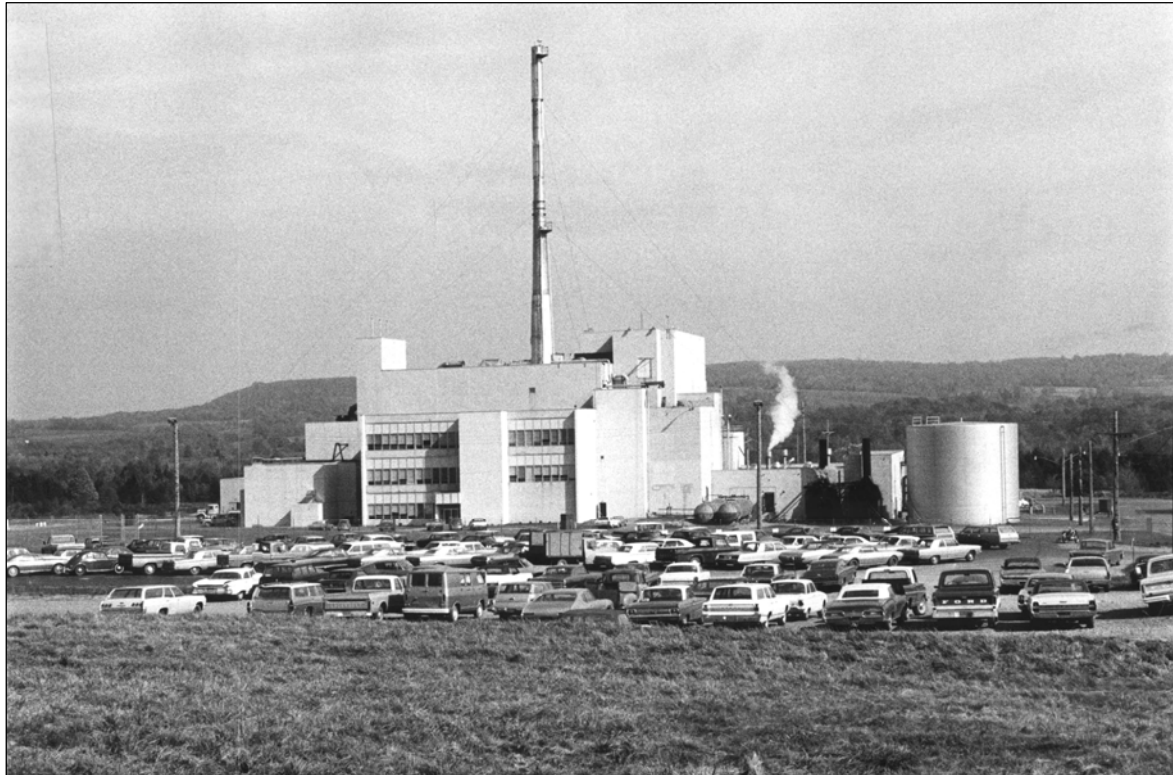


WEST VALLEY DEMONSTRATION PROJECT

CATTARAUGUS COUNTY, NEW YORK

GIS-Based Historical Photographic Analysis



By
The US Army Geospatial Center (AGC)
Warfighter Geospatial Support & Production Directorate
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October 2009 Final Report

Prepared for :
The US Department of Energy,
West Valley Demonstration Project, New York

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PROJECT Cattaraugus County, New York*

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NOTICE AND INTRODUCTION

NOTICE

The views, opinions, and conclusions in this report are those of the author and should not be construed as official Department of Army positions or policy unless so designated by other documentation.

INTRODUCTION

This report presents the results of a GIS-based Historical Photographic Analysis of the West Valley Demonstration Project

The Hydrologic and Environmental Analysis Branch, Warfighter Geospatial Support & Production Directorate, of the U.S. Army Geospatial Center (AGC) was tasked to research, inventory, and catalog available historical imagery, maps, and other data for the West Valley Demonstration Project (WVDP) and to analyze historical photographic records relative to the WDP area to identify potential areas of concern related to activities around the site since its development. The area of the WVDP site covered in this report is approximately 165 acres in size and is located in Cattaraugus County, New York

Significant features, derived through photo analysis, are displayed on selected photos in this hard copy report. The accompanying GIS, supplied on DVD, has additional information useful in locating identified features and defining their extent.

Some of the identified features can be “benign” as it is not always possible to determine the activity that altered the surface. Future field work and additional ancillary information will further determine the relevance of these features.

This analysis was completed for the U.S. Department of Energy, West Valley Demonstration Project, New York.

ACRONYMS

*WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York*

ADMIN	ADMINISTRATION
AGC	ARMY GEOSPATIAL CENTER
AOI	AREA OF INTEREST
BLDG	BUILDING
CDDL	CONSTRUCTION AND DEMOLITION DEBRIS LANDFILL
CWM	CHEMICAL WASTE MANAGEMENT
DEC	NY STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DEIS	DRAFT ENVIRONMENTAL IMPACT STATEMENT
DOE	DEPARTMENT OF ENERGY
DOQ	DIGITAL ORTHO QUADRANGLE
DRG	DIGITAL RASTER GRAPHIC
DVD	DIGITAL VERSATILE DISC OR DIGITAL VIDEO DISC
EIS	ENVIRONMENTAL IMPACT STATEMENT
GIS	GEOGRAPHIC INFORMATION SYSTEM
MED	MANHATTAN ENGINEER DISTRICT
NAD	NORTH AMERICAN DATUM
NARA	NATIONAL ARCHIVES & RECORDS ADMINISTRATION
NDA	NRC-LICENSED DISPOSAL AREA
NEPA	NATIONAL ENVIRONMENTAL POLICY ACT
NFS	NUCLEAR FUEL SERVICES, INC.
NRC	U.S. NUCLEAR REGULATORY COMMISSION
NYSDEC	NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NYSERDA	NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
SDA	STATE-LICENSED DISPOSAL AREA
TEC	TOPOGRAPHIC ENGINEERING CENTER
UTM	UNIVERSAL TRANSVERSE MERCATOR
WGS	WORLD GEODETIC SYSTEM
WMA	WASTE MANAGEMENT AREA
WNYNSC	WESTERN NEW YORK NUCLEAR SERVICE CENTER
WVDP	WEST VALLEY DEMONSTRATION PROJECT

METHODOLOGY

METHODOLOGY

Photographic analysis of historical aerial photography, both vertical and oblique, was the primary method of identifying man-made and natural occurring features in the West Valley Demonstration Project (WVDP).

The analysis in this report is primarily based upon interpretation of black and white and color aerial photography over the project area for the period 1958 to 2007. Stereo viewing was employed where overlapping photographs permitted its use. A list of aerial photography used by AGC appears on the Photographic Source slide.

Both single-optical and stereoscopic viewing, at various magnifications, were performed on AGC's collection of historical aerial photographs. Visible signatures such as size, scale, shape, shadow, tone, texture, and pattern allow features to be recognized on the aerial photography.

Stereo-paired images viewed through a stereoscopic microscope allows for a three-dimensional view of the terrain.



Sample of aerial photographs examined.

GEOREFERENCED DATA

Geodetic Control was applied to the aerial photography using 2007 New York State GIS data (<http://www.nysgis.state.ny.us/gateway/mg/>). This georeferenced image file is placed on DVD for quick and easy access. A "world file", or .tfw file, is associated with each .tif image file included in the DVD. The .tfw file contains the coordinate information of the upper left (x,y) pixel and the pixel size (in feet). This .tfw file must be placed in the same directory as the .tif image file before viewing in any Geographic Information System (GIS) software.

The 2007 orthophoto was used for the horizontal control for the historical photos. Also, selected rectified images were created to support mapping and analysis for various years. ERDAS 9.2 software was used to geo-reference these selected historical photos to the 2007 photomap of the site. ESRI's ArcGIS 9.3 software was used to digitize and create vector layers for the historical years. The data can be shown in a Geographic Information System (GIS) such as ArcMAP. Digital analysis is presented using ArcGIS shape files. Shape files, digital orthophotos and the report are on a DVD. Microsoft PowerPoint 2003 was used to create this report.

Significant features, derived through photo analysis, are displayed on selected photos in this study. All GIS image and vector data are projected in a State Plane coordinate system, New York West, FIPS Zone 3103 ; Spheroid: GRS 1980; Datum: NAD83, Units: feet.

GLOSSARY

*WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York*

BERM: Man-made ridge or embankment, constructed of natural or man-made materials.

BUILDING/STRUCTURES: Relatively permanent, usually box-like and roofed, man-made structure.

CLEARED AREA: An area from which man has removed trees, shrubs or other natural vegetation cover.

CIRCLE FEATURE: A circular shaped ground scar, varying in size and shape that does not appear to be natural. No depth is apparent for these features; however, they may be associated with areas used to dispose of unwanted material.

DEBRIS: The scattered remains of anything broken or destroyed.

DEPRESSION: An area sunken below the surrounding surface.

DISTURBED GROUND: Rough ground surface that has been cleared, overturned, dug up, filled and/or changed from the surrounding area.

DITCH: A long narrow trench or furrow dug in the ground, as for drainage or irrigation.

EXCAVATION: A cavity in the earth formed by digging or scooping out material (e.g. to facilitate construction).

FENCE: A structure serving as an enclosure, a barrier, or a boundary, usually made of posts or stakes joined together by boards, wire, or rails.

GRADED AREA: Area where the ground surface has been shaped, usually leveled to a smooth horizontal or sloping surface.

GROUND SCAR(S): Ground surface, vegetated or not, where marks from a previous activity or feature, or from a subterranean feature, are visible. Ground scars can result from many things and therefore vary greatly in

appearance (e.g. septic drain fields, archaeological features, buried waste disposal pits, filled trenches, etc)

INTERCEPTOR: Trench, catchment basin, or treatment system installed to intercept potentially contaminated groundwater.

LAG: Spent fuel

LINEAR FEATURE: General classification based on tonal quality of feature, caused by man-made or natural occurrences, such as buried (filled in or closed) trenches, vehicle/tank tracks, or geologic conditions.

MOUNDED MATERIALS: Material that has been placed in piles or mounds.

ORTHOPHOTO: Continuous-tone image created from aerial photographs with geometric distortions and relief displacements removed. Depicts terrain features in their true geographic position. This image can also be referred to as a photomap.

OTHER: Descriptions are noted in the remarks section of the GIS file.

OUTSIDE STORAGE AREA: An open-air, outdoor area for storage of materials, supplies, vehicles and/or equipment; may or may not be enclosed by a fence.

PIT: Relatively deep, steep sided hole in the ground surface.

POND/LAGOON: A containment area, man-made or naturally occurring, that appears to be used for waste and/or water storage, disposal, or treatment.

RADWASTE: Radioactive waste, a term used to refer to waste which contains radioactive materials.

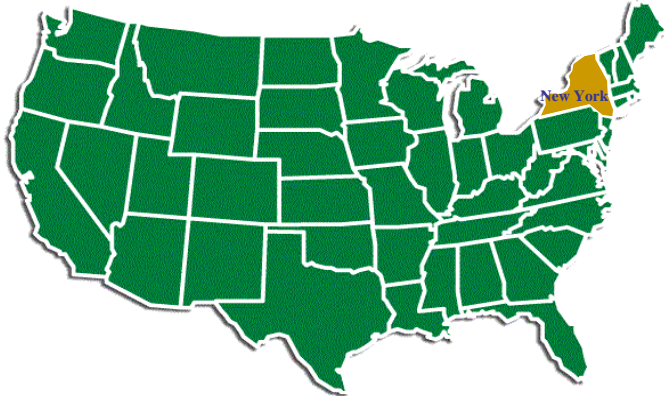
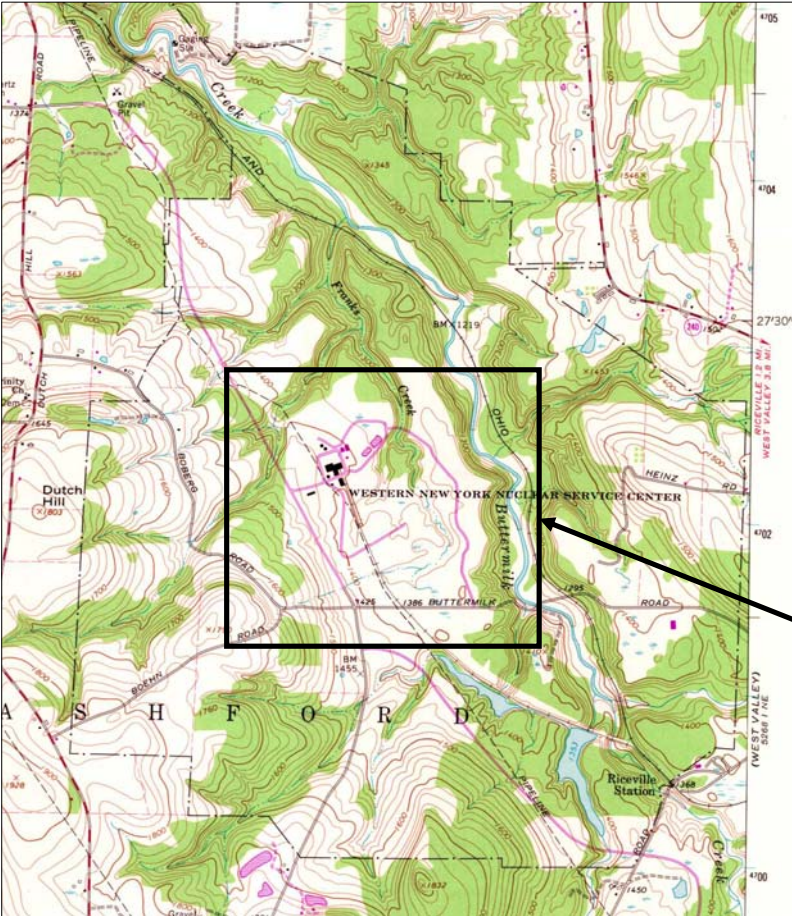
TOWER: Elevated structure, such as a water tank, storage tank, guard tower, or observation tower.

TRENCH: An excavation, often elongated and linear, having steep-sided walls.

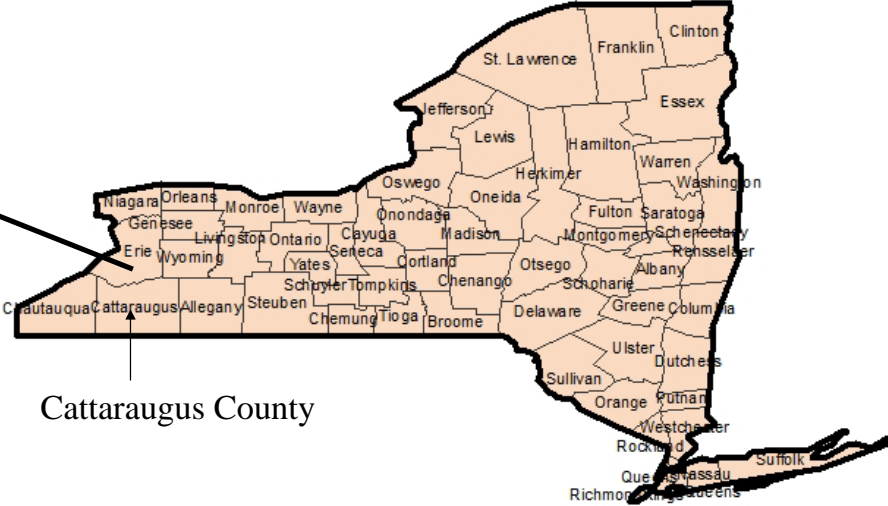
PROJECT AREA LOCATION

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

GENERAL PROJECT AREA



NEW YORK



Source: 1979 USGS Maps, Ashford Hollow, New York, 15 min quadrangle.

AERIAL PHOTOGRAPHIC SOURCES

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

DATE	APROX. SCALE	SOURCES	TYPE	REMARKS
1955 Nov	1:20,000	USDA, Farm Service Agency (FDA)	B&W	Predevelopment.
May 1961	1:20,000	Courtesy of WVDP	B&W	Predevelopment, partial coverage. – Georeferenced.
25 Apr 1962	1:27,000	USGS, EROS Data Center	B&W	Predevelopment. This data was used to create a 1962 geo-referenced base map.
1966 July	1:20,000	Courtesy of WVDP	B&W	
1966 Oct 8	1:20,000	USDA, Farm Service Agency (FDA)	B&W	This data was used to create a 1966 geo-referenced base map.
Apr 1968	1:30,000	Courtesy of WVDP	B&W	This data was used to create a 1968 geo-referenced base map.
Apr 1977	1:4,000	NY State Archives	B&W	This data was used to create a 1977 geo-referenced base map.
21 Oct 1978	1:40,000	Buffalo University	B&W	Georeferenced.
1980 Oct 10	1:36,000	USDA, Farm Service Agency (FDA)	B&W	Georeferenced.

B&W = Black and white

CIR = Color infrared
USGS = U.S. Geological Survey.

NA = Not applicable.

AERIAL PHOTOGRAPHIC SOURCES (CONTINUED)

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

DATE	APROX. SCALE	SOURCES	TYPE	REMARKS
10 Apr 1981	1:40,000	USGS, EROS Data Center	B&W	Georeferenced
July 1984	1:20,000	Courtesy of WVDP	Color	This data was used to create a 1995 geo-referenced base map.
1989	1:4,000	Courtesy of WVDP	Color	Georeferenced
1990 Oct 6	1:36,000	USDA, Farm Service Agency (FDA)	B&W	Georeferenced
1991	NA	Courtesy of WVDP	Color	Oblique Photos
1993	NA	Courtesy of WVDP	Color	Oblique Photos
Mar 28 1995	1m Resolution Imagery	USGS Web Site	B&W	This orthophoto image was obtained from USGS in UTM and was reprojected into New York State Plane coordinate system.
1995	NA	Courtesy of WVDP	Color	Oblique Photos
Apr 1999	1:3,000	Courtesy of WVDP	Color	Georeferenced
2007	24" Resolution Imagery	http://www.nysgis.state.ny.us/gateway/mg/2005/erie	Color	This orthophoto image is used to rectify the raw scanned aerial photos. It also used as the 'present-day' geo-referenced base map.

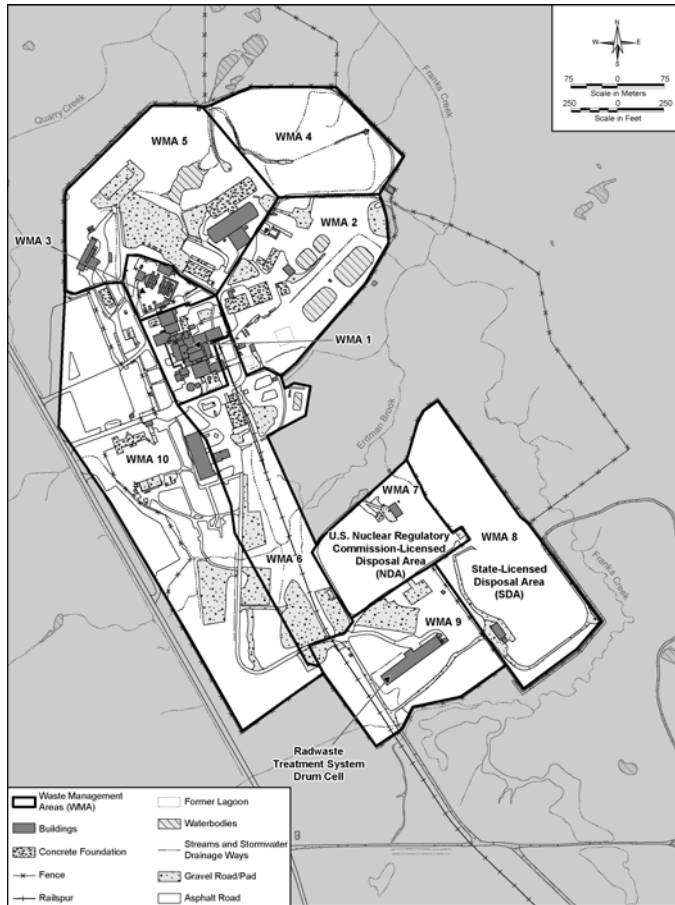
B&W = Black and white

CIR = Color infrared
USGS = U.S. Geological Survey.

NA = Not applicable.

WASTE MANAGEMENT AREAS (WMAs)

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



Location of Waste Management Areas 1 through 10

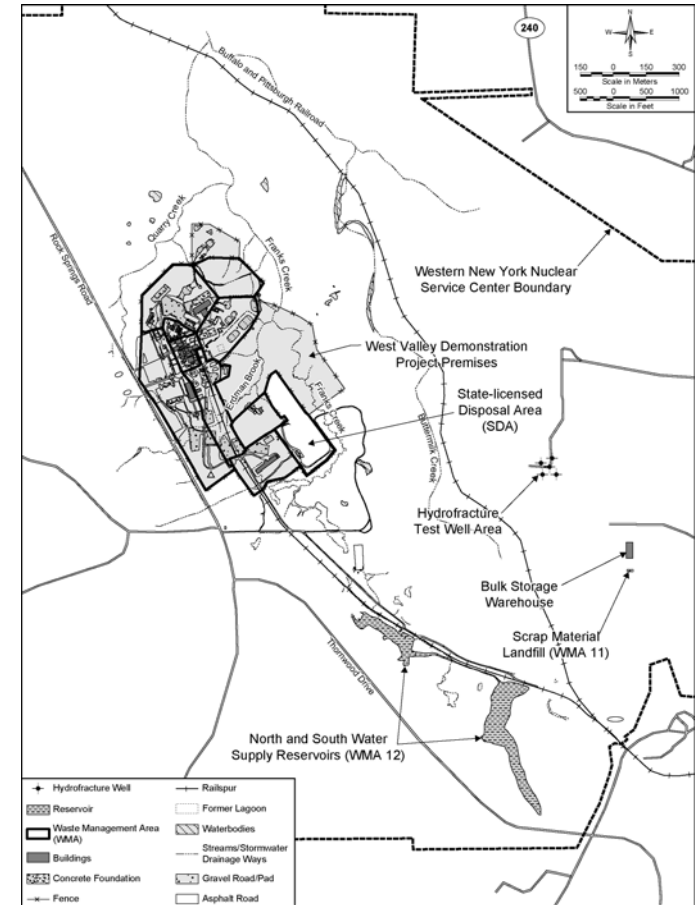
SOURCES: EIS-0226D Chapter 2, Page 2-5 to 2-7

In the Environmental Impact Statement (EIS), (Revised Draft Environmental Impact Statement, EIS-0226D, 2008), the Western New York Nuclear Service Center (WNYNSC) has been divided into the 12 Waste Management Areas (WMA) listed below. The locations of WMA 1 through WMA 10 are shown at left and are included in this photographic analysis. The locations of WMA 11 and WMA 12 are shown on right but are not included in this analysis.

- WMA 1: Main Plant Process Building and Vitrification Facility Area
- WMA 2: Low-Level Waste Treatment Facility Area
- WMA 3: Waste Tank Farm Area
- WMA 4: Construction and Demolition Debris Landfill
- WMA 5: Waste Storage Area
- WMA 6: Central Project Premises
- WMA 7: NRC-licensed Disposal Area (NDA) and Associated Facilities
- WMA 8: State-licensed Disposal Area (SDA) and Associated Facilities
- WMA 9: Radwaste Treatment System Drum Cell Area
- WMA 10: Support and Services Area
- WMA 11: Bulk Storage Warehouse and Hydrofracture Test Well Area
- WMA 12: Balance of Site

For the 2008 EIS the 66-hectare (164-acre) Project Premises, which are controlled by DOE, did not include WMA 8 (the SDA), which is managed by NYSERDA. For this 2009 AGC analysis, however, all of the land in the West Valley Demonstration Project Premises is included. That includes the WMA 8 (SDA).

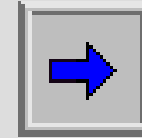
For purposes of this report of AGC's analysis, the WMA 1 through 10 will be used to display the findings obtained through the analysis of historical aerial photography.



