REI
CIVIL & ENVIRONMENTAL ENGINEERING, SURVEYING

November 9, 2017

Wisconsin Department of Natural Resources
Attn: Mr. John Hunt
1701 North 4th Street
Superior, WI 54880

Subject:

Site Investigation Work Plan
WDNR Brule Ranger Station
6250 South Ranger Road
Brule, WI 54820
DNR BRRTS #02-16-580235

Dear Mr. Hunt,

This letter represents the official notification that REI Engineering, Inc. (REI) has been retained as Environmental Consultant for the above-mentioned release. Please see the enclosed site investigation work plan detailing REI's proposed scope of services. This should meet the requirements outlined in the September 25, 2017 Responsible Party Letter. REI would appreciate an opportunity to discuss the proposed scope of services and boring placements with you at your earliest convenience. REI is tentatively scheduling field work for the week of November 27, 2017.

It should be noted that the proposed monitoring wells at the property may require a Ch. NR 141.13 WAC shallow well installation exemption from the WDNR.

If you have any comments, please contact our office at (715) 675-9784 or electronically at bbailey@reiengineering.com.

Sincerely,
REI Engineering, Inc.

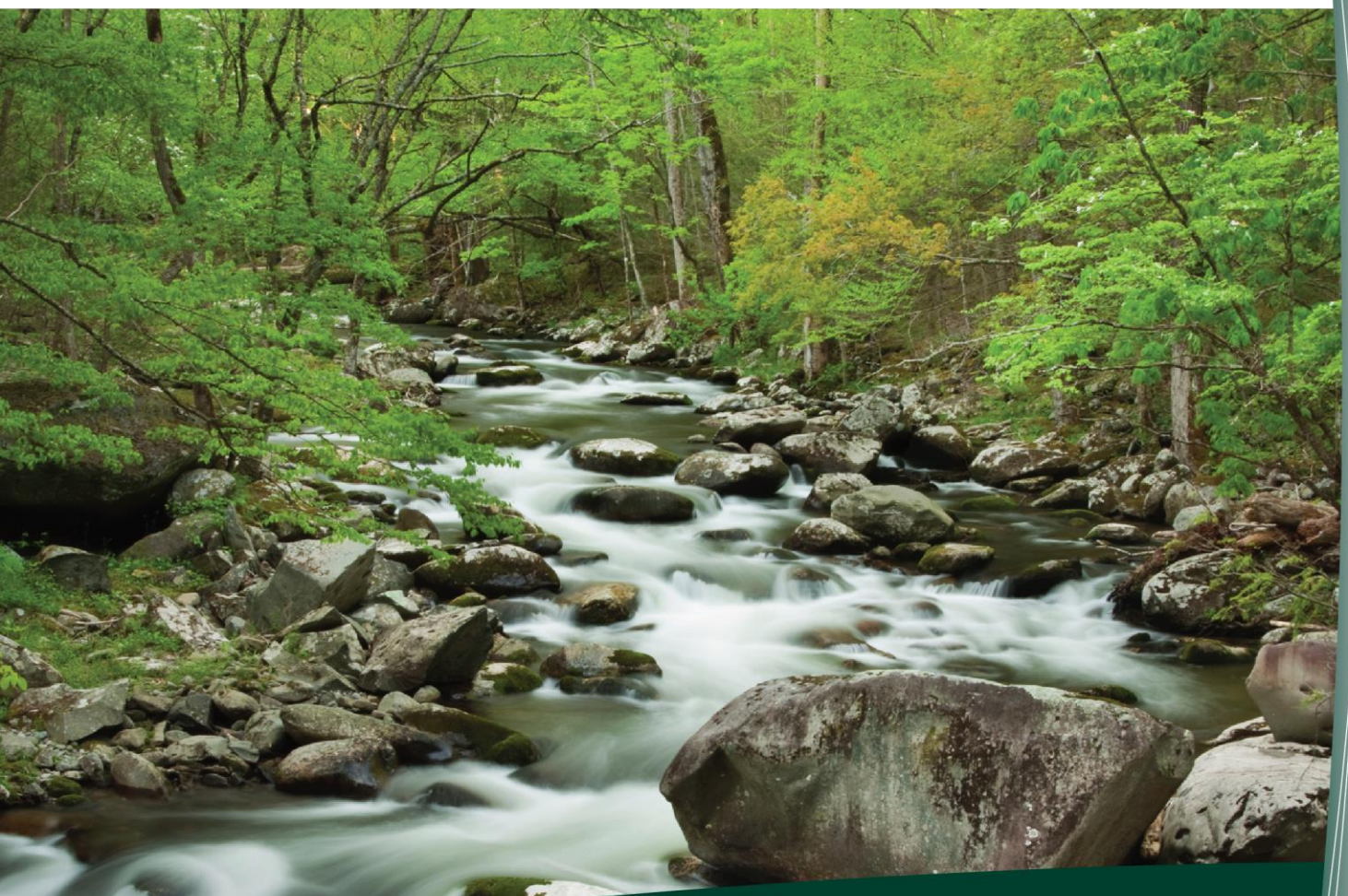
Brian J. Bailey
Environmental Scientist

REI

CIVIL & ENVIRONMENTAL ENGINEERING, SURVEYING

Site Investigation Work Plan

WDNR Brule Ranger Station
6250 South Ranger Road
Brule, WI 54820
DNR BRRTS #02-16-580235



Submitted To:
WDNR
Attn: Mr. John Hunt
1704 North 4th Street
Superior, WI 54880
November 8, 2017

Prepared By:
REI Engineering, Inc.
4080 N 20th Avenue
Wausau, WI 54401
(715) 675-9784

COMPREHENSIVE SERVICES WITH PRACTICAL SOLUTIONS

Site Investigation Work Plan

WDNR Brule Ranger Station
6250 South Ranger Road
Brule, WI 54820

DNR BRRTS #02-16-580235

Prepared For:

