ROLLING KNOLLS LANDFILL SUPERFUND SITE

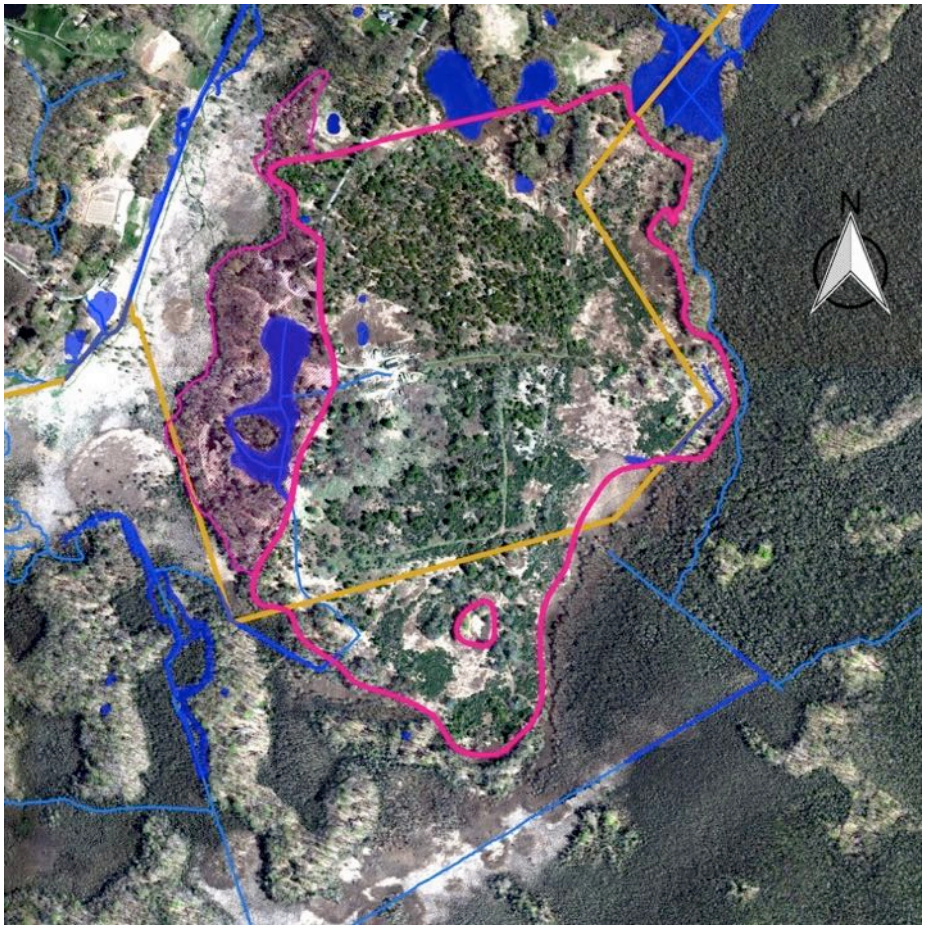
CHATHAM, NJ

Feasibility Study Assessment

U.S. Department of the Interior

Site Background

- Former landfill that operated from the 1930s to approximately 1968
- Approximately 170 acres
- Approximately 35 acres of the landfill are on the Great Swamp National Wildlife Refuge, owned by the United States and managed by the United States Fish and Wildlife Service (USFWS)



Document Review

- 2018 Draft Feasibility Study (FS)
  - Purpose of FS is to evaluate remedial alternatives based on Remedial Action Objectives (RAOs)
  - Analysis primarily based on:
    - Protection of Human Health and the Environment
    - Compliance with laws and related requirements
    - Effectiveness
    - Implementability
    - Cost

Document Review

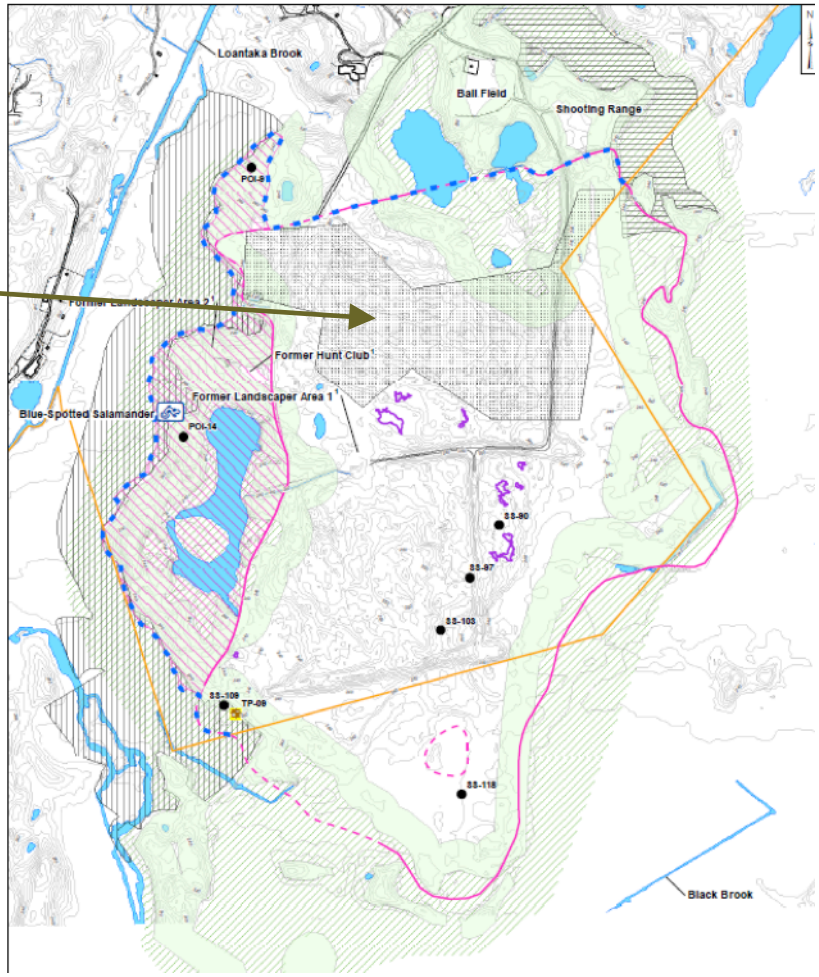
- Two additional ‘modifying criteria’ must be considered for remedy selection:
  - State acceptance
  - **<u>Community acceptance</u>**

Document Review

- 2018 Draft Feasibility Study (FS)
  - 2018 Remedial Investigation (RI)
  - 2016 Baseline Ecological Risk Assessment (BERA)
  - 2014 Baseline Human Health Risk Assessment (BHHRA)

Draft Feasibility Study
Landfill Alternatives

1) No Action
2) Site Controls
3) Cap approx. 25 acres of the 140-acre landfill.
4) Same as 3 above except approx. 2-4 feet of soil/waste would be excavated from approx. 25 acres of the 140-acre landfill and disposed off-site rather than capped; excavated area would be backfilled and revegetated
5) Capping of all landfill with offsite material



Rolling Knolls Site – Assessment of Draft Feasibility Study Alternatives

Do draft alternatives meet DOI/ FWS (Agencies) requirements & concerns?

- Refuge's Comprehensive Conservation Plan (CCP)
- DOI Environmental Compliance Memorandum (ECM)
- Requirements specific to the Refuge portion of the Site

Assessment Questions

1. Has the Refuge been impacted by landfill wastes?
2. If the Refuge has been impacted, is the impact significant and impairing?
3. If the Refuge has been significantly impacted, do the remedial/removal alternatives proposed in the FS address the impacts?
4. Are there other remedial/removal alternatives or modifications of existing remedial/removal alternatives that would address the impacts?

Refuge-Specific Protected Species

- **Bog turtle**: Federally-listed threatened; managed as priority species
- **Indiana bat**: Federally-listed endangered; breeding colonies, priority species
- **Northern long-eared bat**: Federally-listed threatened species
- **Wood turtle**: State-threatened; priority species
- **Blue-spotted salamander**: State-endangered
- **Barred owl**: State-threatened
- **Cooper's hawk**: State-threatened (breeding population)
- **Red-shouldered hawk**: State-endangered (breeding), threatened (winter population)

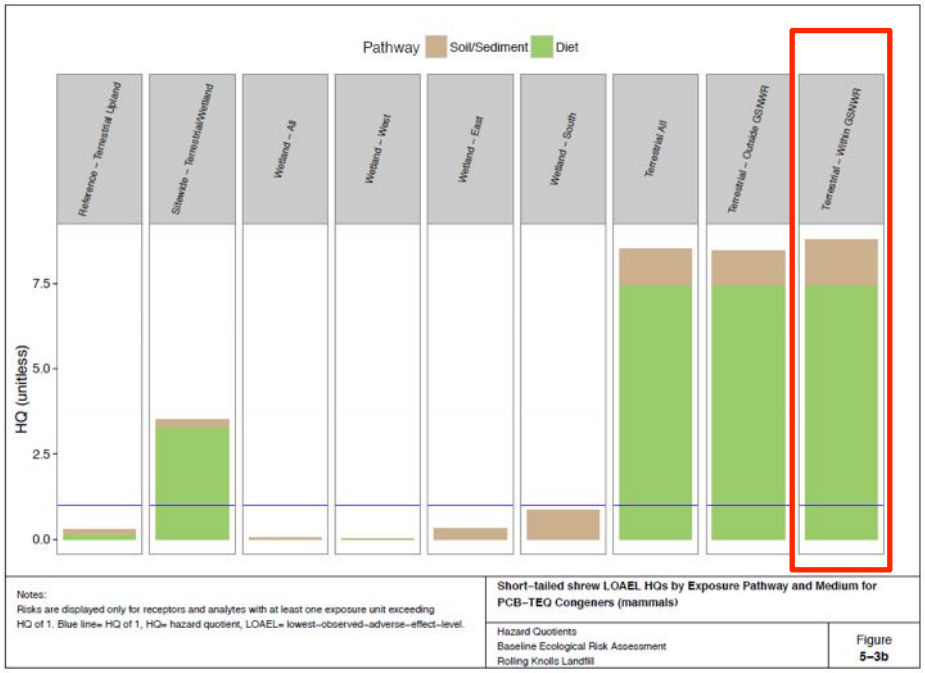
Ecological Risk Assessment

Evaluates the *likelihood of adverse effects to plants and animals ("ecological receptors")*

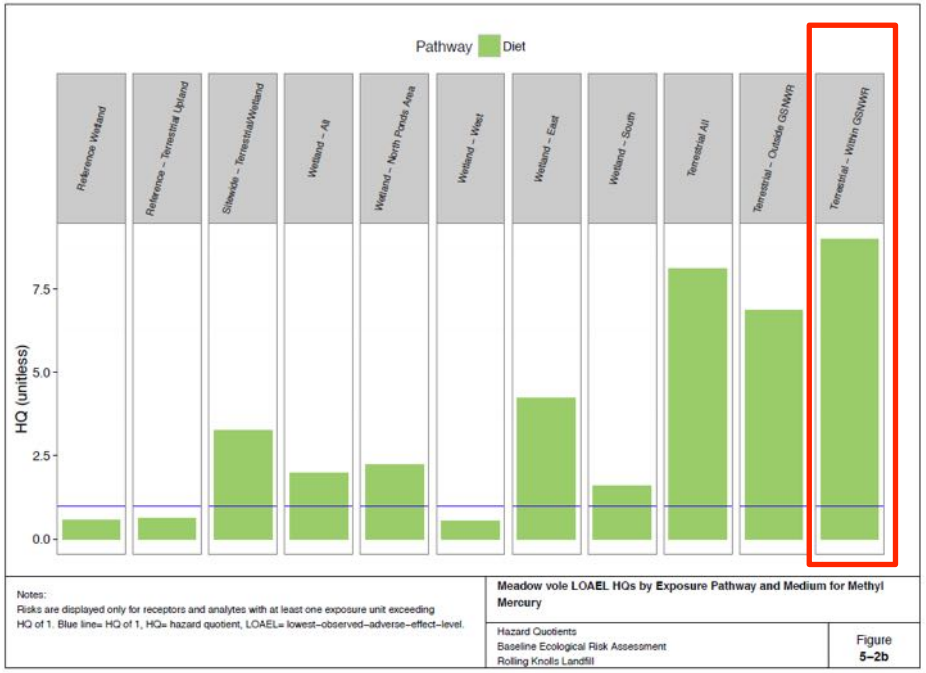
- **Exposure characterization** – Are plants and animals exposed to contaminants and to what degree?
- **Ecological effects characterization** – Is the level of exposure likely to cause harmful effects?
- **Risk management** – What can be done to limit or eliminate the likelihood of harmful effects?

