EHS Support

Dyno Nobel Site
Port Ewen, New York

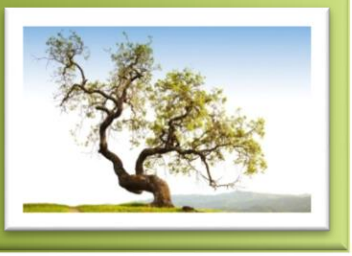
Prepared for:
Hercules Incorporated and Dyno Nobel, Inc.

June 2017

consider it done

Historical Soil Investigation Summary Report

Prepared by:
EHS Support, LLC



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ACRONYMS

AOC	Area of Concern
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
CMS	Corrective Measure Study
COPC	Constituent of Potential Concern
DDNP	Secondary Explosive (Diazodinitrophenol)
DoD	Department of Defense
Dyno Nobel	Dyno Nobel Inc.
FWIA	Fish and Wildlife Impact Analysis
Hercules	Hercules Incorporated
HMX	Secondary Explosive (cyclotetramethylene tetranetramine)
HSWA	Hazardous and Solid Waste Amendments
Hydroqual	, Inc.
ICM	Interim Corrective Measures
LMNR	lead mononitro-resorcinol
NFA	no further action
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PBX	Polymer Bound Explosive (RDX and plasticizer)
PES	potential explosion site
PETN	Secondary Explosive (Pentaerythritol tetranitrate)
PR	Preliminary Review
PRAP	Proposed Remedial Action Plan
QD	Quantity Distance
RCRA	Resource Conservation and Recovery Act
RDX	Secondary Explosive (cyclotrimethylene trinitramine)
ROD	Record of Decision
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SCO	Soil Cleanup Objective
Site	Dyno Nobel Port Ewen, NY Facility
SV	Sampling Visit
SWMU	Solid Waste Management Unit
TSD	treatment, storage and disposal
VSI	Visual Site Inspection
USEPA	United States Environmental Protection Agency
VOCs	volatile organic compounds

1.0 INTRODUCTION

The purpose of this document is to provide the New York State Department of Environmental Conservation (NYSDEC) and other interested stakeholders with information and documentation demonstrating the successful completion of the soil investigation at the Dyno Nobel facility in Port Ewen, New York (the Site), in accordance with the United States Environmental Protection Agency (USEPA) Resource Conservation and Recovery Act (RCRA) Corrective Action Process. The objective of this document is to facilitate the development of the NYSDEC Proposed Remedial Action Plan (PRAP) and Record of Decision (ROD to advance the project into the remedial action phase. The Site has undergone extensive investigation activities since as early as 1991 under the oversight of the NYSDEC. This work has led to a clear understanding of historical operations and areas of concern and focus for investigation and future remediation. A discussion of the Site history and investigations is provided in this document. The focus of this document is to provide a clear understanding of the historical investigations and remedial efforts as well as the current regulatory status of the Site.

1.1 Site Description

The Dyno Nobel Facility is located at 161 Ulster Avenue in Ulster Park, New York, approximately one mile south of the village of Port Ewen in Ulster County (**Figure 1-1**), and covers approximately 350 acres of grassy, marshy and woodlands areas. The Site has been used for the manufacture and assembly of a variety of detonators and blasting caps since 1912. Prior to its development, the land was undeveloped and primarily used for grazing and other agricultural activities. The facility is in a small valley bordered by Hussey Hill to the west and a low-lying ridge to the east (**Figure 1-2)**. The facility is zoned industrial (**Figure 1-3**) and adjoining properties are industrial and residential. A deed restriction is currently in place on the parcels owned by Dyno Nobel (**Figure 1-4**) restricting the use of the properties to industrial operations and restricting subsurface disturbance, building and other Site improvements as well as groundwater use. Of the 350 acres, approximately 100 acres were actively used, including buildings, roads, grassy areas, drainage areas, woodlands and wetlands. The unused 250 acres act as a buffer area and are grassy, woodlands or wetlands areas. **Figure 1-5** shows the current Site boundary, which defines the investigation areas.

Explosives manufacturing commenced at the facility in 1912 by Frank Brewster. Aetna Explosives Company purchased the facility in 1915, sold it to Hercules Incorporated (Hercules) in 1922, who subsequently sold the company to IRECO Incorporated in 1985. In July 1993, IRECO was renamed Dyno Nobel Incorporated (Dyno Nobel), the current property owner.

1.2 RCRA Corrective Action Process

In 1984, the United States Congress passed the Hazardous and Solid Waste Amendments (HSWA), which granted USEPA expanded authority to require corrective action at permitted and non-permitted treatment, storage, and disposal (TSD) facilities. Subsequently, the USEPA developed guidance and policy documents to assist facilities conducting cleanups. These guidance and policy documents describe the steps in the RCRA Corrective Action Process. The NYSDEC has been delegated the oversight of the RCRA program through an Enforcement Agreement with USEPA.

"The objective of a Corrective Action Program at a hazardous waste management facility is to evaluate the nature and extent of the releases of hazardous waste or hazardous constituents; to evaluate facility

characteristics; and to identify, develop, and implement an appropriate corrective measure or measures to protect human health and the environment."[1]

The RCRA Corrective Action Process consists of six stages, each of which comprises a multitude of detailed steps and evaluations, which are described below:

1. Initial Site Assessment
2. Site Characterization
3. Interim Actions
4. Evaluation of Remedial Alternatives
5. Remedy Implementation
6. Long Term Care

Stages 1 through 4 of the RCRA Corrective Action Process have been successfully completed for the Site based on approvals from NYSDEC and details regarding Site-specific activities related to stages 1-4 are provided in **Sections 3** through **6 of this document**. Hercules/Dyno Nobel are currently awaiting NYSDEC's preparation of the PRAP and ROD documenting the selected remedy(s) for the Site in order to proceed with Remedy Implementation.

[1] NYSDEC Corrective Action for Hazardous Waste Facilities webpage at http://www.dec.ny.gov/chemical/9057.html

2.0 SITE BACKGROUND

2.1 Facility Operations

Manufacturing operations at the facility involved the manufacture of blasting cap components, consisting primarily of metal shells, insulated wire and plastic tubing; and the assembly of these components into various types of blasting caps or initiating devices using purchased explosives. The finished devices ranged in size from ¼" long by 1/8" in diameter up to slightly less than 10" in length. The wire or tubing connected to the devices varied according to the client's specifications and intended use of the device. Raw materials included explosives, chemicals, uncoated wire and metal sheets and were procured from off-site sources. Raw explosives were stored as powders under water (to reduce the possibility of explosion) in large underground tanks in the Tank House. As of 1991, explosive materials used at the facility included pentaerythritol tetranitrate (PETN), diazodinitrophenol (DDNP), cyclotrimethylene trinitramine (RDX), cycoltetramethylene tetranitramine (HMX), polymer bound explosive (PBX), tetryl, tetrazene, black powder, nitrocellulose, double base propellant, lead azide, lead mononitro-resorcinol (LMNR) and lead styphnate. These explosive materials were combined with barium salts, chromates, lead oxides, perchlorates, molybdenum, tungsten, silicon, sirconium, and boron powders to make the desired product. Prior to 1988 additional starting materials including selenium, tellurium and lead powders used in earlier product designs. Mercury fulminate was formerly used onsite in the production of certain devices prior to the late 1950s.

In addition to using the purchased explosives outlined above, the explosive diazodinitrophenol was manufactured at the facility. To produce diazodinitrophenol, picramic acid was diazotized in a batch process using nitric acid. The facility estimated that approximately 150 to 200 pounds of the product were manufactured per batch. The reaction was carried out in a stainless steel horizontal tank with water as the solvent. The final step of the process was to treat the water by wet oxidation in two stainless steel treatment tanks. It was then discharged to the local wastewater treatment plant under a pretreatment permit.

Metal stamping and machining operations using aluminum and brass also took place at the facility. Copper was also annealed onsite prior to 1991. Uncoated wire and raw plastics were also used in the manufacturing process. The uncoated wire was coated with plastic, and plastic tubing was extruded for use in non-electric blasting caps.

Waste generated at the facility included process waters, sludges and wastewaters from explosive powder processing cleanup, off-specification finished product, explosive-contaminated packaging, degreasing solvents, and general household refuse. Early housekeeping practices at the facility are believed to have resulted in the systematic release of wastewater potentially contaminated with any or all of the explosive materials and degreaser solvents used at the facility over the course of its operational history. Water accumulated in settling basins, containers and tanks were disposed of on the surrounding soil as a matter of course between 1912 until at least 1972 TCE generated at the Shell Plant was released to the soil via a drainage ditch and potentially to of the drainage ditches located throughout the facility between 1912 and 1979. Testing of detonators also resulted in potential releases.

Past practices allowed for the discharge of liquid wastes directly into drainage sumps on-site while potentially energetic materials were neutralized via open burning and detonation. Waste energetic materials were washed into waste powder catch basins and collected for neutralization by either burning or detonation. Steam condensate was collected and treated using gravity filtration to recover energetic materials and then discharged to the ground. Water from catch basins, collection tanks, and treated steam condensate was routinely discharged to the ground in the past. Sludge collected in the catch basins, tank sumps, and production collection containers was historically disposed of on Site.

During the 1980s and 1990s, production at the facility dropped sharply, and in 2003, 210 employees were laid off following a merger of Dyno Nobel with a subsidiary of Ensign-Bickford Industries. The manufacturing plant closed on June 28, 2010. An office building at the facility is currently occupied by Dyno Nobel personnel who support alternate, administrative company operations. In addition to the Dyno Nobel personnel, a portion of the facility is leased to Maine Drilling and Blasting, who provide blasting services for the construction and quarry markets. Maine Drilling and Blasting operations involve the blending of emulsions and ammonium nitrate, storage and distribution of packaged explosives and bulk blasting agents, and maintenance and repairs to company delivery vehicles are performed on-site.

2.2 Facility Layout

Due to the inherent danger in the manufacturing of explosive materials, the facility was designed and operated over a wide area to limit the damage from potential fires or explosions. This concept is known as quantity distance (QD). QD is a relationship between a specific quantity of explosives at a potential explosion site (PES) and the expected effects of an accidental explosion on an exposed site at scaled distances. The primary potential hazards of an explosion are blast (overpressure), fragmentation, and thermal, and their effects can result in serious personnel injury and property damage. QDs have been developed to provide separation distances from a PES that minimize risk of propagation between PESs, serious injury to personnel, and property damage dependent upon the type of explosive. Historically the facility was a contractor for the Department of Defense (DoD); therefore, the facility was designed and operated in compliance with QDs and buffer zones. Hence, the operations were focused and well defined and did not include the entire footprint of the Site. For example, the drying houses (AOCs G, H, J, M, N, and O) were located in a remote area south of the manufacturing areas (**Figure 2-1**) so that any accidental fires or explosions in one of the drying houses would not affect other drying houses or other manufacturing and storage areas. Due to this QD concept, the buffer zones between manufacturing buildings, storage buildings and other operational areas are not being expected to contain impacts because there were no active operations, production, waste storage or disposal performed in these areas for safety purposes. Both the Department of Defense Contractor's Safety Manual for Ammunition and Explosives (DoD4145.26-M) and Federal explosive regulations, enforced by the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), require explosives storage to be located a certain minimum distance from inhabited buildings, public highways, and passenger railways, based on the quantity of explosive materials in each area. These buffer zone areas can range from 50 to over 2000 feet depending on the type and quantity of explosive materials. The design and operation of the facility in compliance with QDs and buffer zones required by the DoD and the ATF preclude operations from specific areas of the Site. The historic RCRA Facility Assessment (RFA) and RCRA Facility Investigation (RFI) took these restrictions into account to ensure the site investigation activities were comprehensive and that potential impacts from historic operations where accurately characterized.

3.0 INITIAL SITE ASSESSMENT

The first element in most cleanup programs is an initial site assessment. During the initial site assessment, state or USEPA technicians gather information on site conditions, releases, potential releases, and exposure pathways to determine whether a cleanup may be needed and to identify areas of potential concern. In the corrective action program, this step is commonly referred to an RFA. Overseeing agencies may also use initial site assessments to set relative priorities among facilities and allocate resources.

There are three steps to an RFA, all of which require the collection and analysis of data to support initial release determinations:

1) Preliminary Review – focuses primarily on evaluating existing information, including inspection reports, permit applications, historical monitoring data, and interviews with site personnel who are familiar with the facility.
2) Visual Site Inspection – the on-site collection of visual information to obtain additional evidence of release.
3) Sampling Visit – fills data gaps that remain upon completion of the preliminary review and visual site inspection by obtaining sampling and field data.[2]

The result is a RFA Report, which documents the activities undertaken in the preliminary review, visual site inspection and sampling visit.[3]

The following subsections provides details regarding the RFA and identification of potential areas of concern requiring further investigation.

3.1 Preliminary Review and Visual Site Inspection

The Initial Site Assessment stage of the RCRA Corrective Action Process for the Site was completed in the 1990s. In 1991, A.T. Kearney, Inc. prepared a draft RFA under contract with the USEPA. The RFA summarized the preliminary review (PR), and visual site inspection (VSI) activities that took place at the facility on June 11 and 12, 1991. The RFA Report described the facility, its history and operations, waste and management practices as well as regulatory history and history of releases. The RFA provided the environmental setting, and identified solid waste management units (SWMUs) and areas of concern (AOCs), along with providing information about each. The RFA concluded with recommendations for further action. The 1991 RFA identified 30 SWMUs and 4 AOCs.

A second VSI was conducted in June 1993 because additional SWMUs were identified after the first VSI. Subsequently, A.T. Kearney prepared a second draft RFA in July 1993, and a final RFA report was submitted in October 1993 (A.T. Kearney, 1993). Although the USEPA determined the RFA was complete, the NYSDEC identified a number of factual errors contained in the 1993 report, and NYSDEC requested that Dyno Nobel complete another round of revisions to the RFA report prior to undertaking the recommendations. A revised and final RFA was produced by Eckenfelder, Inc. in August 1994. The 1994 RFA (Eckenfelder, 1994) identified 46 SWMUs and four AOCs, and suggested that an RFI be conducted at 23 SWMUs and two AOCs, and confirmatory sampling (or RFA Sampling Visit) be conducted at 13 SWMUs and 2 AOCs.

[2] *RCRA Facility Assessment Guidance, October 1986 at 1-3.*
[3] *RCRA Facility Assessment Guidance, October 1986 at 4-18.*

3.2 Sampling Visit

Sampling associated with the RFA Sampling Visit (RFA-SV) was conducted during December 17-23, 1996 in accordance with the NYSDEC-approved Sampling Visit Work Plan prepared by Eckenfelder dated May 1995 (Eckenfelder, 1995). The work plan called for the investigation of SWMUs 32 and 35 as part of the RFI and added the investigation of SWMUs 14, 15, and 16 to the RFA-SV. Therefore, the RFA-SV included the evaluation of 17 SWMUs and 2 AOCs.

Prior to implementation of the RFA-SV, interim corrective measures (ICM) for explosives were recommended at those SWMUs and AOCs suspected of containing explosive materials in reactive quantities. A discussion of the ICM, RFA-SV, and RFI activities and results are included in the following sections.

4.0 SITE CHARACTERIZATION

Before cleanup decisions can be made, some level of characterization is necessary to ascertain the nature and extent of contamination of a site and to gather information necessary to support selection and implementation of appropriate remedies. This step is often referred to as the RFI. A successful RFI will identify the presence, movement, fate, and risks associated with environmental contamination at a site and will explain the chemical and physical properties of the site likely to influence contamination migration and cleanup. Information collected during the RFI can be used by the owner or operator to formulate and implement appropriate corrective measures. Such corrective measures may range from a) stopping the release through the application of a source control technique to b) a full-scale cleanup of the affected area.