WDNR – Bureau of Facilities and Lands
Mr. Chris Rehlinger
W7303 County Highway CS
Poynette, WI 53955

November 2017

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SITE INVESTIGATION WORK PLAN

WDNR BRULE RANGER STATION
6250 SOUTH RANGER ROAD
BRULE, WI 54820

DNR BRRTS #02-16-580235

1.0 INTRODUCTION

REI Engineering, Inc. (REI) has prepared a work plan to conduct a Site Investigation at the above referenced property. The purpose of the site investigation is to advance borings and install groundwater monitoring wells on the property with the collection of soil and groundwater for laboratory analysis, to determine the degree and extent of the known release. The known release was reported to the Wisconsin Department of Natural Resources (WDNR) on September 20, 2017 after historic contamination was discovered associated with a 55-gallon drum used for improper waste disposal at the above referenced site during excavation for sanitary sewer.

2.0 BACKGROUND INFORMATION AND SCOPE OF WORK

2.1 Responsible Party

WDNR – Bureau of Facilities and Lands

Attn: Mr. Chris Rehlinger

W7303 County Highway CS

Poynette, WI 53955

2.2 Consultant

REI Engineering, Inc.

4080 North 20th Avenue

Wausau, WI 54401

Phone (715) 675-9784

2.3 Site Name, Address, and Location

Site Name: WDNR Brule Ranger Station

Site Address: 6250 South Ranger Road
Brule, WI 54820

Site Location: NW¼, SW¼, Section 23, Township 47N, Range 10W, Town of Brule, Douglas County, Wisconsin

2.4 Past and Present Land Use

The WDNR Brule Ranger Station has been and will continue to be utilized by the WDNR as a hub for managing the Brule River State Forest. The site was undergoing sanitary sewer upgrades when contamination was discovered associated with historic improper waste disposal resulting in a release to the environment.