Location of Waste Management Areas 11 through 12

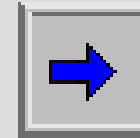


**INTERPRETATION
OF AERIAL
PHOTOGRAPHY**



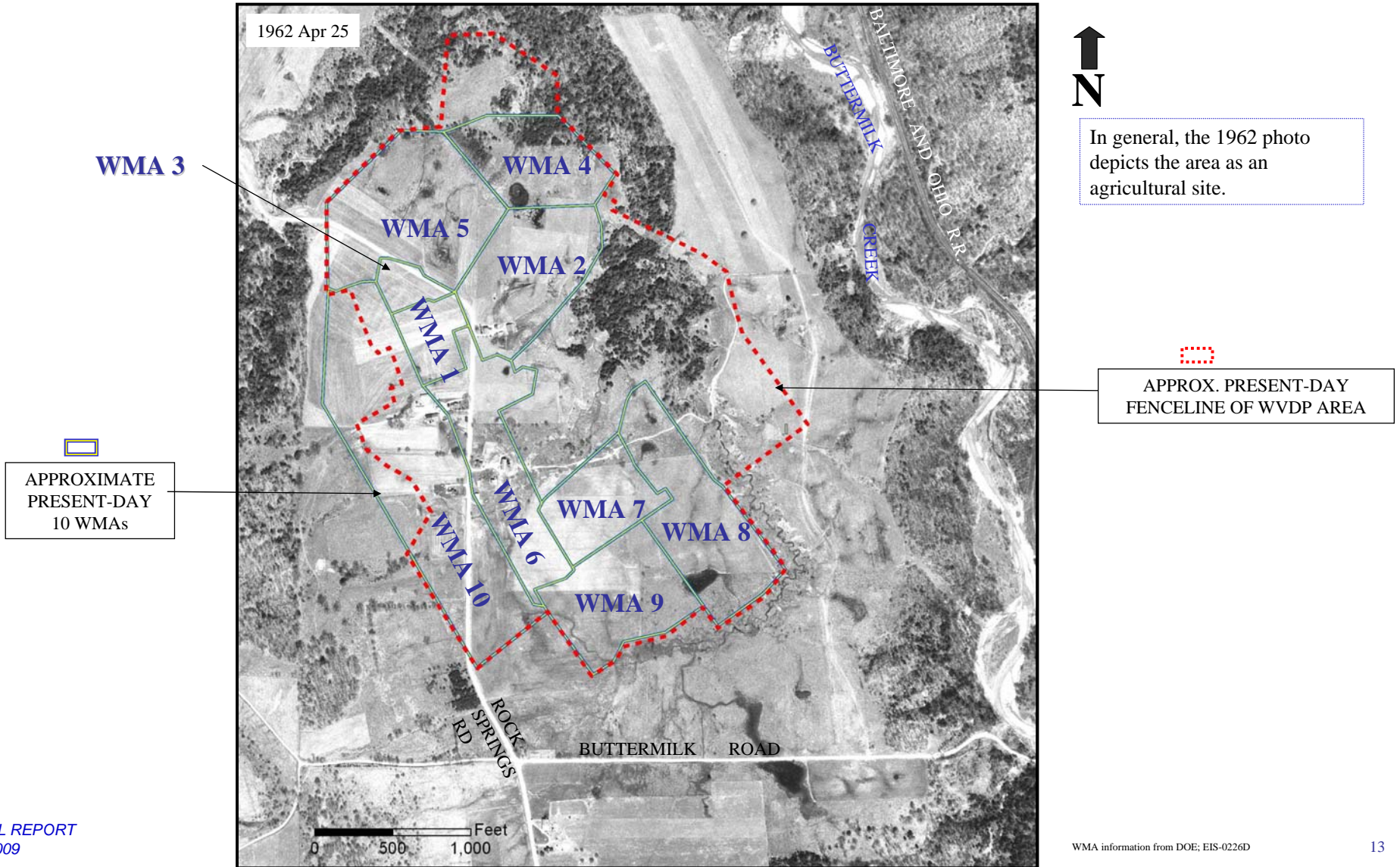


**1962 PHOTO
ANALYSIS**



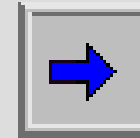
WVDP PREDEVELOPMENT OVERVIEW - 1962

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York





**1966 PHOTO
ANALYSIS**



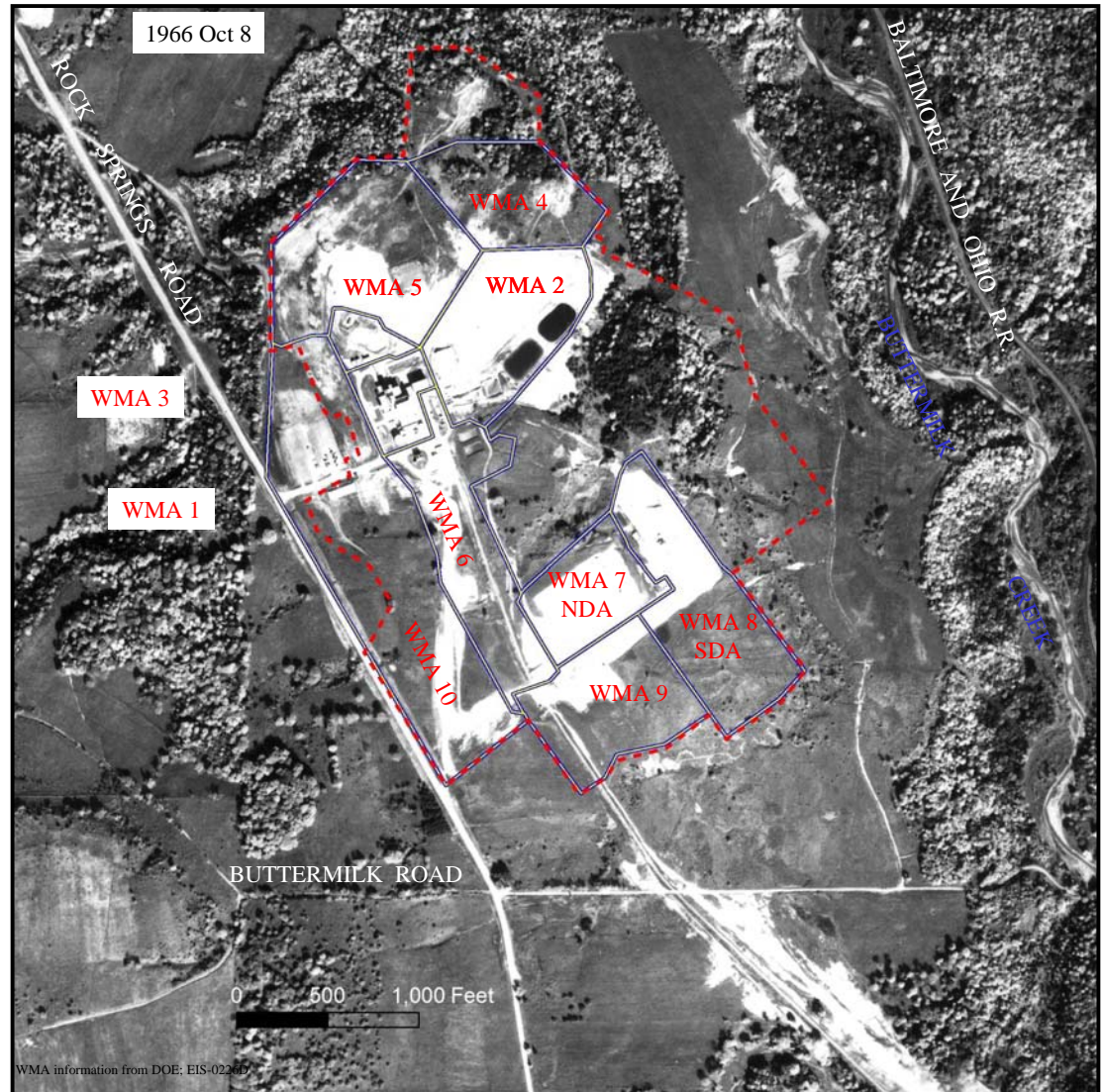
WVDP 1966 OVERVIEW

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

A 1966 image was the earliest aerial photo obtained after WVDP was built. This image indicates most of the WVDP is still under construction.

 FENCE LINE
 WMA

- WMA 1: Main Plant Process Building and Vitrification Facility Area
- WMA 2: Low-Level Waste Treatment Facility Area
- WMA 3: Waste Tank Farm Area
- WMA 4: Construction and Demolition Debris Landfill
- WMA 5: Waste Storage Area
- WMA 6: Central Project Premises
- WMA 7: NRC-licensed Disposal Area (NDA) and Associated Facilities
- WMA 8: State-licensed Disposal Area (SDA) and Associated Facilities
- WMA 9: Radwaste Treatment System Drum Cell Area
- WMA 10: Support and Services Area

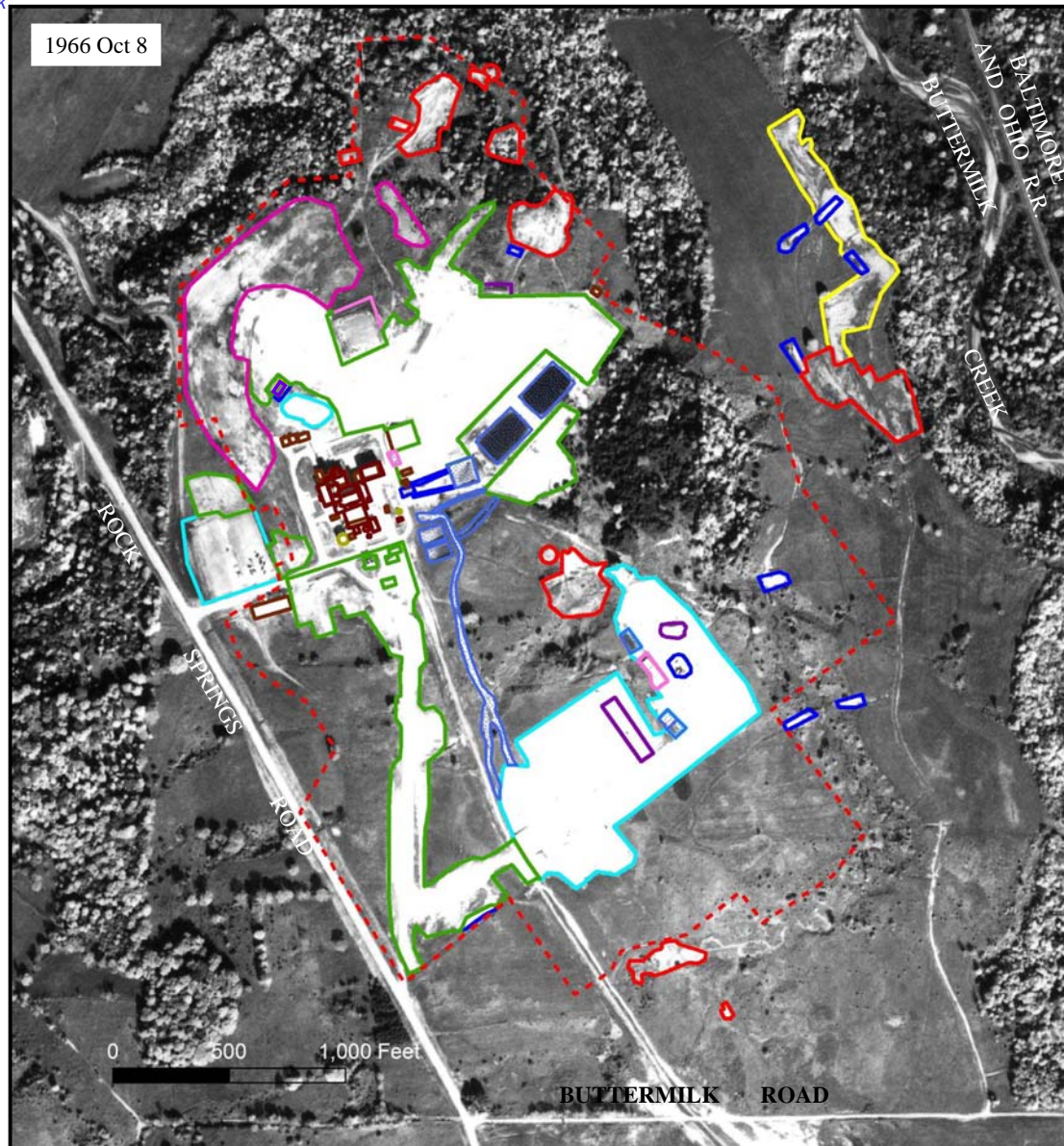


WMA information from DOE: EIS-0226D

WVDP 1966 SIGNIFICANT FINDINGS

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings derived from the 1966 aerial photography. Analysis of the 1966 imagery indicates a very active site. Although the site is still under construction, numerous pits, trenches, lagoons, ground scars, and other features are observed in the photo.



PLEASE SEE A 3D VIEW OF WVDP IN 1966 ON PAGE 71

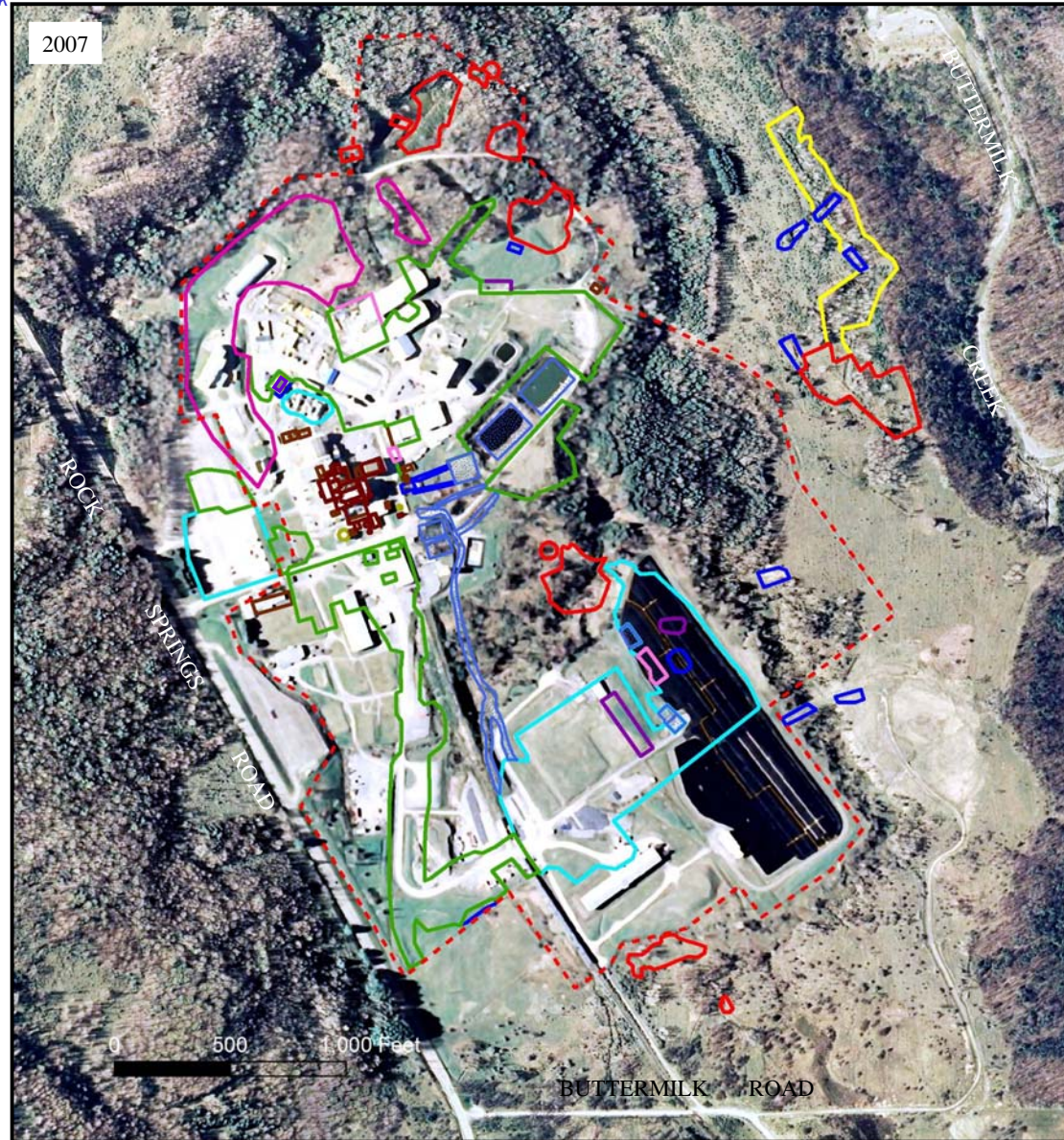
- ⋯ FENCELINE
- ▭ BUILDINGS/STRUCTURES
- ▭ BARE GROUND
- ▭ DISTURBED GROUND
- ▭ EXCAVATION
- ▭ GRADED AREA
- ▭ GROUND SCARS
- ▭ MOUNDED MATERIALS / BERM
- ▭ PITS OR TRENCHES
- ▭ POND / LAGOON
- ▭ STORAGE AREA
- TANK



1966 FINDINGS DISPLAYED OVER 2007 IMAGERY

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings seen on the 1966 aerial photography. The 1966 features are superimposed on a 2007 base image.



- FENCELINE
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- GRADED AREA
- GROUND SCARS
- MOUNDED MATERIALS / BERM
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK

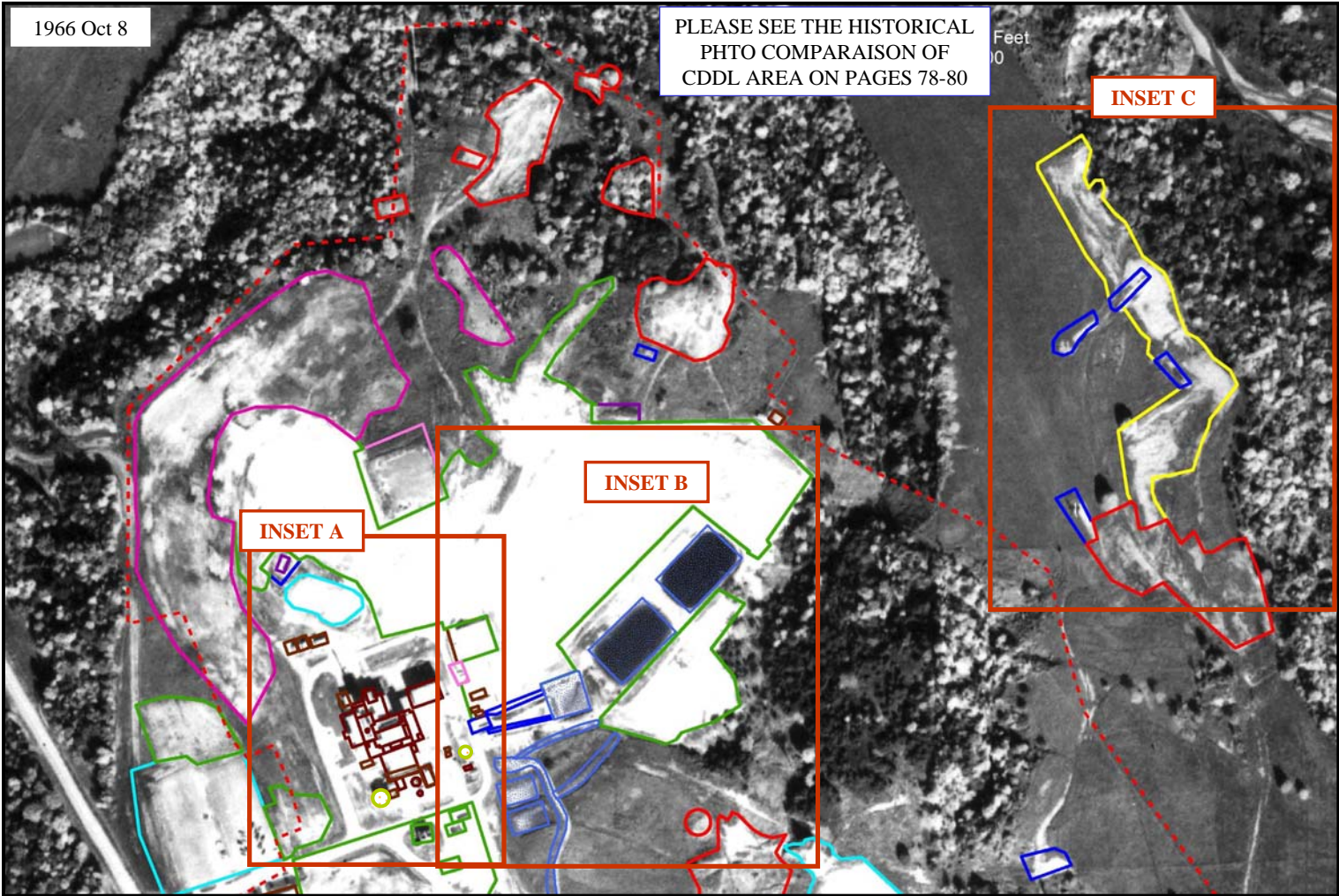


WVDP 1966 – NORTHERN AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

- FENCELINE
- WMAs
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- GRADED AREA
- GROUND SCARS
- MOUNDED MATERIALS / BERM
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK

Activities are seen throughout the site. New structures, new buildings, lagoon, trenches, ground scars, excavation areas, and graded areas are more numerous than in earlier photos.

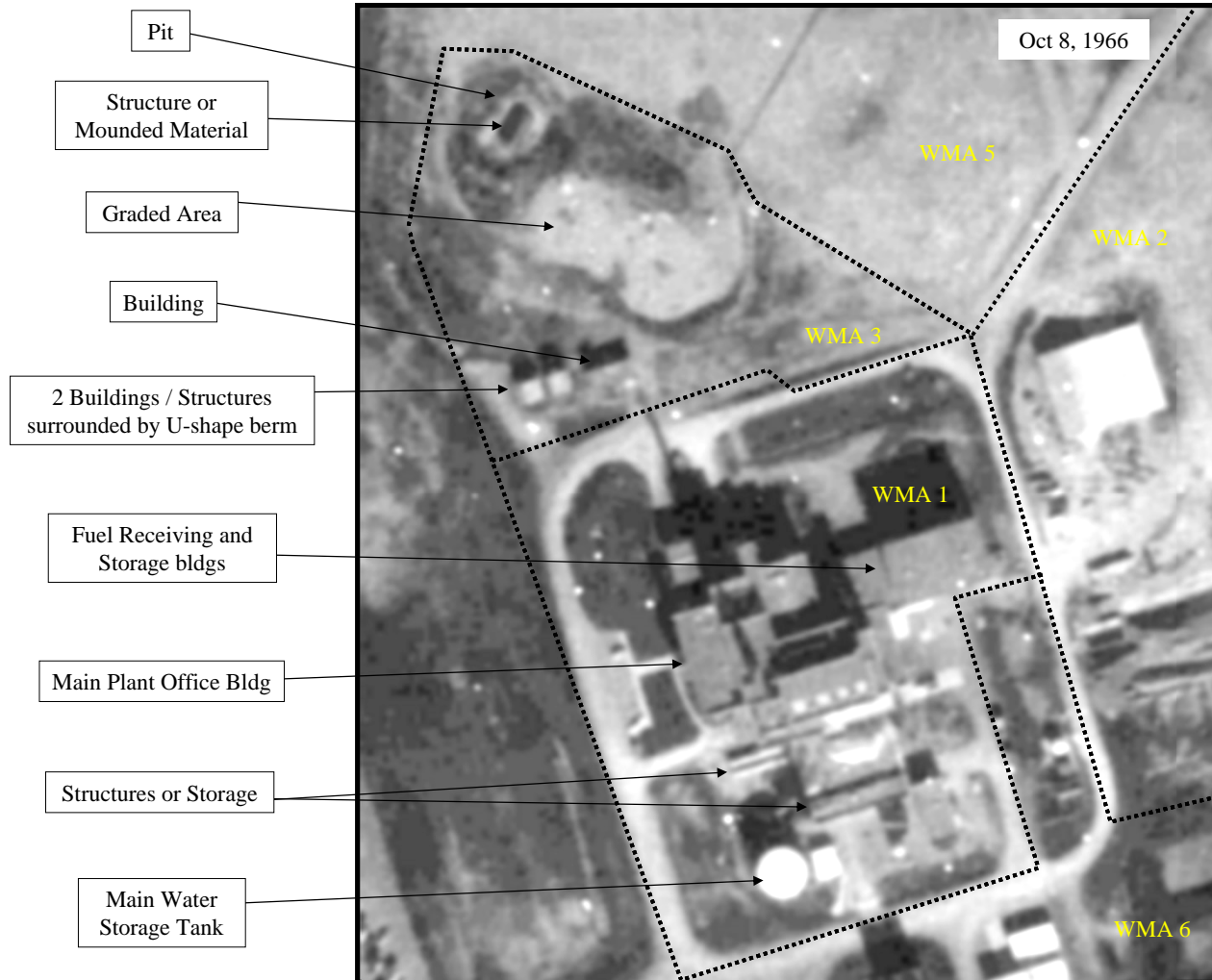


PLEASE SEE ENLARGEMENT OF INSET A, B, AND C ON THE FOLLOWING PAGES

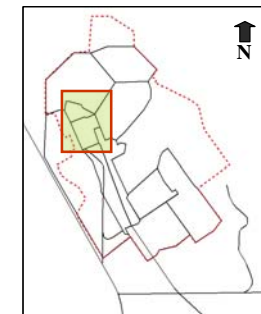
WVDP 1966 – NORTHERN AREA

INSET A: WMA 1 & WMA 3 AREAS

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



LOCATION DIAGRAM



Construction in WMA 1 is almost complete with most of the buildings in place in 1966.

