

US EPA ARCHIVE DOCUMENT



Loureiro Engineering Associates, Inc.

Superfund Records Center
SITE: Centredale
BREAK: 2.17
OTHER: 35137

January 23, 2002

Centredale Manor Performing Parties Group

c/o Swidler Berlin Shereff Friedman, LLP
3000 K Street, NW, Suite 300
Washington, DC 20007-5116

Attn: Jerome C. Muys, Jr.

**RE: Centredale Manor Restoration Project, North Providence, Rhode Island
Review of Historic Topographic Maps and Aerial Photographs
Summary Report**

Dear Mr. Muys:

This correspondence provides a summary of findings obtained through a review of historic maps and aerial photographs of the Centredale Manor Restoration Project Superfund Site (Site). The historic maps and aerial photographs were reviewed to identify and document the nature and location of any landform changes along the eastern boundary of the Site. This information was sought to support the view that soil and sediment containing dioxin and deposited along the floodplain has undergone subsequent manipulation.

To provide a better understanding of the objectives of the historic document review, background information on the Site is presented below. A discussion of the general observations made through a review of historic topographic maps is presented. Specific findings that were made through a review of historic aerial photographs and that lend credence to the notion that the depositional environment has changed over time are also discussed. Detailed descriptions of the landform changes that may be observed through a review of the historic documents are provided as attachments to this summary report. Copies of the historic topographic maps and aerial photographs are also provided as attachments.

Background

As explained by the U.S. Environmental Protection Agency's (USEPA's) conceptual site model (CSM), sediment (dioxin) was transported downstream from the source area(s) and was deposited below the 10-year flood elevation through sedimentation processes. The resulting distribution of dioxin was presumed to be limited to the surface soil and sediment along the floodplain. Analytical results of soil and sediment samples obtained from within the floodplain were used by USEPA to define areas proposed for excavation ("Action Areas"). To refine the limits of these "Action Areas", Loureiro Engineering Associates, Inc. (LEA) implemented a sampling and analytical (immunoassay screening) program on behalf of the Centredale Manor Performing Parties Group (Group) as part of the Non-Time-Critical Removal Action (NTCRA).



Centredale Manor Performing Parties Group

Attn: Jerome C. Muys, Jr.

23 January 2002

Page 2 of 4

Based on the immunoassay screening results, elevated levels of dioxin extend beyond a depth of two feet and beyond the elevation of the 10-year flood elevation. In general, the geographic extent of contamination appears to extend significantly beyond the limits of the "Action Areas" defined by USEPA. Based on the screening results, the distribution of elevated levels of dioxin appears to be varied and widespread.

In checking the assumptions of USEPA's CSM, the distribution of dioxin is not consistent with a straightforward transport and deposition model. The widespread and varied distribution of elevated dioxin levels suggests that areas of deposition may have undergone subsequent episodes of filling and excavation as a result of changing land-use practices and changing landforms along the eastern boundary of the tailrace formerly located on the Site proper, the eastern boundaries of Allendale Pond and Lymansville Pond, and the eastern boundary of the Woonasquatucket River. To validate this explanation of the distribution of dioxin, LEA reviewed historic topographic maps and aerial photographs of the Site and adjoining area. LEA reviewed these historic documents to specifically identify and document the nature and location of any landform changes and to guide future delineation efforts.

Review of Topographic Maps

Historic topographic maps were used as a resource for documenting the general land-use and landform changes to the Site and the surrounding area. Historic topographic maps produced by the U.S. Geological Survey (USGS) were obtained and reviewed for the following years: 1894, 1939, 1957, 1970, 1975, and 1996. Copies of these topographic maps are included in Attachment A. A discussion of the general observations made through a review of these historic topographic maps is presented below. Detailed descriptions of the changes observed over the time period covered by the topographic maps are provided in Attachment B.

Sometime prior to 1940, the flow of the Woonasquatucket River was diverted along the western boundary of the Site proper. However, most of the flow of the Woonasquatucket River appears to continue to flow through the Site by means of a tailrace. Extensive development to the area surrounding the Site and adjacent to Allendale Pond has also occurred by 1940. At this time, Redfern Street, George Street, and Stevens Street extend to the edge of Allendale Pond. However, by 1957 Redfern Street and George Street no longer extend to the edge of Allendale Pond, possibly suggesting that this area has been filled. This interpretation is supported by the change in the extent and geometry of the northern extent of Allendale Pond in this area. The change in topographic elevation in the area defined by "Action Area 4" and "Action Area 5" also suggests that filling and/or excavation may have occurred during the development of this area of Allendale Pond prior to 1957.

As can be seen in the 1996 topographic map, the change in the extent and shape of Allendale Pond is apparent from the failure of Allendale Dam. In general, the area inundated by Lymansville Pond has apparently decreased as a result of this failure. However, it is noted that



Centredale Manor Performing Parties Group

Attn: Jerome C. Muys, Jr.

23 January 2002

Page 3 of 4

areas contiguous with and adjacent to Lymansville pond have also been developed. This is evident for the area south of Falco Avenue ("Action Area 9") and north of Oak Street ("Action Area 10") where land disturbance is suggested by a change in topography. The area immediately east of the northern extent of Lymansville Pond has also been developed and appears to have been filled.

Review of Aerial Photographs

Historic aerial photographs were used as a tool in identifying specific landform changes in the area of the Site. Specifically, historic aerial photographs were obtained and reviewed with the goal of identifying and documenting areas that have been excavated and/or filled since the time that dioxin was reportedly generated at the site. This review was focused on assessing landform changes in the "Action Areas" that exist along the eastern boundary of the tailrace formerly located on the Site proper, the eastern boundaries of Allendale Pond and Lymansville Pond, and the eastern boundary of the Woonasquatucket River. Historic aerial photographs were obtained and reviewed for the following years: 1939, 1951, 1965, 1970, 1975, 1981, 1987, 1995, and 2001. Copies of these aerial photographs are included in Attachment C. Relevant landform changes interpreted from a review of these photographs are discussed below. Detailed descriptions of the changes observed over the time period covered by the photographs are provided in Attachment D.

