

U.S. Department of
Homeland Security

United States
Coast Guard



United States Coast Guard

Removal Action Work Plan

Passage Island Light Station

Keweenaw County, Michigan

Task Order Number HSCG83-04-F-3CL260

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U.S. Department of
Homeland Security

United States
Coast Guard



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Removal Action Work Plan

Passage Island Light Station
Keweenaw County, Michigan

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1. Introduction

This removal action work plan (RAWP) was prepared by MWH Americas, Inc. (MWH) on behalf of the U.S. Coast Guard (USCG) for the Passage Island Light Station (Site) located at Passage Island, Keweenaw County, Michigan (see **Figure 1** and **Figure 2**). This RAWP was prepared in accordance with United States Environmental Protection Agency (USEPA) Guidance for Conducting Non-Time-Critical Removal Actions Under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and Section 300.415 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), to address soil impacted by lead at concentrations above Site-specific removal action objectives (RAOs) resulting from the historical application and weathering of lead-based paint on the Site structures.

Based on soil sampling results, residual soil concentrations do not represent a soil migration to groundwater pathway concern. Soil impacts do not pose a threat to groundwater; therefore, the groundwater pathway may be considered incomplete. Due to the rocky soil conditions and bedrock outcrops on the island, groundwater samples were not collected.

Lead based paint abatement has not been performed and is not anticipated to be performed prior to implementation of the removal action. However, “wet scraping” of the lead based paint will be complete prior to soil removal actions.

This RAWP is designed to be used in conjunction with other supporting documents, including the Engineering Evaluation/Cost Analysis (EE/CA) (MWH, 2012), the project-specific Quality Assurance Project Plan (QAPP) (MWH, 2012) based on the Uniform Federal Policy for QAPPs, and the Field Sampling Plan (FSP) (MWH, 2012). Because the removal action will require field screening and collection of confirmation soil samples following soil removal, this RAWP also contains elements of an FSP consistent with Section 300.410 of the NCP.

Additional information relevant to this RAWP provided in the EE/CA includes the following:

- Site description and background information
- Source, nature, and extent of contamination and waste characterization
- Streamlined risk evaluation

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- Applicable or relevant and appropriate requirements (ARARs)
- RAOs
- Identification of removal action alternatives and selection of removal action as the anticipated final remedy

Additional information relevant to this RAWP provided in the QAPP includes the following:

- Project Management and Objectives
- Measurement and Data Acquisition
- Assessment and Oversight
- Data Review
- Chain-of-Custody Forms
- Laboratory Quality Assurance Plans and Standard Operating Procedures (SOPs)
- Laboratory Certifications

Additional information relevant to the RAWP provided in the FSP includes the following:

- Removal Confirmation Sampling
- Sample Designation System
- Quality Assurance/Quality Control (QA/QC) Procedures

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2. Plan for Removal Action

The primary objective of the proposed removal action is to protect public health, welfare, and the environment, thereby facilitating the transfer of the Site to the National Park Service (NPS). The anticipated future use of the Site is recreational. It is the intent of USCG to conduct response actions in a manner consistent with the NCP and consistent with Section 120 of CERCLA.

As indicated in the EE/CA (MWH, 2012), the only contaminant of concern (COC) identified in the soil at the Site is lead. As discussed in the EE/CA, the USCG has selected a site-specific RAO for lead in soil of 4,800 milligrams per kilogram (mg/kg). This concentration was calculated based upon site-specific data and assumed future recreational land use. The RAO for soil cleanup is expected to be protective of relevant exposure pathways for the current and anticipated future land use of the Site.

The residual lead in soil at concentrations above the RAO has been defined horizontally and vertically as detailed in Section 2.2 of the EE/CA. Soil analytical results from 43 soil samples collected during the soil investigation for lead indicated that lead was detected at concentrations exceeding Michigan Department of Environmental Quality Part 201 Direct Contact Criteria (400 mg/kg) in 36 soil samples. The soil samples exceeding criteria surround the lighthouse and attached keeper's dwelling, fog signal building, winch house, antenna tower, paint locker, and privy. Lead in soil concentrations ranged from 100 mg/kg to 41,040 mg/kg (see **Figure 3**). This is consistent with the conceptual site model, which indicates that the lead impacts in soil are derived from weathering and erosion of historically applied lead-based paint to the external surfaces of the site structures. No other potential sources of soil contamination have been identified at the Site.

Based on waste characterization sampling conducted during June 2004, lead was detected in a composite sample subjected to the Toxicity Characteristic Leaching Procedure (TCLP) at a concentration of 49.7 milligrams per liter (mg/l). This concentration exceeds the Resource Conservation and Recovery Act (RCRA) hazardous waste limit for lead of 5 mg/l. Prior to soil excavation, the soil will be treated using the MAECTITE® process to render soils non-hazardous and meet the RCRA limit prior to excavation and disposal. MAECTITE® process converts leachable metals into mineral crystal species within the waste matrix, greatly lowering the solubility of the metal in this complex form. Under standard conditions of temperature and pressure, curing takes 3 to 5 hours.

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As discussed in the EE/CA, chemical-specific, location-specific, and action-specific federal statutes and regulations that are applicable or relevant and appropriate to the planned removal action are identified in **Table 1a**, **Table 1b**, and **Table 1c**, respectively. In addition, chemical-specific, location-specific, and action-specific federal and state guidelines identified as to be considered (TBC) are also presented in **Table 1a**, **Table 1b**, and **Table 1c**, respectively. Soil removal activities will be performed in accordance with the ARARs and with consideration to the TBC guidance, as described in the following sections.

2.1 Soil Removal Activities

Due to the limited depth and extent of soil impacts, the USCG has determined that the most cost-effective and protective remedy for the Site is removal and off-site disposal of soil impacted with lead above the RAO of 4,800 mg/kg. Soils with lead impacts exceeding the RAO are shown in **Figure 4**. Removal and off-site disposal of lead-impacted soil above the RAO is consistent with Section 300.415 of the NCP and state requirements for protecting public health, welfare, and the environment by:

- Preventing risk of human exposure through dermal contact, ingestion, or inhalation of lead-impacted soil during future use of the Site or potential construction activities on site.

The following is a description of the proposed soil removal actions for the Site.

2.1.1 Site Access

Access to the island is limited to anyone having boat transportation, Federal personnel (USCG and NPS), and those authorized by federal personnel to access the Site. Final approved and signed permits/agreements will be obtained from the appropriate parties prior to proceeding with the removal action.

2.1.2 Site Preparation

The areas targeted for the proposed soil removal are identified on **Figure 4**. Prior to beginning the soil removal action, the extent of each excavation will be measured and marked with stakes and survey tape. Work zones will be identified and delineated as well as staging areas for vehicles and equipment. Heavy vehicles and other heavy equipment will remain staged on a barge located adjacent to the island. A decontamination station for equipment will be established outside the work zone.

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Appropriate traffic patterns for field personal and equipment will also be identified and marked in the field prior to beginning removal efforts.

Prior to mobilization to the Site, the field equipment to be used during soil removal will be cleaned and decontaminated.

2.1.2.1 Utility Clearance

No public utilities are currently present on the Site due to its remote location within Lake Superior. However, in accordance with state law, the one-call utility location service MISS DIG System, Inc. will be contacted at least three working days prior to the removal activities. Available Site plans will be consulted to identify any existing utilities at the Site. USCG and NPS personnel will also be consulted to obtain clearance for digging at the proposed locations (see **Figure 4**). A record of the utility location efforts will be maintained by the oversight contractor for the project files. The planned soil removal actions will proceed only when each of these actions are complete and documented. Additionally, soil removal will be conducted using hand digging and a vacuum truck, therefore minimizing impacts to potential buried utilities.

2.1.2.2 Historic Preservation

In accordance with Section 106 of the National Historic Preservation Act (NHPA), the USCG contracted the completion of an Archeological Cultural Resources Survey for the Site and has submitted the associated report and plans for the proposed remedy to the State Historical Preservation Officer (SHPO).

The survey included historical records research, a visual survey of the Site and shovel tests to identify any culturally significant artifacts. The survey determined that there are no significant prehistoric or historic period archaeological resources within the Site and hence the proposed activities are not expected to affect significant cultural or historical resources. A copy of the Archeological Cultural Resources Survey is provided in **Appendix A**.

Soil removal activities at the Site will not begin until requirements of Section 106 of the NHPA have been met, including concurrence from the SHPO that the removal activities will not adversely affect significant cultural resources. The proposed soil removal action will be performed in a manner that does not compromise the historical integrity of the Site.

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2.1.2.3 Endangered Species Act

Pursuant to Section 7 of the Endangered Species Act of 1973, the USCG will consult with the NPS to ensure that the proposed removal action would not adversely affect or jeopardize species or habitat.

As described in the EE/CA, the State of Michigan listed species within the footprint of the USCG Passage Island Light Station are the Rock Whitlow-grass (*Draba arabisans*), which is a species of concern, and the Prickly saxifrage (*Saxifraga tricuspidata*), which is a state threatened Species. These two species were identified by the NPS. The MDEQ (formerly Michigan Department of Natural Resources) issued an Endangered Species Permit (Permit #1615) to conduct scientific activities (soil excavation) in the areas of these threatened/endangered species (**Appendix B**). The permit was only valid for the areas of lead contamination around the former USCG Passage Island Light Station. The permit allowed the collection and off-site disposal of state threatened or endangered plants (along with soil) occurring within the area of lead contamination. A representative from the NPS will be at the Site during the mobilization stage to flag the areas of state-listed plants outside the contamination area. Foot traffic, equipment operation and equipment staging will be minimized in areas where state-listed plants occur outside of the project foot print. The previous permit expired on July 31, 2005 and will be renewed prior to soil removal activities.

Should any threatened or endangered species be identified within the proposed excavation areas, the proposed excavation and excavation technique may be altered to minimize construction activity impacts.

2.1.2.4 Soil Erosion and Sedimentation Control

The site is located on exposed Precambrian bedrock that is devoid of glacial or post-glacial cover. Bedrock is covered with a thin veneer (less than 6 inches) of soil. The potential for transport and sedimentation of soil from the removal areas to Lake Superior is considered minimal. No stormwater conveyances, surface water bodies, or surface water drainages are present on the island. Soil present on the island is typically less than 6 inches in depth and mixed with weathered bedrock. Excavation will be performed to bedrock leaving no remaining soil. Soil erosion and sedimentation control will be in accordance with MDEQ Water Bureau Soil Erosion and Sedimentation Control Program, Soil Erosion and Sedimentation Control Training Manual (MDEQ, 2005). The use of silt socks and straw bales are proposed for general excavation runoff control. Typical silt fence (with wooden or steel stakes) is not

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feasible due to the shallow bedrock present and inability to install stakes to support the fence. Prior to any work, the excavation subcontractor will be responsible for obtaining any applicable permits or submitting any plans to MDEQ.

2.1.3 Site Restriction and Security

No site restrictions are present as the excavation areas are on an un-inhabited island located in Lake Superior. The only personnel expected to be on the Site would be from the NPS. Occasional site visitors who access the island by boat can be expected but are very infrequent (less than daily). In the event bystanders are observed approaching work areas or equipment, the oversight contractor will immediately stop work and ask the bystanders to move out of the work area. This will be done for the safety of potential bystanders as well as work crews.

2.1.4 Wet Scraping

Prior to soil removal, wet scraping of loose paint chips observed on painted structures will be completed. Areas to be scraped will be limited to those areas accessible from the ground with an extending pole apparatus. These areas will be sprayed with water to moisten the areas prior to attempting to scrape off the loose paint chips. Paint chips will be collected on plastic spread out on the ground below the areas and contained in 55-gallon drums prior to transportation and disposal offsite following soil removal. Care will be taken not to damage the structures. Abrasive methods of paint removal will not be used; no scaffolding or ladders will be used during paint scraping activities.

2.1.5 Soil Removal

Soil removal activities will be completed in two separate mobilizations to the Site. The first includes the application of the MAECTITE® to stabilize the lead impacted soil, field screening described in Section 2.1.4. for the collection of soil confirmation samples (Section 2.2), and the collection of waste characterization samples.

During the initial soil removal mobilization, clearing and grubbing of the excavation areas will be completed to remove vegetation from the excavation areas. Equipment to be used during soil removal activities may include weed chippers, machetes, hand axes, hand operated roto-tillers and various other hand tools such as shovels, pick axes, and brooms.

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The lead impacted soil in the excavation areas will be stabilized using MAECTITE® to render the soils non-hazardous prior to excavation and disposal. MAECTITE® converts leachable metals into mineral crystal species within the waste matrix, greatly lowering the solubility of the metal and its potential to leach. The MAECTITE® will be applied to the surface of the soil to saturate the lead impacted soil. It will be applied to the ground surface of approximately 3,060 square feet (ft²) over four separate excavation areas using hand sprayers. The treated soil will be allowed to cure for at least 3 to 5 hours.

Following application and curing of the MAECTITE®, field screening will be conducted in the excavation area including the potential bottom of the excavation and along the excavation extent. Soil samples will be collected from the proposed excavation bottom and sidewalls for field screening. Soil confirmation samples will then be collected as described in Section 2.2 below and in accordance with the FSP (MWH, 2012) from the potential extent of the excavation based on the XRF readings. In accordance with the FSP (MWH, 2012), waste characterization samples will also be collected from lead impacted soil to be removed following treatment with MAECTITE®.

Following receipt of soil confirmation sample results, waste characterization sample results and approval of the waste profiles (completed using the waste characterization sample results), soil excavation and removal will be completed during the second mobilization to the Site. During soil excavation activities, lead-impacted soil will be removed down to bedrock (a maximum of approximately 6 inches bgs). The location and extent of proposed soil removal at the Site is indicated on Figure 4.

Approximately 3,060 ft², or a maximum of 56 cy (85 tons), of impacted soil will be excavated in the four excavation areas. To remove the impacted soils from the underlying rock surfaces, trailer mounted vacuum systems staged on the construction barge will be used with flexible hosing extended from the barge up to the demarcated excavation areas. Approximately 85 tons of lead impacted soil will be vacuum excavated through the hose and removed from the Site. Shovels will be used as needed during excavation to assist with the vacuuming of the soil through the flexible hosing. Excavated soil will be direct loaded into lined 20 cubic yard vacuum boxes for soil containment on the barge. The vacuum boxes will be sealed once the storage capacity of each box is reached and made ready for transportation.

Soil confirmation samples collected during the previous soil removal activities will be used to identify the extent of soil excavation and direct further excavation activities beyond the original proposed excavation area, if necessary.

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2.1.5.1 Field Screening

To effectively guide and complete removal of lead-impacted soil at concentrations above the RAO, the removal oversight contractor (MWH) will conduct field screening of soil using an Innov-X Systems Alpha Series™ X-ray fluorescence (XRF) analyzer or equivalent. This model unit does not require radioisotope operator certification nor does it pose a radiation hazard, as it operates using a low power (1.0 W) excitation source consisting of an X-Ray tube with a silver (Ag) anode target.

After the anticipated volume of impacted soil has been removed, at each location, soil samples will be collected from the excavation bottom and each of the sidewalls for XRF analysis. These soil samples will be field screened according to the FSP (MWH, 2012) and the SOP for Innov-X Systems Alpha Series™ X-Ray Fluorescence Analyzer Sample Screening and the USEPA Method 6200 Ex-situ Field Screening for Lead Using XRF provided the FPS (MWH, 2012). No soil samples will be collected in areas where the soil has been removed and only bedrock remains. In this case, an XRF reading of the bedrock surface will be recorded.

The portion of soil selected for field screening will be prepared by placing approximately 8 ounces of soil into a disposable zip locking plastic bag. Large pieces of soil within the plastic bag will be broken into smaller pieces and the soil will be mixed to form as homogeneous mixture as is practical. The bagged samples will be placed on a plastic work table that does not contain lead prior to XRF screening. Each sample will be screened by placing the XRF analyzer onto the sample for 30 seconds to obtain comparable results among the samples. A copy of the Innov-X Systems Alpha Series™ instruments specification sheet is provided in the FPS (MWH, 2012).

The results of the XRF analysis will be used to determine if additional soil excavation is necessary. If field screening indicates lead concentrations at or above 4,800 mg/kg, additional soil will be removed. The soil removal will be terminated at each location when results of the field screening indicate lead concentrations lower than 4,800 mg/kg or if bedrock is encountered.

XRF analyzer results will be recorded in the field log book or on field data sheets in instrument units that are equivalent to parts per million (parts per million, roughly equivalent to mg/kg). The XRF analyzer calibrated prior to shipment to the Site and will be standardized daily according to the project QAPP and standardization results recorded in the field log book or on equipment logs.

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Once the soil removal is deemed complete based on XRF readings, confirmation soil samples will be collected to confirm removal of impacted soil to the RAO. As noted above, if the soil has been removed and only bedrock remains, samples will not be collected for laboratory analysis. If the laboratory analysis indicates that a confirmatory sample exceeds the RAO, additional excavation will be necessary to remove the associated soils. After the re-excavation is completed, the area will be re-sampled to verify that the RAO is met. The sampling will be conducted according to the procedures presented in Section 2.2.

