Clove and Maple Former Manufactured Gas Plant (MGP) Site

Proposed Remedial Action Plan for Operable Unit 2

January 2012

NYS Department of Environmental Conservation

Introduction

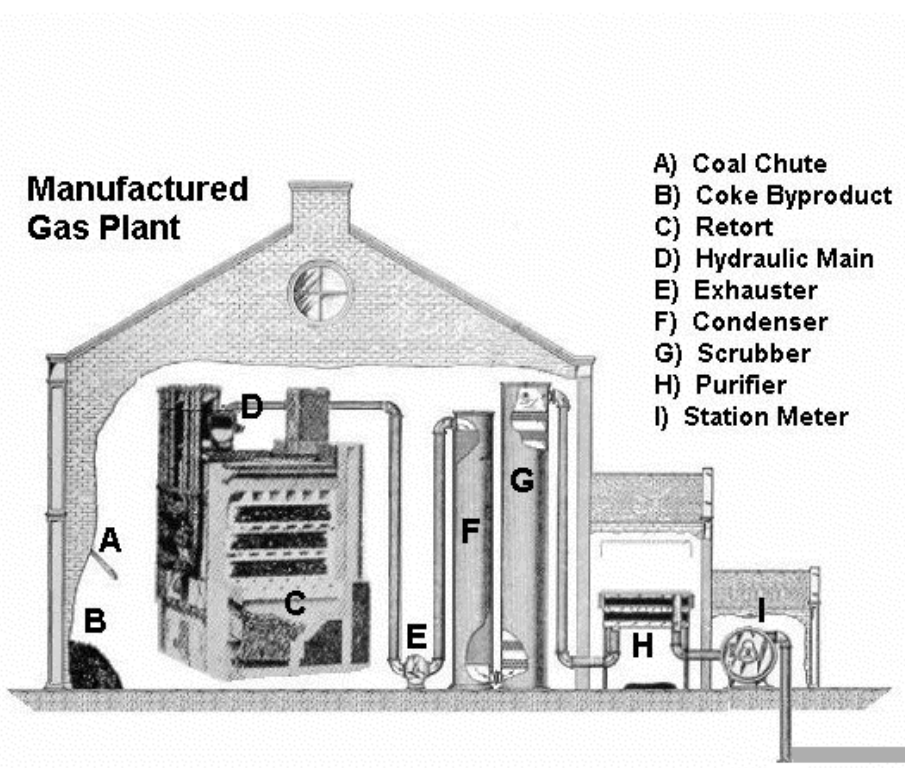
- Goals of the Public Meeting
  - Review Nature and Extent of Contamination
  - Present Feasibility Study Alternatives
  - Present the Proposed Alternative
  - Take Public Comments and Answer Questions

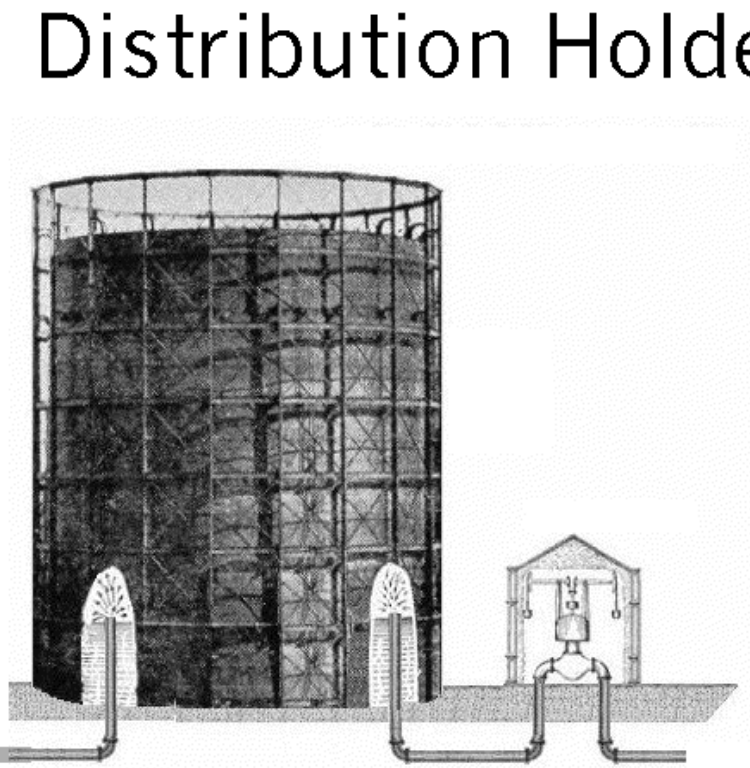
CLOVE AND MAPLE FORMER MGP SITE HAVERSTRAW, NEW YORK	GEI Consultants	OU-1 AND OU-2 LOCATION AERIAL PHOTOGRAPH
ORANGE AND ROCKLAND UTILITIES, INC.	Project 091950-1	January 2010 Figure 2

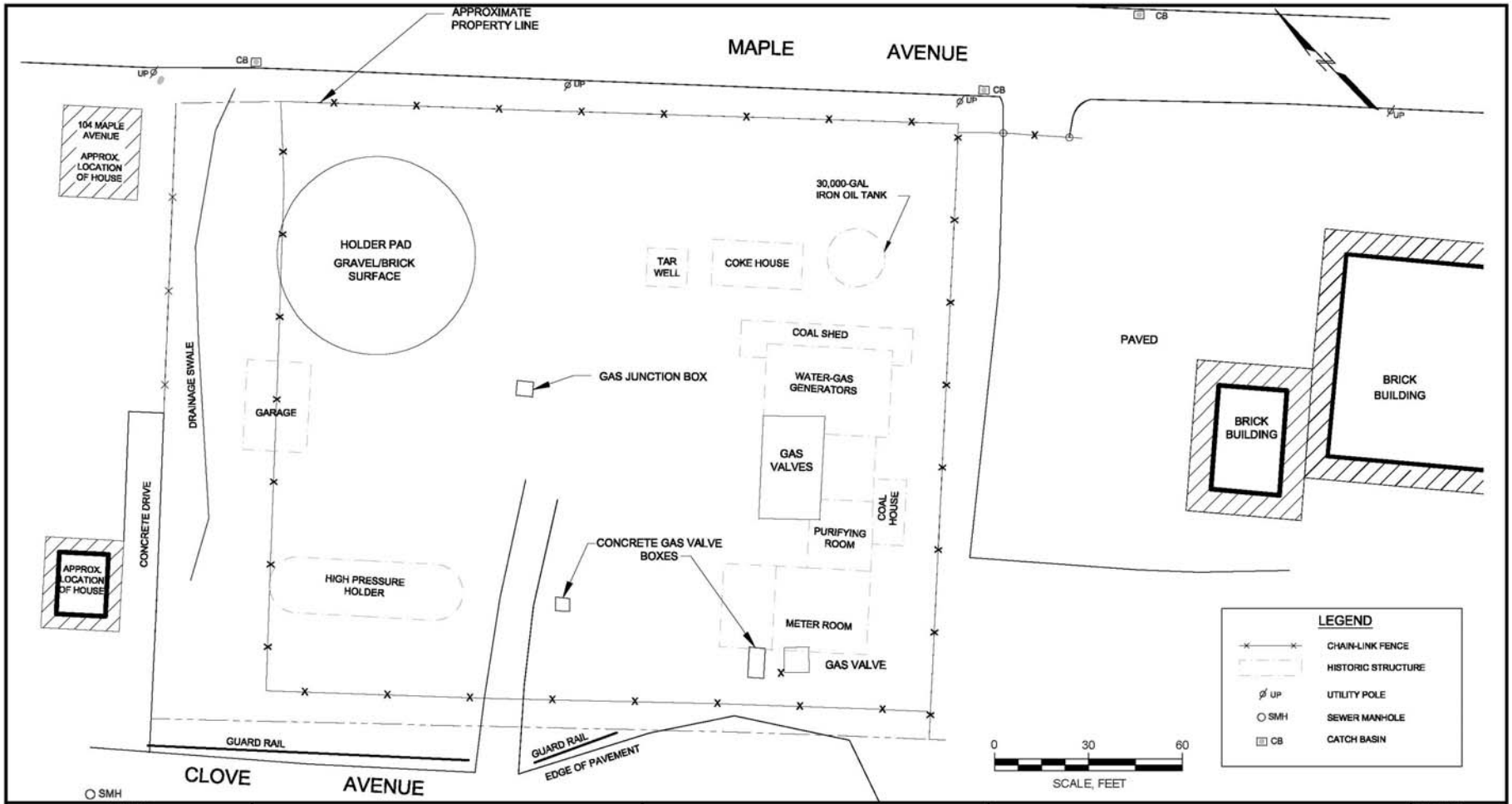
Site History

- Manufactured Gas Plant operated 1887-1935
- 1890 map:
  - 50,000 cubic foot gas holder,
  - 30,000 gallon oil tank
  - coke house
- 1909 - 1935: Gas holder capacity was 60,000 cu ft
- 1935 - Manufactured gas replaced with natural gas
- 1960 - Plant structures were demolished
- 2005 - Soil excavation at 93B
- 2007 - Gas regulator station decommissioned