In the 1994 RFA (Eckenfelder, 1994), the SWMUs/AOCs were evaluated and given one of the following recommendations:

- No further action (NFA)
- \RFA-SV\
- \RFI\
- \ICM\

Based on the RFA recommendations, 17 SWMUs/AOCs required an ICM to be implemented on an expedited basis to facilitate investigation as part of the RFI. Two additional SWMUs (47 and 48) were identified and added after the RFA was completed. The RFA also recommended confirmatory sampling (RFA-SV for 19 SWMUs/AOCs) as part of the RFA-SV. Based on the results of the RFA-SV, 10 SWMUs/AOCs were recommended for further investigation under the RFI.

Dyno Nobel entered into an Order on Consent with NYSDEC on April 15, 1996, which stipulated that 25 SWMUs/AOCs be the subject of a RFI. Additionally, 10 SWMUs/AOCs required further investigation as part of a RFI, based on the RFA-SV report (Eckenfelder, 1997b) and one SWMU (SWMU 12) was eliminated from further investigation due to building construction which make this area inaccessible (Eckenfelder, 1997b).

The RFI Work Plan (Eckenfelder, 1997b) was approved by NYSDEC for the investigation of 34 SWMUs and four AOCs. The RFI Report (Brown and Caldwell, 1999) was submitted in December 1999, and recommended no further action for six (6) SWMUs and further evaluation in a CMS for those areas containing constituent concentrations above the established screening criteria. The 1999 RFI Report was approved by NYSDEC in a letter dated July 11, 2000.

Eight additional SWMUs and 11 AOCs were identified and investigated subsequent to the submittal of the 1999 RFI report (Brown and Caldwell, 1999) and are discussed in **Section 6**.

A list of all the SWMUs/AOCs and their status is provided in **Table 4-1**. The locations of all the SWMUs and AOCs along with their associated soil sample locations are provided on **Figure 4-1a** through **Figure 4-1e**.

5.0 INTERIM ACTIONS

While site characterization is underway or before a final remedy is selected, corrective action facilities often need interim actions. Interim actions are used to control or abate ongoing risks to human health and the environment in advance of the final remedy selection.

When more immediate action must be taken to control a source, interim actions may be required to control or abate ongoing risks to human health and the environment. The purpose, as stated by NYSDEC, is "to control or abate threats to human health and/or the environment from releases and/or to prevent or minimize the further spread of contamination while long-term remedies are pursued."

The EPA's recommended interim measure performance standard is:

1) *Control, minimize, or eliminate release(s) or potential release(s) that pose actual or potential threats to human health and the environment and,*
2) *To the extent practicable, be consistent with the remedies that meet the remedy performance standard.*[4]

Although not a required step in every corrective action, interim measures were taken at the Site. Interim corrective measures for explosives were undertaken during the period July 24, through October 7, 1996 to address health and safety concerns associated with areas of the Site, which may contain explosives at reactive concentrations. A total of 17 SWMUs were screened by UXB International Inc. for primary and secondary explosives. Two locations were found to contain explosive quantities of both primary and secondary explosives. Explosive material was removed from these areas until subsequent sampling indicated that explosive quantities were no longer present.

Three locations were found to contain numerous blasting caps and related debris, which was collected in five-gallon pails for disposal. These activities are documented in the report entitled *Documentation of Interim Corrective Measures (ICM) for Explosives, Dyno Nobel Facility, Port Ewen, New York* (Eckenfelder, 1997a). The objectives of the ICM for explosives were met and the screened areas were deemed safe for further investigation in the RFA-SV and RFI.

Due to the presence of potential energetic materials, NYSDEC requested, in a letter dated August 21, 2000, that Dyno Nobel install a fence around SWMUs 1, 22 and 35. A proposed fence design was submitted to the NYSDEC and approved in a letter dated August 30, 2000 and approximately 4,300 linear feet of chain-link fence was installed around the three SWMUs.

[4] EPA Interim Corrective Action Quick Reference Table at 2, available at https://www.epa.gov/sites/production/files/2016-01/documents/table1.pdf

6.0 EVALUATION OF REMEDIAL ALTERNATIVES

Before choosing a cleanup approach, program implementers and facility owners/operators will typically analyze a range of alternatives and evaluate their advantages and disadvantages relative to facility-specific conditions. Such a study is called the Corrective Action Measures Study (CMS).

In this stage, a range of alternatives are analyzed by weighing advantages and disadvantages relative to facility specific considerations. The result is a CMS, the purpose of which is "[t]o evaluate thoroughly the nature and extent of the releases of hazardous waste and hazardous constituents and to gather necessary data to support the Corrective Measures Study and/or interim corrective measures."5

This section discusses Stage 4 of the RCRA Corrective Action Process, specifically the preparation of the CMS for the Site.

6.1 2000 CMS

The CMS process initially began in 2000 based on the findings of the RFA and RFI. Subsequent revisions and addendums to the CMS have been developed as data gaps have been identified and supplemental investigations and evaluations have been performed. The initial CMS (Eckenfelder, 2000) was prepared for the Site pursuant to a letter from the NYSDEC, dated July 11, 2000, and the requirements of the Part 373 Permit to evaluate and recommend corrective measures alternatives for 32 SWMUs and four AOCs. Based on the technical, human health, and environmental evaluation presented in the 2000 CMS (Eckenfelder, 2000), remedial alternatives were recommended for the SWMUs and AOCs evaluated.

6.2 2003 Addendum to CMS

In a letter dated January 6, 2003, NYSDEC indicated that there were "substantial gaps in the detailed history of the site" and requested "additional information needed in order to fully evaluate existing SWMUs and AOCs and identify any other areas requiring investigation". In response to this request, a historical review was performed and a comprehensive Site history was prepared for the Site by Brown and Caldwell and documented in Addendum to the CMS dated September 22, 2003 (Brown and Caldwell, 2003). The objective of the historical analysis was to conduct a due diligence review of the history of Site operations and development to determine the potential for areas of environmental concern, if any, not adequately uncovered in prior site investigations. The historical review included a review of the Site history, manufacturing processes, including raw materials used, waste products and waste disposal processes. Information used to support the review included aerial photographs and historical Site maps; interviews with current and retired employees; available public records, building/demolition permits, fire/police records, newspaper articles, and Sanborn maps; as wells as corporate records and other documents obtained from Hercules and Dyno Nobel. The review of these items was used to develop a timeline that illustrates the history of the Site since 1912. For ease of reference, the following items presented in the 2003 Addendum to CMS are provided as appendices to this document:

- List of maps reviewed (**Appendix A**)
- Historical aerial photographs (**Appendix B**)
- Timeline figures (**Appendix C**)

The findings of the historical review were consistent with previously identified and investigated SWMUs/AOCs and no new waste disposal areas or practices were identified. However, several areas were

[5] NYSDEC Corrective Action for Hazardous Waste Facilities webpage at http://www.dec.ny.gov/chemical/9057.html

identified for further evaluation, including: 1) the area north of the Site fence line, which was used for storage of ammonium nitrate fuel oil and possibly for demolition debris disposal (SWMU 55), 2) the former production area (SWMU 54), which contained facilities and utilized processes similar to those associated with existing SWMUs/AOCs, and 3) several former dry houses identified in the southern are of the property (AOCs J, K, L, M, N, and O).

6.3 2005 CMS Supplement

Pursuant to a meeting with NYSDEC, New York State Department of Health (NYSDOH), Hercules, Dyno Nobel, and HydroQual Inc. (HydroQual) representatives on July 28, 2005, a Supplement to Corrective Measure Study (HydroQual, 2005) was submitted to NYSDEC. The 2005 Supplement addressed the eight SWMUs (SWMUs 49 through 56) and 11 AOCs (AOCs E through O) identified and investigated since the 2000 CMS. A determination of no further action was made for SWMUs 49, 50, 51, 53, and 55 and AOCs E, F, K and L.

Additional soil investigations were conducted for SWMUs 52, 54 and 56 and AOCs G, H, I, J, M, N, and O. Analytical data from the additional soil investigations were compared to screening criteria and with the exception of SWMU 56 (NFA was proposed), remedial alternatives were recommended for the additional SWMUs/AOCs consistent with those initially presented in the 2000 CMS (Eckenfelder, 2000).

6.4 2006 CMS Addendum

Based on a revision to the Industrial Use Soil Screening Criteria for arsenic, lead, and mercury, the figures presented in both the 2000 CMS (Eckenfelder, 2000) and the 2005 Supplement (HydroQual, 2005) were revised to reflect the new criteria. These figures were submitted to NYSDEC in a letter report dated September 1, 2006 (HydroQual, 2006).

6.5 2013/2014 Revised CMS

A revised CMS report was developed in 2013 (EHS Support, 2013), which superseded all previous CMS documents prepared for the site. The purpose of the 2013 Revised CMS was to:

- Consolidate the data from the 2000 CMS (Eckenfelder, 2000) with its subsequent addendums (Brown and Caldwell, 2003; HydroQual, 2005; HydroQual, 2006);
- Include data from subsequent investigations of groundwater, indoor air, sediment and ecological indicators;
- Re-evaluate and supplement the existing corrective measures alternatives for the SWMUs and AOCs which previously required a CMS based on more recent Site-specific data;
- Evaluate potential corrective measures for impacted sediment within the on-site surface drainage features and off-site wetlands, and
- Evaluate potential corrective measures for indoor air.

The reevaluation of corrective measures alternatives in the 2013 Revised CMS (EHS Support, 2013) included:

- Assessment of soil in comparison to the New York State promulgated standards for commercial and industrial use and proposed remediation options for impacted soil;
- Assessment of the recent Fish and Wildlife Impact Analysis (FWIA) data and proposed remediation options for the Wetlands Complex; and
- Assessment of indoor air data and management options.

Based in NYSDEC comments dated October 25, 2013, the 2013 Revised CMS was revised and resubmitted in January 2014. The 2014 Revised CMS (EHS Support, 2014) identified corrective measure alternatives and preferred alternatives for each media as follows:

- **Soil**: Permeable cover for SWMUs 22, 23, 32, 35. Excavation, On-Site Consolidation and Capping for SWMUs 2-11, 13, 21, 26D, 29, 33, 40, 48, 52, 54, and AOCs A-D, G-J, M-O. Based on a comparison of constituents of potential concern (COPCs) concentrations with the Soil Cleanup Objectives (SCOs), SWMUs 26E, 39, 42, 46, 47, and 56 were determined to require no further action due to no exceedances of the commercial use SCOs.
- **Sediment**: Permeable cover for SWMU 1. Excavation, On-Site Consolidation, and Capping for SWMU 1/22.
- **Groundwater**: Monitored Natural Attenuation with Institutional Controls for SWMU 24, 30 and 37.
- **Indoor Air**: Indoor air quality monitoring annually at Shell Plant building.

The 2014 Revised CMS Report (EHS Support, 2014) was approved by NYSDEC in a letter dated June 5, 2014.

7.0 SUMMARY

In summary, the Site has been investigated using a rigorous investigation rationale (RCRA Corrective Action Process) developed by the USEPA, subsequent to the passing of HSWA in 1984, and administered by NYSDEC. As stated in previous sections, the investigation rationale first utilized available files provided by USEPA, NYSDEC, and Hercules/Dyno Nobel, at a minimum, to research facility operations in order to identify areas of potential concern that may require further investigation by visual inspection and/or sampling. Over the course of this project, 56 SWMUs and 15 AOCs have been identified at the Site. No further action was determined for 31 of these SWMUs and AOCs, however, over 1,000 soil samples have been collected from 42 SWMUs and 15 AOCs as shown on **Figure 4-1a** through **Figure 4-1e**. Each of these samples was installed to vertically and horizontally delineate concentrations of site related constituents exceeding applicable cleanup/remediation standards at each SWMU/AOC by sampling within or around the SWMU and moving outwards away from the SWMU/AOC until concentrations were below the applicable screening criteria. Based on the investigation findings, 34 SWMUs and 11 AOCs have been recommended for remedy evaluation. A remedy evaluation was performed for these SWMUs and AOCs and the evaluation along with a recommendation for corrective action measures was submitted in the 2014 Revised CMS and approved by NYSDEC in a letter dated June 5, 2014.

The RCRA Corrective Action Process is designed to identify, investigate, and characterize environmental media on industrial properties. The Site investigation has spanned over 20 years and was overseen by the USEPA, NYSDEC, and NYSDOH. Over 1,000 soil samples have been collected to date from the Site and analyzed for multiple COPCs including metals and volatile organic compounds (VOCs). More than 100 reports/letter correspondence have been prepared and submitted to NYSDEC documenting the investigation and remedy evaluation process. Based on this investigation, combined with the exhaustive historic reviews, the rationale behind the layout of the facility, and the current industrial zoning of the Site and property deed restrictions, Hercules and Dyno Nobel believes this Site has been characterized under USEPA and NYSDEC requirements and the existing soil sample locations and density are sufficient to move forward with remedy design and implementation as outlined in the 2014 CMS (EHS Support, 2014).

8.0 REFERENCES

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TABLES

TABLE 4-1
STATUS OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs)

Dyno Nobel Site
Port Ewen, New York

SWMU/AOC	Description	Status
Solid Waste Management Units (SWMUs)		
1/22	Wetlands Complex	CM
1	Shooting Pond	CM
2	Burning Cage/Incinerator	CM
3	Copper Wire Burning Area	CM
4	Iron Wire Burning Area	CM
5	Wire Burning Area III	CM
6	Open Burning Pads	CM
7	Open Burning Pads	CM
8	Former Burning Area	CM
9	Waste Powder Catch Basins - Building 2037	CM
10	Waste Powder Catch Basins - Building 2048	CM
11	Waste Powder Catch Basins - Building 2049	CM
12	Waste Powder Catch Basins - Weber City Building	NFA
13	Former Waste Powder Catch Basins - Lead Azide Building	CM
14	Waste Powder Magazine - Building 9222	NFA
15	Waste Powder Magazine - Building 9216	NFA
16	Waste Powder Magazine - Building 3002	NFA
17	Former Waste Storage Trailer	NFA
18	Former Waste Degreaser Storage Building Area	NFA
19	New Waste Degreaser Storage Building Area	NFA
20	Former Empty Drum Storage Area	NFA
21	Lead Recycling Unit Area	CM
22	Former Landfill	CM
23	Former Dump	CM
24	Former Wastewater Treatment Facility	NFA
25	New Wastewater Treatment Facility	NFA
26D	Burnable Waste Satellite Accumulation Area	CM
26E	Burnable Waste Satellite Accumulation Area	CM
26F	Burnable Waste Satellite Accumulation Area	NFA
26G	Burnable Waste Satellite Accumulation Area	CM
27	Sanitary Sewer System	NFA
28	Scrap Metal Area	NFA
29	Drainage Ditch (Downgrade of Building 2049)	CM
30	Drainage Ditch (Downgrade of Building 2036)	NFA
31	Old Well House	NFA
32	Old Dump (near water tower)	CM
33	Mercury Fulminate Tanks Area	CM
34	Old Waste Burning Grounds (near Shooting Pond)	NFA
35	Stone Fence Dump	CM
36	Pellet House Septic Tank	NFA
37	Former Shell Plant Drum Storage Area	NFA
38N	Grenade Disposal Area	NFA
38S	Grenade Disposal Area	NFA
39	Former Washwater Discharge Area - Building 2009	CM
40	Pilot Line Condensate Collection Sump	CM
41	Detonator Production Building Condensate Collection Sumps	NFA
42	SAC Building Steam Collection Containers	CM
43	Lab Annex Condensate Collection Sump	NFA
44	Lead Azide Building Washwater Settling Tank	NFA
45	Washwater Collection Tanks - Building 2009	NFA
46	Vacuum Line Condensate Collection Sump - Building 2059	CM
47	Building 2058 Fuse Room	CM
48	Mercury Fulminate Area	CM
49	Building 2073 Sump	NFA
50	Building 2075 Sump	NFA
51	Construction Stockpiles	NFA
52	Former Commercial Lab Shooting Area	CM
53	Package Burn Test Area	NFA
54	Former Historical Production Area	CM
55	Former ANFO Area	NFA
56	Vent System for Static Security Testing Chamber	CM