2.5 Scope of Work

1. Upon WDNR approval of the workplan, REI will coordinate a publicly owned underground utility locate prior to the site work. REI proposes to mobilize to the site to advance six (6) hydraulic push soil borings (Geoprobes). These soil borings will be advanced to a depth of twelve (12) feet to aid in defining the degree and extent of the previously identified contamination.
2. The soil borings will be advanced to encounter the groundwater table. REI anticipates this will be within ten (10) feet of land surface. Continuous soil samples will be collected from the Geoprobe acetate liners and soil will be field screened to determine presence of volatile organic vapors and logged to document underlying geologic conditions.
3. REI anticipates collection of two (2) soil samples from each soil boring. Soil samples will be submitted to a state certified laboratory for analysis of Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), Lead (Pb) and Polychlorinated Biphenyls (PCBs). One (1) soil sample will be collected from each boring to evaluate direct contact risk within four (4) feet of the surface. The additional sample will be collected at depth from the location of highest PID value in the unsaturated soil.

4. All soil cuttings will be containerized in 55-gallon DOT approved steel drums, properly labeled, and temporarily stored on site until final disposal arrangements are completed.
5. Four (4) Ch. NR 141 WAC compliant groundwater monitoring wells are also proposed. These wells may require Ch. NR 141.13 WAC shallow well installation exemptions from the WDNR. Field data from completed soil borings intersecting the groundwater table will help determine placement of the proposed groundwater monitoring wells.
6. REI will develop and sample the proposed groundwater monitoring wells. The wells will be surveyed to USGS datum to document groundwater flow direction. All purge water will be containerized in 55-gallon DOT approved steel drums and transported for disposal at a licensed treatment facility.
7. REI will collect one (1) groundwater sample from each of the four (4) groundwater monitoring wells. The water samples will be submitted to a state certified lab for analysis of VOCs, PAHs, PCBs and dissolved lead. One (1) sample will also be collected from the potable water supply well for laboratory analysis of similar parameters.
8. REI will geolocate all proposed soil borings, monitoring wells and key property features for preparation of detailed site figures to be submitted with subsequent reports.
9. REI will also conduct vapor intrusion pathway screening based on the completed site investigation work and provide recommendations in the summary report as to whether the vapor intrusion pathway needs to be further investigated.
10. Upon completion of proposed the field work, REI will prepare a summary report that will include photographs, figures, soil boring logs, borehole abandonment forms, well construction forms, well development forms, tabulated analytical results, and laboratory analytical reports. Conclusions and recommendations will be made for: additional field work if the contamination is not defined or a completed site investigation report if contamination is defined. The Site Investigation Report will detail if the site can proceed to closure or if additional actions are needed.

2.6 Other Sources of Contamination

REI will evaluate if other sources of contamination may exist at the subject property through site investigation work at the property.

2.7 Potential Impact to Receptors

REI will investigate and evaluate the potential impact to receptors during the site investigation. REI will determine potential vapor intrusion risks into structures.

2.8 Potable Water Survey

REI will conduct a well records search for locations of any existing nearby potable wells. Results of this search will be included in the report.

3.0 Topographical, Geological, and Hydrologic Conditions

The property is located in the Lake Superior Basin. Site specific soil and geologic conditions, prominent topographic features, significant hydrologic features and surface water drainage patterns will be documented during the site investigation.

4.0 Methodologies

4.1 Geoprobe

4.1.1 Soil Sampling

The Geoprobe unit hydraulically advances threaded, two-inch diameter, four-foot long, steel rod sections into the subsurface. A four-foot sampler, consisting of a drive shoe, a steel tube with a clean acetate liner, and a drive-head retractable piston, is attached to the leading Geoprobe rod. The sampler is driven down to the top of the interval to be sampled. The stop-pin is removed to release the drive head piston, which retracts as the sampler is advanced. When the sampler has been advanced four feet, the rods are retracted from the hole and the soil in the acetate liner is recovered. The acetate liner is split open and the soil is visually and manually classified by the field geologist/technician in accordance with **ASTM:D2488-84**. Logs of the borings are filled out indicating the depth and identification of the various strata, water level information, and

pertinent information regarding the method of maintaining and advancing the borings.

