

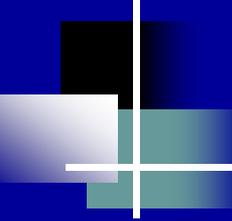
# Groundwater Reclassification Petition

Burgess Brothers Superfund Site  
Bennington, Vermont

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VtDEC Groundwater Coordinating Committee

February 14, 2002



# Agenda

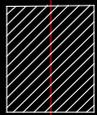
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- Project Overview
- Site Location and Description
- Site Investigations
- Hydrogeologic Setting
- Remedial Actions
- GW Reclassification Boundary

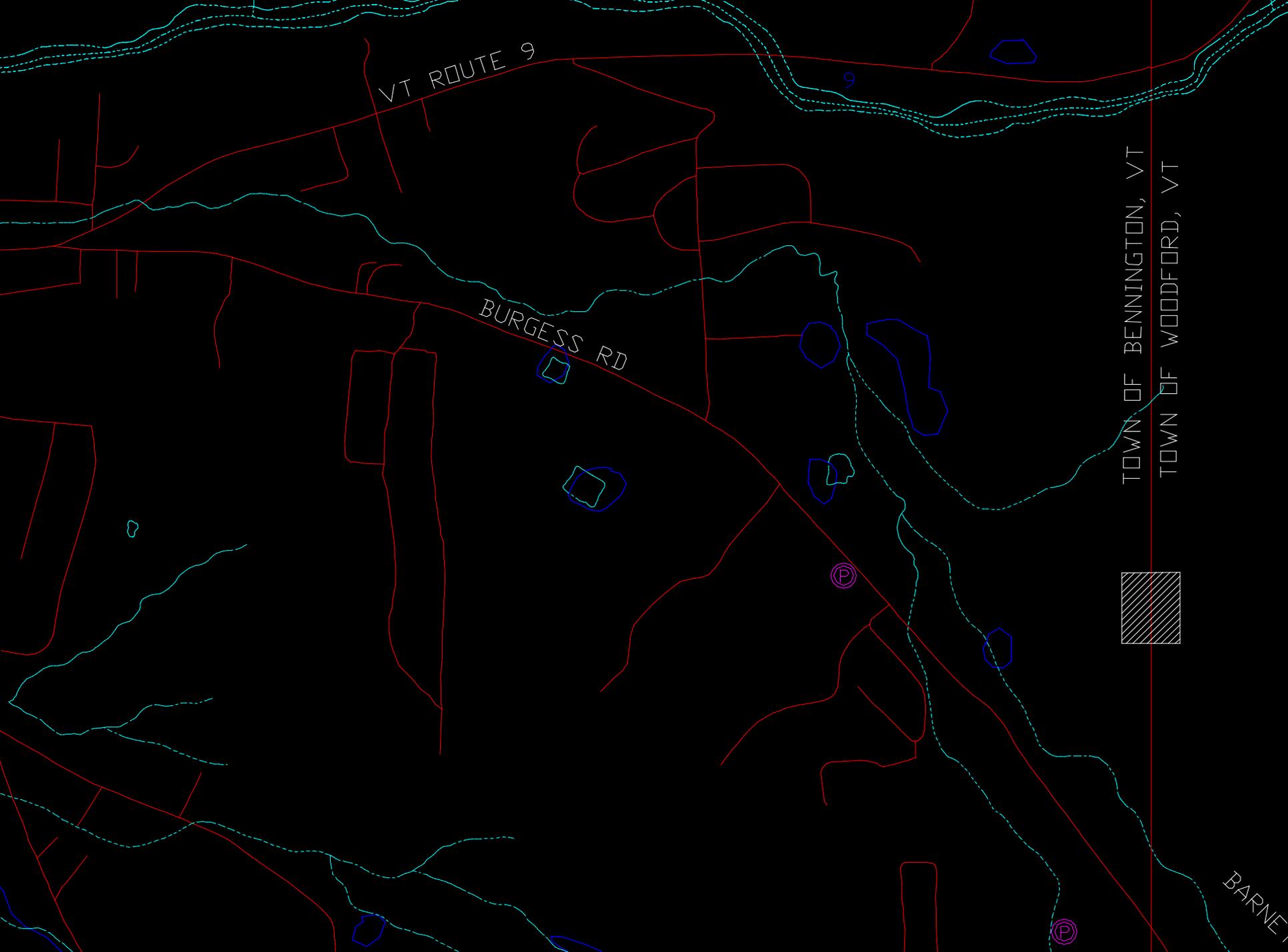
VT ROUTE 9

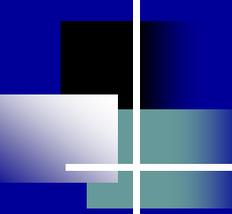
BURGESS RD

TOWN OF BENNINGTON, VT  
TOWN OF WOODFORD, VT



BARNE

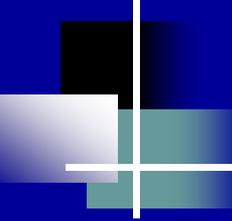




# Project Overview

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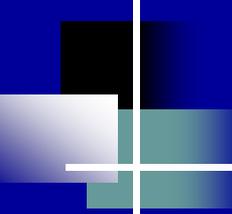
- **Burgess Brothers Landfill**
  - Landfill and 2 Former Lagoons
  - Operated early 1950's to mid-1970's
  - Localized groundwater contamination
- **Regulated under Superfund since 1989**
- **RI/FS investigations: 1990's**
- **Remedial construction: 1999 - 2000**



# Groundwater Reclassification

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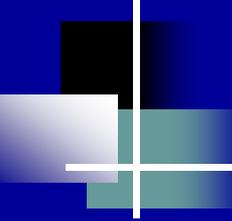
- Groundwater currently Class III
- Reclassify groundwater in immediate landfill area from Class III to Class IV (12.4-acre area)



# Reasons for Reclassification

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- Groundwater use prohibited by institutional controls
- Physical characteristics of aquifer make it infeasible for use as a Class III water supply
  - Majority of area is a landfill
  - Aquifer is of low permeability, yield and thickness
- Groundwater quality exceeds VGES