Baseline Ecological Risk Assessment Results

Short Tailed Shrew Exceeding Benchmarks

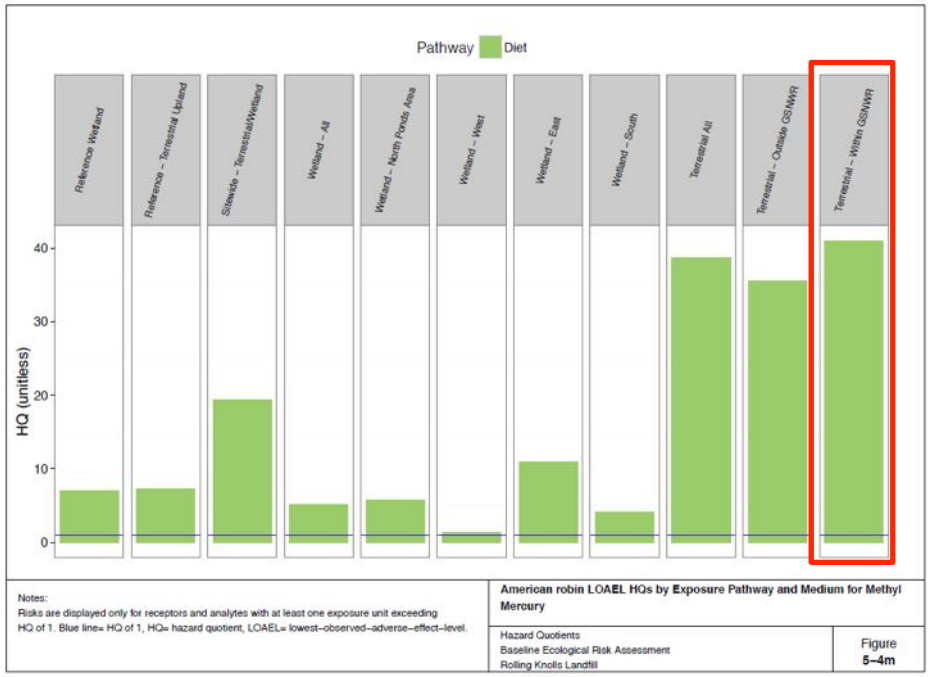


Meadow Vole Exceeding Benchmarks

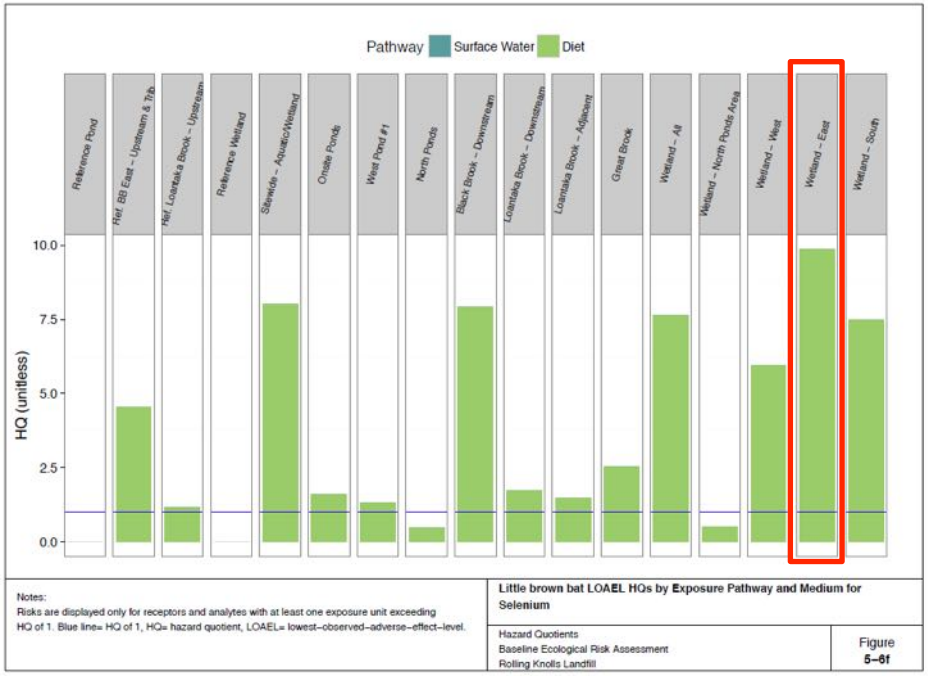


Baseline Ecological Risk Assessment Results

American Robin Exceeding Benchmarks



Little Brown Bat Exceeding Benchmarks

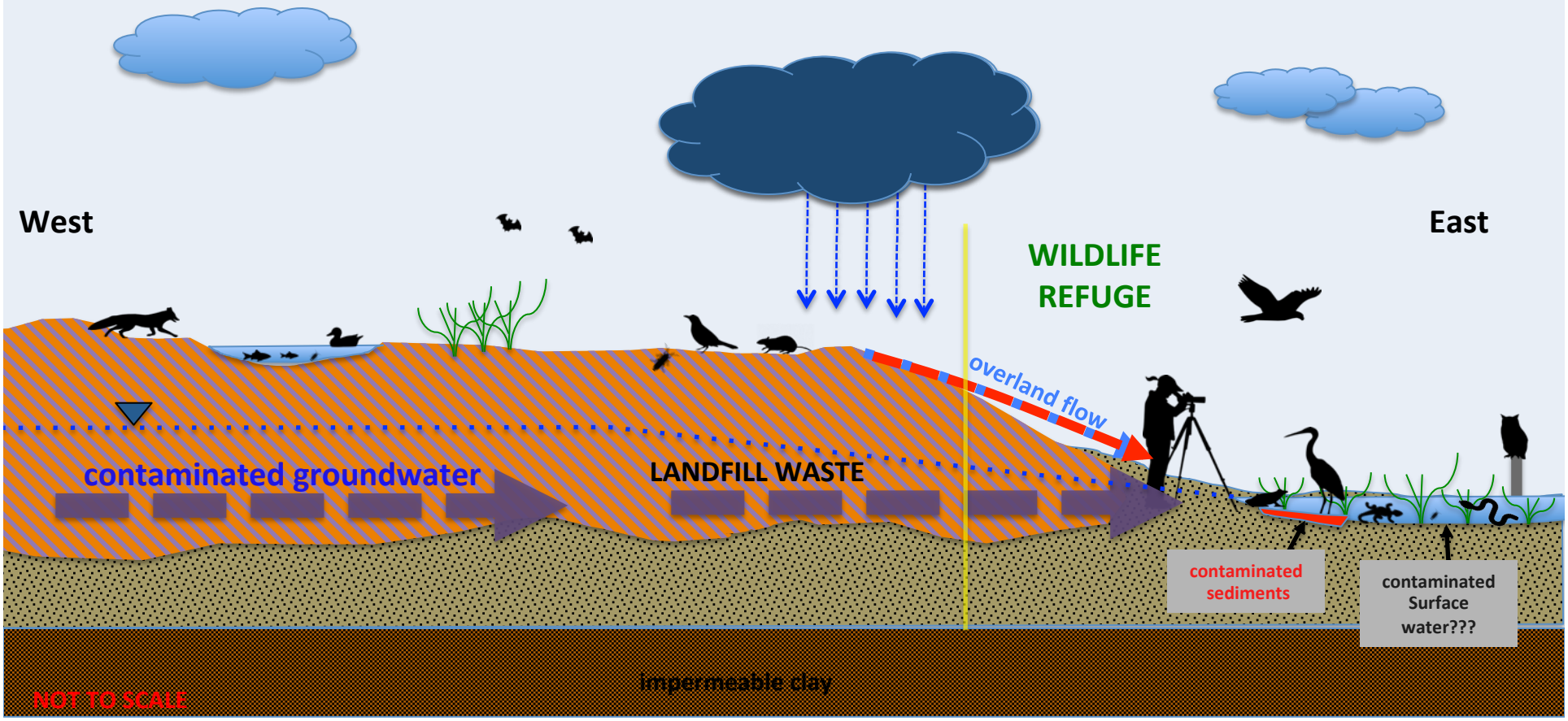


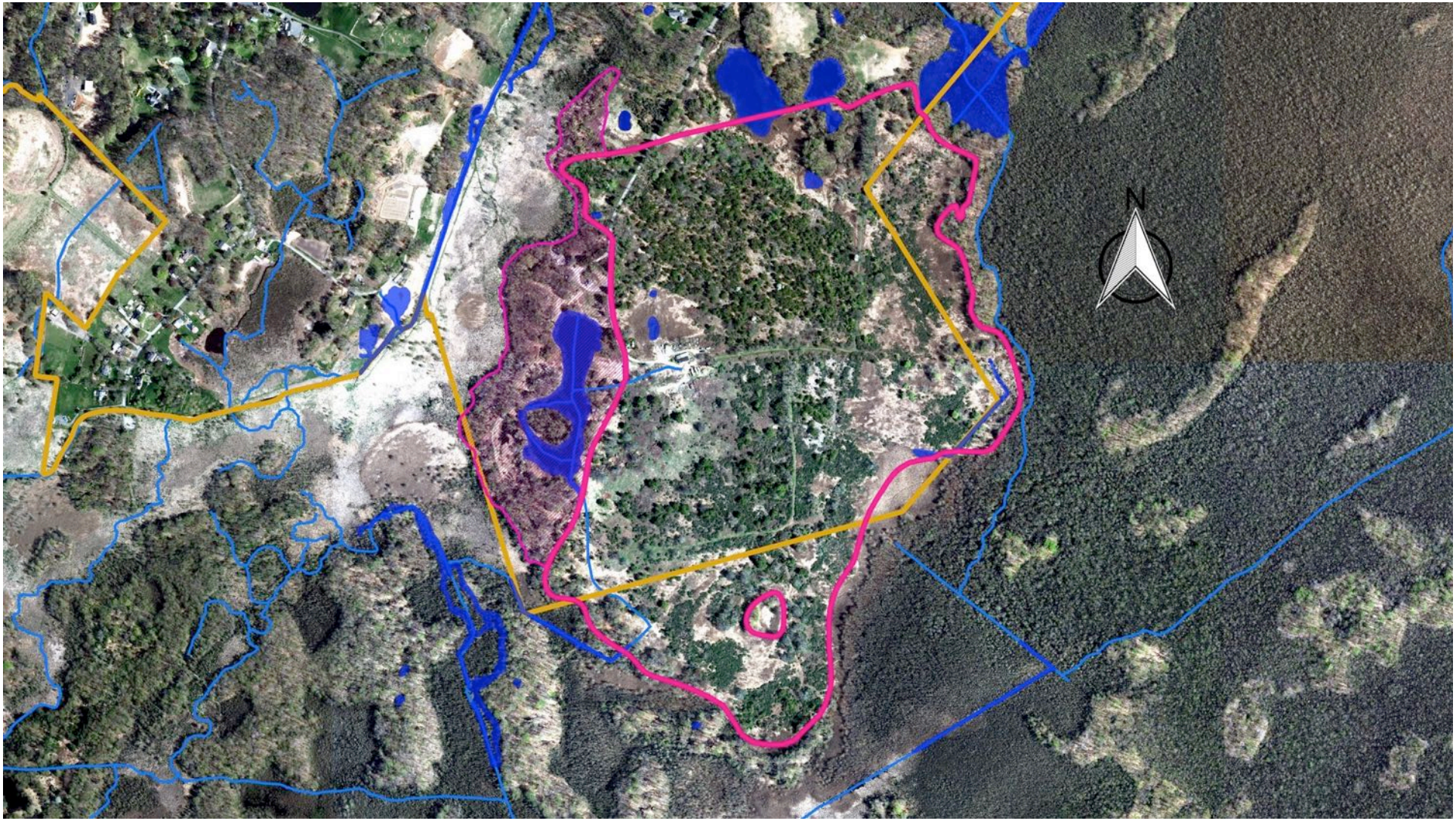
Human Health Risk Assessment

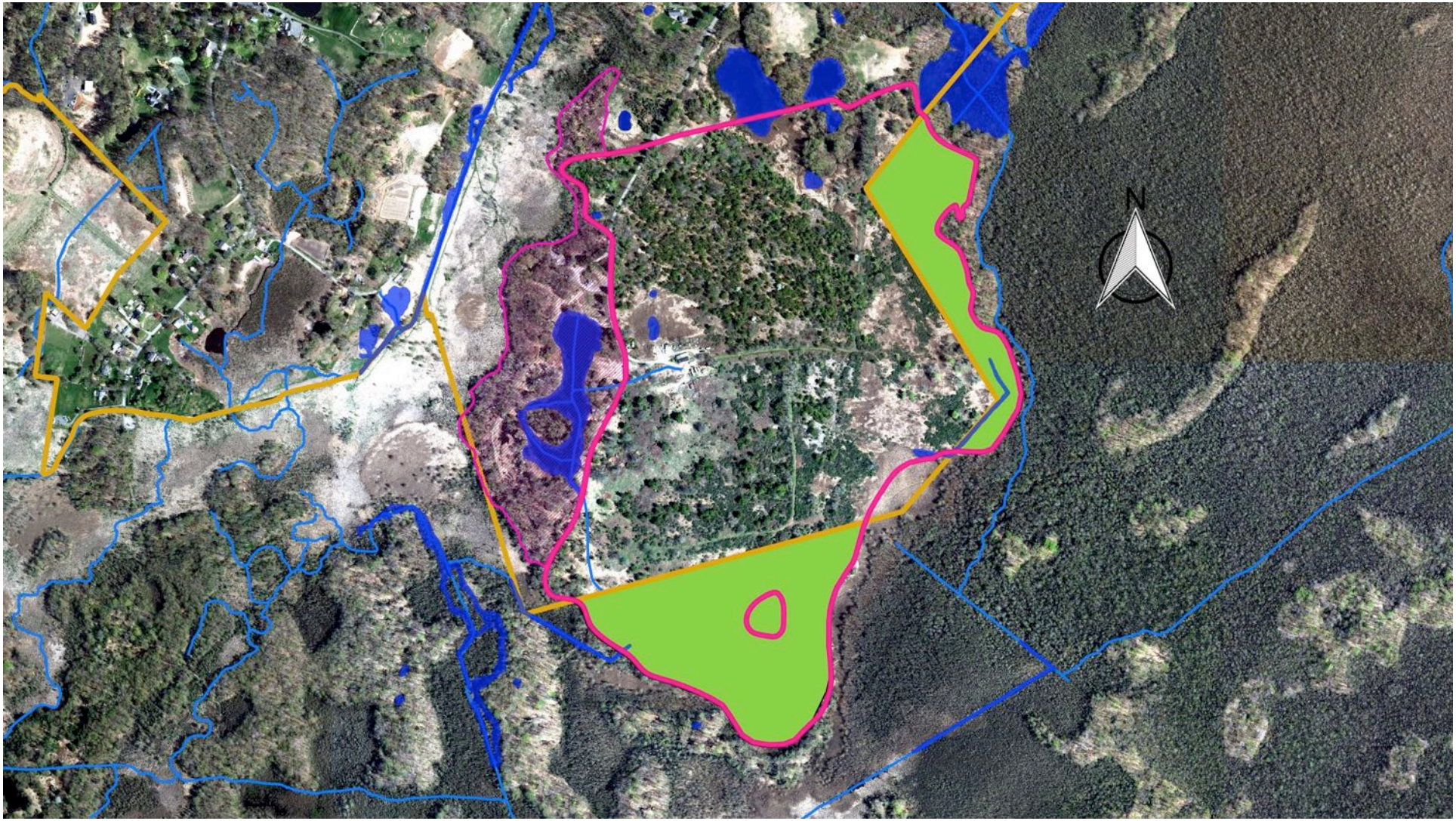
Evaluates the *likelihood of adverse effects to Humans*