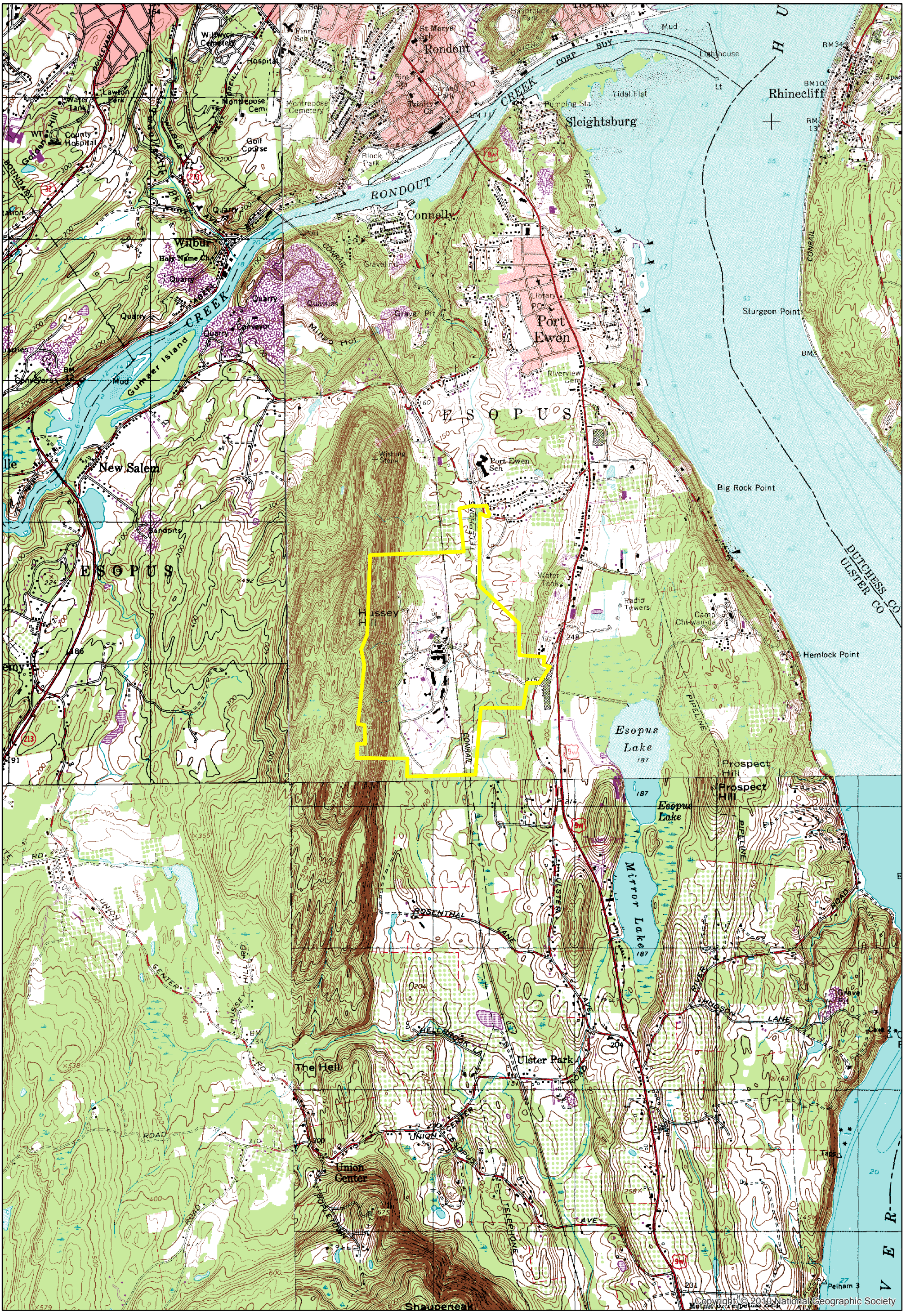
TABLE 4-1
STATUS OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs)

Dyno Nobel Site
Port Ewen, New York

SWMU/AOC	Description	Status
Areas of Concern (AOCs)		
A	Kerosene Tank Leak	CM
B	Open Burning Pads Area	CM
C	Open Detonation Pit	CM
D	Detonation Test Building	CM
E	Former Building 2073	NFA
F	Building 2075	NFA
G	Former Drying House	CM
H	Former Drying House	CM
I	Roof Drainage from Deto Building	CM
J	Former Drying House	CM
K	Former Drying House	NFA
L	Former Drying House	NFA
M	Former Drying House	CM
N	Former Drying House	CM
O	Former Drying House	CM

Notes:
CM = Corrective Measures
NFA = No Further Action

FIGURES



Legend

APPROXIMATE PROPERTY BOUNDARY

0 1,000 2,000 4,000 Feet

N

FIGURE 1-1. SITE LOCATION MAP

DYNO NOBEL SITE
PORT EWEN, NEW YORK

Map Source:
USGS topographic maps: Kingston West (2000), Kingston East (1980), Rosendale (1980), Hyde Park (2000)
Boundaries: Site and property boundaries approximations were determined using available data from historical maps and CAD files.

EHS Support *consider it done*

Wetlands Complex

Active Plant Area

0 250 500 1,000 1,500 2,000 Feet

Legend

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- NYSDEC MAPPED CLASS 2 WETLANDS
- NYSDEC MAPPED CLASS 3 WETLANDS
- LAKE/POND
- SWAMP/MARSH
- CONTOURS (5 meter intervals)
- RAILROAD
- PERENNIAL STREAM
- INTERMITTENT STREAM
- ARTIFICIAL PATH
- CONNECTOR

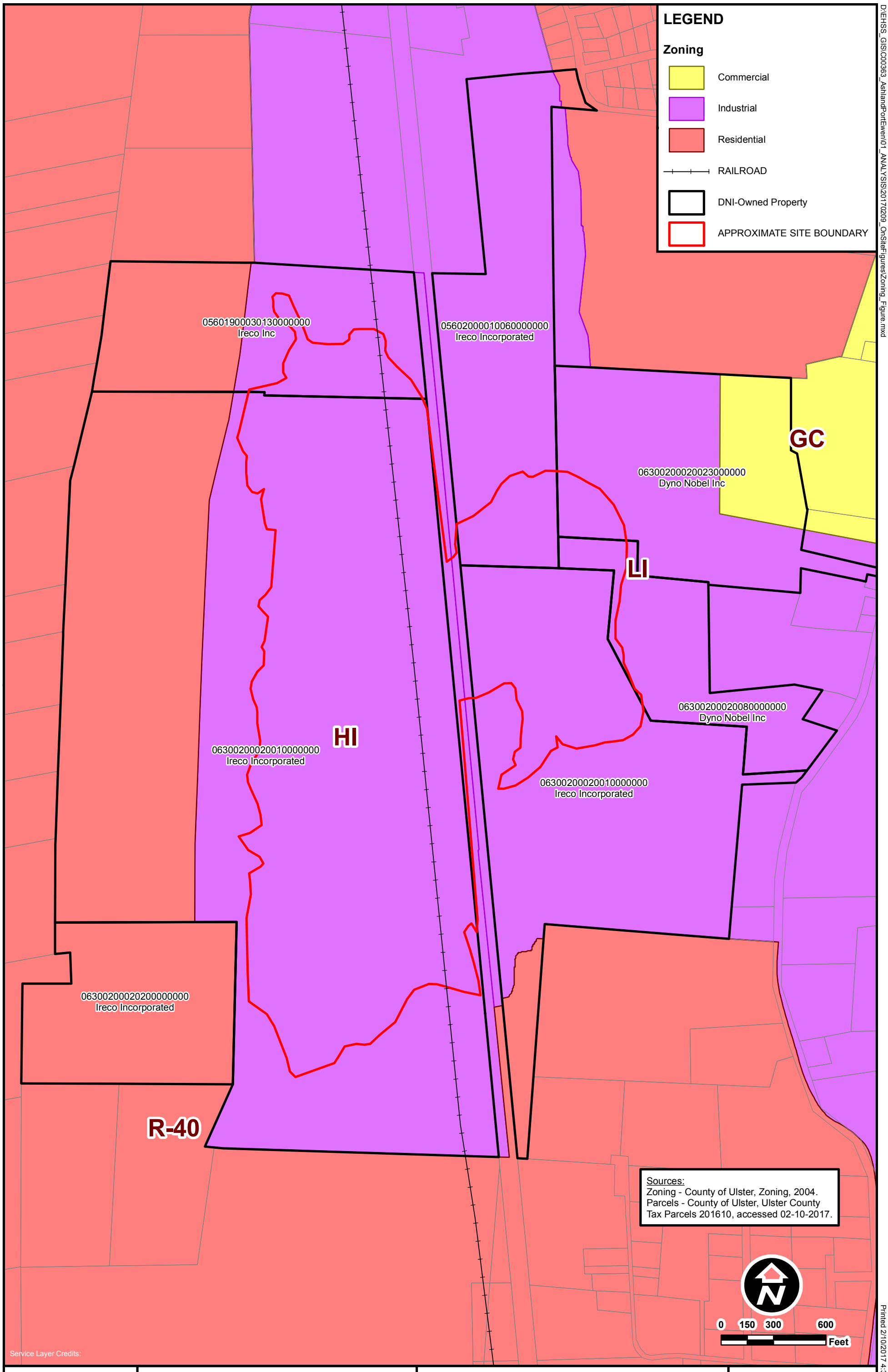
N

FIGURE 1-2 SITE SETTING

DYNO NOBEL SITE
PORT EWEN, NEW YORK

Map Source:
Fresh water wetlands: New York State Department of Environmental Conservation
Surface water: National Hydrography Dataset
Countours: United States Department of Agriculture/Natural Resource Conservation Service - National Cartography and Geospatial Center digital elevation models
Boundaries: Site and property boundaries approximations were determined using available data from historical maps and CAD files.

EHS Support consider it done



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EHS Support *consider it done*	**Dyno Nobel Site** **Port Ewen, New York**	**Zoning Map**	**Figure 1-3**

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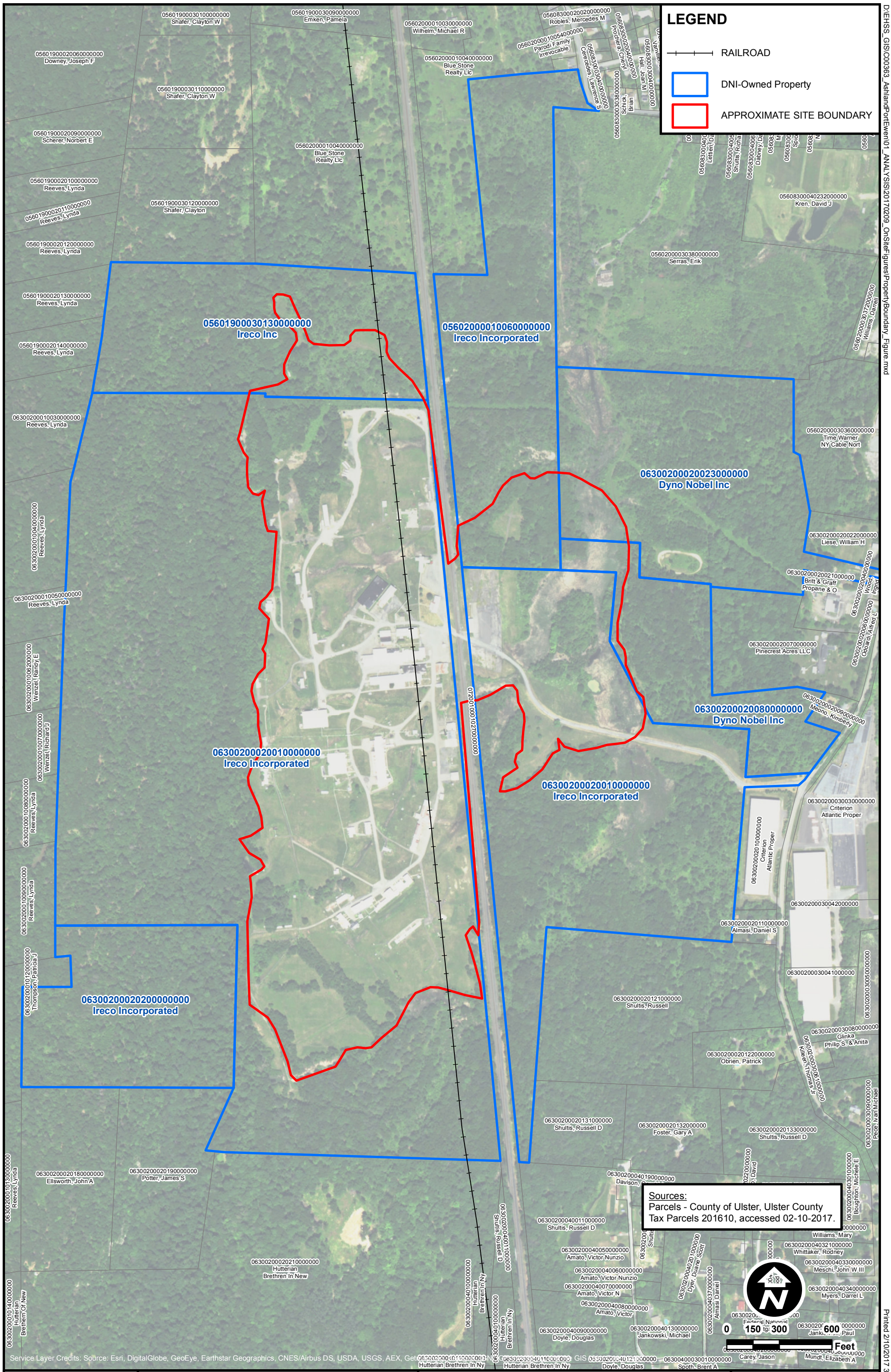

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EHS Support *consider it done*	**Dyno Nobel Site** **Port Ewen, New York**	**Site Parcel Boundary Locations**	**Figure 1-4**

Liquid Chemical Storage Building (LCSB)