Typical Manufactured Gas Plant (MGP)







CMX
Cert. Of Authorization 24GA27926200
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FIGURE 2

HISTORICAL STRUCTURES

REMEDIAL INVESTIGATION HAVERSTRAW FORMER MGP SITE

HAVERSTRAW, ORANGE COUNTY, NEW YORK

PROJECT NO	070748501
SCALE	1" = 30'
DATE	10/31/2007
CHECKED BY	JM
SHEET NO.	2 of 10

Remedial Investigation

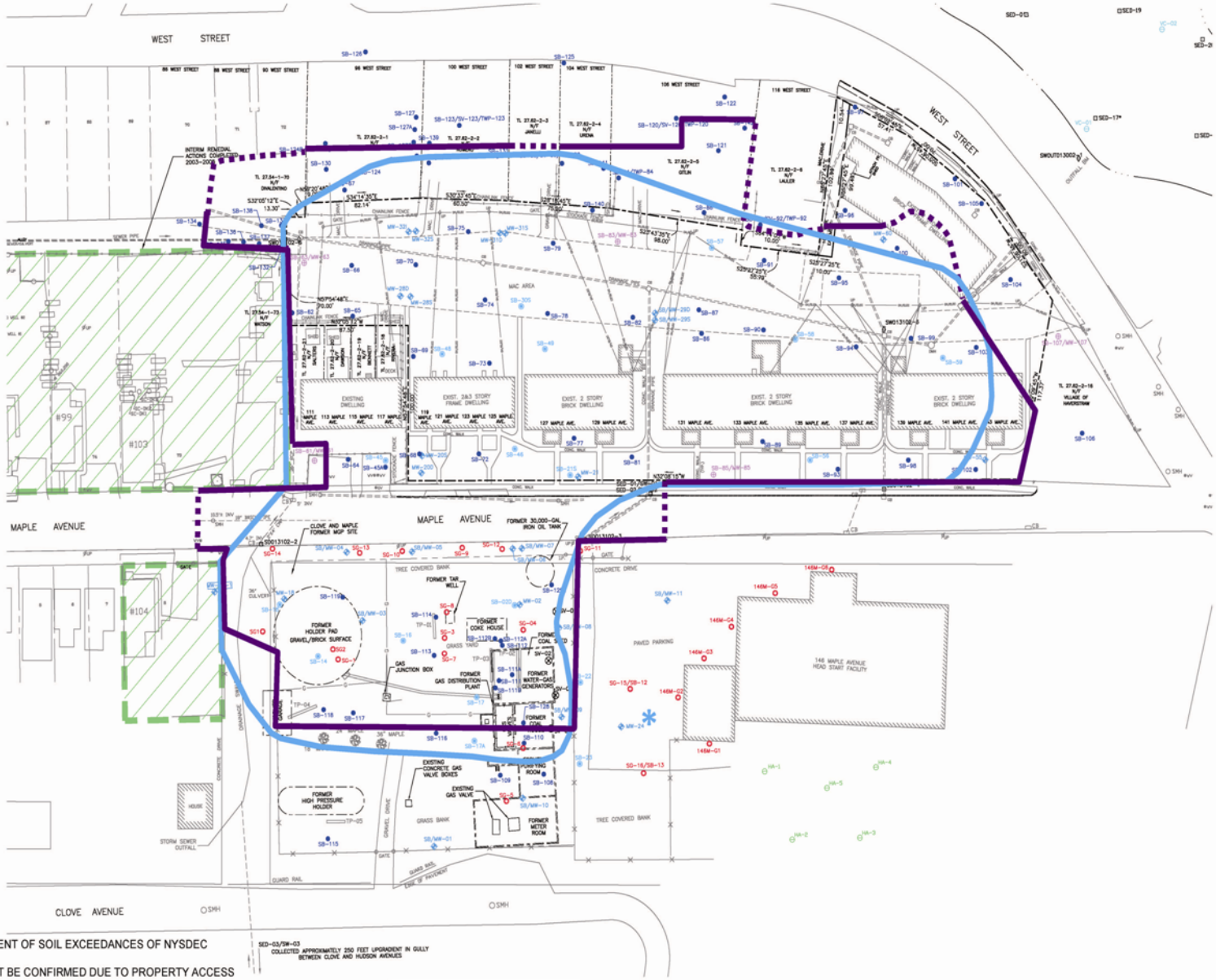
- Nature and Extent of Contamination
  - Soil Samples
  - Soil Gas Samples
  - Groundwater Samples
  - Indoor Air Samples
  - Sediment Samples

Summary of Remedial Investigations

- Several phases from 1996 - 2008
- 142 soil borings
- 9 monitoring wells
- 5 test pits
- Over 550 environmental samples (soil and groundwater)

Subsurface Geology
(Geology controls contaminant migration)

- Fill: Up to 15 feet thick
- Alluvium: Up to 25 feet thick with layers of
  - Coarse and fine-grained sands,
  - gravel,
  - silts and clays,
  - some peat in the former pond area
- Clay: From 2 to 18 feet thick
- Till: Dense silty clay to dense sandy clay



LEGEND:

- APPROXIMATE EXTENT OF SOIL EXCEEDANCES OF NYSDEC PART 375 USCO.
- EXTENT COULD NOT BE CONFIRMED DUE TO PROPERTY ACCESS RESTRICTIONS.
- APPROXIMATE EXTENT OF GROUNDWATER EXCEEDANCES OF NYSDEC AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES.
- * MW-24 HAD NO EXCEEDANCES EXCEPT ONE PAH, CHRYSENE, AT 0.5 mg/LJ (ESTIMATED VALUE).

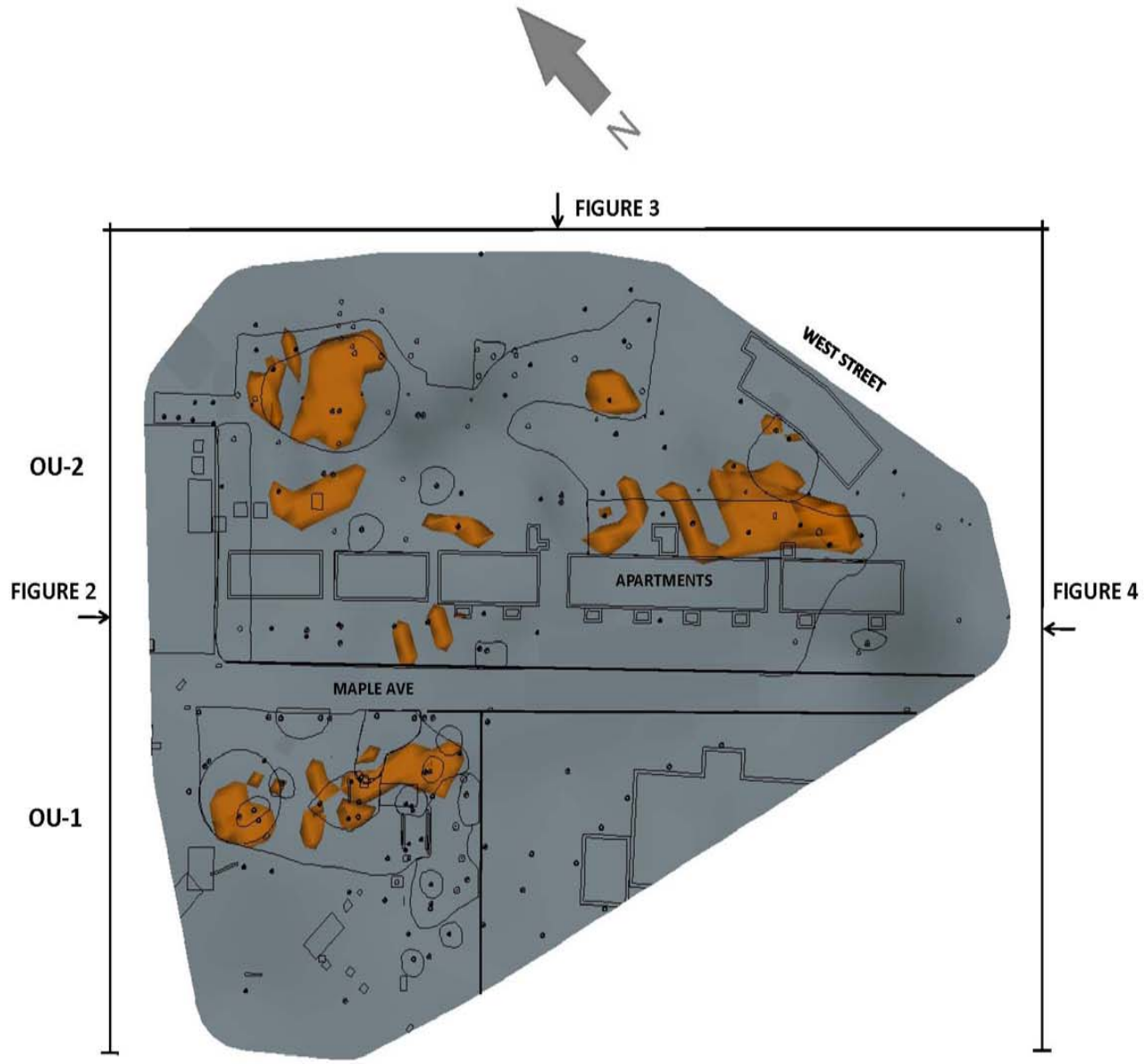
CLOVE AND MAPLE FORMER MGP SITE HAVERSTRAW, NEW YORK	GEI Consultants	EXTENT OF SOIL AND GROUNDWATER IMPACTS
ORANGE AND ROCKLAND UTILITIES, INC.		January 2010 Figure 10

