm water drainage from the Humboldt facility. This area receives water from a ditch along County Road 601 and from the immediate entrance to the Humboldt Administrative office. This entrance is separate from the entrance which will be used to support mill operations. Eagle believes that this monitoring location is not representative of storm water from Eagle's activities at the Humboldt Mill and requests to have this location removed from the monitoring requirements (see the attached site plan for the location of this culvert).
- Eagle intends to continue to include location HMWQ-004 (also shown in the attached figure) in the STSWCS as well as the SWMP under the Part 632 permit. This culvert may receive occasional discharge from the storm water basin located on the property.
- Location HMWQ-005 (not shown on figure, but was in the area of the new Concentrate Load Out Building) was located on the main Humboldt Mill property near the former pellet plant. Due to new building

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<sup>2</sup> This storm water discharge is also permitted under MI0058649 until discharge of tailings to the HTDF begins.



construction and re-configuration of storm water collection at the site, this storm water discharge location no longer exists. Eagle requests to have this location removed from the required storm water monitoring.

- Storm water discharge from the north end of the HTDF was previously characterized at location HMP-009. With construction of the cut off wall, the HTDF level is now controlled via mechanical pumping with discharge at approximately the same location. This discharge is subject to routine monitoring pursuant to a Section 308(a) Request from the US EPA (see the attached site plan for the outfall location).

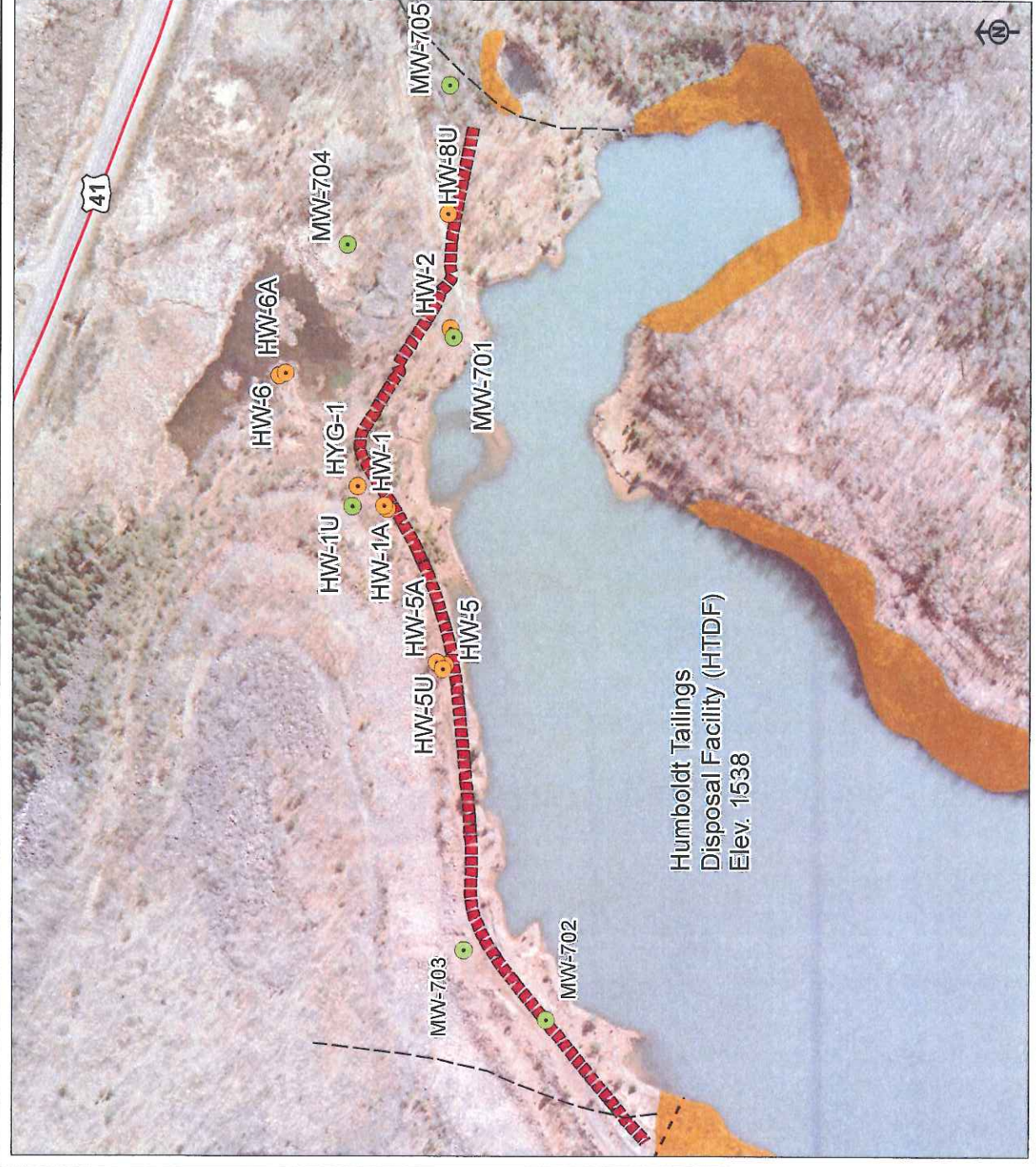
In summary, storm water currently leaves the property at two locations: HMWQ-004 and HMP-009. During operations, HMP-009 will be eliminated and replaced by Outfall 001/Proposed Outfall 002.