2.1.5.2 Cultural Artifacts

A Cultural Resources Survey was performed by Great Lakes Research, Inc. (GLR) and found that the proposed soil excavations will have no effect on significant cultural resources at the Site (**Appendix A**).

It is not anticipated that historically significant artifacts will be unearthed during the soil removal action. However, in the event that objects of potential historical significance are encountered, the excavation oversight contractor (MWH) will stop the removal action to contact the USCG and the NPS to discuss the findings. A field determination will be made based on discussions between the involved parties as to the significance of the findings, and the planned actions will be communicated to the SHPO prior to proceeding with the soil removal.

2.1.5.3 Soil Transport and Disposal Management

Following excavation, each vacuum box will be sealed to prevent leakage of moisture either into or out of the container. Once ready for transport, the barge will be transported back to the mainland where the vacuum boxes will be off loaded from the barge for transport to the approved licensed Waste Management landfill for disposal as non-hazardous waste. The trucks will follow a designated transportation route to the licensed disposal facility.

The USCG will review, approve, and sign all waste profile and non-hazardous waste shipping documents prior to the shipment of soil from the Site. MWH will obtain weight tickets, tare/gross weight slips, and non-hazardous waste shipping documents from each truckload of non-hazardous waste soil transported from the Site. The volume of material removed from the Site will be recorded in the field log book in accordance with the QAPP. Certificates of disposal will be obtained from the disposal facilities. Copies

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of each transport and disposal document will be provided in the removal action completion report and will be kept on file by the USCG for a period of 3 years.

2.1.6 Air Monitoring

Air monitoring will be performed and documented throughout the entire soil removal activities due to the toxicity of lead dust. Air quality will be continuously monitored with a particulate meter within the work zone to evaluate potential worker exposure to airborne particulate concentrations. Monitoring will be completed in general accordance with the MWH and the contractor Health and Safety Plan (HASP) included in the project FSP (MWH, 2012).

Air quality will be continuously monitored with measurements of total particulate concentration, date, time, and wind direction recorded on air monitoring logs or in the field log book. The frequency of the monitoring will depend on the activities being conducted and the predominant wind direction. If the action levels identified in the HASP are exceeded, excavation activities will stop until dust suppression methods are implemented at the Site.

2.1.7 Dust Suppression

Due to the shallow depths of the proposed excavations (0 to 6 inches bgs) and the assistance of a vacuum truck to excavate the soils, excessive dust issues are not anticipated during soil removal activities. However, if the action levels defined in the HASP are exceeded at during field activities, work will be stopped and dust suppression measures will be implemented. These measures may include, but are not limited to, spraying the excavations lightly with water to minimize dust emissions. If necessary, water from Lake Superior will be used for the dust suppression.

2.2 Confirmation Sampling

Soil confirmation samples will be collected during the first mobilization to the Site using the "biased" sampling approach as described in the Section 4 of the FSP (MWH, 2012). There are four excavation locations totaling approximately 3,060 square feet of floor space and approximately 400 linear feet of side walls. Confirmation sidewall and bottom samples will be collected from each excavation in accordance with the biased sampling approach defined in Section 4 of the FSP. Up to 25 confirmation samples are anticipated to be collected. If any confirmation sample is reported to contain concentrations of lead above the RAO, additional excavation activities will be

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conducted in the identified areas. Additional soil screening and soil confirmation samples will then be collected in those areas as described in Section 4.3 of the FSP.

Soil confirmation samples will be collected in laboratory-provided containers using a decontaminated stainless steel scoop or shovel according to the MWH SOP for soil sample collection and handling provided in the QAPP. Sample containers will be labeled with the sample location identification, date of sample collection, and intended analysis. Sample nomenclature is described in Section 8.2 of the FSP. The samples will be immediately placed on ice in a cooler for transportation to the laboratory under chain-of-custody documentation.

Samples will be submitted to Trace Analytical Laboratories located in Muskegon, Michigan for analysis of total lead in accordance with the QAPP. Laboratory results will be reported on a dry weight basis. Appropriate QA/QC samples will be collected in accordance with the QAPP and FSP for the Site. Full Contract Laboratory Program (CLP)-type (Level 4) analytical reporting and validation will be requested for each soil confirmation sample collected.

Based on the limited depth and extent of impacted soil at concentrations above the RAO, up to 25 confirmation samples are expected to be sufficient to definitively demonstrate effective and complete removal of impacted soil at concentrations above the RAO. If the excavations are expanded based on field screening results, the appropriate number of confirmation samples will be recalculated in accordance with the approach outlined in the FSP based on the final size of each excavation and the appropriate number of confirmation samples collected. If bedrock is encountered on the bottom of the excavation, the excavation will be determined to be complete at the depth of bedrock and no bottom sample will be collected at that location. If an excavation sidewall encounters a building/structure that extends below the bottom of the excavation, the excavation will be determined to be complete and no sidewall sample will be collected along that building/structure.

2.3 Decontamination Procedures

Equipment used during soil excavation activities will be decontaminated following completion of site activities. Reusable equipment used for soil sampling will be scrubbed using a solution of detergent and distilled water then double-rinsed with distilled water. Decontamination water will be added to the impacted soil for disposal at the approved disposal facility.

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Disposable personal protective equipment (PPE) and disposable sampling equipment generated during work activities will be disposed of with the impacted soil for disposal at the approved disposal facility.

2.4 Site Restoration

Site restoration activities will include grading the excavation edges to achieve a gradual safe contour into the excavation. The excavation areas will be sloped, as practical, around the building foundations, to allow drainage and will provide for protection of foundations. No backfill, topsoil, or vegetative restoration will be required. Care will be taken when re-grading the surface not to disturb structures at the Site.

2.5 Site Survey

The final excavation limits and location of soil confirmation samples will be surveyed using traditional survey techniques as defined in the SOP provided in Appendix B. The names and locations of survey points will also be recorded in the field log book. The survey data will be used to update the site figures following the soil removal activities.

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3. Contractor Selection

MWH will serve as the oversight contractor for the soil removal action. Qualified subcontractors for the excavation, transport, and disposal of soil and laboratory analysis for this project have been identified based on predetermined qualifications. Sufficient resources are anticipated for the timely and cost-effective implementation of this RAWP. A project organizational chart and contact information for project personnel are provided in the QAPP.

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4. Documentation and Report Preparation

MWH will oversee the removal action subcontractor, perform the confirmation sampling activities, and document these activities. The documentation will include soil confirmation sample data, chain-of-custody forms, manifests, dimensions of the soil excavations, volumes of soil removed, sampling and analytical procedures, and excavation procedures. Site activities will be recorded in a field log book and on appropriate log forms, as needed. Photographic documentation of the removal action and confirmation sampling will also be performed by the MWH. Upon completion of the removal action and confirmation sampling activities, the MWH will prepare a Removal Action Completion Report for review by the USCG and submittal to the regulatory agency.

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5. Schedule

The USCG intends to proceed with the proposed soil removal action upon receipt of USEPA concurrence that the actions taken by the USCG, including the EE/CA, this RAWP, and the QAPP, are consistent with the NCP. As described in the EE/CA, the EE/CA and the RAWP will be made available for public review for a period of 30 days. It is the goal of the USCG to be completed with the removal action by the fall 2013. A project schedule is provided as **Table 2**.

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6. References

MWH. 2012. *U.S. Coast Guard Passage Island Light Station Draft Engineering Evaluation Cost Analysis*

MWH. 2012. *U.S. Coast Guard Passage Island Light Station Draft Quality Assurance Project Plan*

Michigan Department of Environmental Quality. *Soil: Residential and Commercial, Part 201 Generic Cleanup Criteria and Screening Levels* (http://www.michigan.gov/deq/0,1607,7-135-3311_4109_9846_30022-251790--00.html). Developed under the authority of the Natural Resources and Environmental Protection Act, 1994 PA 451 as amended. March 2011.

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United States Environmental Protection Agency, Office of Solid Waste and Emergency Response. 1994. *Memorandum: Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities*. From Elliott . Laws, Assistant Administrator. To: Regional Administrators I-X. EPA/540/F-94/043. August 1994.

Tables

**Table 1a
Potential Federal and State Chemical-Specific ARARs
To Be Considered Guidance
USCG Passage Island Light Station
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Constituent of Concern and Media	Authority	Act	Statute, Regulation, Administrative Code, or Guidance Document	Status	Synopsis of Requirement, Criteria, or Guidance
Federal Requirements and/or Criteria.					
Lead in Soil	Federal Advisories, Guidance, and Training Material.	NA	Recommendations of the Technical Review Workgroup (TRW) for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. TRW for Lead, Washington, D.C. (United States Environmental Protection Agency 1996.)	To Be Considered.	This is non-promulgated guidance that describes a methodology for assessing risks associated with nonresidential adult exposures to lead in soil.
State Requirements and/or Criteria.					
	Waste and Hazardous Materials Division	Natural Resources and Environmental Protection Act (NREPA)	Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.111, et seq.) Michigan Administration Code: R 299.9202-9208, R 299.9212, R299.9228,R 299.9301-9312, R 299.9401-9413, R 299.9501-9523, R299.9601-9634, R 299.9701-9713, R 299.9801-9816, and R 299.11001-11008, et. seq. Part 1: General Provisions; Part 2: Identification and Listing of Hazardous Waste; Part 3: Generators of Hazardous Waste; Part 4: Transporters of Hazardous Waste; Part 5: Construction Permits and Operating Licenses; Part 6: Owners and Operators of Hazardous Waste treatment, Storage and Disposal Facilities; Part 7: Financial Capability; Part 8: Management of Specific hazardous Wastes, Specific Types of Hazardous Waste Part 9: Hazardous Waste Service Fund; Part 10: Availability of Referenced Materials Formerly known as Act 64 (1979)	Potentially Applicable	Defines hazardous waste and establishes requirements for hazardous waste generators, transporters, and treatment/storage/disposal facilities. It is the implementing statute for the federally delegated program under the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous Waste Amendments (HSWA). Regulates the generation, transport, treatment, storage, and disposal of hazardous wastes from site remediation. Regulates closure, post-closure, and corrective action for hazardous waste treatment, storage, and disposal facilities. Note: The State of Michigan has authorization to administer Federal RCRA Subtitle C in the State. - Must be complied with by persons engaging in activities, which would generate, transport, treat, store, or dispose of hazardous waste in this state. Administrative Rules define hazardous waste based on analytical procedures, usage, and process of generation. Response activities may generate waste residuals that may be classified as hazardous waste. Used for characterizing and identifying hazardous wastes and determining appropriate treatment and disposal.
	Air Quality Division	NREPA	Part 55, Air Pollution Control of the Natural Resources and Environmental Protection Act, 1994 Pa 451, as amended (NREPA). (MCL 324.55, et seq.)	Potentially Applicable	Defines air quality standards for potential air emission sources. Prohibits the emissions of air contaminants in quantities that cause injurious effects to human health, animal life, plant life of significant economic value, and/or property or that interfere with the enjoyment of life or property in the state. Applicable for remedial alternatives that would generate air emissions ,i.e., dust, fumes, gas, mist, odor, smoke, vapor, or any combination thereof. For Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) remedial actions that take place entirely on-site, discharge requirements could be identified through the issuance of a Substantive Requirements Document.
	Remediation and Redevelopment Division	NREPA	Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.201, et seq.)	Potentially Applicable	In part, protects the environment and natural resources of the state; regulates the discharge of certain substances into the environment; regulates the use of certain lands, waters, and other natural resources of the state; and prescribes the powers and duties of certain state and local agencies and officials. Establishes cleanup criteria for sites of environmental contamination based on current and future land use. Regulates cleanup of releases of hazardous substances in concentrations that constitute a facility as that term is defined in Section 2010(o) of Act 451 to soil and groundwater.

Notes:
ARARs = Applicable or Relevant and Appropriate Requirements
CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
CFR = Code of Federal Regulations
HSWA = Hazardous Waste Amendments
MCL = Michigan Compiled Laws
NREPA = Natural Resources Environmental and Protection Act
RCRA = Resource Conservation and Recovery Act
TRW = Technical Review Workgroup

**Table 1b
Potential Federal and State Location-Specific ARARs
To Be Considered Requirements
USCG Passage Island Light Station
Keweenaw County, Michigan**

Constituent of Concern and Media	Authority	Act	Statute, Regulation, Administrative Code, or Guidance Document	Status	Synopsis of Requirement, Criteria, or Guidance	
Federal Requirements and/or Criteria.						
<p>The Site is located three and one quarter miles off the northeastern tip of Isle Royale in Keweenaw County, Michigan and has the following specifics:</p> <ul style="list-style-type: none"> Federally owned property Habitat for Threatened Species 	Federal Regulatory Requirement.	Endangered Species Act of 1973.	<p>Endangered Species 16 United States Code (USC) 1531-1544.</p> <p>16 USC Chapter 35</p> <p>Endangered and Threatened Wildlife and Plants (50 CFR Part 17) 50 CFR 17</p> <p>Cooperation of Endangered and Threatened Species of Fish, Wildlife, and plants – Cooperation with the States (50 CFR Part 81) 50 CFR 81</p> <p>Designated Critical Habitat (50 CFR 226) 50 CFR 226</p> <p>Interagency Cooperation Endangered Species Act of 1973 (50 CFR 402) 50 CFR 402</p>	Potentially Relevant and Appropriate	These rules require federal agencies to ensure that their actions do not jeopardize the continued existence of any threatened or endangered species or adversely modify the habitat of such species. For non-major construction, a request for determination of whether any listed species or habitat are in the project area is required, and based on that determination, a biological assessment may be also required.	
	State Requirements and/or Criteria.					
	All DEQ Divisions	NREPA	Natural Resources Environmental and Protection Act of 1994, Public Act 451 as amended (NREPA).	<p>Part 17, Environmental protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.17, et seq.)</p> <p>Michigan Administrative Code: R 324.1701, et. seq. Formerly known as Act 127 (1970)</p>	Relevant and Appropriate	Provides the protection of natural resources. The protection of state resources prohibits any action that pollutes, impairs, or destroys the state's natural resources due to any activities conducted at a site of environmental contamination.
	Land and Water Management	NREPA	NREPA	<p>Part 91, Soil erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.9101, et seq.)</p> <p>Michigan Administrative Code: R 336.1701, et. seq. Formerly known as Act 347 (1972)</p>	Relevant and Appropriate	Requires a soil erosion control and sedimentation plan for any earth charges of one or more acres and/or any earth changes within 500 feet of a lake or stream. Establishes rules prescribing soil erosion and sedimentation control plans, procedures, and measures.
	Remediation and Redevelopment Division	NREPA	NREPA	<p>Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.20101, et seq.)</p> <p>Michigan Administrative Code: R 299.5511 (3)(a), et. seq. Formerly known as Act 307 (1982)</p>	Relevant and Appropriate	In part, protects the environment and natural resources of the state; regulates the discharge of certain substances into the environment; regulates the use of certain lands, waters, and other natural resources of the state; and prescribes the powers and duties of certain state and local agencies and officials. Establishes cleanup criteria for sites of environmental contamination based on current and future land use. Regulates cleanup of releases of hazardous substances in concentrations that constitute a facility as that term is defined in Section 2010(o) of Act 451 to soil and groundwater.
	Land and Water Management Division	NREPA	NREPA	<p>Part 323, Shore lands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.32301, et seq.)</p> <p>Michigan Administrative Code: R 281.21, et. seq. Formerly Known as Act 245 (1970)</p>	Relevant and Appropriate	Regulates the alteration of the soil and vegetation within a great Lakes shore land environmental area without a permit. Regulates activities in high-risk erosion areas and flood risk areas (administered by local units of government through the federal flood insurance program) as well as environmental areas. May be applied to environmental sites of contamination that may affect the protection and management of Great Lake shore land areas.
	Office of the Great Lakes	NREPA	NREPA	<p>Part 329, Great Lakes Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.32901, et seq.)</p> <p>Michigan Administrative Code: R 324.32901, et. seq.</p>	Potentially Relevant and Appropriate	Careful management of the Great Lakes will permit the rehabilitation and protection of the lakes, their waters, and their ecosystems, while continuing and expanding their use for industry, food production, transportation and recreation. May be applied to site remediation that would affect the Great Lakes.
	Department of Natural Resources	NREPA	NREPA	<p>Part 365, Endangered Species Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA) (MCL 324.365 et seq)</p> <p>Michigan Administrative Code: R 324.41101, et. seq. Formerly known as Act 203 (1974)</p>	Potentially Relevant and Appropriate	Establishes rules to provide for conservation, management, enhancement, and protection of species either endangered or threatened with extinction. Habitat listed on the Michigan Natural Features Inventory and Part 365 will need to be protected. The rules contain a listing of the fish, wildlife, and the plant species they have been determined to be endangered or threatened. Remedial action may take place and adversely impact endangered species and other habitat.
Department of Natural Resources	NREPA	NREPA	<p>Part 479, Fisheries Contamination, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.479, et seq.)</p> <p>Michigan Administrative Code: R 324.47903-47905, et. seq.</p>	Potentially Relevant and Appropriate	Used to ensure the protection of aquatic species within waters of the state. A person shall not put into any stream, pond, or lake sandy sand, coal, cinders, ashes, log slabs, decayed wood, bark, sawdust, or fish. May be applied to site remediation to protect and/or restore aquatic life.	