Surface Soil Sampling Results

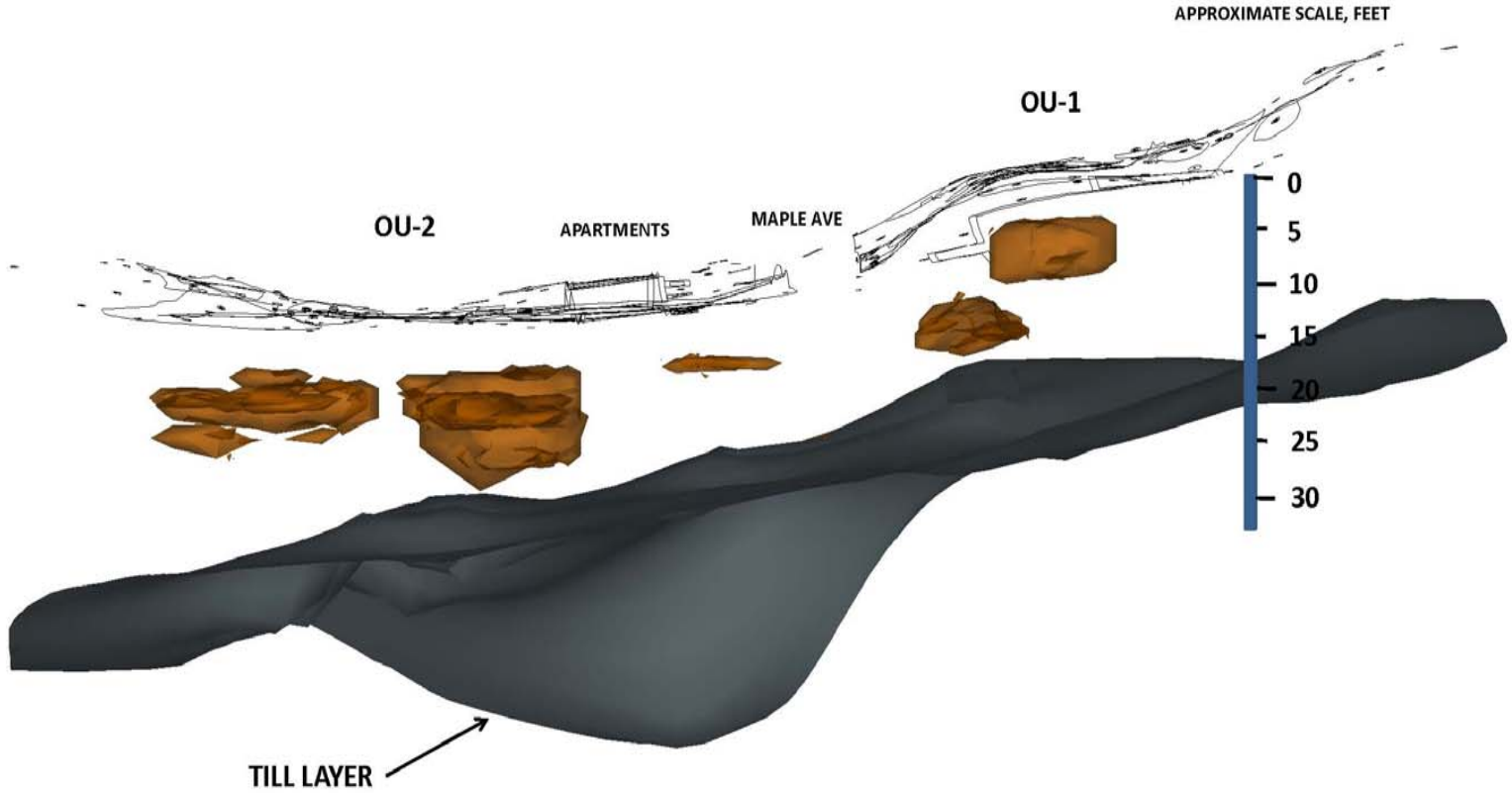
- Samples from the on-site MGP property exceeded soil cleanup objectives for PAHs
- Samples from adjacent properties were consistent with background sample results

Subsurface Soil Sampling Results

- Subsurface soil impacts from the MGP have been fully delineated
- Non aqueous phase liquid (NAPL) was identified and delineated
- NAPL is defined as soil saturated with coal tar or soil containing lenses or “blebs” (droplets) of tar



CLOVE AND MAPLE FORMER MGP SITE HAVERSTRAW, NEW YORK	GEI Consultants	PLAN VIEW OU-1 AND OU-2
ORANGE AND ROCKLAND UTILITIES, INC.		October 2009 Figure 1



CLOVE AND MAPLE FORMER MGP SITE HAVERSTRAW, NEW YORK	GEI consultants	VIEW EAST FROM 103 MAPLE AVE
ORANGE AND ROCKLAND UTILITIES, INC.		October 2009 Figure 2

Groundwater Sampling Results

- BTEX and PAHs exceeded standards in both on-site and off-site wells
- NAPL (tar) was observed in 1 on-site and 2 off-site wells

Soil Vapor Sampling

- Vapor samples taken from on-site and adjacent properties
- Included under buildings
- Likelihood of exposures to soil vapor is minimal

Extent of Contamination

- Contamination was found on the former plant footprint and off site.
- NAPL has migrated down from the former plant site
- Migration is controlled by subsurface geology
  - Collects and moves through coarser lenses
  - Accumulated in the former pond and confined by the underlying till layer
- Sediments near the storm water outfall contain MGP-related compounds

Human Health Exposure Assessment

- Groundwater
- Surface and subsurface soils
- Sediment
- Soil Vapor

NYSDOH Role

- The NYSDOH assists NYSDEC during the investigation and cleanup of sites such as the Clove and Maple site.
- To determine exposure scenarios for the surrounding community.

NYSDOH Responsibilities

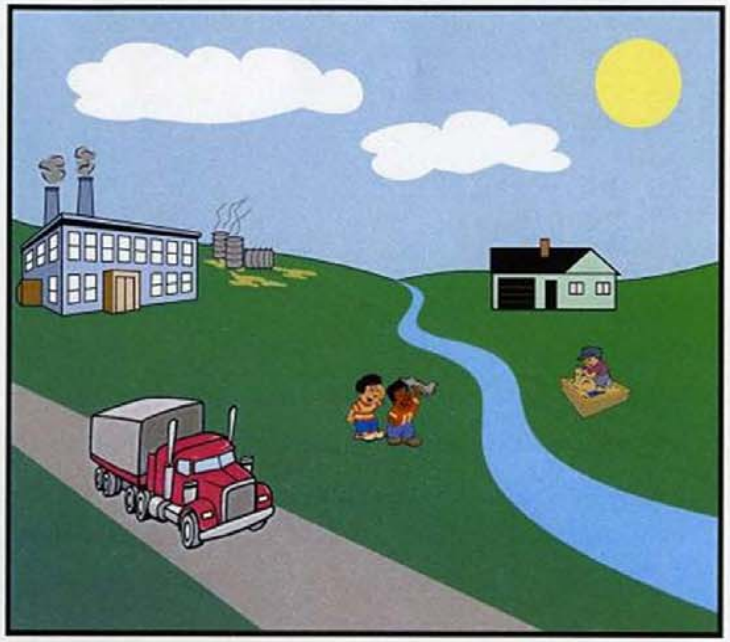
- Review work plans and reports
- Ensure that public health issues relative to potential exposures to hazardous materials at the site are evaluated
- Prevent your exposure to hazardous waste

What is Exposure?

- **The physical contact with a chemical or substance through**
  - ***direct contact*** (touching)
  - ***ingestion*** (eating/drinking)
  - ***inhalation*** (breathing)
- **One or more of these physical contacts <u>MUST</u> occur before a chemical has the potential to cause a health problem**

How Are People Exposed?

1. A chemical is released into the environment.



2. The chemical is carried through the environment by water, air, soil, sediment, plants, animals, or humans.

3. Sometimes the chemical ends up where people could come in contact with it. These "points of exposure" might include homes, gardens, groundwater wells, and playgrounds.

4. At the point of exposure, people could get the chemical in their bodies by, eating, drinking, breathing, or if it touches their skin.

If there is….

