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**ANALYSIS OF BROWNFIELD CLEANUP ALTERNATIVES**

**FORMER LEELANAU COUNTY GOVERNMENT COMPLEX**

**301 E. CEDAR ST.**

**LELAND, MICHIGAN**

**DRAFT**

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## INTRODUCTION AND BACKGROUND

### Location

The property that is the subject of this *Analysis of Brownfield Cleanup Alternatives* (ABCA) is the Former Leelanau County Government Complex site located at 301 E. Cedar St., Leland, Michigan. Refer to Figure 1 in Appendix A for a location map. The property is situated within an area of primarily residential development within the unincorporated Village of Leland. The Leland River defines the western property boundary; the Leland River flows in a northerly direction, eventually emptying into Lake Michigan approximately 0.25 miles northwest of the site.

The property currently consists of site condominiums and will be separated into nine legal parcels occupying a combined approximately 2.8 acres. It is currently owned by the Leelanau County Brownfield Redevelopment Authority (LCBRA). The LCBRA has entered into a purchase agreement for the sale of the property to a developer who will subsequently sell eight approximately ¼ acre residential lots to be developed with private residences by individual home owners.

Leelanau County is the recipient of a grant from the Brownfield Revolving Loan Fund of the United States Environmental Protection Agency (“EPA”) and is specifically authorized to make such loans pursuant to Act 381, and Section 104(k) of the Comprehensive Environmental Response, Compensation and Liability Act (“CERCLA”), 42 U.S.C. §9604(k), as amended by the Small Business Liability Relief and Brownfields Revitalization Act of 2001.

This ABCA was prepared to support a loan from Leelanau County to the LCBRA to conduct remedial activities associated with the residential redevelopment of the site. Environmental assessments of the site have identified metals impact to shallow soils at select locations. The identified contaminant conditions represent a hindrance to the proposed residential redevelopment of the site. This ABCA was prepared to evaluate cleanup options supportive of the proposed residential redevelopment of the site.

### Previous Uses of Site

Historic data sources indicate that the site was developed circa 1870 as a general store and storage yard for stockpiled cordwood used in iron smelting kilns for the Leland Iron Works (which was located off site). In 1882, Leelanau County started to use the Government Complex for various government offices. These offices included, but were not limited to, the 86th District and 13th Circuit Courts, Administration, MSU Extension, Inspections, Prosecutor’s office and other

County service departments. As of September 2007, the buildings located on the site were in the process of being vacated; the County had completely moved operations from the property by early February 2008.

A developer acquired the site for residential development under a land contract from the LCBRA with the intent to redevelop this site with residential condominiums. Phase II Environmental Site Assessments (including soil and groundwater investigations), asbestos abatement and demolition were completed on the subject property between 2008 and 2011 in support of the proposed redevelopment. The proposed development did not move forward due to the developer default on the Land Contract and the property subsequently reverted back to the LCBRA. The site is currently vacant; except for the continued presence of the historic jail. Refer to Figure 2, Appendix A for a site plan detailing current site conditions.

### **Past Site Assessment Findings**

Multiple environmental assessments have previously been conducted on the subject property including:

- MDEQ Brownfield Redevelopment Assessment Report (MIB000000134), Leelanau County Courthouse Campus, 301 E. Cedar St., Leland, Michigan, August 28, 2007;
- MDEQ Brownfield Redevelopment Assessment Report (MIB000000137), River Office, 112 S. Chandler St., Leland, Michigan, September 5, 2007;
- Phase I ESA, Former Leelanau County Complex Property, 10 Parcels, Unincorporated Village of Leland, Leland Township, Leelanau County, Michigan, June 2008, Otwell Mawby, P.C.;
- Phase II ESA, Former Leelanau County Complex, Unincorporated Village of Leland, Leelanau County, Michigan, September 15, 2008, Envirologic Technologies, Inc.;
- Aquifer Analysis and Pump Testing – Preliminary Proposed Site Condominium (Rivertown Cottages & Rivertown Leland), Leland Township, April 6, 2010, Benzie-Leelanau District Health Department;
- Incremental Sampling Methodology (ISM) Soil Sampling, Former Leelanau County Complex, Unincorporated Village of Leland, Leelanau County, Michigan, July/August, 2015 (Envirologic Technologies, Inc.). Conducted in support of informing clean-up options relative to the previously identified contaminant conditions and the proposed residential redevelopment of the site.

**MDEQ Brownfield Redevelopment Assessment, Former Leelanau County Govt. Complex – August 28, 2007**

At the request of Leelanau County, the MDEQ completed a Brownfield Redevelopment Assessment (BRA) of the Leelanau County Government Complex (MIB000000134). The BRA was completed in order to assess the potential for impact to the site in association with historic Leelanau County Government operations. The BRA consisted of the collection of sixteen (16) surficial soil samples (SS); thirteen soil samples below the surface collected via Geoprobe® boring installation (SB), and twelve groundwater samples collected from 1” temporary monitoring wells. The sample locations were selected in order to characterize the site in association with former County operations; in particular as it pertains to the former Courthouse and County Jail.

The BRA sampling results indicated the presence of select contaminants in soil and groundwater on site at concentrations in excess of MDEQ Residential cleanup criteria. The 2007 BRA demonstrates that the Former Leelanau County Government Complex site meets the definition of a “facility” as defined by Part 201 of NREPA.

The primary contaminants of concern identified in the BRA were metals in shallow soil (SS) samples. No contaminants of concern were identified at “facility” concentrations in the deeper soil (SB) samples. Select metals and the petroleum-based volatile organic compounds (VOCs) 1,2,4-trimethylbenzene and 1,3,5-trimethylbenzene were identified in groundwater at select locations. The identification of petroleum-based VOCs in groundwater was limited to a relatively small area north of the former Sheriff’s Office associated with the former presence of a gasoline underground storage tank (UST) that has been removed from the site. The concentrations of TMBs in shallow groundwater exceeded the Residential Drinking Water criteria.

The concentrations of “facility” contaminants exceeded primarily Residential Drinking Water/Drinking Water Protection criteria as well as Groundwater-Surface Water Interface/Groundwater-Surface Water Interface Protection (GSI/GSIP) criteria.