Notes:
ARARs = Applicable or Relevant and Appropriate Requirements
CFR = Code of Federal Regulations

MCL = Michigan Compiled Laws
NREPA = Natural Resources Environmental and Protection Act
USC = United States Code

**Table 1c
Potential Federal and State Action-Specific ARARs
To Be Considered Requirements
USCG Passage Island Light Station
Keweenaw County, Michigan**

Constituent of Concern and Media	Authority	Act	Statute, Regulation, Administrative Code, or Guidance Document	Status	Synopsis of Requirement, Criteria, or Guidance
	Federal Requirements and/or Criteria.				
Excavation of lead-impacted soil and implementation of Institutional Controls (ICs)	Federal Regulatory Requirement.	Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the 1986 Superfund Amendments and Reauthorization Act (SARA).	Federal Facilities 42 United States Code (USC) 9620 42 USC 9620 Reporting Hazardous Substance Activity When Selling or Transferring Federal Real Property (Title 40 Code of Federal Regulations [CFR] 373) 40 CFR 373	Potentially Applicable	These rules require notifications related to hazardous substances prior to the sale or transfer of real property owned by the federal government. This is applicable if a property with residual contamination is transferred.
		CERCLA as amended by the 1986 SARA.	National Contingency Plan (42 USC 9605). 42 USC 9605 National Contingency Plan (40 CFR Section 300.400 through 300.415).	Applicable	These promulgated rules require performing a Removal Site Evaluation and a Removal Action including preparing certain documents (a Quality Assurance Project Plan [QAPP], a field sampling plan [FSP], and an engineering evaluation and cost assessment [EE/CA]), considering federal and state ARARs, soliciting community involvement, and providing notifications prior to the removal action.
		Executive Order 12580 of January 23, 1987, Superfund Implementation.	Executive Order 12580-Superfund Implementation Executive Order 12580	Applicable	The Executive Order provides federal agencies, including the United States Coast Guard, the authority to carry out their CERCLA responsibilities under the National Contingency Plan as a lead agency.
		Resource Conservation and Recovery Act of 1976 (RCRA).	Identification and Listing of Hazardous Waste 42 USC 6921. 42 USC 6921 Identification and Listing of Hazardous Waste (40 CFR 261). 40 CFR 261 Land Disposal Restrictions 40 Part 268. 40 CFR 268	Applicable	These regulations establish requirements for identifying any hazardous wastes that may be generated in the course of the removal action.
		RCRA.	Standards Applicable to Generators of Hazardous Waste 42 USC 6922. 42 USC 6922 Standards Applicable to Generators of Hazardous Waste (40 CFR 262). 40 CFR 262 Standards Applicable to Transporters of Hazardous Waste (40 CFR 263). 40 CFR 263	Potentially Applicable	These regulations establish requirements for the on-site management of any hazardous wastes that may be generated in the course of the remedial action.
		RCRA.	Standards Applicable to Generators of Hazardous Waste. (42 USC 6923). 42 USC 6921 Standards Applicable to Transporters of Hazardous Waste (40 CFR 263). 40 CFR 263 Standards for Universal Waste Management (40 CFR 273). 40 CFR 273	Potentially Applicable	These regulations establish requirements for the off-site transportation of any hazardous wastes that may be generated in the course of the remedial action.
		Hazardous Materials Transport Act (HMTA) as Amended by the Hazardous Materials Transport Uniform Safety Act of 1990.	Transportation of Hazardous Materials (49 USC 5101-5127). 49 USC Chapter 51 Hazardous Materials Regulations -General Information, Regulations and Definitions (49 CFR 171). 49 CFR 171 Hazardous Materials Regulations Hazardous Materials Regulations - Hazardous materials table, special provisions, hazardous materials communications, emergency response information, and training requirements (49 CFR 172). 49 CFR 172 Hazardous Materials Regulations Shippers – General Requirements for Shipments and Packages (49 CFR 173) 49 CFR 173	Potentially Applicable	These regulations establish requirements for the off-site transportation of any hazardous wastes that may be generated in the course of the remedial action.
		Clean Air Act of 1970.	National primary and secondary ambient air quality standards 42 USC 7409. 42 USC 7409 National Primary and Secondary Ambient Air Quality Standards (40 CFR 50) 40 CFR 50	Potentially Relevant and Appropriate	Engineering controls are required to reduce emissions associated with excavation and transportation, as needed, to maintain ambient air quality standards.
		Clean Water Act (CWA).	Water Pollution Prevention and Control, Standards and Enforcement, 33 USC 1313 through 1314. USC 33 National Pollution Discharge Elimination System (NPDES) (40 CFR 122 – 125). 40 CFR Parts 122-125	Potentially Applicable	This regulation establishes requirements for storm-water discharges associated with industrial activity, including waste disposal areas. Soil remediation may require consideration of storm-water regulations.

**Table 1c
Potential Federal and State Action-Specific ARARs
To Be Considered Requirements
USCG Passage Island Light Station
Keweenaw County, Michigan**

Constituent of Concern and Media	Authority	Act	Statute, Regulation, Administrative Code, or Guidance Document	Status	Synopsis of Requirement, Criteria, or Guidance
Federal Requirements and/or Criteria.					
		Occupational Safety & Health Administration Act (OSHA) of 1970.	Occupational Safety & Health Administration Act (Public Law 91-596 84 STAT. 1590). PL 91-596 OSHA Occupational Safety & Health Administration (29 CFR 1910). 29 CFR 1910	Potentially Applicable	These regulations specify requirements for health and safety protection for workers potentially exposed to contaminants during hazardous waste site remediation.
		OSHA.	Occupational Safety & Health Administration Act (Public Law 91-596 84 STAT. 1590). PL 91-596 OSHA ACT Occupational Safety & Health Administration (29 CFR 1926). 29 CFR 1926	Applicable	These regulations specify requirements for health and safety protection for workers at construction sites.
State Requirements and/or Criteria.					
Michigan State Police Motor Carrier Division	NA		Michigan Motor Carrier Safety Code Public Act 181 of 1963, as amended. (MCL 480.11, et seq.) Michigan transportation Code: Transportation of Hazardous Materials (R 480.11-21).	Potentially Relevant and Appropriate	Rules governing the transportation of hazardous materials. Used to protect the public, first responders to hazardous incidents and the environment from hazardous materials.
Michigan Department of Transportation Michigan State Police Motor Carrier Division	Public Act 300		Michigan Vehicle Code Public Act 300 of 1949, as amended. (MCL 257.722, et seq.) Michigan Administrative Code: Size, Weight and Load (R 257.716-726).	Potentially Relevant and Appropriate	Rules governing the reduction of maximum axle loads during springtime frost periods. Maximum Gross Vehicle Weight (GVW) is not to exceed 25-35% of normal GVW. County road jurisdiction- County Road Commission and state roads and highway Jurisdiction- MDOT. Motor Carrier enforces the above. Used to prevent vehicular damage to roadways from transporting heavy materials and equipment. Remedial action and construction may require heavy loads of equipment, fill dirt, contaminated media, etc. to be transported over roadways; however, this is not allowed during frost periods.
Michigan Department of Energy, Labor and Economic growth			The Michigan Occupational Safety and Health Act (MIOSHA) Public Act 154 of 1974, as amended. Michigan Administrative Code: -Safety Standards for General Industry; Safety Standards for General Industry; - Health Standards for general Industry; - Safety Standards for Construction; - Health Standards for Construction; - Administrative Rules for General Industry, Construction Health and Agricultural Operations (R 408.1001-1094).	Relevant and Appropriate	Occupational safety and health standards adopted to provide safe and healthful employment or places of employment, which may include medical monitoring. Provides safety standards for hazards, air contaminants, physical hazards, health hazard control measures, illumination, sanitation, employee right-to-know, and others. Regulations containing worker health and safety standards for construction and general industry operations and requirements for worker training specifically "Hazardous Waste Operations and Emergency response (HAZWOPER)" This is the statute adopted by Michigan from the Federal OSHA Rules contain a list of permissible (HAZWOPER). This is the statute adopted by Michigan from the Federal OSHA. Rules contain a list of permissible exposure limits in the work place for more than 600 chemical compounds. On-site remedial actions have the potential to expose workers to contaminants found in affected material, i.e., soil, air, and water. Construction, excavation and other site actions may present potential health hazards to nearby workers. Such activities are governed by worker safety and health standards under this act and are applicable to all site actions and activities.
All DEQ Divisions	Natural Resources and Environmental Protection Act (NREPA)		Part 17, Environmental protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.17, et seq.) Michigan Administrative Code: R 324.1701, et. seq. Formerly known as Act 127 (1970)	Relevant and Appropriate	Provides the protection of natural resources. The protection of state resources prohibits any action that pollutes, impairs, or destroys the state's natural resources due to any activities conducted at a site of environmental contamination. Applied in remedial Investigation, remedial design, response activity and remedial action activities.
Air Quality Division	NREPA		Part 55. Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.55, et seq.) Michigan administration Code: R 324.5501, R 336.1101, R336.1123, R 336.1127, R 336.1201-1207, R 336.1209-1229, R 336.1230-1241, R 336.1278-1290, and R 336.1299 (Part 2 Air Use Approval), R 336.1301-1331, R 336.1370-1372(Part 3 Emissions Limitations and Prohibitions), R 336.1701-1702, R 336.1901, R 336.2001-2007, et. seq. Formerly Known as Act 348 (1965)	Potentially Relevant and Appropriate	Requires permitting for air emission sources and air monitoring during activities that may cause contaminant releases to air. Remedial actions may introduce contaminants into the air. Prohibits the emissions of air contaminants from wastes on site in quantities, which cause injurious effects to human health, animal life, plant life of significant economic value, and/or property. Applicable for remedial alternatives that generate air emissions (soil excavation) where fugitive dust or air emissions may adversely affect human health and the environment. Requires air emissions to have "non-injurious effects" and is enforced through permitting and monitoring of air pollution sources such as site work when airborne contaminants or dust can be released. These rules address air use, particulate emission limitations, sulfur-bearing compound limitations, volatile organic emissions, and several miscellaneous prohibitions. It also addresses testing, sampling, etc. Requires the issuance of a permit prior to installation or constructions of equipment which may be a source of air contamination. The regulations provide for permit application requirements, air quality modeling, and permit exemptions and waivers. For CERCLA remedial actions taking place entirely on-site, requirements may be identified through issuance of a Substantive Requirements Document (SRD). Defines and describes the general provisions for new sources of volatile organic compound emissions The regulations contain the criteria for conducting performance tests and include detailed emission test

**Table 1c
Potential Federal and State Action-Specific ARARs
To Be Considered Requirements
USCG Passage Island Light Station
Keweenaw County, Michigan**

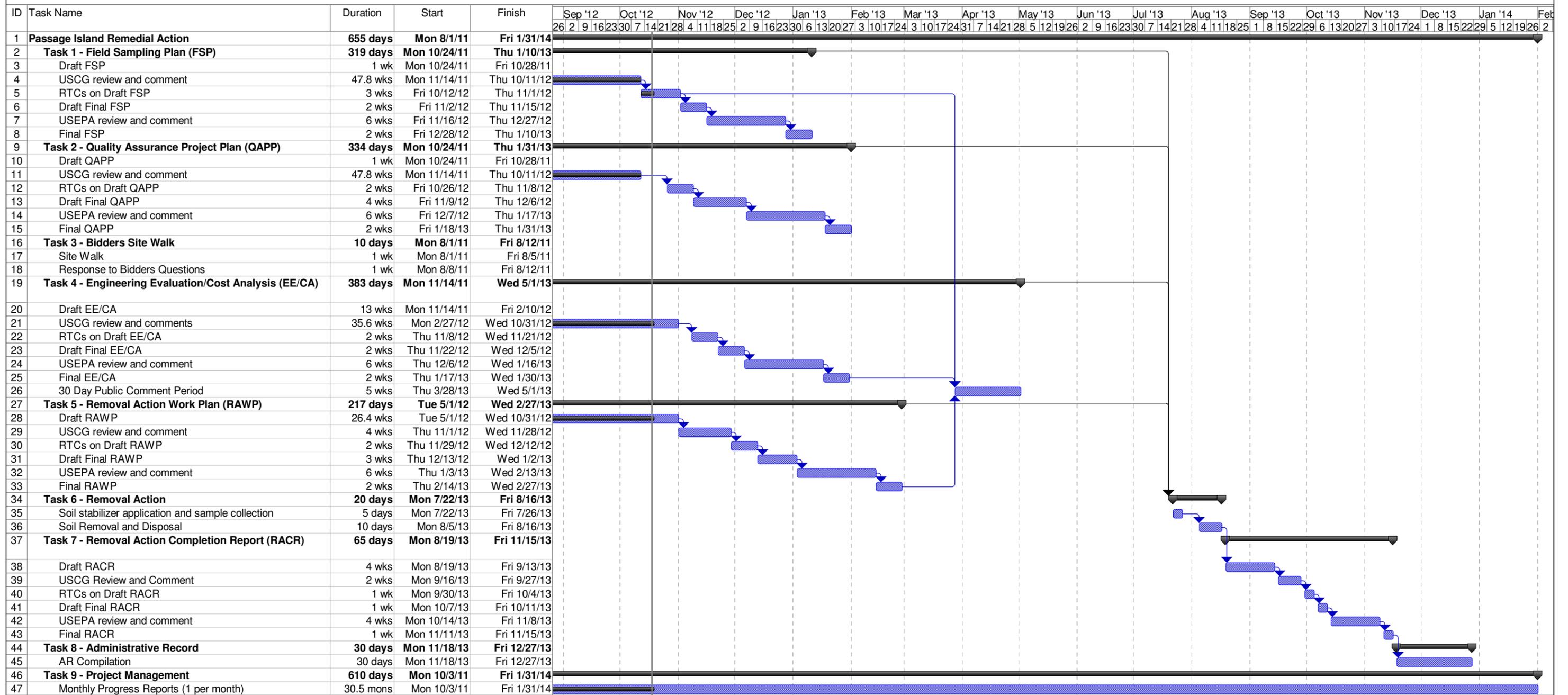
Constituent of Concern and Media	Authority	Act	Statute, Regulation, Administrative Code, or Guidance Document	Status	Synopsis of Requirement, Criteria, or Guidance
State Requirements and/or Criteria.					
	Land and Water Management	NREPA	Part 91, Soil erosion and Sedimentation Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.9101, et seq.) Michigan Administrative Code: R 336.1901, et. seq. Formerly known as Act 347 (1972)	Applicable	Requires a soil erosion control and sedimentation plan for any earth charges of one or more acres and/or any earth changes within 500 feet of a lake or stream. Establishes rules prescribing soil erosion and sedimentation control plans, procedures, and measures. Remedial action may involve capping, construction of a discharge pipe, etc. Consideration of soil erosion and sedimentation control will be necessary to prevent sediment impacts to waters of the state more than 1 acre in area or within 500 feet of a lake or stream, and preserve topsoil loss. May be applied to site activity where earthwork is conducted.
	Waste and hazardous Materials Division	NREPA	Part 111, Hazardous Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.111, et seq.) Michigan Administration Code: R 299.9202-9208, R 299.9212, R299.9228, R 299.9301-9312, R 299.9401-9413, R 299.9501-9523, R299.9601-9634, R 299.9701-9713, R 299.9801-9816, and R 299.11001-11008, et. seq. Part 1: General Provisions; Part 2: Identification and Listing of Hazardous Waste; Part 3: Generators of Hazardous Waste; Part 4: Transporters of Hazardous Waste; Part 5: Construction Permits and Operating Licenses; p g Part 6: Owners and Operators of Hazardous Waste treatment, Storage and Disposal Facilities; Part 7: Financial Capability; Part 8: Management of Specific hazardous Wastes, Specific Types of Hazardous Waste Management facilities, and Used Oil; Part 9: Hazardous Waste Service Fund; Part 10: Availability of Referenced Materials Formerly known as Act 64 (1979)	Potentially Relevant and Appropriate	Defines hazardous waste and establishes requirements for hazardous waste generators, transporters, and treatment/storage/disposal facilities. Regulates the generation, transport, treatment, storage, and disposal of hazardous wastes from site remediation. Regulates closure, post-closure, and corrective action for hazardous waste treatment, storage, and disposal facilities. Remedial action may generate hazardous waste and involve management of hazardous waste. May be applied to off-site disposal of hazardous waste. Used for determining how and in what type of disposal facility contaminated media may be removed to. May be applied to construction and operation of on-site treatment, storage or disposal units relative to requirements for characterization and handling of hazardous waste. Applied to the excavation of certain contaminated media. Note: The State of Michigan has authorization to administer Federal RCRA Subtitle C in the State.
	Waste and Hazardous Materials Division	NREPA	Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.115, et seq.) Michigan State Administrative Code: R 324.11501, et. seq. Formerly known as Act 641 (1978)	Relevant and Appropriate	Addresses solid waste management including general landfill design requirements as promulgated in the administrative rules of the Michigan Solid Waste Management Regulations. Regulates the construction and operations of sanitary landfills, solid waste transfer facilities and solid waste processing plants. Specifies liner and capping requirements for solid waste landfills. Requirements for the operation and closure of non-hazardous waste treatment, storage, and disposal and groundwater quality performance standards. Also imposes geographic limitations on where non-hazardous solid waste can be disposed. Regulates the disposal of non-hazardous solid waste. Provides requirements for closure and post-closure of non-hazardous solid waste treatment, storage and disposal facilities. Provides groundwater quality performance standards. Remedial action may produce non- hazardous solid waste, which must be disposed of in accordance with Part 115. Used for determining the process and type of disposal facility that solid waste or contaminated media may be removed to. May serve as a basis of design for containment of non-hazardous solid waste on-site.
	Remediation and Redevelopment Division	NREPA	Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.201, et seq.) Michigan Administrative Code: R 299.5109, R 299.5505, R 299.5511, R 299.5513, R 299.5515, R 299.5519, R 299.55601, et. seq. Formerly known as Act 307 (1982)	Relevant and Appropriate	In part, protects the environment and natural resources of the state; to regulate the discharge of certain substances into the environment; to regulate the use of certain lands, waters and other natural resources of the state; and to prescribe the powers and duties of certain state and local agencies and officials. Applies to response activities taken at sites of environmental contamination which are facilities as that term is defined in Section 20101(o) of Act 451. Provides risk based site cleanup criteria based on land-use, and other factors necessary to protect the public health, safety, welfare and the environment.
	Department of Natural Resources	NREPA	Part 365, Endangered Species Protection, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). (MCL 324.365, et seq.) Michigan Administrative Code: R 324.61501, et. seq. Formerly known as Act 203 (1974)	Potentially Relevant and Appropriate	Establishes rules to provide for conservation, management, enhancement, and protection of species either endangered or threatened with extinction. Remedial action may take place and adversely impact endangered species and other habitats.