- **Lead (Pb) is a primary human health risk driver**
- **Two Pb clean up goals (Preliminary Remediation Goal)**
  - Recreational exposure scenario = 400 mg/kg
  - Trespasser exposure scenario = 2,700 mg/kg
    - <u>Scenario chosen for the Refuge</u>
- **Refuge manager cannot restrict access to Refuge**

Rolling Knolls Site – Conceptual Site Model




N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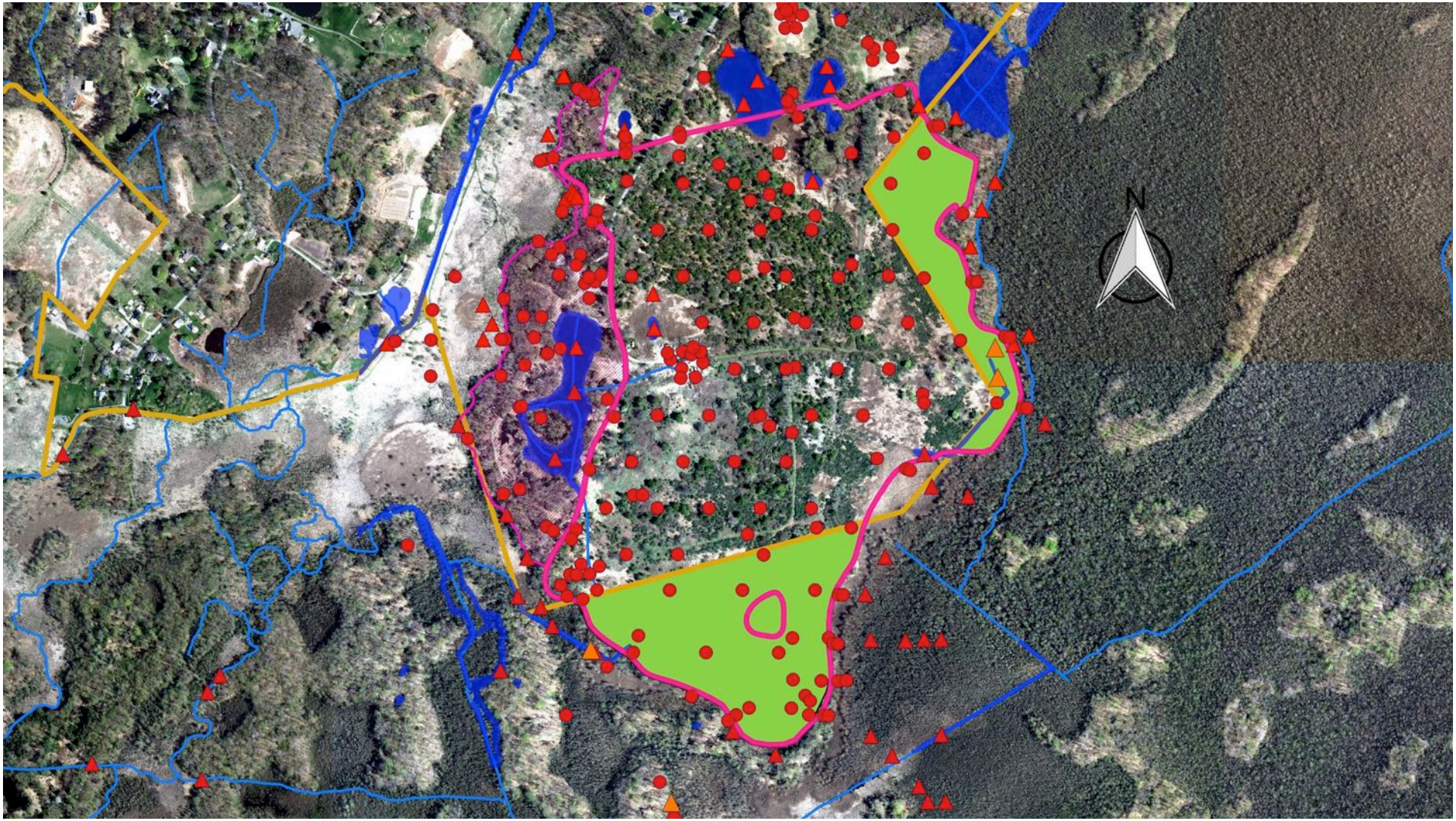
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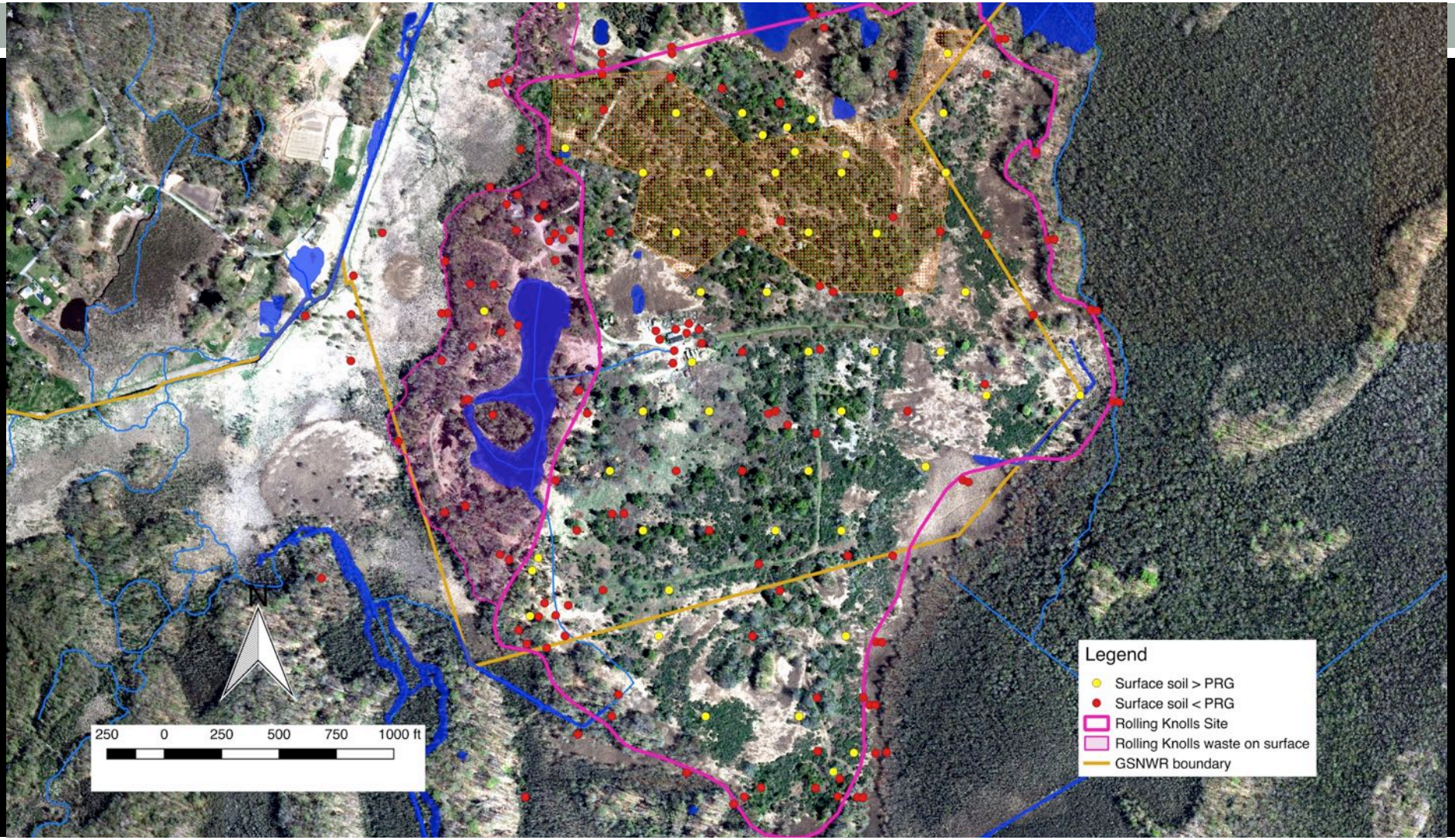
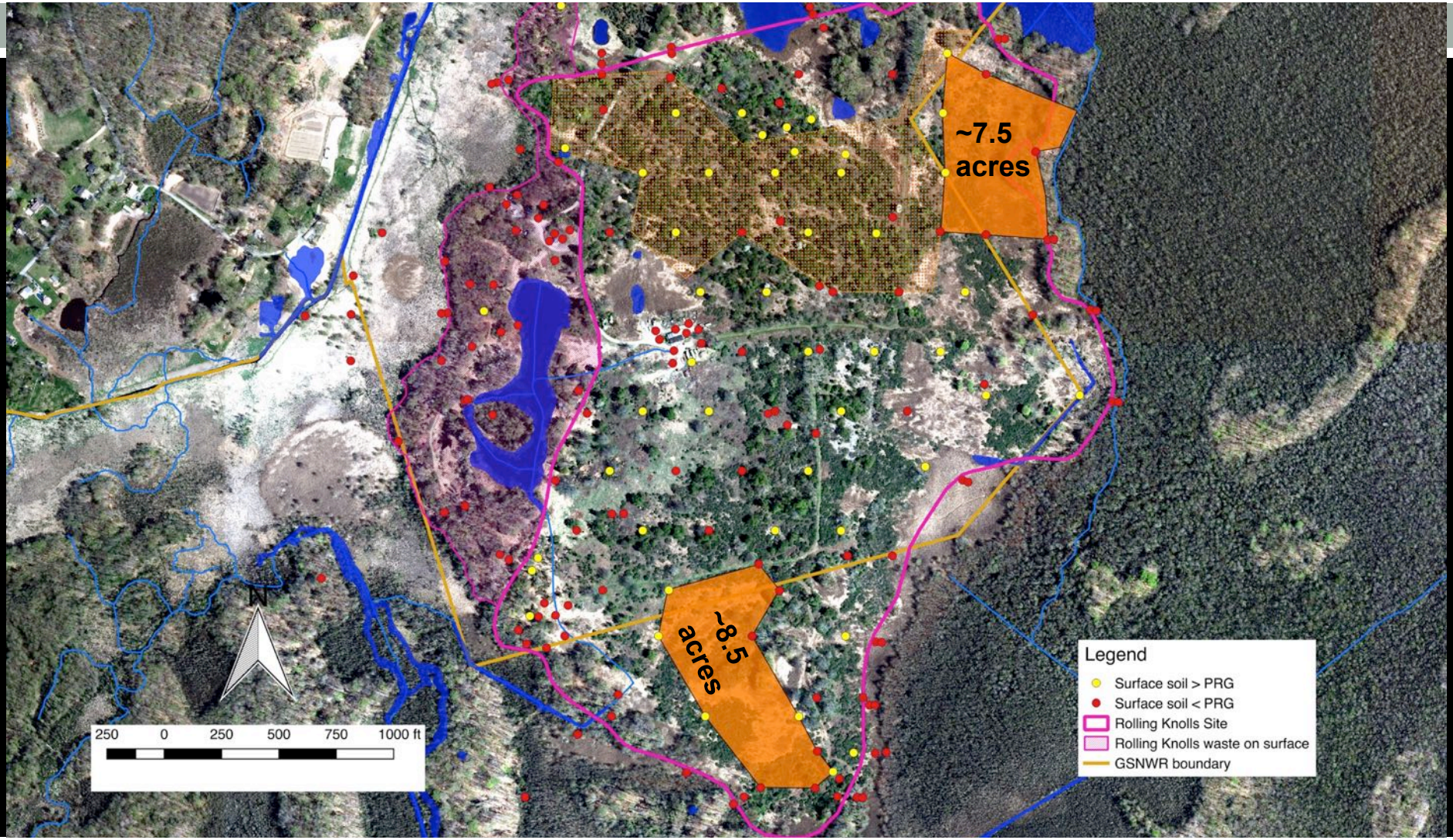