Shell Plant

0 100 200 400 600 800 Feet

Legend

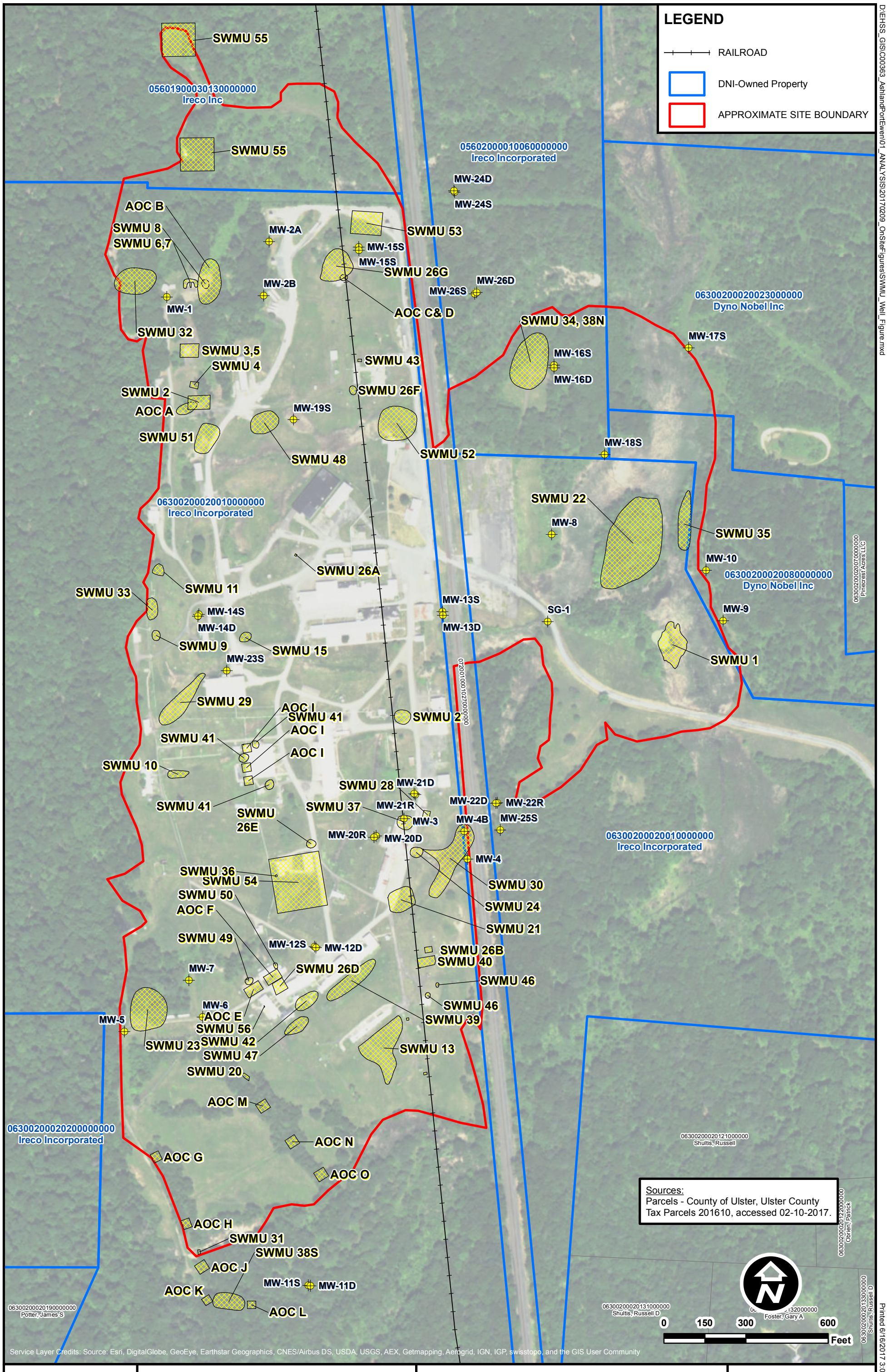
- APPROXIMATE SITE BOUNDARY
- APPROXIMATE PROPERTY BOUNDARY
- NYSDEC MAPPED CLASS 2 WETLANDS
- NYSDEC MAPPED CLASS 3 WETLANDS
- LAKE/POND
- SWAMP/MARSH
- SWMU 1/22 BOUNDARY
- RAILROAD
- PERENNIAL STREAM
- INTERMITTENT STREAM
- ARTIFICIAL PATH
- CONNECTOR

N

FIGURE 1-5
SITE LAYOUT
DYNO NOBEL SITE, PORT EWEN, NEW YORK

Map Source:
Fresh water wetlands: New York State Department of Environmental Conservation
Surface water: National Hydrography Dataset
Countours: United States Department of Agriculture/Natural Resource Conservation Service - National Cartography and Geospatial Center digital elevation models
Boundaries: Site and property boundaries approximations were determined using available data from historical maps and CAD files.

EHS Support consider it done



EHS Support consider it done

Dyno Nobel Site
Port Ewen, New York

SWMU, AOC, and Well Locations

Figure 2-1

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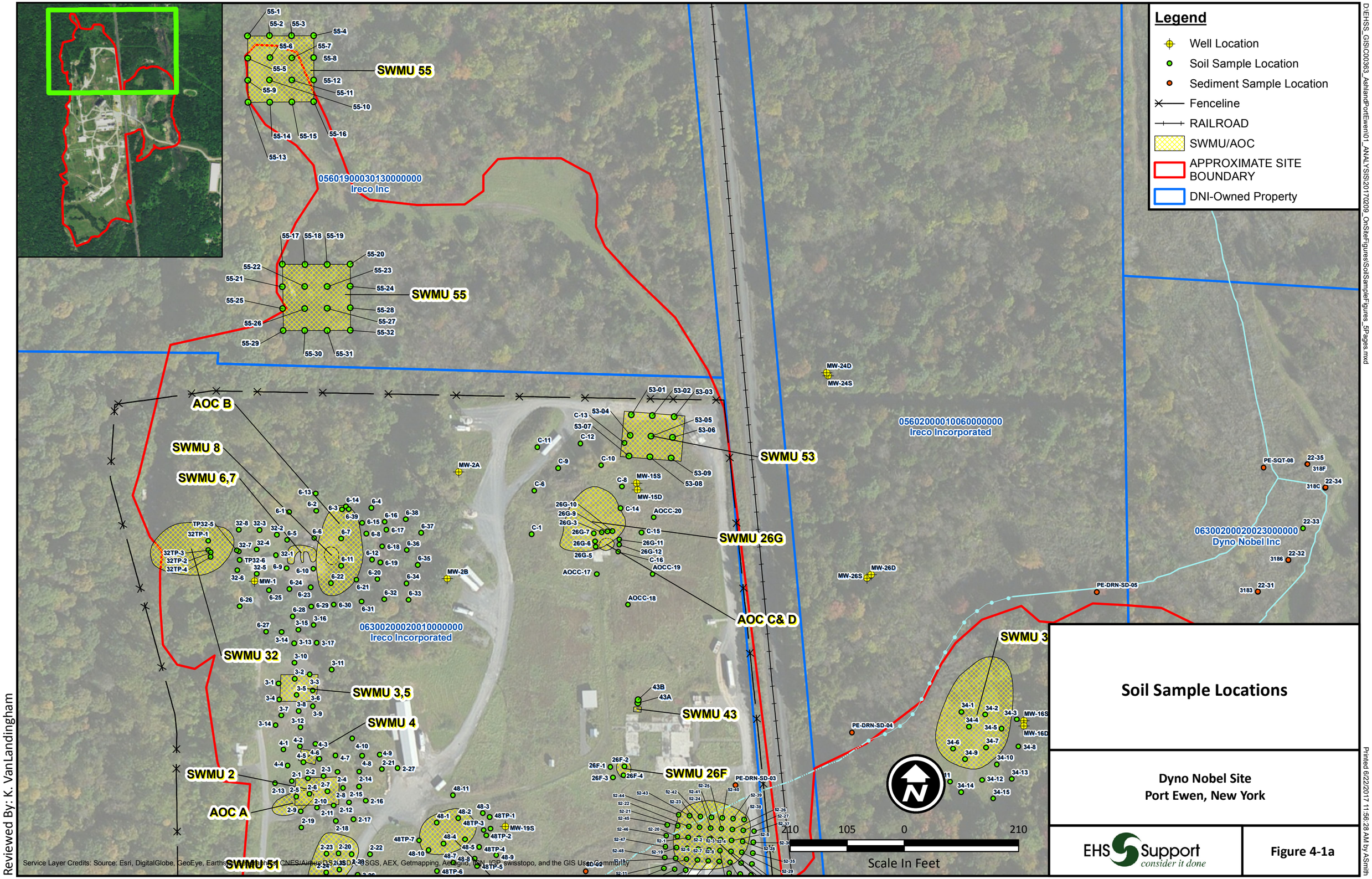
Legend
Well Location
Soil Sample Location
Sediment Sample Location
Fenceline
RAILROAD
SWMU/AOC
APPROXIMATE SITE BOUNDARY
DNI-Owned Property
SWMU 55
SWMU 55
SWMU 53
SWMU 26G
AOC C& D
SWMU 3
SWMU 43
SWMU 26F
AOC B
SWMU 8
SWMU 6,7
SWMU 32
SWMU 3,5
SWMU 4
SWMU 2
AOC A
SWMU 51
05601900030130000000
Ireco Inc
06302000020010000000
Ireco Incorporated
05602000010060000000
Ireco Incorporated
06300200020023000000
Dyno Nobel Inc
MW-1
MW-2A
MW-2B
MW-15S
MW-15D
MW-19S
MW-24D
MW-24S
MW-26D
MW-26S
MW-16S
MW-16D
PE-DRN-SD-03
PE-DRN-SD-04
PE-DRN-SD-05
PE-SQT-08
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
210 105 0 210
Scale In Feet
N
Soil Sample Locations
Dyno Nobel Site
Port Ewen, New York
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Figure 4-1a
Reviewed By: K. VanLandingham
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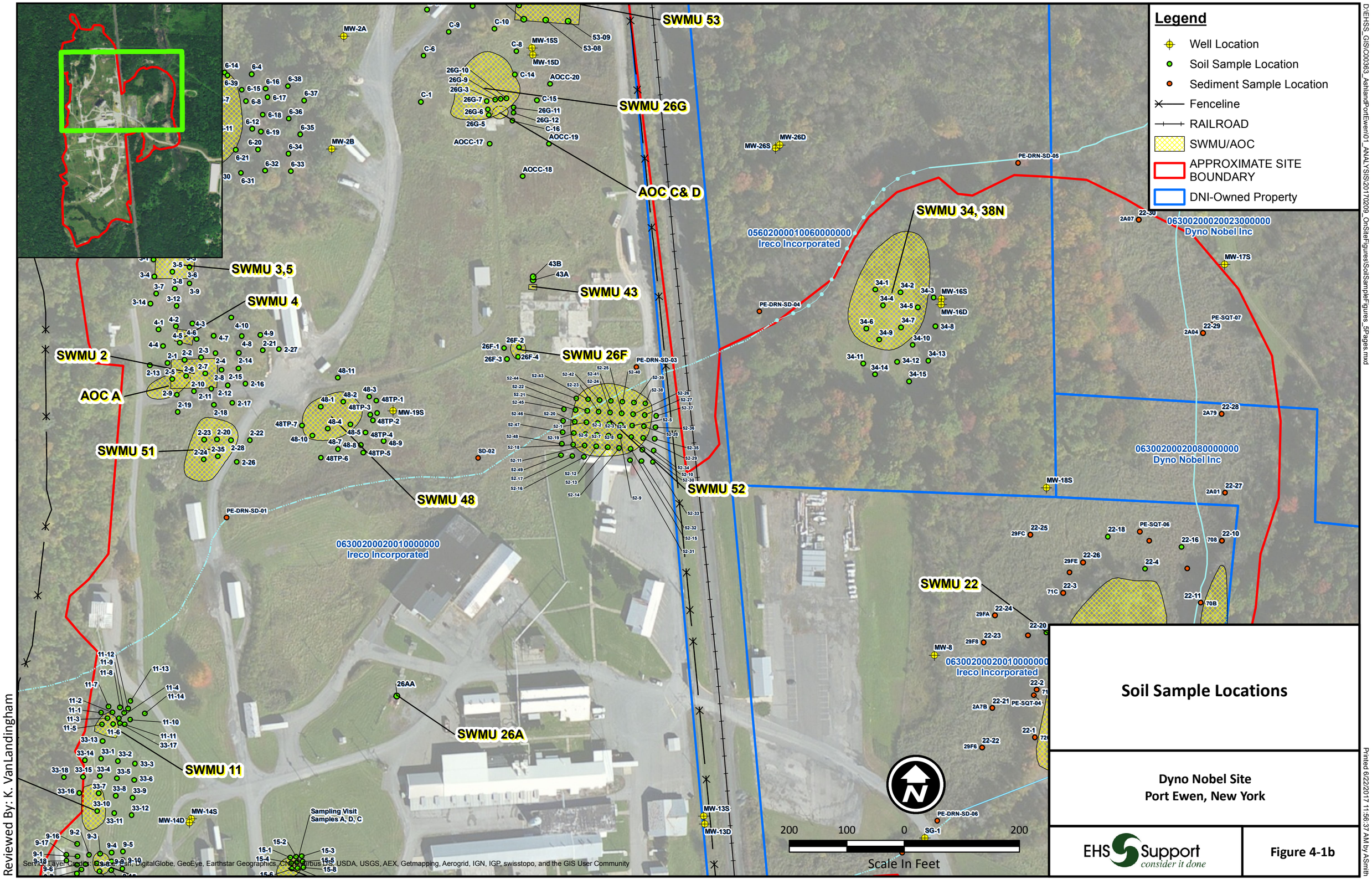
Legend
Well Location
Soil Sample Location
Sediment Sample Location
Fenceline
RAILROAD
SWMU/AOC
APPROXIMATE SITE BOUNDARY
DNI-Owned Property
SWMU 53
SWMU 26G
AOC C& D
SWMU 34, 38N
SWMU 3,5
SWMU 4
SWMU 43
SWMU 2
SWMU 26F
AOC A
SWMU 51
SWMU 48
SWMU 52
SWMU 22
SWMU 11
SWMU 26A
0560200001006000000 Ireco Incorporated
0630020002001000000 Ireco Incorporated
0630020002002300000 Dyno Nobel Inc
0630020002008000000 Dyno Nobel Inc
MW-2A
MW-2B
MW-15S
MW-15D
MW-26S
MW-26D
MW-16S
MW-16D
MW-17S
MW-18S
MW-19S
MW-14S
MW-14D
MW-13S
MW-13D
MW-8
PE-DRN-SD-01
PE-DRN-SD-03
PE-DRN-SD-04
PE-DRN-SD-05
PE-DRN-SD-06
PE-SQT-04
PE-SQT-06
PE-SQT-07
SD-02
SG-1
Sampling Visit Samples A, D, C
200 100 0 200
Scale In Feet
Soil Sample Locations
Dyno Nobel Site
Port Ewen, New York
EHS Support consider it done
Figure 4-1b
Reviewed By: K. VanLandingham
Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
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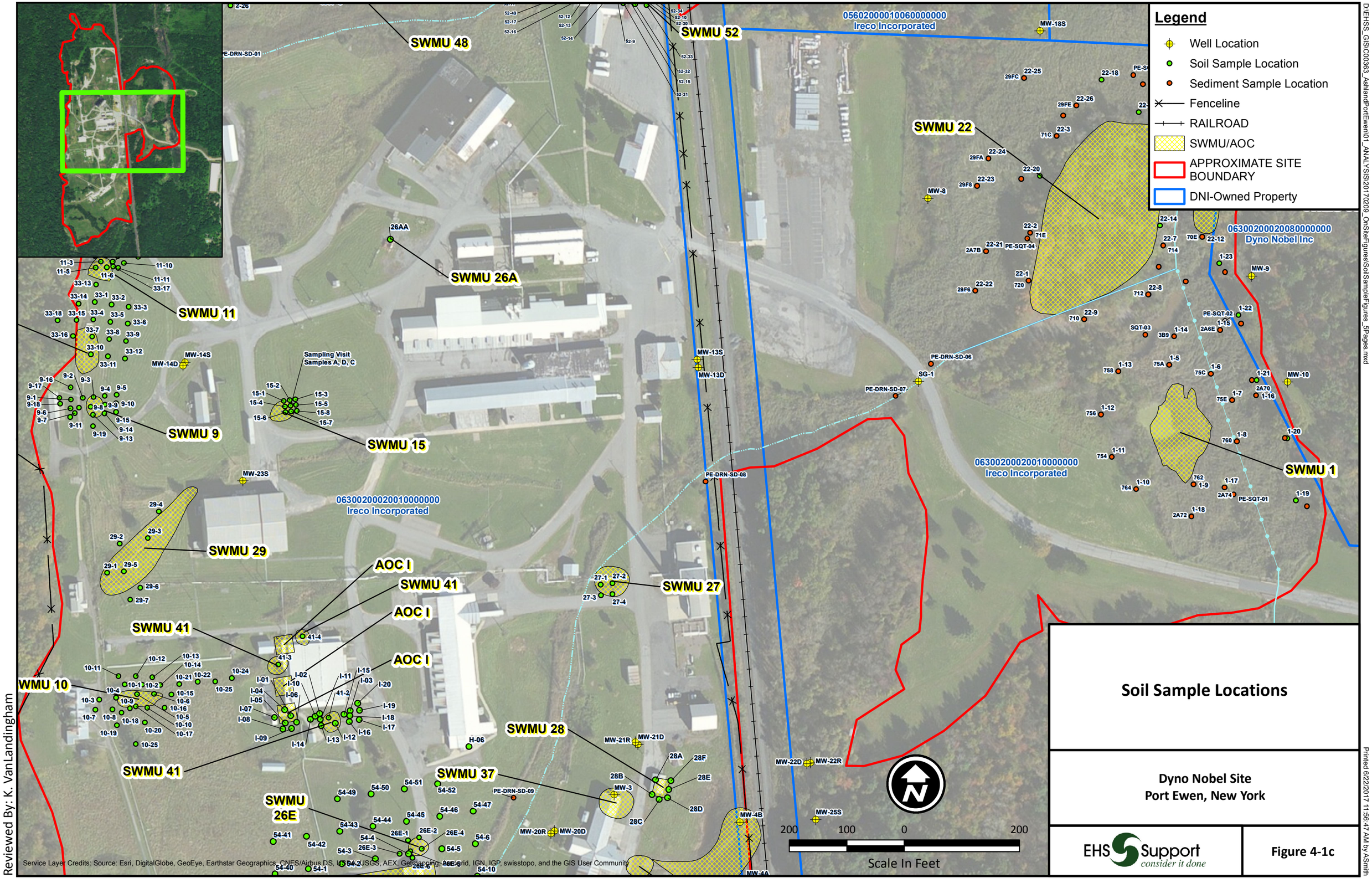

