Freight Train Derailment and Chemical Spill

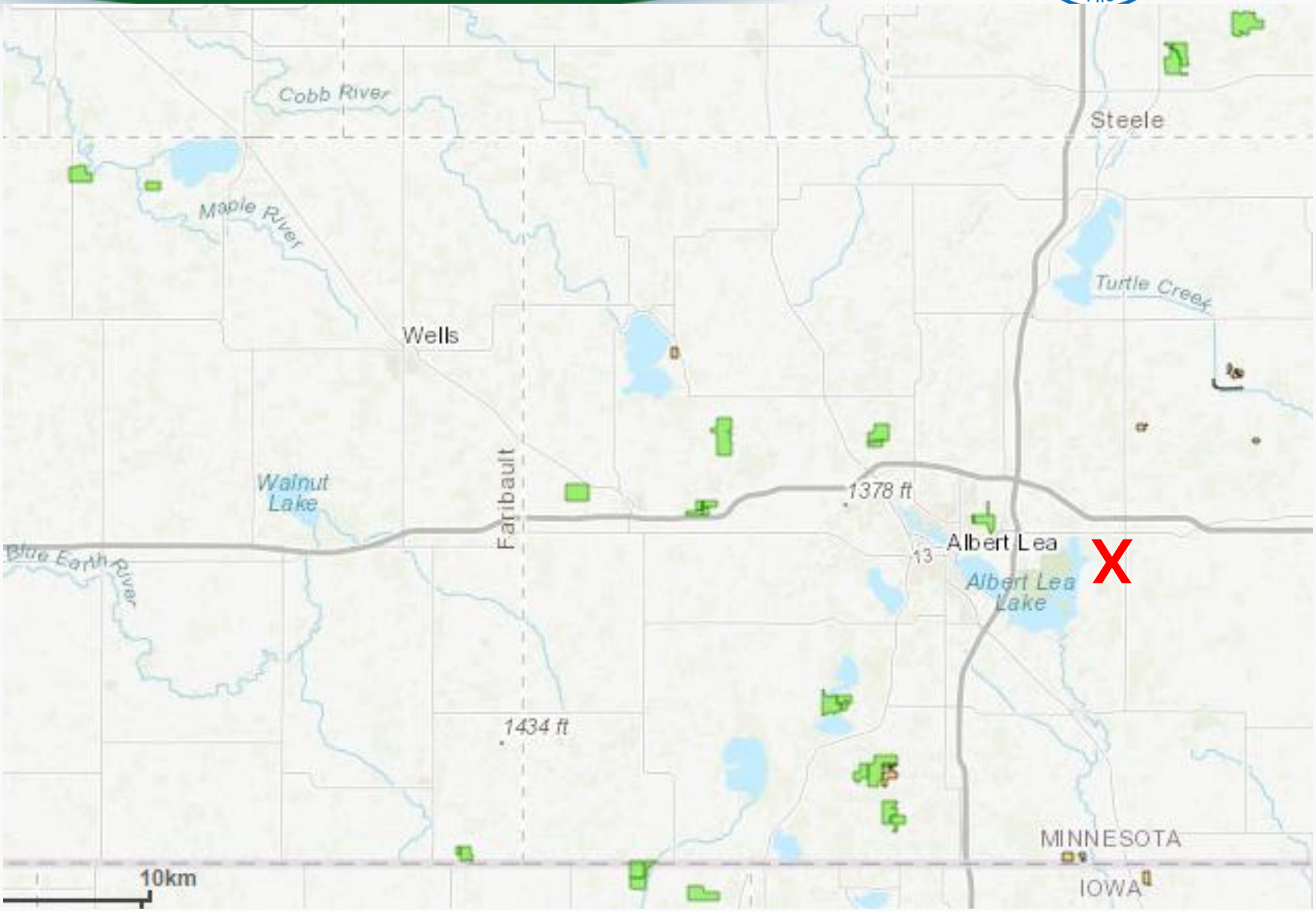
Goose Lake Federal Waterfowl Production Area
Albert Lea, Minnesota. May 15, 2021

Where is Albert Lea, Minnesota ?