N
250 0 250 500 750 1000 ft
Legend
Surface soil > PRG
Surface soil < PRG
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR boundary


~7.5 acres
~8.5 acres
N
250 0 250 500 750 1000 ft
Legend
Surface soil > PRG
Surface soil < PRG
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR boundary

Key Findings - Surface Soils

Findings

Insufficient data to support FS alternatives that do not remove landfill waste from the Refuge

Surface soils on the Refuge contaminated by Pb, PCBs and other chemicals related to landfill wastes at concentrations that suggest risk to Refuge ecological receptors and recreational users

Ecological, wildlife risk-based soils PRGs required for key COPECs

Ecological PRGs guide soils remedial action alternatives affecting the Refuge

FS Assessment

1. Only Alternative 5 (extensive capping) would fully contain source landfill waste at the Site and cover some, <u>but not all</u> of the impacted areas of the Refuge
2. Only alternatives that include full removal of contaminated materials from the Refuge meet the requirements of the Refuge CCP, the DOI ECM and other Requirements
3. Expand Alternative 3 to include removal of all areas on the Refuge where the Eco PRG is exceeded, consolidate on private portion of Site and cap with onsite material to reduce truck traffic. This modified alternative would most closely address the Refuge requirements

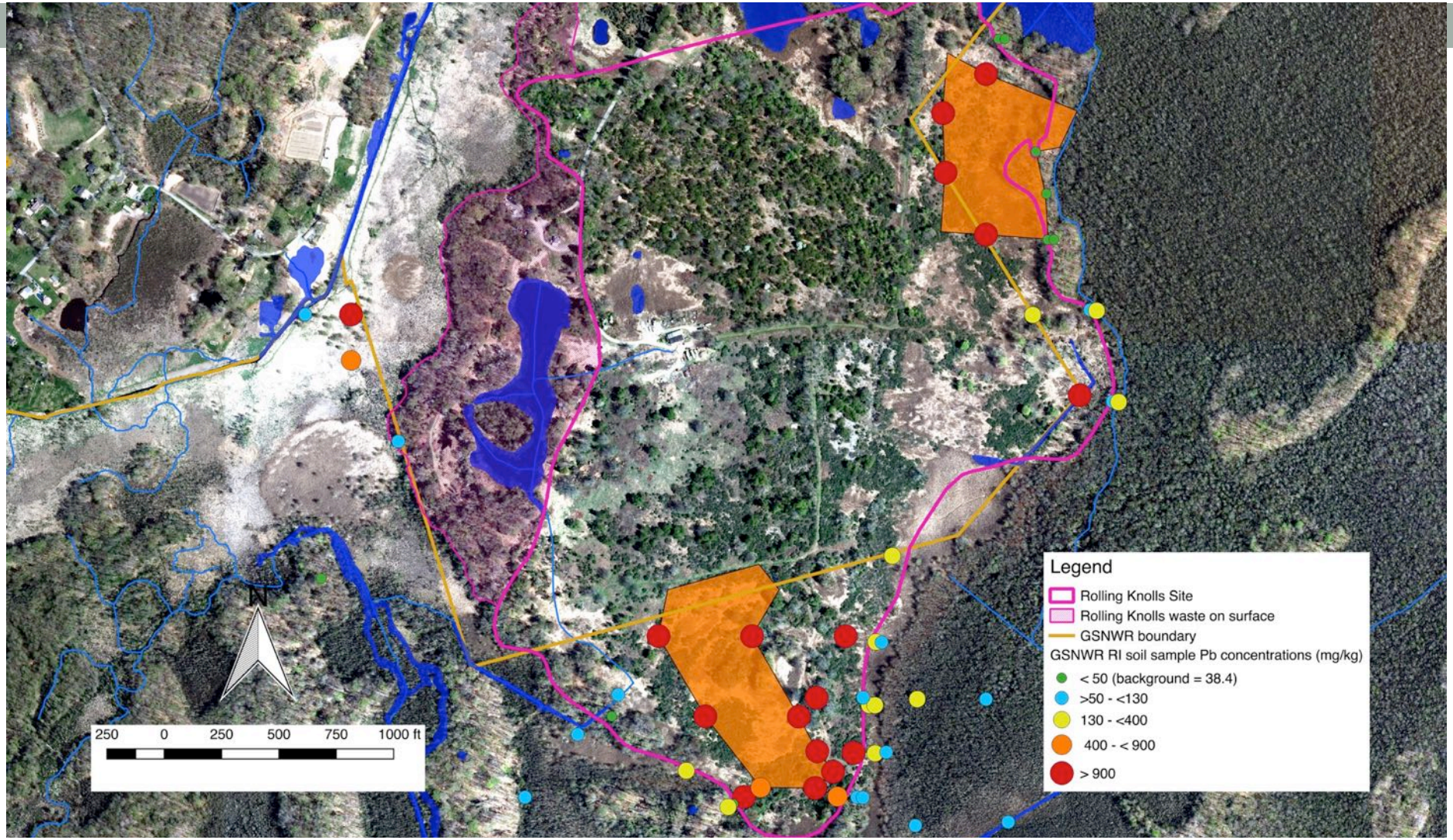
Ecological Benchmarks calculated for Pb

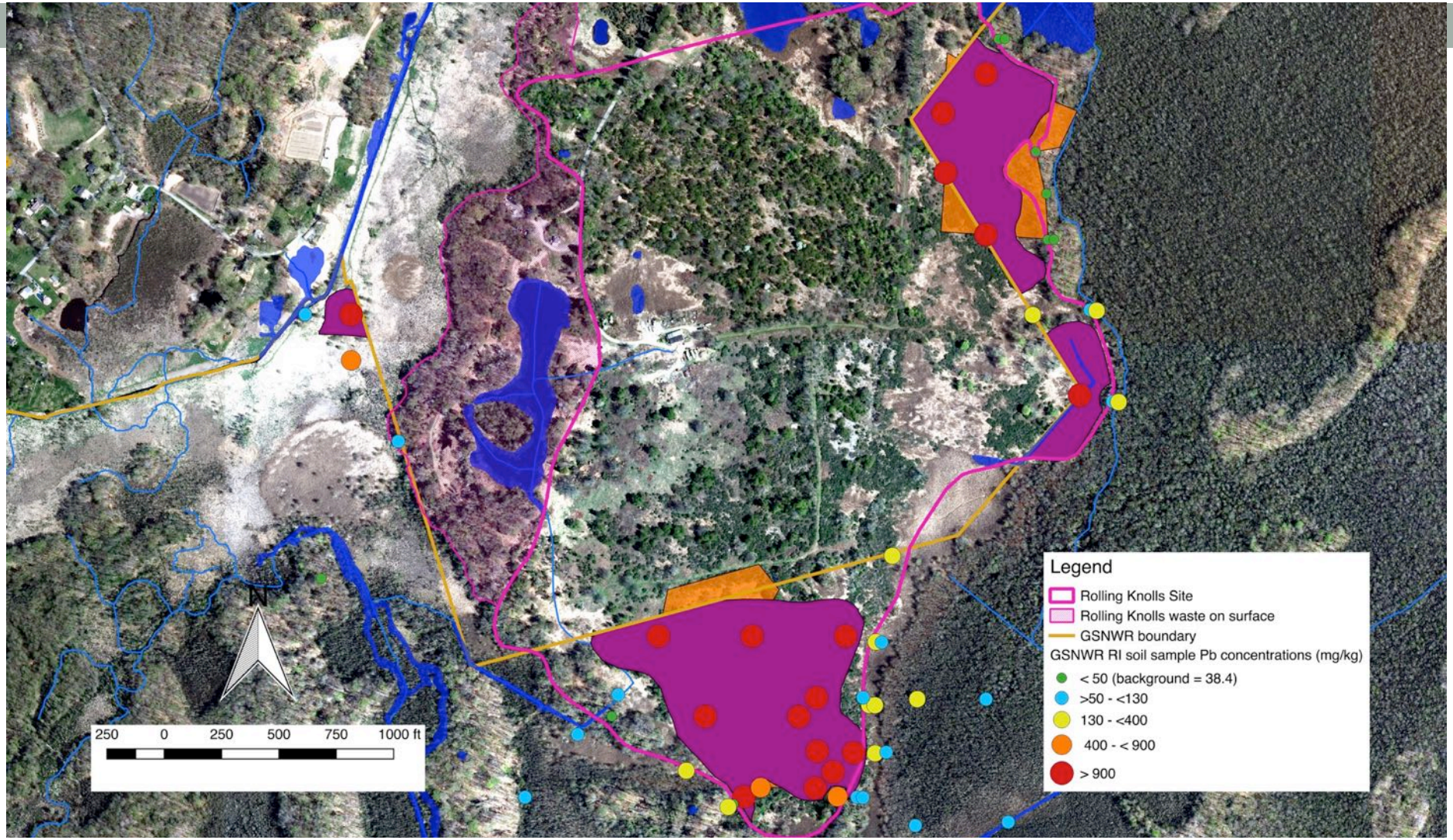
~ 50 mg/kg (American Robin LOAEL)

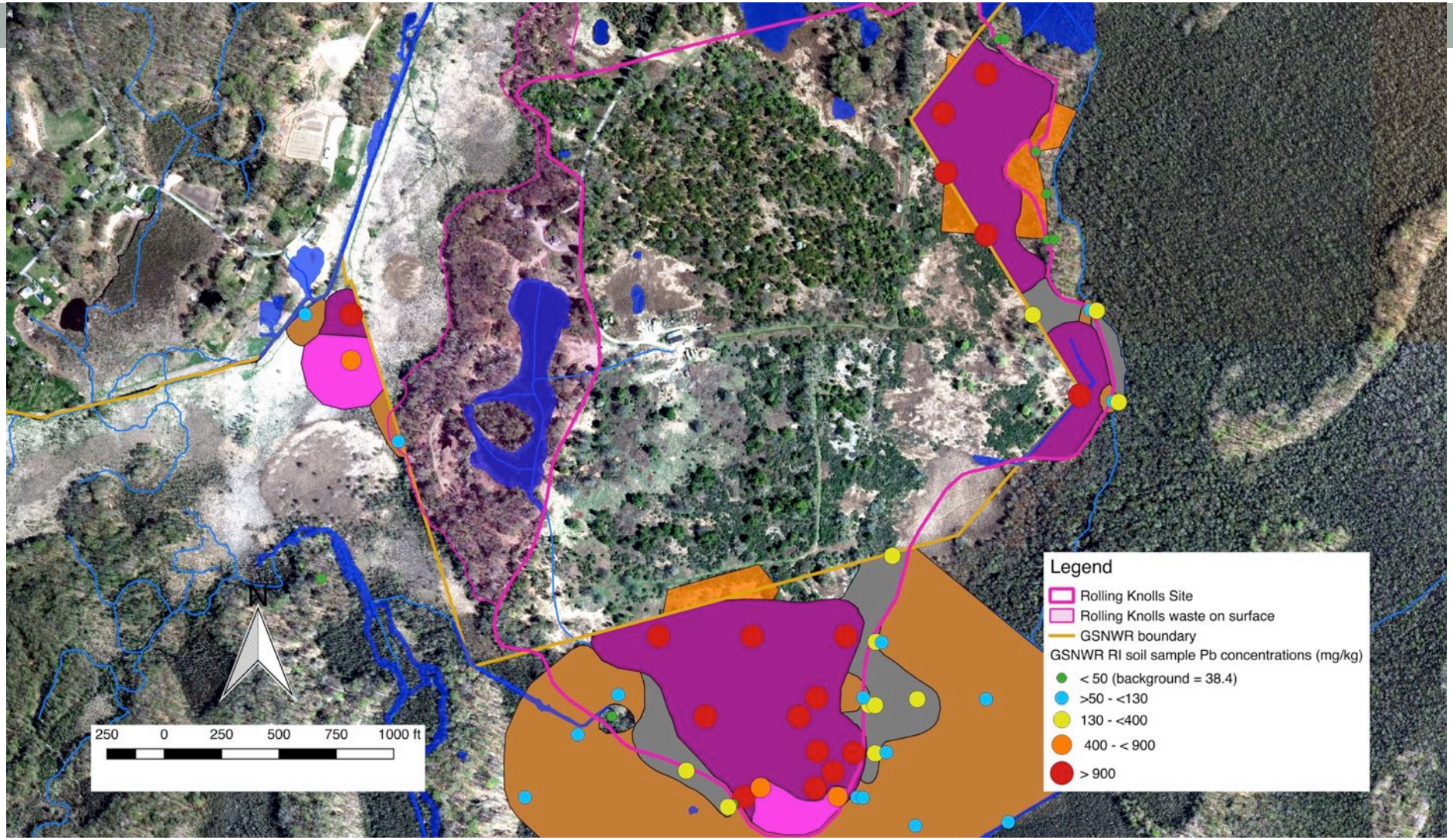
~ 130 mg/kg (Short-tailed Shrew NOAEL)

~ 400 mg/kg (Short-tailed Shrew LOAEL & Recreational users)

~ 900 mg/kg (Meadow Vole NOAEL)


Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR boundary
GSNWR RI soil sample Pb concentrations (mg/kg)
< 50 (background = 38.4)
>50 - <130
130 - <400
400 - < 900
> 900
N
250 0 250 500 750 1000 ft


Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR boundary
GSNWR RI soil sample Pb concentrations (mg/kg)
< 50 (background = 38.4)
>50 - <130
130 - <400
400 - < 900
> 900
N
250 0 250 500 750 1000 ft


Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR boundary
GSNWR RI soil sample Pb concentrations (mg/kg)
< 50 (background = 38.4)
>50 - <130
130 - <400
400 - < 900
> 900
N
250 0 250 500 750 1000 ft

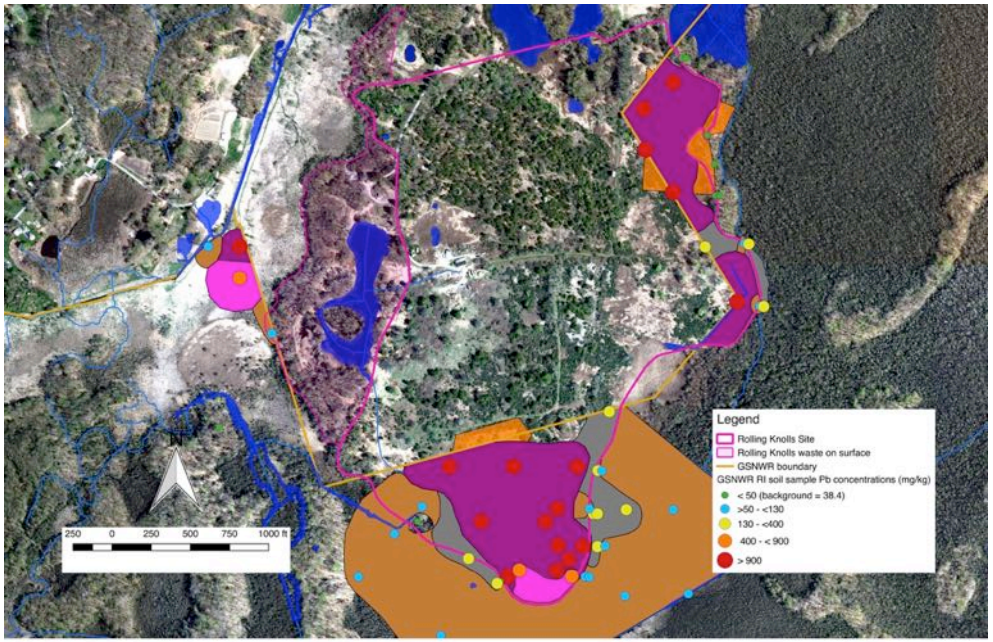
Significant Refuge Area Is Impacted – Typically Pb

> 50 mg/kg ~ 87 acres
(American Robin LOAEL)

> 130 mg/kg ~ 38 acres
(Short-tailed Shrew NOAEL)

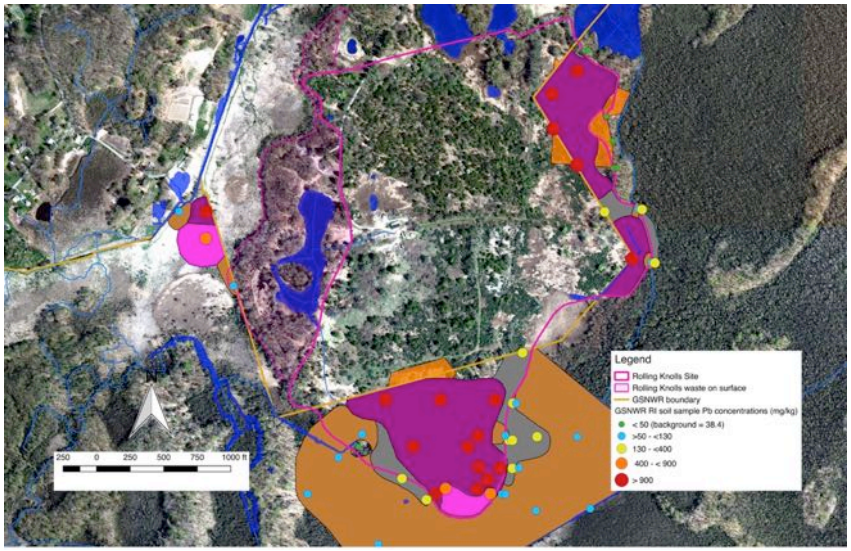
> 400 mg/kg ~ 30 acres
(Recreational users & Short-tailed Shrew LOAEL)