The concentrations of lead identified in shallow soil at two locations on the north side of the historic jail (SS-9 & SS-12) exceed the MDEQ Residential Direct Contact criterion. The potential for unacceptable health exposures relative to Direct Contact with shallow soils has been identified as a hindrance to the proposed residential redevelopment of the project site.

## **MDEQ Brownfield Redevelopment Assessment, River Office – September 5, 2007**

At the request of Leelanau County, the MDEQ completed a Brownfield Redevelopment Assessment (BRA - MIB000000137) of the former Leelanau Enterprise/Print Shop property located west of Chandler St. along the eastern bank of the Leland River adjacent to the former Leelanau County Government Complex. The property was vacant until 1961 when a single story building was constructed for use as a commercial print shop. The site continued to be utilized for commercial printing operations until 2000. The building was subsequently utilized by Leelanau County as administrative office space. The subject building was razed along with the additional buildings associated with the Former Leelanau County Government Complex. The BRA was completed in order to assess the potential for impact to the site in association with historic Leelanau Enterprise commercial printing operations. The BRA consisted of the collection of eight (8) surficial soil samples (SS); five (5) soil samples below the surface collected via Geoprobe® boring installation (SB), and three groundwater samples collected from 1" temporary monitoring wells. The sample locations were selected in order to characterize the site in association with former Leelanau Enterprise commercial printing operations.

The BRA sampling results indicated the presence of select metals in soil and groundwater on site at concentrations in excess of MDEQ Residential cleanup criteria. The 2007 BRA demonstrates that the Former Leelanau Enterprise commercial printing site meets the definition of a "facility" as defined by Part 201 of NREPA.

The "facility" contaminants consist of select metals primarily in shallow soils at concentrations in excess of the Residential Drinking Water Protection criteria as well as the Groundwater-Surface Water Interface Protection (GSIP) criteria. The identification of metals at "facility" concentrations in soil at depth was limited to lead and cyanide at two sample locations west of the former building (RO-SB-5 @ ~ 5 ft. & RO-SB-6 @ 10-18"). The concentration of lead in soil at location RO-SB-5 is in excess of the MDEQ Residential Direct Contact criterion.

The identification of groundwater impact was limited to the detection of iron at a concentration in excess of the MDEQ Residential Drinking Water criteria at one location east of the former building.



**Otwell Mawby, P.C. - Phase I ESA, Former Leelanau County Complex Property, 10 Parcels, Unincorporated Village of Leland, Leland Township, Leelanau County, Michigan, June 2008**

In support of the proposed acquisition and redevelopment of the site with private residences a Phase I ESA of the former County Complex was completed in 2008. The following Recognized Environmental Conditions (RECs) were identified in the Phase I ESA:

1. The historical use of the southwestern portion of the subject property (parcel 009-009-022-00) as a print shop and potential for release of process chemicals via the former drain field;
2. The presence of the floor drains and potential for releases from vehicle and equipment maintenance activities located within the former Sheriff's Department building (parcel 009-009-017-00);
3. The presence of and potential for releases from an oil/water separator system located at the former Sheriff's Department Building (parcel 009-009-017-00);
4. Sanitary drain fields and potential for releases from vehicle and equipment maintenance at the former Sheriff's Department Building (parcels 009-009-017-00 and 009-580-109-00);
5. The lack of closure verification sampling following the removal of a 2,000-gallon underground storage tank (UST) on the subject property (parcel 009-009-010-10);
6. The presence of a "closed" leaking underground storage tank (LUST) site at the former Sheriff's Department building (parcel 009-009-017-00), at which Phase II ESA activities conducted by the Michigan Department of Environmental Quality (MDEQ) identified the presence of contaminants in soil and groundwater;
7. The presence of contaminants in the soils and/or the groundwater of the subject property identified by the MDEQ in several locations on the subject property (parcels 009-009-010-00, 009-009-020-00, 009-009-017-00, 009-009-010-10, 009-009-016-00, and 009-009-022-00);
8. The potential presence of elevated nitrate/nitrite levels in the groundwater of the subject property (all parcels); and
9. The historical use of the subject property as part of the former Leland Iron Works operation and the potential presence of residual iron smelting/slag wastes on the subject property (all parcels).

As detailed above the identified concerns were a combination of former operations/features associated with Leelanau County operations, historic operations associated with Leland Iron

Works activities prior to the County occupying the site, and concerns associated with the contaminant conditions identified in the two BRA's completed by the MDEQ in 2007.

**Envirologic Technologies, Incorporated - Phase II ESA, Former Leelanau County Complex, Unincorporated Village of Leland, Leelanau County, Michigan, September 15, 2008**

The Phase II ESA was completed by Envirologic with the following objectives:

- To demonstrate that the site remains a "facility," as defined by Part 201 of NREPA;
- To further assess soil and groundwater conditions in areas of concern identified in the two MDEQ's Brownfield Redevelopment Assessments (BRAs);
- To investigate the potential for impact from RECs identified in Otwell Mawby's 2008 Phase I ESA;
- Complete additional site characterization in support of evaluating "Due Care" obligations associated with the redevelopment of the property. Specifically, several areas of contamination, identified by previous investigations, had the potential to prohibit the location of water supply wells on the property, which is critical for future development.

The Phase II ESA included the installation of forty-two Geoprobe® direct-push and six hand-auger borings across the site for the collection of soil samples and groundwater samples from temporary monitoring wells.

Boring depths ranged from two to 40 feet below grade level (bgl). Soils encountered beneath the ground surface were generally characterized as inter-bedded lenses of well-sorted tan/brown sand; medium-grained gravelly sand; and poorly-sorted tan sand with gravel. Gravelly fill sand and organic material was encountered in shallow soils at select boring locations. Groundwater on site was encountered at depths ranging from three to 15 feet bgl. The identification of groundwater at shallow depths was limited to western portions of the site proximal to the Leland River.

Sampling activities were completed in accordance with Envirologic Standard Operating Procedures (January 2008), provided to the MDEQ with the approved Initial Work Plan. Physical samples of soils were field screened with a Photo-Ionization Detector (PID) to evaluate the potential presence of volatile contaminants. Soil sampling for volatile organic compounds was conducted using Method 5035 protocols. Groundwater samples were collected from temporary monitoring wells. The temporary wells were constructed with one-inch PVC riser with #10-slot

PVC screens generally set to straddle the water table. At select locations, groundwater samples were collected from multiple intervals in order to vertically profile groundwater conditions.

