



RCRA FACILITY INVESTIGATION (RFI) WORK PLAN ADDENDUM NO. 1

**GM POWERTRAIN BEDFORD PLANT
105 GM DRIVE
BEDFORD, INDIANA**

U.S. EPA ID #IND00603609

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**NOVEMBER 18, 2002
REF. NO. 13968 (29)**

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 GENERAL.....	1
1.2 RFI APPROACH.....	1
1.3 PURPOSE.....	1
2.0 SCOPE OF WORK.....	3
2.1 ADDITIONAL SOIL BORINGS/SAMPLING.....	3
2.2 DNAPL INVESTIGATION.....	3
2.2.1 DNAPL CHARACTERIZATION	4
2.2.2 SUBSURFACE INVESTIGATION	4
2.3 ROCK CORE ANALYSIS	5
2.4 ADDITIONAL ON-SITE MONITORING WELLS.....	6
2.5 GROUNDWATER-SURFACE WATER INVESTIGATION.....	6
2.5.1 STREAM FLOW MONITORING	6
2.5.2 OFF-SITE MONITORING WELLS	7
3.0 QAPP ADDENDUM.....	9
4.0 SCHEDULE	10

LIST OF FIGURES
(Following Text)

FIGURE 1.1	SITE LOCATION
FIGURE 1.2	SITE PLAN AND AOI LOCATIONS
FIGURE 2.1	ADDITIONAL BORINGS/SAMPLES COMPLETED ON-SITE
FIGURE 2.2	AREAS OF DNAPL DISCOVERY
FIGURE 2.3	PROPOSED SHALLOW BEDROCK MONITORING WELLS NEAR OUTFALL #002
FIGURE 2.4	PROPOSED ADDITIONAL ON-SITE MONITORING WELL
FIGURE 2.5	PROPOSED STREAM GAGE AND SHALLOW MONITORING WELL LOCATIONS

LIST OF ACRONYMS AND SHORT FORMS

Agreement	RCRA Corrective Action Agreement
AOI	Area of Interest
CRA	Conestoga-Rovers and Associates
DNAPL	dense, non-aqueous phase liquid
Facility	GM Powertrain Bedford Plant
GM	General Motors Corporation
NAPL	non-aqueous phase liquid
PCB	polychlorinated biphenyl
PVC	polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SVOC	semi-volatile organic compound
TCL	Target Compound List
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
QAPP	Quality Assurance Project Plan

1.0 INTRODUCTION

This document presents an Addendum No.1 to the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Work Plan (RFI Work Plan Addendum No. 1) for the General Motors Corporation (GM) Powertrain Bedford Plant (Facility) located in Bedford, Indiana (U.S. EPA ID# IND006036099).

1.1 GENERAL

The Facility is located at 105 GM Drive, Bedford, Lawrence County, Indiana, 47421. The Site location is presented on [Figure 1.1](#). The Facility produces aluminum casting products, such as transmission cases, pistons, and engine blocks. Major aluminum production processes include die casting and permanent molding. The Bedford Facility has been operating as an aluminum foundry since 1942, with major facility modifications completed in 1950, 1953, 1966, 1971, 1974, 1977, 1979, and 1980.

The Facility, located on 152.5 acres, contains approximately 915,000 square feet of floor space and employs approximately 1,200 people. The Site plan is presented on [Figure 1.2](#).

1.2 RFI APPROACH

GM signed a Performance-Based RCRA Corrective Action Agreement (Agreement) with the United States Environmental Protection Agency (U.S. EPA) for the Bedford Facility on March 20, 2001, as amended on August 31, 2002. The signed Agreement states that GM will work with the U.S. EPA to identify and define the nature and extent of releases of hazardous waste and/or hazardous constituents at or from the Bedford Facility.

1.3 PURPOSE

On October 29, 2001, GM submitted a RFI Work Plan (CRA, October 2001) for completing the first phase of investigative activities within the Facility property. The RFI Work Plan implementation was initiated on December 17, 2001, and this phase of investigative activities, as described in the original Work Plan, are currently nearing completion.

This RFI Work Plan Addendum No. 1 presents additional proposed on-Site and off-Site investigative activities based on preliminary RFI results. The purpose of the proposed

additional investigative activities are to further define the extent of hazardous constituents in soil at the Facility, to characterize non-aqueous phase liquid (NAPL) observed at and near the Facility and its transport pathways, and to obtain additional information on the groundwater-surface water system at and near the Facility.

2.0 SCOPE OF WORK

2.1 ADDITIONAL SOIL BORINGS/SAMPLING

Based upon a review of preliminary RFI data, 18 additional borings were installed on-Site within Areas of Interest (AOIs) 5 and 6 to further define the extent of polychlorinated biphenyls (PCBs). These borings were advanced using the same procedures and sampling protocol outlined in the RFI Work Plan. These locations were identified in Quarterly Progress Report #4 (April 11, 2002). An additional 7 surface samples were completed within AOIs 5 and 6 to further delineate the PCBs, based on the analytical results from the additional 18 borings (these additional 7 have not been previously presented).

Since providing the additional locations to the U.S. EPA, four additional surface soil samples were also collected where the current salary parking lot (AOI 5) was expanded. The parking lot was expanded through the placement of gravel for additional parking area.

In addition to AOIs 5 and 6, three soil borings were completed within the hourly parking lot (north of the manufacturing area). These were completed based on reports that the parking lot may have been built on top of foundry sand material. These locations were identified in the Quarterly Progress Report #4 (April 11, 2002).