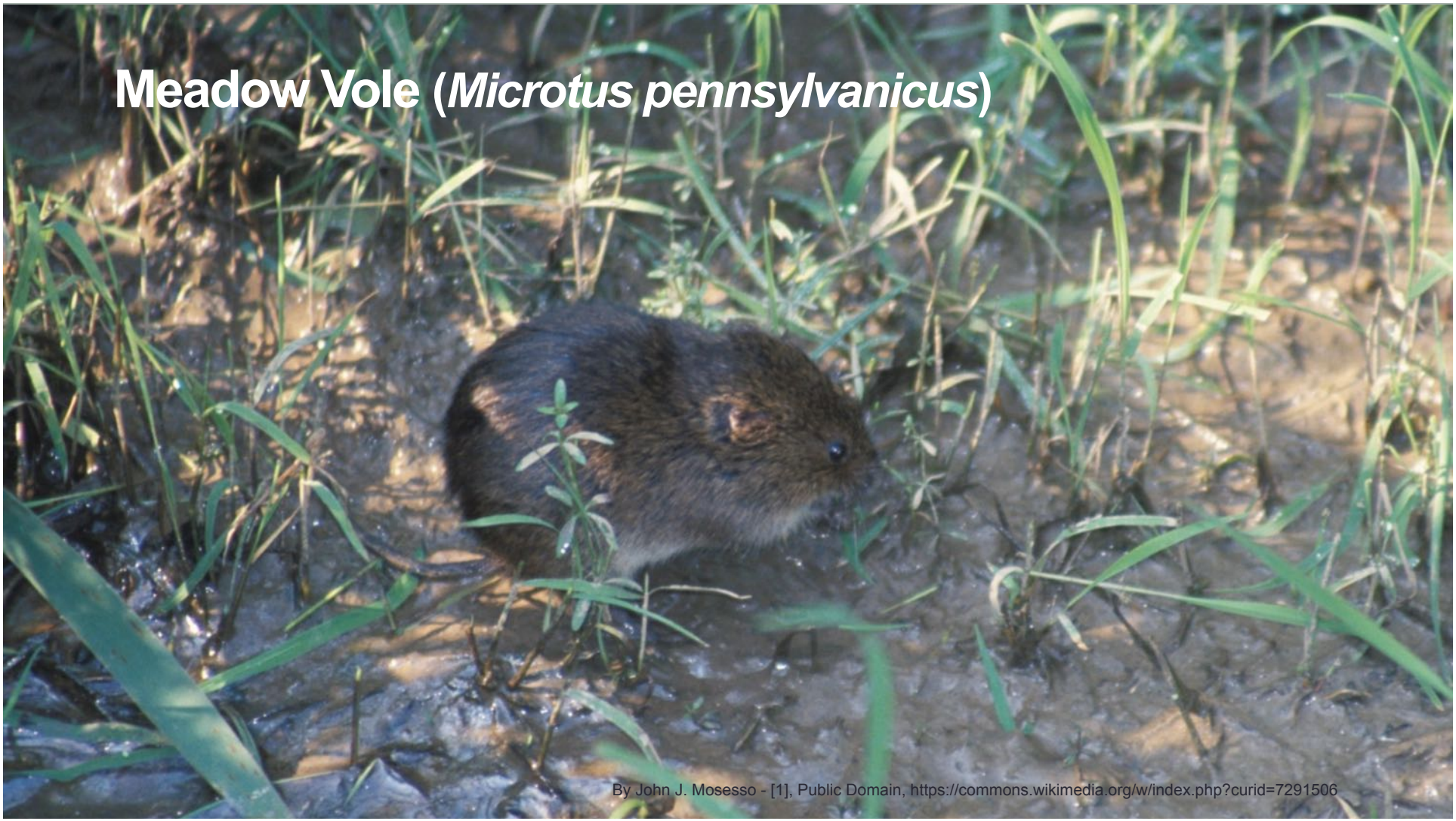
> 900 mg/kg ~ 27 acres
(Meadow Vole NOAEL)

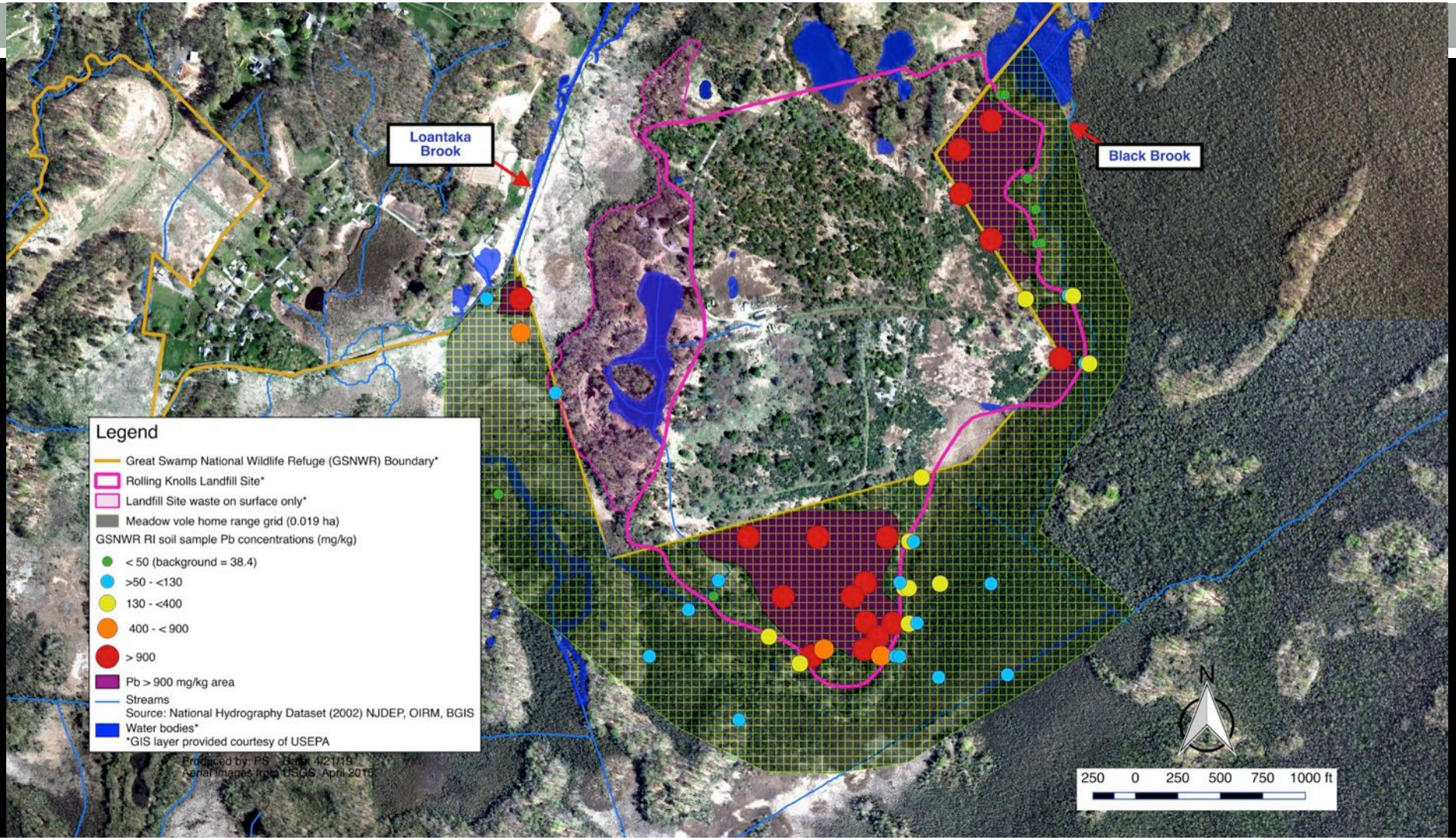


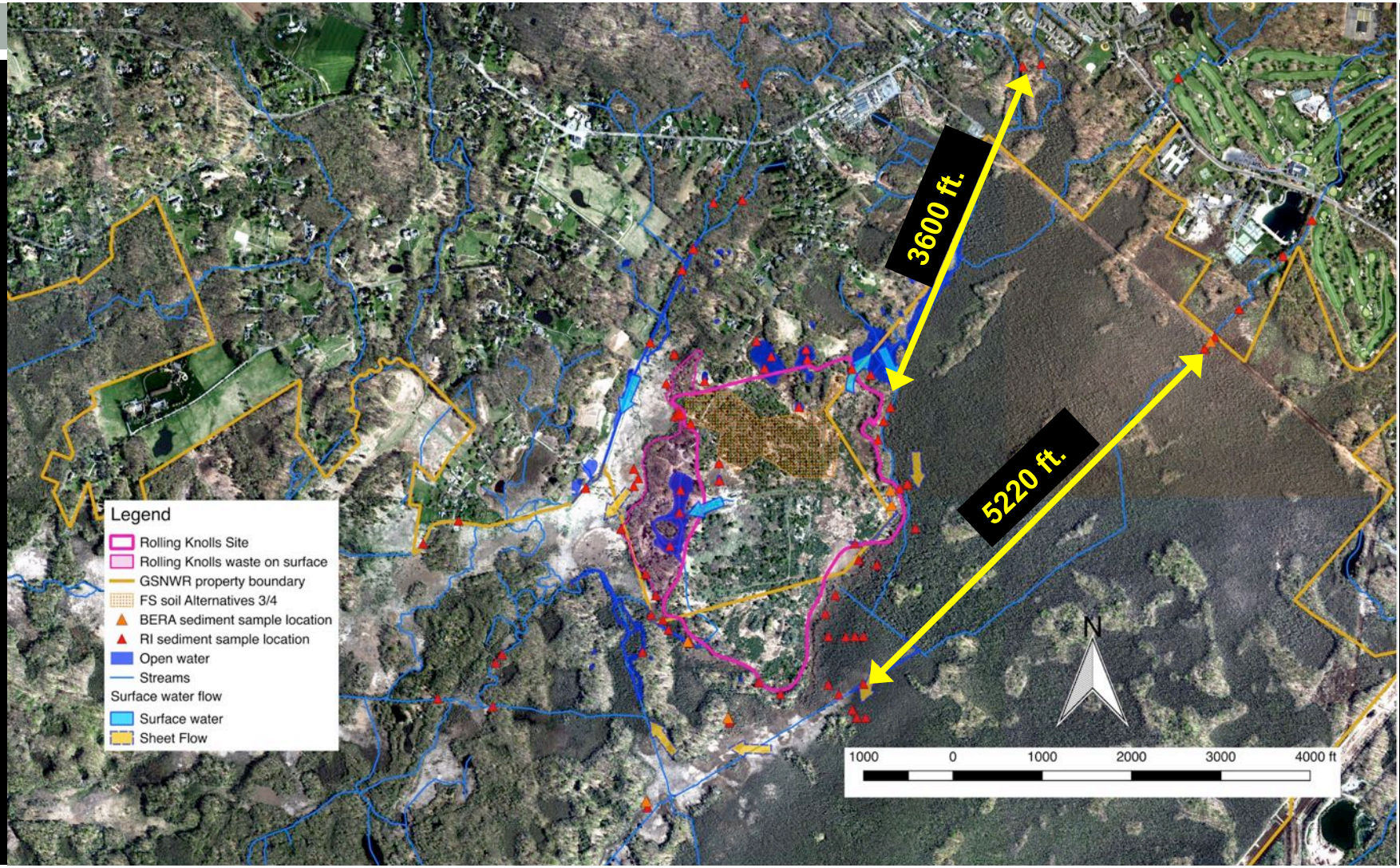
Significant Refuge Area And Receptors At Risk