Similar to the two previously completed BRA's, the Phase II ESA sampling results indicated the presence of select metals in shallow soils and groundwater at concentrations in excess of MDEQ Residential cleanup criteria. The identification of contaminants at "facility" concentrations was generally limited to metals in shallow soil and metals/nitrates in shallow groundwater. The concentrations of select metals in soil exceeded primarily Drinking Water Protection and Groundwater-Surface Water Interface Protection criteria. The concentration of lead in shallow soil identified by Envirologic at two sample locations was in excess of the MDEQ Residential Direct Contact criterion: on the south side of the historic jail (SB-36 @ 0-6"); and west of the former River Office (SB-54 @ 12-18").

Through the course of the previously completed assessment activities no concerns regarding the potential volatilization of contaminants to indoor or ambient air have been identified based upon the concentrations of volatile organic compounds (VOCs). Additionally, no concerns regarding unacceptable health exposure relative to the inhalation of soil particles have been identified based upon the contaminant concentrations.

The site use history and the completed assessment activities indicate that the identification of "facility" contaminants has been limited to shallow soils and shallow groundwater. The site use history and site assessment data support a conceptual site model (CSM) for the subject property indicating that contaminant sources are limited to historic airborne deposition of contaminants associated with former Leland Iron Works (i.e. kiln) operations conducted offsite but in close proximity to the subject property; as opposed to the impacts being attributed to former Leelanau County Government operations. No indications of contaminant sources in soil at depth on the subject property have been identified based upon the site use history and through the course of the multiple previously completed assessment activities.

**Benzie-Leelanau District Health Department – Assessment of the Suitability of Proposed On-Site Water Supply, Rivertown Leland & Rivertown Cottages, Unincorporated Village of Leland, Leelanau County, Michigan, April 6, 2010**

Based upon the identification of select metals, nitrates, and the petroleum-based trimethylbenzene isomers (TMBs) in shallow groundwater, additional assessment of groundwater was conducted in order to evaluate the development of a potable water supply onsite to support residential redevelopment. Two test wells were constructed onsite in October of 2009: one well

was constructed to a depth of 170 feet and one well was constructed to a depth of 255 feet. Aquifer pump testing and groundwater quality sampling of the two wells was completed in 2009. Pump test data reviewed by the MDNRE (now MDEQ) was approved for capacity and isolation from the shallow aquifer on March 25, 2010. The aquifer testing resulted in a demonstration that there will be no hydraulic communication between groundwater impacts identified in shallow groundwater and the deeper groundwater aquifer that will be utilized as a potable water supply for the residential redevelopment. Nevertheless, due to elevated levels of hardness, iron, and sulfates in the deeper aquifer water, treatment will be required in the future prior to distribution in addition to individual water treatment being recommended within private residences.

The Benzie-Leelanau District Health Department issued letters on April 6, 2010 approving the use of the two existing deep aquifer water supply wells as a potable water supply for the residential redevelopment. The Health Department additionally required restricting individual water supply wells in the master deed. The Benzie-Leelanau District Health Department approval, with required water treatment, ensures that there will be no unacceptable health exposures in the future on the subject property in association with the Drinking Water pathway.

**Envirologic Technologies, Incorporated - Incremental Sampling Methodology (ISM), Former Leelanau County Complex, Unincorporated Village of Leland, Leelanau County, Michigan, August 2015**

Envirologic completed further evaluation activities on the subject property in August of 2015 to support the proposed residential redevelopment of the site. The supplemental sampling was conducted to inform the scope of cleanup and support an evaluation of the potential for unacceptable health exposures based upon the previous Phase II ESA sampling results. The supplemental sampling also served to evaluate additional areas on the subject property that may require cleanup but had not been previously sampled based upon the lack of specific historic environmental concerns (RECs) in these areas.

Based upon discussions with the MDEQ it was determined that the completion of Incremental Sampling Methodology (ISM) characterization of shallow soils for metals would be the most appropriate approach to characterizing shallow soils across the site to better inform potential cleanup requirements. In particular, the ISM characterization was identified as most appropriate for an evaluation of the potential for unacceptable health exposures and to inform the need for remedial response activities relative to the Direct Contact and Particulate Inhalation pathways. The ISM is a structured protocol designed to obtain a sample that is representative of the entire environmental media targeted for sampling while providing reproducible results and improved

decision making. As such the ISM characterization is considered more reliable in evaluating overall site conditions within each Decision Unit (DU) and is more representative of the potential for unacceptable health exposures than previously completed discrete sampling conducted during the two MDEQ BRA's completed in 2007 and the Envirologic Phase II ESA completed in 2008. Therefore, the ISM approach was identified as most appropriate to inform cleanup requirements relative to metals impact in shallow soils relative to the proposed residential redevelopment of the site. The ISM approach to help inform cleanup was completed in accordance with MDEQ *Incremental Sampling Methodology and Applications* published in June 2015.

For the purposes of the ISM each of the proposed future residential lots was identified as an individual decision unit (DU). These residential DU's each occupy approximately ¼ acre. Four additional decision units were identified along the Leland River which will provide water front access to four of the residential home lots. Finally, the historic jail that remains on site was identified as a separate decision unit. Thus, a total of thirteen decision units were identified for the ISM. Figure 1 depicts the DU's on the subject property. The incremental samples were collected from the 0-12" interval within each DU. The sampling interval was selected in order to characterize shallow soils most likely to have been impacted by historic Iron Works operations. The sampling interval also most appropriately served to characterize shallow soils relative to the Direct Contact exposure pathway. The number of individual sampling increments within each DU was determined based upon the size of the DU and the results of previously completed sampling activities within each DU. The number of increments within each DU varied from 50 -70. Based upon the previous detection of lead at concentrations in excess of the Residential Direct Contact criterion within DU-2 (historic jail) and DU-4A (former River Office); Envirologic completed triplicate increments within these two DUs (N, E, S or N, E, W). Envirologic additionally completed vertical ISM within these two DU's: one increment from the 0-12" interval; and a second increment at the 12-18" interval.