Notes:

ARARs = Applicable or Relevant and Appropriate Requirements
 CERCLA = Comprehensive Environmental Response, Compensation and Liability Act
 CFR = Code of Federal Regulations
 CWA = Clean Water Act
 EE/CA = Engineering Evaluation/Cost Assessment
 FSP = Field Sampling Plan
 GVW = Gross Vehicle Weight
 HAZWOPER = Hazardous Waste Operations and Emergency response
 HMTA = Hazardous Materials Transport Act

IC = Institutional Controls
 MCL = Michigan Compiled Laws
 NA = Not applicable
 NREPA = Natural Resources and Environmental Protection Act
 OSHA = Occupational Safety & Health Administration Act
 QAPP = Quality Assurance Project Plan
 RCRA = Resource Conservation and Recovery Act
 SARA = Superfund Amendments and Reauthorization Act
 SRD = Substantive Requirements Document
 USC = United States Code

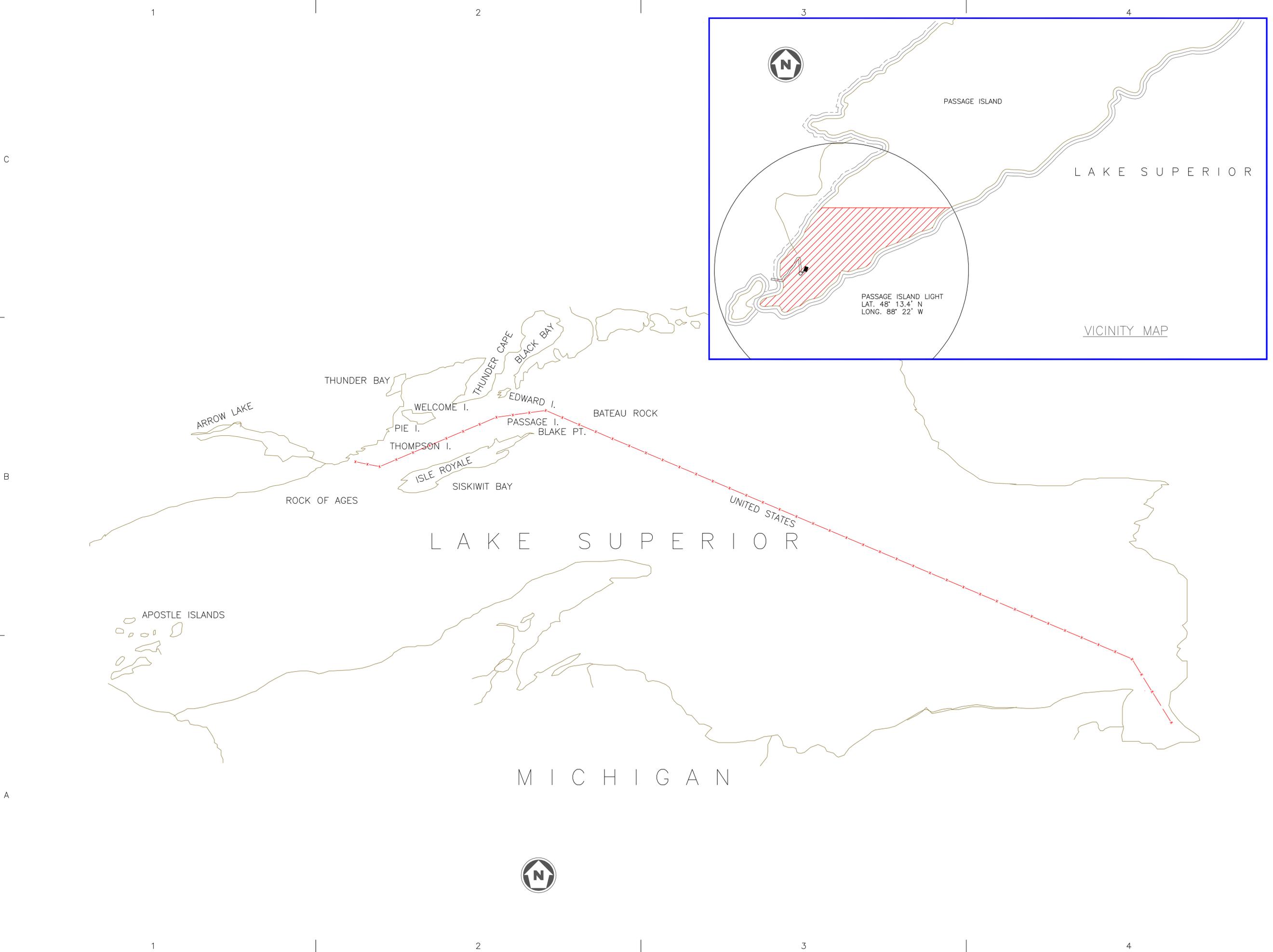
Project Schedule
 USCG CEU Cleveland
 Passage Island Light Station - CERCLA Removal Action
 TO HSCG83-11-J-PCL217
 UPDATED October 18, 2012



Project: Passage Island Light Station CE
 Date: Thu 10/18/12

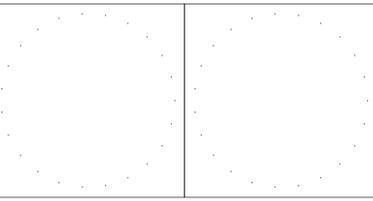
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Milestone		External Milestone		Inactive Summary		Manual Summary		Deadline	
Summary		Inactive Task		Manual Task		Start-only			

Figures



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 1240 EAST 9TH STREET
 CLEVELAND, OH 44199-2060

ISSUE		
MARK	DATE	DESCRIPTION

A/E PROJECT NO: j:\uscg\2008\711\RAWP\CAD
 CAD FILE NAME:
 DESIGNED BY: SAB
 DRAWN BY: SAB
 EDITED BY: DTM
 CHECKED BY: JPJ

SCALE: AS SHOWN PLOT SCALE:

SHEET TITLE
REMOVAL ACTION WORK PLAN
 PASSAGE ISLAND LIGHT STATION
 KEWEENAW COUNTY MICHIGAN
 FIGURE 1

SITE LOCATION MAP

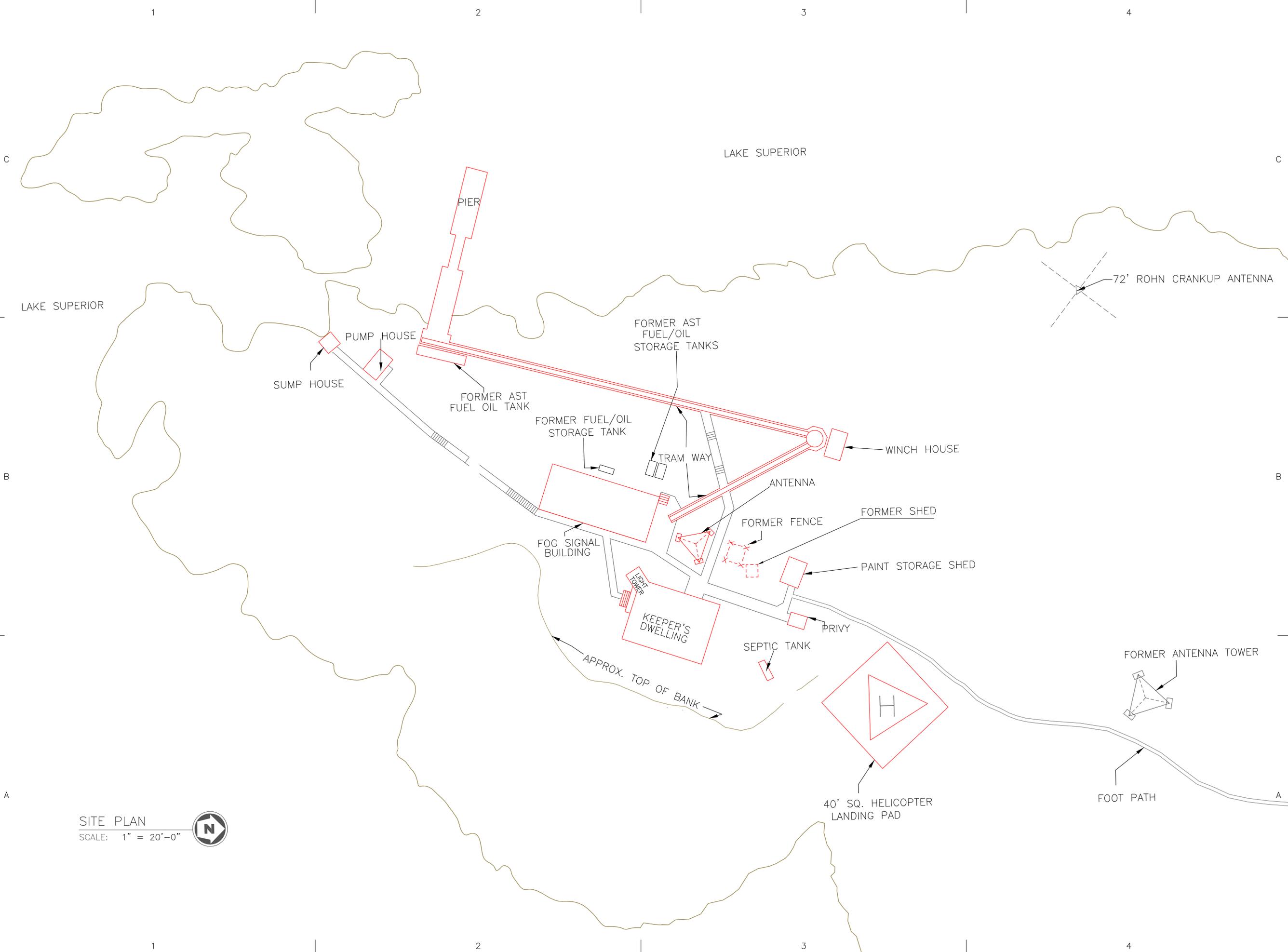
REVIEWED BY:	REVIEWED BY:	REVIEWED BY:
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PROJECT ENG.	BRANCH CHIEF	CONTRACTING KO
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APPROVING OFFICER	DATE
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PROJECT NUMBER	DRAWING NUMBER
09-C01052	7937

DISCIPLINE/SHT NO	SHEET 1 OF 4
C-01	



SITE PLAN
SCALE: 1" = 20'-0"



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ISSUE		
MARK	DATE	DESCRIPTION

A/E PROJECT NO:	j:uscg\2008\711\RAWP\CAD
CAD FILE NAME:	C7937C02
DESIGNED BY:	SAB
DRAWN BY:	SAB
EDITED BY:	DTM
CHECKED BY:	JPJ

SCALE: AS SHOWN PLOT SCALE: 1" = 20'

SHEET TITLE
REMOVAL ACTION WORK PLAN
PASSAGE ISLAND LIGHT STATION
KEWEENAW COUNTY MICHIGAN
FIGURE 2

SITE LAYOUT MAP

REVIEWED BY:	REVIEWED BY:	REVIEWED BY:
PROJECT ENG.	BRANCH CHIEF	CONTRACTING KO

APPROVING OFFICER	DATE
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PROJECT NUMBER	DRAWING NUMBER
09-C01052	7937

DISCIPLINE/SHT NO	SHEET 2 OF 4
C-02	

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USCG, CEU CLEVELAND
 1240 EAST 9TH STREET
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ISSUE		
MARK	DATE	DESCRIPTION

A/E PROJECT NO: juscg\2008\711\RAWP\CAD
 CAD FILE NAME: C7937C04
 DESIGNED BY: SAB
 DRAWN BY: SAB
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SCALE: AS SHOWN PLOT SCALE: 1" = 10'

SHEET TITLE

REMOVAL ACTION WORK PLAN
 PASSAGE ISLAND LIGHT STATION
 KEWEENAW COUNTY MICHIGAN
 FIGURE 4
 PROPOSED SOIL
 EXCAVATION AREAS

REVIEWED BY: REVIEWED BY: REVIEWED BY:

PROJECT ENG. BRANCH CHIEF CONTRACTING CO

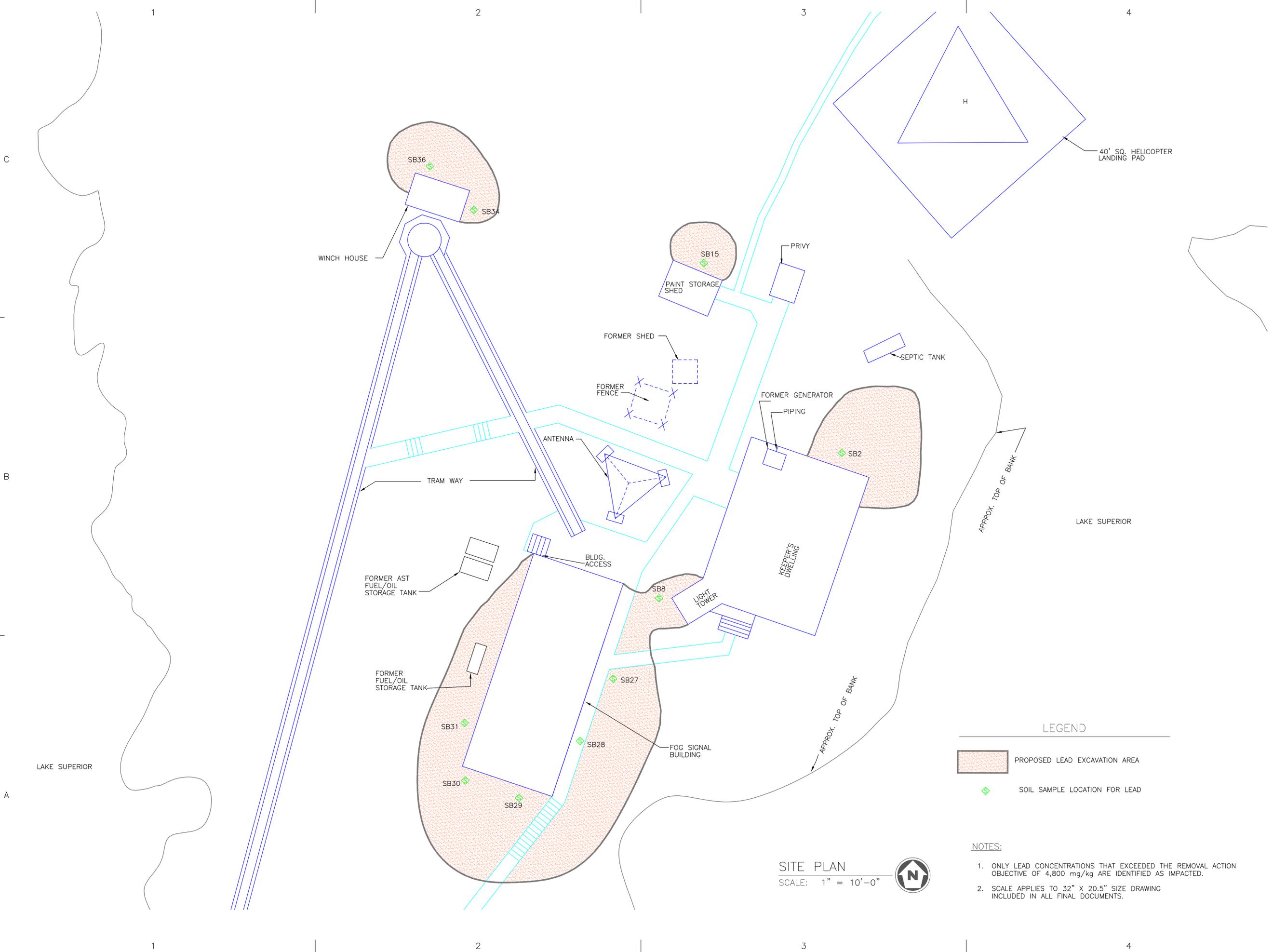
APPROVING OFFICER DATE

PROJECT NUMBER DRAWING NUMBER

09-C01052 7937

DISCIPLINE/SHT NO SHEET 4 OF 4

C-04



LEGEND

PROPOSED LEAD EXCAVATION AREA

SOIL SAMPLE LOCATION FOR LEAD

NOTES:

- ONLY LEAD CONCENTRATIONS THAT EXCEEDED THE REMOVAL ACTION OBJECTIVE OF 4,800 mg/kg ARE IDENTIFIED AS IMPACTED.
- SCALE APPLIES TO 32" X 20.5" SIZE DRAWING INCLUDED IN ALL FINAL DOCUMENTS.