In general, the area surrounding Allendale Pond has been fairly well developed by 1939. At this time, development of the land south of Centredale and in the vicinity of Lymansville Pond was less extensive. As shown in the 1939 photograph, much of the land abutting Allendale Pond, Lymansville Pond, and the Woonasquatucket River was not being utilized. By 1951, the Site proper and land immediately adjacent to Allendale Pond, Lymansville Pond, and the Woonasquatucket River had undergone significant development. The development of adjoining land is exemplified by the landform changes observed at the northern extent of Allendale Pond and the west end of George Street. In this area surface water is no longer present apparently due to filling activities. The development of adjoining land is further exemplified by the change in the appearance of the land defined by "Action Area 6" and "Action Area 7". By 1951, it appears that clearing and construction activities have occurred in these areas.

By 1965, continued development and use of the land abutting Allendale Pond is evident. In general, land that had previously been cleared to the edge of Allendale Pond appears to have been overgrown or filled, as is evident in the vicinity of "Action Area 2" (Steere Avenue). This general observation is also made for "Action Area 4", where additional filling activities appear to have occurred at the west end of George Street. By 1965, it is also evident that land defined by "Action Area 6" has been substantially disturbed.

Landform changes in the vicinity of Lymansville Pond are also evident, and by 1970 the land defined by "Action Area 9" has been cleared and developed with residential buildings. This area of the Site appears to have been uniformly graded to the edge of Lymansville Pond. In the area



Centredale Manor Performing Parties Group

Attn: Jerome C. Muys, Jr.

23 January 2002

Page 4 of 4

of the Site defined by the edge of Lymansville Pond between "Action Area 9" and "Action Area 10", land-use changes have also resulted in sedimentation over time.

Other land-use changes over time are likely to have also resulted in periods of excavation and filling. This is apparent in the vicinity of "Action Area 4" where soil and sediment appear to have been disturbed for residential purposes. This is also evident in the vicinity of "Action Area 12" where changes in land-use are likely to have also resulted in excavation of soil.

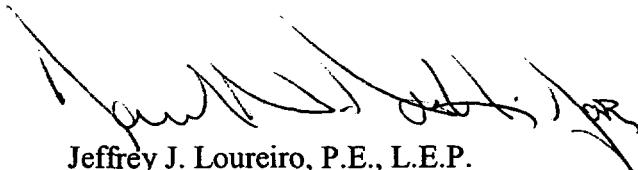
Summary

The findings discussed above document the landform changes along the eastern boundary of the tailrace formerly located on the Site proper, the eastern boundaries of Allendale Pond and Lymansville Pond, and the eastern boundary of the Woonasquatucket River that have occurred over time. These findings support the basis for a Site model in which soil and sediment containing dioxin and deposited along the floodplain have undergone subsequent episodes of filling and/or excavation. Based on this model, elevated levels of dioxin are likely to exist in areas that cannot be explained solely by sediment transport and deposition. The findings are also consistent with the widespread and varied distribution of dioxin that is based on the immunoassay screening analysis performed by LEA. Thus, any future sampling approach at the Site should be based on a model that accounts for intermittent periods of deposition combined with episodes of soil and sediment manipulation. Efforts to delineate the limits of contamination should consider the specific areas of soil and sediment disturbance identified through this review of the attached historic documents, and any additional areas that may be identified by an evaluation of conditions observed in the field.

Should you have any questions regarding this summary report, please feel free to contact me at (860) 747-6181.

Sincerely,

LOUREIRO ENGINEERING ASSOCIATES, INC.