One additional soil boring was completed inside of the Piston Building, near the former LaSalle units. This boring was advanced in an area of the Facility where concrete would be removed during demolition/remodeling. This location was identified in the Quarterly Progress Report #4 (April 11, 2002).

Due to the presence of obvious fill materials at three original background locations, it was determined that these locations would not be considered for background. Therefore, three additional background locations were selected and sampled.

The locations of all borings completed to date, including the above referenced additional soil borings, are presented on [Figure 2.1](#).

2.2 DNAPL INVESTIGATION

Dense, non-aqueous phase liquid (DNAPL) was observed entering the creek through a bedrock fracture downstream of Outfall #002 in May 2002, and within the groundwater

collection sump at the former South Lagoon #4 (AOI 8). It was also observed in an off-Site residential well that had been abandoned (see [Figure 2.2](#)). The following scope of work presents proposed additional activities that will be completed in order to further characterize the DNAPL and DNAPL transport pathways within the bedrock.

2.2.1 DNAPL CHARACTERIZATION

A sample of the DNAPL will be obtained from the sump on-Site, and from within the creek (if present). This sample will be submitted to Queen's University in Kingston, Ontario for analysis of the following constituents:

- Density (ASTM D-1481);
- Kinematic Viscosity (at 10, 20, and 30 degrees Celcius) (ASTM D-445);
- Hydrocarbon Chain Identification (including mass fraction determination by Simulated Distillation) (SW-846 8015M);
- Target Compound List (TCL) for volatile organic compounds (VOCs) (SW-846 8260B) and semi-volatile organic compounds (SVOCs) (SW-846 8270C), PCBs (SW-846 8082), and the site-specific inorganic compounds (TAL minus the earth metals). These analyses will be performed by Severn-Trent Analytical Laboratories in North Canton, Ohio;
- PCB saturation by SPLP (or equilibrium concentration) of water in contact with the oil (site-specific determination, rather than from published data) (SW-846 1312/8082). Also, PCB concentration with the separate phase liquid (SW-846 8082); and
- Interfacial tension (DNAPL/water) at collection temperature (ASTM D-971).

This analysis will aid in the understanding of DNAPL/dissolved contaminant migration potential through the bedrock and in completing the baseline risk assessment.

2.2.2 SUBSURFACE INVESTIGATION

The DNAPL that was discovered downstream of Outfall #002 appeared to be entering the creek through a fracture near the contact between the St. Louis and Salem Formations. In order to attempt to find the source of the DNAPL at the Facility, fourteen additional shallow bedrock boreholes will be advanced along the east side of the Facility property (see [Figure 2.3](#)). These borings will be advanced through the St. Louis

Formation and will terminate within the non-fractured portion of the upper Salem Formation. Four of these borings have been advanced throughout the area of the current wastewater treatment system located on the east side of GM Drive at the Facility. Ten borings are proposed to be located along a line perpendicular to the flow of the stream near the eastern limit of the Facility property. These ten borings will be advanced at an approximate 30 degree angle (if possible given topographic, property ownership, and physical obstructions) from the surface, perpendicular to the approximate strike of the formations so as to intercept as many vertical fractures as possible.

At each shallow bedrock location, the unconsolidated overburden material will be sealed from the bedrock with a four-inch steel casing, grouted into the upper portion of the bedrock surface. The grout will be allowed to cure for a minimum of 48 hours prior to continuing the advancement of the borehole. The bedrock will be cored using a HQ (approximately 3.8-inch diameter) wireline core barrel. Cores will be observed and described at ten-foot increments during advancement.

Upon completion to the final depth (determined in the field), each borehole will then be left as an open-hole completion. Each borehole will be monitored with an oil/water interface probe, or disposable bailer, daily for two weeks upon completion and on an approximate weekly schedule thereafter for the first two months in order to determine the presence of NAPL. If product is observed, a product removal program will be implemented consisting of bailing (dedicated bailers), or other appropriate system (e.g., pumps, canisters, etc.) depending upon the viscosity and quantity of liquid, and on the rate of recovery. If NAPL is encountered, a separate memorandum will be generated to further describe these procedures.

Upon removal of all NAPL that accumulates under natural conditions, the boreholes may be used as part of additional DNAPL investigation and/or recovery efforts (e.g., water flushing, dye tracing, etc.).

Each borehole will be completed with a locking, hinged cap, welded into place on the four-inch outer casing. Bumper posts will be installed as protection around any outer casing near traffic lanes.

2.3 ROCK CORE ANALYSIS

For existing bedrock cores from borings across the Facility, samples will be obtained and submitted for analysis of the following:

- dry bulk density;
- porosity (by mercury pore symmetry); and
- fraction of organic content (or total organic carbon).

Approximately three samples representative of each formation's (St. Louis, Salem, and Harrodsburg Formations) primary matrix (void of stylolites or fractures) will be submitted to Core Laboratories, Inc., located in Houston, Texas for analysis. Each sample will be identified, marked, and photographed prior to laboratory submittal.

2.4 ADDITIONAL ON-SITE MONITORING WELLS

One additional monitoring well will be installed on Facility property, located to the east of Bailey Scales Road (see [Figure 2.4](#)) in order to fill in the perimeter monitoring network. This well will be advanced and completed similar to the existing ten locations completed on Facility property during implementation of the RFI Work Plan.