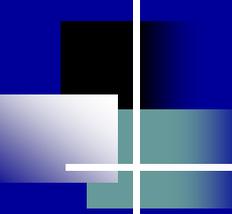
# Site Description

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- 3-acre landfill on 60+ acre parcel owned by Burgess Brothers
- Site Features
  - Landfill Area
  - Former Lagoon Area
  - Marshy Area
  - Harmon Hill
  - Unnamed Stream and Barney Brook







# Site Features

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- Abutting land uses

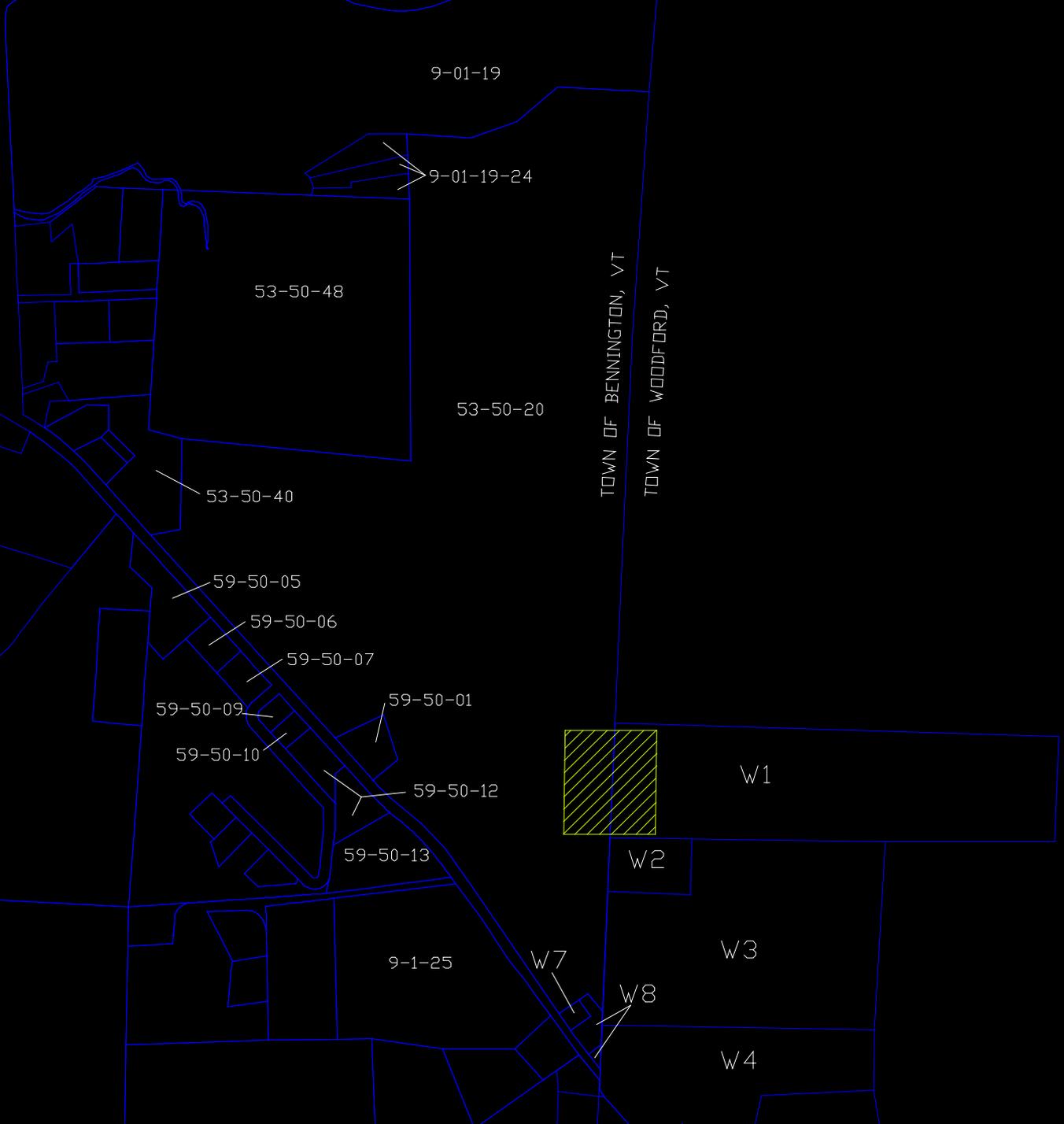
  - Green Mountain National Forest
  - Residents

- Water Supply Locations

  - Public

    - Ryder & Morgan Spring wells
    - 1 mile from site

  - Private water supplies - Olin and Dickenson wells



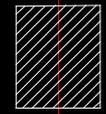
-  PARCEL
- B1** BENNINGTON  
PARCEL OWNER
- W1** WOODFORD PARCEL  
OWNER
-  APPROXIMATE LOCATION  
GROUNDWATER RECLASSIFICATION

LOT NUMBER	PARCEL OWNER
9-01-19	JOSEPH MAYER
9-01-19-24	RUTH RUDNICK
53-50-48	STATE OF VT
53-50-40	WOODFORD PACKERS
59-50-05	CLYDE D. HOWE,
59-50-06	LAWRENCE HARRINGT
59-50-07	RALPH DICKINSON,
59-50-09	PATRICK KINNEY,
59-50-10	FRANCIS ROY, 22
59-50-01	PEGGY SAUER-GAGND
59-50-12	GLENN SAUER, 1
59-50-13	JEAN BURGESS,
9-1-25	BENJAMIN BACON,
53-50-20 *SITE*	BURGESS BROS / CLYDE
W1 *SITE*	BURGESS BROS / CLYDE
W2	BURGESS BROS / CLYDE
W3	BURGESS BROS / CLYDE
W4	C. BURGESS & I. WAL
W5	BEVERLY & THEODORE P
W6	R. FRANTZ AND NANCY C
W7	BURGESS BROS / CLYDE
W8	TOW