Jeffrey J. Loureiro, P.E., L.E.P.
President

Attachment

Copy to: Centredale Manor Restoration
Project Superfund Group

ATTACHMENT A
USGS TOPOGRAPHIC MAPS



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

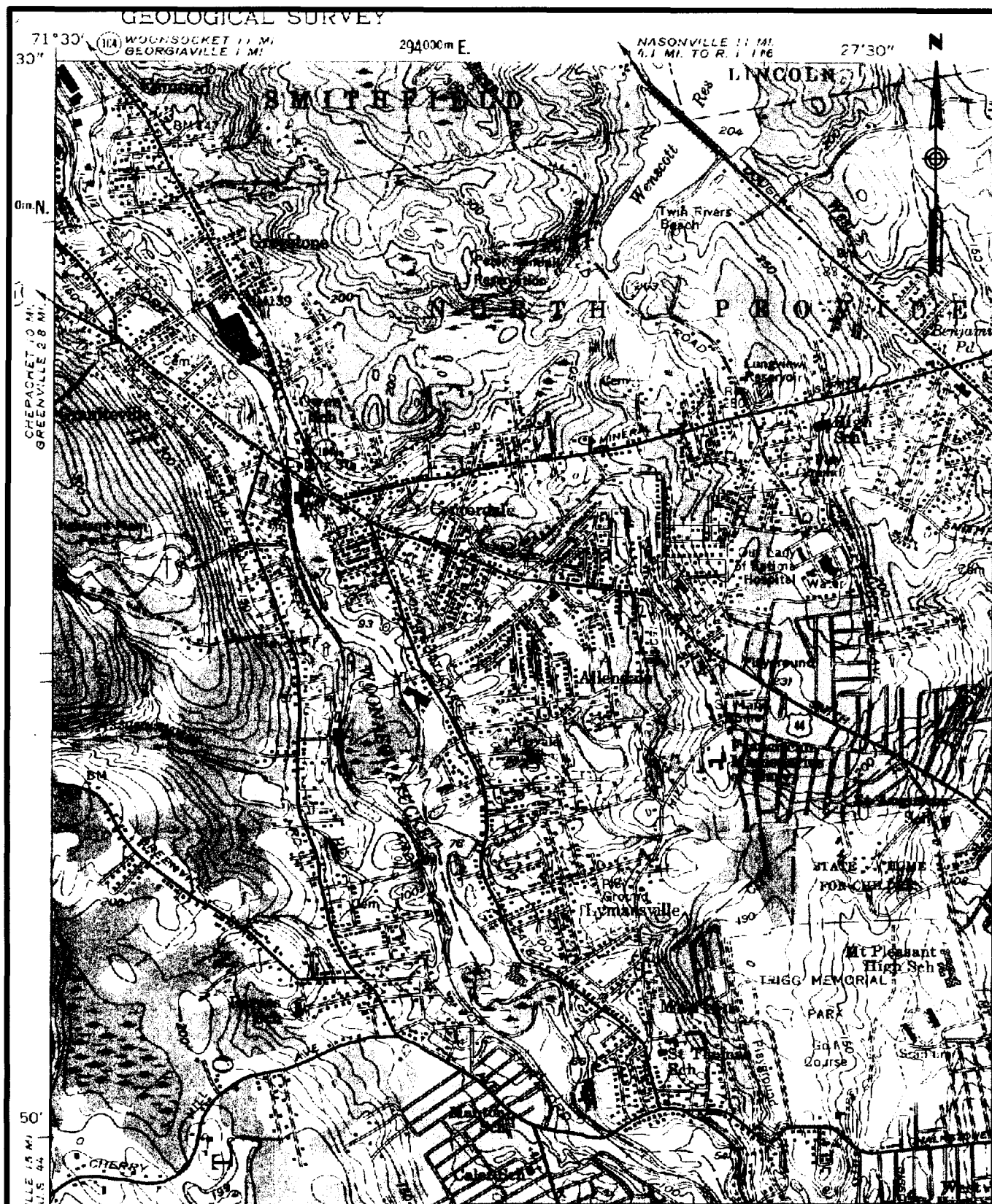
USGS TOPOGRAPHIC MAP

Comm.No.

15RP102

Originals in color.





**CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI**

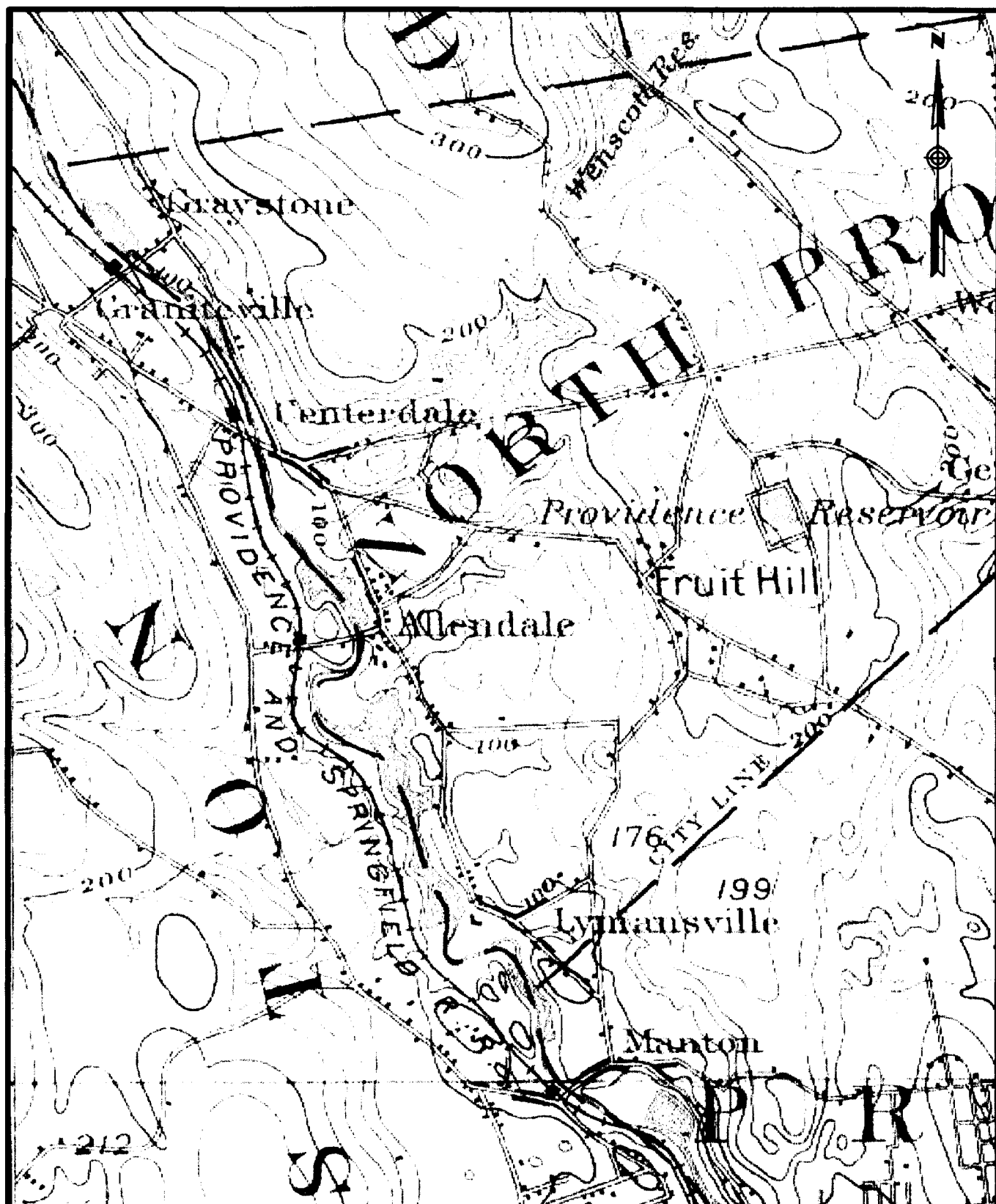
USGS TOPOGRAPHIC MAP

Comm.No.