2.5 GROUNDWATER-SURFACE WATER INVESTIGATION

2.5.1 STREAM FLOW MONITORING

The purpose of this flow monitoring is to obtain current rainfall data and flow information to support and calibrate the hydrologic model that has been developed for the Pleasant Run Flow system in the area of the Facility. This model has been developed using historic Site information. The model will be used to predict storm flows, flood elevation, flow velocities and sediment transport potential for areas of interest under existing and post remedial conditions. Current rainfall and flow information will be compared to information obtained through the model in order to calibrate the model.

This section provides information on the proposed flow monitoring to be conducted along Bailey's Branch and Pleasant Run Creek. Currently there are no water level gages on either water body, nor is there record of any gages historically being present. It is therefore required that suitable water level and flow velocity gages be installed to provide actual discharge data suitable for design purposes. Measurements will be collected according to the schedule below on both water bodies.

It is proposed that five stream monitoring stations in total will be installed at the locations presented on [Figure 2.5](#). Each stream monitoring station will be comprised of a water level and water velocity recorder. Two rainfall stations will be installed to allow for sufficient Site-specific data for the conversion of rainfall data into synthetic discharge data for the hydraulic modeling of the watershed. The main water level, water velocity, and rainfall station will be installed at the former railroad bridge or near the Peerless Road bridge on Pleasant Run Creek. Three water level and water velocity locations will be installed at road crossings to allow for determination of flow from the various creeks and tributaries. The second rainfall station, along with the fifth stream monitoring station, will be placed in the upstream reaches of Pleasant Run Creek.

The water velocity recorders will utilize a pressure transducer for the measurement of water depth, which can be converted into velocity and flow information. To ensure that the transducer maintains its position in the stream and its work depth velocity measurements are accurate, the transducer will be placed in a stilling well design that does not require excavations. The proposed stilling well will be constructed of a polyvinyl chloride (PVC) pipe placed on the stream bank that extends into the creek.

2.5.2 OFF-SITE MONITORING WELLS

Shallow bedrock monitoring wells are proposed at five locations along the stream system (see [Figure 2.5](#)). The purpose of these wells will be to assist in the determination of groundwater/surface water hydraulic characteristics. Each monitoring well will be installed adjacent to a stream gage. The stream gages will monitor the level and flow of the surface water throughout the creek system.

The monitoring wells will be constructed similarly to the shallow bedrock wells described in Section 2.2.2 of this RFI Work Plan Addendum No.1. However, advancement of these five shallow bedrock wells will be completed vertically, rather than at an angle. The total depth of each shallow bedrock well will be below the seasonal groundwater low, if possible.

Water levels within the monitoring wells and stream gage measurements will be measured simultaneously at the following proposed schedule to run consecutively after the installation of the final monitoring well (at a minimum):

<i>Frequency</i>	<i>Duration</i>
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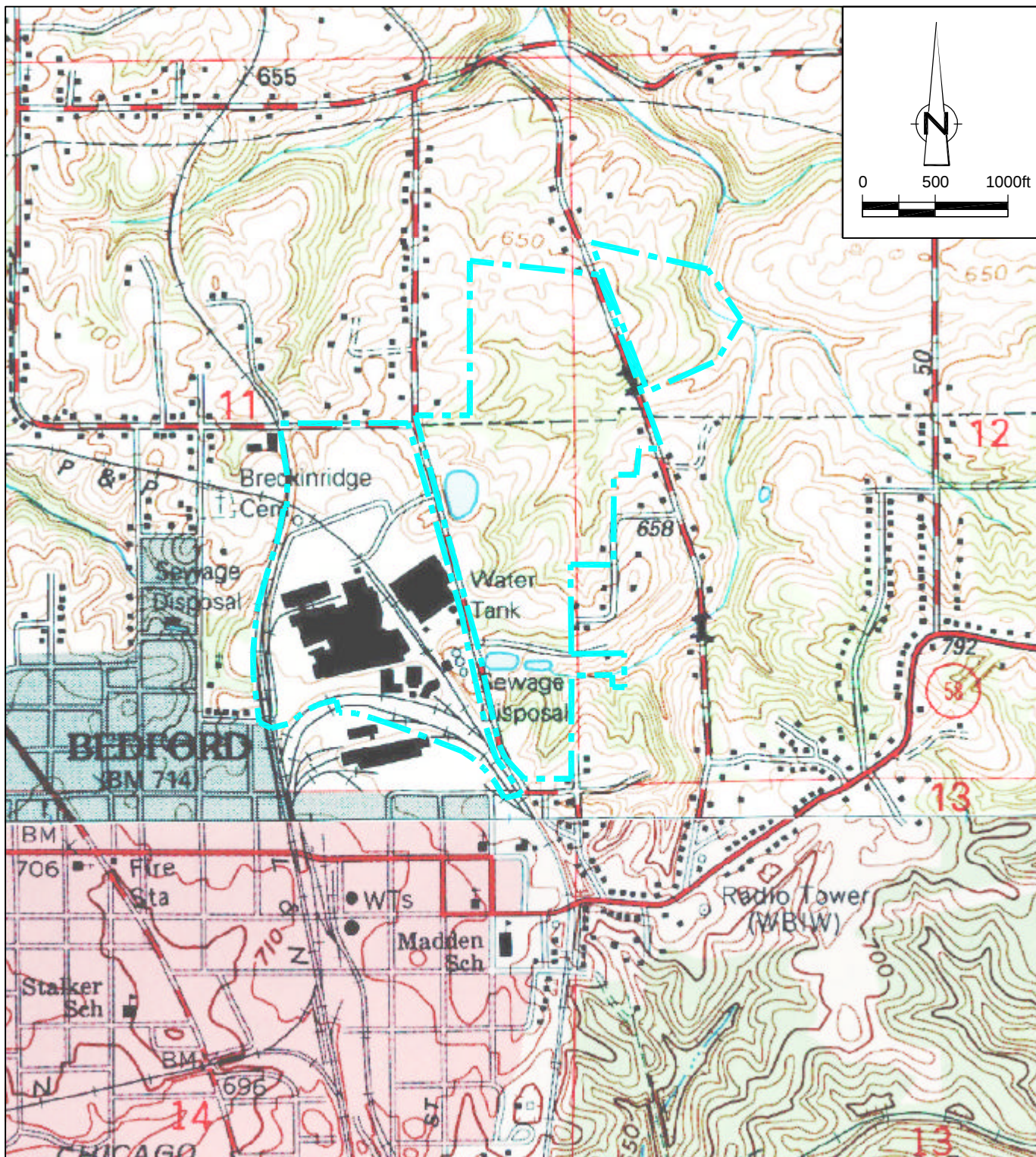
Daily	2 weeks
Weekly	2 months
Monthly	3 months
Quarterly	1 year