The ISM results demonstrated that no contaminants of concern were identified at "facility" concentrations in 9 of the 13 DU's. In these 9 DU's, there will be no potential for unacceptable health exposures and will not require cleanup. However, although not required and to provide additional comfort in a residential setting, several small "hot-spot" areas in DU-2 (historic jail) and DU-4A (former River Office) identified by previous discrete samples are planned to be removed.



The identification of contaminants of concern in excess of MDEQ Residential cleanup criteria in the ISM samples was limited to the following DU's:

DU-1A: Mercury>Groundwater-Surface Water Interface Protection (GSIP)

Lead>Residential Direct Contact

DU-3A: Antimony>Drinking Water Protection (DWP)

DU-6A: Silver> Groundwater-Surface Water Interface Protection (GSIP)

DU-10: Mercury> Groundwater-Surface Water Interface Protection (GSIP)

Envirologic subsequently completed Synthetic Precipitation Leaching Procedure (SPLP) testing on the ISM sample from DU-3A and DU-6A. The SPLP results for DU-3A demonstrated that antimony would not leach from soils to groundwater at a concentration in excess of the Residential Drinking Water criterion. The SPLP results demonstrate that antimony is not a "facility" contaminant for DU-3A despite the identification of antimony in soil at a concentration in excess of the GSIP. The SPLP result for DU-6A resulted in a concentration of silver in excess of the Groundwater-Surface Water Interface (GSI) criterion. As such, the presence of silver in shallow soils represents a "facility" contaminant within DU-6A. Based upon analytical "hold time" limitations; SPLP testing for mercury could not be conducted at locations DU-1A and DU-10.

While not identified at a "facility" concentration; the concentration of lead in DU-3A was reported to be 380,000 ug/Kg; which is close to but does not exceed the MDEQ Residential Direct Contact criterion of 400,000 ug/Kg.

Thus, the identification of contaminants at concentrations representing a concern for potential unacceptable human health exposures was limited lead and the MDEQ Residential direct contact pathway within DU-1A and DU-3A. The inclusion of DU-3A represents a conservative determination based upon the fact that the lead concentration identified in DU-3A approaches, but does not exceed, the MDEQ Residential direct contact criterion.

The ISM results demonstrate that no potential for unacceptable human health exposures exist in association with contaminants of concern in soils in association with the eight proposed residential development lots (DU's).



The identification of contaminants of concern in soil at a concentration that represents a potential for unacceptable health exposures is limited to lead within DU-1A and DU-3A; which are located west of the residential lots on the Leland River.

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## PROJECT GOALS AND RE-USE PLAN

The Leelanau County Brownfield Redevelopment Authority (LCBRA) has entered into a purchase agreement with a developer who intends to acquire the site and subsequently sell eight approximately ¼ acre residential development lots. The purchasers of the residential lots will subsequently construct their own owner occupied private residences. The construction of the residences may include the installation of a basement. Four of the residential lots will include frontage along the Leland River.

The historic jail currently present on site will remain on a separate approximately ¼ acre parcel subsequent to residential redevelopment of the surrounding private lots. The historic jail may be made available for public access as a museum.

Potable water for the individual lots/residences will be provided through the two existing deep aquifer water supply wells that were approved for this purpose by the Benzie-Leelanau District Health Department.

The multiple environmental assessment activities conducted on the site have demonstrated that contaminants of concern consist primarily of metals in shallow soil and metals, nitrates, and TMBs in shallow groundwater. No potential for unacceptable health exposures relative to the use of groundwater will occur based upon the future use of the two approved deep aquifer potable wells.

Thus the presence of select metals at “facility” concentrations in shallow soil ISM samples on select DU’s has been identified as the primary concern for residential redevelopment of the site. Additionally, six “hot spots” where metals were identified in soil at “facility” concentrations in discreet samples during previous assessments also represent a concern for residential redevelopment of the site. The “hot spot” exceedances consist primarily of lead in shallow soils at concentrations in excess of the Residential Direct Contact criterion. While the ISM soil results demonstrate that the potential for unacceptable health exposures relative to Direct Contact in shallow soils is limited to DU-1A (and conservatively DU-3A) the presence of the discreet “hot spot” Direct Contact exceedances will be addressed as a conservative measure to support residential redevelopment of the site.



## APPLICABLE REGULATIONS AND CLEANUP STANDARDS

### Cleanup Oversight Responsibilities

Environmental cleanup activities in Michigan are overseen by the MDEQ. MDEQ will have opportunity to review details of the proposed cleanup activities through review and approval of a Response Activity Plan, Document of Due Care Compliance (DDCC) under Section 20107a of the Natural Resource and Environmental Protection Act (NREPA), and/or through review of a Work Plan (State Voluntary Cleanup Plan) submitted through Michigan's Brownfield Redevelopment Financing Act (PA 381 of 1996).

The LCBRA will retain appropriate environmental professionals to ensure daily cleanup activities are properly implemented in accordance with State standards, protocols and methodologies. The LCBRA has been able to secure professional assistance through the LCBRA's approved environmental consultant, acquired through a competitive process.

### Cleanup Standards for Major Contaminants

Cleanup standards in Michigan have been defined in the *Cleanup Criteria Requirements for Response Activity* which are derived from the Part 201 cleanup criteria rules (R299.1 through R299.50) effective December 30, 2013. Cleanup criteria are provided for various exposure pathways. The relevant exposure pathway for the proposed cleanup is Soil Direct Contact, Soil Drinking Water Protection, and Soil Groundwater-Surface Water Interface Protection (GSIP) Criteria. MDEQ cleanup standards are provided for Residential and Non-Residential property uses. Based upon the proposed redevelopment of the site with eight individual private residences, utilization of the Residential cleanup criteria would be most suitable. Thus, this cleanup intends to utilize the Residential cleanup criteria established under Part 201 of NREPA for all complete exposure pathways.

### Applicable Laws and Regulations

The primary law that directs cleanup at the site is Part 201 (Environmental Remediation) of NREPA. This law provides direction on cleanup criteria, relevancy of exposure pathways, work plan requirements, and all other facets of environmental cleanup activities in Michigan. The Part 201 Rules (regulations) developed under the Act provide technical details for cleanup standards, methods, and demonstrations. Other applicable laws include OSHA's Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation to ensure worker safety during the cleanup.