15RP102

Originals in color.





MAP REFERENCE: SCALE IN FEET
USGS 7.5 MINUTE SERIES QUADRANGLE FOR
PROVIDENCE, R.I., DATED 1894

CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

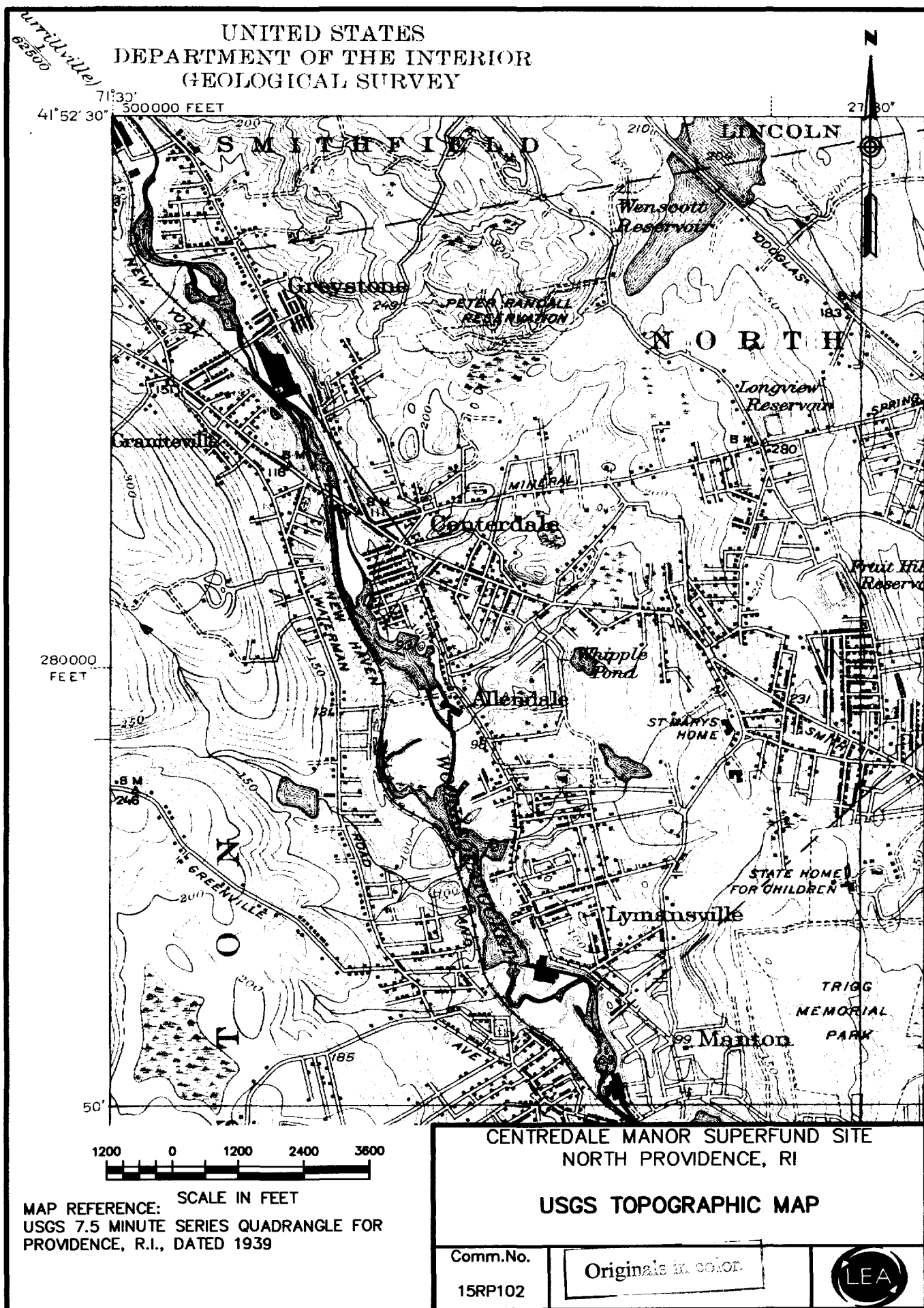
USGS TOPOGRAPHIC MAP

Comm.No.

15RP102

Originals in color.







ATTACHMENT B
SUMMARY REVIEW OF HISTORIC TOPOGRAPHIC MAPS



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**REVIEW OF HISTORIC TOPOGRAPHIC MAPS
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND**

Historic topographic maps produced by the U.S. Geological Survey (USGS) were obtained and reviewed for the following years: 1894 (reprinted 1932), 1939, 1957, 1970, 1975, and 1996. The pertinent features that are presented on these maps are discussed below.

1894 (reprinted 1932) Providence, Rhode Island Quadrangle, USGS 15-Minute Series

Allendale Pond and Lymansville Pond are clearly defined on this map. As of yet, the site proper (2072 and 2074 Smith Street) has not been developed. The properties adjacent to Allendale Dam and at Lymansville Dam have been developed. Properties along Woonasquatucket Avenue have also been developed between Smith Street and Lymansville Dam. Allendale Way (Allendale Avenue) is the only crossroad that has been developed. Several buildings exist along this road at this time.