Map credit: Ian Johnson, UNC Asheville's National Environmental Model and Analysis Center. Public domain.

Goose lake is a 79 acre shallow lake with wetlands. It is owned and managed by the U.S. Fish and Wildlife Service

Goose Lake Federal Waterfowl Production Area (WPA). Part of a National Refuge System for Migratory Birds



Goose Lake WPA, View of Southwest Shoreline
Day 5, *05/20/2021*

Goose Lake WPA, view of Northern Shoreline and initial spill area.

The Incident

28 Train Cars Derailed:
(3) Liquified Petroleum Gas (LPG) tankers,
(3) tanker cars of HCL (32% conc.),
(5) residual tank cars (lube oil),
(2) hopper cars with Potash (KOH)
and the rest were lumber, empties, and non-hazardous goods.

40,000 gallons of Hydrochloric Acid was released next to the Lake.

Two of the 20,000 gallon capacity HCL cars were punctured about half-way down, one was found to have a puncture at the bottom and had lost all contents.

151,400 Liters of HCL

The derailment destroyed the Bridge and the outfall from the Lake (Goose Creek).
- The leaked acid started to migrate into the lake.

Photo: CBS News

Site Safety

Vapor clouds were present at the work site well into the next day.

- Upon confirmation of a vapor or possible "offgassing", local first responders requested sheltering in place for nearby residences with air monitoring conducted by the State Chemical Assessment Team.

Site Safety

Air Monitoring Plan

UPRR Albert Lea, Minnesota Derailment
Mile Point 253.67, Albert Lea Subdivision

Union Pacific Railroad

May 15, 2021

2. Chemical Information, Exposure Standards, Guidelines, and Action Levels

2.1 Anhydrous HCL

Anhydrous HCL will react with water to generate hydrochloric acid. Atmospheric release of anhydrous HCL will react with moisture in the air and create an airborne hydrochloric acid mist. When spilled in water, at a concentration less than 10 % by weight; an inhalation hazard would not likely exist. Airbone HCL acid mist has a distinct pungent irritating odor and has a published odor threshold of 0.3 ppm.

Unified Command

After Fire Department Command, management of the site eventually moved to a Unified Command.

Initial priorities included developing and implementing an air monitoring plan,
- Fixed Area-Rae Network,
- Handheld Multi Raes and colorimetric tubes.

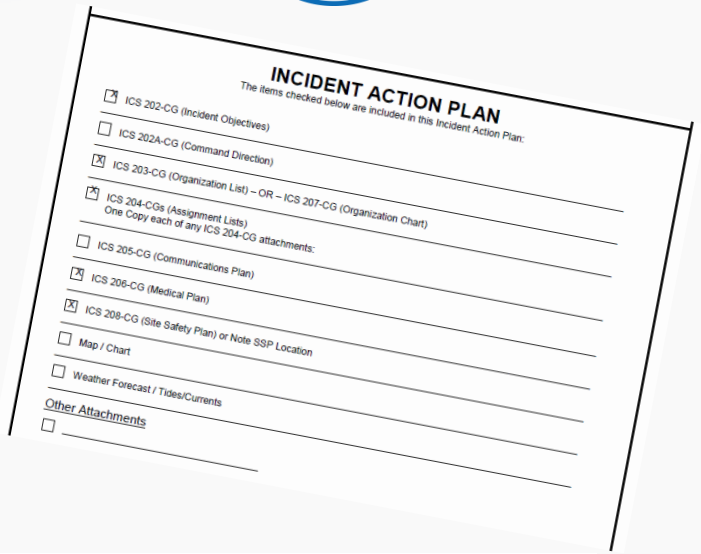
COI	Action Level[1]	Description of Action
Hydrogen Chloride	< 1 ppm	Action Level 1 - No action required.
	≥ 1 ppm	Action Level 2 - Communicate air mo monitoring reading with a duplicate ir HCl concentrations above the action control measures to limit HCl. If air monitoring readings continue to consult with a GHD Certified Industri qualified individuals to recommend a effectiveness and reduces potential e
Total VOCs (as Stoddard Solvent)	< 50 ppm	Action Level 1 - No action required.
	≥ 50 ppm	Action Level 2 - Communicate air mo monitoring reading with a duplicate ir VOC concentrations above the actior If air monitoring readings continue to consult with a GHD Certified Industri qualified individuals to recommend a effectiveness and reduces potential e
Hydrogen Sulfide	< 1 ppm	Action Level 1 - No action required.
	≥ 1 ppm	Action Level 2 - Communicate air mo monitoring reading with a duplicate ir H_2S concentrations above the action measures to limit H_2S. If air monitoring readings continue to consult with a GHD Certified Industri