VT ROUTE 9

BURGESS RD

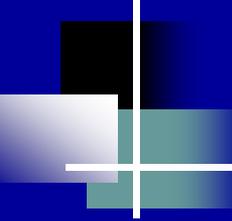
TOWN OF BENNINGTON, VT  
TOWN OF WOODFORD, VT



BARNEY BROOK



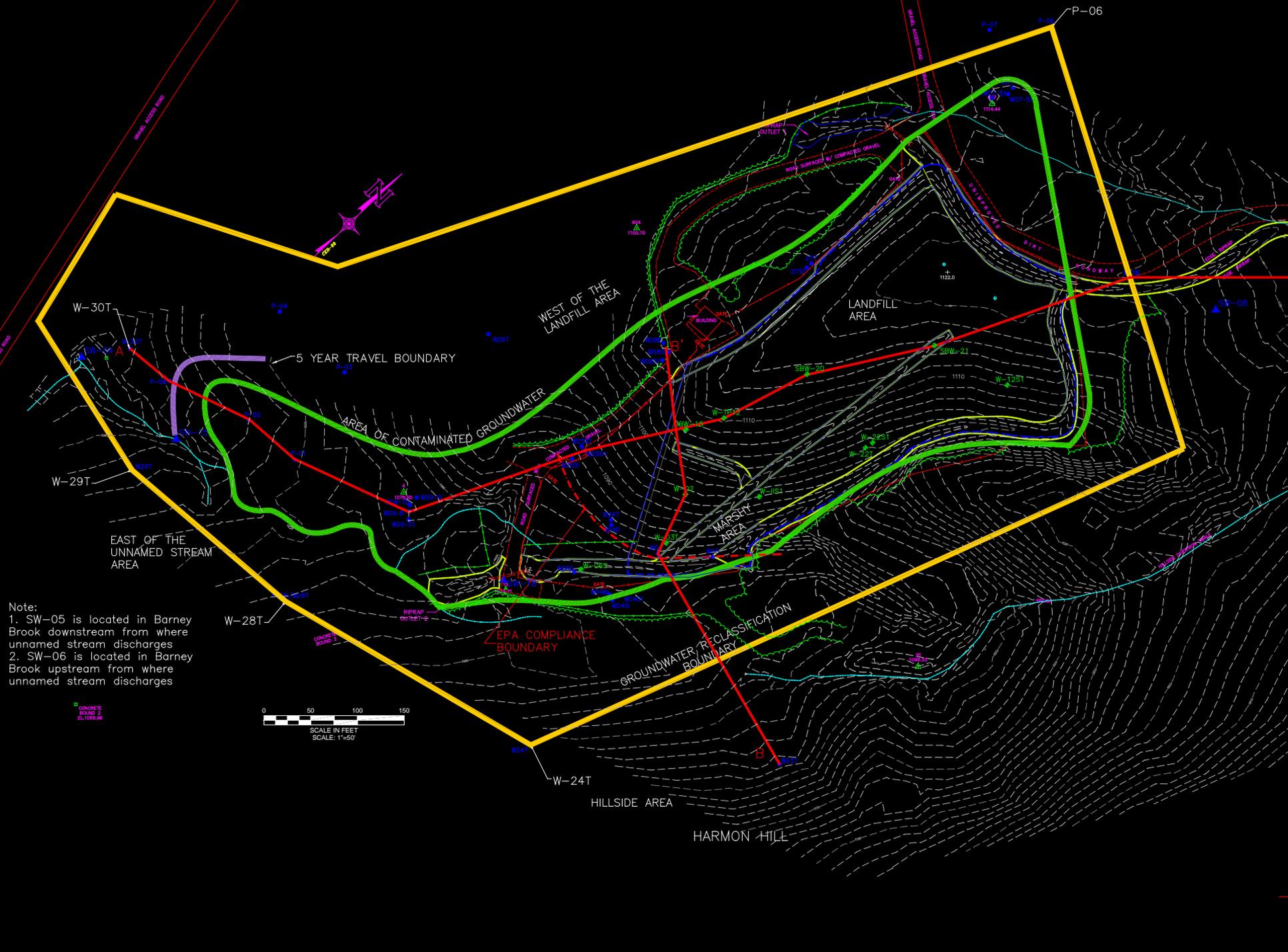
NOTE  
AREA



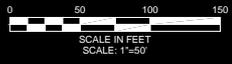
# Hydrogeologic Setting

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- Shallow overburden aquifer
  - Kame sand
  - Ablation glacial till
- Lodgemont till
  - Dense, low permeability confining layer
  - Separates shallow and deep aquifer
- Bedrock aquifer



Note:  
 1. SW-05 is located in Barney Brook downstream from where unnamed stream discharges  
 2. SW-06 is located in Barney Brook upstream from where unnamed stream discharges