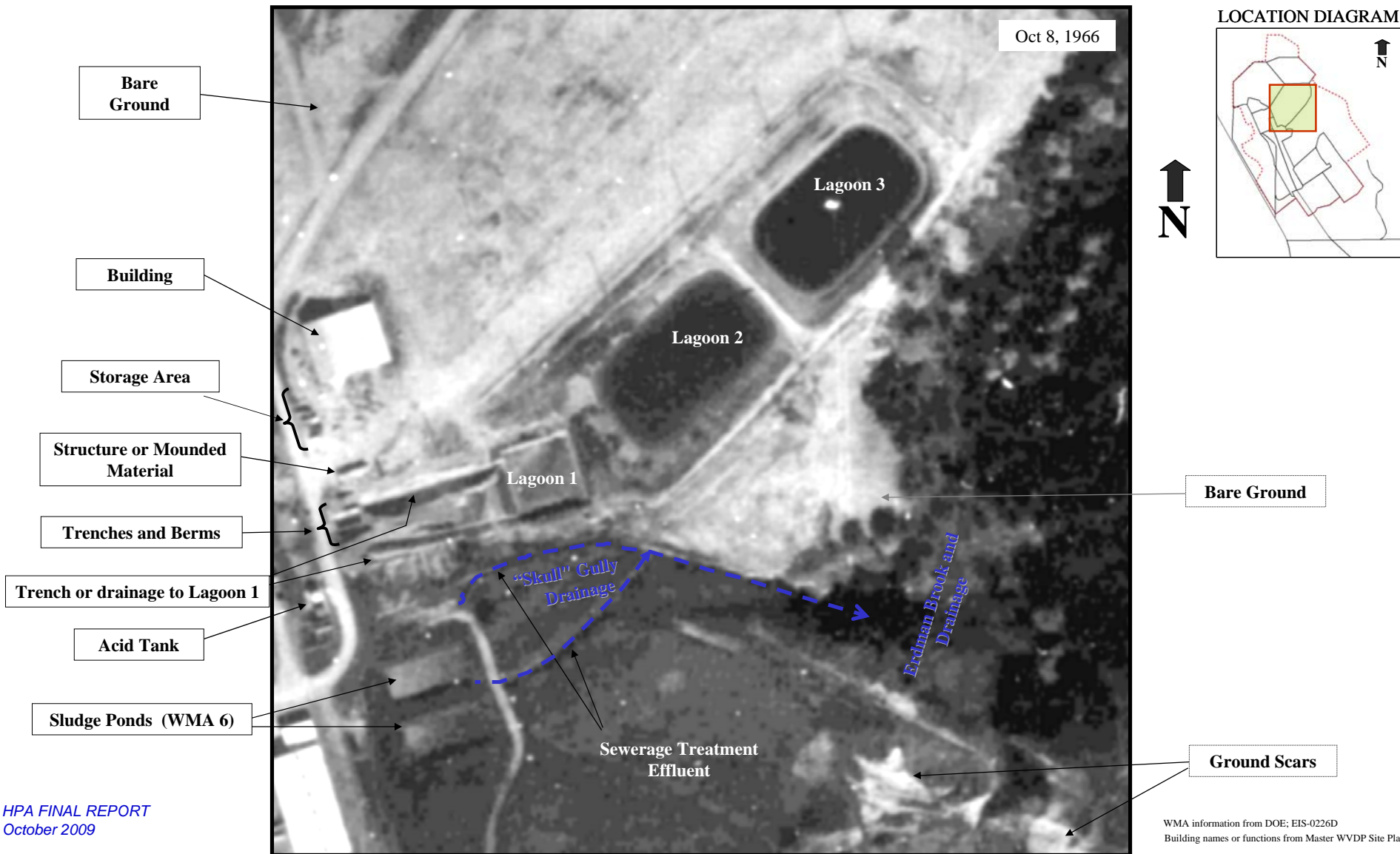
WMA 3 contains three buildings on the southwest side. Below the level of the three buildings, in a series of descending terrace-like elevations, is a graded area almost half the size of the WMA 3 area, followed by another level area in the northwest section of the WMA. A Structure feature, or perhaps Mounded Material, in this northwest location is surrounded by vegetation giving this feature the appearance of a structure inside a pit. In later years a fence is seen around this structure.

WMA information from DOE; EIS-0226D
Building names or functions from Master WVDP Site Plan.

WVDP 1966 – WMA 2 AREA

INSET B: WMA 2 AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



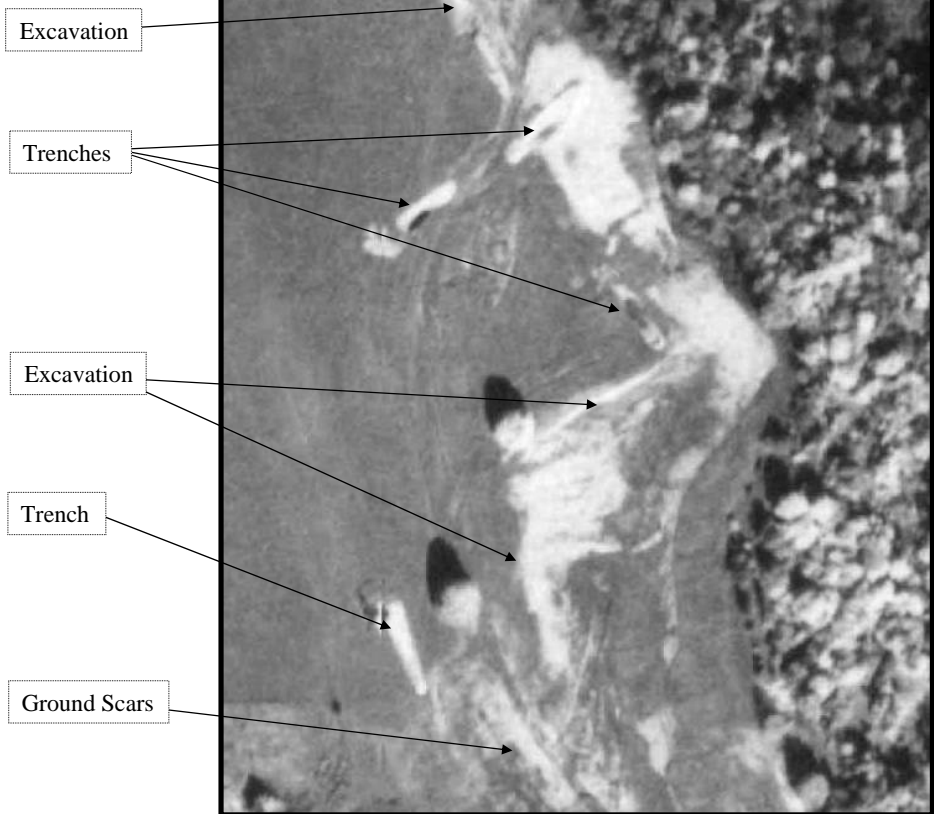
1966 – NORTHERN AREA

INSET C: ACTIVITY AREA OUTSIDE WVDP FENCE

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

Oct 8, 1966

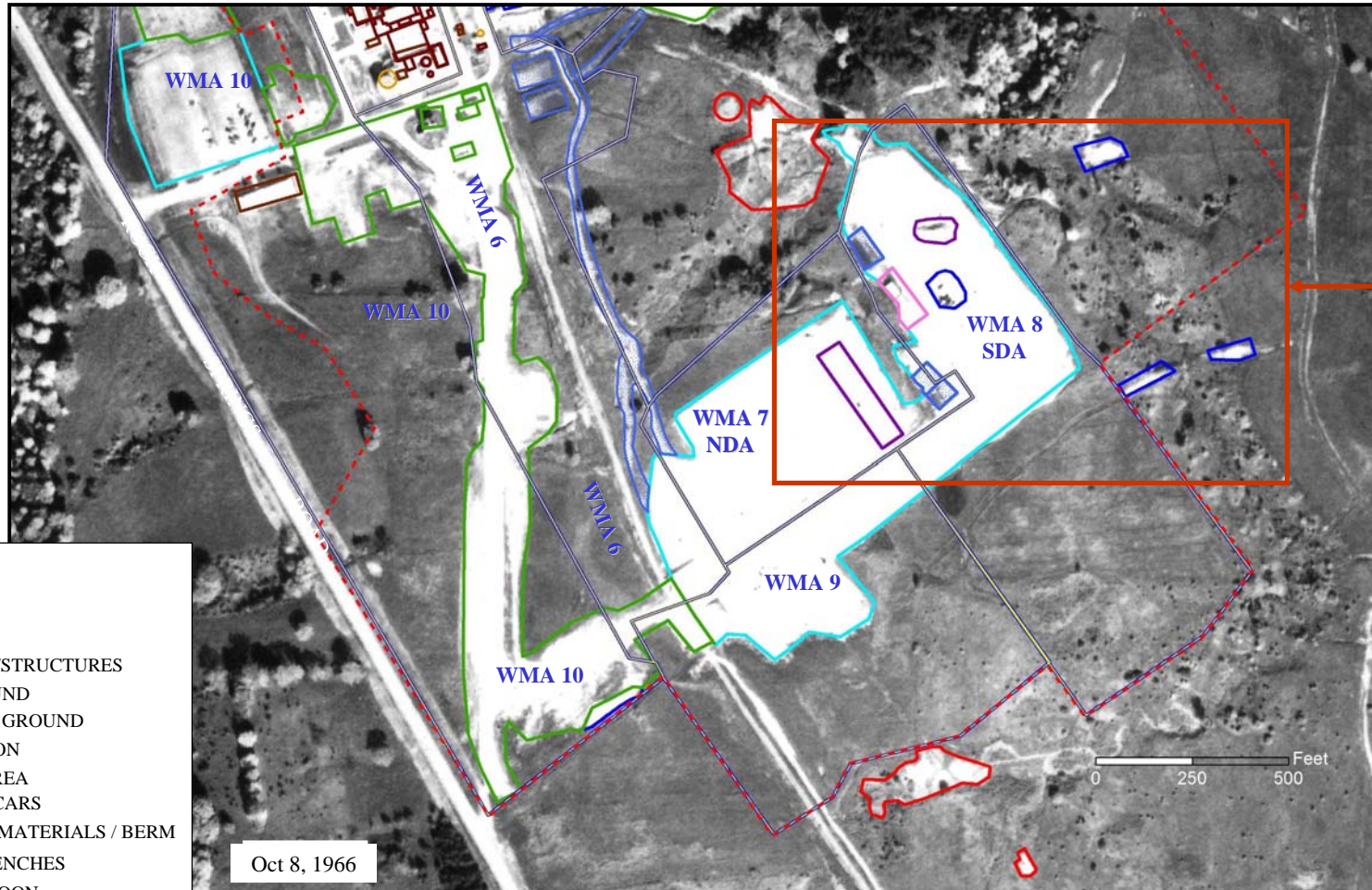
The 1966 image shows some activities on the eastern side, adjacent to the wooded area. Excavation, trenches, and ground scars are evident at the site.



1966 Findings Draped Over a 2007 Aerial Photo

WVDP 1966 – SOUTHERN AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



SEE ENLARGEMENT
NEXT PAGE

- ⋯ FENCELINE
- WMAs
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- GRADED AREA
- GROUND SCARS
- MOUNDED MATERIALS / BERM
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK

Oct 8, 1966

WMA information from DOE; EIS-0226D

In this 1966 image, the southern part of the WVDP is still under construction. WMA 7, NRC-licensed Disposal Area (NDA), WMA 8 State-licensed Disposal Area (SDA), and WMA 9 are not completed. WMA 8 shows a lot of activity with structures like ponds / lagoons seen on the side, a big mounded materials and a huge pit in the middle. Some trenches and ground scars are observed around the area.

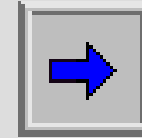
1966 – SDA AND NDA AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York





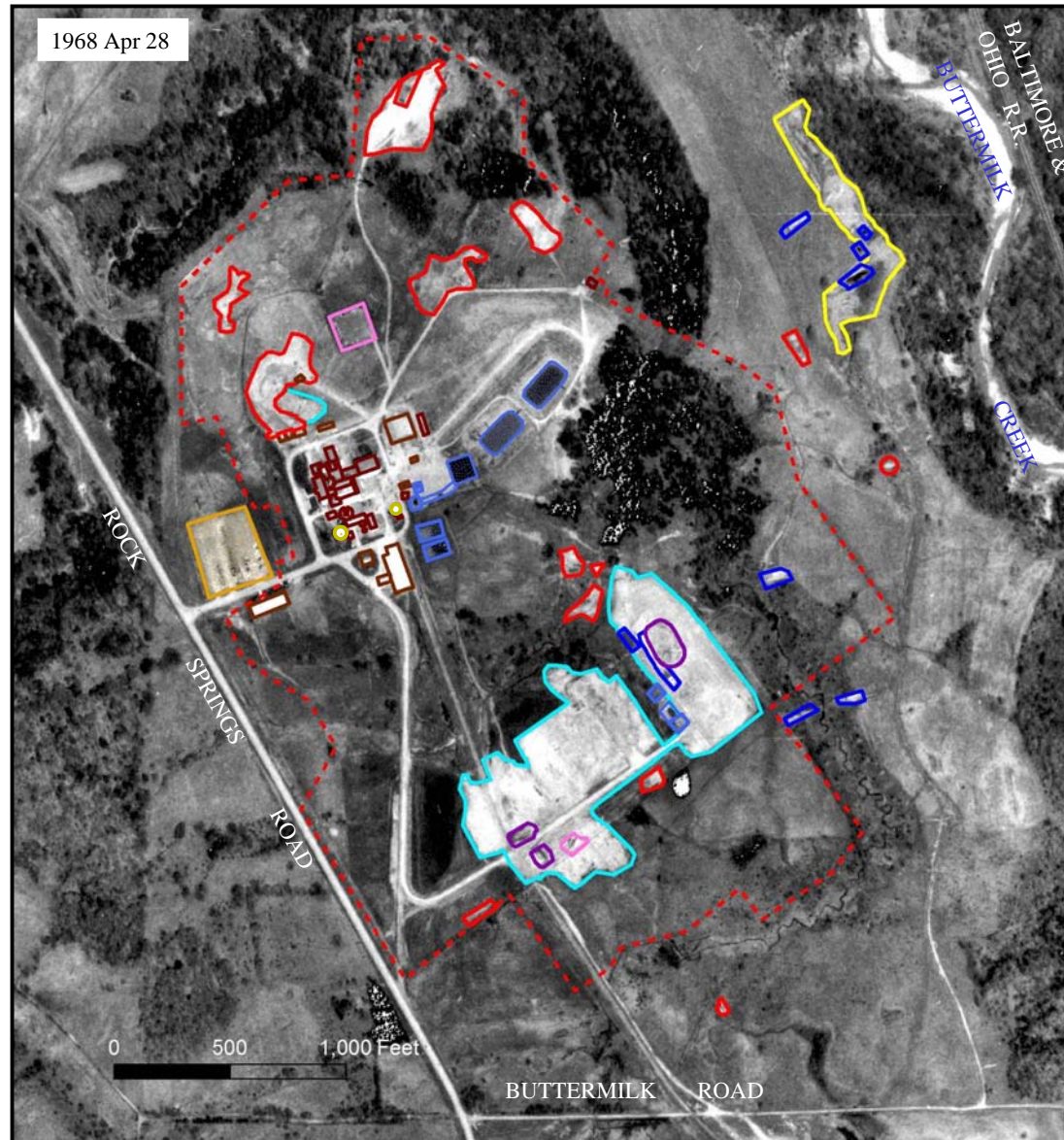
**1968 PHOTO
ANALYSIS**



WVDP 1968 SIGNIFICANT FINDINGS

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings derived from the 1968 aerial photography. Overall, analysis of the 1968 imagery indicates a very active site. Most of features found in 1966 photos are still present. Numerous pits, trenches, lagoons, and ground scars are observed in the photo.



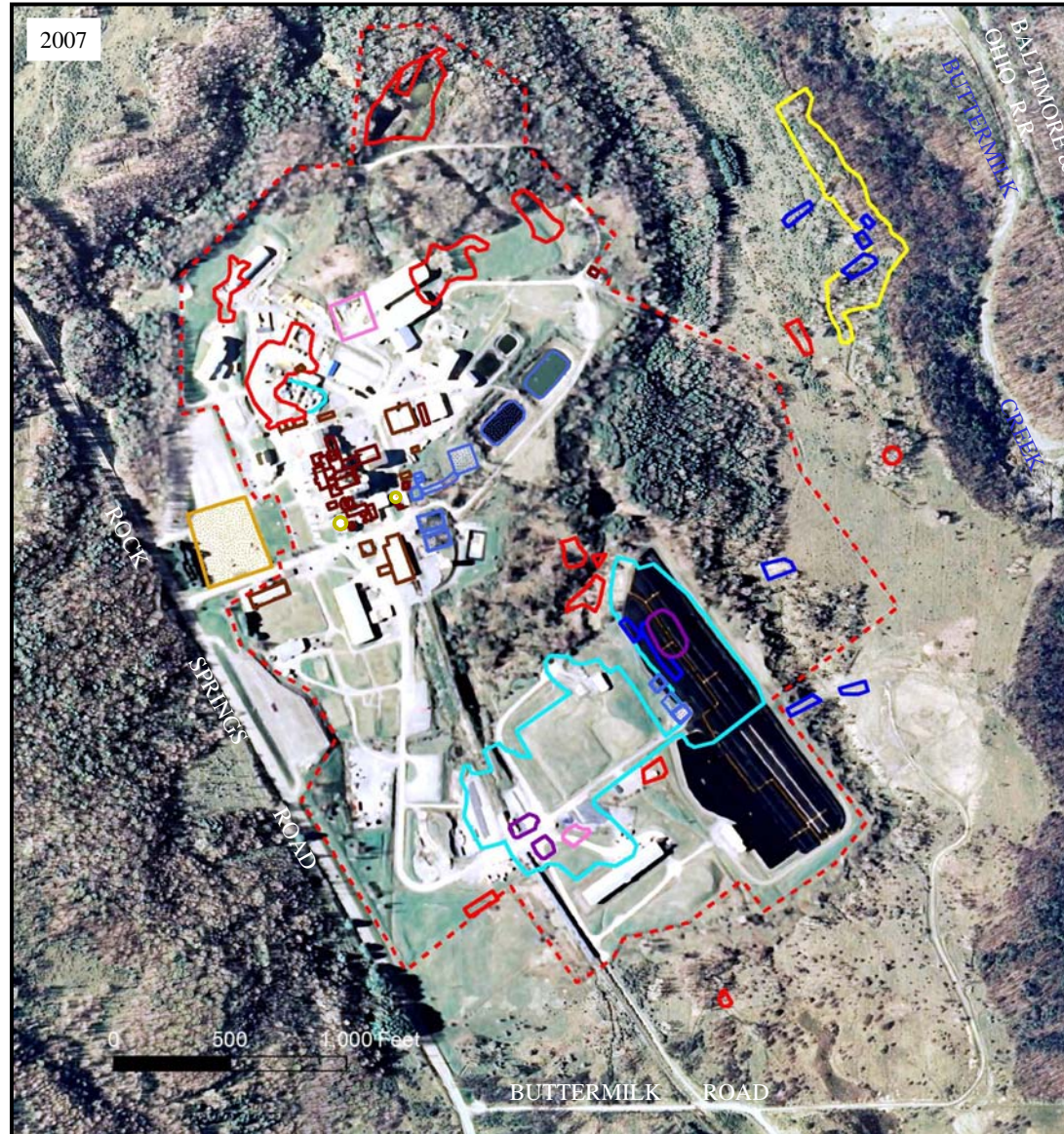
	FENCELINE
	BUILDINGS/STRUCTURES
	BARE GROUND
	DISTURBED GROUND
	EXCAVATION
	INTERCEPTOR
	GRADED AREA
	GROUND SCARS
	MOUNDED MATERIALS / BERM
	PARKING LOT
	PITS OR TRENCHES
	POND / LAGOON
	STORAGE AREA
	TANK



1968 FINDINGS DISPLAYED OVER 2007 IMAGERY

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings 1968 aerial photography superimposed on a 2007 base image.

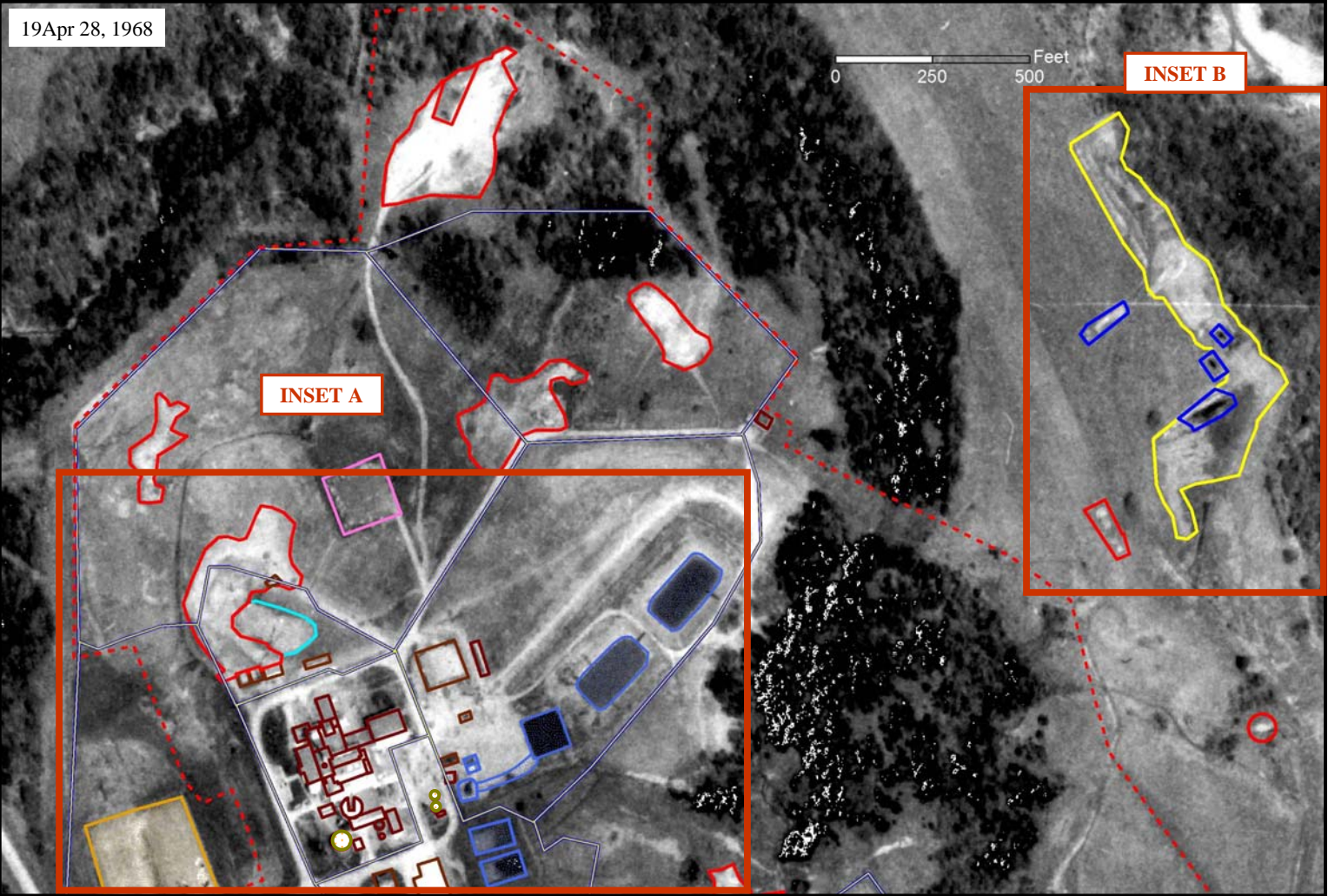


- FENCELINE
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- INTERCEPTOR
- GRADED AREA
- GROUND SCARS
- MOUNDED MATERIALS / BERM
- PARKING LOT
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK



WVDP 1968 – NORTHERN AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

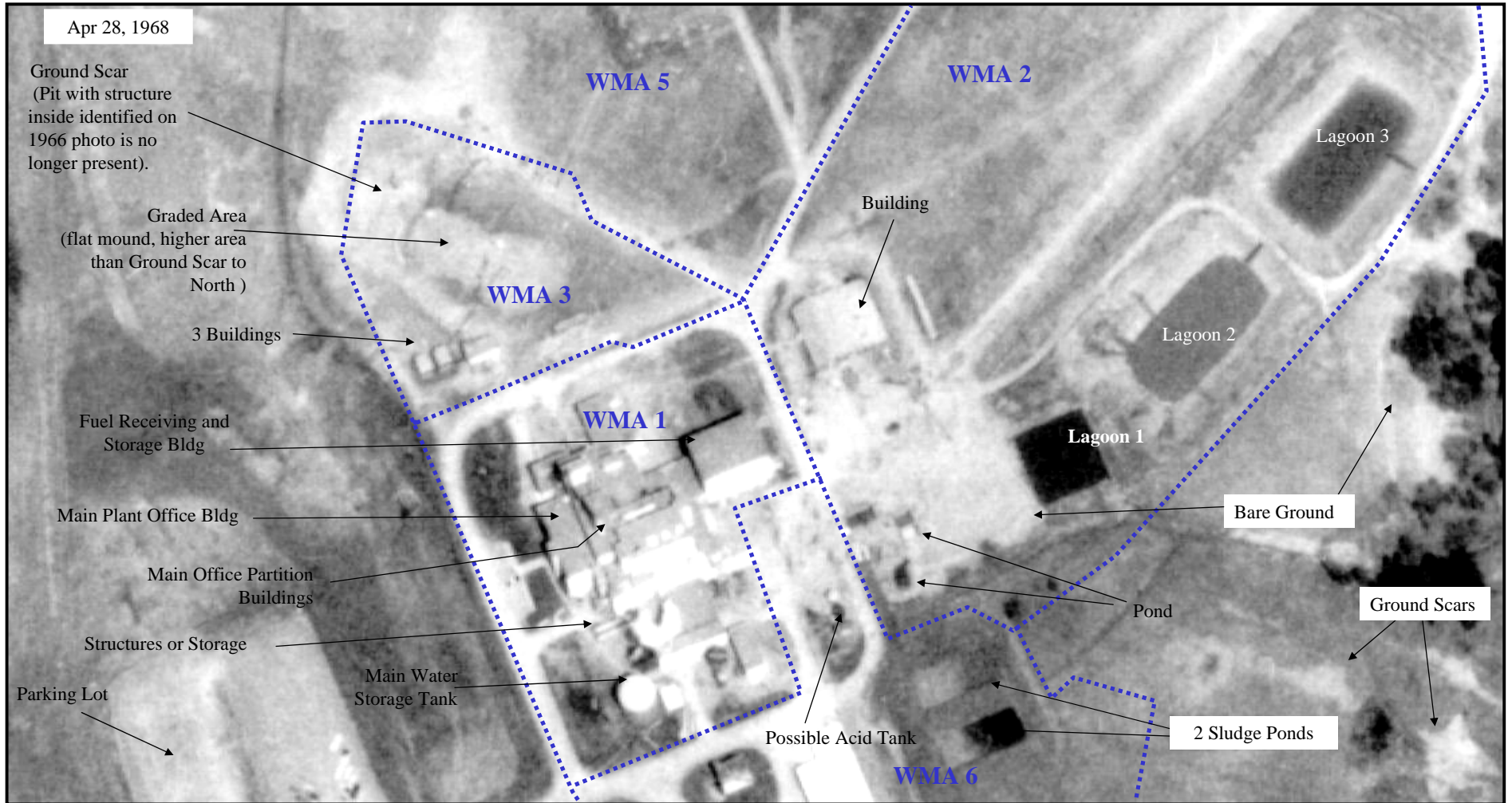


WMA information from DOE; EIS-0226D

Building names or functions from Master WVDP Site Plan.