A line of air monitors was set up between the crash site and the residential housing.

Incident Action Plan (IAP)

The First comprehensive IAP came out on day three of the response.

- Included agreed-upon Objectives for response.
- Organizational Structure
- Safety Plan
- Communications plan,
- etc.



INCIDENT ACTION PLAN

The items checked below are included in this Incident Action Plan:

- [ ] ICS 202-CG (Incident Objectives)
- [ ] ICS 202A-CG (Command Direction)
- [X] ICS 203-CG (Organization List) – OR – ICS 207-CG (Organization Chart)
- [X] ICS 204-CGs (Assignment Lists)
  One Copy each of any ICS 204-CG attachments:
- [ ] ICS 205-CG (Communications Plan)
- [X] ICS 206-CG (Medical Plan)
- [X] ICS 208-CG (Site Safety Plan) or Note SSP Location
- [ ] Map / Chart
- [ ] Weather Forecast / Tides/Currents

Other Attachments

1. Incident Name UPRR Albert Lea Derailment - May 15	2. Operational Period (Date/Time) From: 18-May-21 0700 To: 19-May-21 0700	INCIDENT OBJECTIVES ICS 202-CG

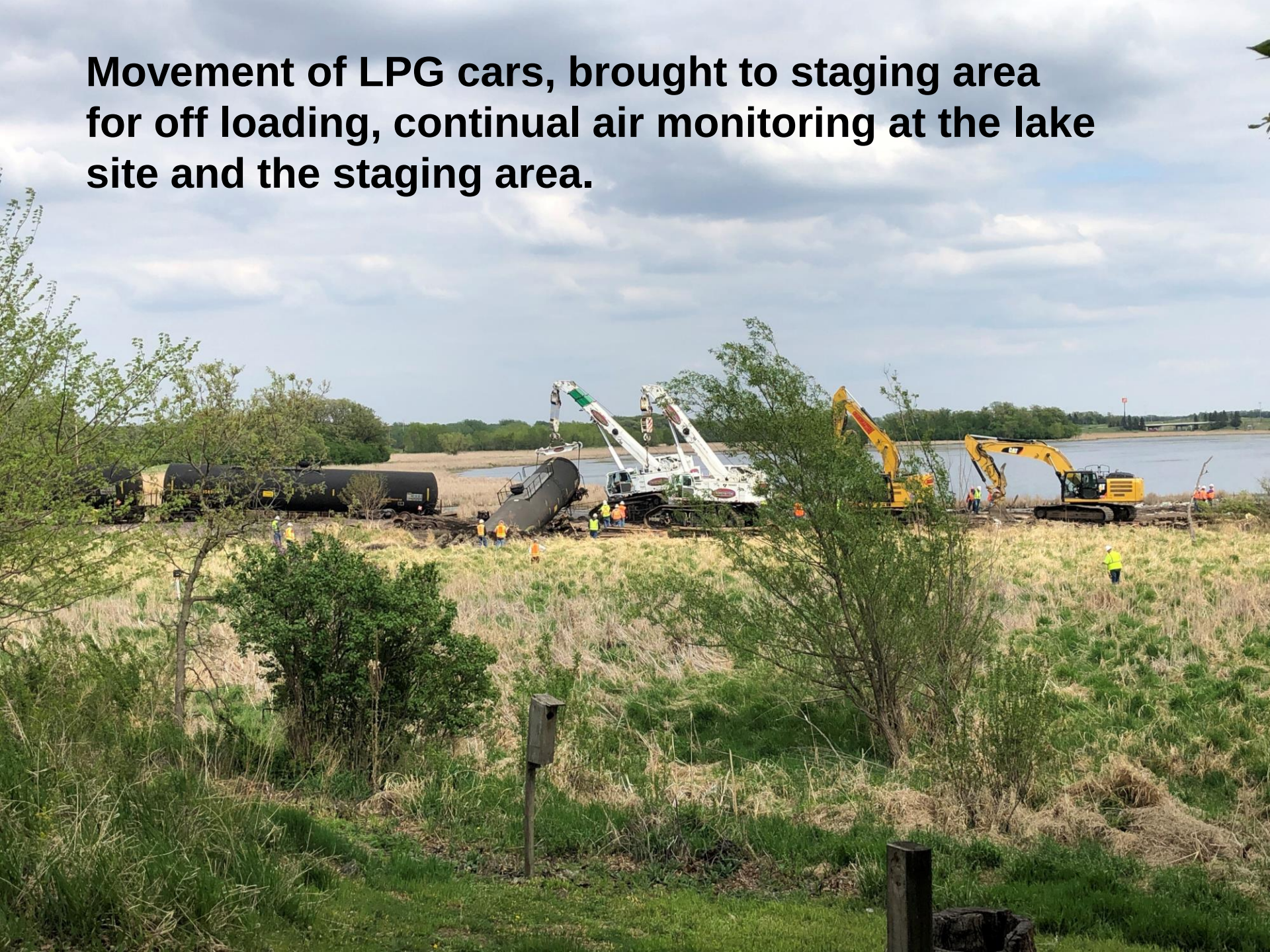
3. Objective(s)