If you have questions concerning this submittal please contact me at 906-339-7029.

Sincerely,



Jennifer Nutini  
Environmental Engineer



**MONITORING WELL NETWORK  
PART 632 COMPLIANCE PROPOSED  
LOCATIONS (NORTH END OF HTDF)**

**Legend**

- Newly Installed Well
- Pre-Existing Well
- Estimated Limit of  
Aquifer
- ▬▬▬ Containment Wall
- ▬▬▬ Flow Divide
- ▬▬▬ Bedrock Outcrop
- ▬ Highway

**Reference**

Data provided by: Eagle Mine,  
North Jackson Company,  
Projection & Datum: UTM NAD 83 Zone 16N  
Aerial Photo: 2006

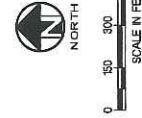
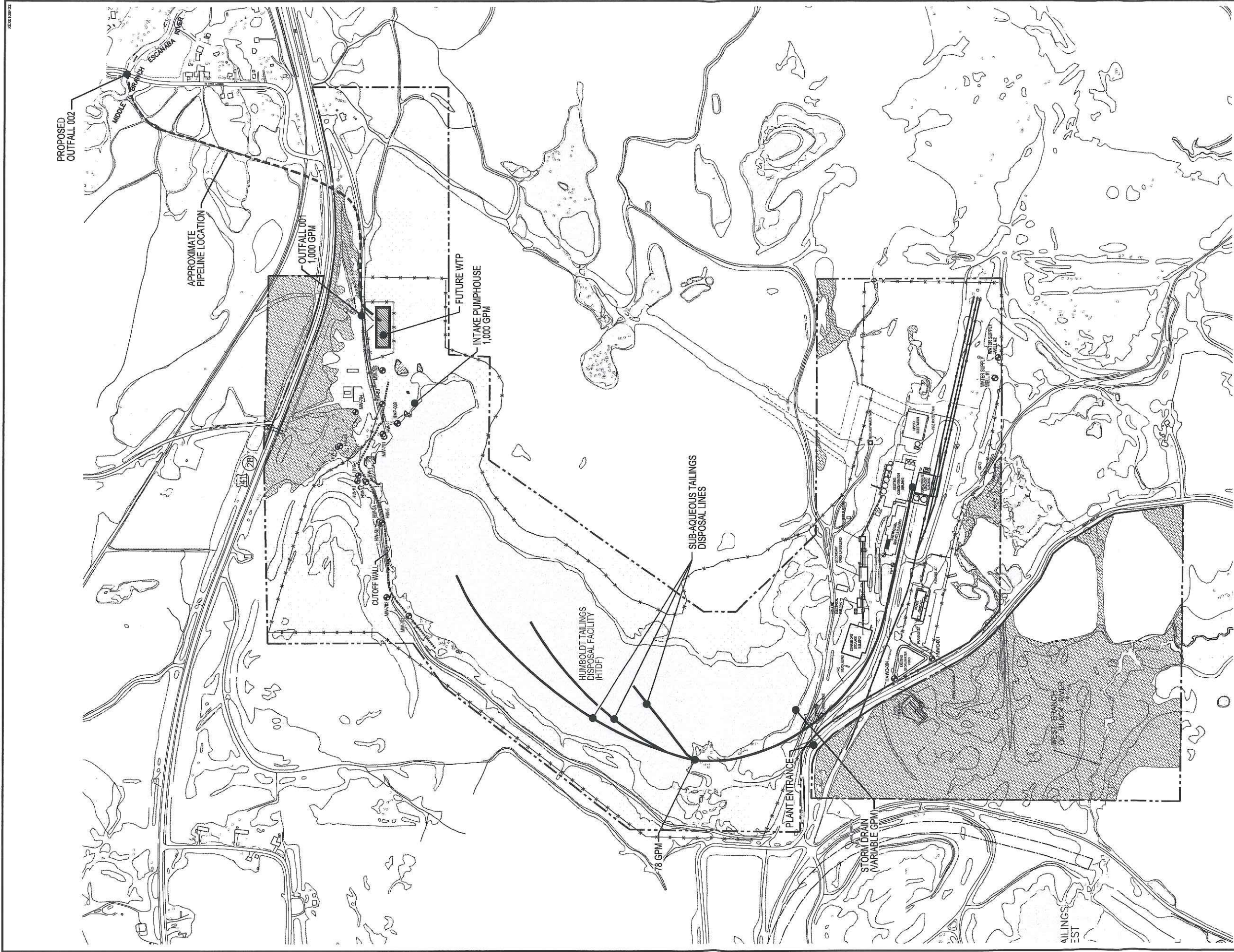