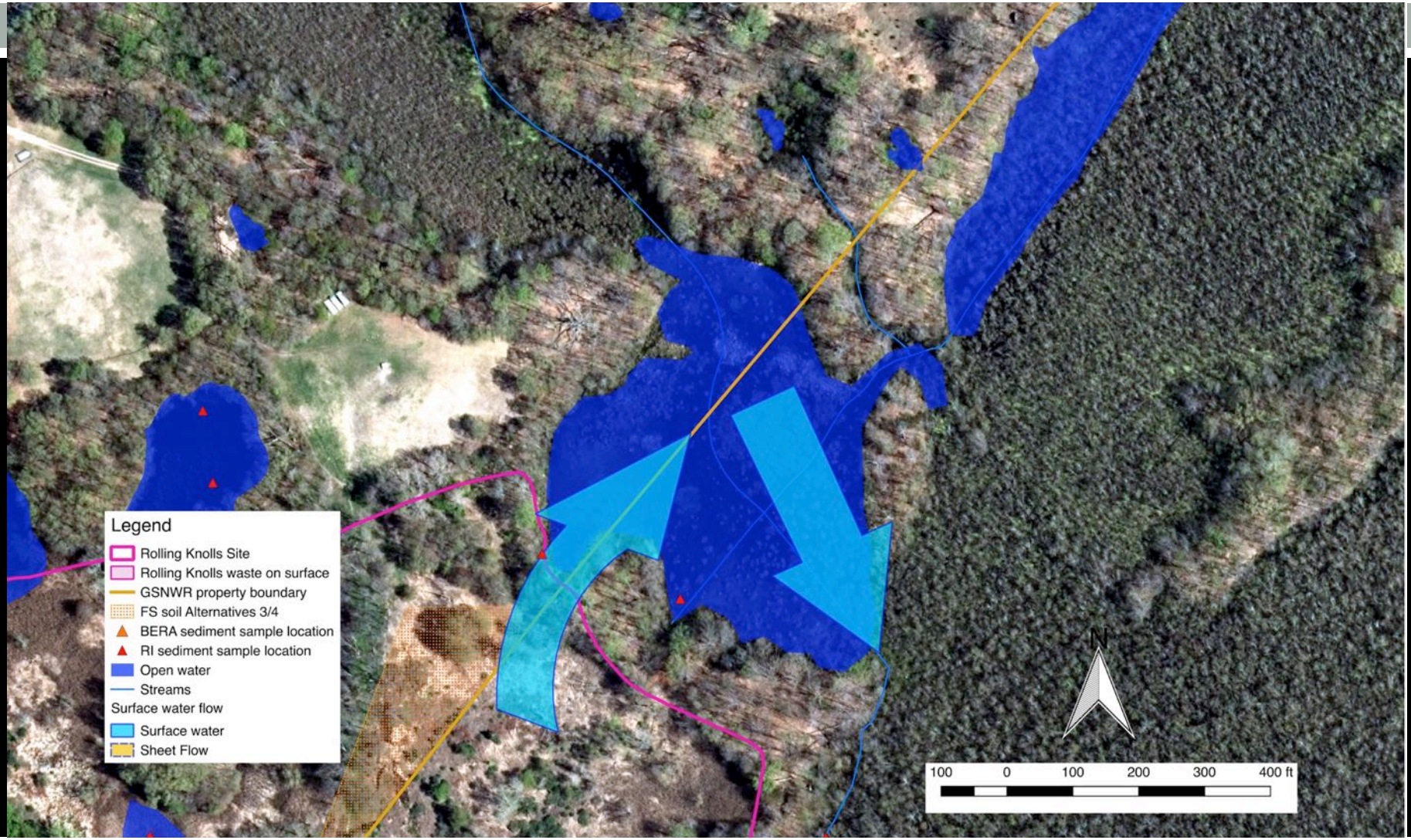
Representative receptor Acreage posing risk	~ Home Receptor Range - Acres
American robin (verminivorous birds) 87 Acres	0.3 to 2.0
Short-tailed shrew (verminivorous mammals) 30 Acres	1.0
Meadow vole (herbivorous mammals) 27 Acres	0.05




Meadow Vole (*Microtus pennsylvanicus*)
By John J. Mosesso - [1], Public Domain, https://commons.wikimedia.org/w/index.php?curid=7291506


Loantaka Brook
Black Brook
Legend
Great Swamp National Wildlife Refuge (GSNWR) Boundary*
Rolling Knolls Landfill Site*
Landfill Site waste on surface only*
Meadow vole home range grid (0.019 ha)
GSNWR RI soil sample Pb concentrations (mg/kg)
< 50 (background = 38.4)
>50 - <130
130 - <400
400 - < 900
> 900
Pb > 900 mg/kg area
Streams
Source: National Hydrography Dataset (2002) NJDEP, OIRM, BGIS
Water bodies*
*GIS layer provided courtesy of USEPA
Produced by: PS Date: 4/21/19
Aerial Images from USGS April 2015
N
250 0 250 500 750 1000 ft

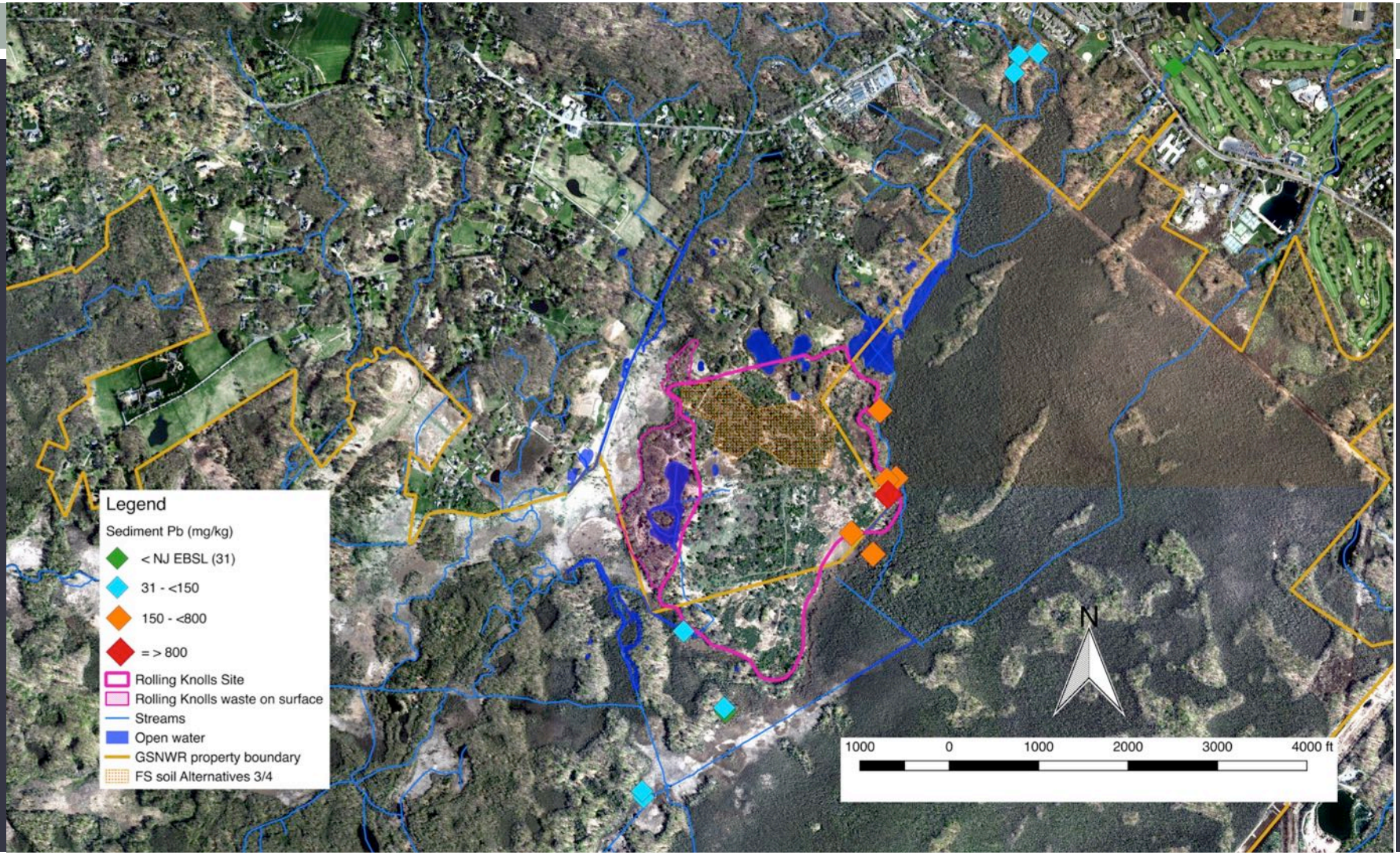

3600 ft.
5220 ft.
Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR property boundary
FS soil Alternatives 3/4
BERA sediment sample location
RI sediment sample location
Open water
Streams
Surface water flow
Surface water
Sheet Flow
N
1000
0
1000
2000
3000
4000 ft

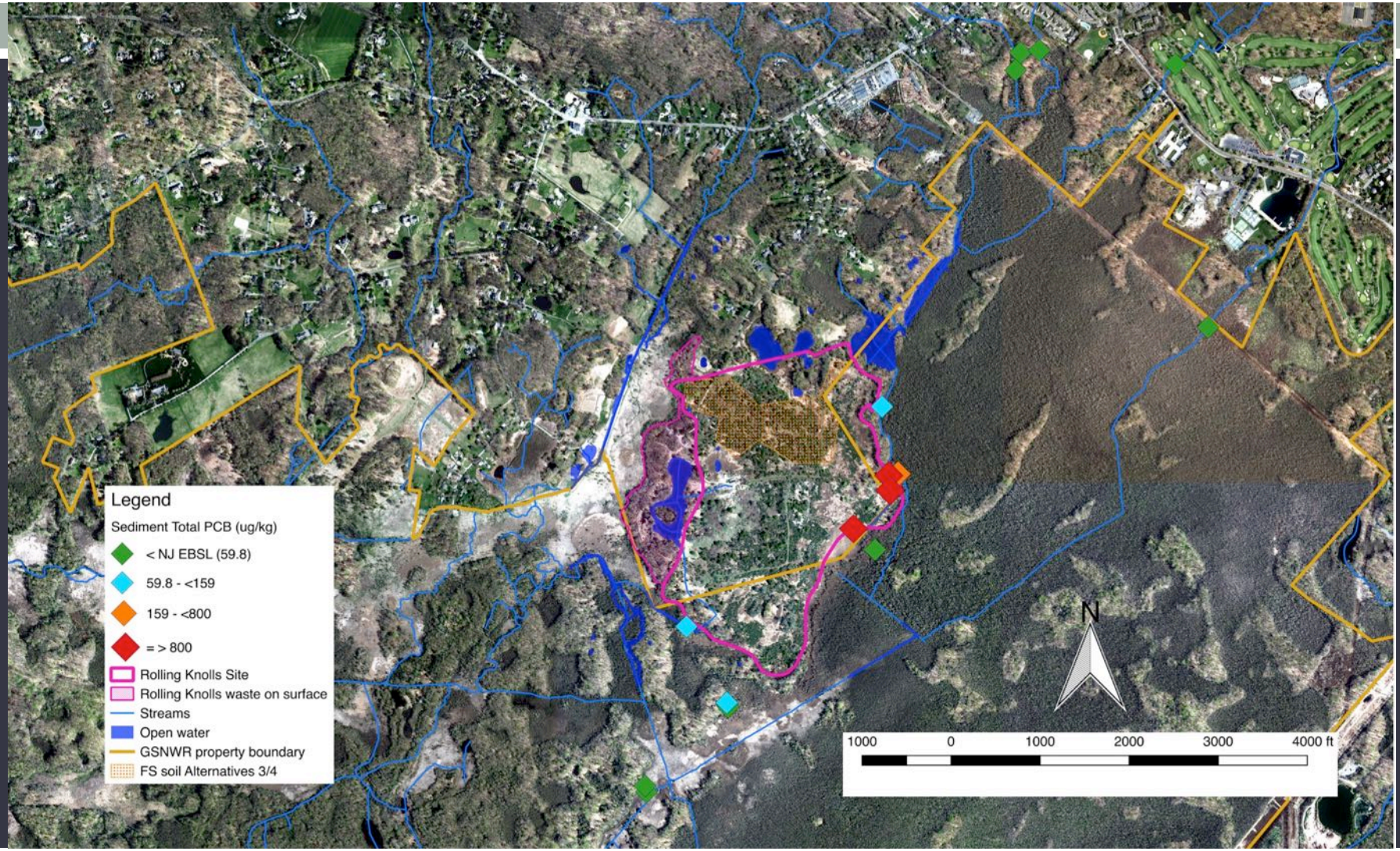

Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR property boundary
FS soil Alternatives 3/4
BERA sediment sample location
RI sediment sample location
Open water
Streams
Surface water flow
Surface water
Sheet Flow
N
100 0 100 200 300 400 ft