1. Continue to carry out air monitoring plan for HCl, LEL, VOCs downwind from derailed cars
2. Continue damage assessment of remaining derailed cars
3. Continue neutralization of areas impacted by HCl
4. Maintain containment / receptor protection with consideration of liquid flow to Goose Lake
5. Continue excavation of impacted soils
6. Remove additional cars from site and reconstruct rail

Operations

Matting was laid along the railroad right-of-way
to help access the derailment area with heavy equipment.

Movement of LPG cars, brought to staging area for off loading, continual air monitoring at the lake site and the staging area.



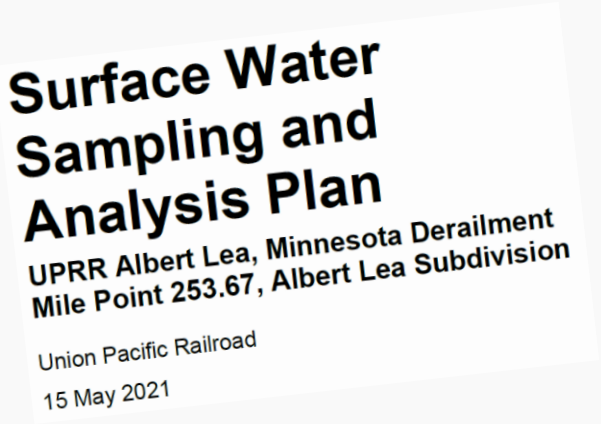
Soils Removal and Neutralization

The contaminated sediments at the source area were neutralized by application of **soda ash** (sodium carbonate) and then the source area was excavated and stockpiled on plastic at the staging area.

Approximately **62 tons** of soda ash were utilized in the source area mitigation. The area was backfilled with lime rock for additional buffering for any residuals prior to rail reconstruction with granitic ballast rock.