SITE PLAN
 SCALE: 1" = 10'-0"



Appendix A

Archeological Cultural Resources
Survey

**CULTURAL RESOURCE SURVEY:
PASSAGE ISLAND LIGHTHOUSE
(20IR202), KEWEENAW COUNTY,
MICHIGAN**

**A CULTURAL RESOURCE MANAGEMENT STUDY
PREPARED FOR SUBMISSION TO THE
MICHIGAN STATE HISTORIC PRESERVATION OFFICER**

**GREAT LAKES RESEARCH, INC.
ARCHAEOLOGY / CULTURAL RESOURCE MANAGEMENT**

**CULTURAL RESOURCE SURVEY:
PASSAGE ISLAND LIGHTHOUSE (20IR202),
KEWEENAW COUNTY, MICHIGAN**

PREPARED AND SUBMITTED BY:

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GLR Report No. 2004-05

SUBMITTED TO:

MWH Americas, Inc.
41551 Eleven Mile Road
Novi, MI 48375

30 August 2004

The opinions, findings, and conclusions expressed in this document are those of the authors, Great Lakes Research, Inc., and are not necessarily those of our client, MWH Americas, Inc.

ABSTRACT / MANAGEMENT SUMMARY

In August 2004, Great Lakes Research, Inc. (GLR) was contracted by MWH Americas, Inc. of Novi, Michigan to perform a Phase I archaeological cultural resource survey and evaluation of an approximately 0.25 acre property located in Section 9, T67N R32W, Houghton Township, Keweenaw County, Michigan. The study area generally corresponds to the footprint of the Passage Island lighthouse complex (20IR202), which is located on the extreme south end of the island, approximately four miles northeast of the northeast extremity of Isle Royale in Lake Superior.

This survey was requested by the Michigan State Historic Preservation Officer (SHPO) and was predicated on the planned remediation of contaminated soils at the U.S. Coast Guard property. Although the Native American archaeological sensitivity of this remote property appeared relatively low, the general environmental setting was considered of increased historic period sensitivity due to the presence of the ca. 1881 Passage Island lighthouse complex.

Prefield archival research per prehistoric and historic Native American archaeological potentials in relation to the study area had indicated a very low sensitivity concern. This was predicated on (1) isolated nature of the island and (2) the exposed bedrock landform on which 20IR202 is located.

Archival research also indicated that the general study area had been developed as a lighthouse site no earlier than 1880 and that this land use had continued until the present day. The only significant change to the property has been its conversion to an automated rather than manned station. Although such a property could include archaeological deposits of significance, Phase I survey of this property determined that soils deposits were extremely thin and that artifacts included therein were largely limited to architectural debris, coal fragments, and ash/cinder deposits.

Based on a Phase I survey program that combined archival research with pedestrian reconnaissance and subsurface testing, it has been determined that there are no significant prehistoric or historic period archaeological resources within the Passage Island lighthouse (20IR202) study area. Therefore, GLR recommends that no further evaluation or mitigation of this project will be required for archaeological resources, and that its immediate release for soil remediation appears warranted.

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SECTION 1.0 - INTRODUCTION

In August 2004, Great Lakes Research, Inc. (GLR) was contracted by MWH Americas, Inc. of Novi, Michigan to perform a Phase I archaeological cultural resource survey and evaluation of an approximately 0.25 acre property located in Section 9, T67N R32W, Houghton Township, Keweenaw County, Michigan (Figure 1). The study area generally corresponds to the footprint of the Passage Island lighthouse complex (20IR202), which is located on the extreme south end of the island, approximately four miles northeast of the northeast extremity of Isle Royale in Lake Superior. The only ready access to Passage Island is via hired boat from Isle Royale National Park.

This survey was requested by the Michigan State Historic Preservation Officer (SHPO) and was predicated on the planned remediation of contaminated soils at the U.S. Coast Guard property. Although the Native American archaeological sensitivity of this remote property appeared relatively low, the general environmental setting was considered of increased historic period sensitivity due to the presence of the ca. 1881 Passage Island lighthouse complex.

Following the completion of prefield archival research, which was conducted by the principal investigator, Mark C. Branstner (M.A. Anthropology, Wayne State University), the fieldwork phase of the project was implemented. Fieldwork was initially scheduled to be completed early in the week beginning 16 Aug 2004 in order to meet a contracted completion date of 20 Aug 2004, but weather conditions on Lake Superior precluded boat access to Passage Island during that period. The trip was rescheduled for the following week and principal investigator arrived at Isle Royale National Park on Wednesday, 25 Aug 2004. Unfortunately, although Lake Superior was calm, the entire area was fogged in, precluding off-island boat travel until Friday morning (27 Aug 2004). The survey was completed on Friday and the principal investigator returned to Isle Royale, under renewed small-craft advisories.

The following report represents our findings.

Figure 1. General location of project area (U.S. Coast Guard).

SECTION 2.0 – PHYSICAL ENVIRONMENT

Topographically, the Passage Island lighthouse project area is identical to the much larger Isle Royale, which is located approximately four miles to the southwest. As such, it is best described as a bedrock outcrop with vegetation present at any point where soil has accumulated (Farrand and Bell 1982). Elevation of the study area ranges from approximately 620-640 ft above mean sea level or approximately 20-40 ft above the immediately adjacent Lake Superior surface (600 ft above mean sea level).

At the time of the survey, the defined survey area (Figure 2) was best described as the crest of a bedrock outcrop, bounded on the south, east and west by wave-cut exposures leading down to Lake Superior, and to the north by forested portions of the island. Soils have developed, accumulated or been placed in general proximity to the various structures and in low areas between bedrock exposures. Vegetation was limited to grasses, weeds, and a few small woody shrubs.

SECTION 3.0 – CULTURAL ENVIRONMENT

3.1 NATIVE AMERICAN RESOURCES

The general outline of the Native American occupation of the Upper Great Lakes has been presented by several authors (cf., Bieder 1995; Cleland 1992; Fitting 1975; Green et al. [eds.] 1986; Lovis 1990; R. Mason 1981). From these accounts, it is apparent that the region reflects approximately 10,000 - 12,000 years of Native American presence, and nearly 400 years of Euroamerican occupation and utilization. Coupling this time depth with the study area's location, it can be expected that the range of cultural resources potentially included within the survey area is large, and that nearly the entire range of archaeological resource types known for the Upper Great Lakes region may be encountered.

3.1.1 The Paleoindian Period

The Paleoindian period in Michigan was characterized by an environment recovering from the recent effects of deglaciation. Tundra and spruce woodland habitats prevailed, and the configuration of proglacial water bodies in what would become the Great Lakes was markedly different than that at present. Some areas of the state, specifically the Upper Peninsula, were deglaciated later and remained in a periglacial environment until more recent times than the more southern reaches of the Lower Peninsula. Currently available evidence suggests that the earliest human inhabitants of the area were organized into small nomadic bands moving across large territories as they followed the great herds of Pleistocene herbivores that served as a primary subsistence and economic resource (Fitting 1975). While Cleland (1965, 1966, 1976) has suggested that barren ground caribou provided some of the protein for this big game hunting, narrow spectrum economy, others have made the case that mastodon (e.g., Fisher 1984) and/or bison (e.g., Shay 1971) may also have contributed greatly to the seasonal subsistence cycle. Although the evidence is limited, excavations at Paleoindian sites in the northeastern United States indicate that a variety of small and medium-sized mammals, fish, and a variety of plants and nut resources were also being exploited (e.g., Meltzer and Smith 1986; Rusch and Penman 1984). Within the Upper Great Lakes region, the presence of white-

Figure 2. Plan view of study area (U.S. Coast Guard).

tailed deer, beaver and turtle bones, some of which are calcined, has been reported from the Late Paleoindian Sucices site in northwestern Wisconsin (Rusch and Penman 1984). Thus, while caribou or other large mammals may have served as a key economic resource, they were most likely only one component of a much more diverse subsistence system.

Upper Michigan's earliest human inhabitants presumably entered from the south, primarily via Wisconsin, and migrated north and east across the peninsula, following the large game and receding glaciers. In Wisconsin, the Paleoindian time period has been divided into two parts (R. Mason 1986a): the Early Stage (ca. 10,000-8000 BC) and the Late Stage (ca. 8000-6000 BC). Similar chronologies have been derived for lower Michigan and Ontario (Ellis and Dellar 1990; Fitting 1975). The Early Stage is characterized by fluted projectile points, often made from exotic cherts and fine grades of quartzite, although it is unknown whether these raw materials were acquired through trade or were brought in with the early peoples. Unfortunately, no Early Stage Paleoindian sites have been formally excavated in Wisconsin to date. There are a few fluted point sites in the southern portion of Wisconsin and Michigan and a number of isolated findspots have been located throughout each state (Fitting 1975; R. Mason 1986a).

The Late Stage of the Paleoindian period, while more visible than the Early Stage, is still poorly represented in Upper Peninsula. This period is characterized by collaterally flaked lanceolate projectile points, often manufactured from exotic cherts or Hixton silicified sandstone. As expected, the sites associated with this stage appear to be single component occupations by small groups of people. Evidence of occupation during the late Paleoindian period in the Upper Peninsula has been provided by the recent work of Buckmaster and Paquette (1989) along the south shore of Lake Superior in Marquette County. In this area they have recorded a series of Late Paleoindian or Plano period sites on outwash features of the Marquette re-advance (Buckmaster and Paquette 1989; Buckmaster and Ruggles 1991; Clark 1989). These sites are represented by Scottsbluff, Eden, Agate Basin and other collaterally flaked point styles, often found in dense concentrations, suggesting cremations or restricted activity areas. The Minocqua and Squirrel River phases (Salzer 1974) from northern Wisconsin clearly relate to this time period, and the distribution of these phases may extend across the north shore of Lake Michigan into the western Upper Peninsula. This is clearly a periglacial adaptation that extended eastward across the northern and eastern shores of Lake Huron.

Perhaps the oldest authenticated site lying in reasonable proximity to the current project area is the Keweenaw Peninsula's 20KE20, which has produced a radiocarbon date of 5920 ± 350 BC. Although the sample from which this date was derived remains somewhat ambiguous, it may be associated with a hearth feature and a worked copper artifact (S. Martin [ed.] 1993). If the date is associated with the cultural deposits, it would minimally suggest a Late Paleoindian - Initial Archaic date for the area. Clearly, although the physical evidence remains scant, the presence of sites from at least the Late Paleoindian period onwards appears possible for the project area.

3.1.2 The Archaic Period

The Archaic period is traditionally set off from the preceding Paleoindian period based on a shift from the focal, large game hunting of the earlier period to the highly diffuse hunting and gathering strategy that marks the Archaic (Cleland 1966, 1976; Fitting 1975; Stoltman 1986). This shift most likely occurred in response to rapid environmental changes in the post-

glacial period, including major changes in post-glacial vegetation patterns. The initial shift from the glacial tundra environment to a spruce and fir-dominated landscape was followed by a shift towards the modern mixed northern deciduous forests. Thus, Archaic adaptations in the region were responding to a series of major environmental changes. Corresponding in part to these environmental variations, the Archaic period is typically divided into subperiods. In northern Michigan these include a combined Early-Middle Archaic period (ca. 6500-3000 BC) and a Late Archaic period (ca. 3000-1 BC) (Fitting 1975). In Wisconsin, a slightly different chronology has been offered, including the Early Archaic (ca. 6500-3000 BC), the Middle Archaic (3000-1200 BC), and the Late Archaic (1200-1 BC; Stoltman 1986). For the purposes of this discussion, Fitting's (1975) chronology will be used, in modified form, to discuss Initial (6500-3000 BC) and Terminal (3000-1 BC) Archaic horizons in the Upper Peninsula.

Coincident with the rapid environmental changes of the Archaic period were major readjustments in Great Lakes basin lake levels. The major stages, as relevant to the Archaic period, will be briefly outlined below (cf., Anderton 1993; Monaghan 1993). Around 9000 BC the Lake Superior basin saw some of its highest lake levels (ca. 1340 ft AMSL). By 6000 BC lake levels had reached their all time low (the Houghton Stage). However, due to isostatic rebound the Houghton Stage shoreline was at an elevation near, but possibly below, the modern level of Lake Superior (605 ft AMSL). Nevertheless, this represents a variation in excess of 600 ft AMSL in lake levels over an approximately 3000 year period. The Terminal Archaic period is dominated by the Nipissing stage of lake development. Nipissing I reached a level of approximately 630-650 ft AMSL between 3000 and 2500 BC. Between 2500 BC and the formation of modern Lake Superior (ca. 2000 BC), the lake levels generally remained between 620-605 ft AMSL. While the lake fluctuation was not as dramatic during the Late Archaic period, the process illustrates that the Great Lakes represent a dynamic, continually evolving system.

In the combined Michigan/Huron basin, high water levels were achieved by 9000 BC with the establishment of Lake Algonquin (ca. 720-725 ft AMSL). By 7500 BC the high water levels associated with glacial Lake Algonquin gave way to greatly reduced water levels known as the Chippewa and Stanley low stages in the Michigan and Huron basins, respectively. Although the actual elevation of Lake Chippewa is not known, it was at least 200-300 ft below the current level of Lake Michigan (580 ft AMSL). Like the Superior basin, the Michigan and Huron basins were marked by the Nipissing lake stage during the Archaic period. Beaches associated with the Nipissing maximum have been plotted at modern elevations between 600-605 ft AMSL in the Bay de Noc Region, while post-glacial rebound has raised them to approximately 635 ft AMSL in the Straits of Mackinac region. The final major shift in lake levels occurred with the Algoma transgression around 1200 BC, when lake levels ranged between 10-30 ft above their modern shores in both the Michigan and Huron basins. Modern lake levels (ca. 580 ft AMSL) were generally achieved by 2000 years ago. Thus, Archaic period sites might be located well below or well above the modern shorelines, reflecting the dynamic changes in the lake levels during this period.

Evidence for the Initial Archaic stage is nearly non-existent in northern Michigan and Wisconsin (Fitting 1975; Stoltman 1986). Two possible explanations for the lack of identified sites pertaining to this period have been offered by Stoltman (1986). The first is simply that archaeologists have not learned to differentiate Early Archaic sites from Late Paleoindian ones. Salzer's (1974) Squirrel River Phase, marked by side and corner-notched projectile points, is the best example of Early Archaic materials in northern Wisconsin. Fairchild (1970) has

offered a similar argument for the lack of Early Archaic sites in Michigan, suggesting that Middle Archaic occupations may have greater time depth than previously thought. The second rationale relates to the changing level of the Great Lakes. Recent research concerning settlement systems in the central Upper Peninsula of Michigan (Anderton 1993, 1995; Franzen 1987) indicates that Great Lakes paleoshorelines were regularly used for settlement in the Middle-Late Archaic Period. If a similar pattern exists for the Early Archaic stage, then many of these sites, based on the lake levels noted above, have been eroded away by mid-Holocene lake levels or lie under the current surface of the Upper Great Lakes. Alternately, the low carrying capacity (Fitting 1975) of the spruce/fir forests that dominated the region during this time period may not have been particularly conducive to human occupation. Regardless of the rationale, there are few documented Early Archaic sites in the region.

The end of the Early Archaic stage is marked by the appearance of large side-notched projectile points and the use of native copper (Fitting 1975; R. Mason 1981; Stoltman 1986). The increasing use of native copper during this period led to its designation as the *Old Copper* culture (Griffin 1961; Mason and Mason 1961; Ritzenthaler [ed.] 1957). Despite the Old Copper appellation, it should be noted that copper makes up only a small portion of the total assemblage of this period, and similar copper artifacts, while decreasing in number, are used and manufactured into the Initial Woodland Period.