WVDP 1968 – WMA 1, WMA 2, & WMA 3 AREAS

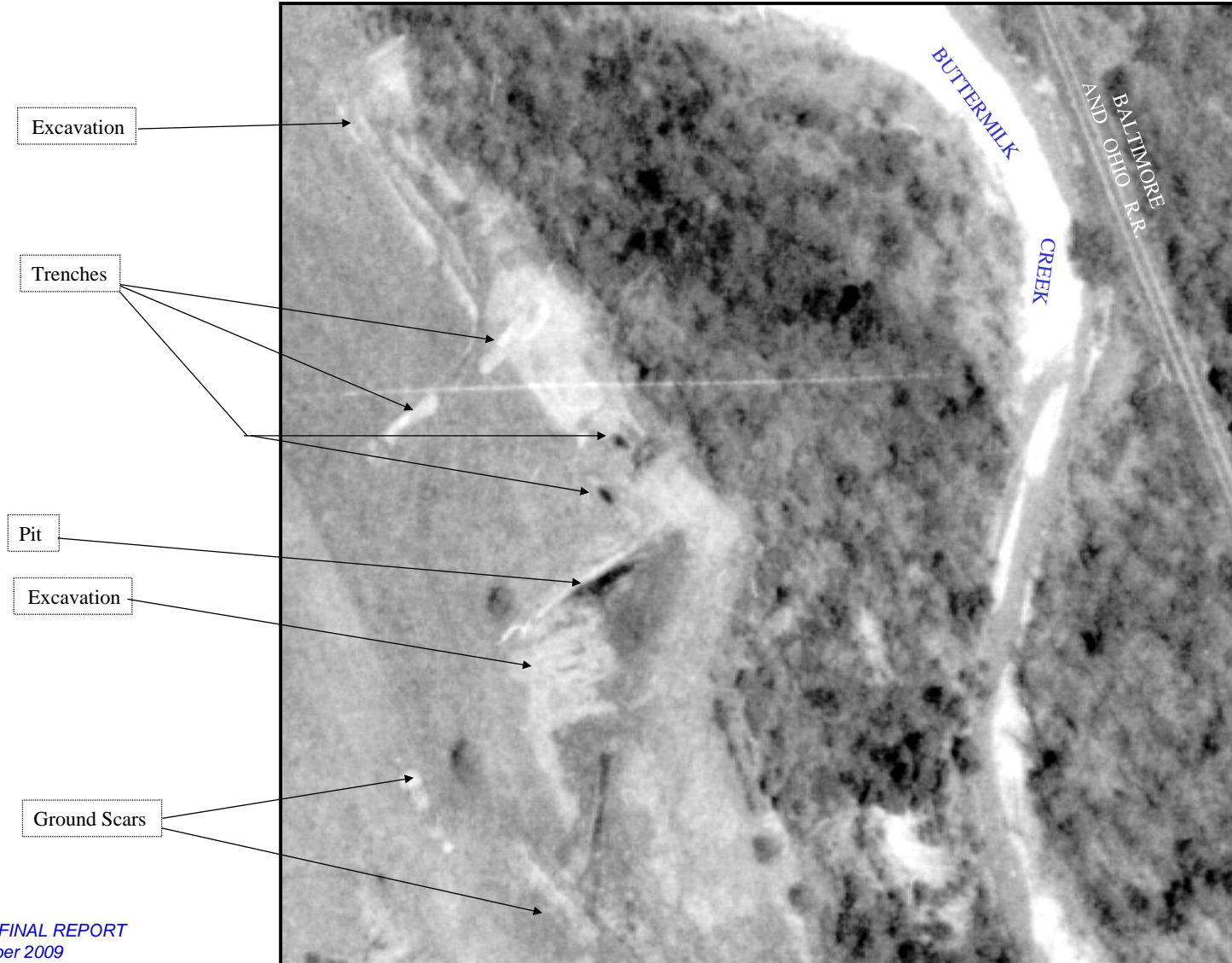
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



1968 – NORTHERN AREA

INSET B: ACTIVITY AREA OUTSIDE WVDP FENCE

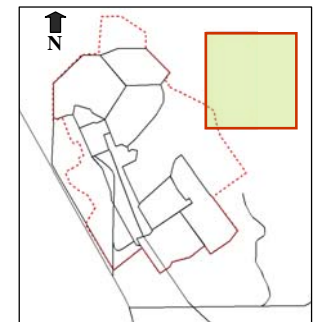
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



Activity area on the eastern side, adjacent to the woods, first evidenced in 1966.



LOCATION DIAGRAM



WVDP 1968 – SOUTHERN AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



In 1968 image, the construction of WMA 7 (NDA), WMA 8 (SDA), and WMA 9 is still evident. The features found in 1966 photos (trenches, mounded materials, pit, lagoons) are still present.

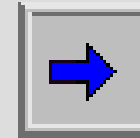
1968 - WMA 8 - SDA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York





1977 PHOTO ANALYSIS



WVDP 1977 SIGNIFICANT FINDINGS

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings derived from the 1977 aerial photography. Analysis of the 1977 imagery indicates a very active site with expanded parking lot, new storage areas, lagoons, structures, buildings, trenches & berms, etc.



PLEASE SEE A 3D VIEW OF WVDP IN 1977 ON PAGE 72

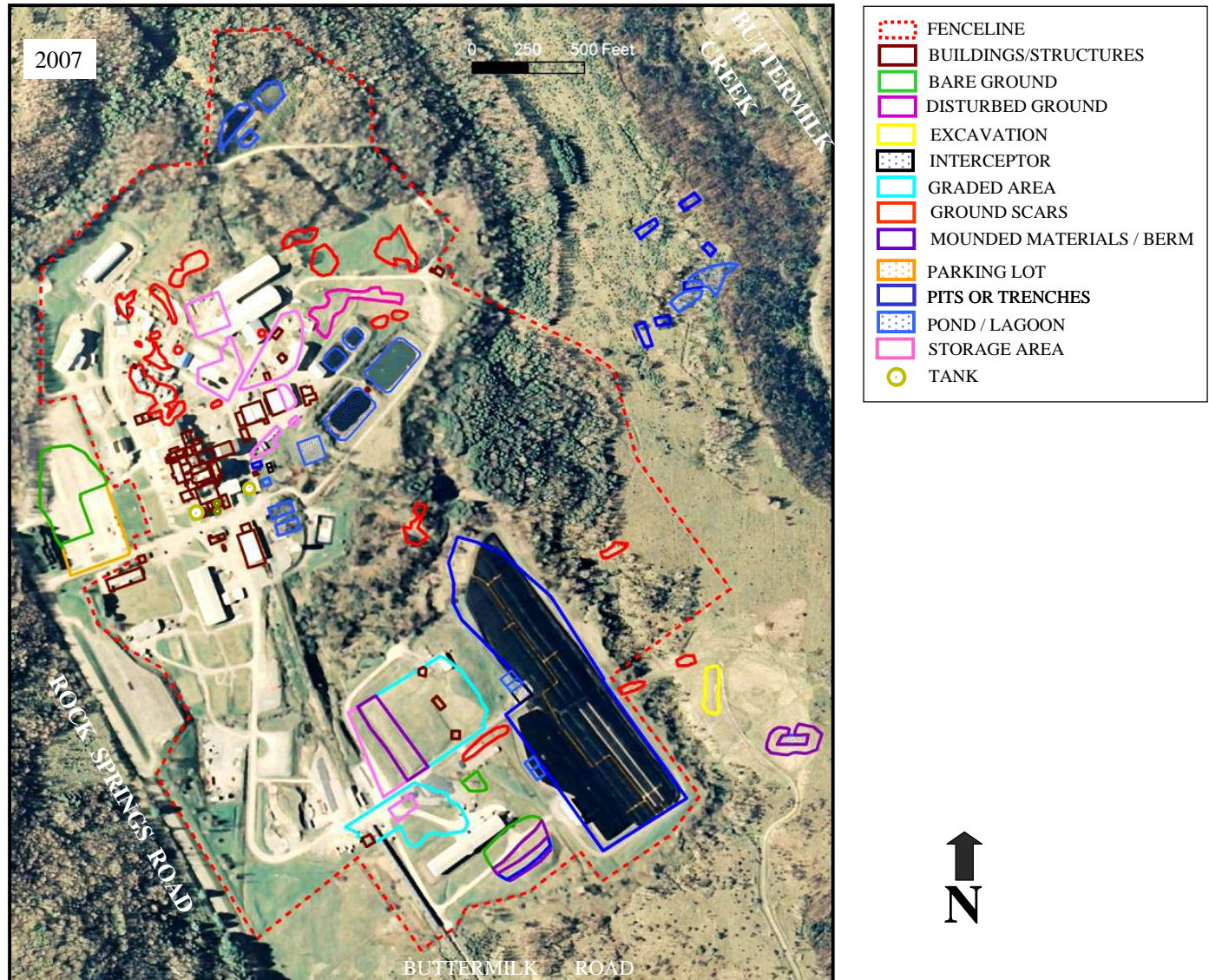
- FENCELINE
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- INTERCEPTOR
- GRADED AREA
- GROUND SCARS
- MOUNDED MATERIALS / BERM
- PARKING LOT
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK



1977 FINDINGS DISPLAYED OVER 2007 IMAGERY

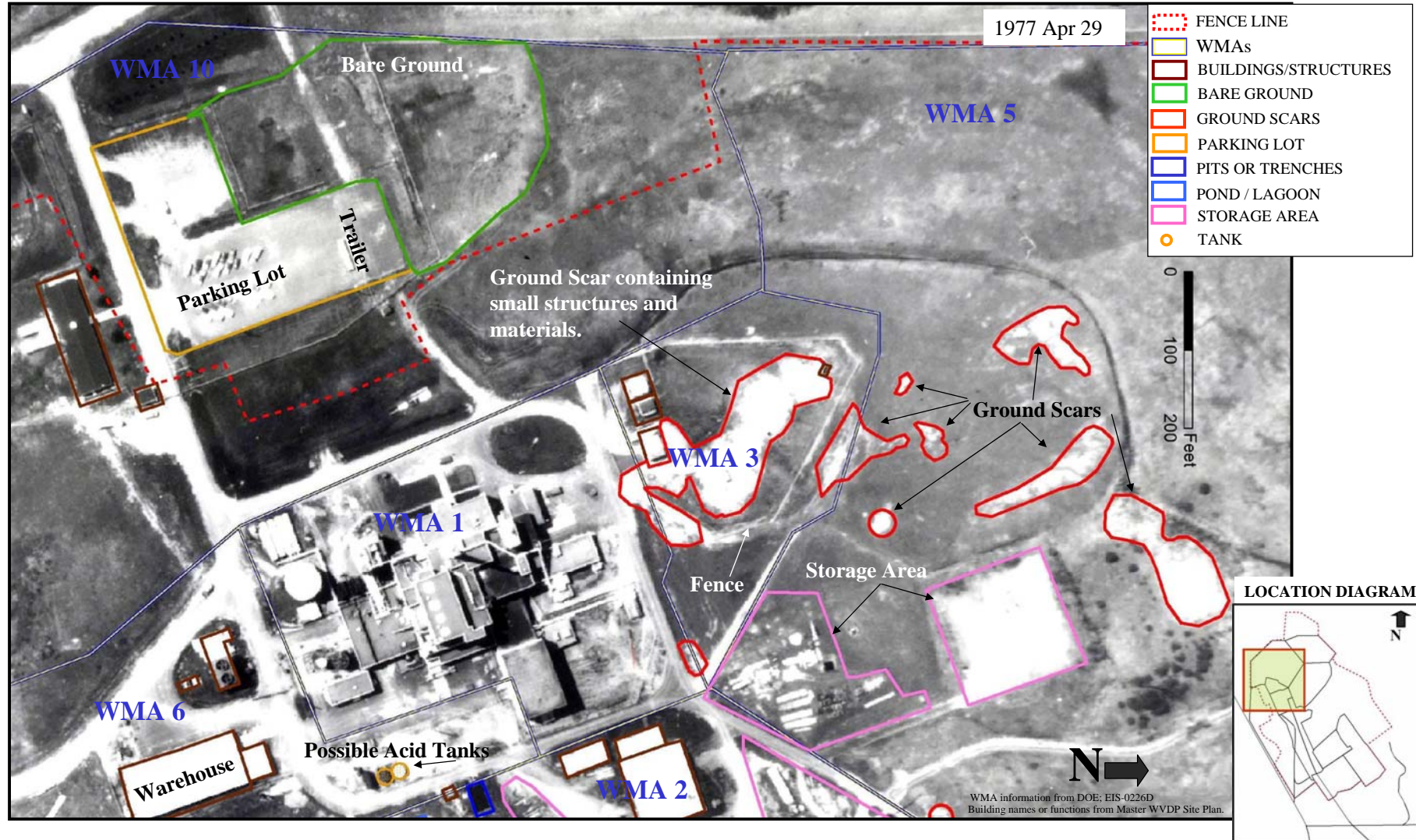
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings 1977 aerial photography superimposed on a 2007 base image.



WMA 1, WMA 3, & WMA 5 AREA, 1977

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



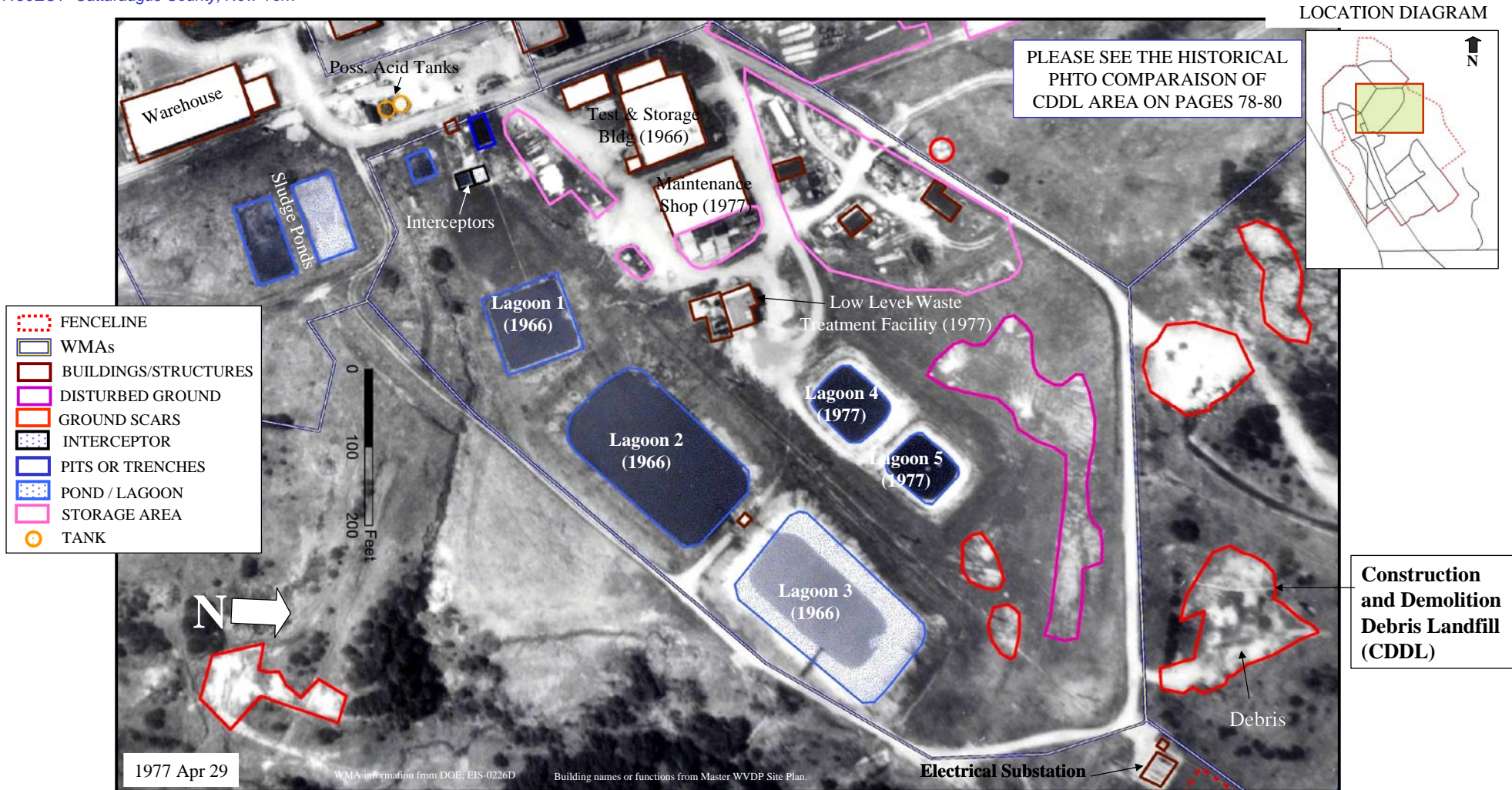
HPA FINAL REPORT
October 2009

In 1977 photos, WMA 1, Main Plant Process Building, is well established. WMA 3, Waste Tank Farm Area, is fenced. It contains ground scars with small structures and other unidentified objects.

WMA 5, Waste Storage Area, contains some ground scars and outdoor storage areas. WMA 10 is the Support and Services Area.

AERIAL VIEW OF WMA 2 AND CDDL AREA, 1977

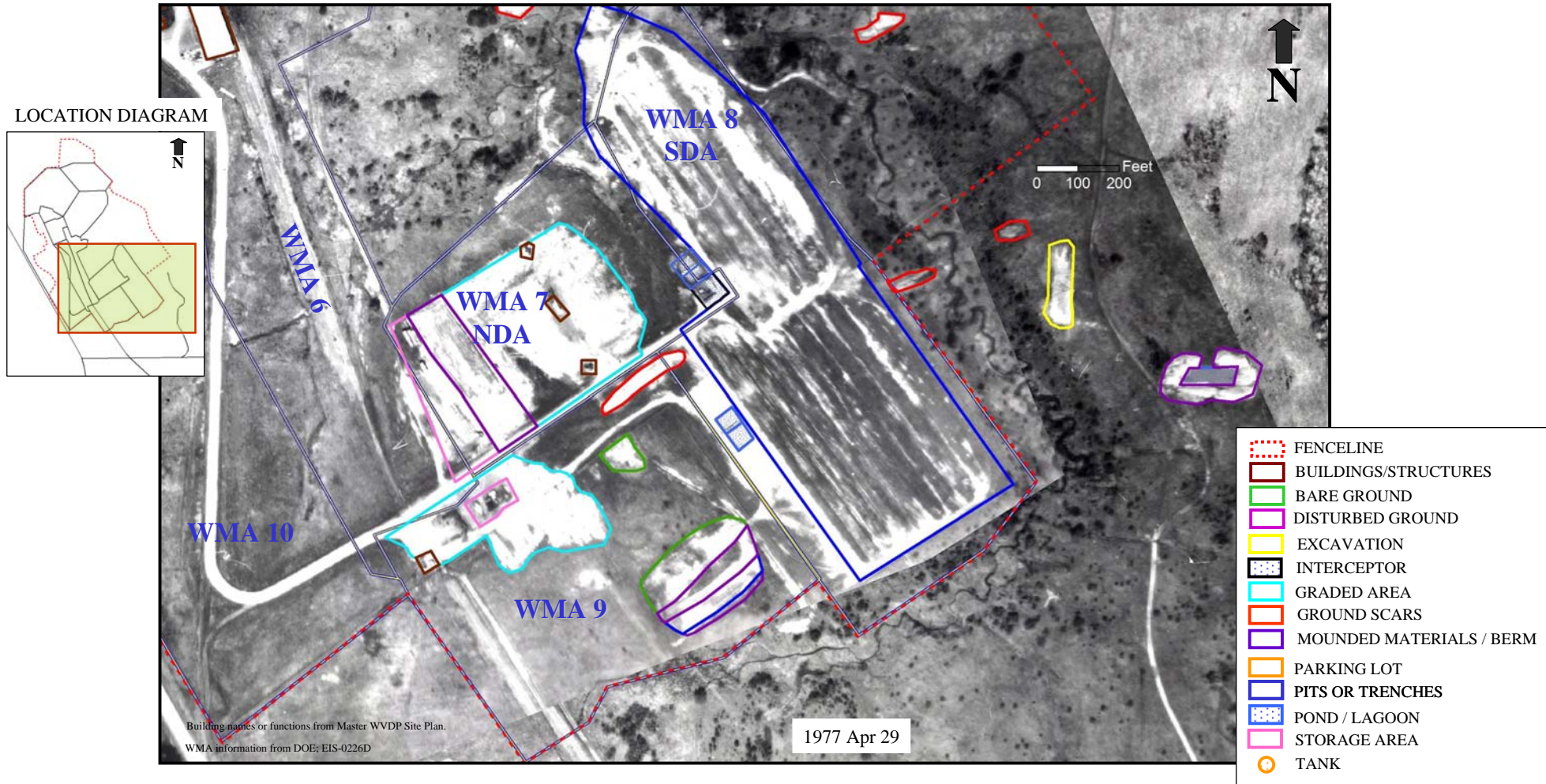
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



Lagoon 4, Lagoon 5, and the Low Level Waste Treatment Facility are first observed in this 1977 aerial photo. They are in WMA 2. In WMA 4 (CDDL), ground scars and debris are evident.

WVDP 1977 – SOUTHERN AREA

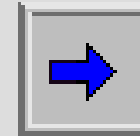
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



In this 1977 image, the southern section of the WVDP is expanded. Mounded material and dirt piles at the sites of WMA 7 and WMA 9 imply these sites may be still under construction. WMA 8 contains a series of elongated trenches and berms, and structures resembling ponds or lagoons are seen on the west side of the site. A new pond and excavation are observed on eastern side, outside the fence.



**1982 PHOTO
ANALYSIS**



WVDP 1982 OVERVIEW

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



ADMIN & PARKING LOT AREA – 1982

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



Building names or functions from Master WVDP Site Plan.

In 1982, a series of new labs are seen behind the admin building. The parking lot is paved and is adjacent to a bare ground area.

1982 - WMA 1 AND VICINITY

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

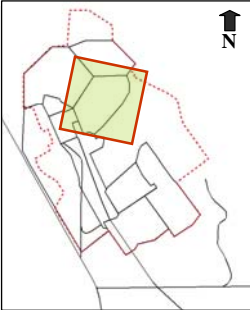


WMA 1 is the Admin Area. From this aerial view, the site is similar to the 1966 photos.

OBLIQUE VIEW OF WMA 2, 1982

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

LOCATION DIAGRAM



Frank Creek

Open Storage

Structures



WMA information from DOE; EIS-0226D
Building names or functions from Master WVDP Site Plan.

WMA 2 is the Low-Level Waste Treatment Facility Area

OBLIQUE VIEW OF WMA 3, 1982

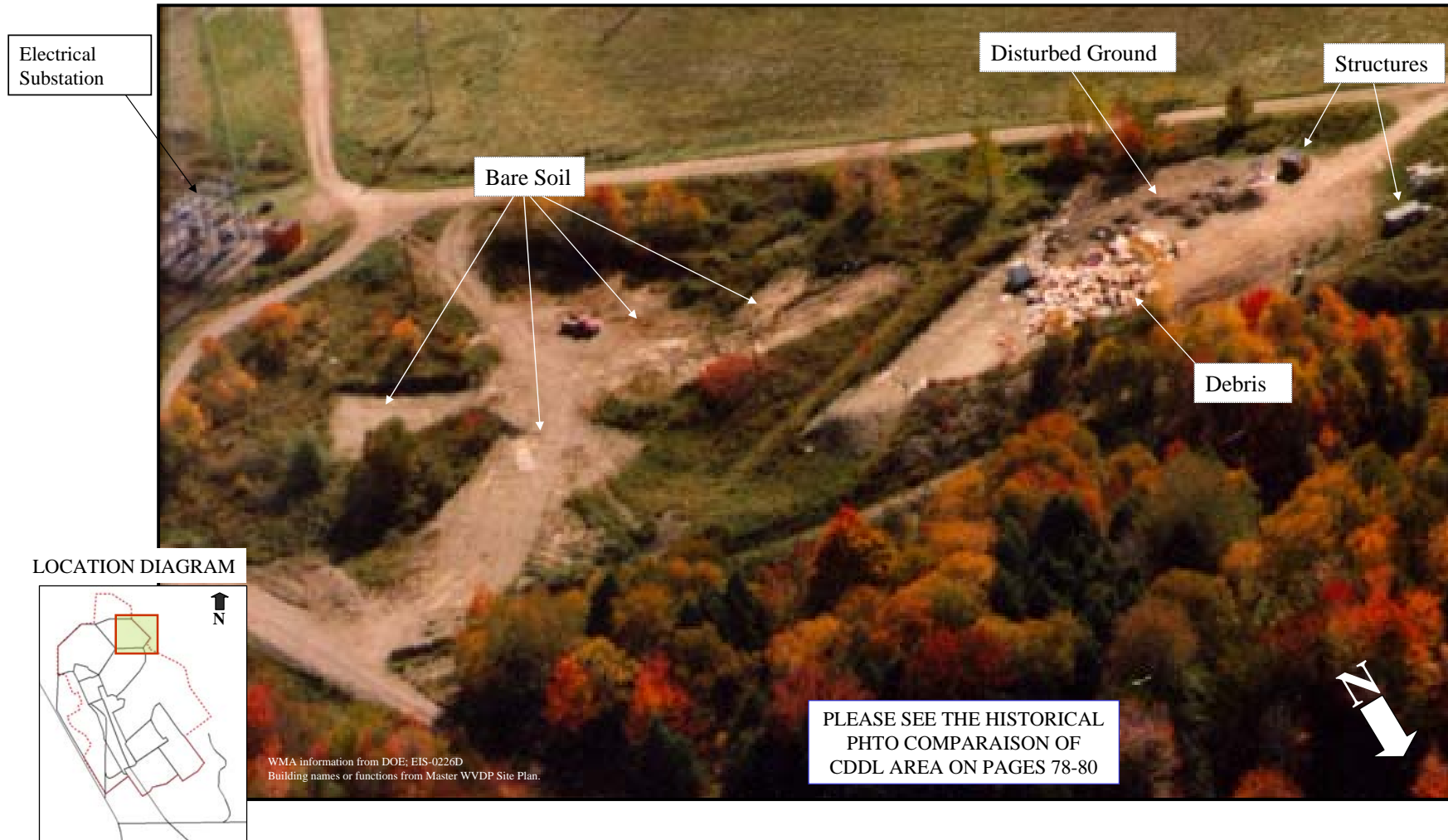
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA 3 is fenced enclosed. The three buildings/structures found in 1966 photos are still present.