Surface Water Sampling

The lake outlet (bridge/tressel) was destroyed by the derailment so Goose Creek had little to no outward flow from the lake.



Surface Water Sampling and Analysis Plan

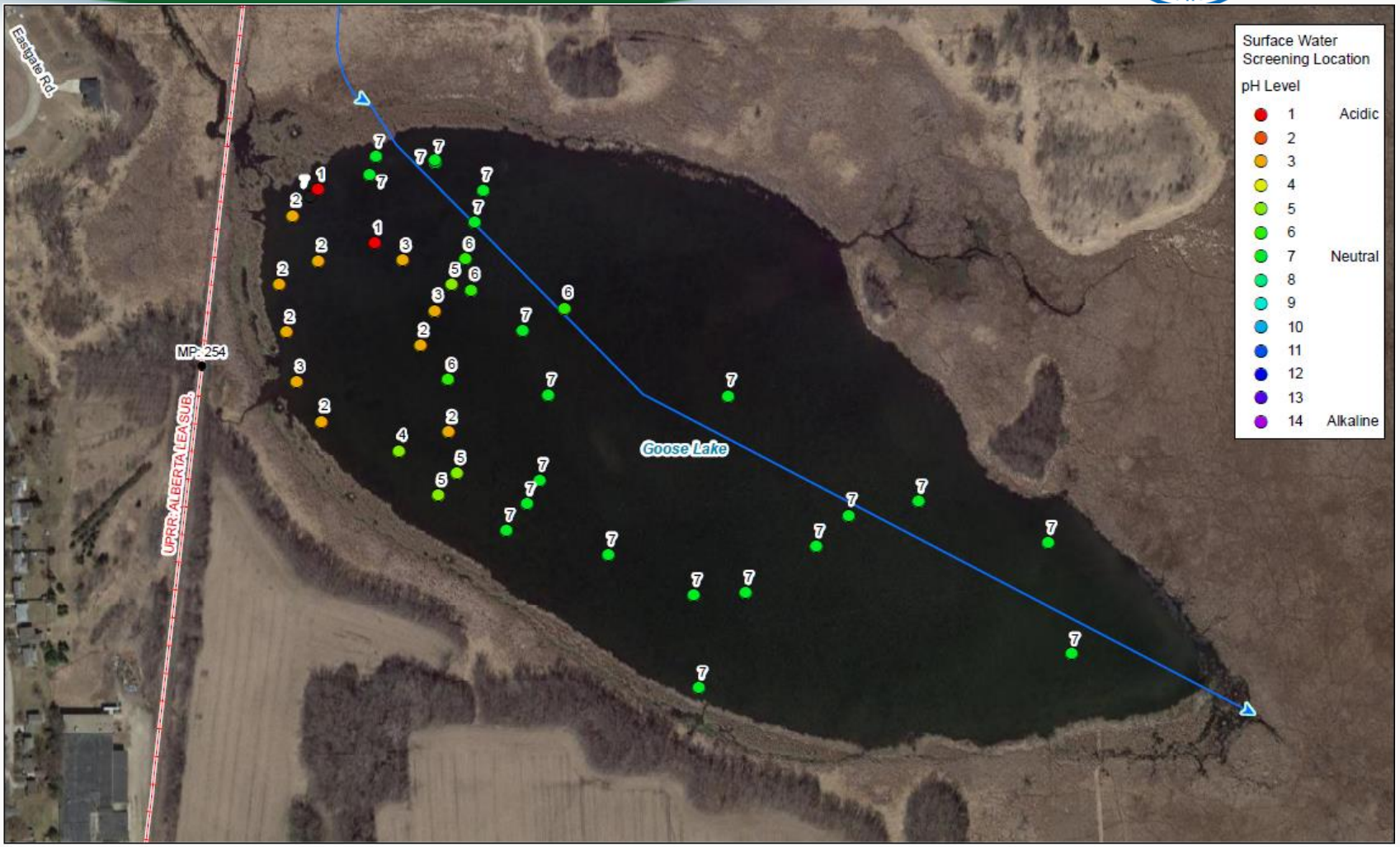
UPRR Albert Lea, Minnesota Derailment
Mile Point 253.67, Albert Lea Subdivision

Union Pacific Railroad

15 May 2021

A Sampling and Analyses Plan was developed within hours of the notifications.
- It was then provided to the environmental agencies for review and comment and then sent to the Unified Command for approval and implementation.