## EVALUATION OF CLEANUP ALTERNATIVES

### Mass Excavation

One option for cleanup is to remove contaminated soil from the site, transport the soil for disposal at a Class II landfill, backfill, grade, and seed the resulting excavations. The remedial activities would involve the excavation of shallow soil in the upper three feet across the entire footprint of the three DU's on which contaminants were identified at "facility" concentrations during the ISM (DU-1A, DU-6A, and DU-10). Excavation of shallow soils across the entire footprint of DU-3A will also be completed as a conservative measure based upon the fact that the ISM lead concentration in DU-3A approached the MDEQ Residential direct contact criterion. The remedial activities will also include the excavation of six additional discreet soil sampling "hot spots" where contaminants were previously identified at "facility" concentrations. In particular, the remediation of "hot spots" will focus on locations where lead was previously identified at concentrations in excess of the MDEQ Residential Direct Contact criterion. While the ISM characterization of shallow soils demonstrated that the presence of lead in excess of Direct Contact was limited to DU-1A; the remediation of previously generated discreet soil sample "hot spots" exceedances is considered a conservative measure to support the residential redevelopment of the site.

Based upon the ISM results in conjunction with the identified site use history and air borne/surficial contaminant sources, the presence of contaminants of concern is limited to shallow soils. This conclusion is supported by the results of previous assessments which demonstrated the lack of contaminants of concern at "facility" concentrations in soil samples collected at depth. As such, the completion of soil excavation activities will be limited to the upper 3 feet within the DU's of concern. The depth of excavation of soils in association with discreet soil sampling "hot spots" will be a function of the depth at which discreet soil samples were collected (primarily 0-18"); with the exception of one location proximal to the Leland River where the excavation would be completed to a depth of approximately 8 feet (RO-SB-5).

Subsequent to the completion of soil excavation verification of soil remediation (VSR) sampling would be conducted. Excavation and mass removal would continue until contaminants of concern were demonstrated to no longer be present at "facility" concentrations within the excavations. The excavation areas would subsequently be backfilled with clean fill sand, topsoil, and seeded.



### **Engineered Barrier**

A second option is to construct an engineered barrier over the specific DU's on which the ISM results continue to identify metals at "facility" concentrations. An engineered barrier would additionally be constructed on the DU's in which discreet soil sampling "hot spot" exceedances exist. The engineered barrier would consist of a geotextile fabric overlain by 1 foot of clean fill material and 0.5 feet of topsoil. The barrier would prevent direct contact with impacted soils and provide a visual marker indicating a depth below which contaminants have been identified at "facility" concentrations. Rough grading the site would be necessary to prepare the area for the barrier; specifically, planning for site drainage and transitional elevations between the land, future residences, and roads. After rough grading, a separation barrier and a minimum of twelve inches of clean fill and topsoil would be placed over the areas of concern.

The use of an engineered barrier would require use restrictions and/or the use of personal protective equipment in association with future site use activities involving access/disruption of soils beneath the engineered barrier in order to ensure that no exacerbation of contaminant conditions or unacceptable health exposures would occur in the future.

### **No Action**

The "No Action Alternative" would leave conditions as is. This action would not remedy the unacceptable exposures presented by the contaminants.



## IMPACT OF POTENTIAL CLIMATE CHANGE

The impact of potential climate change on the proposed cleanup is not anticipated to have a significant effect. The National Weather Service Climate Prediction Center does not show predictions of significant change in precipitation or temperature. Thus, predictive data does not suggest significant changes in flood zones, groundwater elevation, or seasonal periods for ground freezing and thawing. According to U.S. EPA's climate change website regarding potential long term changes in the Midwestern U.S.:

*“Precipitation in the Midwest is likely to fall more frequently in heavy downpours, which will increase the likelihood of flooding, property damage, travel delays, and disruption in services. The last three decades have been the wettest in a century for the Midwest. In the first half of 2008, severe floods swept the region, causing fatalities, evacuations, and damage to roads and infrastructure.”*

Thus, the design of drainage features should consider the predicted additional volume and velocity of future storm events.

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### COST OF CLEANUP ALTERNATIVES

Preliminary Cost Estimates for each alternative are itemized below. Actual project costs will be based on competitive bidding processes, bid specifications and other criteria. These preliminary data are for comparative purposes only. Costs are based on website reviews, historical project activities and other experiential data. Costs of supplies are intended to include delivery and installation.

	<b>Option 1 Mass Removal</b>	<b>Option 2 Engineered Barrier</b>	<b>Option 3 No Action</b>
Survey and Elevation Pre-Planning	\$10,000	\$10,000	\$0
Excavation, Load, Transport and Disposal of Soil	\$175,500 (~2,700 cubic yards @ \$65/CY)	\$0	\$0
Verification of Soil Remediation (VSR) Sampling & Analysis	\$15,000	\$0	\$0
Grading	\$25,000	\$10,000	\$0
Separation Barrier	\$0	\$10,000	\$0
Backfill	\$36,200 (2.5' depth; 1,810 CY @ \$20/CY)	\$19,200 (1' depth; 957 CY @ \$20/CY)	\$0
Topsoil	\$10,860 (0.5" depth; 362 CY @ \$30/CY)	\$14,400 (0.5" depth; 479 CY @ \$30/CY)	\$0
Seeding	\$6,700 (22,300 ft <sup>2</sup> @ \$0.30/ft <sup>2</sup> )	\$7,750 (25,822 ft <sup>2</sup> @ \$0.30/ft <sup>2</sup> )	\$0
Preparation of DDCC/Response Activity Plan	\$5,000	\$5,000	\$5,000
<b>SUBTOTAL</b>	<b>\$284,260</b>	<b>\$76,350</b>	<b>\$0</b>
Project Management, Oversight, Professional Services (~20%)	\$57,740	\$15,509	\$0
<b>SUBTOTAL</b>	<b>\$342,000</b>	<b>\$91,859</b>	<b>\$5,000</b>
15% Contingency	\$51,300	\$13,779	\$750
<b>TOTAL ESTIMATE</b>	<b>\$393,300</b>	<b>\$105,638</b>	<b>\$5,750</b>



The estimate above indicates that Option 1 has more cost than Option 2 but also ensures no unacceptable health exposures will occur without requiring site use limitations or personal protective equipment (PPE) dermal contact protection below the engineered barrier. Option 3 has minimal cost but provides no benefit.