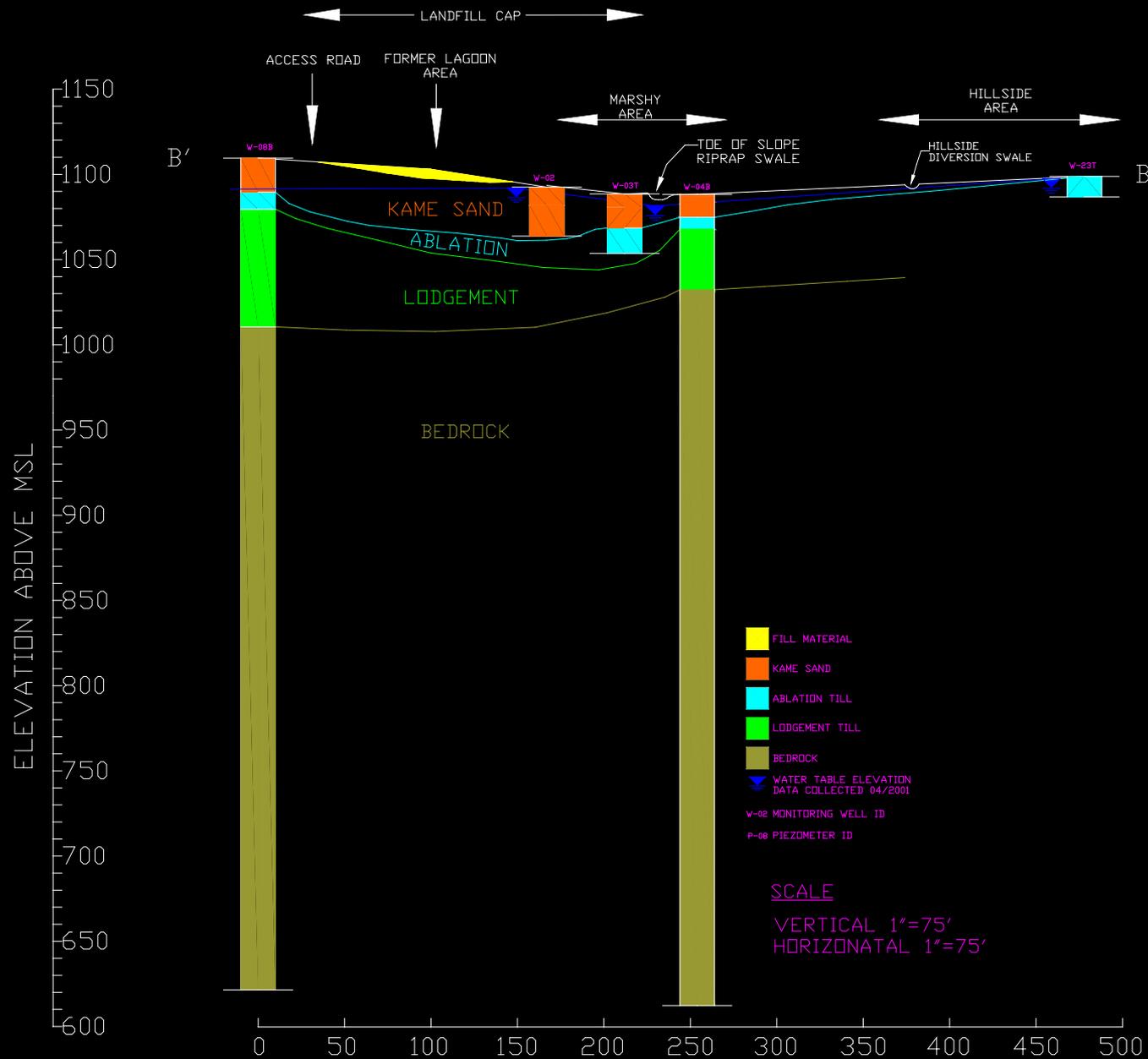
CONCRETE BOUNDARY  
 ELUVIUM

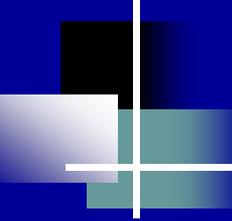
HILLSIDE AREA

HARMON HILL



# East – West Cross-section





# Hydrogeologic Setting

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- Groundwater flow

  - Horizontal

    - Follows site topography

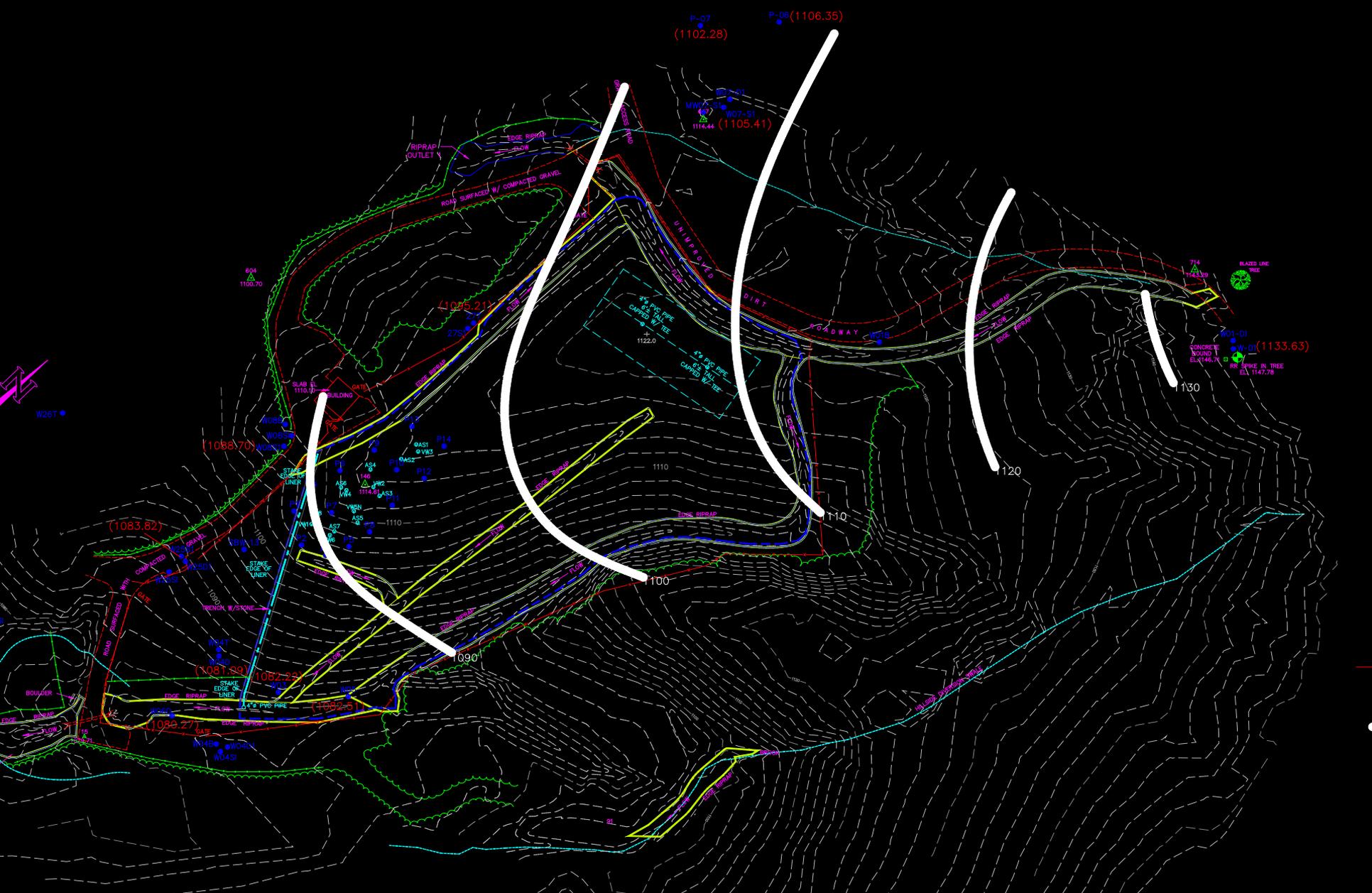
    - North-south slope, Harmon Hill to east