OBLIQUE VIEW OF WMA 4 (CDDL AREA), 1982

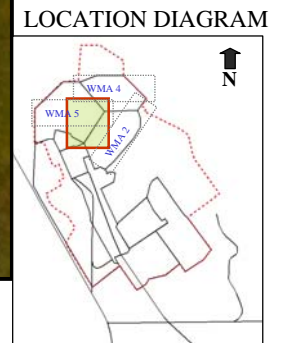
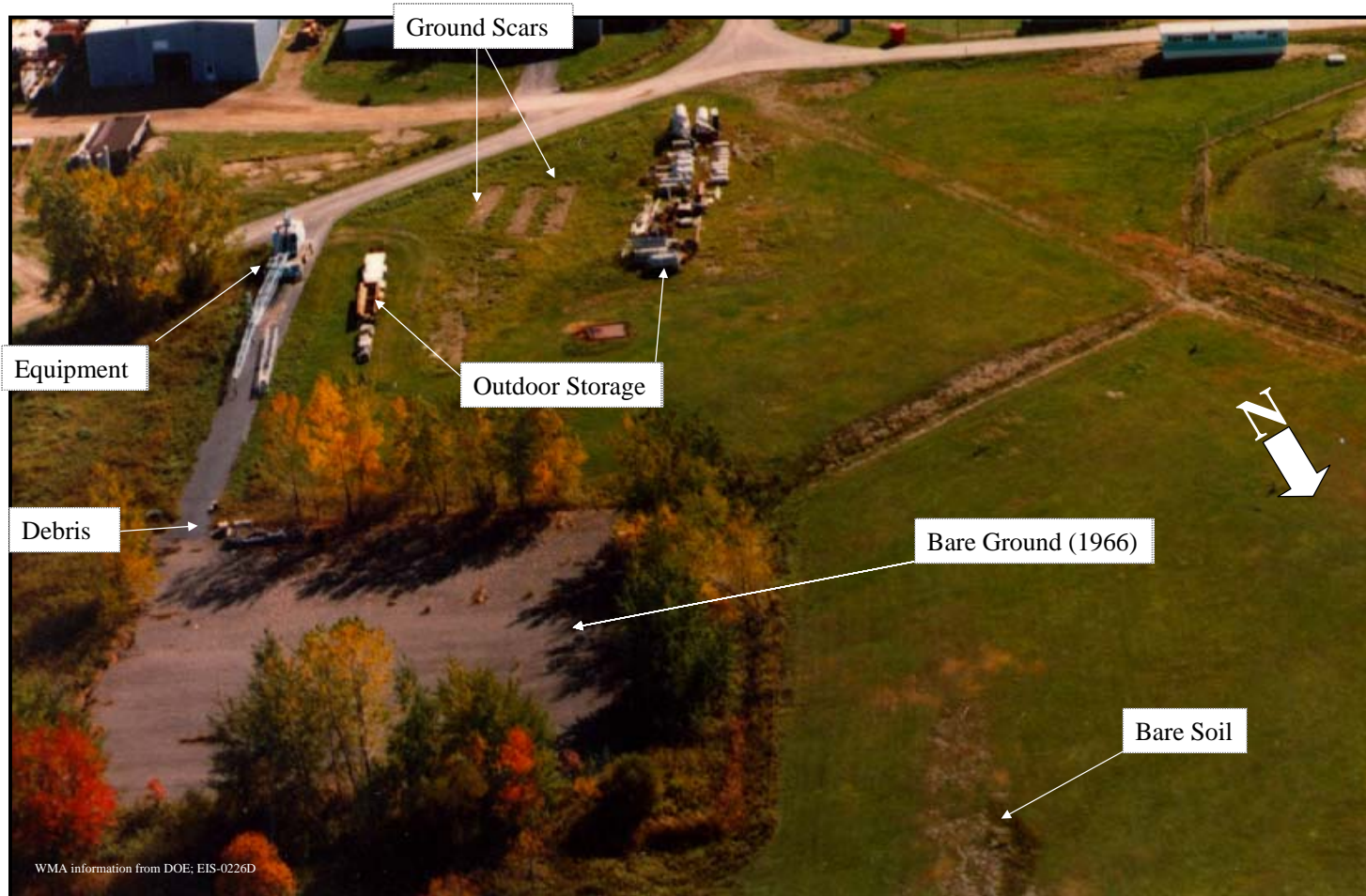
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA 4 is the Construction and Demolition Debris Landfill (CDDL)

WMA 5 AREA, 1982

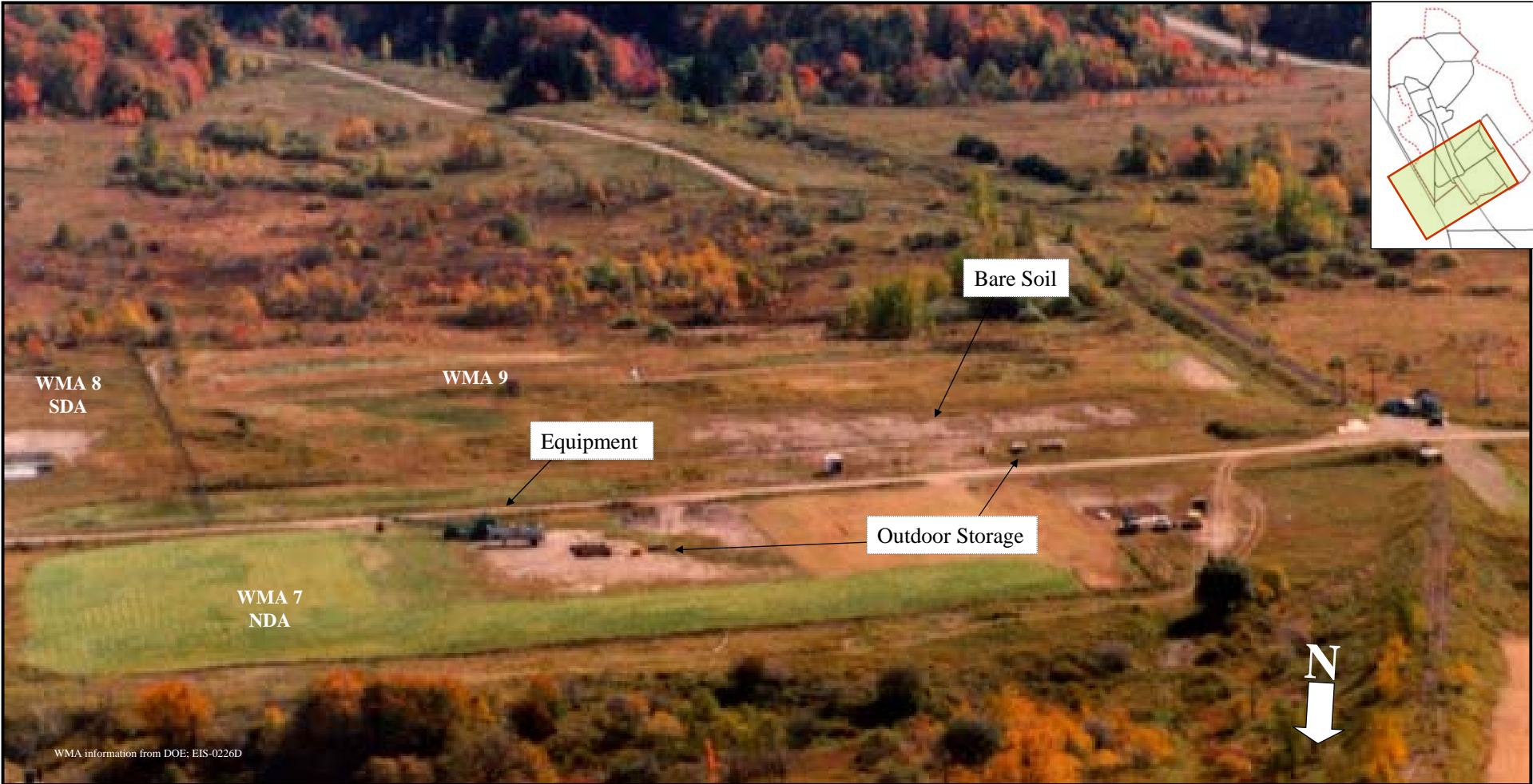
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA 5 is the Waste Storage Area. From this aerial view, the site is similar to the view in 1966.

WMA 7 & WMA 9 AREA, 1982

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

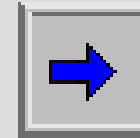


WMA information from DOE; EIS-0226D

WMA 7: NRC-licensed Disposal Area (NDA) and Associated Facilities
WMA 8: State-licensed Disposal Area (SDA) and Associated Facilities
WMA 9: Radwaste Treatment System Drum Cell Area



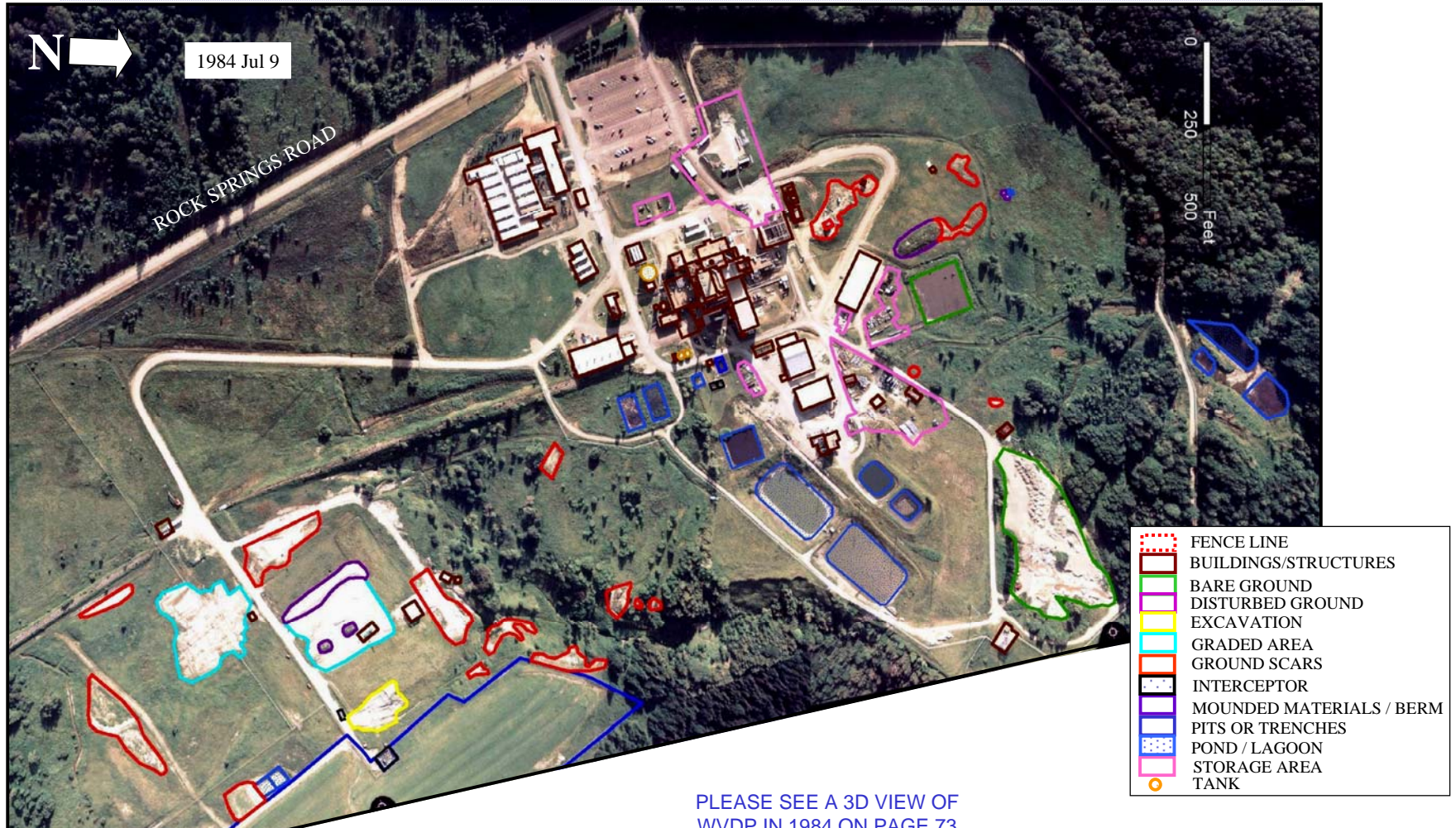
**1984 PHOTO
ANALYSIS**



WVDP 1984 SIGNIFICANT FINDINGS

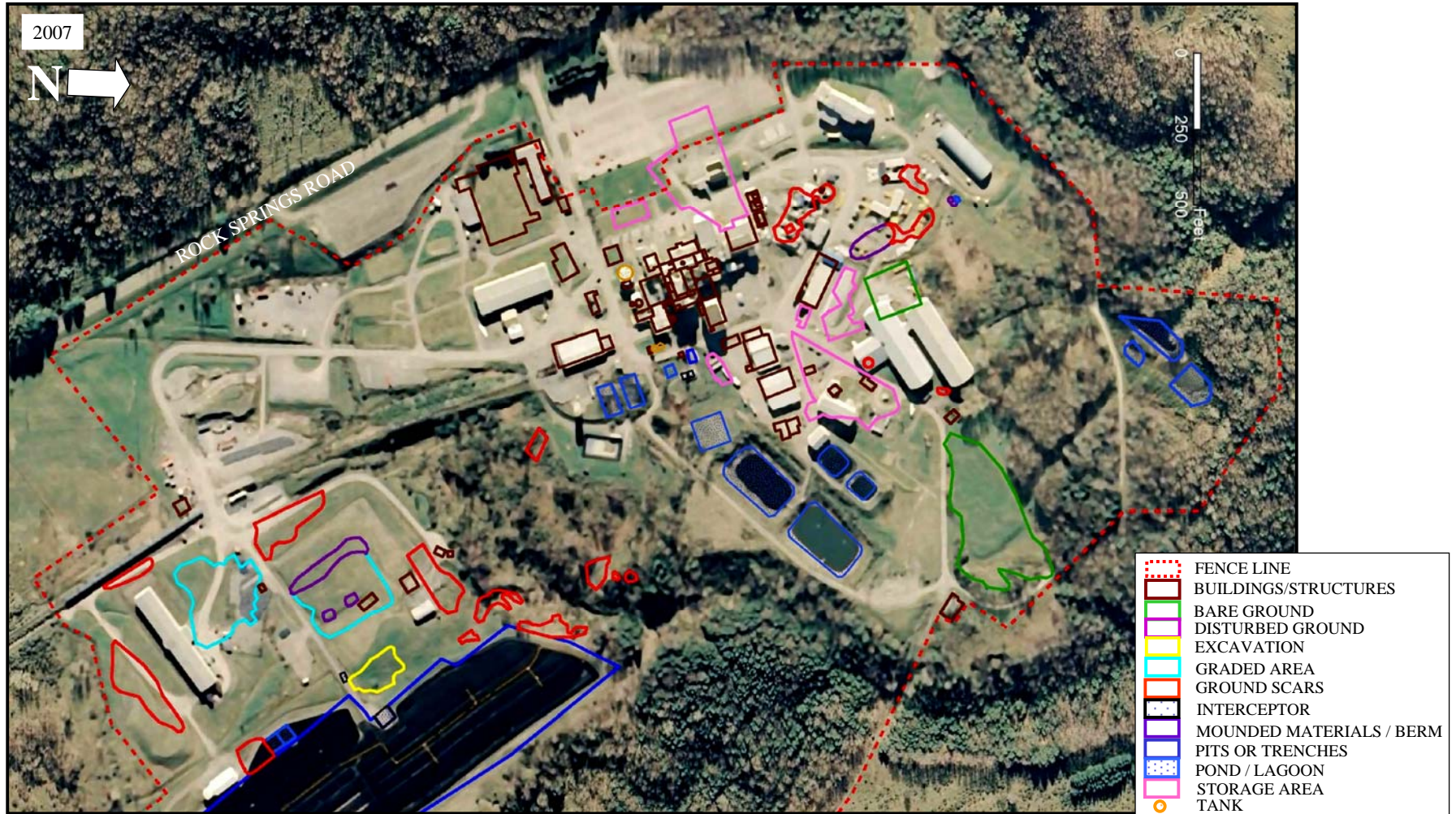
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

This graphic depicts an overview of findings derived from the 1984 aerial photography. Analysis of the 1984 imagery indicates a very active site with numerous new (since 1982) labs/buildings/structures, storage areas, and ground scars, observed in the photo.



1984 FINDINGS DISPLAYED OVER 2007 IMAGERY

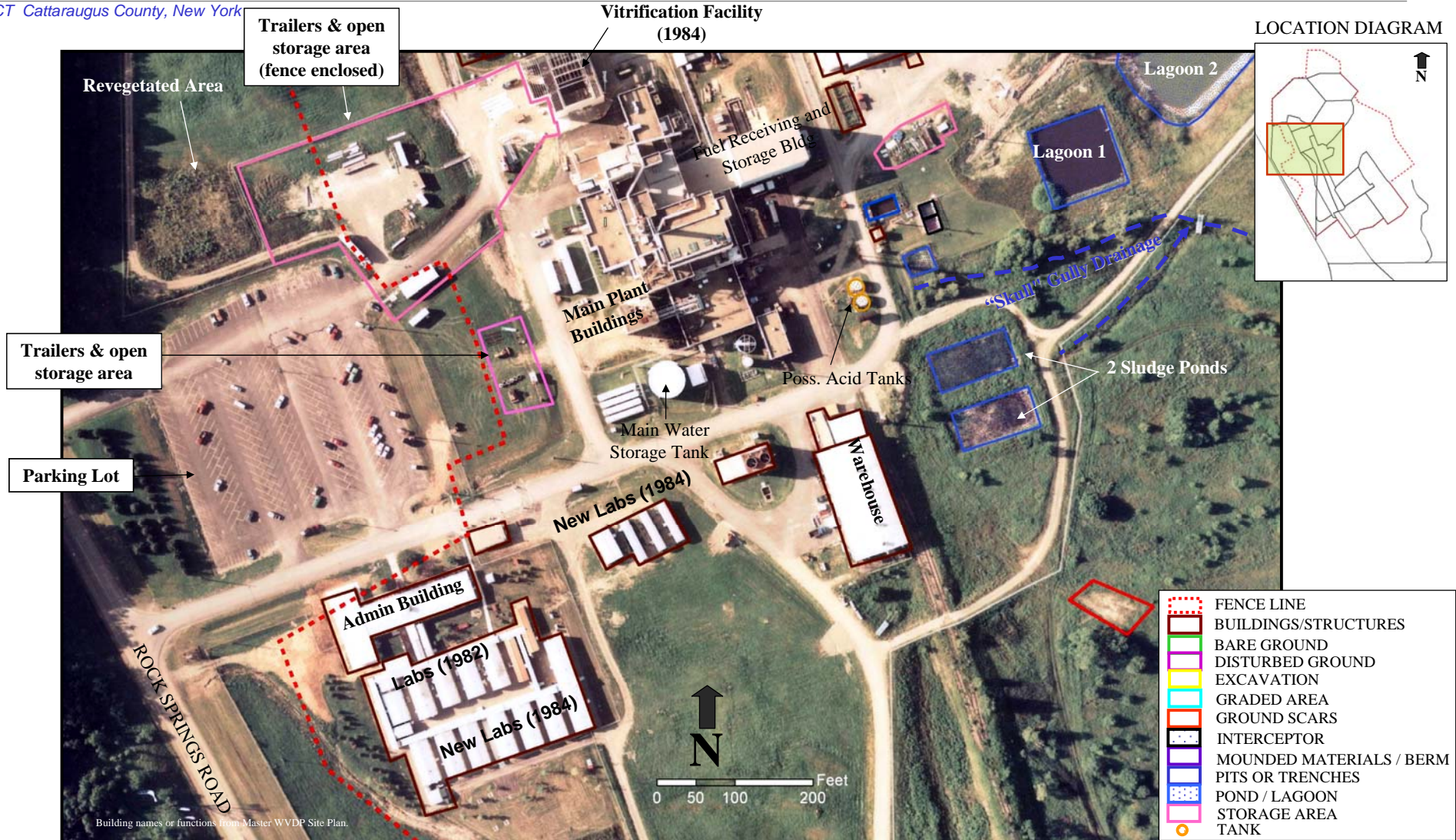
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



This graphic depicts an overview of findings from 1984 aerial photography superimposed on a 2007 base image.

ADMIN & PARKING LOT AREA – 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



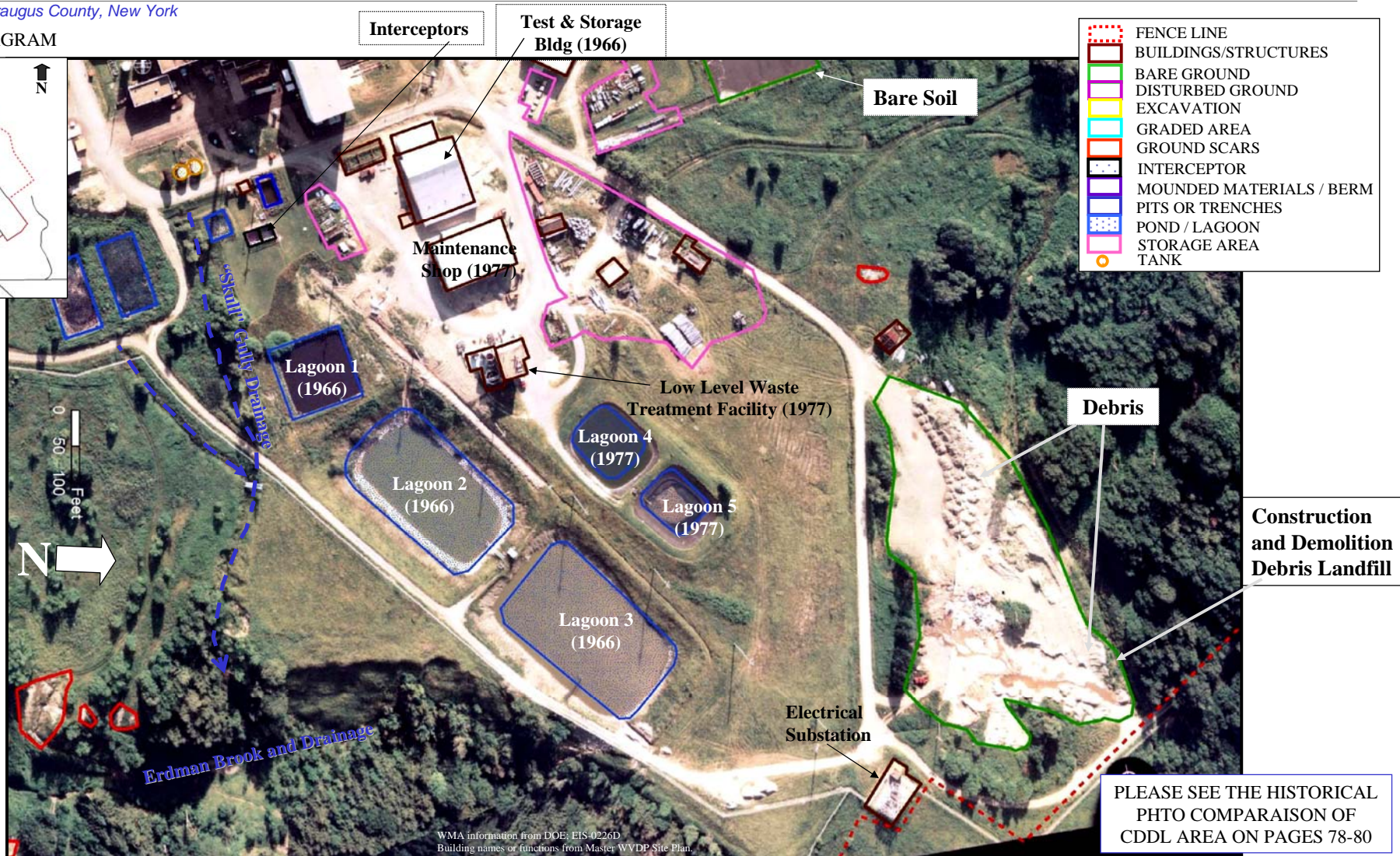
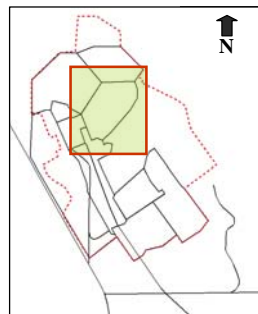
HPA FINAL REPORT
October 2009

Two new series of labs are observed near the admin building in this 1984 aerial photo. In the upper left, the bare soil area seen in the 1977 photos is now revegetated. This 1984 image is the first time the fence enclosed area adjacent to the upper parking lot is seen. It contains trailers and open storage.