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## EFFECTIVENESS, IMPLEMENTABILITY, PRELIMINARY COST

Both mass removal of contaminated soil and the engineered barrier provide a control to prevent exposure to contaminated soils. Both options of mass removal and an engineered barrier utilize proven environmental techniques. The control to exposure to contaminated soils in association with the engineered barrier does not address activities that may involve exposure to the subsurface at depths below the barrier. The “No Action Alternative” is not an effective means of managing the environmental hazard as it provides no mitigation of the unacceptable exposure especially in a residential setting.

The implementation of mass removal will be more complicated than the engineered barrier option by the mere volume of material involved and requires more planning related to traffic control, erosion controls, safety issues related to working in an excavation, and other logistical issues. Mass removal would also require attention placed on dust control to prevent offsite exposures during the remediation.

The engineered barrier option has a lower cost relative to mass removal. However, the engineered barrier option will require ongoing obligations in the future regarding not accessing soils beneath the engineered barrier or the use of appropriate personal protective equipment relative to the direct contact of soils at select locations beneath the barrier. Additionally, the placement of backfill and topsoil represents a challenge in association with increased site elevation in association with the existing historic jail building.

The engineered barrier option also complicates future construction and will result in additional redevelopment costs on DU's where shallow soil impacts would persist beneath the engineered barrier. By leaving shallow soils in place that are impacted future redevelopment activities are complicated by requiring that impacted soils present beneath the engineered barrier are managed differently than the clean fill soils of the engineered barrier. This requires additional staging and the moving of materials multiple times to ensure engineered barrier soils remain segregated from impacted soils. The effect of these requirements is that the mass removal option provides a more development ready solution than does the engineered barrier option.

Preliminary costs were outlined above. The difference in costs is primarily related to the different volumes of soil that are manipulated through each option. Other issues that affect cost include the estimated length of time necessary to effect the cleanup options.

## RECOMMENDED CLEANUP ALTERNATIVE

Based on an evaluation of the effectiveness of each cleanup alternative compared to cost and other factors affecting implementation, mass removal is the recommended cleanup alternative. The mass removal option eliminates the potential for unacceptable health exposures and exacerbation of contaminant conditions in the future. This option provides maximum benefit to the proposed residential redevelopment of the site.

The engineered barrier option costs less and consumes fewer resources than mass removal. However, the engineered barrier option requires land use limitations and/or the need for appropriate personal protective equipment relative to direct contact in association with conducting future activities on site that would involve access to soils beneath the engineered barrier. These limitations represent a significant hindrance to the residential redevelopment of the site.

The No Action Alternative is not an acceptable alternative as it provides no environmental benefit, does not eliminate the unacceptable exposures caused by the site, and does not advance the residential redevelopment of the site.