1939 Providence, Rhode Island Quadrangle, USGS 7.5-Minute Series

A diversion structure is present along the Woonasquatucket River immediately north of Smith Street. This structure diverts the Woonasquatucket River along the western boundary of the site proper (2072 and 2074 Smith Street). However, most of the flow of the Woonasquatucket River is diverted by this structure through a raceway, the tailrace of which flows through the site proper. The area covered by Allendale Pond has increased, apparently due to the development of the raceway through the site proper. The shape of Allendale Pond is beginning to resemble the shape of the pond prior to the failure of Allendale Dam. The area and shape of Lymansville Pond is generally consistent with present-day Lymansville Pond.

The site proper has been developed. Several buildings are situated on both the east and west side of the tailrace. Extensive development has occurred in the vicinity of Allendale Pond. Steere Avenue, Grover Street, Redfern Street, George Street, Stevens Street, Aldrich Street, and Centredale Avenue have been developed. Numerous buildings are situated along these streets. It is noted that Redfern Street, George Street, and Stevens Street extend to the edge of Allendale Pond, below an elevation of 100 feet. A crossroad, west of Centredale Avenue, connects George Street, Stevens Street, and Aldrich Street.

The raceway at Allendale Mill has been created and is also clearly evident. Most of the present-day crossroads in the Lymansville Pond area have been partially developed and a number of buildings are situated along these roads.

1957 Providence, Rhode Island Quadrangle, USGS 7.5-Minute Series

The site proper has been more extensively developed, as have the properties to the east of the site. Mill Street has been constructed and provides a direct route from Grover Street, through Steere Avenue, to Smith Street, intersecting Smith Street immediately west of the Smith Street and Route 104 intersection. Redfern Street and George Street are shown to only extend to the contour representing an elevation of 100 feet and no longer extend to the edge of Allendale



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Pond, possibly suggesting that this area has been filled. This interpretation is supported by the change in the configuration of the northern extent of Allendale Pond in this area. The area immediately west of Redfern Street and George Street is no longer inundated with water. The change in the extent and geometry of this area of Allendale Pond suggests that the area has been filled. The crossroad, west of Centredale Avenue, connecting George Street, Stevens Street, and Aldrich Street, is no longer present between George Street and Stevens Street, and now only connects Stevens Street and Aldrich Street. The elevation of properties adjacent to Allendale Pond in this area suggests that excavation and filling has occurred during the development of this area. In the area adjacent to Lymansville Pond, Rockwell Avenue and Maple Avenue have been completed. There are no other noticeable changes to the area surrounding Lymansville Pond.

1970 Providence, Rhode Island Quadrangle, USGS 7.5-Minute Series

There is no discernible change to the site proper and the properties adjacent to Allendale Pond depicted on this map. The only noticeable change to the site and surrounding area is that Falco Avenue, Zambarano Avenue, and Cynthia Drive have been developed adjacent to Lymansville Pond.

1975 Providence, Rhode Island Quadrangle, USGS 7.5-Minute Series

As shown on this map, the site proper is vacant. There are no noticeable changes to the shape and extent of Allendale Pond, nor to the elevation and development of the surrounding terrain. Likewise, there are no noticeable changes to the shape and extent of Lymansville Pond, nor to the elevation and development of the terrain surrounding Lymansville Pond.

1996 Providence, Rhode Island Quadrangle, USGS 7.5-Minute Series

The most noticeable change on this map is the change in the extent and shape of Allendale Pond resulting from the failure of Allendale Dam. The Brook Village and Centredale Manor buildings are also clearly evident on this map. Changes to the elevation and development of the surrounding terrain are not discernable. In general, the area inundated by Lymansville Pond has apparently decreased. It should be noted, however, that areas contiguous with and adjacent to the pond have also been developed. This is evident for the area south of Falco Avenue ("Action Area 9") and north of Oak Street ("Action Area 10") where a change in topography indicates that excavation and filling has occurred. The northern extent of Lymansville Pond has changed such that the area covered by the pond has decreased. A few pools of water have developed in this wetland area. These pools now flow into Lymansville Pond. The area immediately east of the northern extent of Lymansville Pond has been developed and appears to have been filled. Warren Avenue has been extended to the edge of the Pond in this area.

ATTACHMENT C
AERIAL PHOTOGRAPHS



600 0 600 1200 1800
SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
05-15-39