Immediate serious concern, lake pH dropping to 1

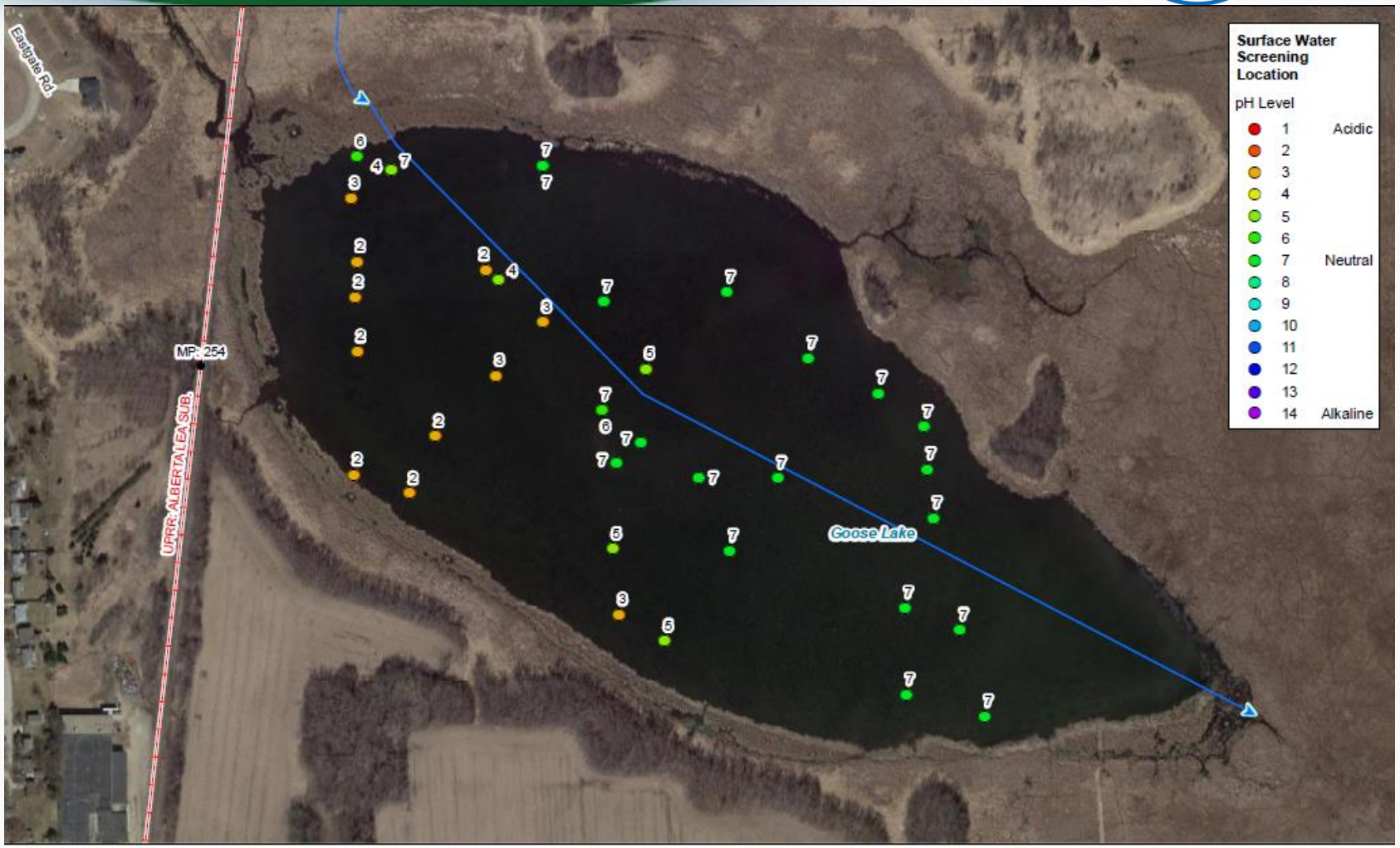


Immediate Intervention Needed

EPA OSC contacted Environmental Response Team (ERT) limnologists for review and comment on water sampling efforts. ERT provided a recommendation for mitigation/neutralization by the application of calcium carbonate.