3.0 QAPP ADDENDUM

A Quality Assurance Project Plan (QAPP) Addendum will be submitted under separate cover to address the additional laboratory protocols necessary to support this RFI Work Plan Addendum No. 1. In addition, the QAPP Addendum will add details and laboratory protocols utilized during the collection and analysis of samples which were not included in the original RFI Work Plan or the Pre-Investigation QAPP.

4.0 SCHEDULE

The Scope of Work presented in this RFI Work Plan Addendum No. 1 will be initiated within 30 days after review by the U.S. EPA. It is anticipated that the field work addressed in this Addendum can be completed within approximately two to three months, depending upon access issues, weather, and any other unforeseen circumstances.



BASE SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES;
 BARTLETTSVILLE, INDIANA 1994
 BEDFORD EAST, INDIANA 1978
 BEDFORD WEST, INDIANA 1993
 OOLITIC, INDIANA 1987

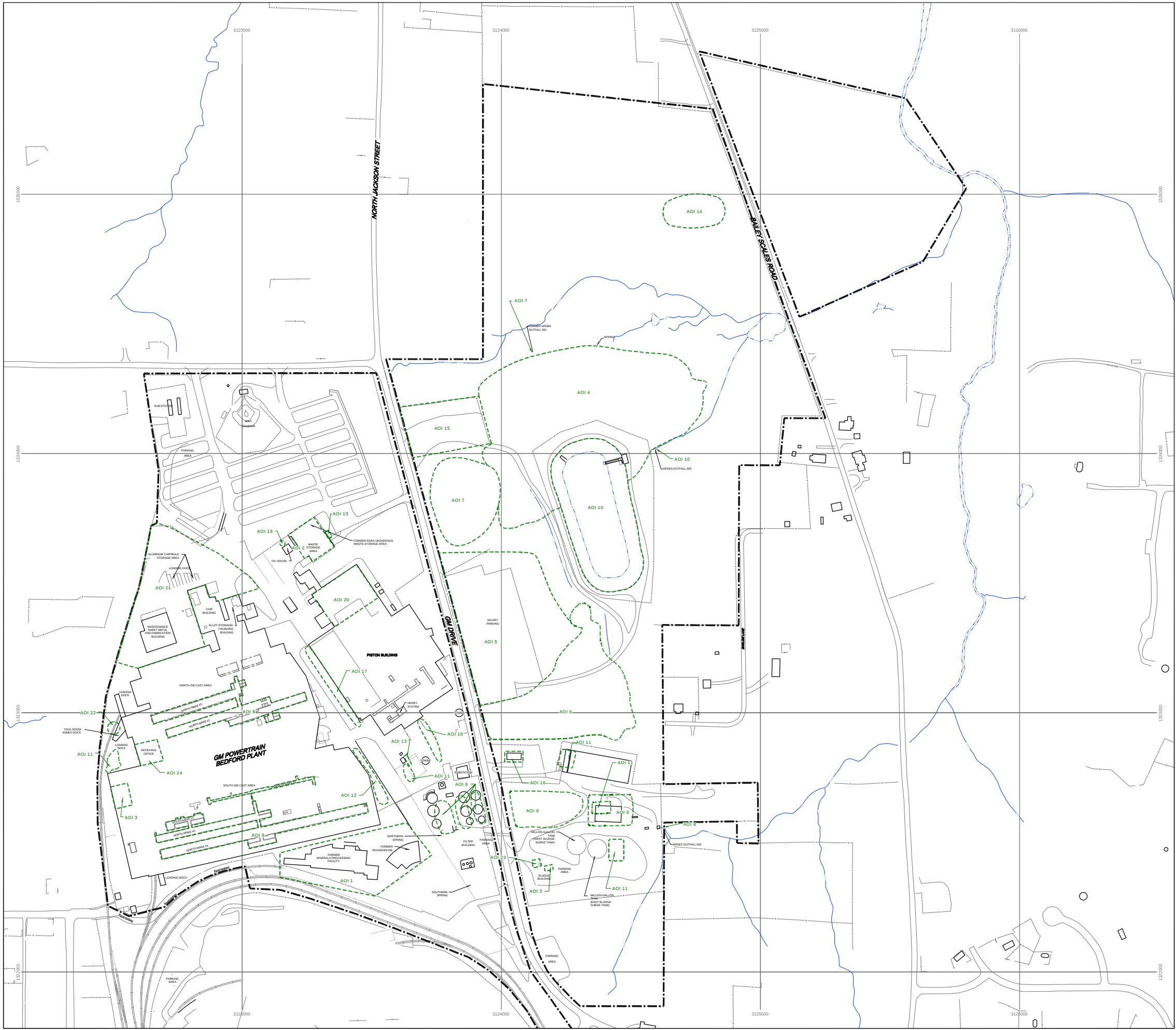


LEGEND



FACILITY BOUNDARY

figure 1.1
 SITE LOCATION
 GM POWERTRAIN BEDFORD PLANT
Bedford, Indiana



No.	Revision	Date	By

Legend

- AOI Boundary
- Approximate City Property Boundary
- Stream
- Fence Line
- Railroad Tracks
- Dirt Roads
- Grade-Fixed Areas