AERIAL VIEW OF WMA 2 AND CDDL AREA, 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

LOCATION DIAGRAM

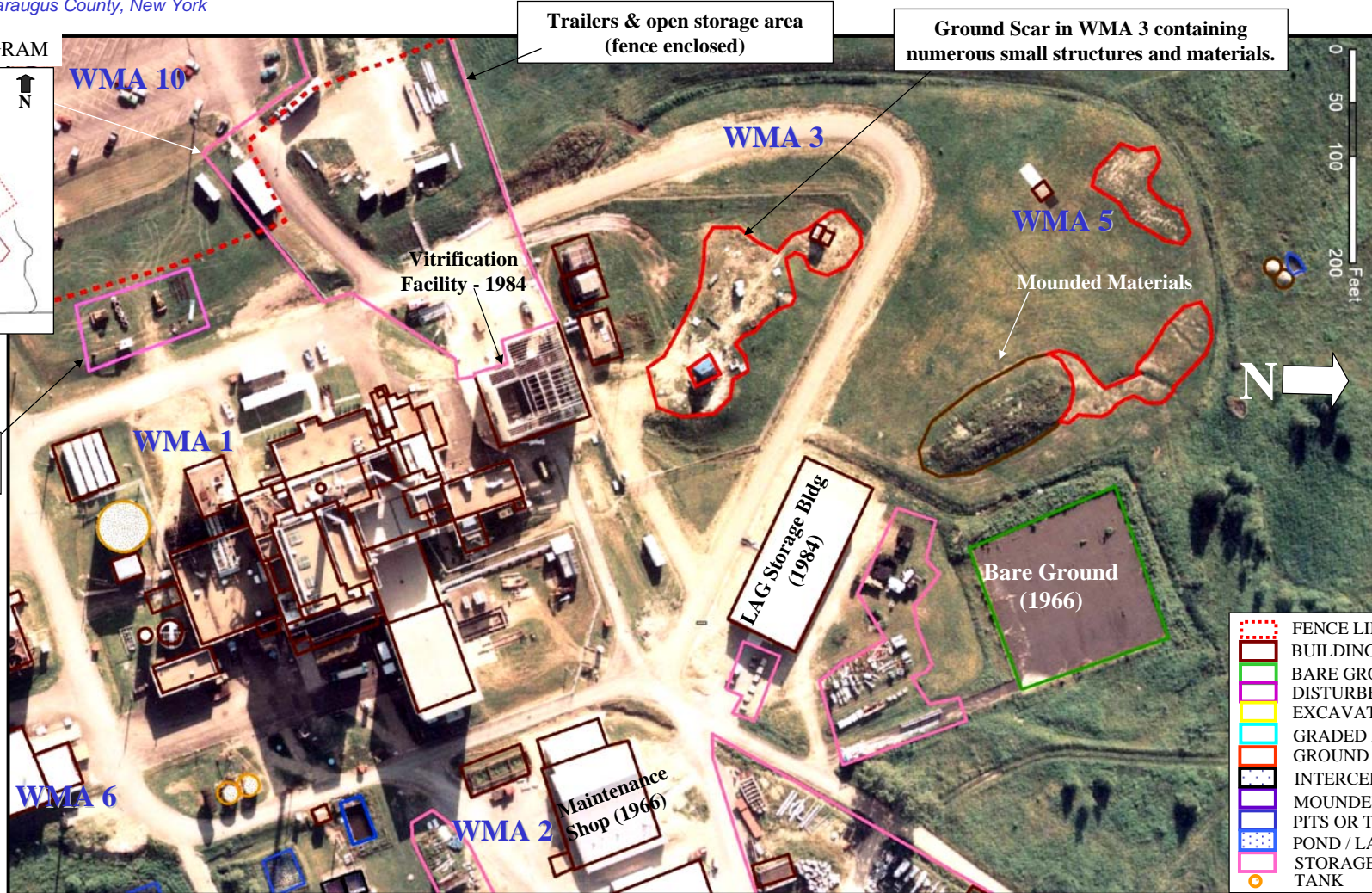
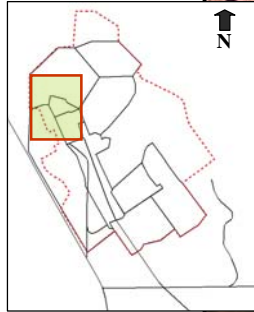


In this 1984 aerial photo, the Landfill area is first observed as a bare ground site containing large amount of debris.

WMA 1, WMA 3, & WMA 5 AREA, 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

LOCATION DIAGRAM



Trailers & open storage area

- FENCE LINE
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- GRADED AREA
- GROUND SCARS
- INTERCEPTOR
- MOUNDED MATERIALS / BERM
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK

WMA information from DOE; EIS-0226D
Building names or functions from Master WVDP Site Plan.

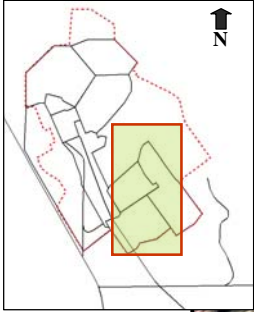
WMA 1: Main Plant Process Building and Vitriification Facility Area
WMA 2: Low-Level Waste Treatment Facility Area
WMA 3: Waste Tank Farm Area

WMA 5: Waste Storage Area
WMA 6: Central Project Premises
WMA 10: Support and Services Area

WMA 7, WMA 8, & WMA 9 AREA, 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

LOCATION DIAGRAM



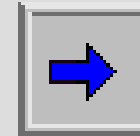
- FENCE LINE
- BUILDINGS/STRUCTURES
- BARE GROUND
- DISTURBED GROUND
- EXCAVATION
- GRADED AREA
- GROUND SCARS
- INTERCEPTOR
- MOUNDED MATERIALS / BERM
- PITS OR TRENCHES
- POND / LAGOON
- STORAGE AREA
- TANK

WMA information from DOE: EIS-0226D

In this 1988 image, WMA 7 and WMA 9 may be still under construction with graded areas, excavation, numerous ground scars, and mounded materials in the sites. Trenches and berms of WMA 8 are covered with grass.

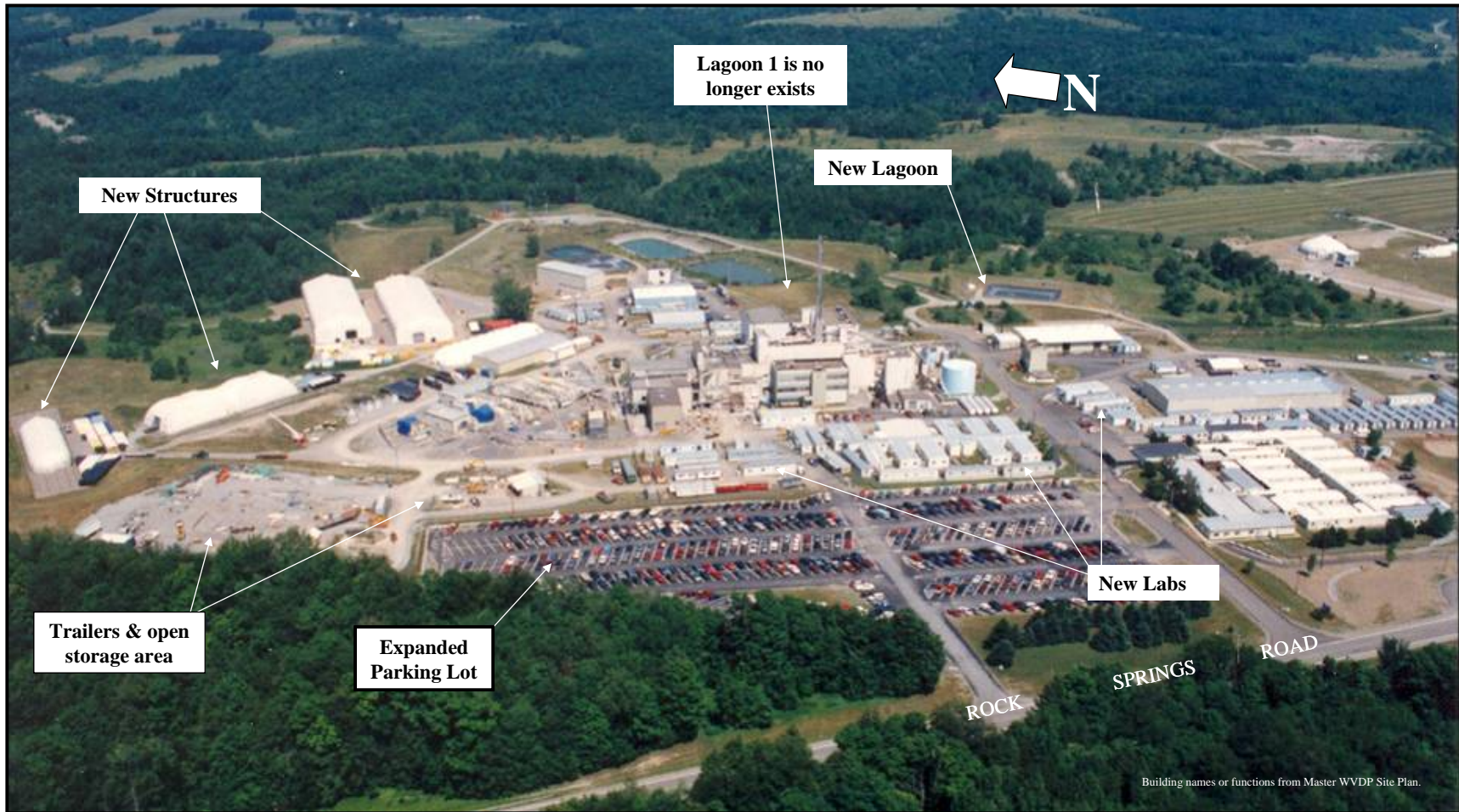


**1991 PHOTO
ANALYSIS**



WVDP 1991 OVERVIEW, LOOKING EAST

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



1991 Imagery is oblique aerial photograph and georeference is not available.
Numerous new (since 1984) lab/facilities are seen in this photo.

1991 OVERVIEW (CONTINUED)

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

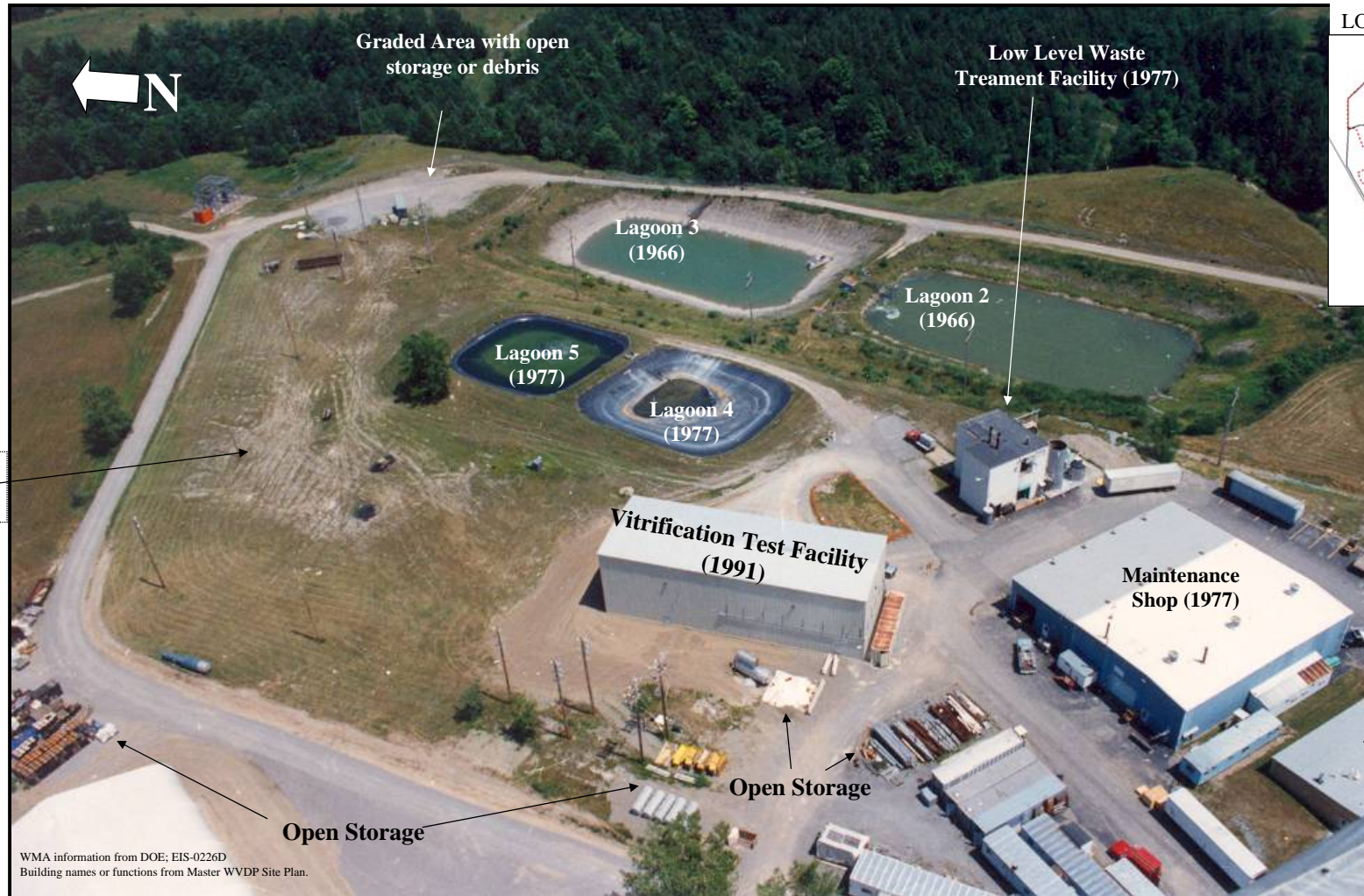


OBLIQUE PHOTO TAKEN FROM SOUTH SIDE LOOKING NORTHEAST

Numerous new (since 1984) lab/facilities are seen in this photo.

OBLIQUE AERIAL VIEW OF WMA 2, 1991

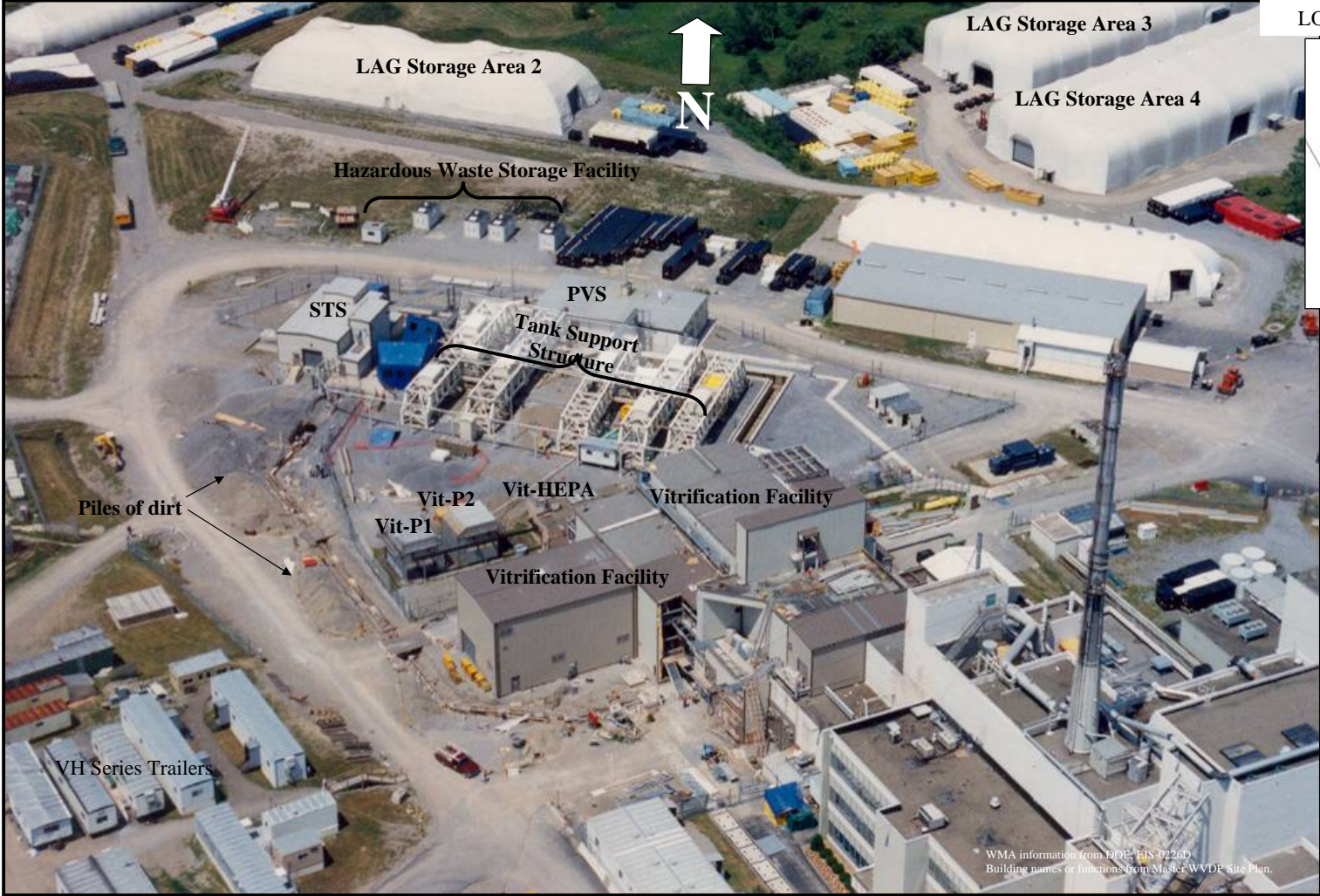
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA 2 is the Low-Level Waste Treatment Facility Area. In this 1991 photo, the Vitrification Test Facility (VTF) is first seen. Large amounts of open storage near the building area, a graded area with debris or open storage at the northeast side (near Lagoon 2), and a disturbed ground with heavy vehicle tracks are observed in the photo.

OBLIQUE VIEW OF WMA 3, 1991

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

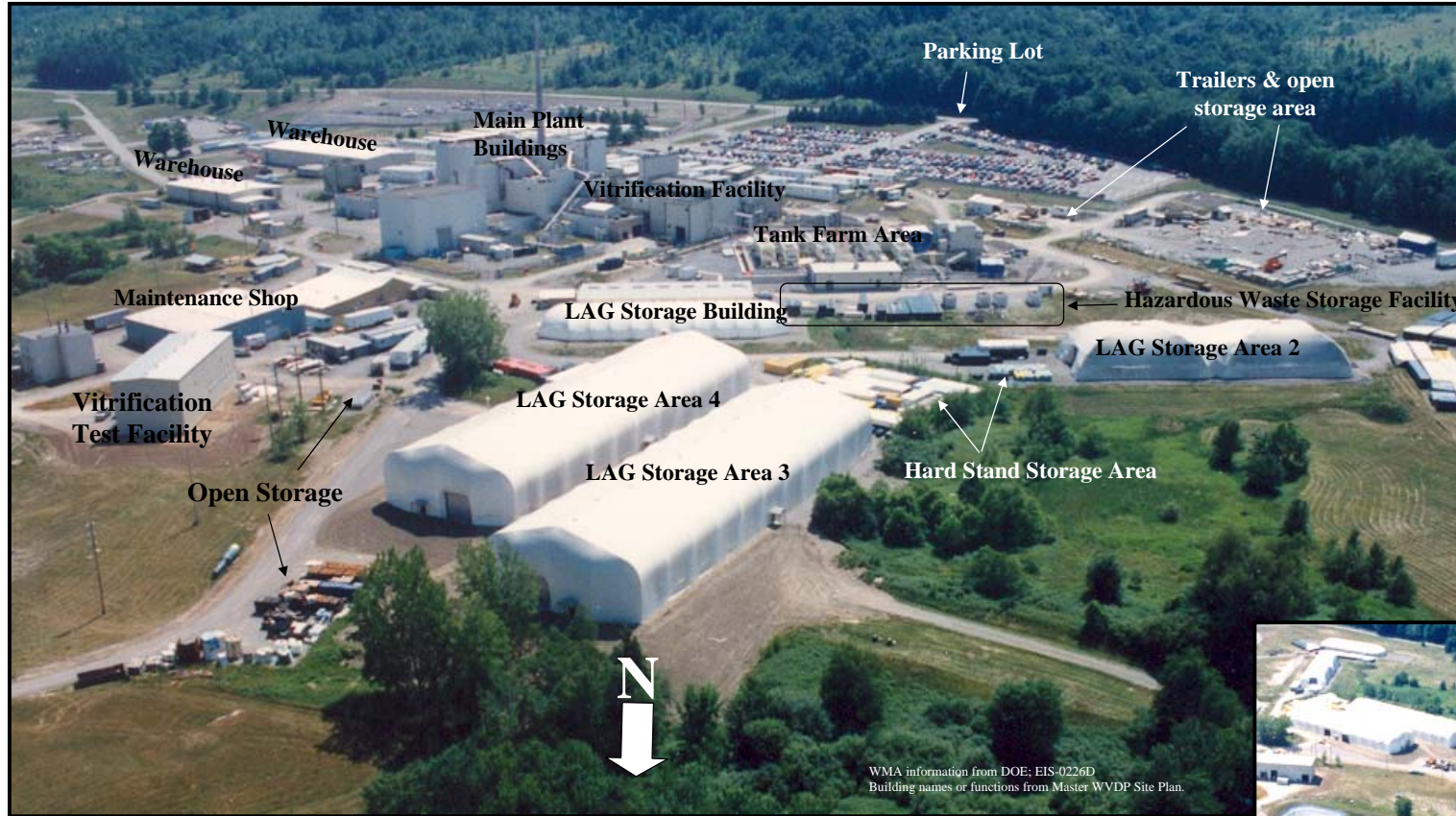


WMA information from DOE, EIS-0226D.
Building names or functions from Master WVDP Site Plan.

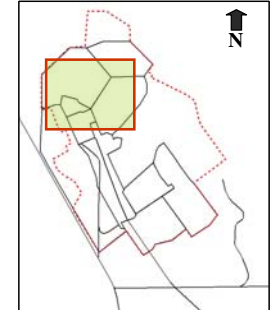
WMA 3 is the Waste Tank Farm Area. In this 1991 photo, the Permanent Ventilation System (PVS), Supernatant Treatment System (STS), and the Tank Support Structures are first seen.

OBLIQUE AERIAL VIEW OF WVDP, 1991 (FROM CDDL LOOKING IN SOUTHWEST DIRECTION)

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



LOCATION DIAGRAM



This photo of CDDL shows a revegetated area. No additional activity is seen at the site.



Construction and Demolition Debris Landfill
(CDDL)

The front view is WMA 5 is, which is the Waste Storage Area. In this 1991 photo, the LAG Storage building, LAG Storage Area 2, 3, & 4 are first observed. Open storage areas are seen in many parts of the installation.

OBLIQUE AERIAL VIEW OF WMA 7, WMA 8, & WMA 9 - 1991

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

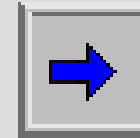


WMA 7: NRC-licensed Disposal Area (NDA) and Associated Facilities
WMA 8: State-licensed Disposal Area (SDA) and Associated Facilities
WMA 9: Radwaste Treatment System Drum Cell Area

In this 1991 image, many new facilities have been built since the 1984 photos: a dome-shape structure in the northeast of WMA 7, the SDA Mixed Waste Storage Facility in WMA 8, and the RTS Drum Cell in the center of WMA 9. WMA 7 may be still under construction with bare soil covering the north and the east sides. WMA 9 has some remaining ground scars. The trenches and berms of WMA 8 are covered with grass.