Immediately after identification, the soil is quickly divided into two portions. One portion is prepared for potential laboratory analysis. The other portion is placed into a clean one-quart Ziploc bag for field screening. See the section "Soil Headspace Analysis" for field screening procedures.

Soil samples recovered by the acetate liner will be divided into two portions. One portion will be prepared for laboratory analysis. The other portion will be placed into a clean one-quart Ziploc bag. A headspace analysis will then be conducted on this latter portion. Soils storage will be in WDOT approved 55-gallon drums. These drums will be kept on site until transportation and treatment can be approved and arranged.

4.1.2 Groundwater Sampling

Water samples will be collected via polyethylene tubing that is inserted into the Geoprobe boring. Groundwater is extracted through the polyethylene tubing using a peristaltic pump. Retained samples are then placed into laboratory prepared containers and stored in an iced cooler.

4.2 Hollow Stem Auger Boring and Monitoring Well Installation

4.2.1 Soil Sampling

Soil sampling will be done in accordance with **ASTM:D1586-84**. Using this procedure, a two-inch **OD**, two-foot-long split barrel sampler is driven into the soil by a 140-pound weight falling 30 inches. After an initial set of six inches, the number of blows required to drive the sampler an additional 12 inches is known as the penetration resistance, or N value. The N value is an index of the relative density of cohesionless soils and the consistency of cohesive soils.

As the samples are obtained in the field, they will be visually and manually classified by the field geologist/technician in accordance with **ASTM:D2488-84**.

Representative portions of the samples will be returned to the laboratory for further examination and for verification of the field classification. Logs of the borings will be filled out indicating the depth and identification of the various strata, the N value, water level information and pertinent information regarding the method of maintaining and advancing the borings.

Soil samples recovered by the split spoon will be divided into two portions. One portion will be prepared for laboratory analysis of volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) and lead constituents. The other portion will be placed into a clean one-quart Ziploc bag. A headspace analysis will then be conducted on this latter portion. Soils storage will be in WDOT approved 55-gallon drums. These drums will be kept on site until transportation and treatment can be approved and arranged.

4.2.2 Monitoring Well Installation

If required, monitoring wells will be installed in accordance with Wisconsin Administrative Code NR 141 regulations. The WDNR "Monitoring Well Construction Form 4400-113A" will be completed in accordance with ch. 144, 147, and 160 Wis Stats.

The water table monitoring wells consist of pipe joint threaded, two (2) inch by ten (10) feet long schedule 40 PVC screen (#10 slot) with two (2) inch schedule 40 PVC riser. The bottom of the screens will be placed five (5) to seven (7) feet below the water table. After the screen and riser pipe are set, a sand filter pack will be placed around the screen to a depth two (2) feet above the top of the screen, capped by two (2) feet of fine sand layer, covered with a bentonite seal, annular space seal and surface seal. A protective casing will enclose the PVC riser pipe and locking caps will be used to protect the integrity of the well.

4.2.3 Water Level

Groundwater level measurements will be obtained by using an electronic measuring device, which indicates when a probe is in contact with the water surface. The distance from the top of the well casing to the probe will be measured. All measurements will be reported to the nearest 0.01 foot.

4.2.4 Groundwater Investigation Methodology

If monitoring wells are included in the scope of work, they will be positioned so that hydrogeologic parameters can be evaluated for the site. The wells will be set to bisect the groundwater table in order to accommodate for seasonal fluctuations in groundwater levels.

4.2.5 Groundwater Sample Collection

Each of the groundwater monitoring wells will be sampled for analysis of volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB) and lead constituents. Before each sampling event, each well will be purged by removing at least four (4) well casing volumes of water with a disposable (polyethylene) bailer to ensure collection of a representative sample. If a well is purged dry, it will be allowed to regenerate before being sampled. The wells will then be sampled with disposable (polyethylene) bailers, which will be disposed of following sample collection at each well location. Samples will be taken from the middle section of the bailer and will be placed in laboratory prepared bottles. Samples will be labeled and stored in an iced cooler at approximately four degrees Celsius. Samples will be accompanied by Chain of Custody records. All well development and purge water will be containerized on site in 55-gallon, WDOT approved drums, until proper handling procedures are determined.