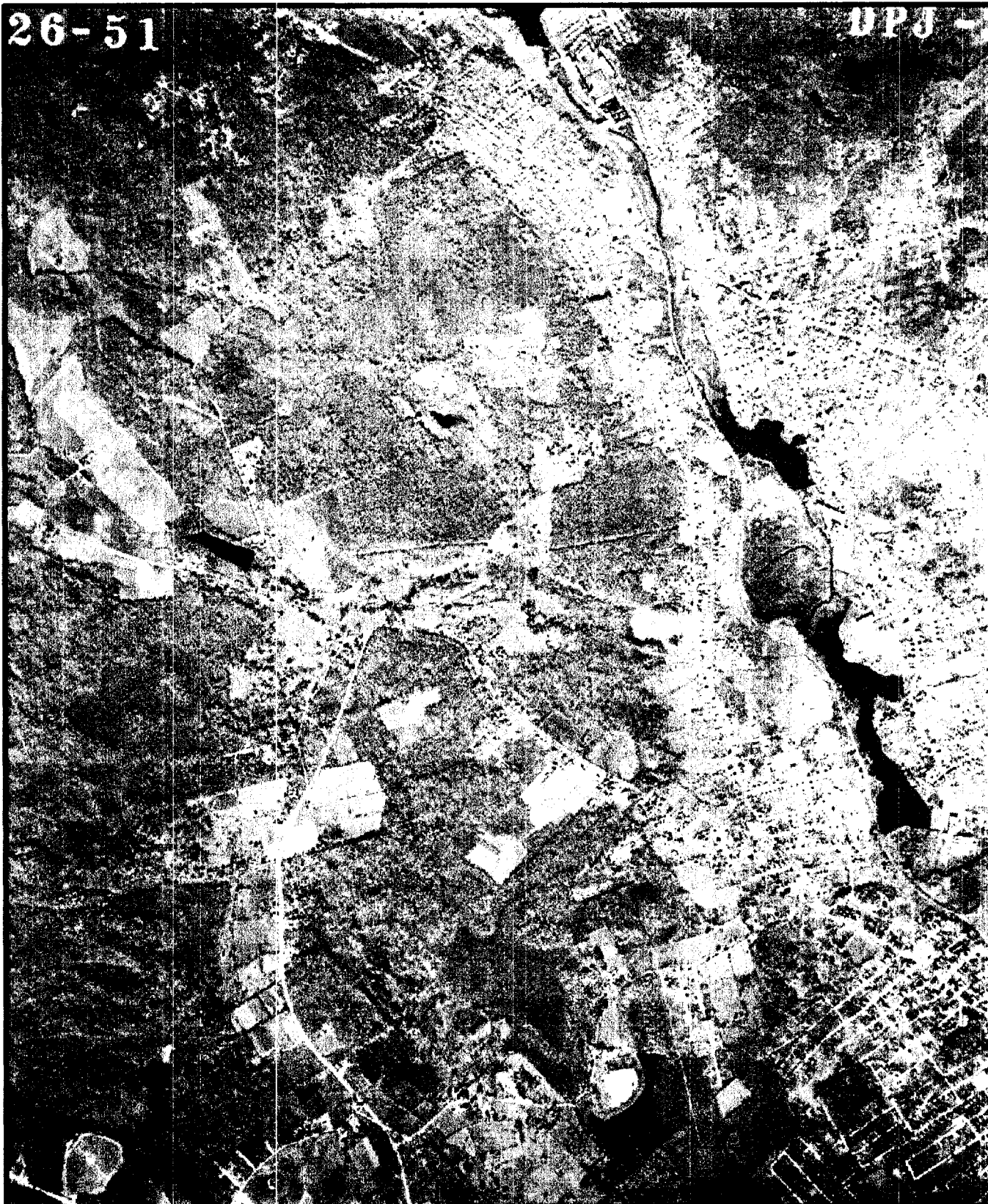
Comm.No.

15RP102



26-51

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SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
10-26-51

Comm.No.

15RP102



15RP102-A01301.uny
10-26-51



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SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
4-19-65

Comm.No.

15RP102



15RP102 AT 363 543
4-19-65



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SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-28-70

Comm.No.

15RP102





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SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



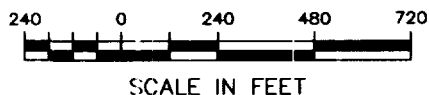
CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-14-87

Comm.No.

15RP102





PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-14-87

Comm.No.

15RP102





250 0 250 500 750



SCALE IN FEET

PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

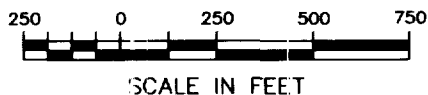
AERIAL PHOTOGRAPH
04-17-95

Comm.No.

15RP102



*EPA-95-001-001-001
4-17-95, 4-17-95



PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



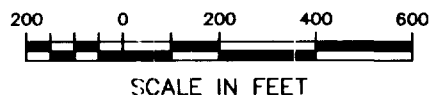
CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-17-95

Comm.No.

15RP102





PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



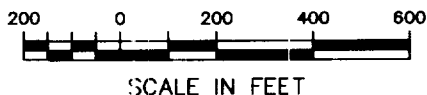
CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-26-2001

Comm.No.

15RP102





PHOTOGRAPH REFERENCE:
NATIONAL AERIAL RESOURCES
SARATOGA SPRINGS, NY 12866



CENTREDALE MANOR SUPERFUND SITE
NORTH PROVIDENCE, RI

AERIAL PHOTOGRAPH
04-26-2001

Comm.No.

15RP102



**ATTACHMENT D
SUMMARY REVIEW OF AERIAL PHOTOGRAPHS**



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**REVIEW OF HISTORIC AERIAL PHOTOGRAPHS
CENTREDALE MANOR RESTORATION PROJECT SUPERFUND SITE
NORTH PROVIDENCE, RHODE ISLAND**

Historic aerial photographs were obtained and reviewed for the following years: 1939, 1951, 1965, 1970, 1975, 1981, 1987, 1995, and 2001. This review was focused on assessing the landform changes in the "Action Areas" defined by USEPA. The relevant landform changes interpreted from these photographs are discussed below.

"Action Area 1"

Although the land adjacent to the area defined by "Action Area 1" appears to have been partially cleared in 1939, this land has not yet been developed. Vegetation exists along the east embankment of the tailrace in this area. The west embankment of the tailrace is more heavily vegetated; the southern half of the site proper has not yet been developed. By 1951, the tailrace appears to have been filled in the northern part of the site and no longer continuously flows through the entire eastern part of the site. However, surface water is still present in the drainage feature in the area identified as "Action Area 1". By 1965, the land to the east of the area defined by "Action Area 1" has been developed. In general, the area defined by "Action Area 1" has become more densely vegetated and forest growth is apparent. The west embankment of the former tailrace appears to be partially cleared, although some vegetation (trees) is evident. In 1970, the area defined by "Action Area 1" still appears to be inundated by surface water. Surface drainage from the site proper appears to flow toward this area. By 1987, the shape of the general area surrounding "Action Area 1" appears to have changed due to the development and landscaping of the site proper. There is no discernible change to the terrain immediately east "Action Area 1". The area defined by "Action Area 1" is still inundated with water in the 1987 photograph. There is no discernible change to this area, as shown in the 1995 photograph. As shown in the 2001 photograph, a residential building (Scott residence) has been constructed on the property located immediately to the east of "Action Area 1".