    - Upward gw flow in kame sands/till in Marshy area

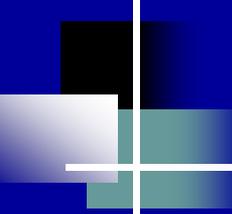
- Discharge to swales and Unnamed Stream

# Groundwater Flow – Kame Sand

10498.37  
MARBLE POST  
T.B.M. 713



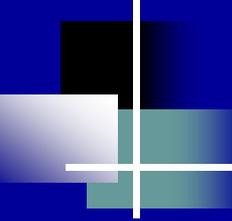




# Site Characterizations

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- RI Investigations – 1991 to 1996
- Supplemental RI – 1997
- Low-flow groundwater sampling (4 rounds) – 1995, 1996
- Additional m.w. and piezometer installation and sampling – 1998, 1999
- Post-closure monitoring - ongoing



# Contaminants of Concern

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## Organics

Vinyl Chloride

Trichloroethene

Tetrachloroethene

Dichloroethene

Benzene

Chlorobenzene

Chloroform

## Inorganics

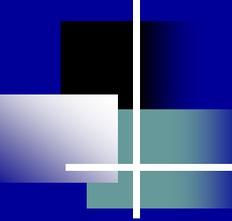
Arsenic

Lead

Manganese

Thallium





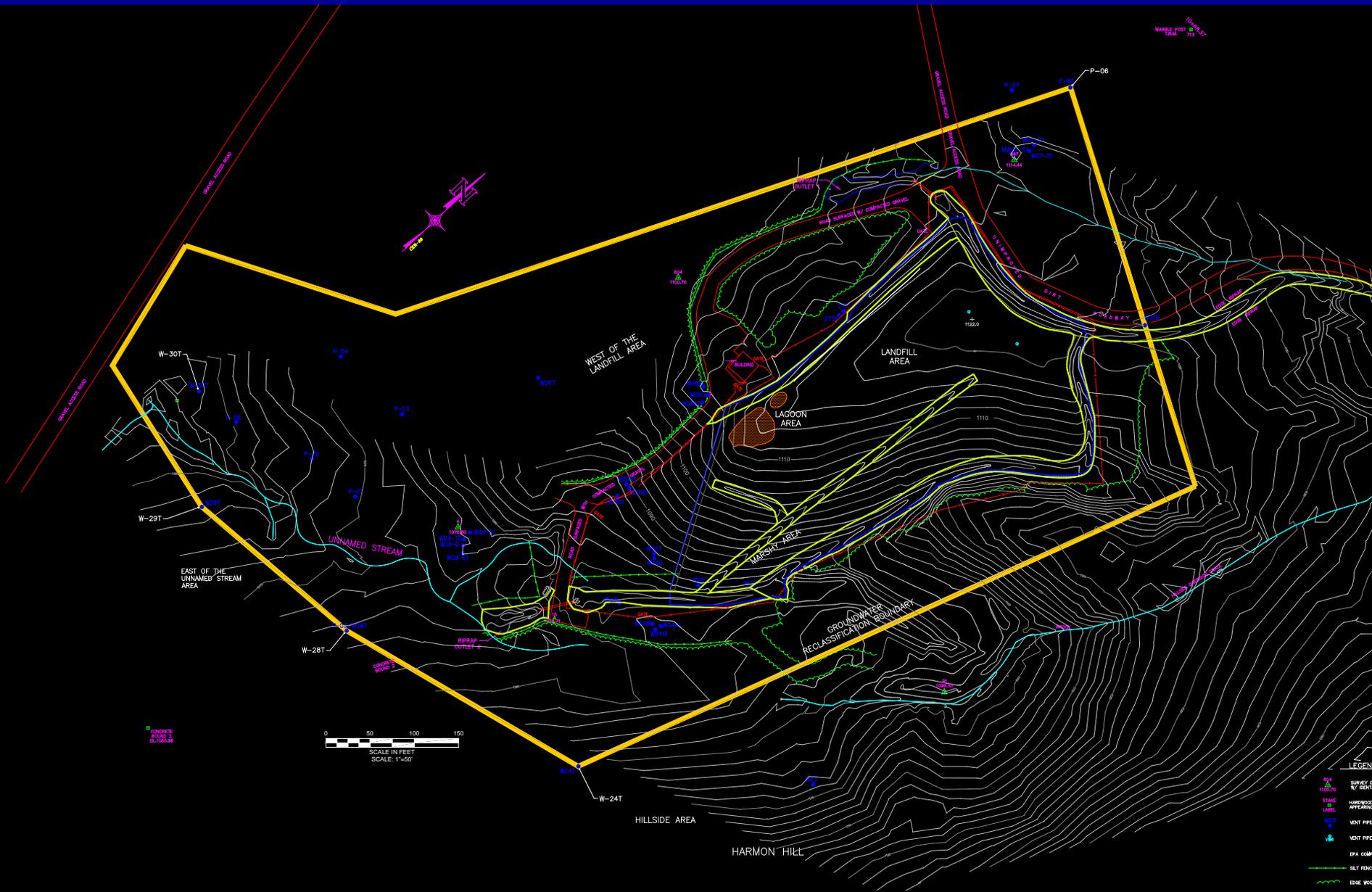
# Remedial Actions

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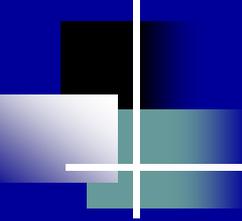
- Landfill/Marshy Area
  - Impermeable capping system
- Former Lagoon Area
  - Soil vapor extraction (SVE) and air sparging
- Surface water diversion