- No physical contact - there is no exposure

- No exposure - then no health effects

NOTE:

Exposure to a substance does not necessarily mean that health effects will occur.

Investigation Activities

Potential **exposure pathways that were evaluated:**

- **Ingesting of contaminated groundwater or soil**
- **Touching contaminated soil and/or groundwater**
- **Inhalation of contaminated air**

Overall Message

- Presently there are no health issues
- The proposed clean-up remedy will include measures to protect public health
- Do not hesitate to contact Bill or Tony if you have any concerns

Feasibility Study

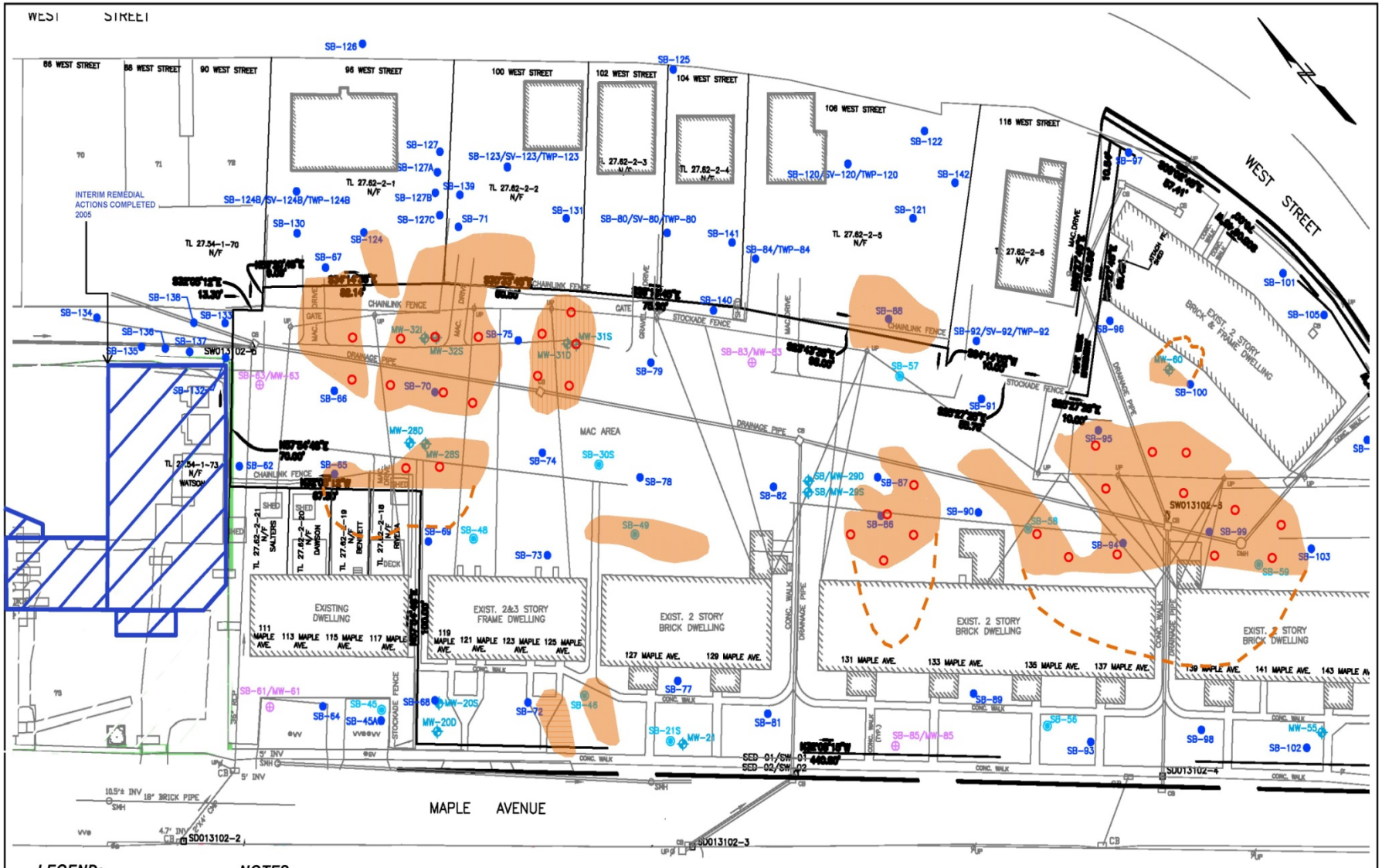
- Define Remedial Objectives
- Develop and Evaluate Remedial Alternatives

Evaluation Criteria

1. Overall protectiveness of public health and the environment
2. Standards, criteria and guidance
3. Long-term effectiveness and permanence
4. Reduction in toxicity, mobility, or volume of contamination through treatment
5. Short-term impacts and effectiveness
6. Implementability
7. Cost effectiveness
8. Community acceptance
9. Land Use

OU-2 Remedial Alternatives

1. No Action
2. NAPL Recovery, In-Situ Groundwater Treatment and Natural Attenuation (NA)
   - NAPL recovery
   - Maintenance of existing paved areas
   - Groundwater Treatment and monitoring
   - Site Management Plan



LEGEND:

- APPROXIMATE EXTENT OF SOURCE MATERIAL (GREATER THAN 0.2 FEET THICKNESS) FROM EVS 3D MODEL
- POSSIBLE EXTENT OF SOURCE MATERIAL.
- NAPL RECOVERY AREA. LOCATION OF RECOVERY WELLS TO BE DETERMINED DURING DESIGN.

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009
3. EXISTING DWELLINGS ON WEST STREET APPROXIMATE FROM AIR PHOTOS
4. IRM EXCAVATION LIMITS APPROXIMATE, BASED ON FIGURE 3, RECORD EXCAVATION PLAN, GEI IRM CERTIFICATION REPORT, 93B MAPLE AVE, MARCH 31, 2006.

0 40 80

SCALE, FEET

CLOVE AND MAPLE FORMER MGP SITE
HAVERSTRAW, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.

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OU-2 ALTERNATIVE 2

Project 091950-1 | September 2011 | Figure 16

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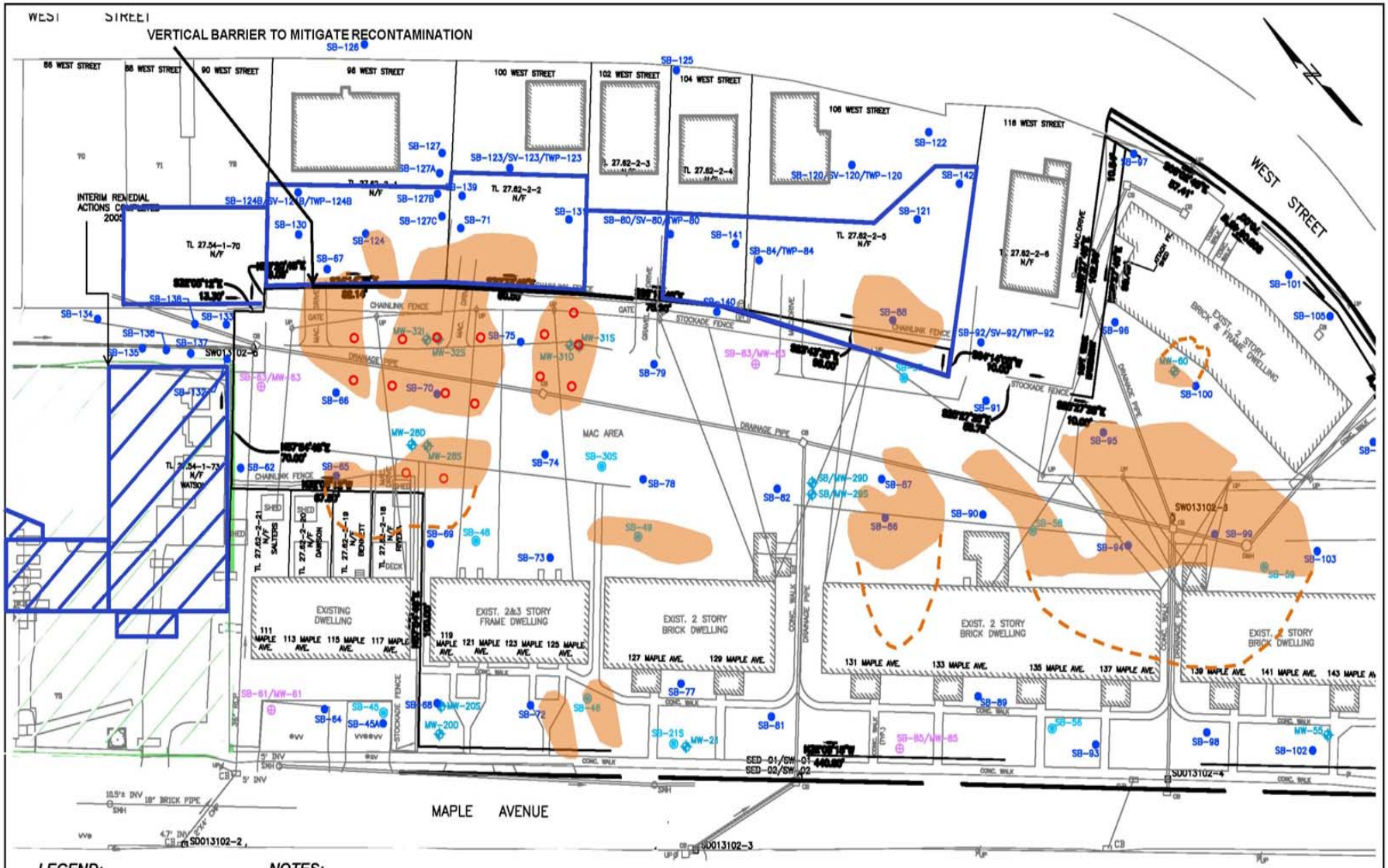
3. NAPL Recovery, Phased Soil Excavation, Barrier Wall Installation, In-Situ Groundwater Treatment and NA