"Action Area 2"

In 1939, Steere Avenue is cleared to the edge of the tailrace, immediately north of the area defined by "Action Area 2". The tailrace in this area is distinctly defined as a fairly wide and straight surface water feature. This area has not been cleared and is covered by vegetation along this section of the tailrace. It is noted that two small areas to the east of this area appear to have been disturbed. By 1965, the boundaries of the former tailrace are no longer distinctly defined in this area. The former tailrace has been partly overgrown, resulting in a faint surface water feature that meanders through this area. Immediately north of the area, Steere Avenue is no longer cleared to the edge of the water. Only one small disturbed area to the east of "Action Area 2" is now apparent. In 1970, there does not appear to be much change in this area, other than increased vegetation along the area of the former tailrace. The remaining small disturbed area to the east of "Action Area 2" is no longer visible. In 1987, although additional residential construction has occurred to the east of this area, the eastern edge of the drainage swale does not appear to have changed. The land to the west of this area has been modified by the development of the Centredale Manor property. Through 1995, there does not appear to be much change in



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this area, other than increased vegetation along the area of the former tailrace. At the time of the 2001 photograph, surface water does not appear to be present in the drainage feature defined by "Action Area 2".

"Action Area 3"

By 1939, extensive clearing has occurred in the area adjacent to "Action Area 3". The property at the end of Grover Street appears to be cleared to the edge of the water emanating from the tailrace. The area between Grover Street and Redfern Street has also been cleared along the edge of the water. It is noted that Redfern Street does not extend to the edge of the water. However, land at the west end of Redfern Street has been cleared to the edge of the water; nothing has been developed on this part of the land. No changes to the land surrounding this action area are evident in the 1951 photograph. By 1965, the southern extent of the area defined by "Action Area 3" that is adjacent to the west end of Redfern Street has been disturbed. The remainder of this area has changed only in that a few trees have grown along the east embankment. Other than the establishment of additional vegetation in the area that had previously been cleared, there does not appear to be much change in this area through 2001.

"Action Area 4"

In 1939, most of the area defined by "Action Area 4" has not been developed and is heavily vegetated along the edge of Allendale Pond. However, the southern portion of this area has been cleared (on the northern side of Stevens Street). It is noted that George Street extends to the edge of the water at the point where the surface water emanating from the tailrace flows into Allendale Pond. At this northern extent of Allendale Pond, the water emanating from the tailrace flows around an island. Landform changes are not noticeable in the 1951 photograph, with the exception that this island is beginning to disappear as a result of filling between the island and the end of George Street. By 1965, this island has disappeared; the area between the island and the end of George Street has been filled. Thus, George Street no longer extends to the edge of the water. Vegetation has grown over the southern portion of this area that had once been cleared. The eastern edge of the channel has become poorly defined, apparently as a result of filling of this low-lying wetland area. By 1970, a residential building has been erected on the parcel of land adjacent to the southern portion of this area. At this time, the edge of Allendale Pond is not visible in this area due to tree canopy. As shown in the 1987 photograph, there does not appear to be a significant change to the terrain in this area. In the 1995 photograph, water does not appear to be flowing through the drainage feature in this area. As shown in the 1995 photograph, a shed has been placed to the north of this action area, just east of the edge of the embankment. An area within the drainage swale appears to have been disturbed just to the west of this shed. There does not appear to have been any subsequent landform changes to this area since 1995.

"Action Area 5"

In 1939, the entire reach of Allendale Pond between Stevens Street and Aldrich Street and defined by "Action Area 5" appears to be cleared of vegetation. Through the interpretation of the 1951 and 1965 photographs, this area has remained cleared. In the 1970 photograph, the edge of Allendale Pond is not visible in this area due to tree growth along the adjoining land. As



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seen in the 1987 photograph, the northern portion of this area, defined by the west end of Stevens Street, is cleared to the edge of Allendale Pond. In the southern end of this area, the edge of Allendale Pond is not visible due to tree growth. In the 1995 photograph, a small drainage feature meanders through this area where the northern extent of Allendale Pond previously existed. The northern end of the area defined by "Action Area 5" is overgrown with some ground vegetation and trees. Other change to the terrain in this area is not discernable. As shown in the 2001 photograph, the drainage feature is almost non-existent. No other changes to this area are apparent.

"Action Area 6"

In 1939, the area along the reach of Allendale Pond south of Aldrich Street, defined by "Action Area 6", has not been cleared. This area of Allendale Pond has a well-defined shoreline, as do the other areas along the eastern shore of Allendale Pond at this time. By 1951, some clearing and grading appears to have occurred on the land immediately adjacent to "Action Area 6". The edge of Allendale Pond in this area is no longer well defined. By 1965, the land adjacent to the area defined by "Action Area 6" has been significantly disturbed. Clearing activities have occurred along the southern extent of this area. It appears that the land along the southern extent of this area has been graded and sloped toward the edge of Allendale Pond. By 1970, it appears that the southern extent of this area that had been cleared has become partly overgrown. The northern extent of this area has not yet been cleared. By 1987 this action area and the land adjoining this area to the east has been grossly disturbed. Several buildings have been erected on the land adjoining this area. One of these buildings appears to be used for commercial or industrial purposes. An unidentifiable structure is evident that leads from this building to the south toward Allendale Pond. What appears to be an automobile salvage yard is located between this building and the area defined by "Action Area 6". The salvage yard, although enclosed within a fence, appears to extend to within several feet of the edge of the Pond. At least 30 stockpiled automobiles are visible in the 1987 photograph. As seen in the 1995 photograph, the building and the associated unidentifiable feature are no longer present on the land adjacent to this action area. However, approximately 60 automobiles are now located on this parcel of land. In the 2001 photograph, only approximately 20 automobiles are located on the adjacent property. The land that is closest to Allendale Pond, while fenced, has become somewhat overgrown.