**Eagle Mine**  
humboldt.mine.com

North Jackson Company  
ENVIRONMENTAL SCIENCE & ENGINEERING  
**Figure: 1**

Humboldt Tailings  
Disposal Facility (HTDF)  
Elev. 1538

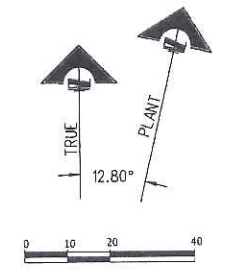
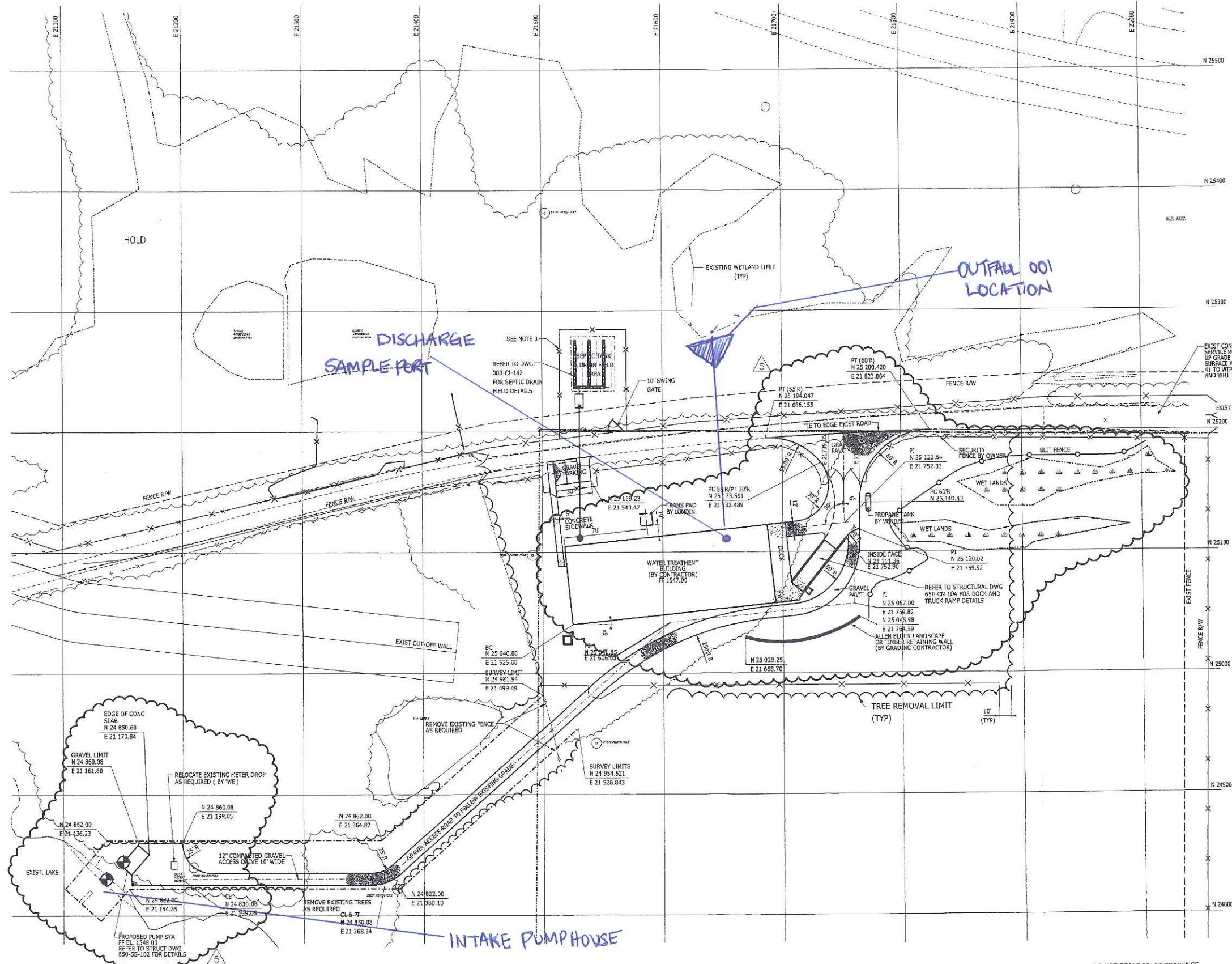