Sediments – Many Ecological Benchmarks Exceeded In Refuge Sediments

Black Brook (East Side)

Chemicals of Potential Ecological Concern (COPEC) from BERA Figure 4-3	Unit	Black Brook Upstream			Black Brook Upstream of Vernal Ponds		Vernal Ponds		Black Brook Downstream of Vernal Ponds		
		SD 34 (2008)	SD 35 (2008)	SD 36 (2008)	SD 22 (2008)	SD 23 (2008)	SD 38 (2014)	SD 44 (2014)	SD 24 (2008)	SD 25 (2008)	SD 26 (2008)
Total DDx [A]	µg/kg	-	-	-	-	-	-	-	-	-	-
4,4-DDE	µg/kg	9.2	6	7.1	6	9.5	29	-	6.2	5.2	-
DDD	µg/kg	-	24	-	12	17	150	67	11	-	-
o,p-DDD	µg/kg	-	11	-	8.8	-	78	25	-	-	-
o,p-DDE		-	-	-	-	-	17	9.2	-	-	-
Total PCBs [A]	µg/kg	-	-	-	82	160	1300	864	-	-	-
Aroclor 1254	µg/kg	-	-	-	82	160	690	350	-	-	-
Aroclor 1260	µg/kg	-	-	-	-	-	240	64	-	-	-
Barium	mg/kg	-	-	-	-	-	-	-	-	-	-
Copper	mg/kg	28.3	21.1	32.7	71.8	102	618	135	94.8	61.3	19.1
Lead	mg/kg	116	62.9	-	150	242	845	160	208	117	-
Mercury	mg/kg	0.32	-	-	0.46	0.84	4.4	0.89	0.84	0.41	0.26
Nickel	mg/kg	22.9	-	-	24.3	35.6	70.2	58.3	39.8	23.1	-
Zinc	mg/kg	135	128	125	293	660	2270	637	497	333	-


Legend
Sediment Pb (mg/kg)
< NJ EBSL (31)
31 - <150
150 - <800
= > 800
Rolling Knolls Site
Rolling Knolls waste on surface
Streams
Open water
GSNWR property boundary
FS soil Alternatives 3/4
N
1000
0
1000
2000
3000
4000 ft


Legend
Sediment Total PCB (ug/kg)
< NJ EBSL (59.8)
59.8 - <159
159 - <800
= > 800
Rolling Knolls Site
Rolling Knolls waste on surface
Streams
Open water
GSNWR property boundary
FS soil Alternatives 3/4
N
1000
0
1000
2000
3000
4000 ft

Key Findings – Sediments

Black Brook sediment impacted

- Sediments adjacent to landfill (Black Brook) exceed Screening Benchmarks
  - Possible bioaccumulation (e.g., PCBs)
- Vernal ponds significantly exceed up gradient concentrations

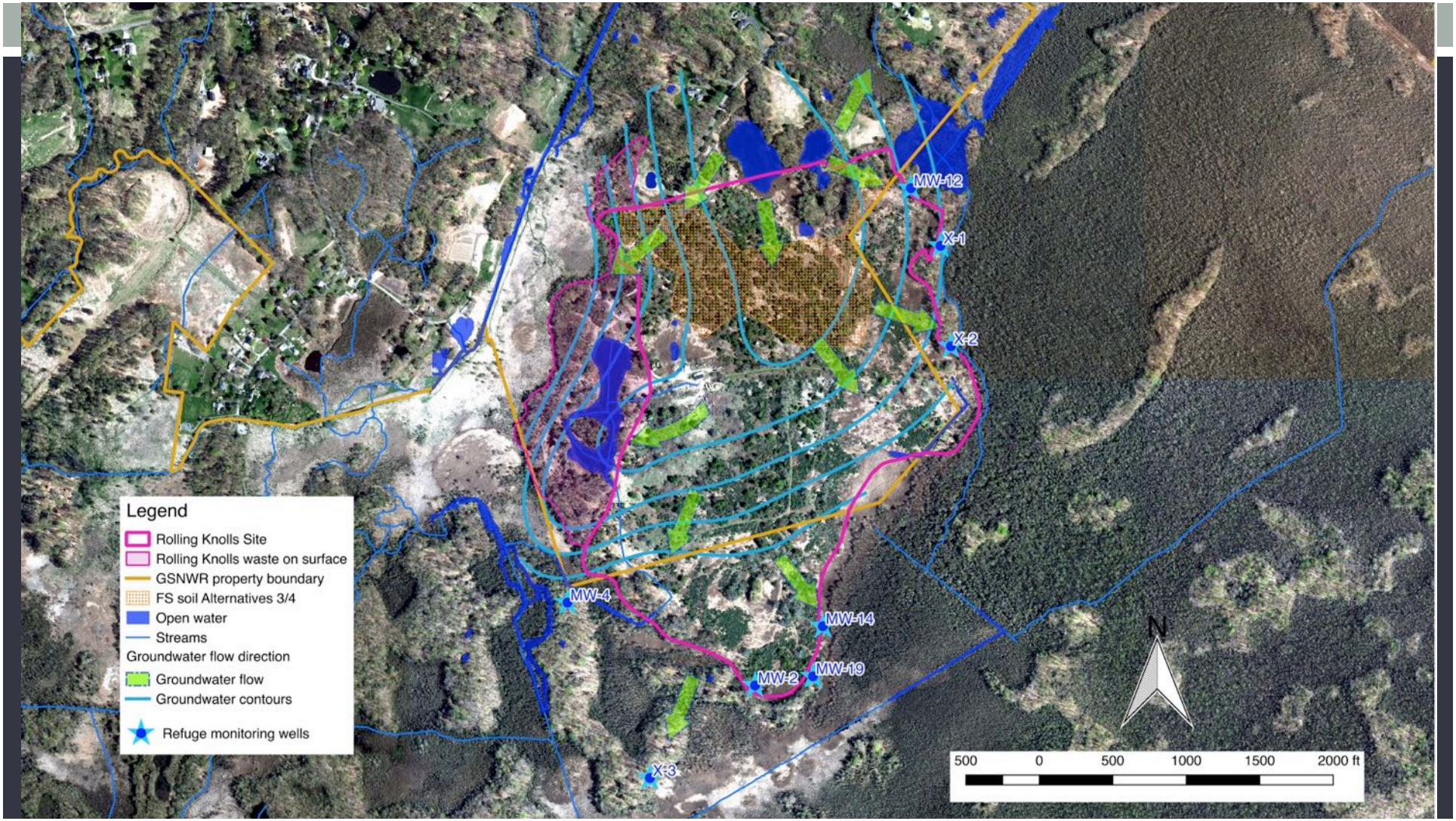
Loantaka Brook and vernal ponds south of the landfill and on the Refuge are impacted

- Sediment concentrations exceed USEPA Probable Effects Levels (PELs), State of New Jersey Severe Effects Levels (SELs), and NJDEP EBSLs

Key Findings – Sediments

FS Alternatives Assessment

1. Alternative 5 would fully contain the landfill waste to prevent contaminant exposures and further migration of contaminants into the surface water and sediment of the Refuge
   - Alternative 5 would not address the contaminated sediment in Black Brook
2. Sediment contamination characterization insufficient to support alternatives that do not fully contain the source landfill waste to prevent further contaminant migration
3. Primary concern for sediments is continued migration of contaminants from the source landfill waste onto the Refuge
   - Modify FS Alternatives to fully contain source landfill waste and remove or contain Refuge resources contaminated by this waste


Legend
Rolling Knolls Site
Rolling Knolls waste on surface
GSNWR property boundary
FS soil Alternatives 3/4
Open water
Streams
Groundwater flow direction
Groundwater flow
Groundwater contours
Refuge monitoring wells
MW-12
X-1
X-2
MW-4
MW-14
MW-2
MW-19
X-3
N
500
0
500
1000
1500
2000 ft

Key Findings – Groundwater

Findings

- Groundwater in 8 Refuge wells impacted
- Many reported concentrations exceed State of New Jersey water quality requirements for dissolved and total metals and, in one well, benzene
- New Jersey's groundwater quality requirements identified as possible chemical-specific applicable requirements (ARARs)

Key Findings – Groundwater

FS Alternatives Assessment

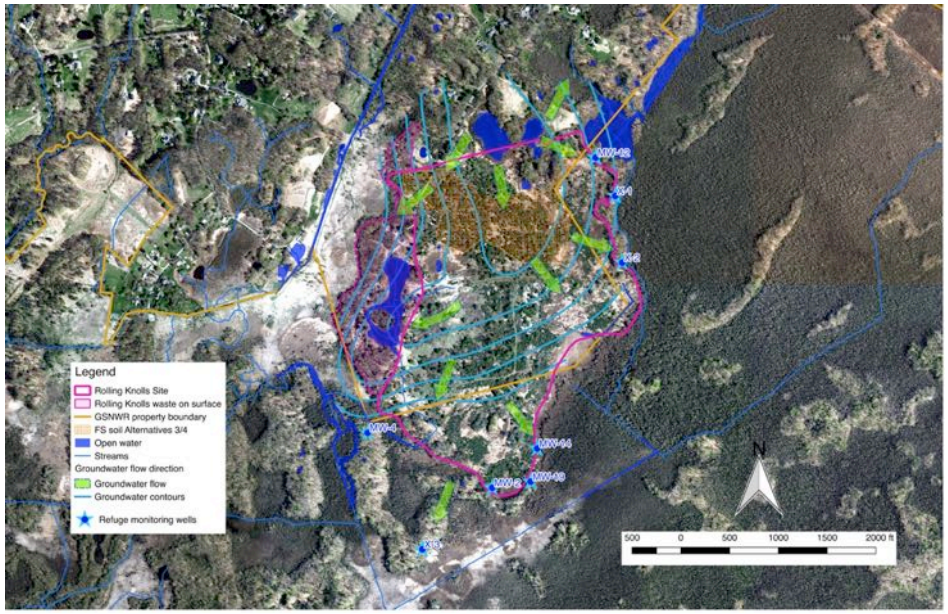
1. Draft FS implies that groundwater alternatives 2 and 3 will achieve Requirements at some point in time
2. 8 Refuge impacted wells are not specifically addressed in the FS
3. Potential future impacts to surface water from contaminated groundwater discharges need to be evaluated
4. Unclear if other groundwater alternatives or modifications of groundwater alternatives 2 or 3 will ensure compliance with chemical-specific Requirements
5. Modification of the landfill alternatives to fully contain source landfill waste would address continued migration of contaminants into the groundwater

Groundwater
8 Wells Exceeding NJ Standards

Well	No. Consitiuents Exceeding New Jersey Groundwater Standards [a]	Summary
MW - 2	4	Dissolved Metals
MW - 4	4	Dissolved Metals
MW-12	5	Dissolved Metals
MW -14	4	Dissolved Metals
MW - 19	5	Dissolved Metals and Benzene
X-1	6	Dissolved Metals
X-2	4	Dissolved Metals
X-3	3	Dissolved Metals

Source: RI Figure 4-2 (Geosyntec Consultants, 2018)

[a] N.J.A.C. 7:9C Ground Water Quality Standards



Key Findings – Surface Water

Findings

- Contaminants of concern not found in high concentrations at many locations
- Pore water sample collected from one location
- Contaminated groundwater expected to keep discharging into wetland

Rolling Knolls Site – Assessment of Draft Feasibility Study Alternatives

Assessment Questions

1. Has the Refuge been impacted by landfill wastes? **YES**
2. If the Refuge has been impacted, is the impact significant and impairing? **YES**
3. If the Refuge has been significantly impacted, do the remedial/removal alternatives proposed in the FS address the impacts? **NO**
4. Are there other remedial/removal alternatives or modifications of existing remedial/removal alternatives that would address the impacts? **YES**

Questions? - Discussion