2,400 pounds of calcium carbonate was applied to low pH areas in the lake for neutralization/buffering.

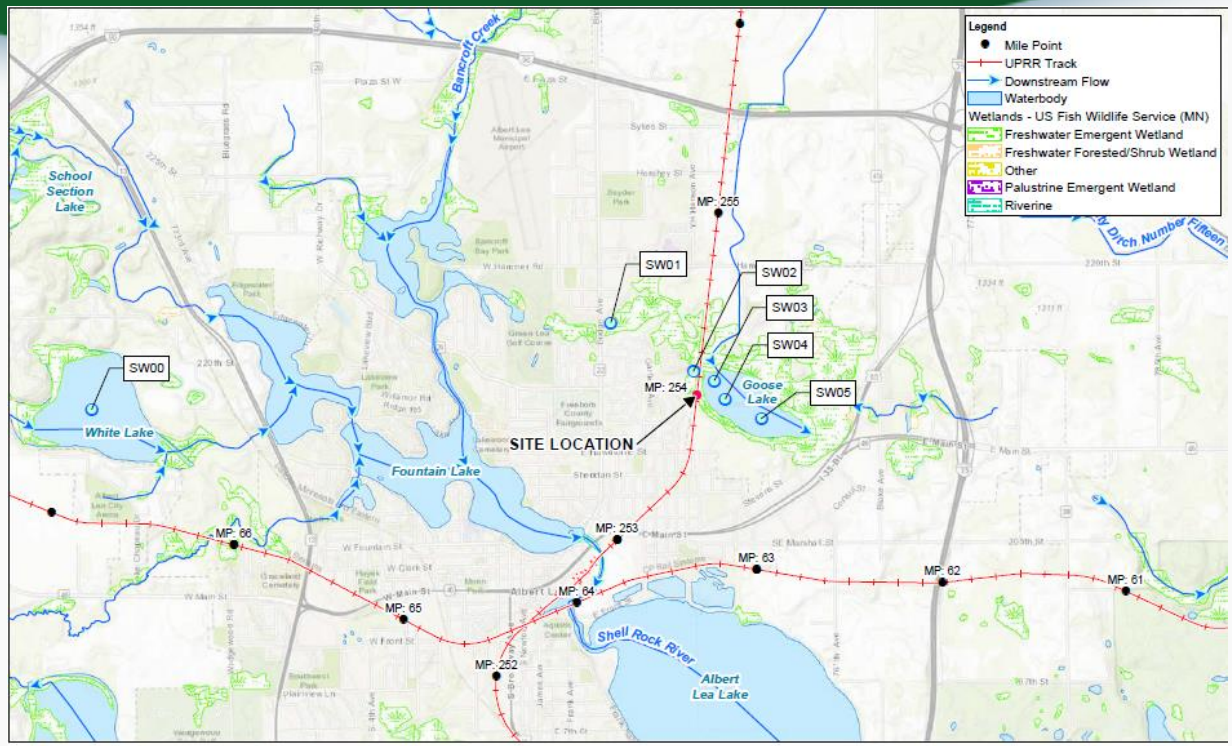
Acid Migrating further into lake



Day 3:

pH drop is expanding to the southern portion of the lake.

Comprehensive Sampling Plan



With unknown background water quality, Lake ecoregion water quality normal range values were used to evaluate water quality means and lake health.