"Action Area 7"

In 1939, the land along the edge of Allendale Pond and defined by "Action Area 7" appears to have been partly disturbed. The southern portion of this area appears to have been cleared and excavated. South of "Action Area 7", the raceway at Allendale Mill is clearly evident. By 1951, a garage has been erected very close to the Pond's edge in this area. All of the land along the edge of Allendale Pond and defined by "Action Area 7" has now been cleared. South of this area, the raceway at Allendale Mill is still present. Through 1970 all of the land along the edge of Allendale Pond has remained cleared and no change is apparent to the terrain in this area. Nor are any changes apparent to land-use in the area immediately adjacent to this action area. As shown in the 1987 photograph, the area along "Action Area 7" has remained relatively unchanged with the exception of the growth of some trees. The most obvious change to the area as shown in the 1995 photograph is the recession of the pond's edge due to the failure of



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Allendale Dam. To the south of this area, water is not present in the raceway at Allendale Mill. There are no apparent changes to the land in this area, as shown in the 2001 photograph.

“Action Area 9”

In 1939, the land adjacent to the edge of Lymansville Pond and defined by “Action Area 9” has not been cleared. Land immediately adjoining this area appears to be used for agricultural purposes. Further to the north and east, the land has been cleared, and what appears to be soil stockpiled from excavation of the land is apparent. As interpreted from the 1951 photograph, the land defined by “Action Area 9” has remained relatively unchanged. However, the land immediately adjoining this area no longer appears to be used for agricultural purposes. By 1965, several residential buildings have been constructed along the edge of Lymansville Pond to the east of this action area. By 1970, the land along the edge of Lymansville Pond and defined by “Action Area 9” has been cleared and developed with residential buildings. This land appears to have been uniformly graded to the edge of Lymansville Pond. The shoreline of Lymansville Pond is clearly defined by the edge of the cleared properties in this area. No changes to the landform in this area are apparent in the 1987, 1995, and 2001 photographs.

“Action Area 10”

In 1939, the land along the edge of Lymansville Pond and defined by “Action Area 10” has not been cleared. Land adjoining this area appears to be used for residential and agricultural purposes. It is noted that land across the pond from this area appears to be used for commercial or industrial purposes, based on the construction of the building on this property. No change to the landform in “Action Area 10” is apparent in the 1951 and 1965 aerial photographs. Land adjoining “Action Area 10” appears to still be used for residential and agricultural purposes. It is noted that the commercial/industrial use of the property to the north and across the pond is resulting in sedimentation of the pond. While this area has not changed significantly by 1970, vegetative growth including the presence of trees along this area of the shoreline has become more prominent. No changes to the landform in this area are apparent in the 1987 and 1995 photographs. It is noted that the commercial/industrial property to the north has undergone re-development, as shown in the 1987 photograph. It is further noted that sedimentation apparently emanating from this property has continued and is increasingly evident in the 1970, 1987, 1995, and 2001 aerial photographs.

“Action Area 11”

In 1939, the land adjacent to the area defined by “Action Area 11” appears to have been used for agricultural purposes. The embankment of this reach of Lymansville Pond appears to be vegetated, as trees are evident. Except for some additional tree growth, this area has remained relatively unchanged through 1965. By 1970, while the embankment of this reach of Lymansville Pond still appears to be over grown, the surrounding area has undergone development for residential use. Significant changes to the terrain in “Action Area 11” cannot be distinguished. No major changes to the landform in this area are apparent in the 1987 photograph. As shown in the 1995 photograph, the apartment complex that exists today has been constructed on the property immediately to the east of “Action Area 11”. There has been no apparent disturbance to the embankment in this area, or to the land adjoining the embankment.



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“Action Area 12”

As interpreted from the 1939 photograph, “Action Area 12” is located immediately north of a raceway leading from Lymansville Pond to the former Mill at Lymansville. In 1939, low-lying vegetation appears to cover the eastern embankment of this reach of Lymansville Pond. A trail appears to be located adjacent to the edge of the pond in “Action Area 12”. To the south of this area, the tailrace for the facility at Lymansville is clearly evident. As shown in the 1951 aerial photograph, a small parking lot associated with the facility at Lymansville has been cleared to the northeast of this area. The trail located adjacent to the edge of the pond in this area is still present, as is the tailrace. A few trees have developed along the edge of the embankment in this area. By 1965, the trail that was once evident in this area is no longer apparent. Low-lying vegetation still covers the eastern embankment of this reach of Lymansville Pond. Trees are now more prominent in this area as well. The parking lot associated with the facility at Lymansville to the northeast of this area has been expanded. To the south of this area, the tailrace is still evident. There is no noticeable change in the terrain defined by this area, as shown in the 1970 photograph. By 1987, the land along the eastern embankment is forested. A large building has been constructed in the area to the northeast of “Action Area 12”, where a parking lot previously existed. In 1987, a smaller parking lot is located immediately to the east of “Action Area 12”. To the south of this action area, a dirt road exists between the main drive surrounding the facility at Lymansville and the spillway at Lymansville Dam. A dirt road leading from the parking lot to the east of “Action Area 12” joins this road. The tailrace for the facility has been filled by 1987, and some modifications have been made to the facility structure. Based on subsequent aerial photographs, there are no noticeable changes to the land comprising and surrounding “Action Area 12”.