- LEGEND:**
- - MONITORING WELL / GROUNDWATER MONITORING LOCATION
  - ▨ - WETLANDS
  - - DRAINS TO HTDF
  - - RAILROAD
  - - FENCE
  - - EAGLE MINE PROPERTY BOUNDARY

SHEET NUMBER: <b>1</b>	PROJECT: <b>KEX-0109</b>	CAD FILE: KEX0807	NO.	REVISIONS	DATE
		LAST EDIT: 02/02/2014			
DRAWN BY: CWN		FLOT SCALE: 1:1			
FEBRUARY 2014					
EAGLE MINE, LLC HUMBOLDT MILL FACILITY HUMBOLDT TOWNSHIP, MARQUETTE CO., MICHIGAN		NPDES PERMIT RENEWAL MI0058649			
HORIZON ENVIRONMENTAL		4771 50th STREET SE, SUITE ONE - GRAND RAPIDS, MI 49512 616 554.3210 - FAX 616 554.3211 - www.HORIZONENV.com			





- NOTES:**
- COORDINATES AND ELEVATIONS SHOWN ON DRAWINGS ARE BASED ON A MODIFIED STATE PLANE COORDINATE SYSTEM WHICH IS SITE SPECIFIC.
  - FOR LEGEND, GENERAL NOTES, AND ABBREVIATIONS REFER TO DWG 000-CI-121
  - PERIMETER SECURITY FENCE AND GATES SHOWN FOR INFORMATION PURPOSES ONLY. REFER TO DWG 000-CI-123 FOR FENCE LAYOUT AND GATE SIZES.

*J. M. Howard*  
 21 Oct 13  
 PROFESSIONAL ENGINEER  
 STATE OF SOUTH CAROLINA  
 LICENSE NO. 12077

DO NOT SCALE 11x17 DRAWINGS

REFERENCES		REFERENCES		REVISIONS					REVISIONS					SCALE: 1"=40'		DATE	
DWG. NO.	TITLE	DWG. NO.	TITLE	NO.	DESCRIPTION	BY	APP'D	DATE	OWNER	NO.	DESCRIPTION	BY	APP'D	DATE	OWNER	DESIGNED BY	DATE
				5	ADDED NEW WET LANDS LIMITS.	JC	JBC	21OCT13	N/A	2	REV'D SEPTIC SYSTEM AREA LOCATION	JC	LDC	22JUL13	WDE	HWB	14FEB13
					REV'D GRADING, LOCATED PUMP HOUSE.					1	REV'D WTP LAYOUT 110' X 75'	JC	JHC	01MAY13	WDE	HWB	14FEB13
				4	REV'D BLDG SIZE	JC	JB	16AUG13	WDE	0	ISSUED FOR CONSTRUCTION	TH	JHC	11APR13	WDE	JC	14FEB13
				3	RE-DESIGNED WTP AREA	JC	JB	15AUG13	WDE	P2	ISSUED FOR APPROVAL	TH	JC/RT	20FEB13	WDE	JC	20FEB13
										P1	ISSUED FOR SQUAD CHECK	JC		14FEB13	WDE		20FEB13

**FLUOR**  
 100 Floor Daniel Drive  
 Greenville, SC 29607  
 864-281-4400  
 www.fluor.com

**KENNECOTT EAGLE MINERALS**  
 EAGLE DEVELOPMENT PROJECT  
 GENERAL SITE  
 WATER TREATMENT BUILDING  
 SITE PLAN

JOB NO. A6ED  
 DWG NO. 000-CI-158  
 REV NO. 5  
 DATE 21OCT13