Soil Sample Locations

Dyno Nobel Site
Port Ewen, New York

EHS Support consider it done

Figure 4-1c

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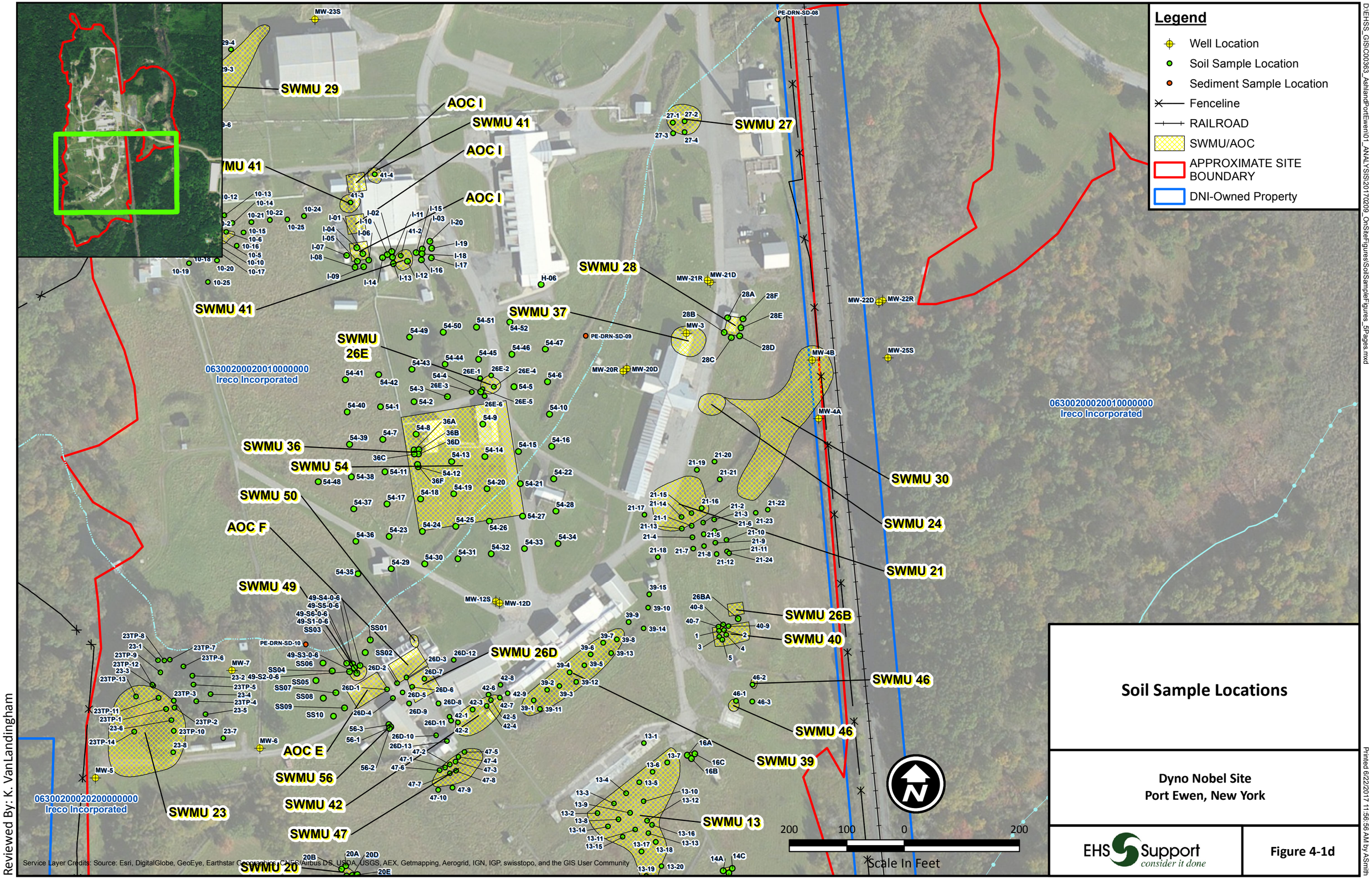

Soil Sample Locations

Dyno Nobel Site
Port Ewen, New York

EHS Support consider it done

Figure 4-1d

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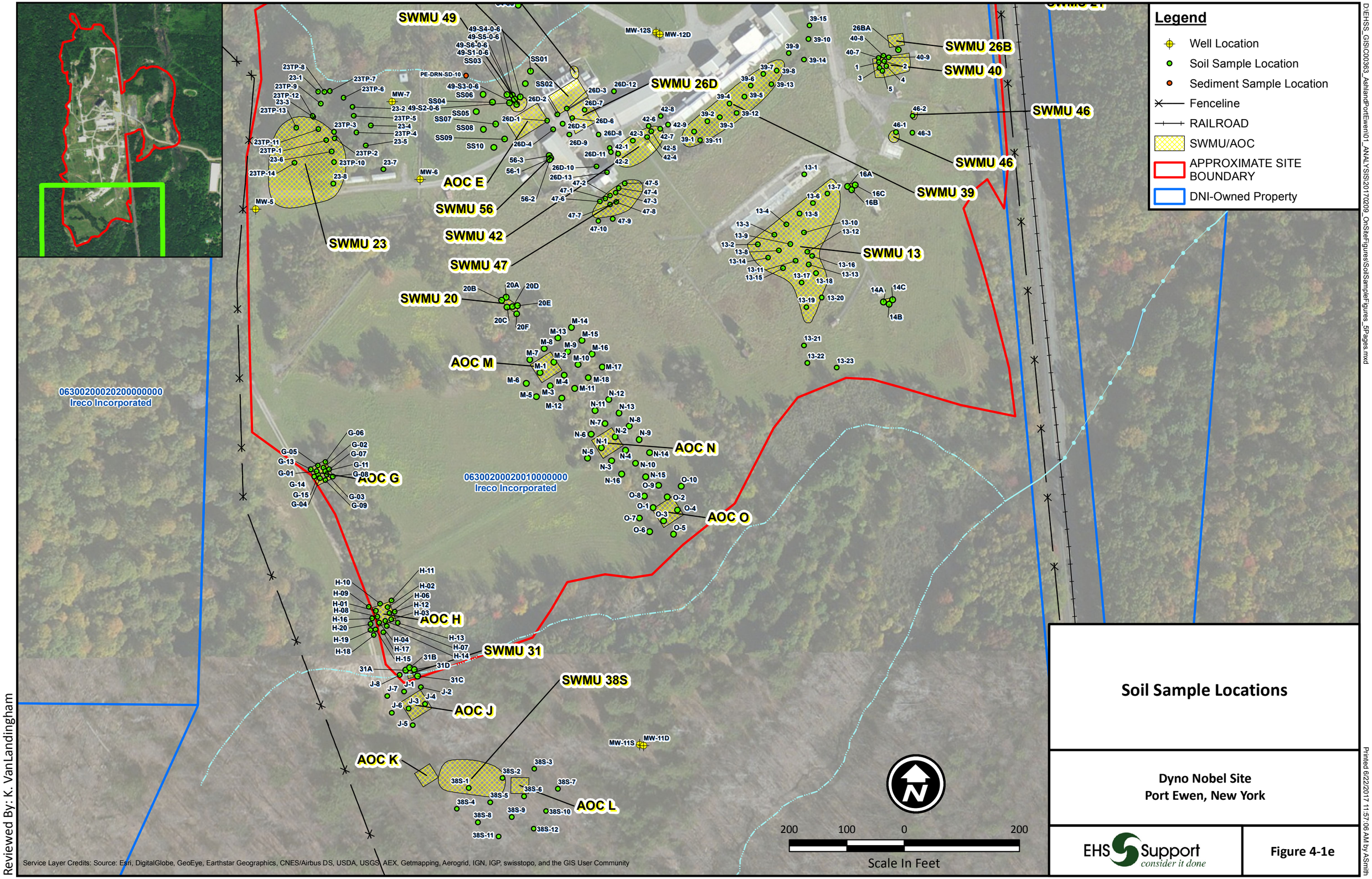

Reviewed By: K. VanLandingham

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Soil Sample Locations

Dyno Nobel Site
Port Ewen, New York

EHS Support consider it done

Figure 4-1e

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APPENDIX A

DYNO NOBEL MAP INVENTORY

Title	Date
Brewster Plant Map	08/10/16
Port Ewen Maps	04/15/29
Port Ewen Magazine	4/12/1921 Revised 4/16/1956
Location and Topographical Map of Operating Area	04/03/31
Port Ewen Wells	09/18/36
Location and Topographical Map Showing New Warehouse and Proposed New Shops with RR Changes	06/25/37
Port Ewen Topographical Map Portion of DWG 10125W Revised	07/14/37
Port Ewen Building Location Map Operating Area	06/02/39
Port Ewen Outside Water Lines	03/20/45
Lands of Hercules	06/01/40
Outside Electric Lines	04/07/42
Outside Steam Lines	04/07/42
Experimental Detonator Line Operating Area	04/27/42
Detail of Location	04/22/43
New Buildings and Facilities - Details of Outside Lines	08/31/43
New Buildgings and Facilities - Detail of New Water Line	09/14/43
Study for Control of Future Plant Expansion	10/09/43
Map Showing Mill Creek and Sewage Disposal Plant	12/07/43
Location Sketches for Projects Involving Necessity Certificates	12/15/43
Location Sketches for Projects Involving Necessity Certificates	12/16/43
Outside Electric Lines	06/13/46

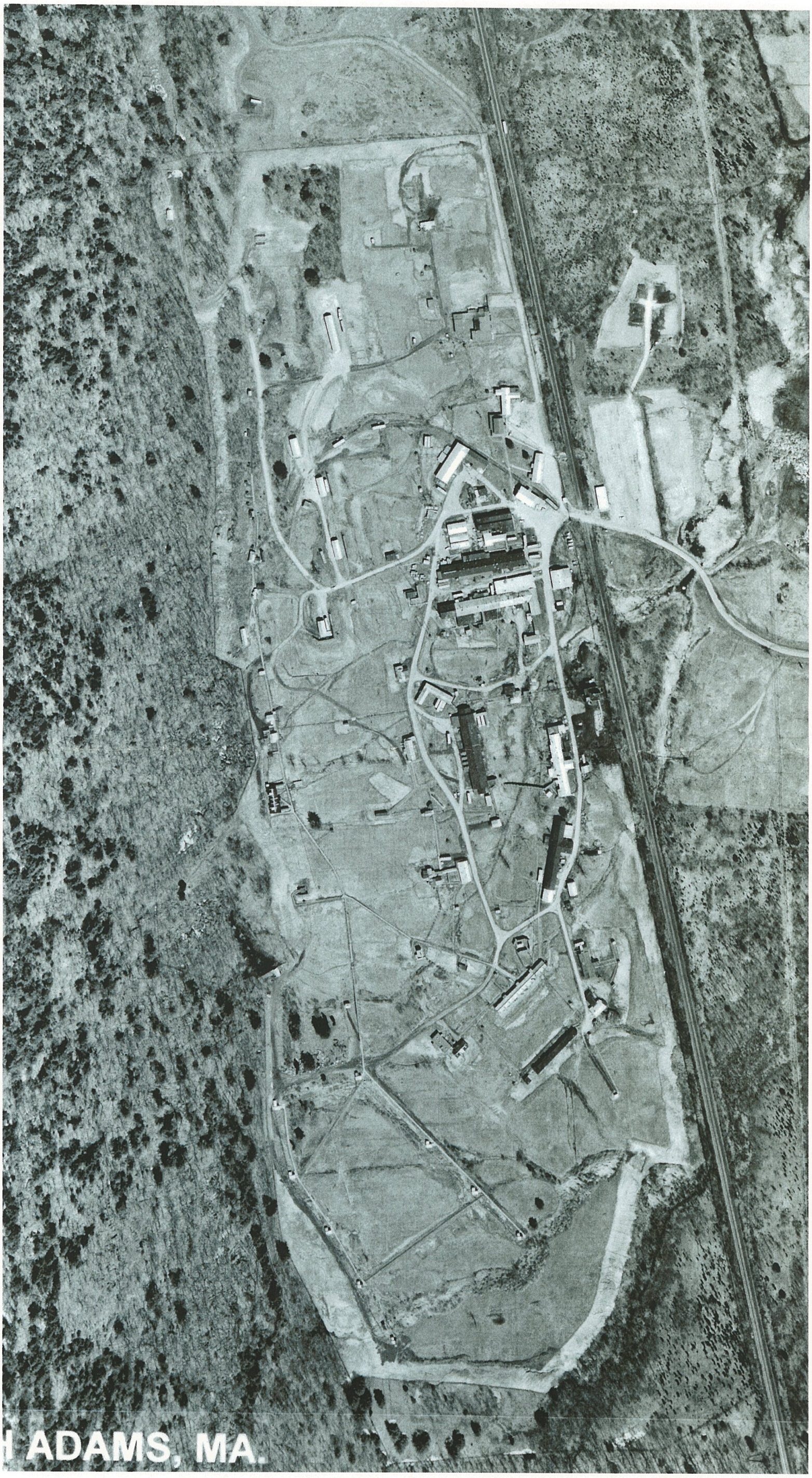
DYNO NOBEL MAP INVENTORY

Title	Date
Location Sketches for Projects Involving Necessity Certificates	02/13/45
General Plant Map	04/02/51
Outside Water Lines, Well Location Map	07/18/57
Property Map	04/22/85
Surface Discharge Points	1/20/76 Revised 11/14/1990
General Plant Map	07/01/91
Plant Outside Water Lines	11/05/91
Site Layout	12/01/93
Site Drainage Map	12/01/93
General Plant Map	1/19/94 Revised 8/4/75, 7/17/76, 9/76, 11/79, 8/24/78, 9/29/81, 8/10/82, 7/12/88, 11/14/90, 9/23/91, 11/5/91, 2/4/92, 10/21/92, 12/17/92, 9/21/93