# Groundwater Reclassification Boundary



- LEGEND**
- 604 SURVEY POINT
  - 1100.70 ELEVATION
  - 51000 HARDWOOD
  - 51000 LUMBER
  - 51000 VENT PIPE
  - 51000 EPA COMP
  - 51000 SILT FENCE
  - 51000 EDGE WOOD
  - 51000 AS-BUILT



# GW Reclassification Boundary Defined by:

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Area of Contaminated Groundwater

Topographic Barriers to Migration

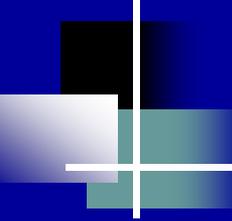
North – South Slope

Harmon Hill to East

Hydrogeologic Barriers to Migration

GW flow direction (N-S)

Diversion swales and Unnamed Stream



# GW Reclassification Boundary: Upgradient & Cross-gradient

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- Upgradient (North): P-06 through W-01B
- Cross-gradient (East & West)
  - Topographically/hydraulically upgradient of Area of Contaminated Groundwater
  - East - on slope rise to Harmon Hill to W-24T
  - West – P0-6 to survey marker near W-26T



# GW Reclassification Boundary: Downgradient

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- Southeast – South

  - W-24T to W-28T to W-29T

  - GW flow captured by Unnamed Stream

  - No contaminants detected across from stream

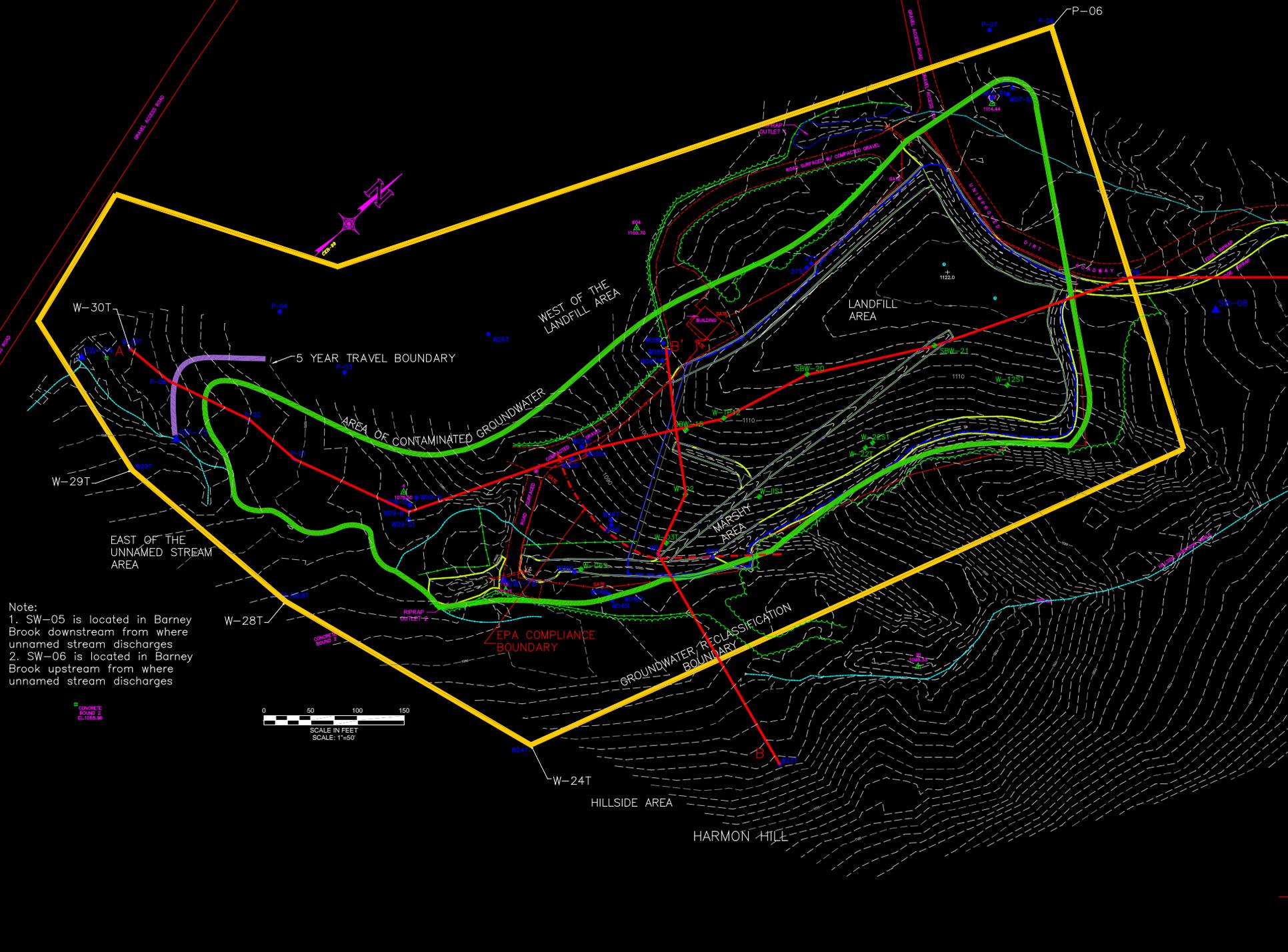
- Southwest

  - Adjacent to gravel access road

  - 5-yr travel boundary from ACGW = 35'

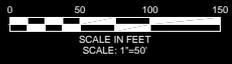
  - Buffer zone = 160' to 200' (min. 22 yr travel time)

  - 3 monitoring wells between ACGW and  
Reclassification Boundary (P0-2, P-08, W-30T)