AOI SUMMARY

AOI 1: Former Railroad Operations and Minerals Processing Facility

AOI 2: Former Storage Area

AOI 3: PCB Storage Areas

AOI 4: Former North Disposal Area

AOI 5: Former East Sand Disposal Area

AOI 6: Former South Disposal and Fine Tuning Area

AOI 7: Former North Lagoon and Outfall 001

AOI 8: Former South Lagoon and Outfall 002

AOI 9: Service Tunnels

AOI 10: Existing Stormwater Lagoon and Outfall 003

AOI 11: Aboveground Storage Tanks

AOI 12: Area Affected by the Recycled Hydraulic Fluid Release

AOI 13: Underground Storage Tanks

AOI 14: Mobile Cans Disposal Area

AOI 15: Former Equipment Storage Area

AOI 16: Former East Electrical Substation

AOI 17: Former Building Oil Accumulation

AOI 18: Area Affected by the Heavy Oil Spill

AOI 19: Area Affected by the Heavy Oil Spill

AOI 20: Northern Portion of the Prior Building

AOI 21: Filled Ravine North of the Cast Building

AOI 22: Tool Room Area Cuts Release

AOI 23: Area Affected by the 1995 Wastewater Treatment Filter Cake Release

AOI 24: Area Affected by the June 2000 Tin Lube 5100 Release

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

DRAWING STATUS

Author	Checker	Reviewer	Scale	Date	By

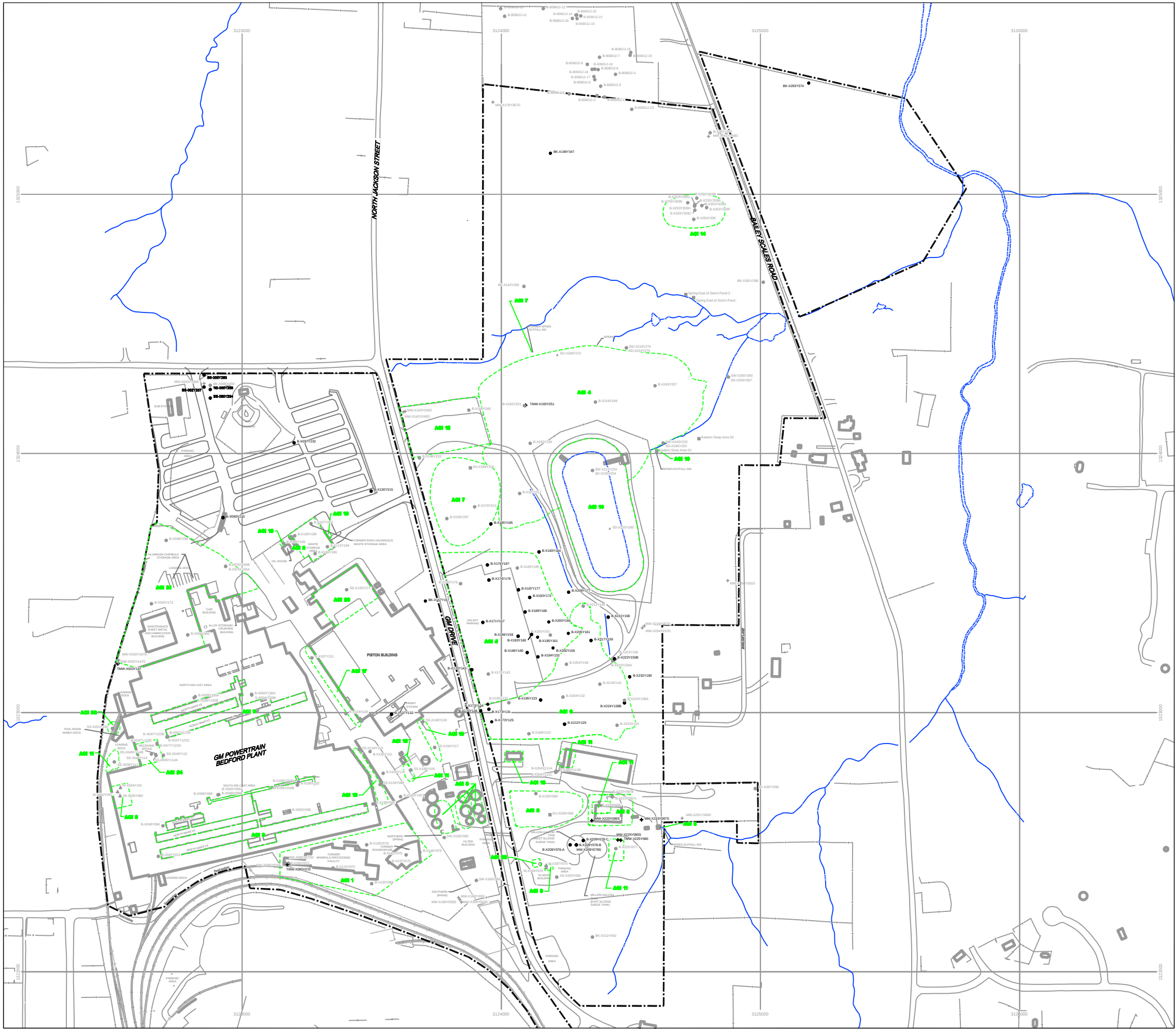
GM POWERTRAIN BEDFORD PLANT

SITE PLAN AND AOI LOCATIONS

Source Reference:

Project Manager	Reviewed By	Date
J.M.	B.S.S.R.	NOVEMBER 2002

Scale	Project N°	Report N°	Drawing N°
AS SHOWN	13968-00	029	figure 1.2



No.	Revision	Date	By

0 40 120

--- AOI BOUNDARY

--- PROPERTY BOUNDARY

--- STREAMS

--- FENCE LINE

--- ALLOCATED TRUCKS

--- DIRT ROADS

--- SANDS/FILL AREAS

--- GREY INDICATES EXISTING WELLS LOCATION

--- WELLS MONITORING WELL LOCATION

--- WELLS SEGMENT SAMPLE LOCATION

--- WELLS SPRING SAMPLE LOCATION

--- WELLS SURFACE WATER SAMPLE LOCATION

--- WELLS WASTE SAMPLE LOCATION

--- WELLS BACKGROUND SOL SAMPLE LOCATION

--- WELLS SOL SAMPLE LOCATION

--- NEW WELLS SOL SAMPLE LOCATION

AOI SUMMARY

AOI 1: Former Machine Operations and Minerals Processing Facility

AOI 2: Waste Storage Area

AOI 3: PCB Storage Area

AOI 4: Former North Disposal Area

AOI 5: Former East Sand Disposal Area

AOI 6: Former Sludge Disposal and Fine Training Area

AOI 7: Former North Lagoon and Outfall 001

AOI 8: Former South Lagoon and Outfall 002

AOI 9: Service Tank

AOI 10: Existing Stormwater Lagoon and Outfall 003

AOI 11: Abandoned Storage Tank

AOI 12: Abandoned Storage Tank

AOI 13: Millhole Caves Disposal Area

AOI 14: Former East Electrical Substation

AOI 15: Former Building Oil Accumulation

AOI 16: Area Affected by the Henry System Discharge

AOI 17: Area Affected by Pines and Thinner Soil

AOI 18: Northern Portion of the Plant Building

AOI 19: Filled Area South of Oil Cask Building

AOI 20: Fuel Room Area Dock Release

AOI 21: Area Affected by the 1996 Incinerator Treatment Filter Cake Release

AOI 22: Area Affected by the June 2000 Die Lub 5550 Release

AOI 23: Area Affected by the June 2000 Die Lub 5550 Release

AOI 24: Area Affected by the June 2000 Die Lub 5550 Release

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

Approved: _____

DRAWING STATUS

Drawn	Checked	Date	By

GM POWERTRAIN BEDFORD PLANT

ADDITIONAL BORINGS/SAMPLES COMPLETED ON-SITE

COMESTOGA-ROVERS & ASSOCIATES

Source Reference:

Project Manager	Reviewed By	Date
J.M.	R.S.S.R.	NOVEMBER 2002

Scale	Project No.	Sheet No.	Drawing Title
AS SHOWN	13968-00	029	figure 2.1

13968-00(2)G01H-WA02 NOV 13/2002

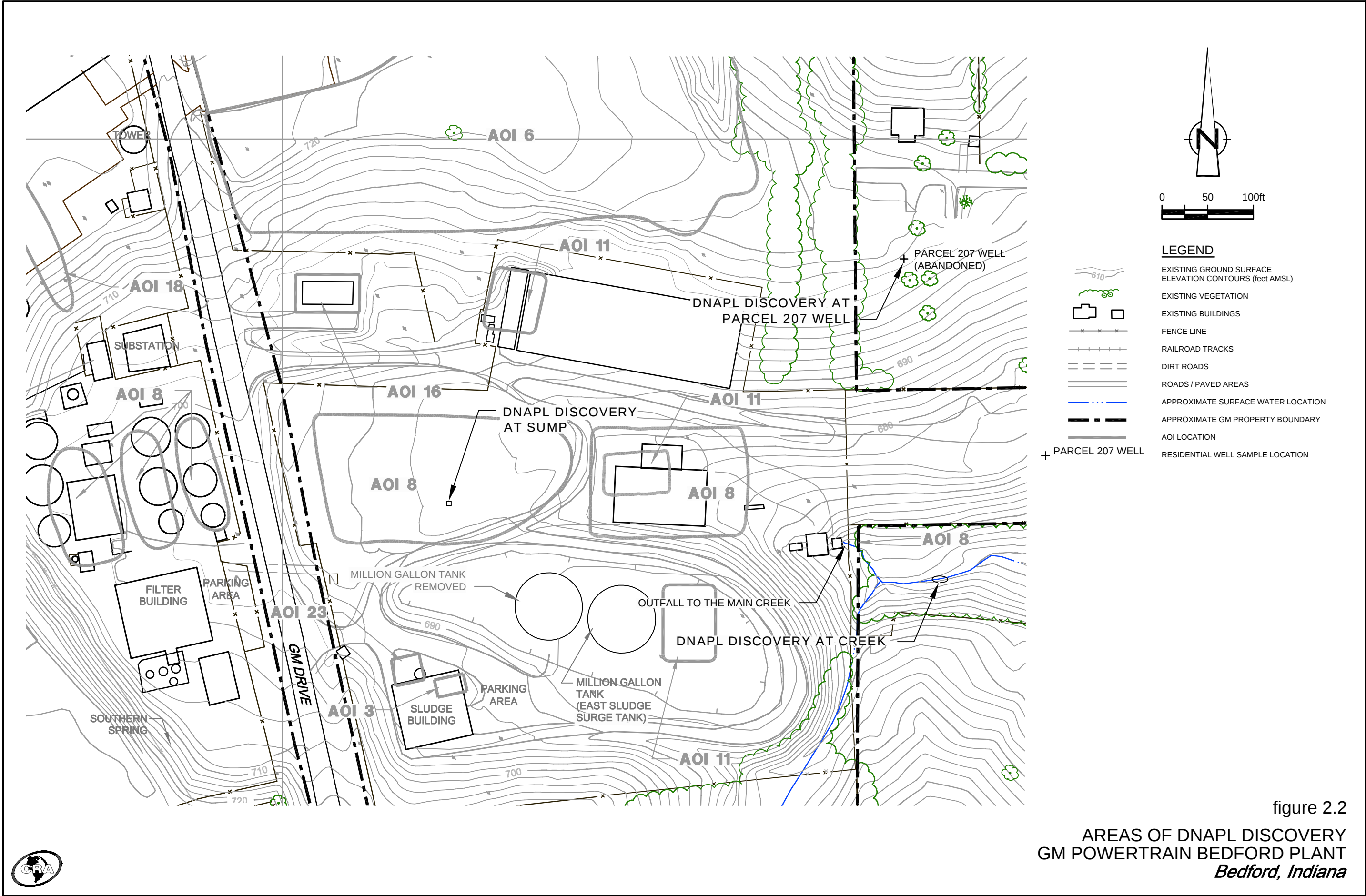
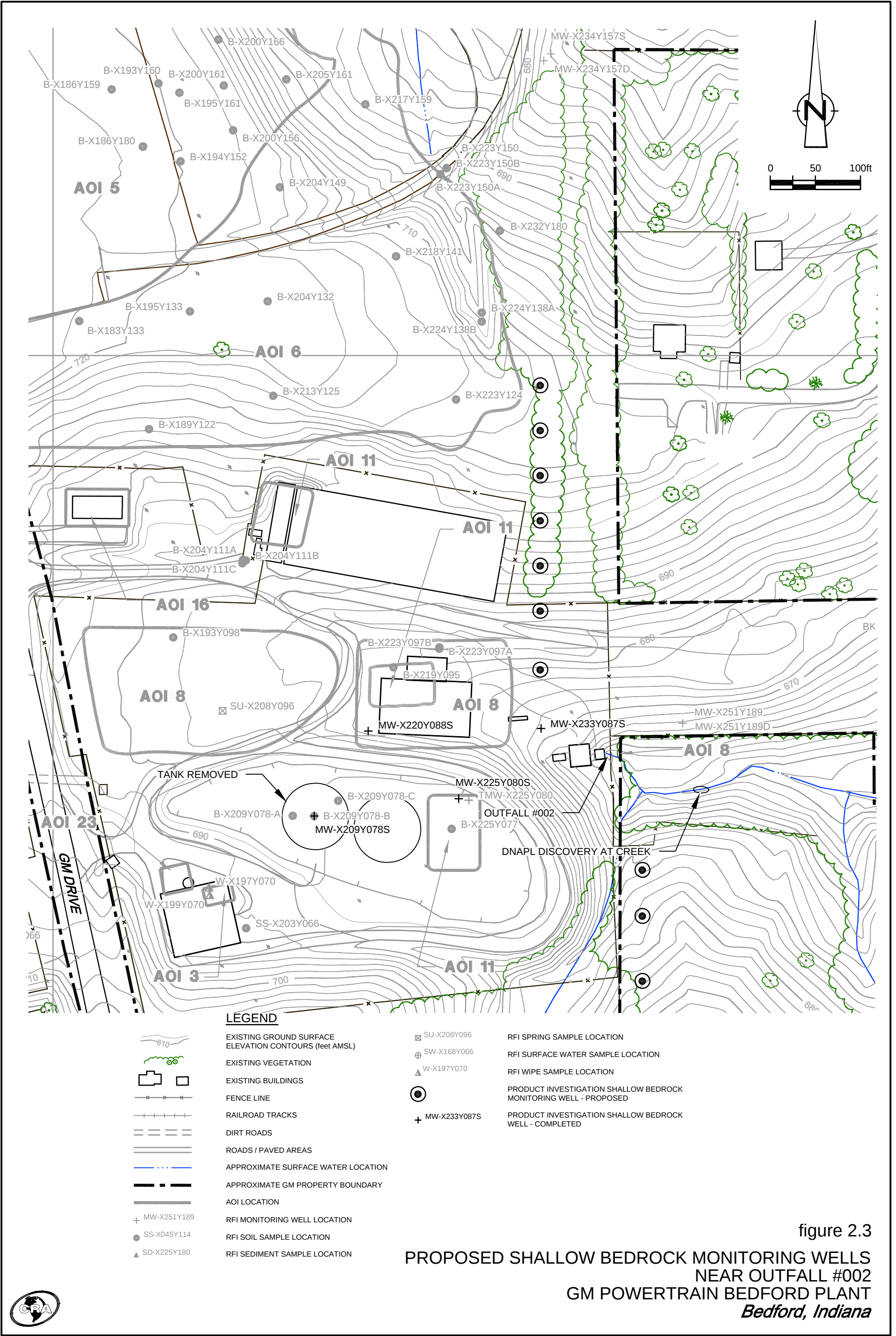
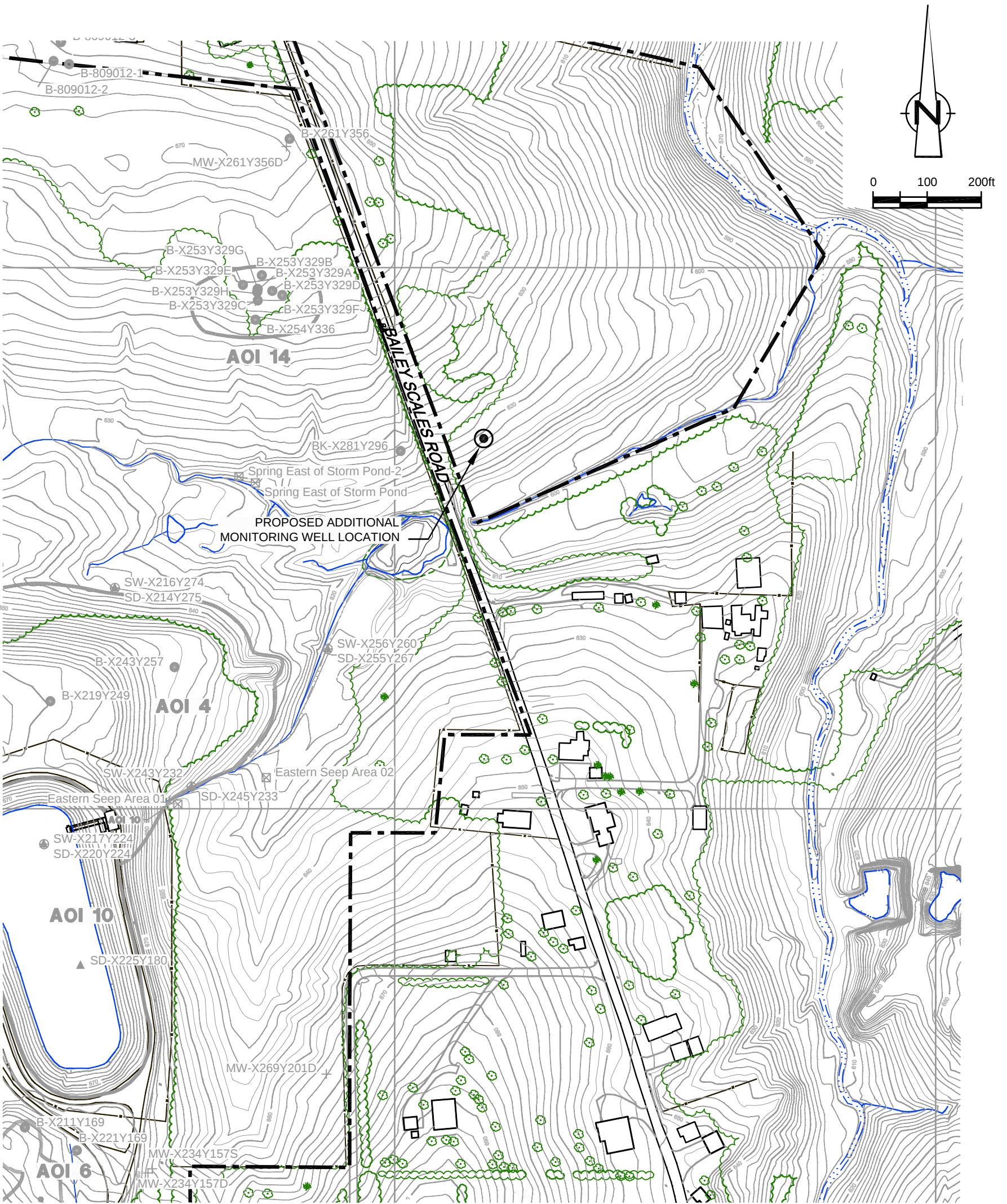