4.3 Headspace Analysis

The soils will be screened with a RAE photoionization detector (PID) equipped with a 10.6 eV lamp. The detector will be calibrated in instrument units for Total Organic Vapors using an isobutylene standard. The soil sample, sealed in a Ziploc bag, will

be shaken vigorously to promote volatilization of the contaminant into the headspace of the bag. The sample will be allowed to rest for at least ten minutes and then shaken again before screening. When ambient temperatures are below 60 degrees F, soil samples are allowed to warm for a minimum of ten (10) minutes in a heated environment prior to headspace development. The Ziploc bag will be punctured with the PID probe and the resulting meter reading will be recorded.

4.4 Vapor Analysis (If Needed)

4.4.1 Interior Vapor Sample Collection

Interior sampling will be conducted by the installation of a permanent sample port purchased from Entech Instruments, Inc. (Part #01-39-640020) and installed using a hammer drill with a 3/8" bit through the concrete slab and a ¾" bit to a depth of approximately 2" to set the probe. The probes will be set in place using anchoring cement. Due to the type of sample port used, REI will use Entech part #39-64200 – Gas Extraction Fitting. Samples will be collected using one-liter Summa Canister and a helium shroud. The helium shroud consists of a three-gallon polyethylene box placed over the sample port. The sample tubing is connected to the sample port through the gas extraction fitting, and the tubing passes through the helium shroud. Helium is introduced through a valve in the top of the helium shroud and a vacuum pump is used to purge the sample line. Four volumes of air were removed from the tubing and the purge air monitored for the presence of helium using a Restek Electronic Leak detector. Once the line was purged, and the helium detector showed the seal was adequate, the Summa Canister was connected to the sample line and allowed to fill for 30 minutes through a 30-minute flow restrictor.

4.4.2 Exterior Soil Gas Sampling

Soil gas sampling points will be installed to depth using direct push technology. A bentonite surface seal will be placed around the probe rods and the sampling points will be fitted with new inert tubing. A minimum of two (2) air volumes will be purged with a graduated syringe and the samples will be collected by attaching the top end of the tubing to a Summa canister instrumented with a

vacuum gauge. The initial vacuum reading will be noted, and the valve will be opened. The Summa canister valve will be closed after the canister has filled and a PID reading is collected. Each probe hole will be abandoned with bentonite after gas sampling is completed. The canister will be submitted to a state certified laboratory and analyzed using EPA Method TO-15.

4.5 Quality Assurance/Quality Control (QA/QC)

REI personnel will maintain strict adherence to established QA/QC procedures during sample collection and handling. EPA and/or WDNR standard accepted sample collection, transportation and storage protocols will be implemented prior to analysis of samples by a state certified laboratory. Sample containers will be properly preserved and stored prior to analysis. Dates of analysis, contingent upon the shelf life of the parameter of interest, will be noted. Field chain-of-custody (COC) documentation will be maintained for each sample. Internal laboratory QA/QC protocols will be adhered to in accordance with protocols outlined in EPA document SW846, Test Methods for Evaluating Solid Waste, EPA Method 8260 (VOCs), EPA Method 8270 (PAHs), EPA Method 6010B/C (Lead), and EPA Method 8082 (PCBs).

4.5.1 Chain of Custody

Upon completion of a soil or groundwater sample, a chain of custody log will be initiated. The chain of custody record will include the following information: project name, work order number, shipped by, shipped to, sampling point, location, field ID number, date and time taken, sample type, number of containers, analysis required, sampler(s) signature(s), etc. The fewest number of people possible will handle the samples.