- NAPL recovery
- Phased Soil Excavation
  - West Street Properties in Phase 1
  - Apartment Complex and Maple Ave Properties in Phase 2
- Installation of a vertical barrier to prevent recontamination
- Groundwater monitoring and Natural Attenuation
- Site Management Plan



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OU-2 ALTERNATIVE 3 – PHASE 1

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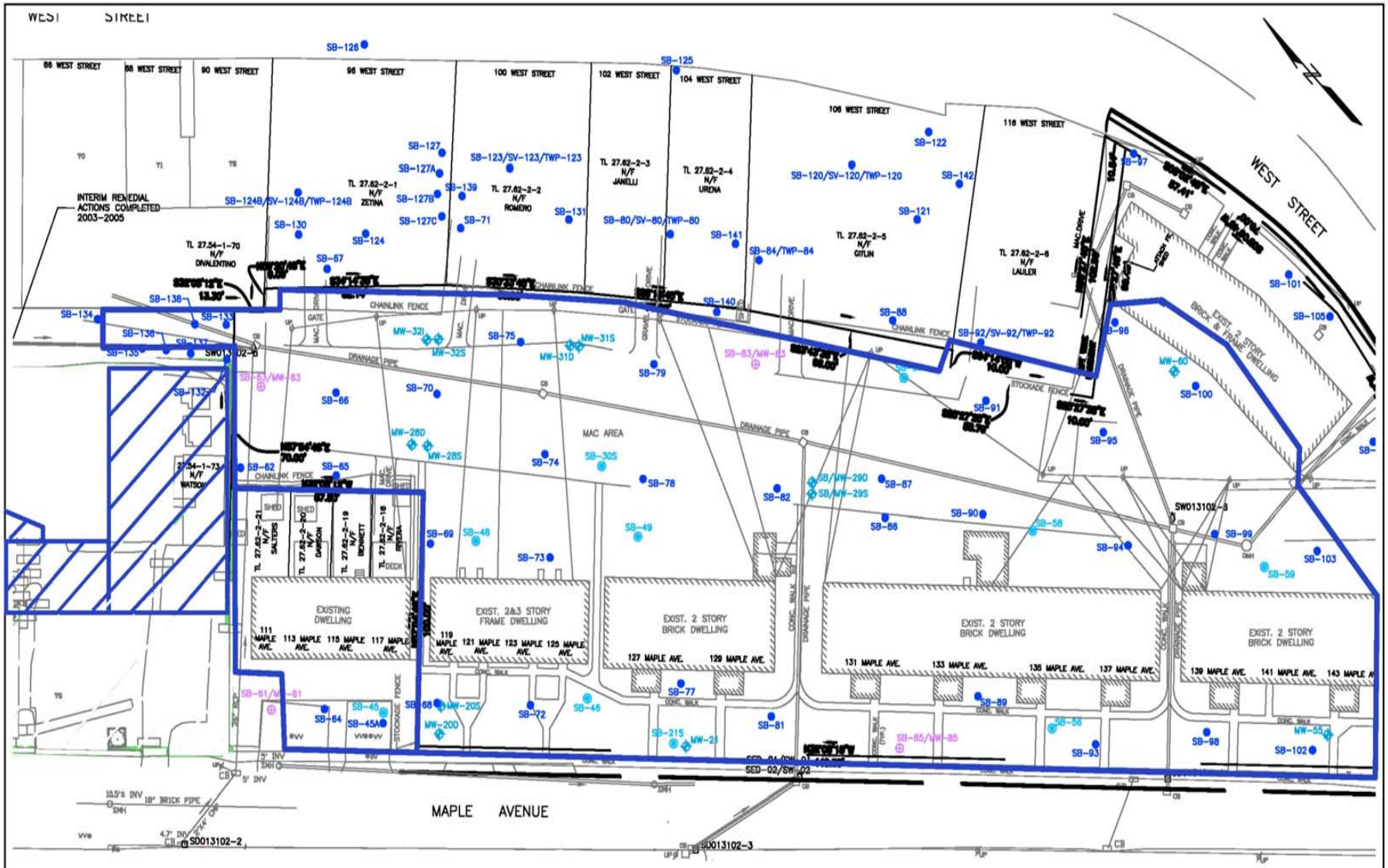

LEGEND:

APPROXIMATE LIMITS OF EXCAVATION FOR PART 375 RESIDENTIAL CLEANUP OBJECTIVES

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009

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SCALE, FEET

CLOVE AND MAPLE FORMER MGP SITE
HAVERSTRAW, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.

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OU-2 ALTERNATIVE 3 – PHASE 2

Project 091950-1 | September 2011 | Figure 18

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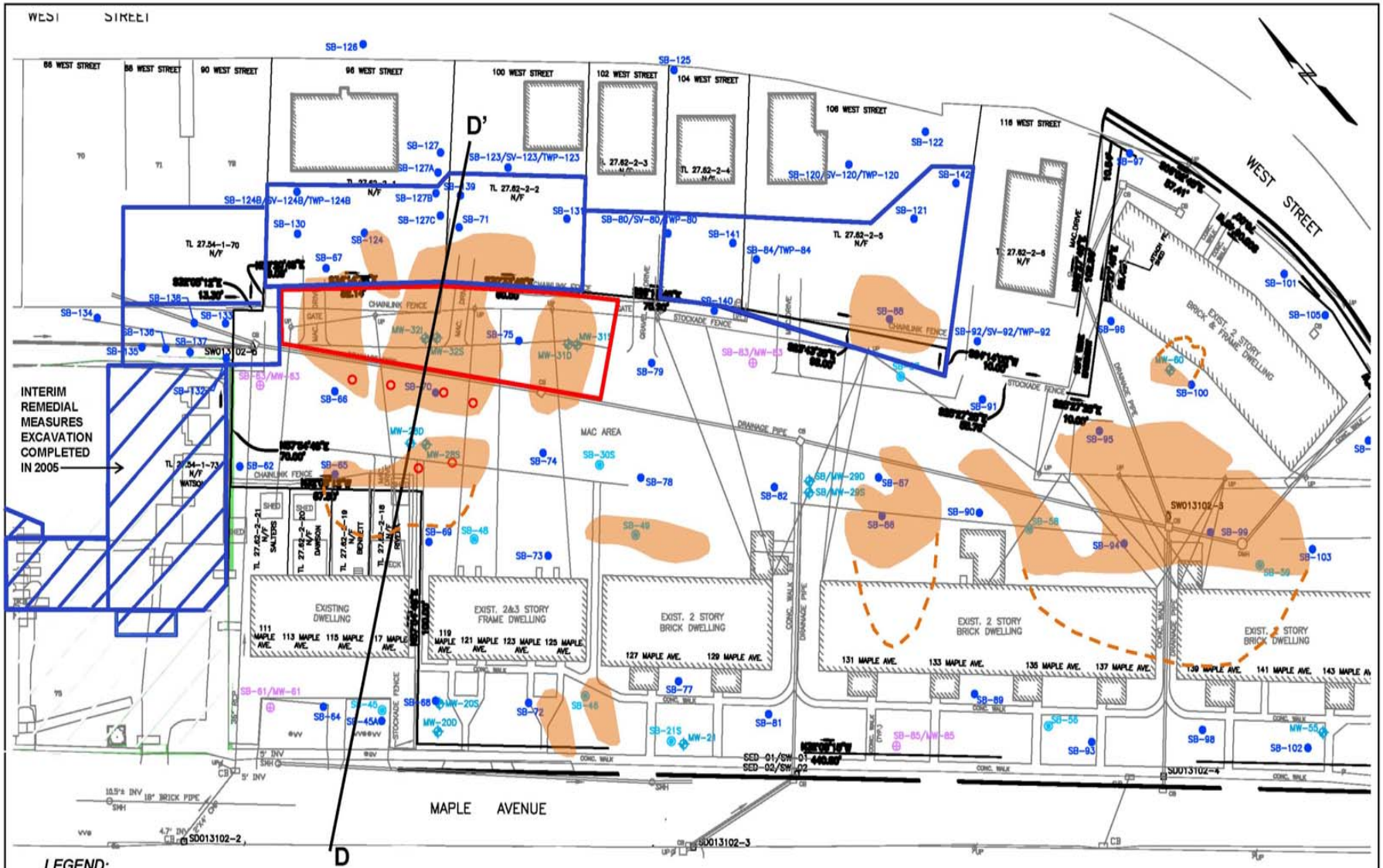
4. NAPL Recovery, Phased Soil Removal to Residential/Restricted-Residential SCOs, Source Area Removal in Phase 1, and In-Situ Groundwater Treatment and NA