**APPENDIX A**

**FIGURES**

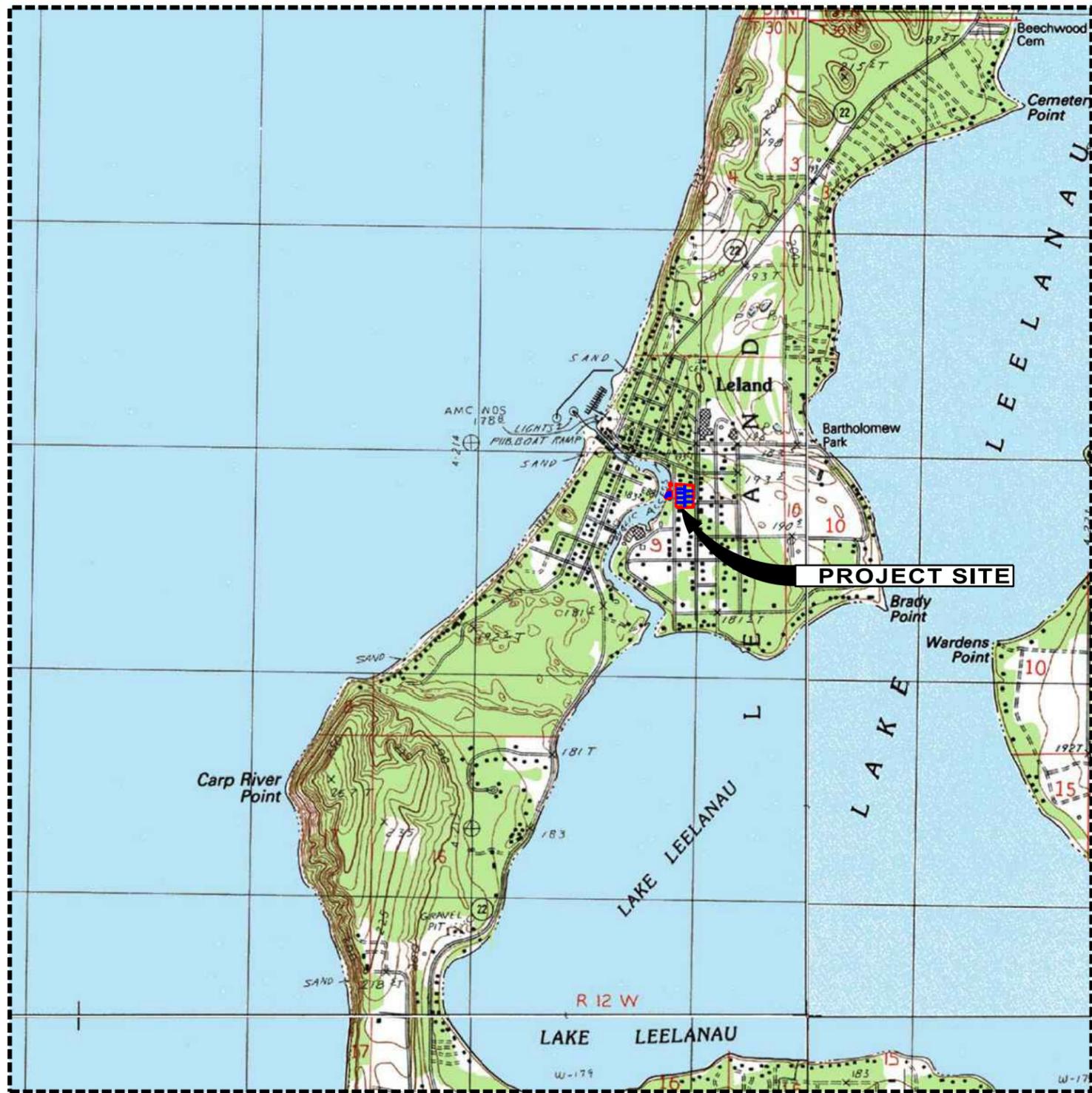
**Location Map**

**Site Plan with Proposed Residential Redevelopment Lots and Decision Units (DU's)**

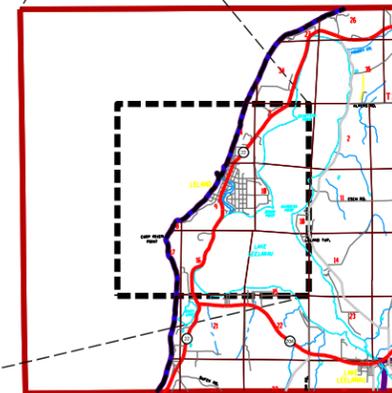
**Site Plan with Proposed Soil Remedial Locations**

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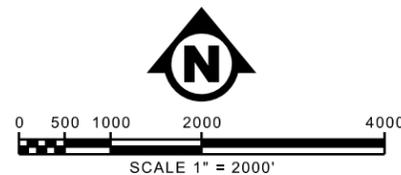


SOURCE: LELAND, MICHIGAN USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS  
 MAPTECH® U.S. TERRAIN SERIES™ ©MAPTECH®, INC. 606-433-8500



T 30 N. R. 12 W.  
 LEELANAU COUNTY  
 LELAND, MICHIGAN

000000 AAAAAA File: AA.dgn Model: Location Map



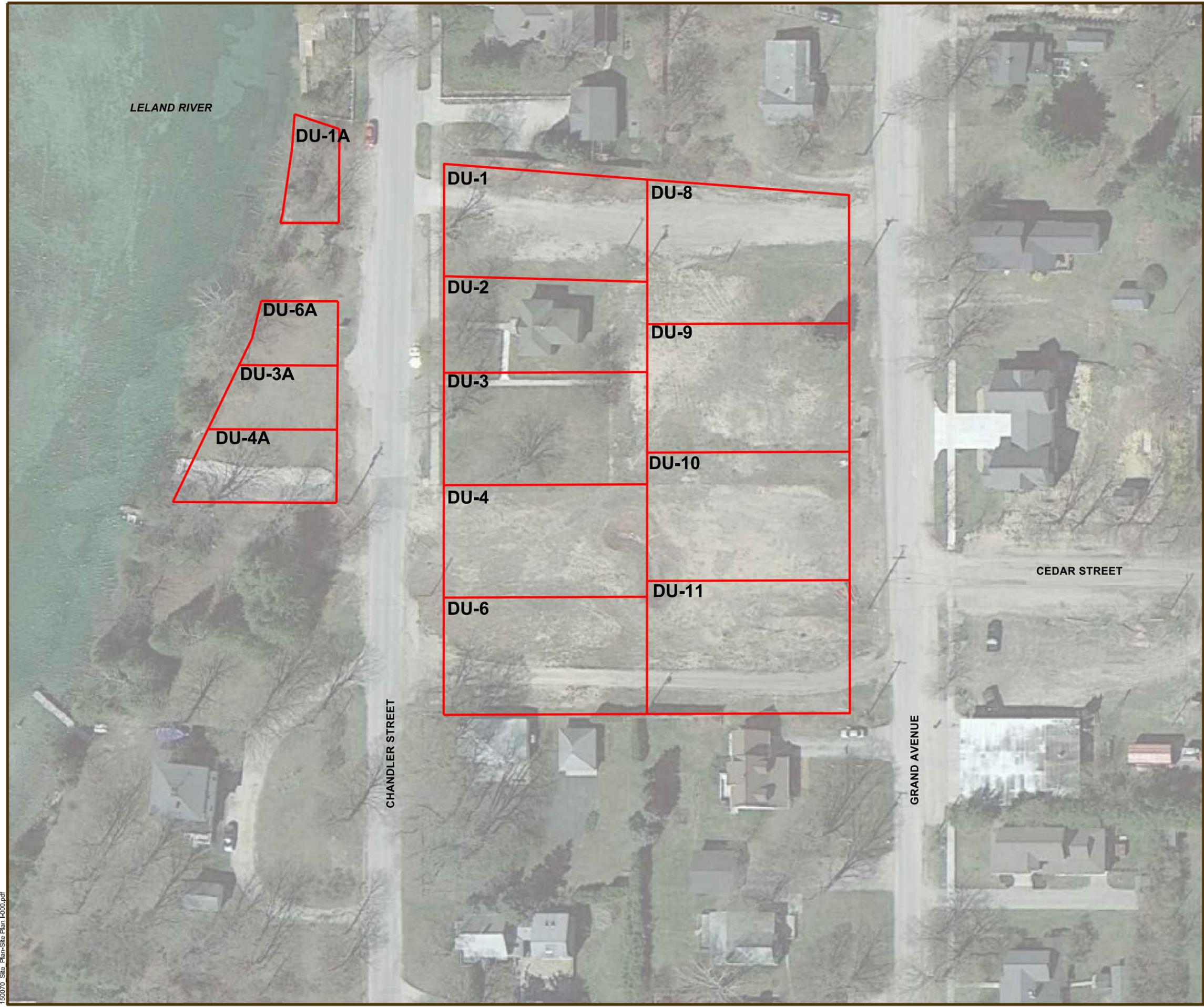
**envirollogic**  
 environmental consulting + services  
 2960 INTERSTATE PARKWAY  
 KALAMAZOO, MICHIGAN 49048  
 PH: (269) 342-1100 FAX: (269) 342-4945

**FORMER LEELANAU  
 COUNTY COMPLEX**  
 301 CEDAR STREET  
 LELAND, MICHIGAN  
**LOCATION MAP**

PROJECT NO.  
 150070

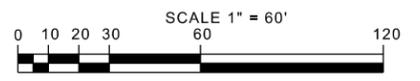
FIGURE No.