4.5.2 Decontamination

Decontamination of all field equipment will be performed to eliminate potential cross-mixing between discrete sampling points. All sampling equipment will be decontaminated by washing with an Alconox/distilled water solution, rinsing with distilled water and triple rinsing with deionized water. All drilling equipment including augers, tools, and split spoons will be decontaminated

using a high-pressure steam cleaner. Wash water will be contained on-site in Wisconsin Department of Transportation (WDOT) approved 55-gallon drums pending proper disposal or treatment.

4.5.3 Investigative Waste

Soil and groundwater waste collected during site investigation field work will be containerized in WDOT approved 55-gallon drums and properly disposed of.

5.0 Chemical Analysis of Soils

Soil samples collected will be submitted to a state certified laboratory for analysis of appropriate constituents. Laboratory analysis of the collected soil samples will be completed in accordance with EPA and/or WDNR accepted methods. The soil/water interface sample and the sample exhibiting the highest PID reading from each boring will be analyzed according to one or more of the following methodologies:

EPA Method	Analytical Constituent	Method Detection Limit
8260	Volatile Organic Compounds	0.00539 – 9.19921 mg/kg
8270	Polycyclic Aromatic Hydrocarbons	2.03 – 11.6 mg/kg
6010B/C	Lead	0.433 mg/kg
8082	Polychlorinated Biphenyls	0.025 mg/kg

ug/kg = parts per billion (ppb)
mg/kg = parts per million (ppm)

6.0 Chemical Analysis of Groundwater

Groundwater samples will be collected from each monitoring well and will be sent to the laboratory for analysis of appropriate constituents. Samples will be collected in laboratory prepared vials and jars, placed into an iced cooler and transported to a state certified laboratory for one or more of the following analysis:

EPA Method	Analytical Constituent	Method Detection Limit
8260	Volatile Organic Compounds	0.14-114.64 ug/L
8270	Polycyclic Aromatic Hydrocarbons	0.00490 – 0.01833 ug/L
6010B/C	Dissolved Lead	4.33 ug/L
8082	Polychlorinated Biphenyls	0.25 ug/L

ug/L = ppb
mg/L = ppm

7.0 REPORTING

At the conclusion of the field investigation, REI will analyze the data collected and prepare a written report of the findings. Measurements that are taken in the field will be utilized to prepare a scaled map of the subject site. Laboratory reports for both soil and groundwater samples collected during the investigation will be utilized to determine the extent of contamination. All data will be summarized into data tables. All soil samples collected will be classified and logged on the Wisconsin Department of Natural Resources Soil Boring Log Information Form 4400-122. The report that follows the investigative work will provide documentation of all work performed for the project and will include recommendations as to whether or not additional delineation of petroleum compounds or completion of a Remedial Action Plan is warranted.

8.0 PROJECT SCHEDULE

Once the Site Investigation Proposal has been approved by all parties the project will proceed according to the following schedule. The project schedule may be altered accordingly should additional work be required beyond the scope of work outlined in the Work Plan:

TASK DESCRIPTION	Time in Weeks								
	1	2	3	4	5	6	7	8	9
1. Approval of Work Plan	*								
2. Field Work									
3. Lab Analysis									
4. Data Interpretation & Draft									
5. Client Review									
6. Final Report									