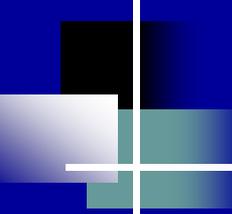
Note:  
 1. SW-05 is located in Barney Brook downstream from where unnamed stream discharges  
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CONCRETE BOUND 2  
 EL105596



HILLSIDE AREA

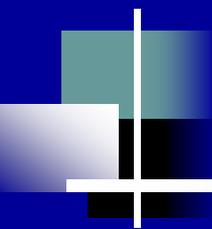
HARMON HILL



# Summary

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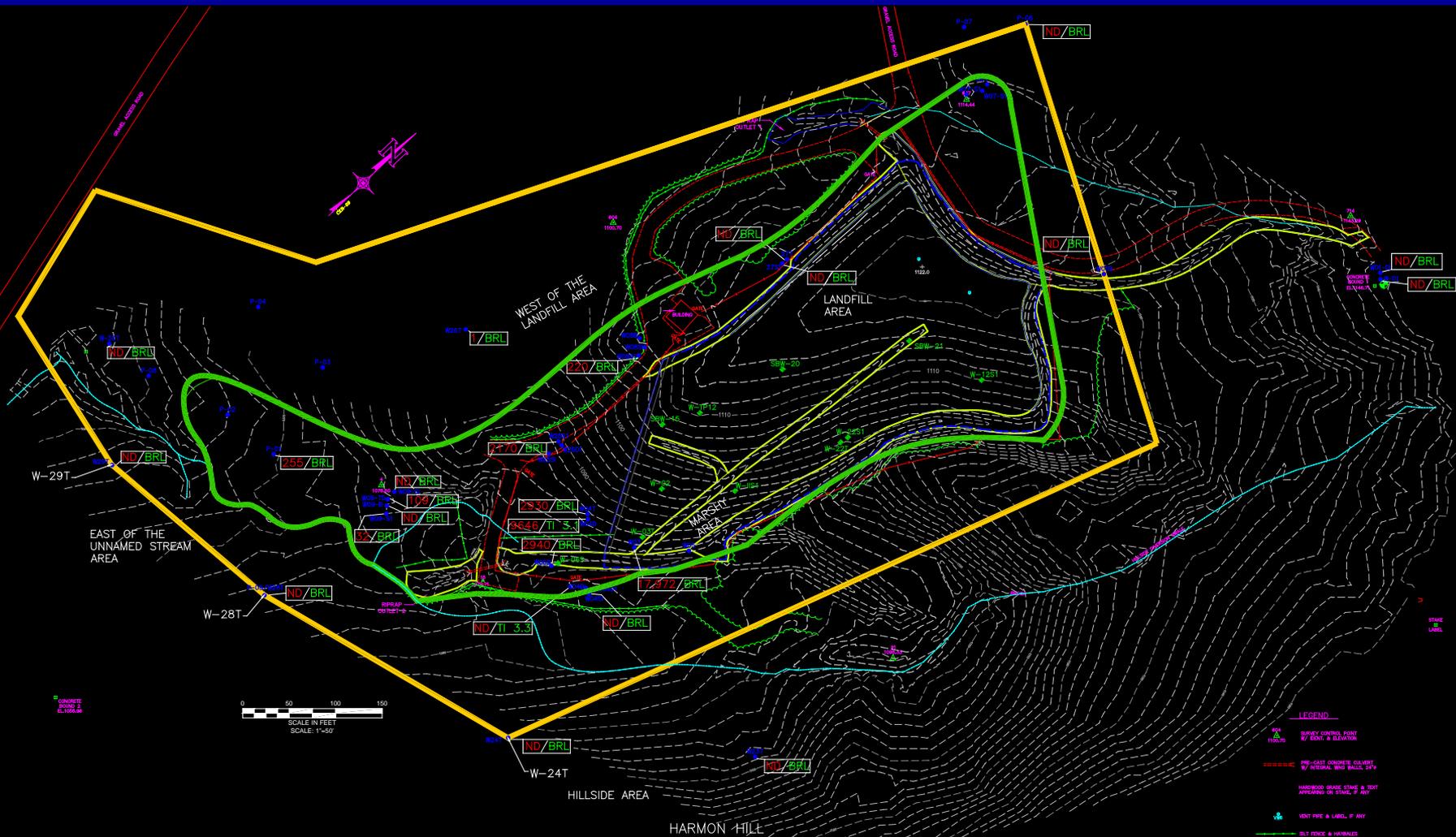
- Landfill and immediate area (12.43 acres) proposed for Class IV groundwater designation
- Groundwater quality exceeds VGES
- Institutional controls prohibits use of groundwater
- Physical characteristics of aquifer make it infeasible for use as a Class III water supply
  - Majority of area is a landfill
  - Aquifer is of low permeability, yield and thickness
- Groundwater quality makes it infeasible for use as a Class III water supply



The End

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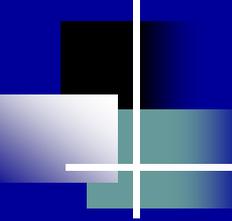
# Groundwater Quality – 1999 and 2001



- Notes:
1. Total VOC results in ug/L are shown in red.
  2. Metals results are shown in ug/L are shown in green.
  3. All VOC results are from April 2001 sampling