- NAPL recovery
- Phased Soil
  - West Street Properties and Source Areas in Phase 1
  - Apartment Complex and Maple Ave Properties in Phase 2

Alternative 4 (continued)

– Groundwater monitoring and Natural Attenuation
– Site Management Plan



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OU-2 ALTERNATIVE 4 – PHASE 1

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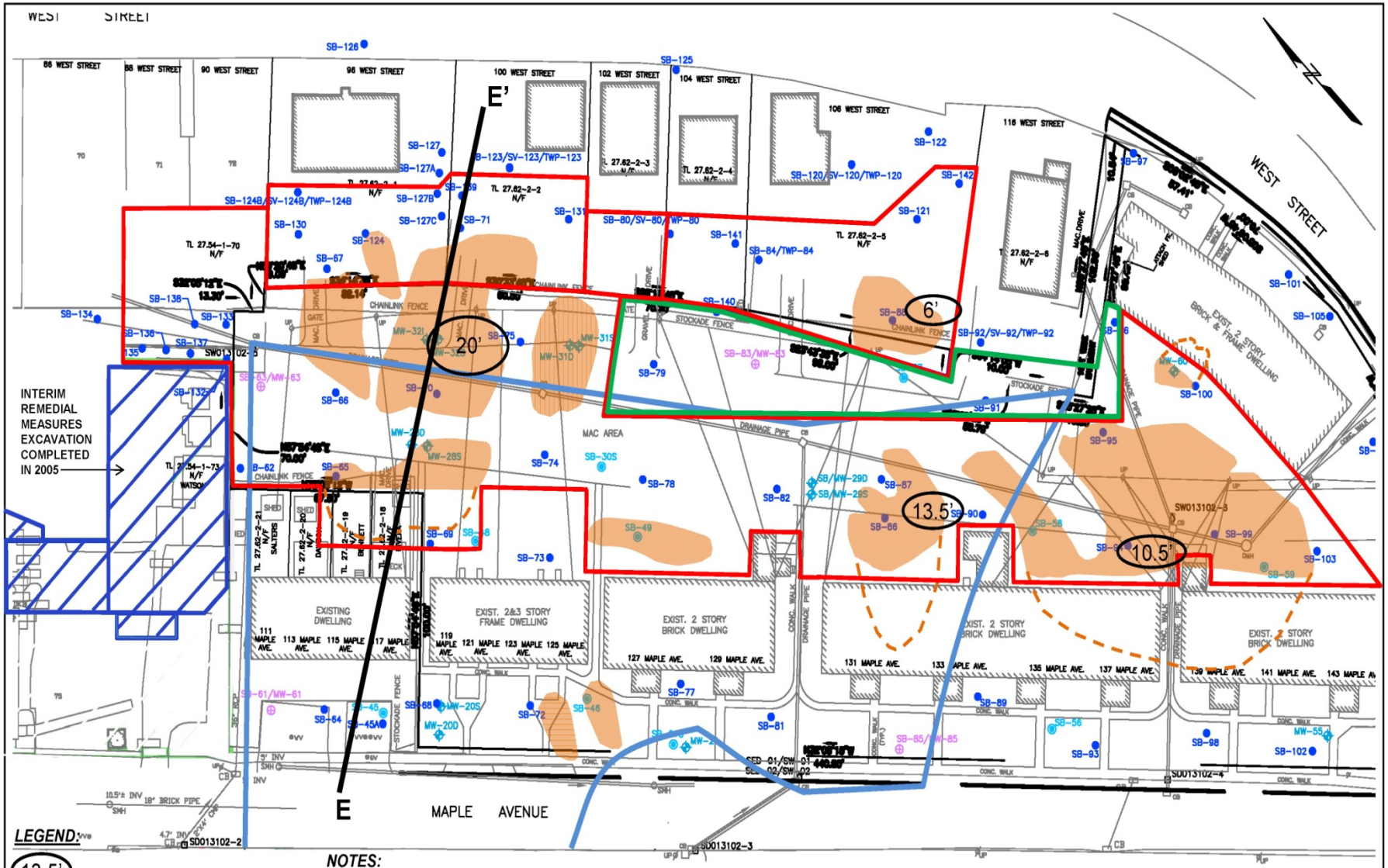
5. Phased Soil removal to Residential Levels, Barrier Wall Installation and Groundwater Treatment

- Phased Soil Removal
  - West Street Properties and Source Areas in Phase 1
  - Apartment Complex and Maple Ave Properties in Phase 2
- Installation of a barrier wall to prevent recontamination
- Groundwater monitoring
- Site Management Plan



LEGEND:

- 13.5' — APPROXIMATE MAXIMUM DEPTH OF SOURCE MATERIAL
- ADDITIONAL DELINEATION REQUIRED
- EXCAVATION OF MATERIAL WITH TPAHs >25 ppm
- APPROXIMATE EXTENTS OF GROUNDWATER EXCEEDANCES OF NYSDEC AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES
- APPROXIMATE EXTENT OF SOURCE MATERIAL (GREATER THAN 0.2 FEET IN THICKNESS) FROM EVS 3D MODEL
- EXTENT OF POTENTIAL SOURCE MATERIAL BENEATH BUILDINGS

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009
3. EXISTING DWELLINGS ON WEST STREET APPROXIMATE FROM AIR PHOTOS
4. IRM EXCAVATION LIMITS APPROXIMATE, BASED ON FIGURE 3, RECORD EXCAVATION PLAN, GEI IRM CERTIFICATION REPORT, 93B MAPLE AVE, MARCH 31, 2006.

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SCALE, FEET

CLOVE AND MAPLE FORMER MGP SITE
HAVERSTRAW, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.

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Project 091950-6

OU-2 ALTERNATIVE 5A – PHASE 1

December 2011 Figure 2

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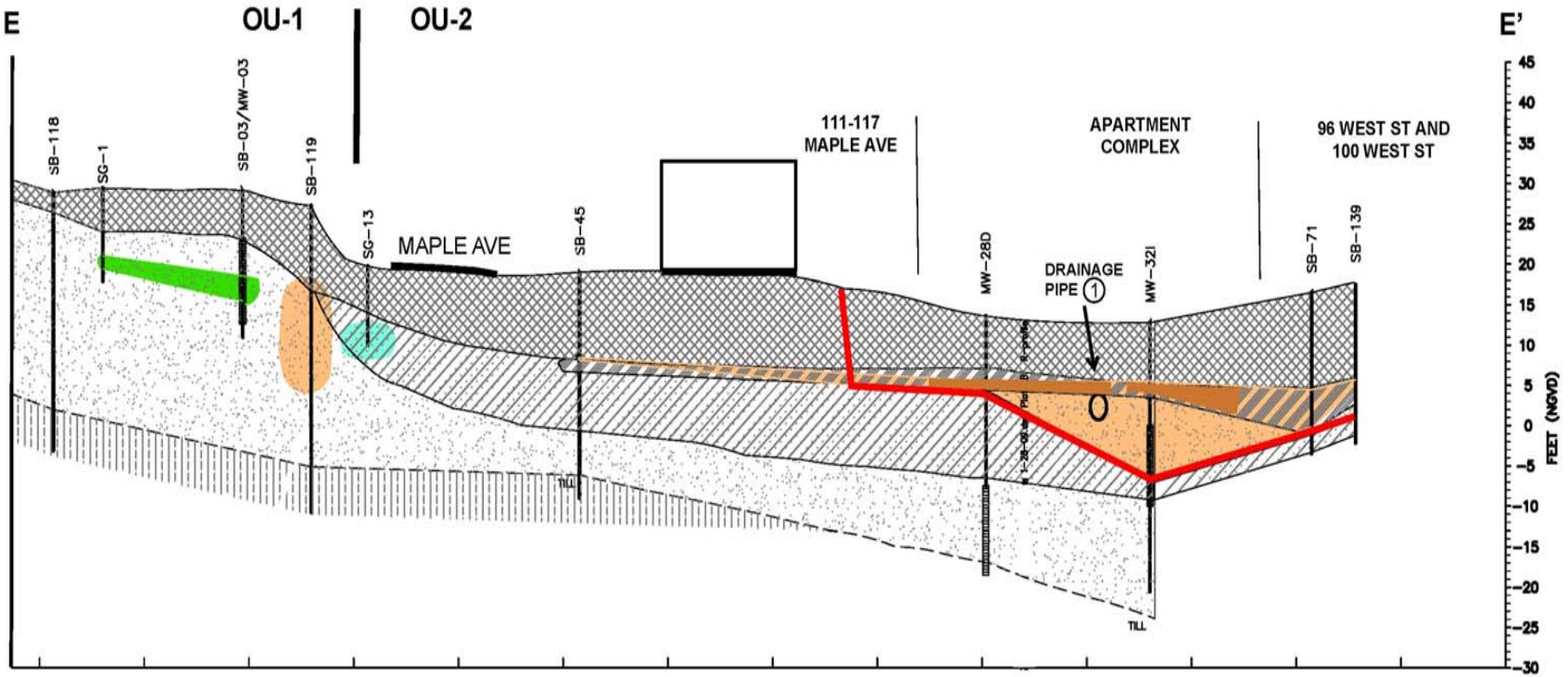