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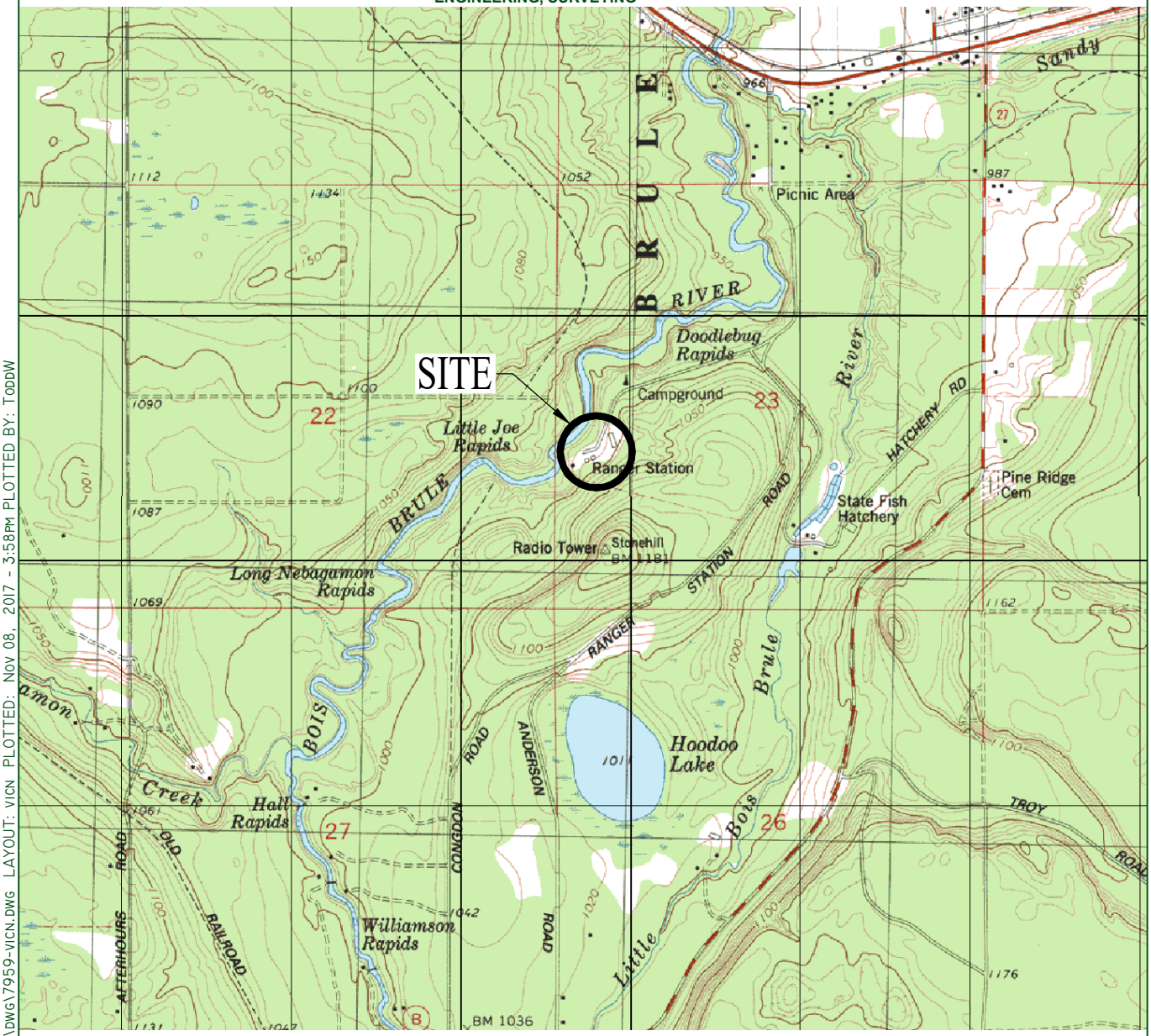

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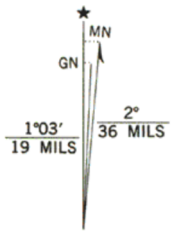

UTM GRID AND 1984 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

JADRANGLE LOCATION

BRULE, WIS.
SE/4 BRULE 15′ QUADRANGLE
46091-E5-TF-024

1984
REI Engineering, INC.

WDNR BRULE RANGER STATION
6250 SOUTH RANGER ROAD
BRULE, WISCONSIN 54820

FIGURE 1 : SITE VICINITY MAP

PROJECT NO.	DRAWN BY:	DATE:
7959	TAW	11/8/2017

DRAWING FILE: P:\7900-7999\7959 - WDNR - BRULE RANGER STATION\DWG\7959-VICN.DWG LAYOUT: VICN PLOTTED: Nov 08, 2017 - 3:58PM PLOTTED BY: TODDW