figure 2.2
AREAS OF DNAPL DISCOVERY
GM POWERTRAIN BEDFORD PLANT
Bedford, Indiana







LEGEND

- | | | | |
|--|---|--|---|
| | EXISTING GROUND SURFACE
ELEVATION CONTOURS (feet AMSL) | | RFI SPRING SAMPLE LOCATION |
| | EXISTING VEGETATION | | RFI SURFACE WATER SAMPLE LOCATION |
| | EXISTING BUILDINGS | | RFI WIPE SAMPLE LOCATION |
| | FENCE LINE | | PRODUCT INVESTIGATION SHALLOW BEDROCK
MONITORING WELL - PROPOSED |
| | RAILROAD TRACKS | | |
| | DIRT ROADS | | |
| | ROADS / PAVED AREAS | | |
| | APPROXIMATE SURFACE WATER LOCATION | | |
| | APPROXIMATE GM PROPERTY BOUNDARY | | |
| | AOI LOCATION | | |
| | RFI MONITORING WELL LOCATION | | |
| | RFI SOIL SAMPLE LOCATION | | |
| | RFI SEDIMENT SAMPLE LOCATION | | |

figure 2.4
PROPOSED ADDITIONAL ON-SITE MONITORING WELL
GM POWERTRAIN BEDFORD PLANT
Bedford, Indiana