APPENDIX B

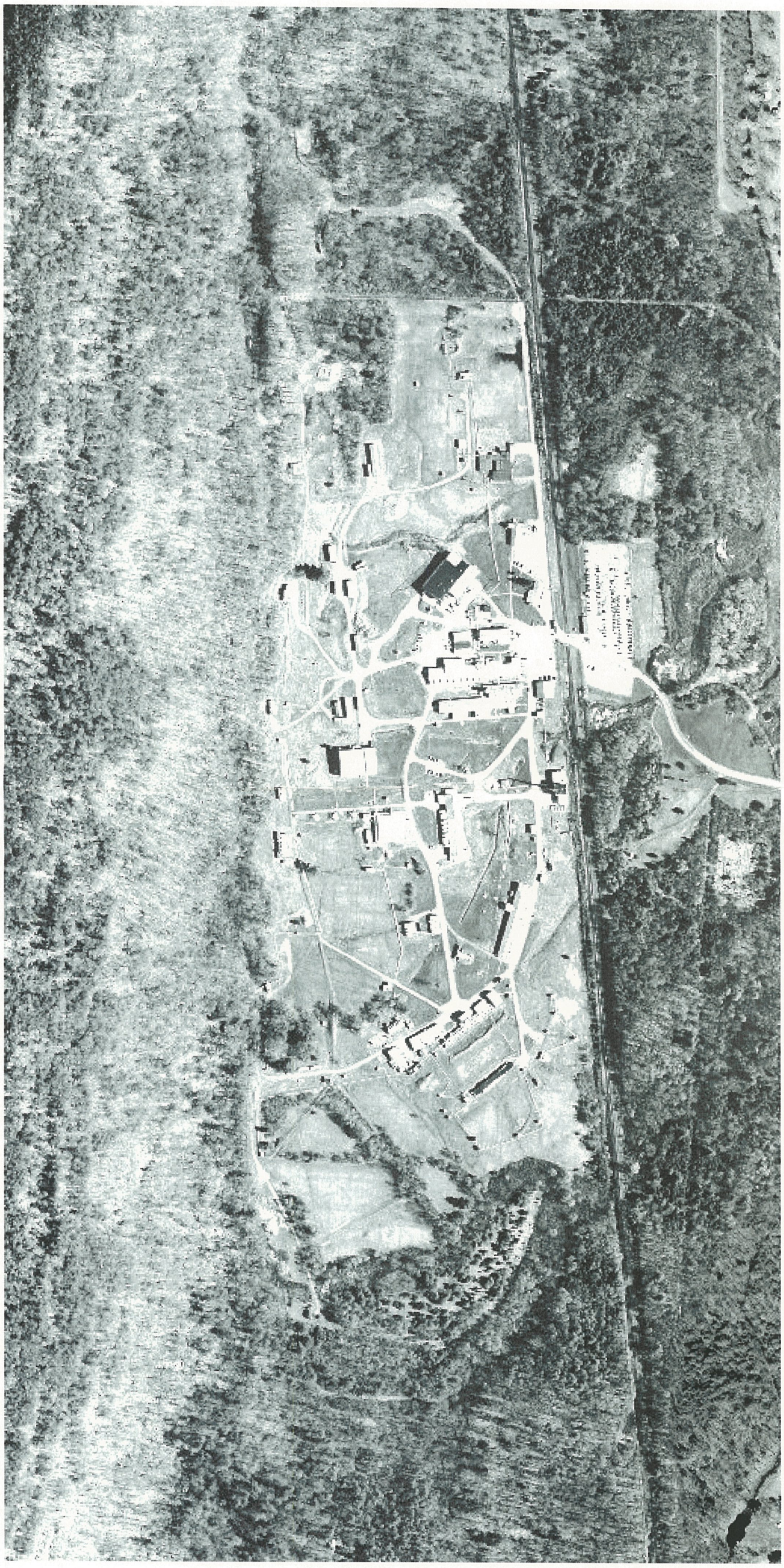
Dyno Nobel Port Ewen Facility, May 1, 1956

Dyno Nobel Port Ewen Facility, April 21, 1962



Dyno Nobel Port Ewen Facility, April, 1971

Dyno Nobel Port Ewen Facility, April 20, 1994



Dyno Nobel Port Ewen Facility, 2001

APPENDIX C

23774.006

Figure 4-1
Timeline
1916-1930

Legend:

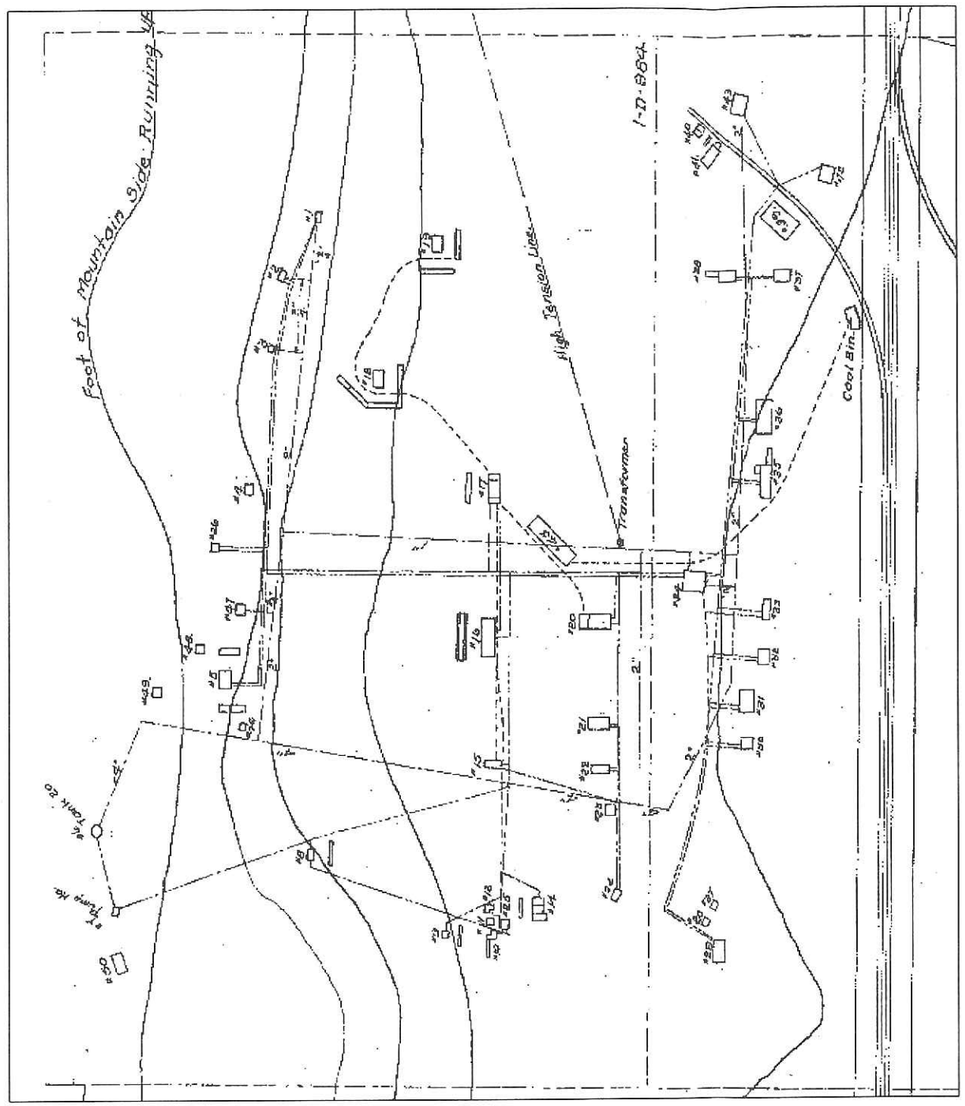
Map Legend

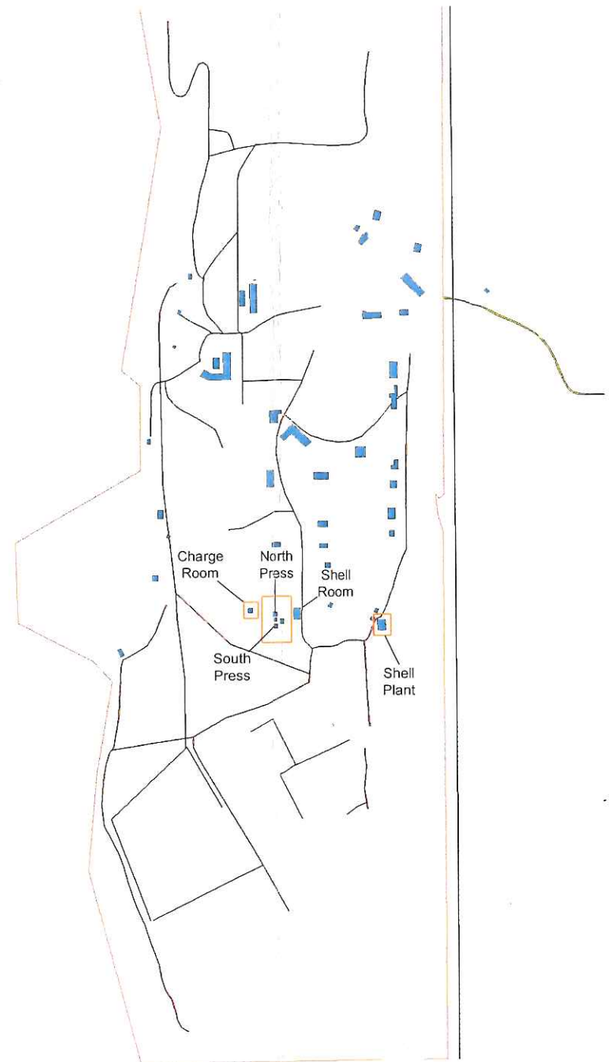
- Constructed
- Demolished
- Pre-Existing

Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL





SITE DEVELOPMENT CA 1916

1900 1910 1920 1930

Brewster Exp. Co. 1912-1915	Aetna Exp. Co. 1915-1920	Hercules Powder Company 1921- 1985

	Press Bldg #59 11/21	Press Bldg #59 12/22		Charging Room 2/24			Shell Plant, Bldg. #68 11/27		

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23774.006

Figure 4-2
Timeline
1930-1940

Legend:

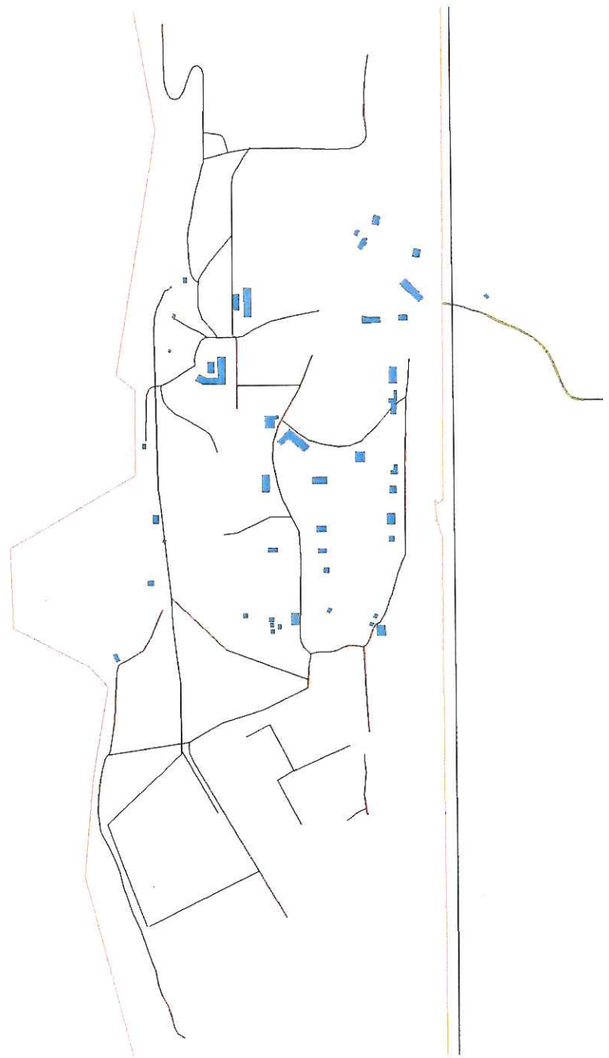
Map Legend

- Constructed
- Demolished
- Pre-Existing

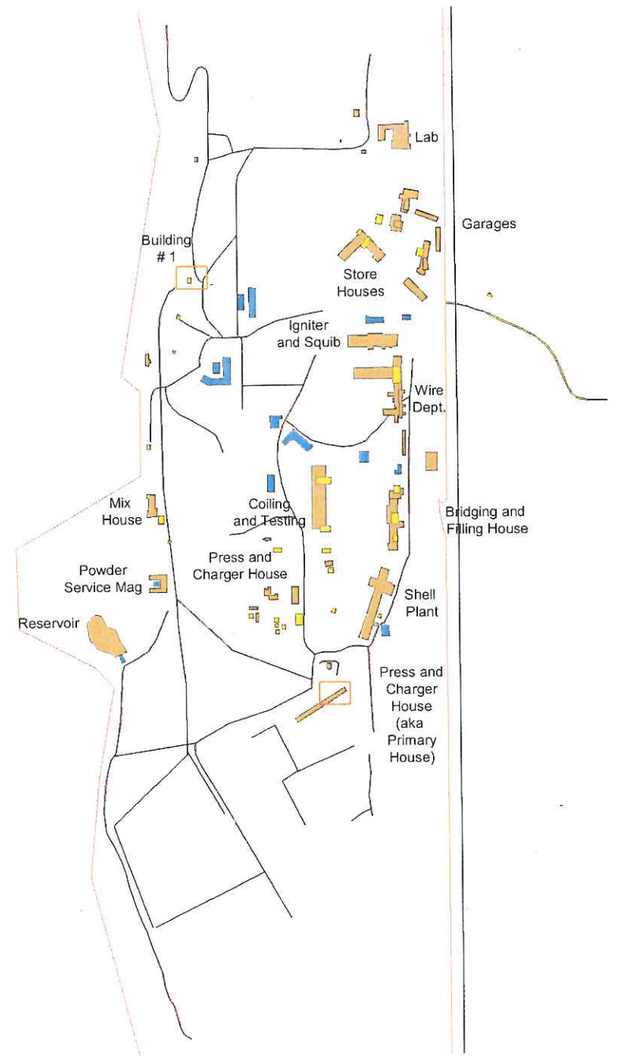
Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL



SITE DEVELOPMENT CA 1916



SITE DEVELOPMENT CA 1939

1930 — 1940

Hercules Powder Company 1921- 1985

				Primary House Bldg. #24 Nov-'34					Building #1 6/39

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23774.006

Figure 4-3
Timeline
1940-1950

Legend:

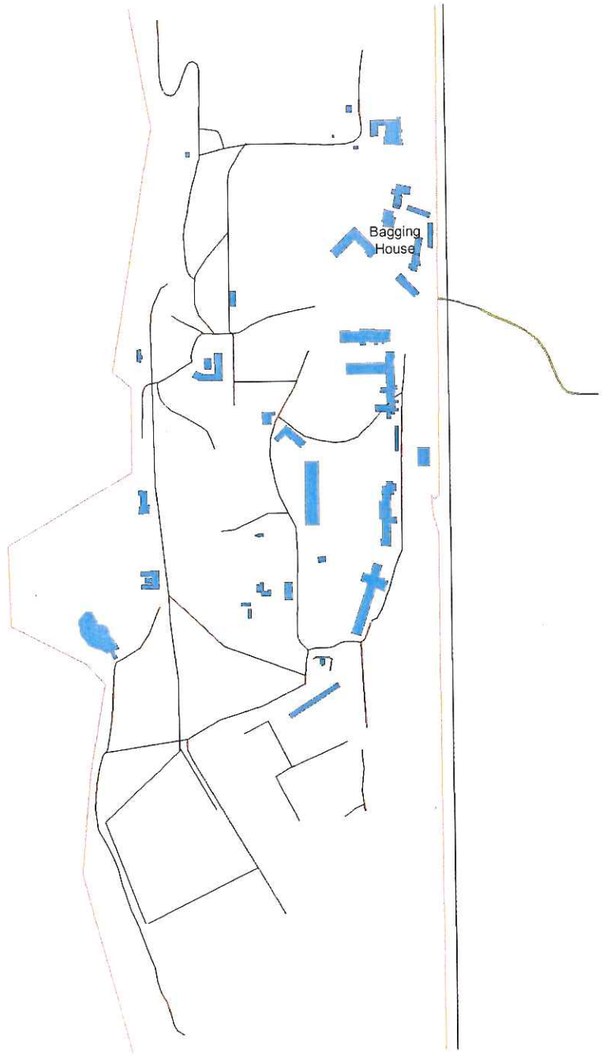
Map Legend

- Constructed
- Demolished
- Pre-Existing

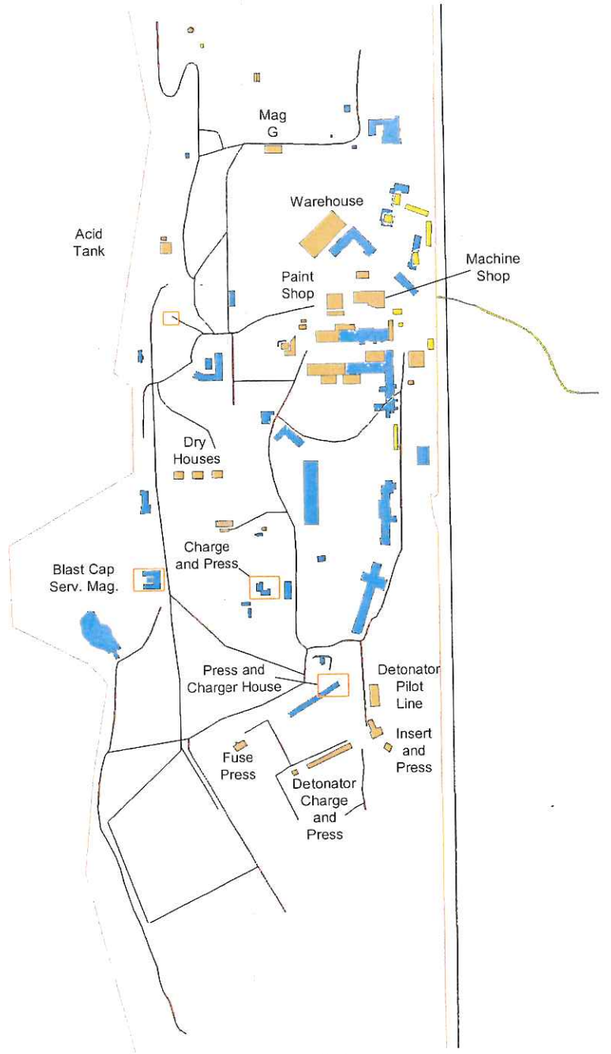
Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL



SITE DEVELOPMENT CA 1939



SITE DEVELOPMENT CA 1945

1940 — 1950

Hercules Powder Company 1921-1985

		Press & Chrgr., and Bagging Bldgs. #2 & #24 10/42,11/42					Press & Charger House Bldg. #24 7/48	Pwdr Svc. Mag. Bldg. #8 8/48	Charge & Press Bldg. #59 11/48	

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Figure 4-4
Timeline
1950-1960

23774.006

Legend:

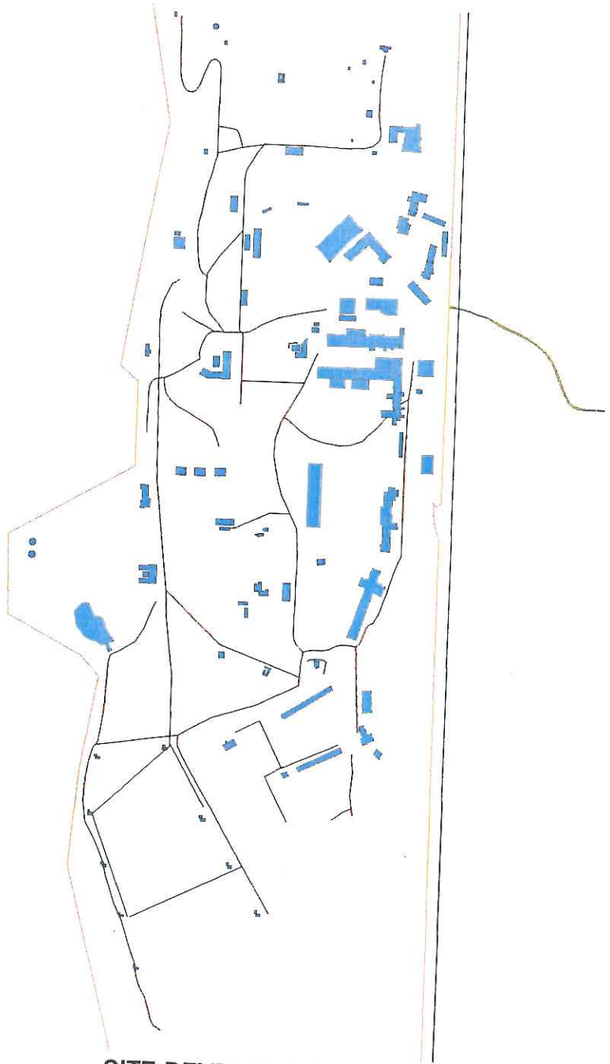
Map Legend

- Constructed
- Demolished
- Pre-Existing

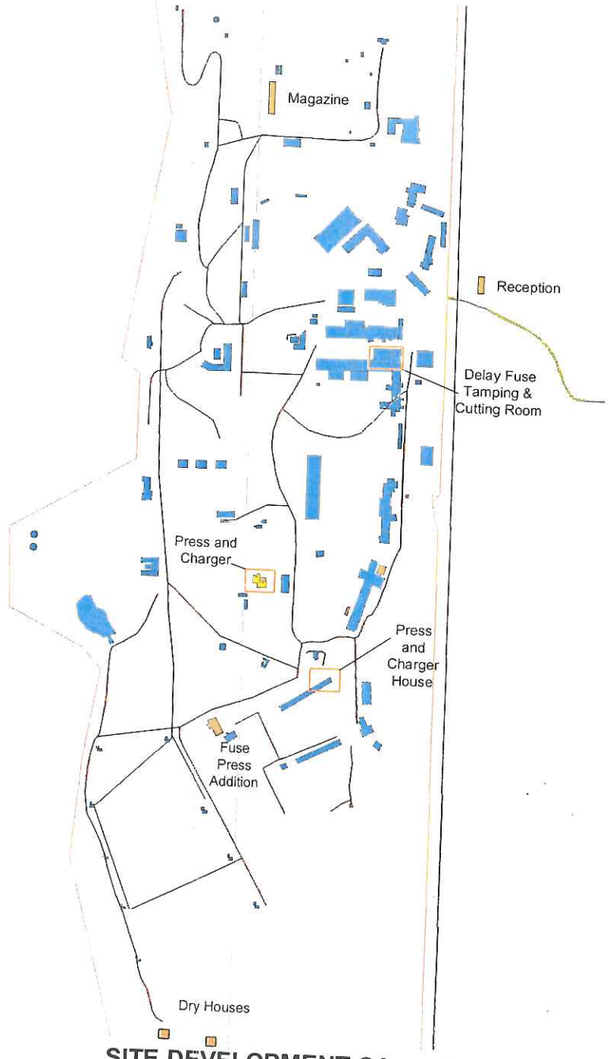
Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL



SITE DEVELOPMENT CA 1945



SITE DEVELOPMENT CA 1957

1950 — 1960

Hercules Powder Company 1921- 1985

Press & Charger House Bldg. #59 8/50	Press & Charger House Bldg. #59 10/51			Exp. Drying Room Bldg. #97-B 1/54	Press & Chrgr Bldg. #24 5/55	Delay Fuse Tamping & Cutting Room- Bldg. #78-A 3/56			Experimental Bldg. #11 1/59

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Figure 4-5
Timeline
1960-1970

Legend:

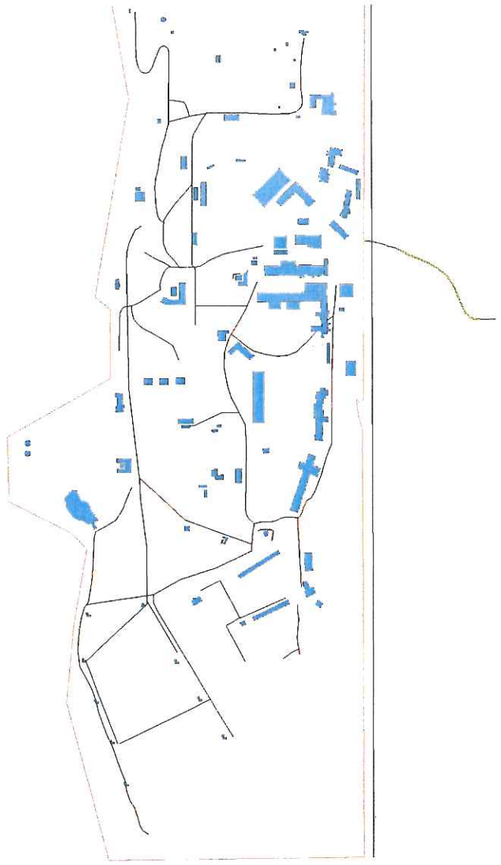
Map Legend

- Constructed
- Demolished
- Pre-Existing

Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

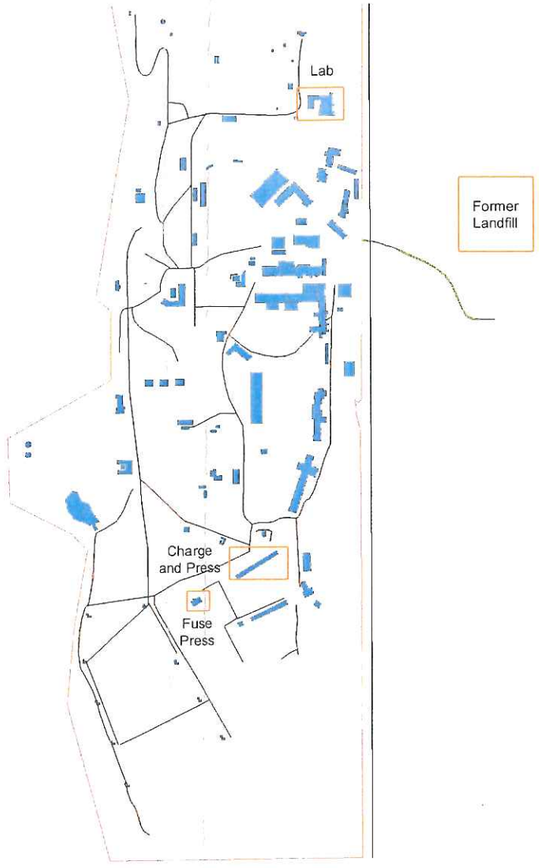
BROWN AND CALDWELL



SITE DEVELOPMENT CA 1960

ANFO Area North of Fence Line

23774.006



SITE DEVELOPMENT CA 1970

1960 — 1970

Hercules Powder Company 1921-- 1985

- Charge & Press Bldgs. #24 & #80-2 9/61
- Lab Bldg. #8111 4/64; Chrg. Press Bldg. #2009 5/64
- Charge & Press Bldg. #2009 8/66
- Charge & Press Bldg. #2009 1/67
- Fuse Press Bldg. #2058 11/68
- Plant Waste Burning Grounds 7/69
- Add. to Svc. Mag. Bldg. #204 3/61
- Chgs in Bldgs. #36F,78,207,20,204, 14B, & Paint Shop 7/61
- Add. to Hercules Powder Co. 12/61
- Add. to Hercules Powder Co. 7/62
- Add. to Bldg. #20 9/62
- Demo a Bldg. (type unknown) 4/67
- Construct Add. to Bldg. #78 6/68; Alter Bldg. (Unknown) 11/68
- Repairs to Storage Shed 12/69

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Figure 4-6
Timeline
1970-1980

Legend:

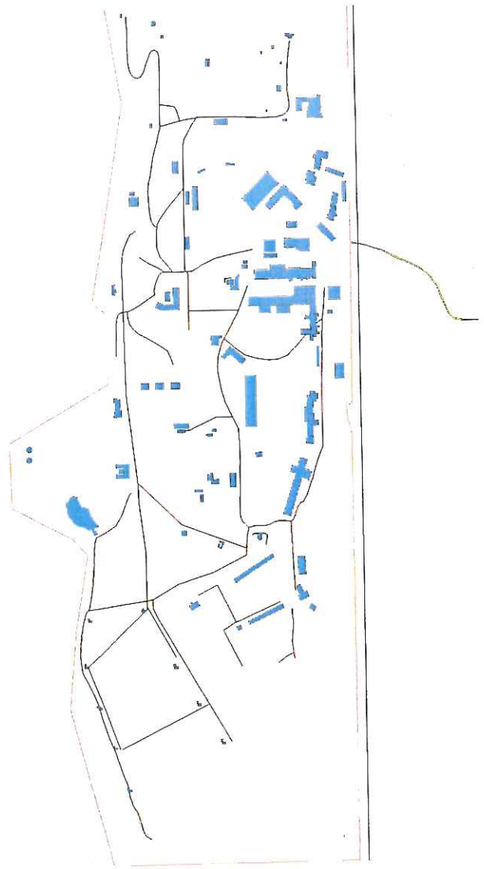
Map Legend

- Constructed
- Demolished
- Pre-Existing

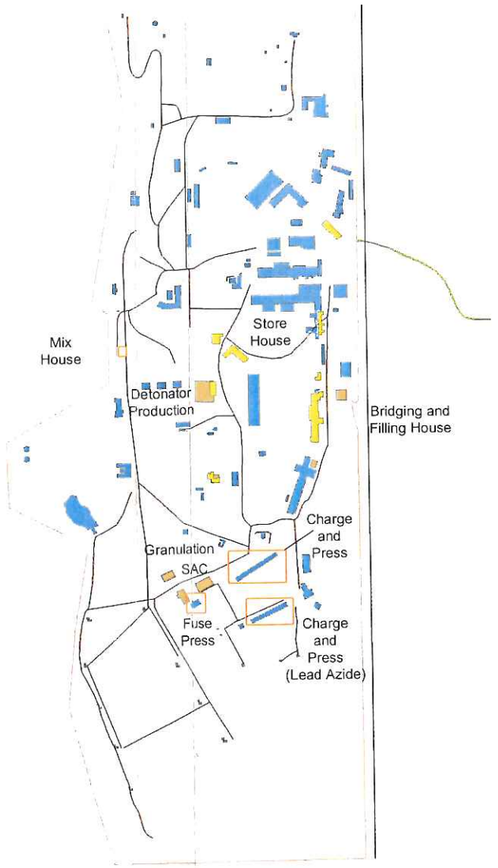
Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL



SITE DEVELOPMENT CA 1970



SITE DEVELOPMENT CA 1980

1970 — 1980

Hercules Powder Company 1921- 1985

Lead Azide Press Bldg. #3011 7/70, 8/70	Lead Azide Press Shot Bldg. #3011 4/71	#3 Press Shot Bldg. #2009 6/71			Charge & Press Bldg. #2009 7/74, 11/74			Charge & Press Bldg. #2009 3/77, 11/77	Shot-Lead Azide Bldg. #3001 1/79
Erect bldg. (Unknown) 8/70			Build Warehouse, Erect 3 Powder Drying Units 9/74		Construct Prod. Bldg. 2/75	Demo Warehouse 7/75			

Shot- MK96 Assembly 4/78 | Mix House Bldg. #2038 5/78 | Lead Azide Bldg. #3001 7/78 | Shot- MK96 Assembly 12/78

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Figure 4-7
Timeline
1980-1990