LEGEND:

- APPROXIMATE LIMITS OF EXCAVATION OF MATERIAL WITH TPAHs >25 ppm
- MW-10 — SOIL BORING OR MONITORING WELL LOCATION
- SCREENED INTERVAL
- HYDROCARBON-LIKE ODORS
- MGP-LIKE ODORS
- SHEENS OR STAINING ONLY
- MGP OIL-LIKE BLEBS, LENSES
- MGP TAR-LIKE MATERIAL, CHARACTERIZED BY LOW VISCOSITY NAPL
- FILL MATERIAL — UNIT 1
- COARSE-GRAINED SANDS AND GRAVELS
- CLAY AND FINE SAND/ SILT MIXTURES
- FINE SANDS
- SILT AND FINE TO COARSE-GRAINED SAND
- PEAT, ORGANIC CLAY — UNIT 2
- CLAY MATERIAL — UNIT 3
- TILL MATERIAL — UNIT 4

NOTES:

1. SIZE, TYPE, DEPTH, AND LOCATION OF DRAINAGE PIPE TO BE CONFIRMED DURING REMEDIAL DESIGN.
2. NOT FOR BIDDING OR CONSTRUCTION
3. BASE FIGURE FROM PLATE 4B, CROSS SECTION G-G', 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009
4. VERTICAL SCALE EXAGGERATED 2X HORIZONTAL SCALE

CLOVE AND MAPLE FORMER MGP SITE HAVERSTRAW, NEW YORK	GEI Consultants	ALTERNATIVE 5A- PHASE 1 CROSS SECTION E-E'
ORANGE AND ROCKLAND UTILITIES, INC.	Project 091950-6	December 2011 Figure 3

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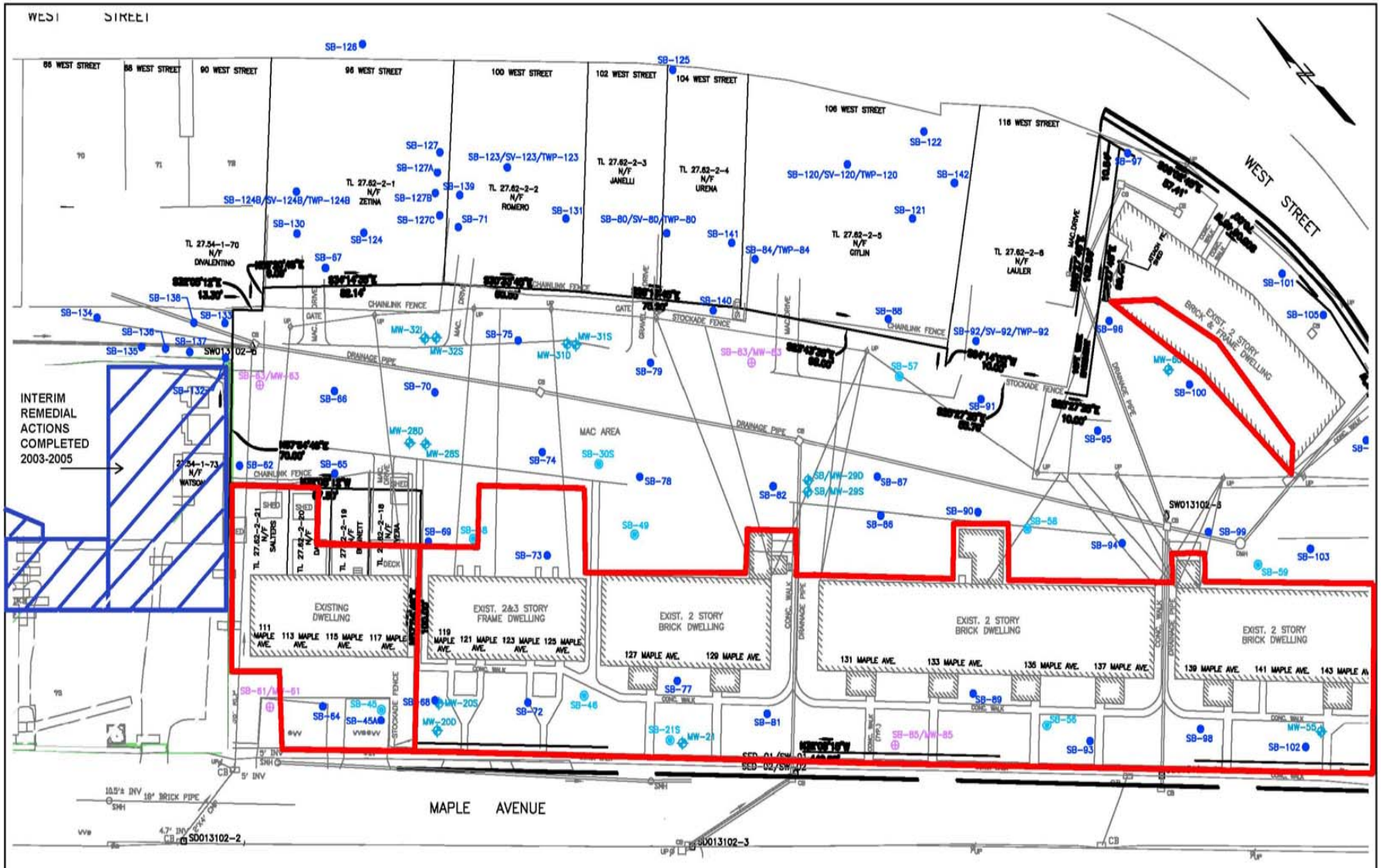

LEGEND:

EXCAVATION OF MATERIAL WITH TPAHs >25 ppm (ADDITIONAL DELINEATION REQUIRED UNDER STRUCTURES)

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009

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HAVERSTRAW, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.

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OU-2 ALTERNATIVE 5A – PHASE 2

Project 091950-6 | December 2011 | Figure 4

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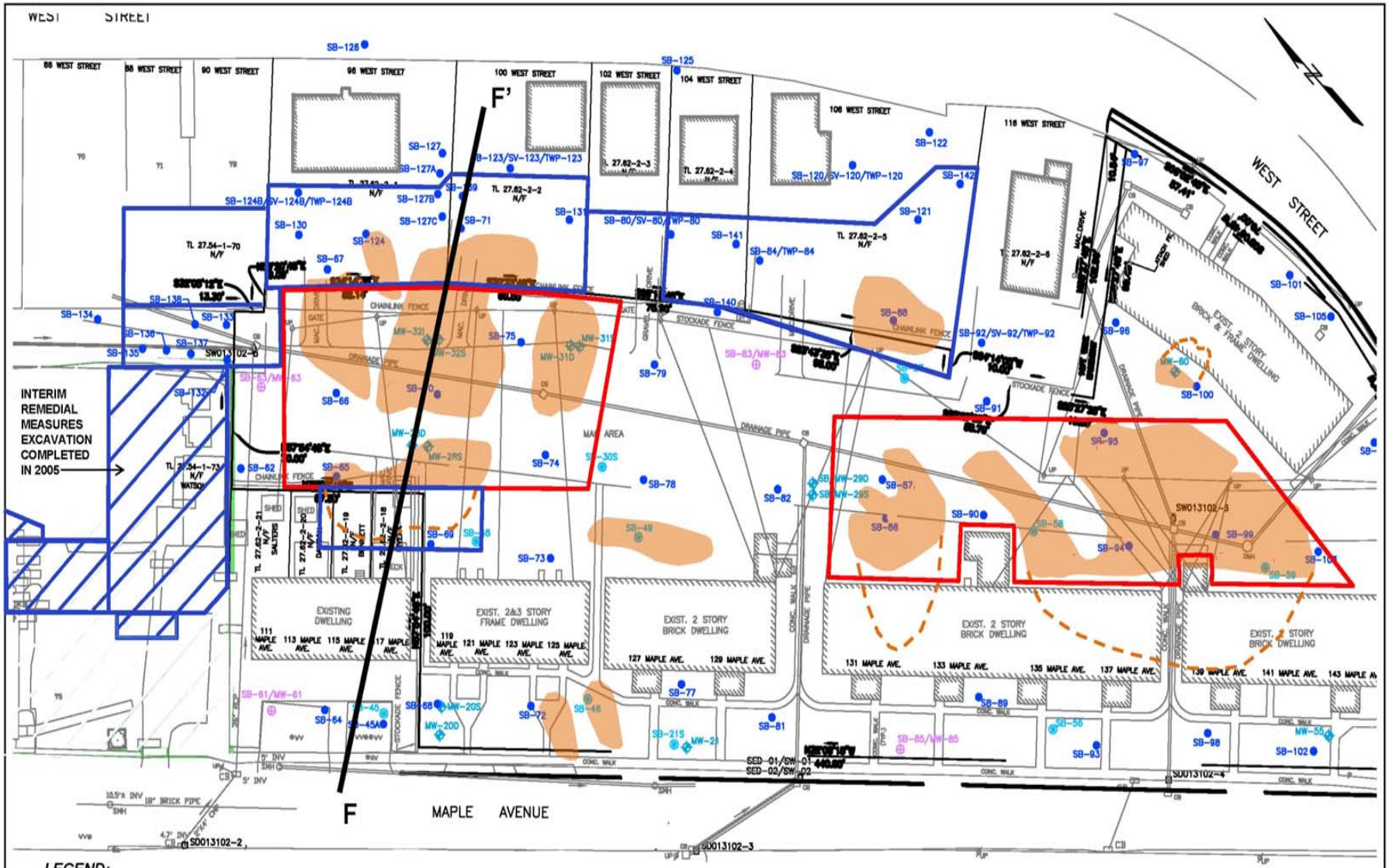
6. In-Situ Solidification (ISS) of Source Materials and Soil Removal in Non-ISS Areas
   - Phase 1, ISS of Source Materials and soil removal at the West Street properties
   - Removal and installation of the stormwater pipe in clean fill
   - Phase 2, soil removal under the Apartment complex and Maple Ave properties
   - Clean soil cover (2 ft)over entire ISS area
   - Groundwater monitoring
   - Site Management Plan