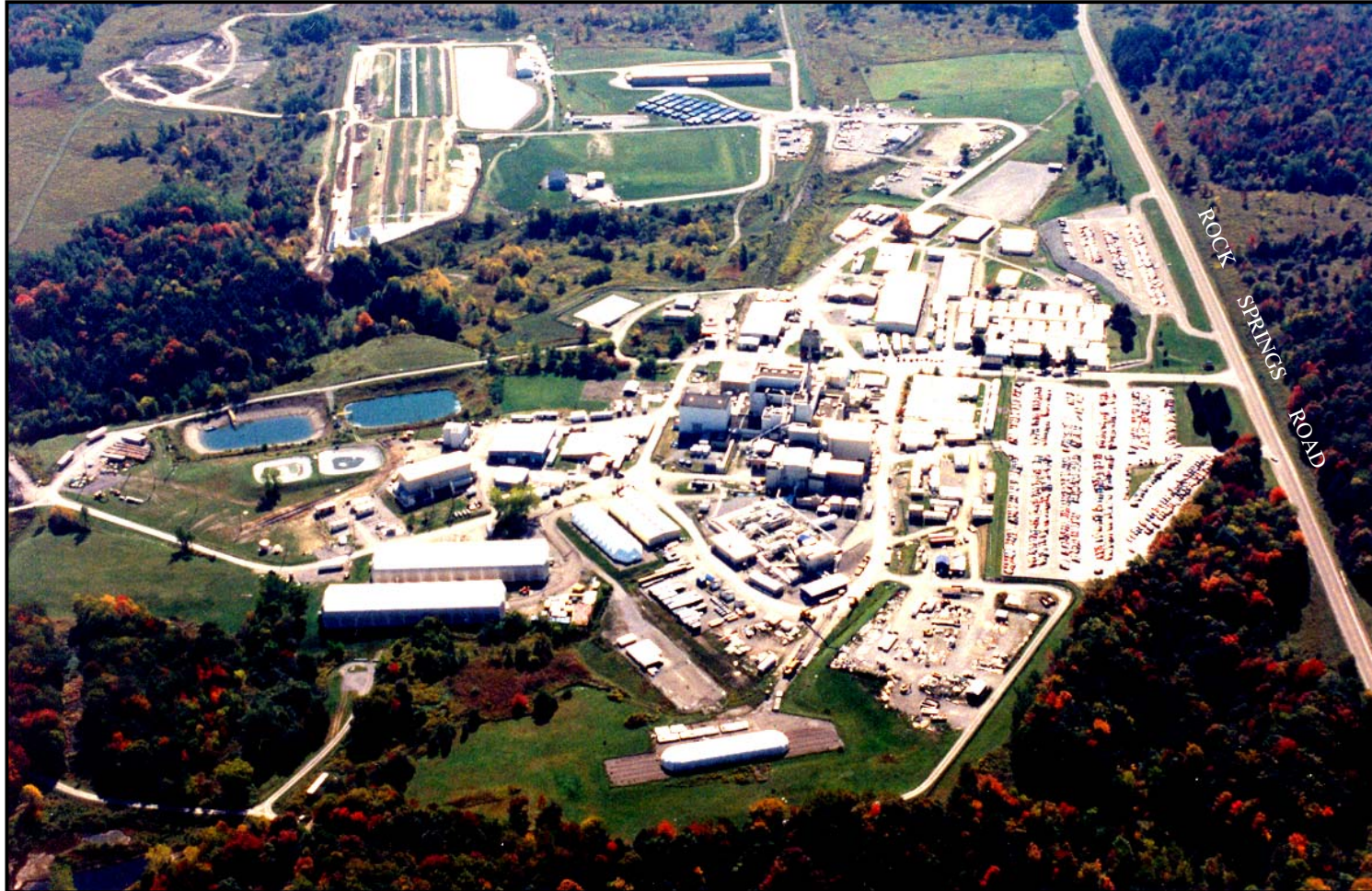


**1995 PHOTO
ANALYSIS**



WVDP 1995 OVERVIEW

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

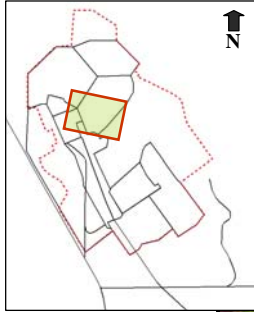


This 1995 imagery is an oblique aerial photograph and georeference is not available. In general, most of the structures, labs, and facilities seen in this photo are present in 2007 photography.

WMA 2 BUILDING AREA, 1995

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

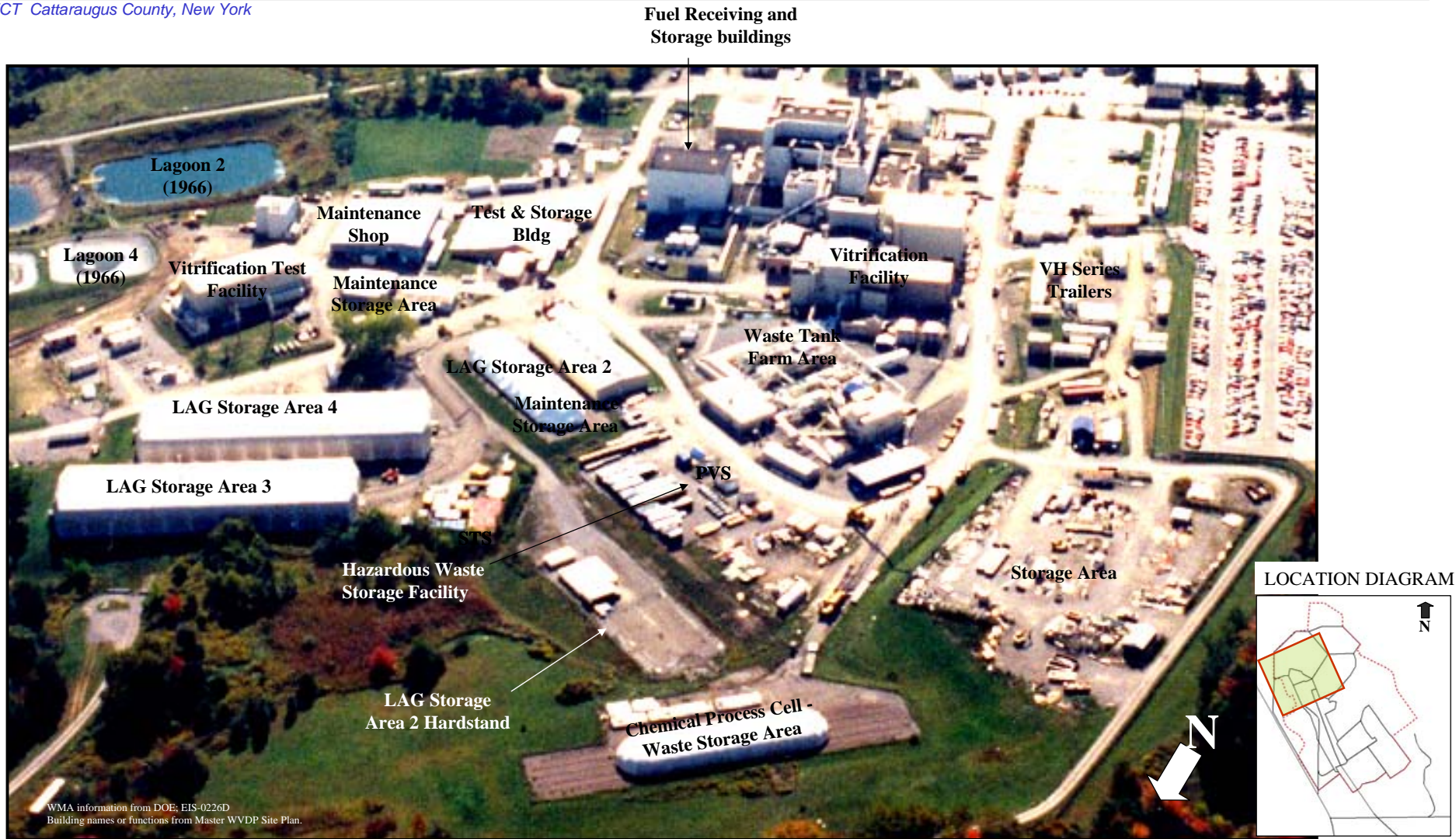
LOCATION DIAGRAM



WMA 2 is the Low-Level Waste Treatment Facility Area. The Low-Level Waste Treatment Building is new since 1991. Lagoon 1 is no longer present, and the site is totally revegetated. The interceptors are now roof covered. Several trailers and open storage areas are seen.

OBLIQUE VIEW OF NORTHERN SIDE, WVDP 1995

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA 3, the Waste Tank Farm Area, has not change since the 1991 photos. In this 1995 photo, the Chemical Process Cell – Waste Storage Area - is first seen in the Northwest of WMA 5, the Waste Storage Area.

OBLIQUE VIEW OF SOUTHERN SIDE, WVDP 1995

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

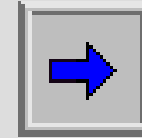


WMA 7: NRC-licensed Disposal Area (NDA) and Associated Facilities
WMA 8: State-licensed Disposal Area (SDA) and Associated Facilities
WMA 9: Radwaste Treatment System Drum Cell Area

In this 1995 image, WMA 9 has not changed from the 1984 photos. In WMA 7, the dome-shape structure is replaced by the NDA Pretreatment Building. WMA 8 has three sections and may be under reconstruction. The south section is covered by a dark grey material. The northeast section still contains construction equipment. It is partially covered by black material, but mostly covered with bare soil. The southeast section has a trench filled with an unidentified substance.

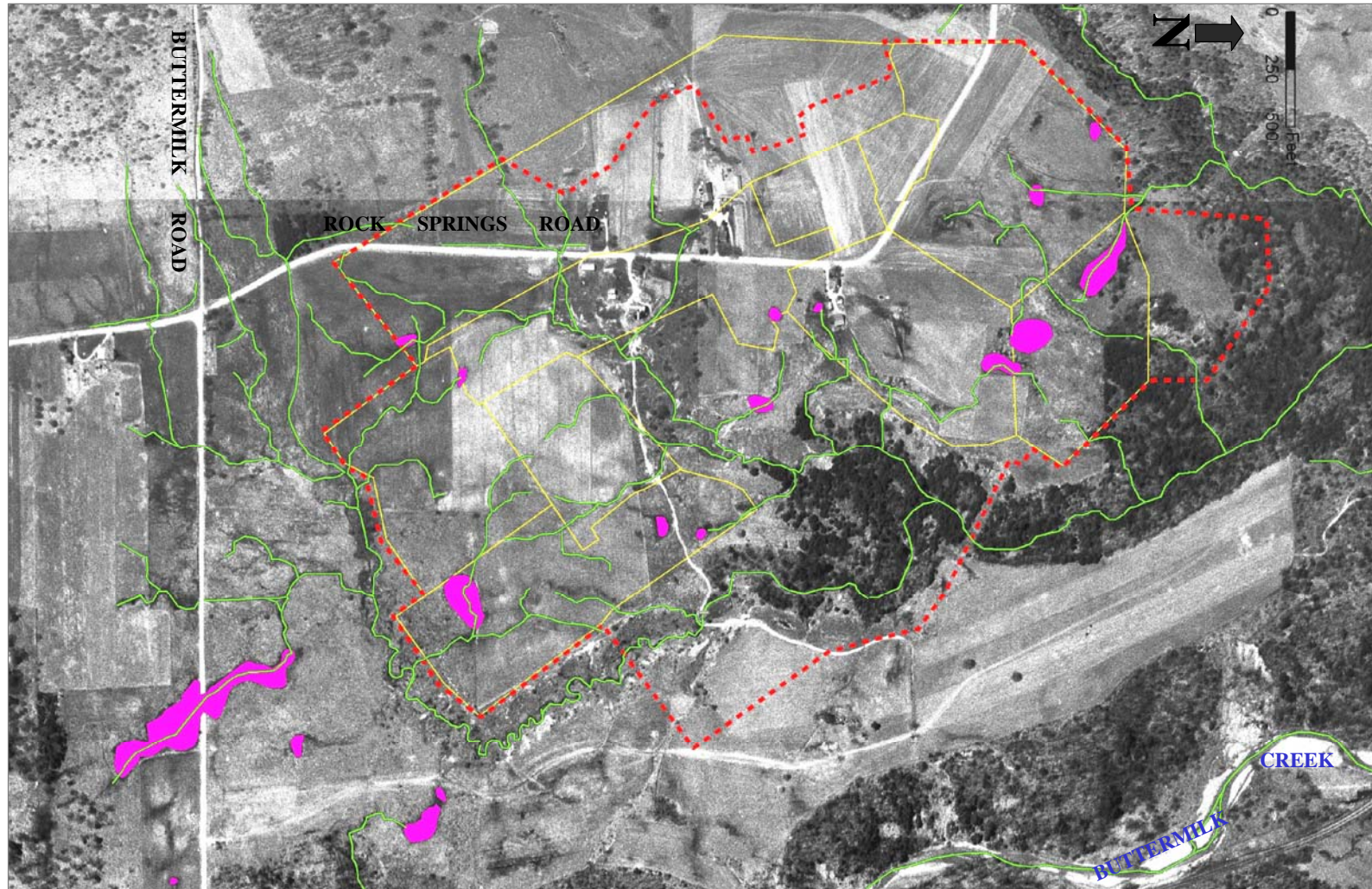


**DRAINAGE
ANALYSIS**



PREDEVELOPMENT DRAINAGE - 1962

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



WMA information from DOE; EIS-0226D

HPA FINAL REPORT
October 2009



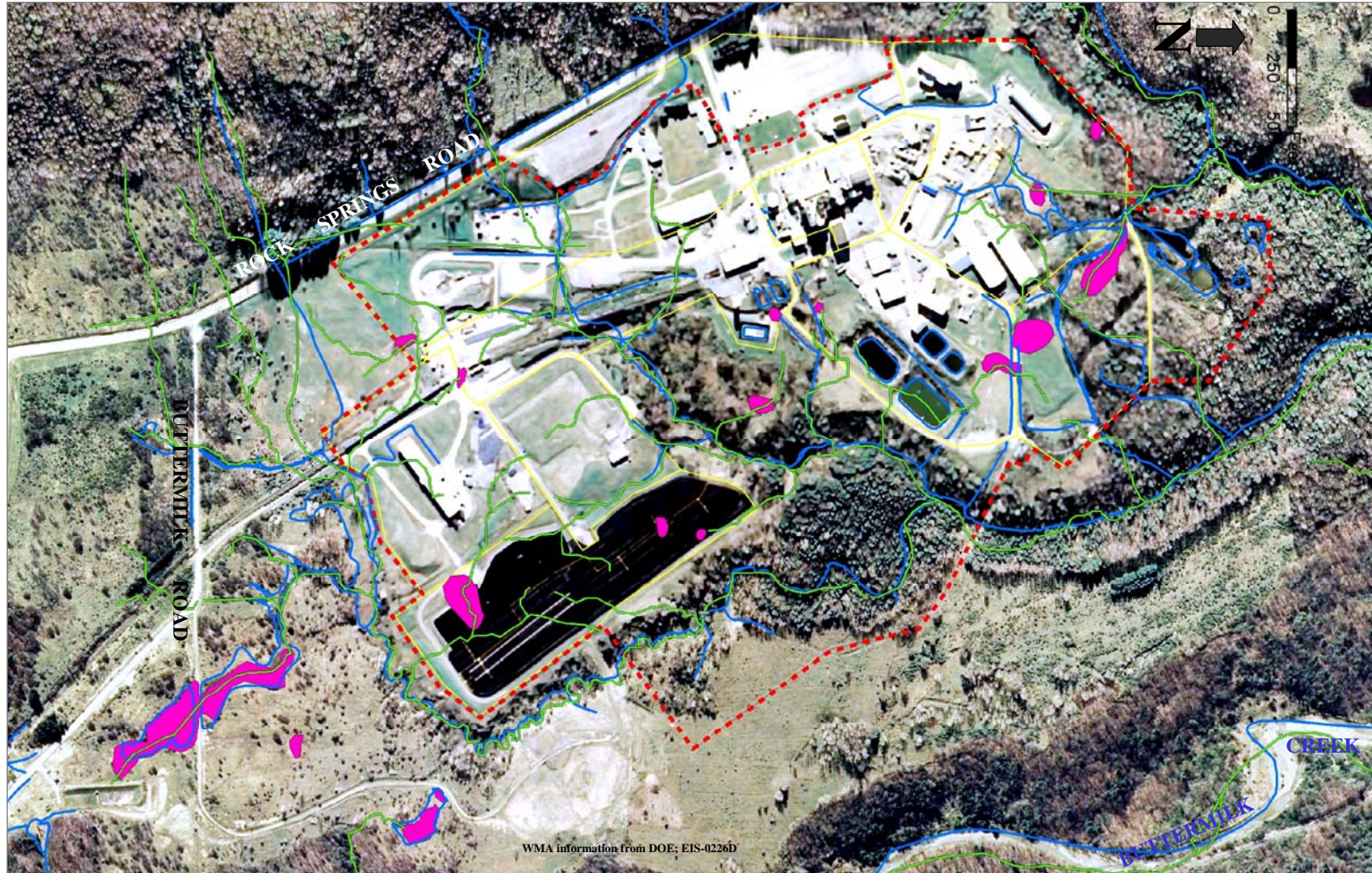
APPROX. PRESENT-DAY
FENCELINE OF WVDP AREA
APPROX. PRESENT-DAY 10 WMAs



APPROX. DRAINAGE SYSTEM IN 1962
APPROX. SWAMP/DEPRESSION IN 1962

DRAINAGE OF 1962 AND PRESENT DAY DISPLAYED OVER 2007 IMAGERY

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

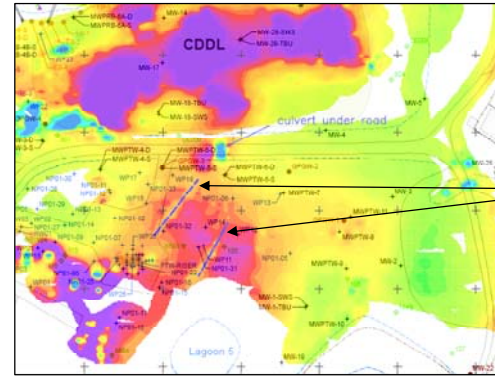


- - - - - APPROX. PRESENT-DAY FENCELINE OF WVDPA AREA
- — — — — APPROX. PRESENT-DAY 10 WMAs
- APPROX. SWAMP/DEPRESSION IN 1962
- — — — — APPROX. DRAINAGE SYSTEM IN 1962
- — — — — APPROX. DRAINAGE SYSTEM IN PRESENT DAY (PROVIDED BY ARGONNE NATIONAL LABORATORY)

PREDEVELOPMENT DRAINAGE VS ANOMALIES FROM GEOPHYSICAL SURVEY

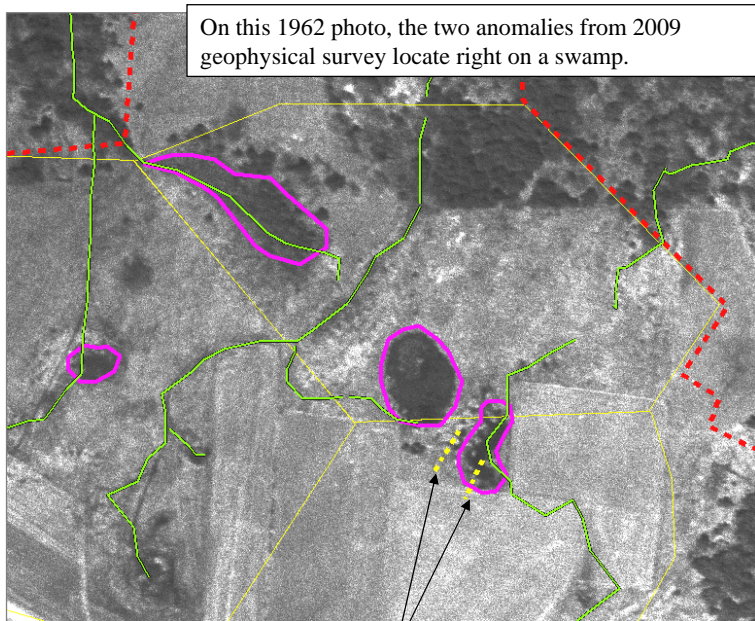
WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

- - - - - APPROX. PRESENT-DAY FENCELINE OF WVDP AREA
- APPROX. PRESENT-DAY 10 WMAs
- APPROX. DRAINAGE SYSTEM IN 1962
- APPROX. SWAMP/DEPRESSION IN 1962
- APPROX. DRAINAGE SYSTEM IN PRESENT DAY (PROVIDED BY ARGONNE NATIONAL LABORATORY)
- - - - - APPROX. ANOMALY LOCATIONS



Geophysical Survey Map

A Geophysical Survey in 2009 using an EM31 records two anomalies that are noted by dotted lines near WP-11 and NP01-32.

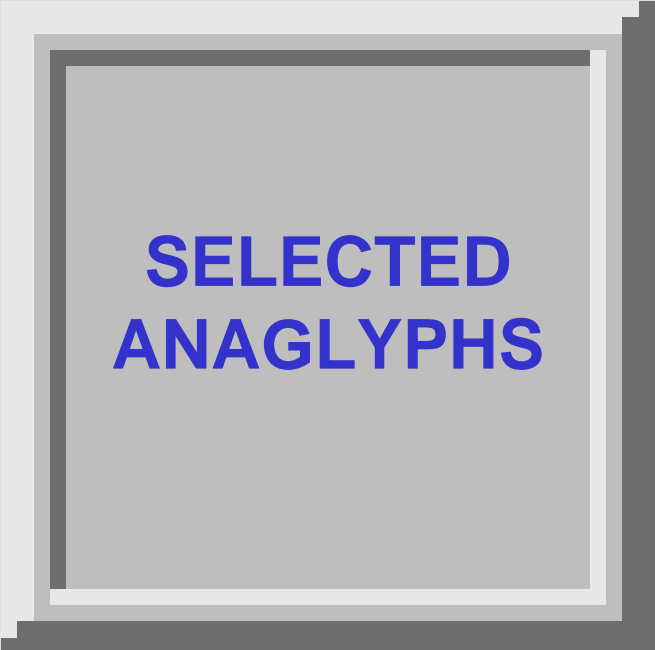


ANOMALIES FROM 2009 GEOPHYSICAL SURVEY SUPERIMPOSED ON 1962 DRAINAGE MAP

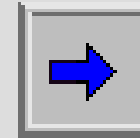


ANOMALIES FROM 2009 GEOPHYSICAL SURVEY SUPERIMPOSED ON 2007 DRAINAGE MAP

WMA information from DOE; EIS-0226D

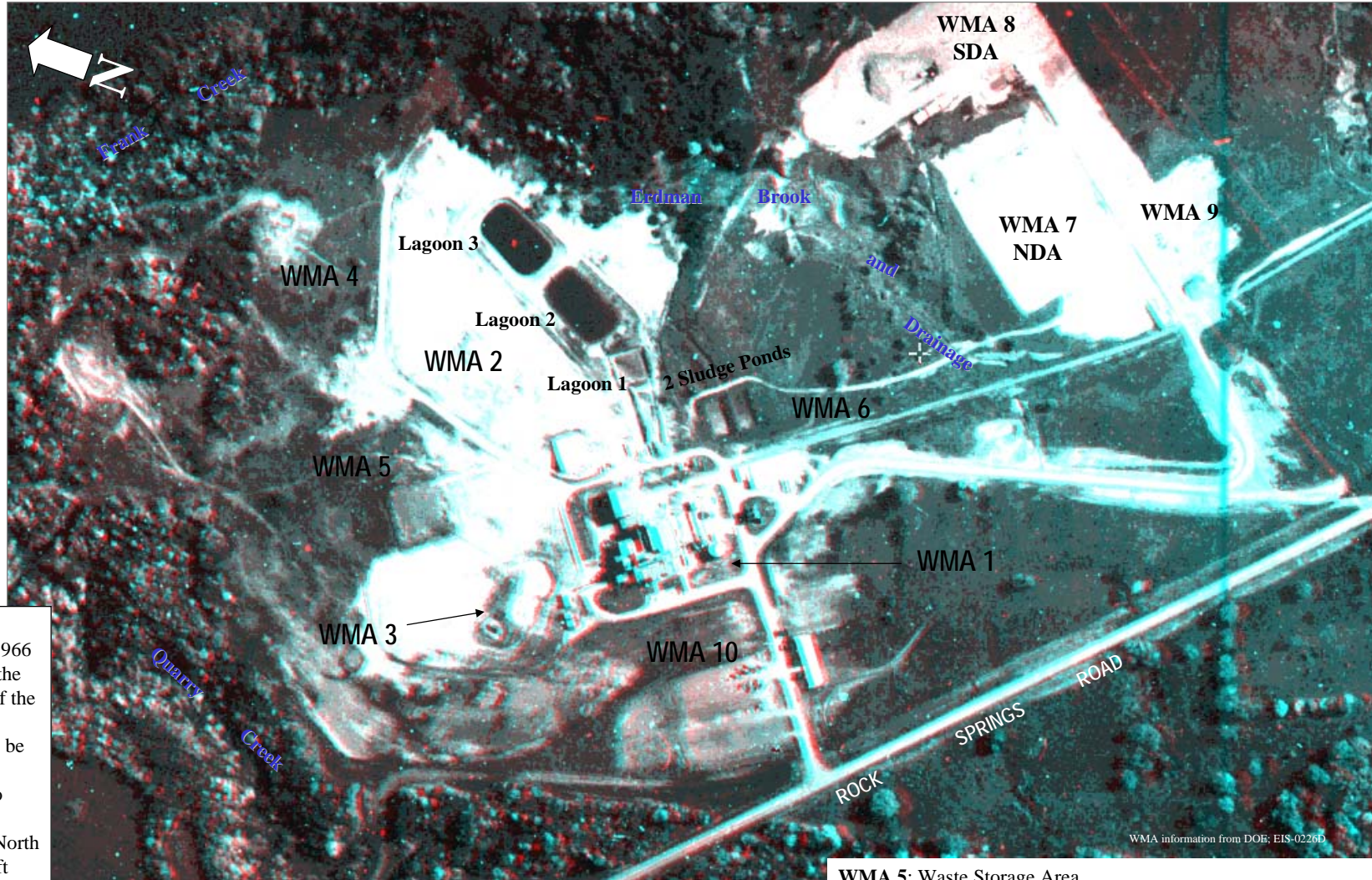


**SELECTED
ANAGLYPHS**



3D VIEW OF WVDP, OCTOBER 1966

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



In order to make the 1966 anaglyph, the direction of the photos are required to be oriented to their stereo viewing position. North is to the left