A single Old Copper site, Oconto, has been excavated in northeastern Wisconsin (Ritzenthaler and Wittry 1957). While primarily a cemetery, containing both primary and secondary burials as well as cremations, the site also produced evidence for an associated settlement. In addition to copper beads and tools, these burials contained chert points and tools as well as a variety of antler artifacts. Another major site from this region is the Riverside site in Menominee County, Michigan (Hruska 1967). This Old Copper site also contains both burial and occupation components. If the artifact variability and radiocarbon dates are any indication, this site had probably been repeatedly occupied throughout the course of the Late Archaic and subsequent Initial Woodland periods. Three radiocarbon dates, ranging from 510 BC to AD 1, combined with an abundance of stemmed and expanding stemmed projectile point styles reminiscent of more southern tier Late Archaic complexes, reveal a substantial Archaic occupation.

The Late Archaic stage is generally distinguished from the earlier Archaic by a shift from notched to stemmed projectile (Durst/Dustin) points (Fitting 1975; Stoltman 1986). A burial complex known as Red Ochre has been identified in much of the Lake Michigan basin, including the Bay de Noc and Straits of Mackinac regions (Ritzenthaler and Quimby 1962). Red Ochre burials get their name from the inclusion of ground hematite with the inhumations. Specific traits associated with these burials (although not universal) include flexed burials in sand; large ellipsoidal ceremonial blades (light-colored chert); turkey-tail blades of Wyandot chert; and small ovate-triangular cache blades (Ritzenthaler and Quimby 1962). Recent compliance work in the city of St. Ignace revealed the presence of a second Late Archaic cultural complex in the Upper Peninsula. This complex is currently only represented by a partially disturbed burial with an associated cache of approximately 50 Meadowood style bifacial preforms made on Onondaga chert from the Niagara Falls region (Beld 1995). Of particular interest is the occurrence of one of these bifaces on Hixton Silicified Sandstone, arguing for large-scale east-west interactions among Archaic peoples across the Upper Peninsula. Unfortunately, the limited nature of the information on these Terminal Archaic adaptations in northern Michigan precludes more specific exploration of the relationships

between these cultural groups and those in the more southern parts of the state, other than to note that it appears to represent a continuation of the influence of more southern projectile point styles in an evolving local Late Archaic adaptation.

Recently, several Archaic period sites have been identified in Alger County. For example, the Popper site has been identified on Grand Island (Dunham and Branstner 1995). This site is comprised of a generalized quartzite lithic assemblage consisting of flakes, cores, and expedient tools, and a Late Archaic date has been derived from at least one of the site's hearth features (2100±50 BC; Dunham and Branstner 1995). Two additional sites from this region have also provided Archaic dates. Like Popper, these sites produced somewhat problematic, non-diagnostic quartzite lithic assemblages. The Miner's Beach site has produced Late Archaic dates from a hearth feature (1150±80 BC; Clark 1993) and the Trout Point site has produced slightly more recent thermoluminescence dates from quartzite FCR (150±200 BC; Benchley et al. 1988). Terminal Archaic dates have also recently been derived from two sites (20MQ90-91) located to the east Marquette County (950±60 BC and 1630±90 BC; CCRG 1995).

Although lacking internal chronology, the Bay de Noc and Mackinac Straits regions have several sites of reputed Archaic age. Two such sites include the Bergquist and Sack Bay sites in Delta County (Fitting 1975). These are riverine and lakeshore sites, respectively, and attest to the fact that sites of this stage can occur in both stable terrace and active eolian dune contexts. Both sites are attributed to the Archaic based on a lack of ceramics, rather than radiocarbon dates. The lack of fauna and flora from these sites makes subsistence statements speculative, although Fitting (1975) argues that the tool assemblages and locations would make Bergquist a fishing camp and Sack Bay a hunting camp. An Ocoela-like point has also been identified at FS 09-10-02-418, on a Nipissing age beach barrier, indicating the presence of an Archaic lithic station. Likewise, the Nelson site in St. Ignace (Fitting 1974) contains both copper items and small notched projectiles that are clearly Late Archaic in age.

3.1.3 Initial Woodland Period

By definition, the Woodland period is traditionally marked by the introduction of ceramics. In Michigan, the appearance of this technological innovation occurs at different times across the state. Thus, north of the Canadian-Carolinian transition zone, ceramics did not appear until ca. AD 1 or a little earlier, whereas in southern lower Michigan they appeared as early as 600 BC (Fitting [ed.] 1972; Garland 1986; Ozker 1982). While the term Early Woodland has been applied to northern Michigan, it is perhaps more appropriate to refer to an Initial Woodland period for the Upper Peninsula, reflecting the lag in ceramic production in the northern Great Lakes region and an apparent continuation of the evolutionary trends that characterize the Archaic period. Thus, the Initial Woodland of the northern Great Lakes region is effectively coeval with the Middle Woodland of the southern Great Lakes, ca. AD 1-800 (R. Mason 1981).

The Riverside II, Reindle and Little Cedar River sites, in the Menominee River watershed, have been associated with the Early Woodland based on the presence of Dane Incised ceramics (Buckmaster 1979). Derived from the Illinois region, Dane Incised wares are also present in eastern and central Wisconsin, as well as the Green Bay area (R. Mason 1966). Thus, suggesting the cultural affiliation of these peoples is more closely tied to areas to the

southwest, rather than to the east. No other Early Woodland ceramic types are known from Upper Peninsula sites.

The appearance of thin, tool-impressed, sandy paste ceramics generally serves as the hallmark of the Initial Woodland in the region. Sites associated with the Initial Woodland North Bay and Laurel Traditions are best represented regionally along the north shore of Lake Michigan and the Straits of Mackinac (Buckmaster 1979; Brose 1970a; Fitting [ed.] 1974; R. Mason 1966, 1969). In general terms, the North Bay and Laurel traditions are similar in regard to the composition of the artifact assemblages (Janzen 1968a; R. Mason 1966, 1969; Stoltman 1973). Each cultural assemblage includes cordmarked or smoothed ceramic vessels decorated with a variety of plain, dentate, or pseudo-scallop shell stamping. The lithic assemblages are generally comprised of small tools, particularly scrapers and wedges, stemmed or notched projectile points, and bipolar cores. One of the most important sites of this period in the Lake Superior basin is Naomikong Point (Janzen 1968a). Materials recovered at this site demonstrate the broad regional similarities which mark the Laurel culture (e.g., Stoltman 1973; Wilford 1941; Wright 1972), with the most notable consisting of the smooth-bodied rim-decorated ceramics, characteristic end scrapers, and thin side-notched projectile points (Janzen 1968a). Copper artifacts often appear in Initial Woodland assemblages. Salzer (1986a:273) has suggested that many of the so-called Old Copper artifacts may actually have been produced by Initial Woodland peoples. A similar conclusion has been reached by Susan Martin and her co-authors, who recovered a possible copper beadmaker's toolkit from the Lac La Belle site (20KE20), located only about one or two miles inland from the current study area. Textiles preserved through contact with the copper blanks, beads and awls were radiocarbon dated to the 5th century AD (Martin 1994; Martin [ed.] 1993).

The Initial Woodland period in the Bay de Noc region is known from several sites in Menominee, Delta, and Schoolcraft counties. Two well-reported sites from the western Upper Peninsula include Summer Island (Brose 1970a) and Burnt Bluff (Fitting [ed.] 1968). The former, along with sites such as the Winter site (Richner 1973), attests to the potential for clear stratification of occupational materials in coastal dune contexts. Faunal remains and the presence of oval residential structures suggest that several extended families may have occupied this site during the spring and summer. The archaeological remains of a similar structure have recently been identified at the Timid Mink site in Iron County (Hill 1995). The conoidal, tool-impressed ceramics from the Summer Island site, lacking the cord-impressed surfaces common to North Bay materials, are more closely related to southern Laurel types from the Straits of Mackinac region. Corner-notched and expanding stemmed projectiles, small scrapers, and wedges/bipolar cores also conform to a Laurel affiliation. An aquatic emphasis is present in the faunal assemblage. Cleland (1976) has presented the case that shallow water fishing with nets, as well as individualized fishing, was the dominant spring/summer subsistence mode for Initial Woodland populations, who aggregated during the spring and dispersed during other seasons of the year. This is consistent with the model proposed by Brose (1970a) for the Summer Island site, where it is argued that large mammals probably filled out the seasonal economy. At this time, this model also appears to hold true for the Straits of Mackinac Initial Woodland populations as well.

The site of Spider Cave on Bay de Noc is unusual in that it appears to represent a ritual locale. The name of the site is derived from the presence of several cave paintings, including an anthropomorphic spider. Projectile point fragments, representing a range of regional Initial Woodland styles, are interpreted as having been shot into the cave from a distance, fracturing

upon impact with the wall of the cave (Cleland and Peske 1968). It is still not clear what this activity might represent, although Richner (1973) speculates that these activities might relate to hunting success. He further notes in his analysis the marked similarity of the lithic assemblage from the Winter site with that from the Burnt Bluff material reported by Cleland and Peske (1968). A nearby cave also contains evidence for ritual activity, including the skeletal remains of seven subadults (Janzen 1968b).

The southern Laurel tradition is well-represented in the Straits of Mackinac Region (Fitting 1979; Fitting [ed.] 1974). At present, radiocarbon dates notwithstanding, it is difficult to place a refined chronological control on the several sites of this time period. For example, Lovis and Holman (1976) have argued on the basis of the radiocarbon chronology from Fort Michilimackinac and the Wycamp Creek site that the Initial Woodland intrusion into the northern Lower Peninsula was a late phenomenon, initiating ca. AD 400. Examples of such occupations include the Steiner site (Fitting 1979), the Arrowhead Drive site on Bois Blanc Island (Bettarel and Harrison 1962), as well as the Gyftakis and MacGregor sites in St. Ignace (Fitting [ed.] 1974). Straits region sites include both coastal and inland locations. Coastal locations at the Straits and along Lake Michigan reveal high artifact densities suggestive of repetitive use, with abundant ceramics and stone tool inventories. Inland sites display lower artifact densities overall. At face value, one could postulate a coastal/interior pattern of seasonal use, with spring/summer aggregation in coastal zones and dispersal into smaller social units during fall and winter. While no compelling model of Initial Woodland seasonal dynamics has been developed for the region, such a pattern of seasonal mobility is quite likely.

The best known Initial Woodland site on the south shore of Lake Superior is Naomikong Point (Janzen 1968a). Other recognized Initial Woodland sites within the Hiawatha National Forest include the Gooseneck Lake IV site (Franzen 1987), the Indian River site (Franzen 1987), the multicomponent Williams Landing locale (Dunham and Branstner 1995), and the Carp River site (Dunham et al. 1993). The Carp River site has been interpreted as a transitional Middle-Late Woodland fishing encampment at the mouth of the Carp River. Faunal evidence from the site suggests an emphasis on spring-spawning species (e.g., sturgeon, walleye, etc.), although fall spawning species (e.g., whitefish and lake trout) are also represented. The location of the site is also consistent with that of transitional Middle-Late Woodland fishing village based on current regional settlement subsistence models (Cleland 1976, 1982a; Martin 1989), as the mouth of the Carp River would provide excellent access to both river-spawning spring species and deep water-spawning fall species.

There has been a tendency to ascribe Middle or Late Archaic dates to aceramic sites situated on mid-Holocene landforms. However, this has been found to be a problematic assumption, as demonstrated from a series of recently excavated sites on Lake Superior, in the Upper Peninsula of Michigan. For example, although the Popper site is situated on a Nipissing age feature and has generated an aceramic assemblage, the site has produced late Initial Woodland radiocarbon dates (AD 765±350 [Anderton 1993]), as well as Archaic dates (2100±50 BC [Dunham and Branstner 1995]). Similarly, Terminal Archaic (1,150±80 BC) and late Initial Woodland (AD 870±50) dates have also been derived from aceramic features at Miner's Beach (Clark 1993). Finally, a ca. 350 BC - AD 50 range has been determined for the aceramic Trout Point site, which is situated on a mid-Holocene landform (Benchley et al. 1988). These sites clearly illustrate the problem of dating sites based on the presence/absence of ceramics, and argue for the presence of aceramic Initial Woodland sites in the Lake Superior basin.

3.1.4 The Terminal Woodland Period

In the Upper Great Lakes region, the Terminal Woodland is generally distinguished from the Initial Woodland by a trend towards greater regional diversity as well as changes in technology and subsistence patterns beginning as early as ca. AD 600 (Buckmaster 1979; Clark 1991; S. Martin 1989). The subsistence patterns appear to be keyed to seasonally dense, abundant plant and animal resources such as spawning fish and wild rice (Cleland 1976). Technological changes include the bow and arrow, indicated by the use of small triangular points, and the use of deep water gill nets, represented by grooved net sinkers (Clark 1991; Cleland 1976, 1982a; S. Martin 1989). Ceramic styles begin to reflect significant diversity encompassing Oneota, Blackduck, and Iroquoian influences, as well as localized forms such as Mackinac and Juntunen wares (Brose 1970a; McPherron 1967; R. Mason 1966, 1981; Salzer 1986b).

Perhaps the most compelling economic model for the larger region is the one proposed by Cleland (1976; 1982a), who presents a case for the advent of deep water gillnet fishing by Terminal Woodland peoples based on changes in site location, fauna, and artifacts. Several lines of evidence are used to draw this conclusion. First, there is the technological component, which involves a shift from individualized fishing gear, such as hooks, gorges and toggle harpoons, to a technology incorporating netsinkers, presumably employed to weight deep water nets. Second, shifts from shallow water site locations during the Middle Woodland to the addition of sites proximal to deep water habitats during the Late Woodland are used as parallel lines of evidence to demonstrate a settlement system transformation to fall aggregate sites. Finally, faunal data are incorporated into the discussion to demonstrate the increasing use of deep water, autumn-spawning fish species during the Late Woodland. In concert, the three sets of information are used to infer an increased reliance on abundant, deep water fish species, such as lake trout and whitefish, extracted with gillnets and processed for storage by larger social aggregates. It should be noted that the incorporation of deep water fishing of fall spawning species into Terminal Woodland subsistence strategies does not decrease the importance of other resources, such as shallow water spring spawning species (S. Martin 1989).

Cultural affiliations for the Bay de Noc region are clearly tied to the south and west in Wisconsin. The presence of Madison wares in some abundance, rather than Straits sequence ceramics, reveals that the Bay de Noc region is part of a different cultural system (Brose 1970a; Buckmaster 1979). This is further attested to by the fact that Oneota ceramic wares occur across the region at many Terminal Woodland sites (e.g., Sturgeon River site [Buckmaster 1983; Martin and Martin 1980]; Ogontz Bay site [CCRG 1991a]). Two sites in this portion of the HNF provide interesting information concerning the settlement and subsistence of the region. The 10 Mile Rapids site, which is situated inland on the Sturgeon River, has produced cordmarked ceramics, a triangular point, and a slate elbow pipe, as well as a faunal assemblage consisting primarily of sturgeon and beaver bone (CAI 1984). Both the site's location at a rapids and the recovered faunal assemblage indicate that it was a spring encampment focusing on spawning sturgeon. The Ogontz Bay site, situated on the shore of the Stonington Peninsula, has produced Sand Point ceramics, a variety of stone tools, and a very diverse faunal assemblage, including fish, mammals, and birds (CCRG 1991a). The faunal assemblage suggests a focus on spring spawning fish species (especially, walleye and bass). Other faunal data are intriguing, including a cache of black bear mandibles, human-modified painted turtle shell, beaver incisors, and a bald eagle talon. These finds may indicate specific

resource procurement and may, particularly in reference to the eagle claw, reflect ideological behaviors.

In the Mackinac Straits region, Holman (1978) has outlined a cycle of seasonal mobility during the AD 700 - 1000 Mackinac phase. Using site catchment analysis as her analytic method and exploring seasonal resource availability adjacent to known Mackinac phase sites, she reconstructs two potential mobility models. Both incorporate a cycle of coastal spring/summer/autumn movement to repetitively occupied locations, with late autumn/winter dispersal into dissected interior lacustrine environments. The basic difference between her two models revolves around the location of autumn deep water locations, one incorporating the coastal zone of Lake Michigan and the other keying on the Straits of Mackinac. The result replicates historically documented cycles of Ojibwa mobility in the region. However, it should be noted that neither model suggests the use of horticulture/agriculture in the subsistence economy, and that while we have the ability to differentiate time periods within the Late Woodland, there is currently no reason to suggest additional large scale transformation of the settlement system during the period.

With the latter point in mind, the chronology of the Straits region can be reconstructed from McPherron's (1967) analysis of the Juntunen site on Bois Blanc Island in the Straits of Mackinac. This sequence begins ca. AD 800 with the inception of the Mackinac phase, characterized by subconoidal, flared rim, cord-decorated pottery termed Mackinac ware. These early Late Woodland styles lack collars or castellations. Mackinac wares decline by ca. AD 1000. The subsequent Bois Blanc phase displays an increase in Blackduck-related decorative styles. Vessels of this phase incorporate decorative/manufacturing techniques such as rim and shoulder appliqué, low castellations, globular vessel shapes, and generally straight rim sections. Decoration often includes bands of closely spaced corded tool impressions, brushing, and overlapping punctates. The western complexion of the Straits area ceramic sequence changes markedly with the introduction of Juntunen wares which define the Juntunen phase (ca. AD 1200-1500). McPherron (1967) argues that these ceramics are more closely comparable to Iroquoian styles from southern Ontario.