LEGEND:

- APPROXIMATE LIMITS FOR PART 375 RESIDENTIAL CLEANUP
- ISS OF SOURCE MATERIAL
- APPROXIMATE EXTENT OF SOURCE MATERIAL (GREATER THAN 0.2 FEET IN THICKNESS) FROM EVS 3D MODEL
- EXTENT OF POTENTIAL SOURCE MATERIAL BENEATH BUILDINGS

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009
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SCALE, FEET

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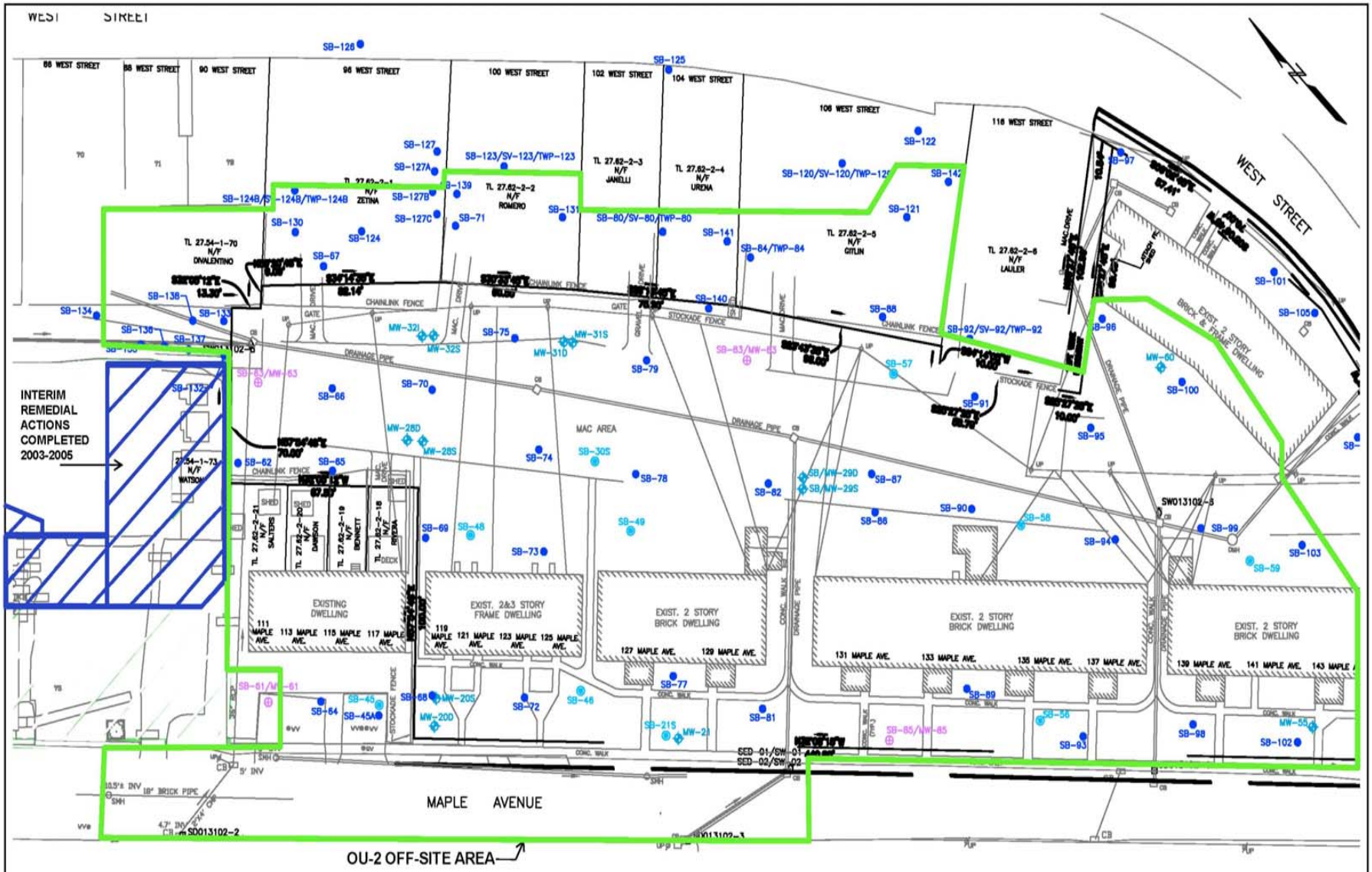
OU-2 ALTERNATIVE 6 – PHASE 1

Project 091950-1 | October 2011 | Figure 25

I:\GEI\Project\ORANGE AND ROCKLAND\HAVERSTRAW\091950\FS in PPt\C&M Figure 25.ppt

7. Restoration to Unrestricted Conditions

- Excavation of soil exceeding Unrestricted SCOs
- Acquisition and demolition of the Apartment buildings
- Backfilling with clean soil
- Groundwater monitoring
- Site Management Plan



LEGEND:

- APPROXIMATE LIMITS OF EXCAVATION FOR PART 375 UNRESTRICTED CLEANUP OBJECTIVES

NOTES:

1. NOT FOR BIDDING OR CONSTRUCTION
2. BASE MAP FROM PLATE 2, 1/28/2009, CMX REMEDIAL INVESTIGATION REPORT, MAY 2009

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SCALE, FEET

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HAVERSTRAW, NEW YORK

ORANGE AND ROCKLAND UTILITIES, INC.

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OU-2 ALTERNATIVE 7 – PART 375 UNRESTRICTED SOIL CLEANUP OBJECTIVES

September 2011 Figure 28

I:\GEI\Project\ORANGE AND ROCKLAND\HAVERSTRAW\091950\FS in PP\C&M Figure 26.ppt

Remedial Alternative	Capital Cost ($)	Annual Cost ($)	Total Present Worth ($)
1. No Action	0	0	0
2. NAPL Recovery and In-Situ Groundwater Treatment	$1,125,000	$62,500	$2,090,000
3. NAPL Recovery and Phased Soil Excavation	$16,700,000	$37,200	$17,300,000
4. NAPL Recovery, Phased Removal Residential/Restricted Residential	$19,700,000	$45,900	$20,400,000
5. Phased Soil Removal to Part 375 Residential Levels	$27,200,000	$17,200	$27,500,000
6. ISS	$19,400,000	$17,200	$19,700,000
7. Soil Removal to Unrestricted SCOs	$42,000,000	0	$42,000,000

Proposed Alternative

Alternative 5

- Phased Soil Removal West Street Properties and Portion of Apartment Complex in Phase 1 and remainder of Apartment Complex and Maple Ave Properties in Phase 2
- Installation of a barrier wall to prevent recontamination as needed
- Groundwater monitoring
- Site Management Plan
- Capital Costs $27.2 million
- Total Present Worth Cost $27.5 million

Next Steps

- Public Comment Period ends February 6, 2012
- Responsiveness Summary
- Record of Decision
- Remedial Design
- Remedial Construction
- Site Management

Public Comment Period
Proposed Remedial Action Plan

Comments postmarked by February 6, 2012

Submit to:

Mr. William Ports, P.E.
NYSDEC
625 Broadway
Albany NY 12233-7014
(518) 402-9662
wfports@gw.dec.state.ny.us

Anthony Perretta

New York State Department of Health

Bureau of Environmental Exposure Investigation

Flanigan Square

547 River Street, Troy NY 12180

518-402-7880

Questions and Answers