Thallium Note:  
Source of Thallium (Tl) is not known. Thallium

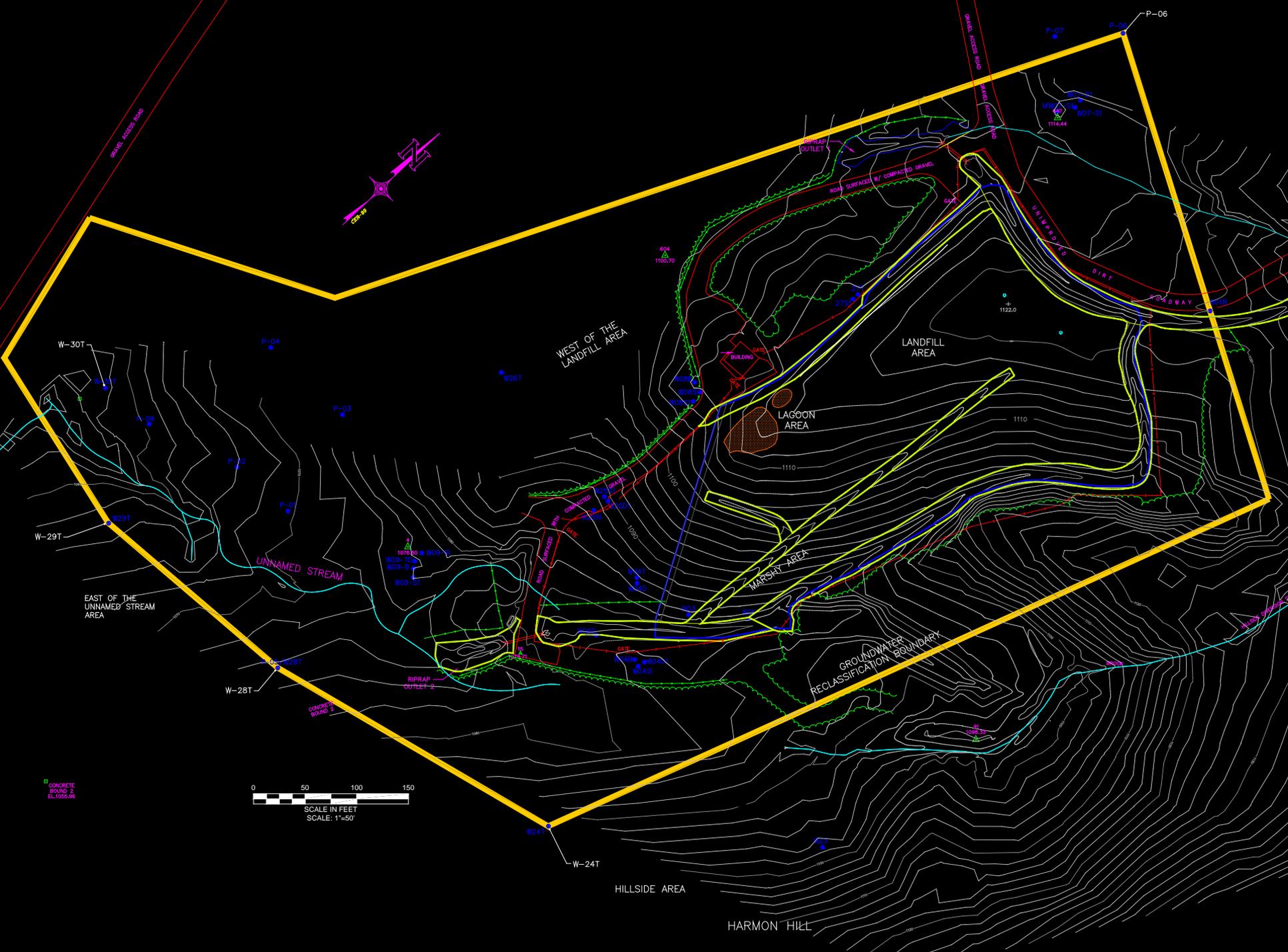




# Site Location and Description

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- Insert site locus



WEST OF THE LANDFILL AREA

LANDFILL AREA

LAGOON AREA

MARSHY AREA

HILLSIDE AREA

HARMON HILL



CONCRETE BOUND 2  
EL:1055.96

UNNAMED STREAM

GROUNDWATER RECLASSIFICATION BOUNDARY

EAST OF THE UNNAMED STREAM AREA

RIPRAP OUTLET

RIPRAP OUTLET 2

CONCRETE BOUND 2

GRAVEL ACCESS ROAD

GRAVEL ACCESS ROAD

GRAVEL ACCESS ROAD

ROAD SURFACES W/ COMPACTED GRAVEL

UNIMPROVED DIRT ROADWAY

ROADWAY

BUILDING

W-30T

P-04

W-26T

P-03

P-02

P-01

W-29T

W-09-A  
W-09-B  
W-09-S1

W-28T

W-24T

W-24T

P-07

P-06

P-06

W-01-S1  
W-07-S1

1114.44

1122.0

1110

1110

1099

1090

1080

1070

1060

1050

1040

1030

1020

1010

1000

990

980

970

960

950

940

930

920

910

900

890

880

870

860

850

840

830

820

810

800

790

780

770

760

750

740

730

720

710

700

690

680

670

660

650

640

630

620

610

600

590

580

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560

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540

530

520

510

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470

460

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430

420

410

400

390

380

370

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340

330

320

310

300

290

280

270

260

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230

220

210

200

190

180

170

160

150

140

130

120

110

100

90

80

70

60

50

40

30

20

10

0



Unit	Thickness (feet)	Mean Horizontal K (ft/day)	Horizontal Velocity (ft/year)	Description
<b>Landfill Material</b>	0-18			Miscellaneous paper, wood, municipal trash, cement blocks, and appliances with local areas (lagoons) containing battery waste sludges
<b>Kame Sand</b>	0-36	0.12/ 0.19	10-30	Loose to medium dense fine sand with trace amounts of silt and/ or gravel
<b>Ablation Glacial Till</b>	4-18	0.05	7	Medium dense till, transitional with the kame sand, consisting of medium to fine sandy silt with gravel and clay; generally poorly sorted
<b>Lodgment Till</b>	35-90	NC	NC	Dense, poorly sorted till, consisting of sands and silts with clay, boulders, and gravel.
<b>Weathered Bedrock</b>	180-360	0.19	5-8	Weathered schist and gneiss and contains highly weathered layers of silty clay to clay, or loose medium to fine sand, commonly referred to as "ochre," interbedded with less weathered schist and gneiss.
<b>Competent Bedrock</b>		1.67	NC	Massive to thickly bedded quartzite with frequent high angle fractures.

Notes: NC = not calculated

K = Hydraulic Conductivity