In the Lake Superior basin, few Terminal Woodland sites have been formally excavated. Naomikong Point contains a Terminal Woodland component (Janzen 1968a). Ceramic styles across much of the eastern part of the Superior basin indicate an affinity towards the south and east, including Juntunen wares and Iroquoian motifs. In the central and western Upper Peninsula, along Lake Superior, the ceramic wares are more westerly in association. For example, the Sand Point site in Baraga County, which has produced Black Duck and Oneota-like ceramic assemblages, appears to represent a village and funerary mound (Cremin 1980). Similarly, the Williams Landing locale on Grand Island has produced Madison points and Sand Point-like ceramics (Dunham and Branstner 1995; CCRG 1991b). The 1994 excavations at the latter site identified subsurface features and a possible former living floor associated with the Terminal Woodland occupation of the site (Dunham and Branstner 1995). One feature, a small pit, contained a miniature ceramic vessel as well as the carbonized remains of cherry and acorn. These excavations also revealed three grooved sandstone net sinkers, reflecting the use of the adjoining bay for deep water fishing.

Finally, as indicated by the potential date ranges derived from Miner's Beach and the Popper site, which can be interpreted as representing transitional Initial/Terminal Woodland occupations, aceramic Terminal Woodland assemblages may also be present (Anderton 1993;

Clark 1993; Dunham and Branstner 1995). The Yellow Feather site (FS 09-10-01-292) in the Rapid River District of the Hiawatha National Forest has also produced an aceramic assemblage with apparent Terminal Woodland radiocarbon dates (AD 900±200; Anderton 1993). The absence of ceramics in certain Terminal Woodland assemblages suggests that ceramics may have only been used for specific activities or in specific parts of the seasonal round, or that they may have been replaced within particular contexts by containers constructed of other perishable materials. For example, birchbark containers were extensively used by the peoples of the Upper Great Lakes region during the historic period (Densmore 1979; Ritzenthaler and Ritzenthaler 1991). In any case, the possibility of aceramic Woodland sites appears quite likely in the region.

3.1.5 The Historic Period

Oral traditions and early graphic representations of the Native Americans document that the Historic period in the Upper Great Lakes had its roots firmly in the Terminal Woodland (Cleland 1985; Rajnovich 1994; Warren 1984). This perspective is confirmed by the archaeological record, which indicates a significant continuity between the prehistoric Terminal Woodland and the early or protohistoric period of the late sixteenth and early seventeenth centuries AD. In fact, the only way to clearly separate archaeological assemblages of this transitional period is via the presence or absence of European trade goods, with the presence of such goods indicating at least the beginnings of culture contact (Brose 1983; C. Mason 1986; Quimby 1966). By the late 17th century it can be expected that at least secondary culture contact would have been prevalent across the region. By the early 18th century, European missions and military outposts had been established throughout the region (Stone and Chaput 1978).

European contact with the Upper Great Lakes Native American populations can be traced to at least the early 17th century, when French fur traders and Jesuit priests began making their first tentative contacts with indigenous peoples. This process was accelerated in the 1650s, when the Huron-speaking peoples of the Georgian Bay region were pushed west by Iroquoian expansion (Stone and Chaput 1978; C. Mason 1986). Two decades later, the first permanent European settlement was established within a few miles of the current study area. Founded in 1671 and persisting through at least the first decade of the 1700s, the Jesuit mission at St. Ignace expanded to include a small military garrison, a community of voyageurs, and at least two Native American villages; one Ottawa and one Huron. While the French presence has not been convincingly relocated, a number of archaeological sites relating to the contemporary Native American presence have been identified. These include the ca. 1671-1705 Tionontate Huron village (S. Branstner 1987, 1989; Fitting 1980; Fitting [ed.] 1976; Stone 1972), and a number of temporally related burial sites, including Lasanen (Cleland [ed.] 1971), Gros Cap (Nern and Cleland 1974), and Richardson (Greenman 1958).

Historic Native American sites are also well represented in the Bay de Noc region. Notable occupations include those described at Rock Island (R. Mason 1986b) and Summer Island (Brose 1970b). These occupations are associated with protohistoric and earlier historic period occupations of the seventeenth and eighteenth centuries. Nineteenth century activity in this region is documented on General Land Office (GLO) maps placing gardens, villages, and sugar bushes throughout the area (Martin 1977). One community originated in the later 19th century at Indian Point around the old St. Lawrence Church (Dunham et al. 1994; Martin 1977). This community appears to have shifted to the east, becoming the Nahma Indian

community in the 20th century. A lumber camp associated with the latter community, Lambert's Camp, was also occupied in the first half of the 20th century (Anderton et al. 1995).

Several sites are known from this period along Lake Superior. In addition to the other components at the site, Naomikong Point includes both a 19th century component and the Crane clan village, which was located near Tahquamenon Bay (Martin 1977). Sugar camp locales possibly associated with this mid-19th century community have been tentatively identified (Dunham et al. 1994) and the continued presence of the Bay Mills Reservation further demonstrates the historic Native American use of the area. The area around Munising also saw historic period Native American activity. Evidence for 18th and 19th century use of the Williams Landing locale on Grand Island has been documented through possible structural features and artifacts as well as historical references (Dunham and Branstner 1995; CCRG 1991b; Roberts 1991).

As would be expected, historic period Native American sites in the Upper Great Lakes region are typically located along the Great Lakes shoreline or interior lakes, where the occupants subsisted on a mixed economy that included fishing, maple sugaring, wild rice gathering, hunting, and horticulture (e.g., Cleland 1976, 1982b, 1993). Fitting (1976) has suggested that deep water fishing became more important during the early historic period. While numerous Native American village and cemetery sites are known in the Upper Great Lakes region from this period (C. Mason 1986), few have been formally documented in the region. However, the discovery of components relating to historic period Native American activities (e.g., burials, camps, and maple sugaring sites) can be expected at any time. Given the culture continuity between the Terminal Woodland and Historic Native American populations, sensitivity modeling parameters for such resources will be similar to those presented for prehistoric resources of the preceding Terminal Woodland period. While it can be presumed that Europeans were occasionally present at historic period Native American sites (e.g., Alexander Henry [1966]), it does not seem likely that these presences will be readily discernible. Later Historic Native American sites, like Euroamerican sites, will be typically associated with transportation routes.

3.2 EUROAMERICAN RESOURCES

3.2.1 Colonial and Territorial Periods (ca. 1650-1836)

As stated above, the European presence in the Upper Great Lakes region can be traced to the French traders, explorers and priests of the early 17th century. Although present at an early date, the physical impact of their presence remained minimal. 17th century components known or postulated for Michigan are limited to the ca. 1671-1705 Jesuit mission and military garrison at St. Ignace, the slightly earlier Jesuit mission at Sault Ste. Marie, the short-lived 1680s Fort St. Joseph on the St. Clair River, and the subsequent Fort St. Joseph on the St. Joseph River. Although materials associated with these sites have been noted, e.g., Fort St. Joseph (Hulse 1981), none of the sites have been authoritatively relocated or investigated. None of these sites are in direct relation to the current study area.

European resources of the 18th century are divided between French sites of the pre-1760 period and British resources of the post-1760 period. French sites are largely limited to Fort Repentigny at Sault Ste. Marie; Fort St. Joseph in southwest Michigan; St. Ignace and Fort Michilimackinac at the Straits of Mackinac; and the extensive French settlements

surrounding Fort Pontchartrain and along the Detroit River. Although the ca. 1750-1760 Fort Repentigny site may have been relocated (Fitting 1975; Stephenson 1991), archaeological research has not proceeded past the initial testing stages. Archaeological recoveries relating to Michigan's French period occupation are almost exclusively limited to work at Fort Michilimackinac (e.g., Heldman 1991a; Heldman and Grange 1981; Noble 1983; Scott 1985, 1991; Stone 1975). While the official French presence was limited to the posts and missions, French voyageurs and Metis often lived in the local Native American communities (cf., Bieder 1995; Trask 1989). While the presence of such French components can be assumed at the various villages of the region, it does not appear likely that they can be differentiated from the contemporary Native American archaeological settings and assemblages. Therefore, given the locations of the current study area, it appears unlikely that resources relating directly to French period occupation will be included.

When the French relinquished control of Upper Canada to the British in 1760, changes were more administrative than substantive. Land use during the 1760-1796 period remained almost entirely devoted to the fur trade, with the only significant settlements associated with the administration of that trade, e.g., Fort Michilimackinac (pre-1780), Fort Mackinac (post-1780), Green Bay, and Sault Ste. Marie. Archaeological recoveries relating to the British colonial period are conspicuously limited to the Straits of Mackinac (e.g., Grange 1987; Heldman 1991b; Martin 1985) and a number of sites in southeast Michigan. British period settlements are not generally associated with the current study area.

Other British period settlements in the Upper Great Lakes include the ca. 1815-1828 Fort Collyer [Collier] site on Drummond Island, Michigan (20CH50) and occupations at Ft. St. Joseph on St. Joseph Island, Ontario (Emerson et al. 1977). Between 1989-1994, excavations conducted by the Michigan State University Museum at the Ft. Collyer military installation and associated village site have focused on the mapping and initial testing of the extensive complex. Although portions of the site have been impacted by limestone quarrying, survey and mapping efforts have resulted in the identification of more than 80 structural remains, including structural platforms, chimney and hearth remains, several submerged wharves, two wells and a cemetery. Formal testing has included both the enlisted men's and officers' barracks, probable kitchen/mess house and storage structures, and a number of indeterminate structures of non-military origin (Demers 1990, 1992, 1995). Again, British period settlements are not generally associated with the current study area.

While 1796 is the date officially designated for the British surrender of the Upper Great Lakes region, British fur traders operated in the project area until the 1830s (Gilman 1974). In the late eighteenth through the early 19th century the Northwest Company still operated in Lake Superior and may have had a wintering post on Munising Bay (Roberts 1991). It can be presumed that administrative and/or fur-trade posts during this period would have included residential populations as well, i.e., British, French, Native American and Metis, and the European and Metis traders were present in Native American communities. Again, while some British period resources have been relocated in the region through archival and archaeological research, it does not appear that the current study area will include a significant number of identifiably British sites.

As had been the case in 1760, the 1796 American succession resulted in few immediate changes to Michigan's cultural landscape (Gilpin 1970). The American Fur Company became quite active in the region by 1810 and began to dominate the Chequamegon area trade during

the 1820s (Gilman 1974; Heldman 1991a). American posts were established at the locations of the former British installations and in many cases incorporated the buildings and personnel of their competitors. By the 1830s the fur trade was beginning to wane in the region, and the American Fur Company began to rely more on commercial fishing ventures and land speculation than the fur trade itself (Nute 1926; Roberts 1991). The American Fur Company ceased formal operations in the Lake Superior basin around 1840.

Archaeological resource potentials for Michigan's territorial period have been summarized by Branstner (1999) and have been shown to include urban centers, e.g., Detroit, Monroe and Ann Arbor; residential and commercial facilities relating to the agrarian settlement of southern lower Michigan; terminal fur trade era posts scattered throughout the state; and military sites, e.g., Forts Mackinac, Gratiot and Brady. Proven archaeological resources of the territorial period are generally limited to a few urban residential sites in Detroit, e.g., the Renaissance Center (Demeter 1990; Mudar 1978), and military sites, e.g., Fort Brady at Sault Ste. Marie (Demers 1990), Fort Mackinac (Prah and Branstner 1984), and Fort Gratiot at Port Huron (Hawkins and Stamps 1989).

In the Upper Peninsula, potential archaeological resources from this period should be similar to those of the earlier Colonial period. British and American fur trading posts operated in the area and missionaries continued their work as before (e.g., Pitezal 1959). In fact, this period may be more poorly represented than previous periods, in that the fur trade was in decline and Native American communities were dispersing (Bieder 1995; Gilman 1974). Aside from the trading posts in the north, most of Michigan's early American settlement was constricted to the southern portion of the state, along the Great Lakes and the major rivers (Gilpin 1970).

3.2.2 Michigan Statehood Period (1838-2004)

Between statehood and the onset of the Civil War, a number of factors effected major changes in Michigan's cultural landscape. During the speculative years of the late 1830s, emigrant agriculturalists, merchants and industrial entrepreneurs from New England began to arrive at Detroit. What had only seemed a trickle in the late territorial period quickly amounted to a flood. The discovery of metal ore reserves (first copper, then iron) began large scale speculative interest in Michigan's Upper Peninsula in the 1840s (Dunbar and May 1980; Krause 1992; Lankton and Hyde 1982). The completion of the Sault Ste. Marie Canal in 1855 (Dunbar and May 1980) made the transportation and exploitation of these ores more logistically feasible. The vast pine stands in the Upper Peninsula were also coming under the ax at this time (Karamanski 1989).

Although economically successful copper mining operations within the Keweenaw region would not begin until the late 1850s and early 1860s, the initial speculative period of the 1840s prompted extensive mineralogical surveys. While these surveys proved that the copper deposits were limited to the Keweenaw and Isle Royale (Karamanski and Zeitlin 1988), they also resulted in the discovery of a resource of at least equivalent significance. Running survey lines in 1844, one of the government survey teams under the direction of William Burt stumbled upon what was to become known as the Marquette Range, a tremendous deposit of high-grade iron ore. Within two years, the first attempt at mining and processing this ore was taking place at the Carp River Forge (Michigan History Division n.d.). For the remainder of

the 19th century copper and iron extraction would remain the driving forces behind the settlement and economic development of the western Upper Peninsula.

The earliest timber harvesting activities were confined to the shores of the Great Lakes and along the drivable rivers. Rail transport became more accessible in the 1880s and gradually opened up much of the interior regions. The early focus of the Upper Peninsula lumber industry was the pine. Hardwood charcoal was also in demand as a result of the region's copper and iron industries and, as noted above, increased shipping tied to the iron and lumber industries required cordwood fuel. The expansion of mining and lumbering throughout the Lake Superior region, as well as the growth of industrial centers in the southern part of the state, called for building materials which were produced in the lumber mills.

The lumber boom had peaked in activity by the first decade of the 20th century. While hardwood was still actively harvested up to the Second World War, pulpwood gradually emerged as the principal manifestation of commercial logging in the 20th century. The actions of the timber industry also resulted in a generally failed agricultural settlement of cut-over lands. Farms were established by lumber companies and private individuals to supply the lumber camps with food and fodder. Despite the efforts of farmers to tame the stump fields, by the onset of the Great Depression, the adverse climate and poor soils conspired against the successful agrarian development of most of the Upper Peninsula.

The 19th century development of the Upper Peninsula was therefore founded on a triumvirate of immensely successful extractive industries: copper, iron and, during the post-Civil War period, lumber (Karamanski 1989). This pattern persisted through the end of the 19th century and on into the early decades of the 20th century. As in the Lower Peninsula, the actions of the timber industry also resulted in the agricultural settlement of cut-over lands, and in similar fashion, the majority of these settlers eventually failed. Shortly after the First World War, the economic potential of both the extractive and agricultural industries had been largely exhausted, and the regional economy collapsed. By the 1930s, the majority of the mines had closed and the Upper Peninsula was reverting to second-growth forest. The economic collapse led much of the former timber lands to revert to state and federal management. After the Second World War, the triad of pulpwood, tourism and recreation formed the economic basis of the region

3.3 ARCHAEOLOGICAL SENSITIVITY OF STUDY AREA

3.3.1 Native American Resources

Based on the research presented above, it is apparent that evidence for virtually the entire range of Native American land use is potentially available within the Keweenaw Peninsula and Isle Royale, ranging in date from the Late Paleoindian through the Historic periods. While numerous prehistoric Native American sites have been identified on Isle Royale, particularly with respect to prehistoric copper mining, none have yet been recorded on Passage Island. While no formal surveys appear to have been conducted at the latter location, its small size and general isolation likely precludes a significant number of Native American resources. The location of the current study area, on a highly exposed location consisting primarily of bedrock, should also reduce the specific area's Native American archaeological sensitivity.

3.3.2 Euroamerican Resources

Although nearby Isle Royale has been occupied and exploited by Euroamericans since at least the early decades of the 19th century, little can be said about similar activities on Passage Island. As of the present date, only two resources have been identified.

The first of these is the wreck of an unnamed launch (20US255) in a deep cove near center of Passage Island. As of 1984, the hull was intact up to the gunnels on the starboard and up to the deck on the port side. The hull bulged outward amidships on the port side. The stern, rudder, screw and exhaust were undamaged; the engine and fuel tank were present amidships. The steering quadrant was present, but not in its original position. The cabin was missing. Debris was scattered across the forward deck, some of it charred.