**1**



**LEGEND**

DU = INCREMENTAL SAMPLING METHODOLOGY (ISM)  
DECISION UNIT



NOTE:  
THIS IS NOT A PROPERTY BOUNDARY SURVEY. PROPERTY BOUNDARIES SHOWN ON THIS MAP  
ARE BASED ON AVAILABLE FURNISHED INFORMATION AND ARE APPROXIMATE ONLY AND  
SHOULD NOT BE USED TO ESTABLISH PROPERTY BOUNDARY LOCATION IN THE FIELD.

**FORMER LEELANAU  
COUNTY COMPLEX**

301 CEDAR STREET  
LELAND, MICHIGAN

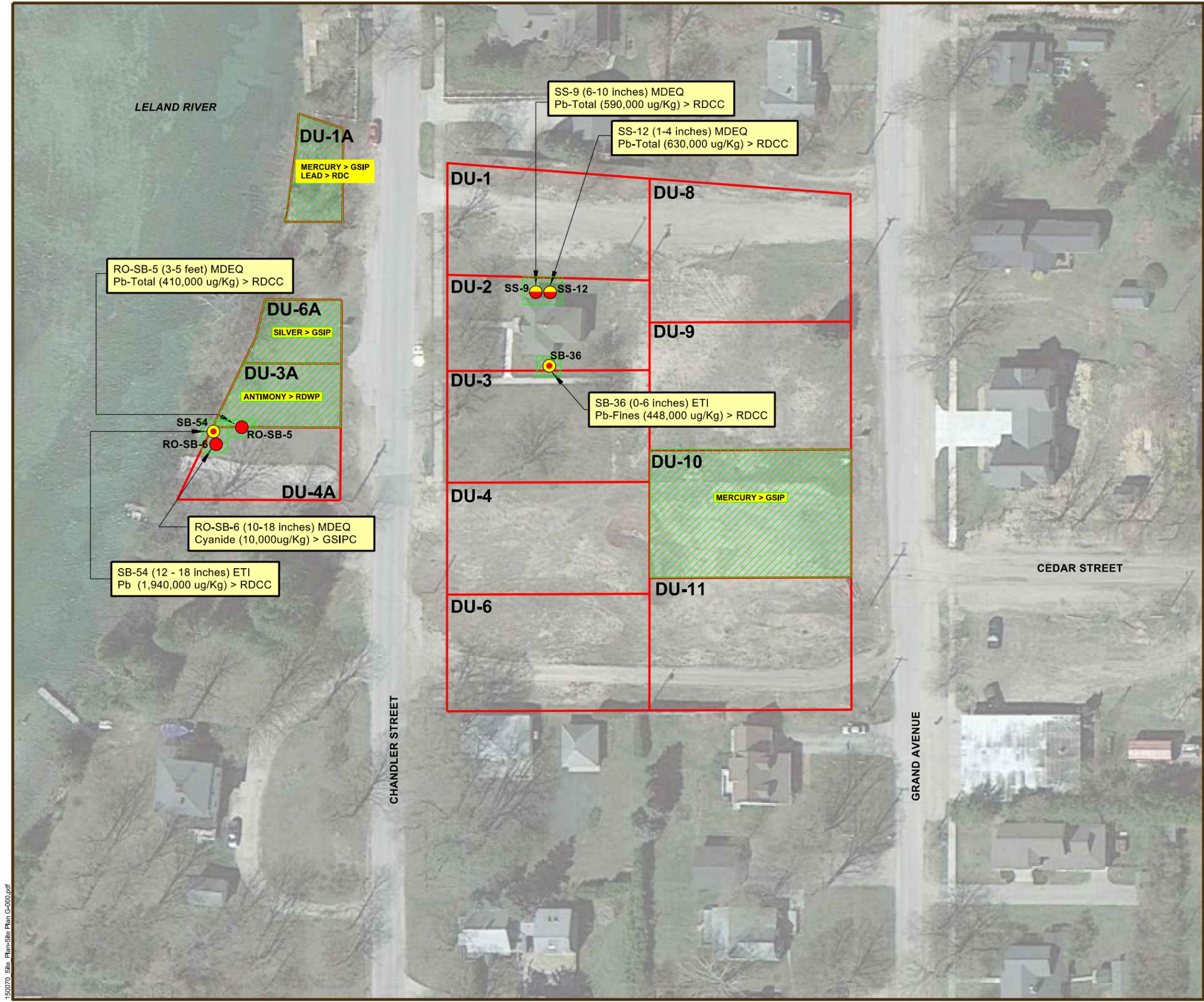
**ABCA  
SITE PLAN**

environmental consulting + services  
2960 INTERSTATE PARKWAY  
KALAMAZOO, MICHIGAN 49048  
PH: (269) 342-1100 FAX: (269) 342-4945

PROJECT NO.  
150070

FIGURE No.

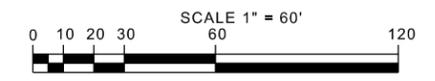
**2**



**LEGEND**

DU = INCREMENTAL SAMPLING METHODOLOGY (ISM) DECISION UNIT  
 GSIP = GROUNDWATER - SURFACE WATER INTERFACE PROTECTION  
 RDC = RESIDENTIAL DIRECT CONTACT  
 RDWP = RESIDENTIAL DRINKING WATER PROTECTION

- DEQ SURFICIAL SOIL SAMPLE LOCATION
- DEQ SOIL BORING LOCATION
- ETI GEOPROBE® SOIL BORING LOCATION "TMW" DENOTES TEMPORARY WELL
- AREA OF PROPOSED SOIL REMEDIATION



NOTE:  
 THIS IS NOT A PROPERTY BOUNDARY SURVEY. PROPERTY BOUNDARIES SHOWN ON THIS MAP ARE BASED ON AVAILABLE FURNISHED INFORMATION AND ARE APPROXIMATE ONLY AND SHOULD NOT BE USED TO ESTABLISH PROPERTY BOUNDARY LOCATION IN THE FIELD.

**FORMER LEELANAU COUNTY COMPLEX**

301 CEDAR STREET  
 LELAND, MICHIGAN

**PROPOSED REMEDIAL LOCATIONS**



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PROJECT NO.  
 150237

FIGURE No.

**3**