Legend:

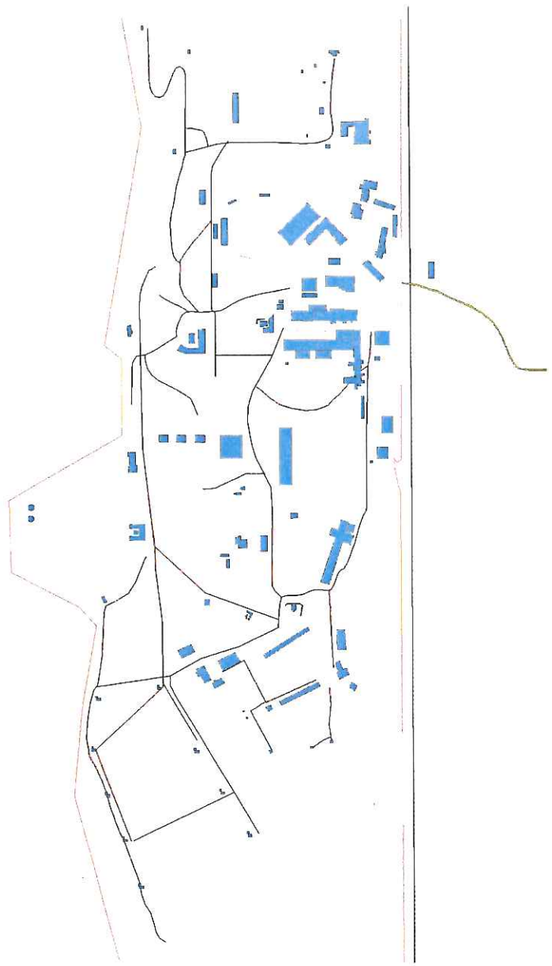
Map Legend

- Constructed
- Demolished
- Pre-Existing

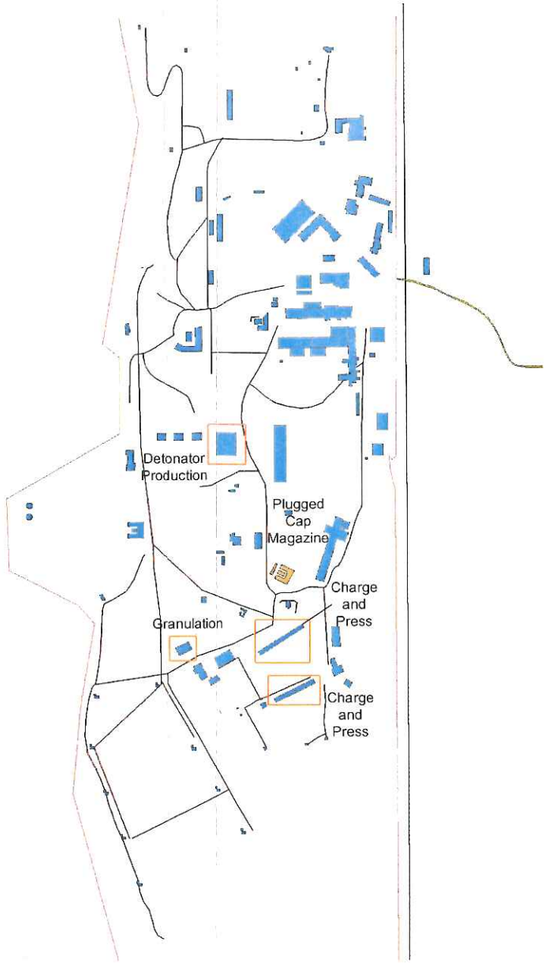
Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL



SITE DEVELOPMENT CA 1980



SITE DEVELOPMENT CA 1990

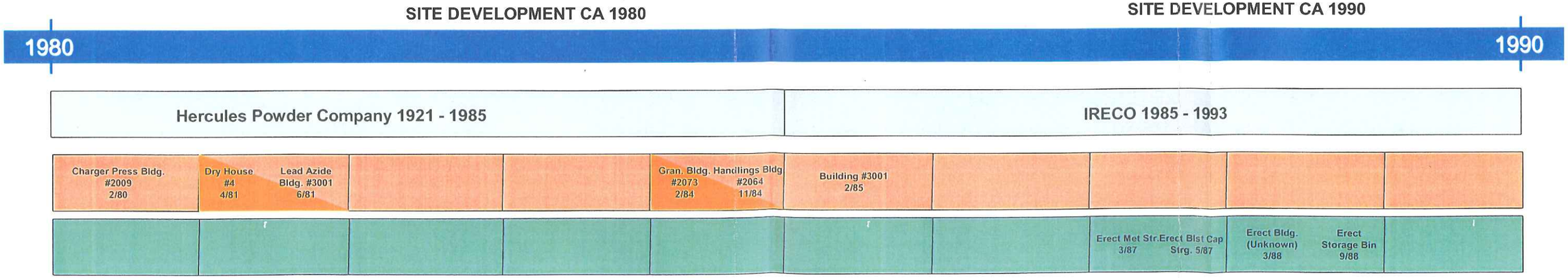


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Figure 4-8
Timeline
1990-1995

23774.006

Legend:

Map Legend

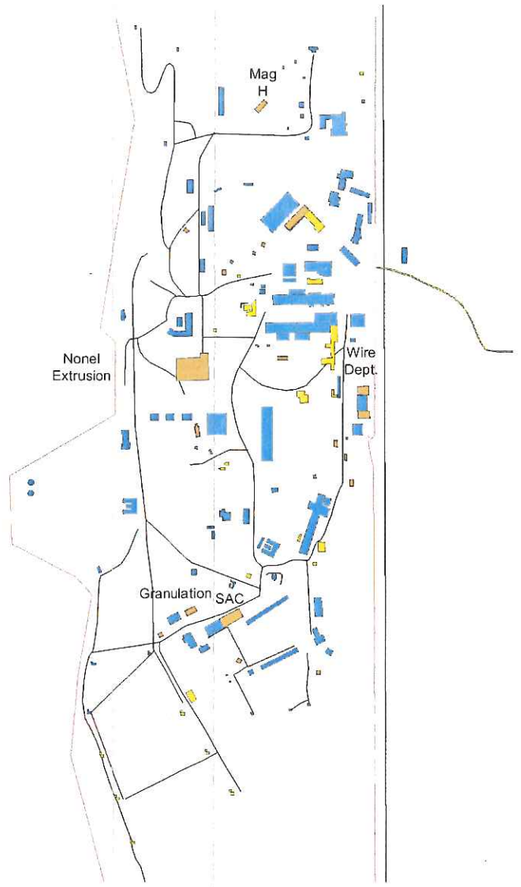
- Constructed
- Demolished
- Pre-Existing

Timeline Legend

- Ownership
- Accidents (box indicates location)
- Fires
- Bldg/Demo Permits

BROWN AND CALDWELL

SITE DEVELOPMENT CA 1990



SITE DEVELOPMENT CA 1994

1990 — 1995

IRECO 1985 - 1993

Dyno Nobel 1993 - 2003

Erect Bldg. 6/91
Combine 2 Motor Rms. 7/91
Erect Gran. Bldg. 10/91
Renovate Pwdr Mix Bldg. 10/91
Expand Bldg. #2026 8/92
Convert Bldg. #9206 8/92
Erect bldg. to house sand filter 9/92
Erect Add. to Bldg. #3001 12/92
Erect Bldg. (Type Unknown) 3/94
Erect Add. to Bldg. #2009 3/94
Erect Ext. to Bldg. #2026 8/94
Demo Mfg. Bldgs. #2059, #2062 9/94
Demo Storage at Bldgs. #2015, #8205 5/92
Demo Bldgs. #9300, #8102 5/92
Demo Bldgs. #9210, #2051 7/92
Demo Bldg. #9215 1/93
Erect Utility Bldg. 8/93
Replace bldg. #2042. 12/93

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Figure 4-9
Timeline
1995-2003

Legend:

Map Legend

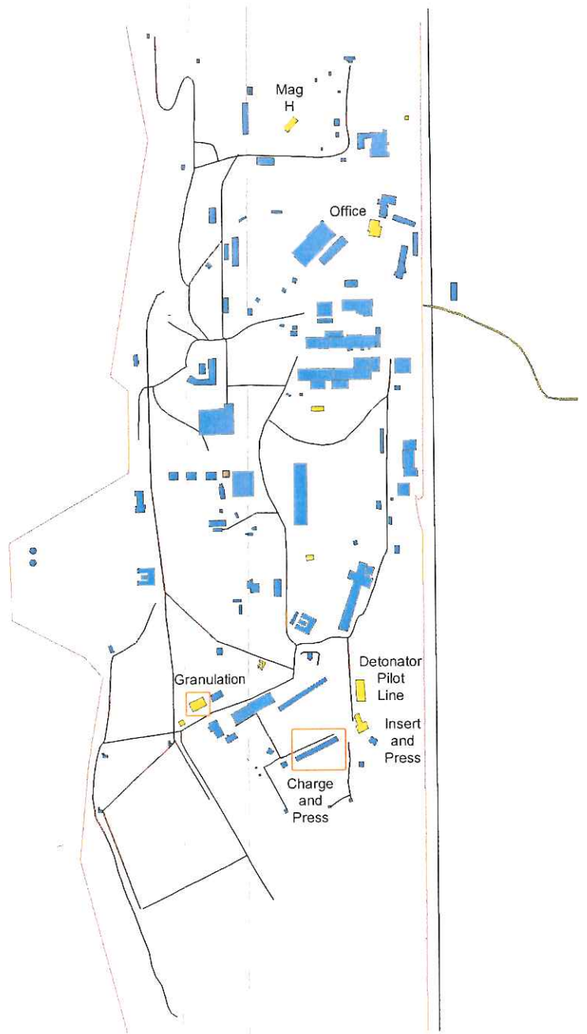
- Constructed
- Demolished
- Pre-Existing

Timeline Legend

- **Ownership**
- **Accidents** (box indicates location)
- **Fires**
- **Bldg/Demo Permits**

BROWN AND CALDWELL

SITE DEVELOPMENT CA 1994



SITE DEVELOPMENT CA 2000

1995 — 2000

Dyno Nobel
1993 - 2003

Granulation Building 7/95	Charge & Press Building 9/96				
Demo Bldg. #2073 8/95	Erect Bldg. 3/96	Renovate Mixing Hse 8/96	Replace Wall/Roof #2009 11/96	Erect Add. To Shell Plant 11/96	Erect Building to House Granulator 7/97

Erect Add. to Bldg. #2033 2/98	Erect Add. to Bldg. #2040 5/98	Erect Storage Area 12/98	Addition of Third Loading Dock 4/99	

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Figure 4-10
Historical Site Summary Map

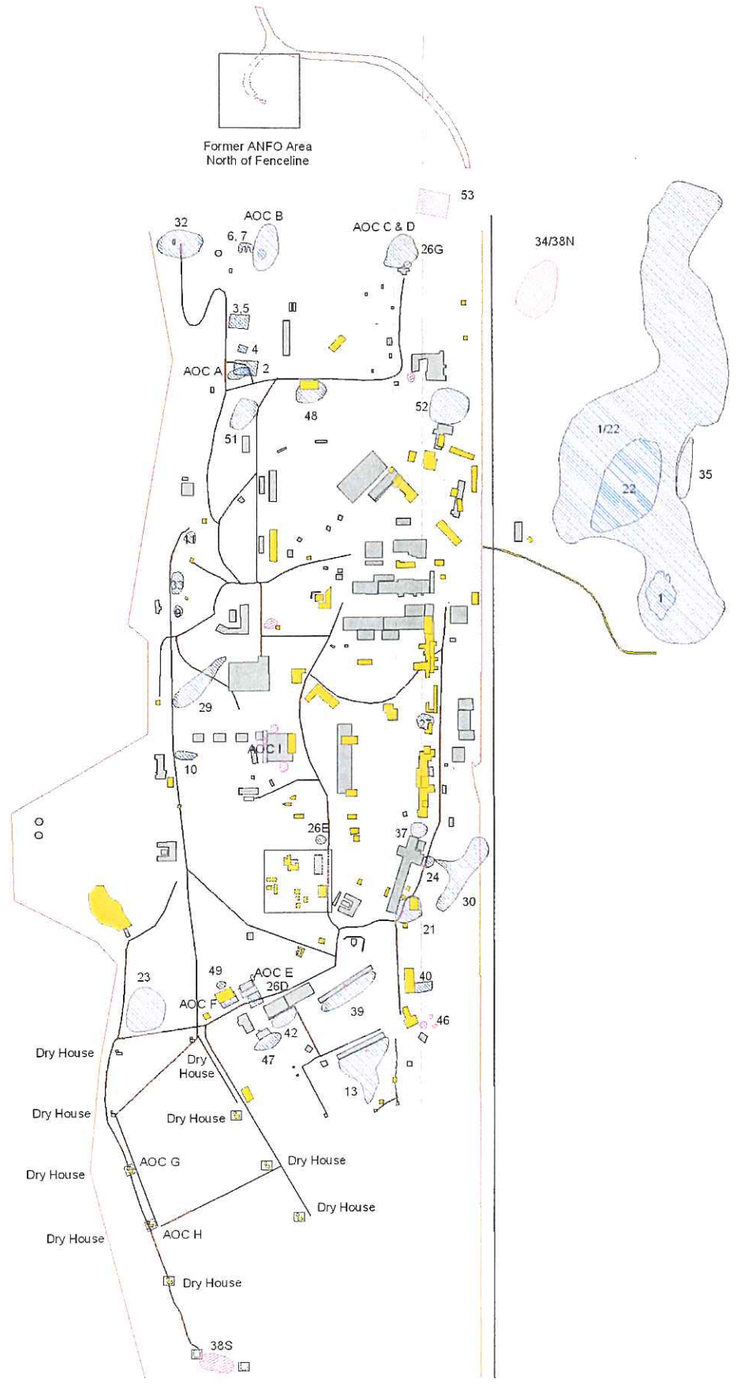
LEGEND

- SWMU/AOC Locations
- SWMU/AOC Locations (NFA)
- Existing Structures
- Historical Structures
- Potential Area of Interest

BROWN AND CALDWELL

SWMU No.	SWMU Name
1	Shooting Pond
2	Burning Cage/Incinerator
3	Copper Wire Burning Area
4	Iron Wire Burning Area
5	Wire Burning Area III
6-7	Open Burning Pads
8	Former Burning Area
9	Waste Powder Catch Basins - Building 2037
10	Waste Powder Catch Basins - Building 2048
11	Waste Powder Catch Basins - Building 2049
13	Former Waste Powder Catch Basins – Lead Azide Building
21	Lead Recycling Unit Area
22	Former Landfill
23	Former Dump
24	Former Wastewater Treatment Facility
26D,E & G	Burnable Waste Satellite Accumulation Areas (3 locations)
29	Drainage ditch (Downgrade of Building 2049)
30	Drainage ditch (Downgrade of Building 2036)
32	Old Dump (near water tower)
33	Mercury Fulminate Tanks Area
35	Stone Fence Dump
37	Former Shell Plant Drum Storage Area
39	Former Wastewater Discharge Area – Building 2009
40	Pilot Line Condensate Collection Sump
42	SAC Building Steam Collection Containers
46	Vacuum Line Condensate Collection Sump – Building 2059
47	Building 2058 Fuse Room
48	Mercury Fulminate Area
49	Building 2073 Sump
50	Building 2075 Sump
51	Construction Stockpiles
52	Former Commercial Lab Shooting Area
53	Package Test Burn Area

AOC	AOC Name		
A	Kerosene Tank Leak	F	Burn Waste Sat. Acc Area
B	Open Burning Pads Area	G	Former Drying House
C	Open Detonation Pit	H	Former Drying House
D	Detonation Test Building	I	Deto Products Building
E	Former Building 2073		



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