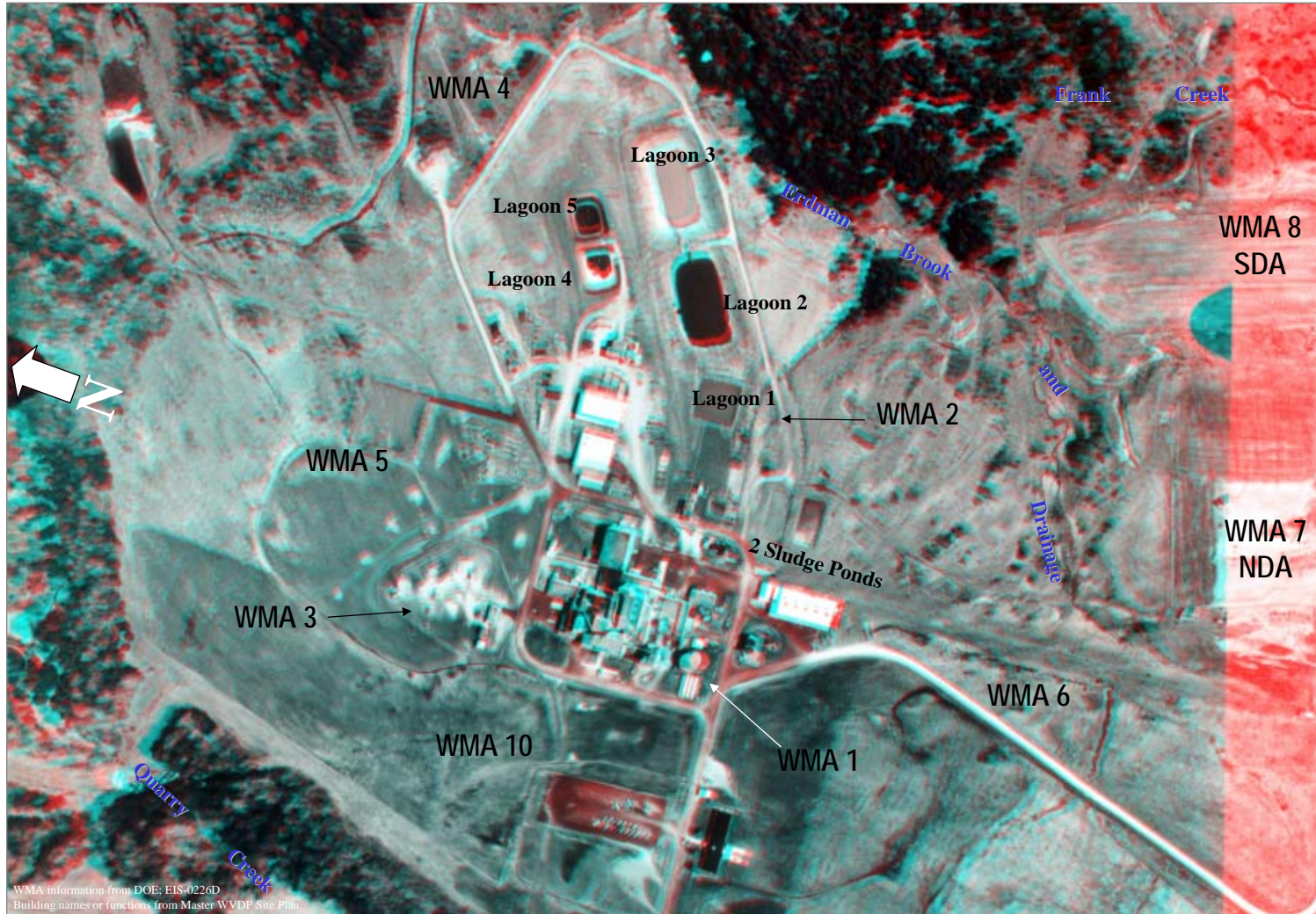
WMA information from DOE; EIS-0226D

HPA FINAL REPORT
October 2009

- WMA 1:** Main Plant Process Building and Vitrification Facility Area
- WMA 2:** Low-Level Waste Treatment Facility Area
- WMA 3:** Waste Tank Farm Area
- WMA 4:** Construction and Demolition Debris Landfill
- WMA 5:** Waste Storage Area
- WMA 6:** Central Project Premises
- WMA 7:** NRC-licensed Disposal Area (NDA) and Associated Facilities
- WMA 8:** State-licensed Disposal Area (SDA) and Associated Facilities
- WMA 9:** Radwaste Treatment System Drum Cell Area

3D VIEW OF WVDP, APRIL 1977

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



In order to make the 1966 anaglyph, the direction of the photos are required to be oriented to their stereo viewing position. North is to the left

WMA information from DOE; EIS-0226D
Building names or functions, from Master WVDP Site Plan

- WMA 1:** Main Plant Process Building and Vitrification Facility Area
- WMA 2:** Low-Level Waste Treatment Facility Area
- WMA 3:** Waste Tank Farm Area
- WMA 4:** Construction and Demolition Debris Landfill

- WMA 5:** Waste Storage Area
- WMA 6:** Central Project Premises
- WMA 7:** NRC-licensed Disposal Area (NDA) and Associated Facilities
- WMA 8:** State-licensed Disposal Area (SDA) and Associated Facilities
- WMA 9:** Radwaste Treatment System Drum Cell Area

3D VIEW OF WVDP, 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

NOTE:

In order to make the 1984 anaglyph, the direction of the photos are required to be oriented to their stereo viewing position. North is to the right.

1984 photographs are large scale photos. No one frame covers the whole installation.



- WMA 1:** Main Plant Process Building and Vitrification Facility Area
- WMA 2:** Low-Level Waste Treatment Facility Area
- WMA 3:** Waste Tank Farm Area
- WMA 4:** Construction and Demolition Debris Landfill
- WMA 5:** Waste Storage Area
- WMA 6:** Central Project Premises
- WMA 7:** NRC-licensed Disposal Area (NDA) and Associated Facilities
- WMA 8:** State-licensed Disposal Area (SDA) and Associated Facilities
- WMA 9:** Radwaste Treatment System Drum Cell Area

WMA 6

WMA 2

2 Sludge Ponds

Lagoon 1

Lagoon 2

Lagoon 4

Lagoon 5

Lagoon 3

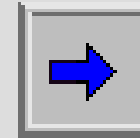
Erdman Brook



WMA 4



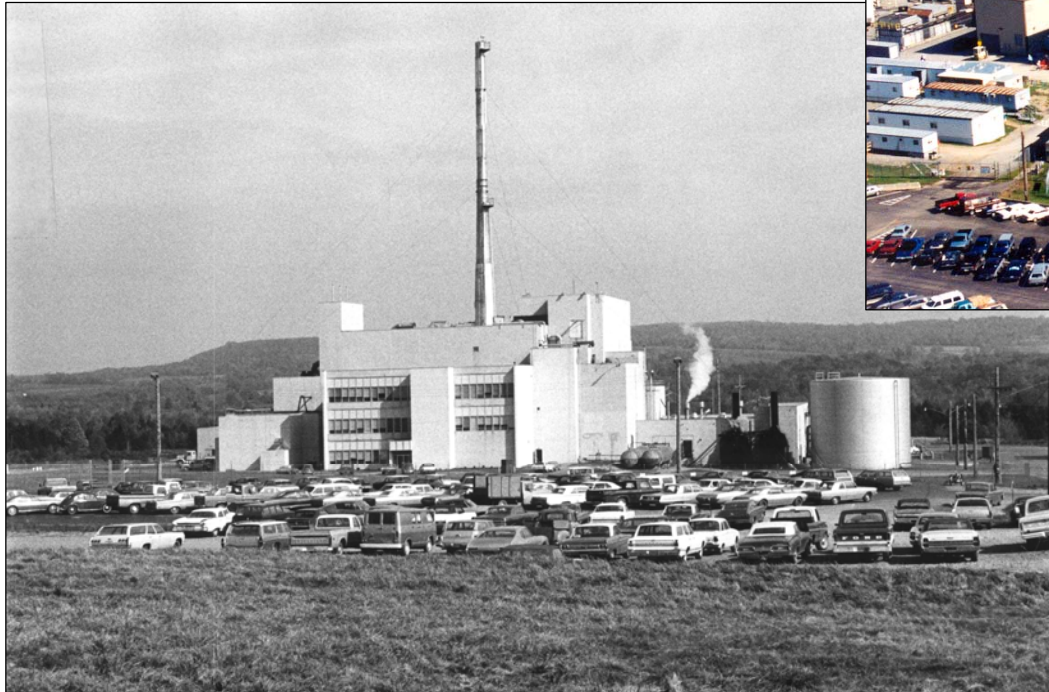
**SELECTED
HISTORICAL
STILL PHOTOS**



HISTORICAL PHOTO COMPARAISON OF MAIN PLANT AREA

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

WVDP, No Date picture.
- Circa 1970s



WVDP, 1995

FUEL RECEIVING AND STORAGE BUILDING, CIRCA 1970s

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York



Fuel Receiving and
Storage bldg

World's first privately-owned spent nuclear fuel reprocessing plant operated by Nuclear Fuel Services, Inc., a majority-owned subsidiary of W. R. Grace and Co. The plant is located on a 3,300-acre site in West Valley, N. Y., owned by the New York State Atomic and Space Development Authority.

AEC-74-10502

NUCLEAR FUEL SERVICES...Spent fuel shipment arrives at Nuclear Fuel Services reprocessing plant at West Valley, New York. Irradiated fuel from a nuclear power plant is shipped within a cask built to withstand accidents and protect employees and the general public from radiation. In the reprocessing plant, the spent fuel is put through a series of solvent extraction processes to recover uranium and plutonium for use as fuel and to separate the fission product wastes. The NFS plant was shut down in 1972 for modifications and expansion with resumption of reprocessing expected in 1977. The NFS plant was authorized to continue receiving spent fuel and storing it in water-cooled basins for future processing.

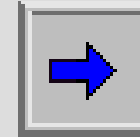
U. S. Atomic Energy Commission
Office of Information Services
Washington, D.C. 20545

434-SF-99-3



Fuel Receiving and
Storage bldg

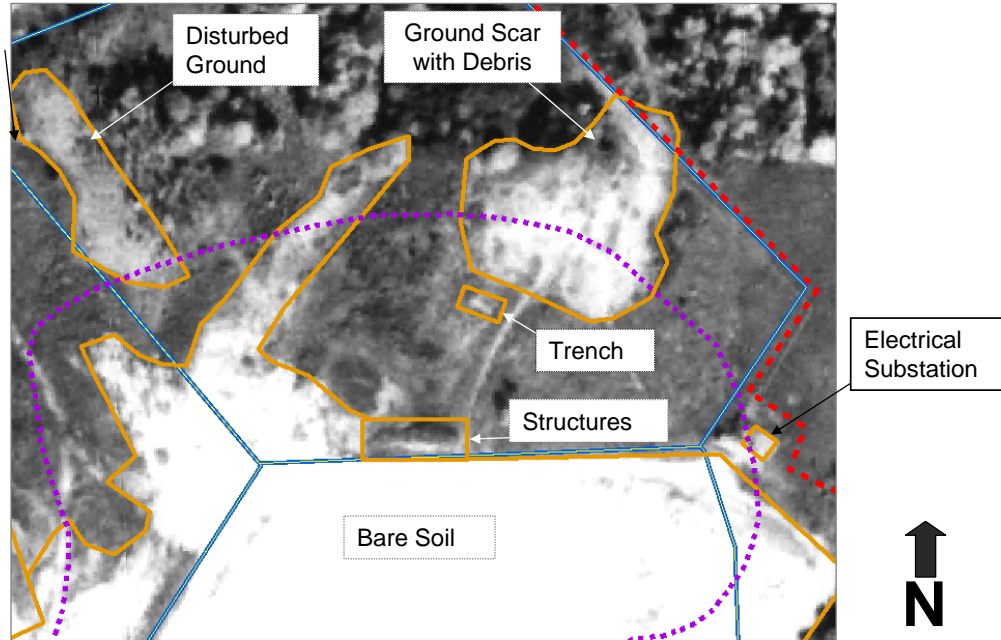
**HISTORICAL PHOTO
COMPARAISON OF
CDDL AREA**



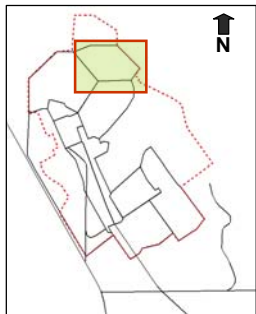
HISTORICAL PHOTO COMPARAISON OF WMA 4 (CDDL AREA), 1966 & 1977

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

Oct 8, 1966



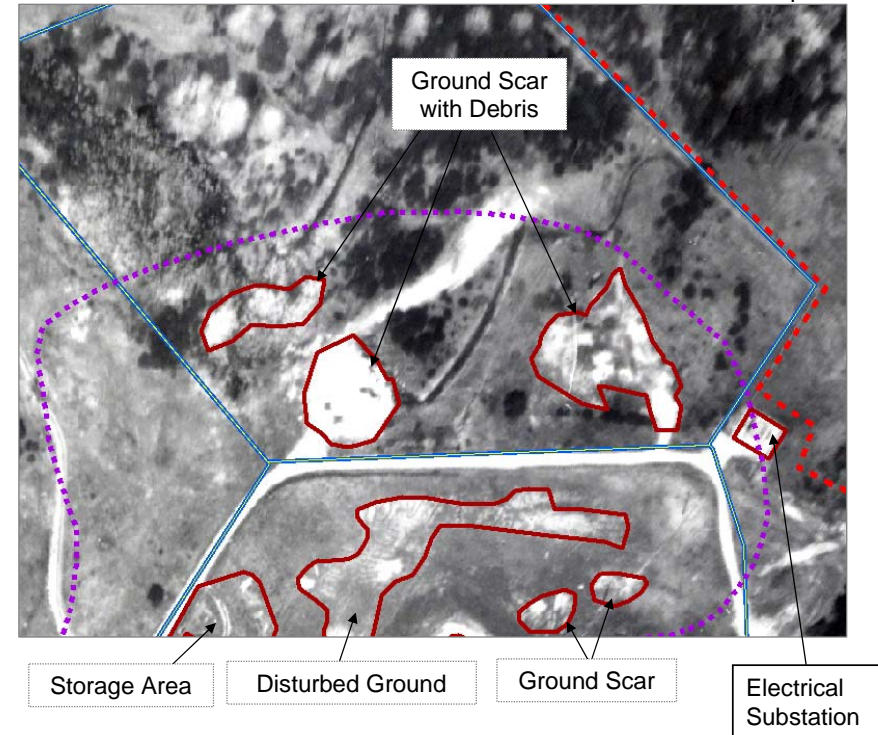
LOCATION DIAGRAM



WMA 4 is the Construction and Demolition Debris Landfill (CDDL)

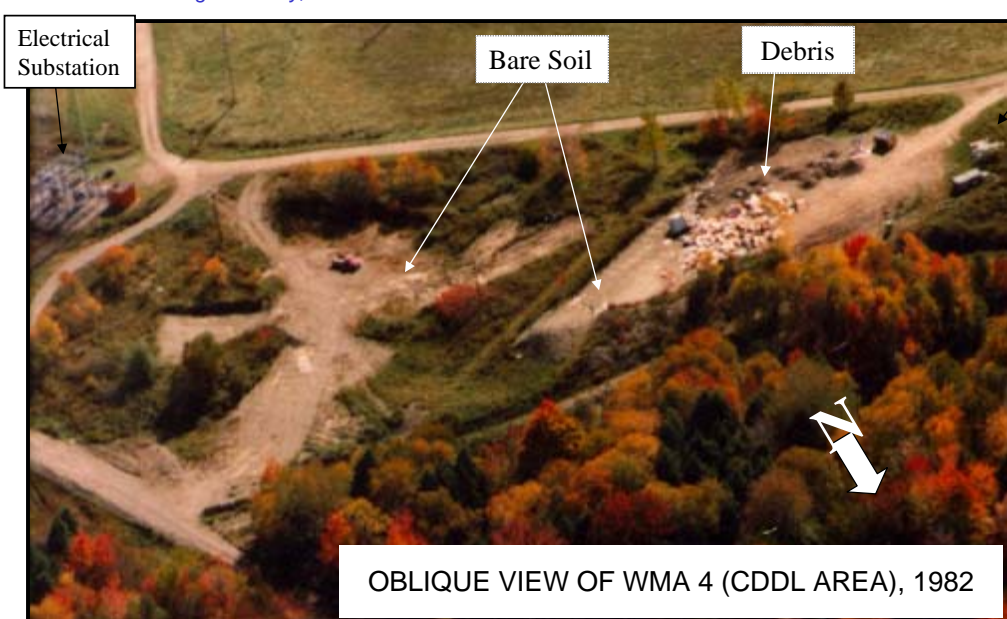


1977 Apr 29



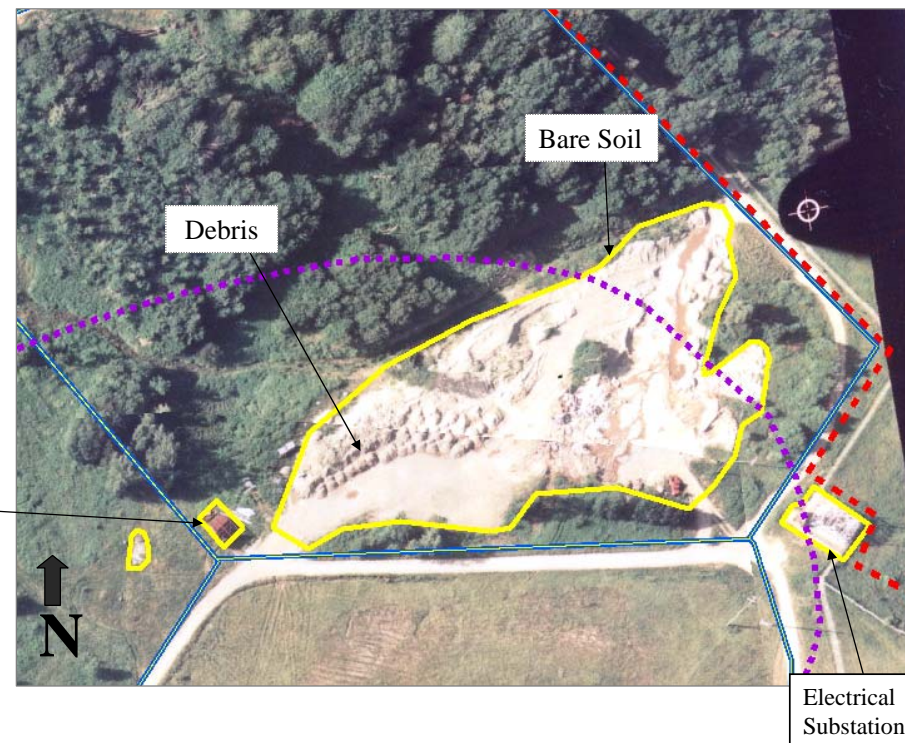
HISTORICAL PHOTO COMPARAISON OF WMA 4 (CDDL AREA), 1982 & 1984

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

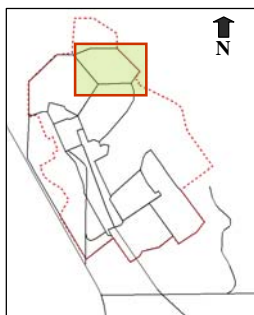


- - - - - APPROX. PRESENT-DAY FENCELINE OF WVDP AREA
- APPROX. PRESENT-DAY 10 WMAs
- - - - - APPROX. NORTH PLATEAU PLUME
- 1984 FINDINGS

VERTICAL VIEW OF WMA 4 (CDDL AREA), 1984



LOCATION DIAGRAM



In general, the bare soil area in 1982 and 1984 photos in the Construction and Demolition Debris Landfill (CDDL) are similar.

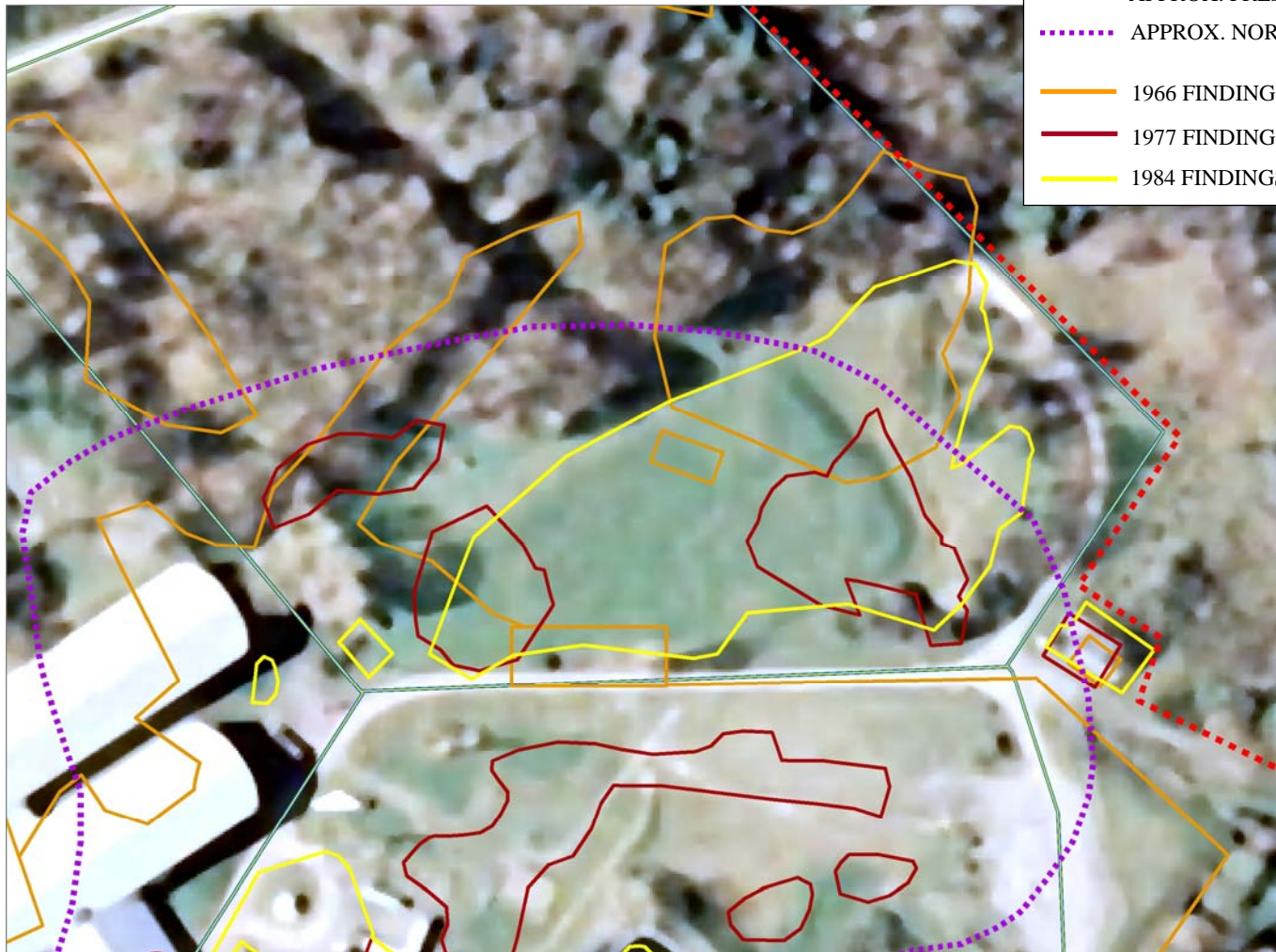
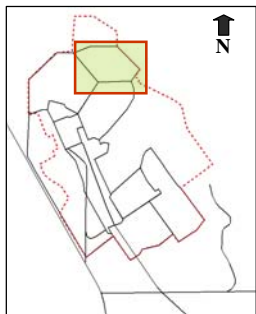
CDDL AREA - 1966, 1977, & 1984 FINDINGS DISPLAYED OVER 2007 IMAGERY

WEST VALLEY DEMONSTRATION
PROJECT Cattaraugus County, New York

- APPROX. PRESENT-DAY FENCELINE OF WVDP AREA
- APPROX. PRESENT-DAY 10 WMAs
- APPROX. NORTH PLATEAU PLUME
- 1966 FINDINGS
- 1977 FINDINGS
- 1984 FINDINGS



LOCATION DIAGRAM



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North Plateau Groundwater Plume & WMA information from DOE; EIS-0226D
Building names or functions from Master WVDP Site Plan

REFERENCES

*WEST VALLEY DEMONSTRATION
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U.S. Department of Energy; EIS-0226D; Revised Draft Environmental Impact Statement for Decommissioning and /or Long-Term Stewardship at the West Valley Demonstration Project and Western New York Nuclear Service Center (November 2008): Volume I Chapter 2 website:
<http://www.gc.energy.gov/NEPA/1020.htm>

U.S. Geological Survey, 1964 Edition Ashford Hollow, NY, 15 min quad; Polyconic projection. 1927 North American datum 10,000 foot grid based on NY coordinate system, west zone

U.S. Geological Survey, 1979 Edition Ashford Hollow, NY, 15 min quad; Polyconic projection. 1927 North American datum 10,000 foot grid based on NY coordinate system, west zone.

U.S. Geological Survey, EROS Data Center, Sioux Falls, SD.

U.S. Geological Survey, Reston, VA,22092.

USA Photomaps Inc.

West Valley Nuclear Services Company (WVNSCO), NY.

WEBSITES:

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<http://www.nysgis.state.ny.us/gateway/mg/2005/erie>

University at Buffalo - The State University of New York web site:

<http://ublib.buffalo.edu/libraries/asl/maps/aerial/arf-2gg-8-1966-june12.jpg1980>

U.S. Geological Survey website: <http://terraserver-usa.com>