The other site is the Passage Island lighthouse (20IR202). According to Hyde (1986:181):

... Congress agreed in March 1874 to spend \$18,000 for a light on Passage Island, but would build it only after the Canadian government had erected a lighthouse on Colchester Reef near the mouth of the Detroit River. As a result of this international diplomacy, construction did not begin until 1881. The work was completed the following year, and the light was first exhibited on July 1, 1882. It marks the northeastern end of Isle Royale, guiding vessels in Thunder Bay, and it is the northernmost American lighthouse on the Great Lakes ... The surviving buildings at Passage Island include the original light tower, keeper's house, and fog signal building [as well as several smaller buildings]. The octagonal tower is 8 feet in diameter at the base and 44 feet tall, built into one corner of the rectangular dwelling. Both are made of coursed rubble masonry construction. The Fresnel lens still in place was built by Barbier, Benard & Turenne of Paris in 1880.

Thus, it would appear that historic period Euroamerican archaeological sensitivities in relation to the current study area are limited to the post-1880 Passage Island lighthouse complex (Figures 3-6).



Figure 3. 20IR202: View of lighthouse south façade, viewed to north.



Figure 4. 20IR202: General view of lighthouse complex, viewed to south.



Figure 5. 20IR202: Lighthouse and fog signal building, viewed to southeast. Note bedrock in foreground.



Figure 6. 20IR202: Tramway and winch house, viewed to northwest.

SECTION 4.0 - RESULTS OF INVESTIGATIONS

4.1 ARCHIVAL RESEARCH

Field investigations were preceded by a period of archival research to determine what, if anything, could be predictively said per prehistoric or historic archaeological sensitivities prior to the onset of fieldwork. To assess generalized archaeological potentials, the site files of the Michigan Department of History, Arts and Libraries were reviewed. To assess historic period archaeological potentials, the holdings of the Library of Michigan in Lansing were also examined. The results of these inquiries have been presented in the preceding section.

4.2 FIELD METHODS

Prefield and fieldwork identified those areas within the study parcels that were totally lacking in subsurface archaeological potentials. These areas generally included (1) areas severely impacted by previous development, (2) areas where grade or slope are too great for prehistoric or historic period occupation, and (3) those areas where poor drainage would have precluded occupation. Where possible, these areas were identified during prefield research and verified through surface reconnaissance.

4.3 RESULTS OF FIELD INVESTIGATIONS

Upon arriving at the project area, it was determined that the testable areas within the approximately 0.25-acre survey parcel were in fact even smaller in size. Obstacles included numerous structures, including the residence/lighthouse, fog signal building, outhouse, paint shed, winch house, and tower pylons, as well as sidewalks and extensive bedrock exposures. As such, the original plan of shovel testing the entire area on a regular 5-m grid did not prove feasible.

In response, it was determined to focus shovel test units on delimited areas that appeared to have some depth of soil, as identified by vegetation. Ultimately, a total of 22 shovel test units were excavated, scattered across available areas of the site (Figure 7). Most shovel test units exhibited varying depths (10-30 cm) of dark brown/black sandy soils overlying sterile light brown to medium browns sands, gravels and bedrock, depending on their location. Artifact recoveries were limited to several items per test unit, with typical recoveries including nails (both square and round), window glass, and bottle glass; due to the small quantities of recovered materials and their lack of analytical content, none were curated. Although none of the recovered artifacts were particularly diagnostic, all were consistent with a post-1880 period of occupation. Spatial patterning of deposits within the tested area included the recovery of coal near the north end of the fog signal building, which appeared to correspond to the tramway location, and deposits of coal cinder and ash along the north line of the tested area, between the outhouse and the helicopter landing pad. It appeared that the ash and cinder had been consciously and consistently dumped in this area, and then buried under dark-colored humic soils. Significant quantities of domestic refuse were not discovered, and it is concluded that such materials were deposited off-site.

Figure 7. Plan view of study area with approximate shovel test locations (U.S. Coast Guard/GLR).

Based on the results of the Phase I archaeological survey of the Passage Island lighthouse complex (20IR202), it is concluded that the site does not include a Native American component and that Euroamerican archaeological materials are limited to architectural debris, coal fragments and ashes associated with the former use of this ca. 1881 lighthouse complex. The latter materials do not appear significant at the level that would elevate them to National Register of Historic Places eligibility.

SECTION 5.0 - CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Prefield archival research per prehistoric and historic Native American archaeological potentials in relation to the study area had indicated a very low sensitivity concern. This was predicated on (1) isolated nature of the island and (2) the exposed bedrock landform on which 20IR202 is located.

Archival research also indicated that the general study area had been developed as a lighthouse site no earlier than 1880 and that this land use had continued until the present day. The only significant change to the property has been its conversion to an automated rather than manned station. Although such a property could include archaeological deposits of significance, Phase I survey of this property determined that soils deposits were extremely thin and that artifacts included therein were largely limited to architectural debris, coal fragments, and ash/cinder deposits.

5.2 RECOMMENDATIONS

Based on a Phase I survey program that combined archival research with pedestrian reconnaissance and subsurface testing, it has been determined that there are no significant prehistoric or historic period archaeological resources within the Passage Island lighthouse (20IR202) study area. Therefore, GLR recommends that no further evaluation or mitigation of this project will be required for archaeological resources, and that its immediate release for soil remediation appears warranted.

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Appendix **B**

Permits and Correspondence



STATE OF MICHIGAN

DEPARTMENT OF NATURAL RESOURCES
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

REBECCA A. HUMPHRIES
DIRECTOR

October 11, 2004

BMC A. Martin
U.S. Coast Guard Station Portage
P.O. Box 350
Dollar Bay, MI 49922-0350

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL		# of pages ▶ 5
To	ERICA GETSCLER	From LYNN KELLER
Dept./Agency	MNH	Phone # 216-902-6258
Fax #	248-344-0217	Fax # -6277

NSN 7540-01-317-7388

5089-101

GENERAL SERVICES ADMINISTRATION

Dear BMC Martin,

Enclosed is Endangered Species Permit # 1615, issued in your name. This permit replaces the permit originally issued on August 31, 2004. I have made some modifications to the original permit according to the requests of Lynn M. Keller. Please destroy the original permit.

Sincerely,

Todd C. Hogrefe, Endangered Species Coordinator
Natural Heritage Program, Wildlife Division
517-373-1263
hogrefet@michigan.gov

TCH:meh
Enclosure

Cc: Lynn M. Keller

STANDARD PERMIT CONDITIONS

- A. All specimens authorized for collection under this Permit shall be deposited in the collection of an approved public educational or research institution prior to Permit expiration.
- B. None of the specimens collected shall become part of a private collection or private property.
- C. This permit does not allow or grant the right of trespass. Projects shall not take place on any private or public lands without permission from the owner or administrator of such lands.
- D. This permit does not provide authorization to circumvent any federal, state, or local laws and ordinances.
- E. Additionally, federal permits may be required for activities affecting federally listed threatened or endangered species and/or migratory birds. Contact the U. S. Fish and Wildlife Service at 2651 Coolidge Road, East Lansing, MI 48823.
- F. The activities covered under this Permit are not transferable to another person unless specifically authorized.
- G. Unless otherwise noted, within 10 days of the expiration of this Permit, the holder is required to file a report detailing the locations of any threatened and endangered species encountered and the number and disposition of specimens handled. Annual reports for multi-year permits are due at the end of each calendar year.
- H. A person conducting any activities authorized by this permit shall carry a copy of this permit and shall produce a copy of this permit upon request of a Department of Natural Resources employee or law enforcement officer.

*USCG Passage Island Light Station
T/ES Permit # 1615*



WILDLIFE DIVISION
DEPARTMENT OF NATURAL RESOURCES
PO BOX 30444
LANSING MICHIGAN 48909-7944

Permit Number: 1615

Date Issued: 08/31/2004

THREATENED/ENDANGERED SPECIES PERMIT

BY THE AUTHORITY OF PART 365, ENDANGERED SPECIES PROTECTION,
OF THE NATURAL RESOURCE AND ENVIRONMENTAL PROTECTION ACT, 1994 PA 451,
AND THE RULES AND REGULATIONS THEREUNDER, PERMISSION IS HEREBY GRANTED TO:

BMC A. Martin
U.S. Coast Guard Station Portage
P.O. Box 350
Dollar Bay, MI 49922-0350

To conduct the scientific activities listed under special conditions on the threatened/endangered species listed below.
All activities are subject to the standard permit conditions on the back of this permit

SPECIES: prickly saxifrage (*Saxifraga tricuspidata*) and other state threatened or endangered plants within the

THIS PERMIT SHALL BE VALID ONLY ON THE FOLLOWING LANDS/LOCATIONS: areas of lead contamination around the former U.S. Coast Guard Passage Island Light Station, Keweenaw County contamination area

SPECIAL CONDITIONS:

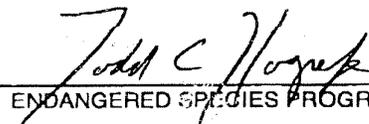
In addition to the standard requirements listed on the back of this permit:

- 1) For purposes of human safety, permitted is the collection and off-site disposal of state threatened or endangered plants occurring within the area of lead contamination.
- 2) Efforts should be made to minimize impacts to state-listed plants outside the area of lead contamination. State-listed plants outside the contamination area should be flagged or fenced to facilitate recognition and avoidance by project personnel. Foot traffic, equipment operation, and equipment staging should be minimized in areas where state-listed plants occur outside of the project footprint.
- 3) Equipment should be power-washed prior to transport to Passage Island to prevent introduction of exotic plant species.
- 4) This permit does not require the reporting outlined under standard permit condition G.

SUBPERMITTEES: U.S. Coast Guard (USCG) personnel under direction of BMC A.R. Martin; USCG Civil Engineering Unit Cleveland personnel; National Park Service personnel; employees of MWH Americas and other hired contractors

UNLESS REVOKED SOONER, THIS PERMIT EXPIRES ON: 07/31/2005

THE DIRECTOR OF NATURAL RESOURCES BY:


ENDANGERED SPECIES PROGRAM COORDINATOR

State-Listed Species Within Footprint of USCG Lead-Contaminated Soil Removal Project at Passage Island

Rock Whitlow-grass (*Draba arabisans*) (Species of Concern)

An estimated 350 plants are located within and adjacent to the soil removal footprint, surrounding the lighthouse keeper's residence (within 15' of the residence on all sides.)

Approximately 10 plants are located along the walkway west of the lighthouse keeper's residence, near the antenna.

Prickly saxifrage (*Saxifraga tricuspidata*) (State Threatened)

An estimated 10 plants are located along the walkway and tramway ramp. Although this is outside the soil removal area, it is an area that is likely to be damaged as a result of foot traffic or staging because it is the major path to the lighthouse keeper's residence.

Note: No areas outside of the 400mg/kg lead impact footprint were intensively surveyed for state-listed plant species (except for the area near the tramway and walkways.) If other areas off the trail and outside of the removal footprint are proposed to be used, they will require surveys.

Recommendations:

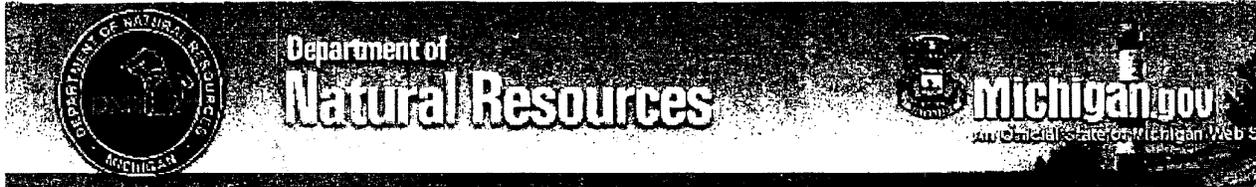
Protective pads over *Saxifraga tricuspidata* near tram and walkways may reduce damage to the plants.

Flagging project footprint will reduce likelihood of damage to listed species beyond the work area.

Equipment should be power-washed prior to transport to Passage Island to prevent import of exotic seeds that could indirectly impact state listed species outside of work footprint if exotic species become established.

(Data on species and locations taken from "Inventory and Establishment of Monitoring Programs For Special Floristic Elements at Isle Royale National Park, Michigan.", Judziewicz, 2004, and from 2004 field surveys.)

Jean Battle
Natural Resource Specialist
Isle Royale National Park



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Search

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 - > Creating Wildlife Habitat
 - > Viewing Wildlife
 - > Research Projects



Protection for Plants in Michigan

Numerous plants in Michigan are protected by state law. Plants may be protected because they're very rare or to prevent overharvest. Michigan legislation that protects plants includes Parts 365 (Endangered Species Protection) and 529 (Christmas Trees, Boughs, Plants, and Other Trees) of P.A. 451 of 1994, and the Michigan Ginseng Act (Act 184 of 1994).

Part 365 (Endangered Species Protection) of P.A. 451 of 1994 protects all plants listed as threatened and endangered in Michigan. A Species can be listed if it has become rare in Michigan due to habitat loss, if Michigan is along the edge of it's range, or simply by overharvest. Part 365 makes it unlawful to collect, pick, cut, dig up, or destroy any threatened or endangered plant in Michigan without a permit from the MDNR. While not protected by Part 365, species listed as "special concern" should be considered rare and be treated accordingly.

Part 529 (Christmas Trees, Boughs, Plants, and Other Trees) of P.A. 451 of 1994 makes it unlawful to possess or transport several species of trees, boughs, wildflowers, shrubs, and mosses without a bill of sale or some other evidence of title. While many of the species protected by Part 529 are not rare, this legislation is in place to prevent the overharvest or irresponsible take of these species.

The Michigan Ginseng Act was passed in 1994 to regulate the harvest, sale, and distribution of American Ginseng in Michigan. This act covers both cultivated and wild ginseng, and makes it unlawful to take American ginseng from the wild without a permit from the MDNR.

Related Co

- > [MNFI Rare Reference](#)
- > [Michigan's \(An Overv](#)
- > [Michigan's Plants](#)
- > [Michigan's List of Enc Threatene](#)

- Hunting**
- Fishing**
- Recreation & Camping**
- Inside DNR**
- Forests, Land & Water**
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On-line
Campground and Harbor Reservations



NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION ACT (EXCERPT)
Act 451 of 1994

324.36505 Prohibitions; exceptions.

Sec. 36505. (1) Except as otherwise provided in this part, a person shall not take, possess, transport, import, export, process, sell, offer for sale, buy, or offer to buy, and a common or contract carrier shall not transport or receive for shipment, any species of fish, plants, or wildlife appearing on the following lists:

(a) The list of fish, plants, and wildlife indigenous to the state determined to be endangered or threatened within the state pursuant to section 36503 or subsection (3).

(b) The United States list of endangered or threatened native fish and wildlife.

(c) The United States list of endangered or threatened plants.

(d) The United States list of endangered or threatened foreign fish and wildlife.

(2) A species of fish, plant, or wildlife appearing on any of the lists delineated in subsection (1) which enters the state from another state or from a point outside the territorial limits of the United States may enter, be transported, possessed, and sold in accordance with the terms of a federal permit issued pursuant to section 10 of the endangered species act of 1973, 16 USC 1539, or an applicable permit issued under the laws of another state.

(3) The department may, by rule, treat any species as an endangered species or threatened species even though it is not listed pursuant to section 36503, if it finds any of the following:

(a) The species so closely resembles in appearance, at the point in question, a species which is listed pursuant to section 36503 that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species.

(b) The effect of the substantial difficulty in differentiating between a listed and an unlisted species is an additional threat to an endangered or threatened species.

(c) The treatment of an unlisted species will substantially facilitate the enforcement and further the intent of this part.

(4) The department may permit the taking, possession, purchase, sale, transportation, exportation, or shipment of species of fish, plants, or wildlife which appear on the state list of endangered or threatened species compiled pursuant to section 36503 and subsection (3) for scientific, zoological, or educational purposes, for propagation in captivity of such fish, plants, or wildlife to ensure their survival.

(5) Upon good cause shown and where necessary to alleviate damage to property or to protect human health, endangered or threatened species found on the state list compiled pursuant to section 36503 and subsection (3) may be removed, captured, or destroyed, but only as authorized by a permit issued by the department pursuant to part 13. Carnivorous animals found on the state list may be removed, captured, or destroyed by any person in emergency situations involving an immediate threat to human life, but the removal, capture, or destruction shall be reported to the department within 24 hours of the act. *

(6) This section does not prohibit any of the following:

(a) The importation of a trophy under a permit issued pursuant to section 10 of the endangered species act of 1973, 16 USC 1539, which is not for resale and which was lawfully taken in a manner permitted by the laws of the state, territory, or country where the trophy was caught, taken, or killed.

(b) The taking of a threatened species when the department has determined that the abundance of the species in the state justifies a controlled harvest not in violation of federal law.

(c) Subject to any permits that may be required by the department, the possession, transfer, transportation, importation, or exportation or the transport or receipt for shipment by a common or contract carrier of a raptor or the captive-bred progeny of a raptor, a raptor egg, or raptor semen acquired in accordance with applicable state and federal laws and regulations which allow raptors, raptor eggs, or raptor semen to be used in falconry or in the captive propagation of raptors for use in falconry.

(d) Subject to any permits that may be required by the department, the selling, offering for sale, buying, or offering to buy a raptor that was captive-bred or semen from a raptor that was captive-bred in accordance with applicable state and federal laws and regulations which allow raptors or raptor semen to be used in falconry or in captive propagation of raptors for use in falconry.

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