- Nearby White Lake was chosen for “background”/comparative sampling.

ECOREGIONS

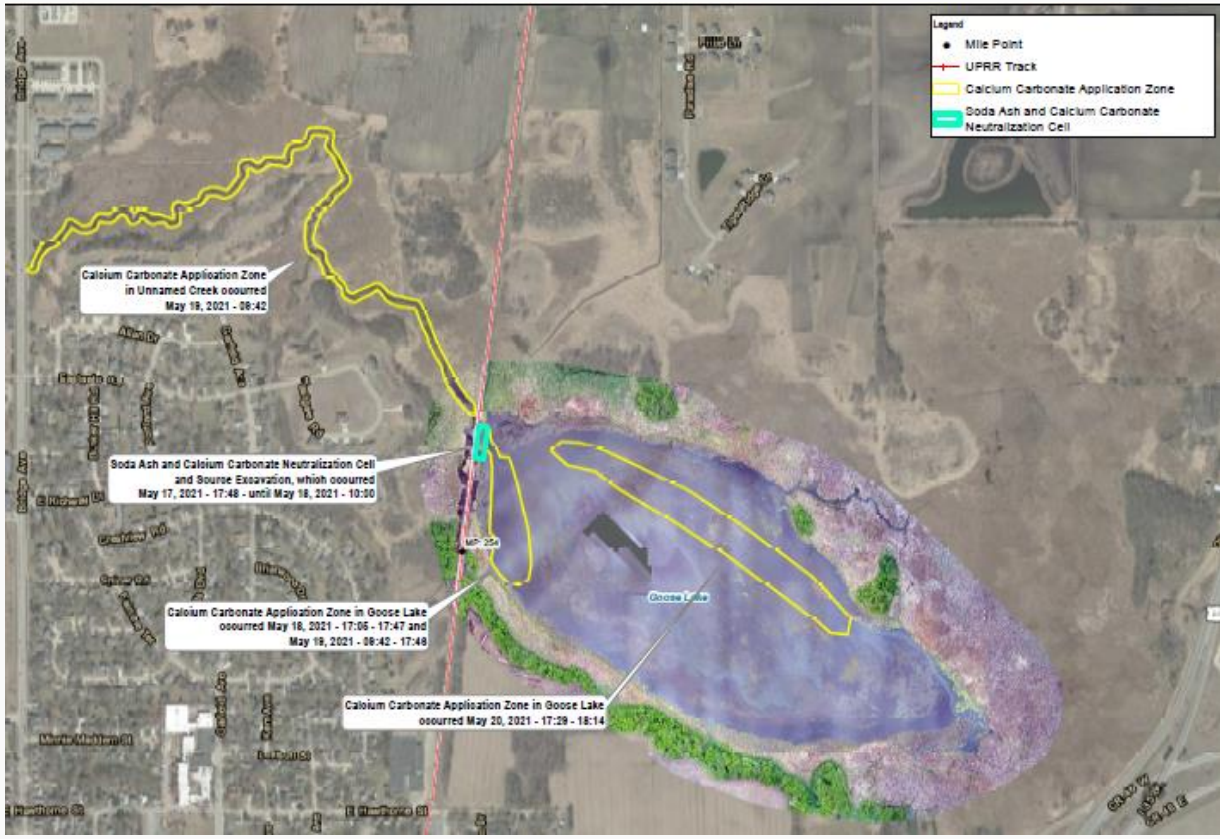
The USA (and Minnesota) has different ecoregions as defined by geography, geology, climate, habitats, etc.

Streams and Lakes in an ecoregion are often contrasted with the water quality and Index of Biological Indicators of the healthiest water bodies in that ecoregion.

Goose Lake is located in the Western Corn Belt Plains (WCBP) ecoregion of southern Minnesota.

On Going Intervention

The Railroad replaced the former bridge with culverts and opened-up the flow to the creek and downstream receiving water (Fountain Lake). Neutralization efforts then expanded to include the creek.

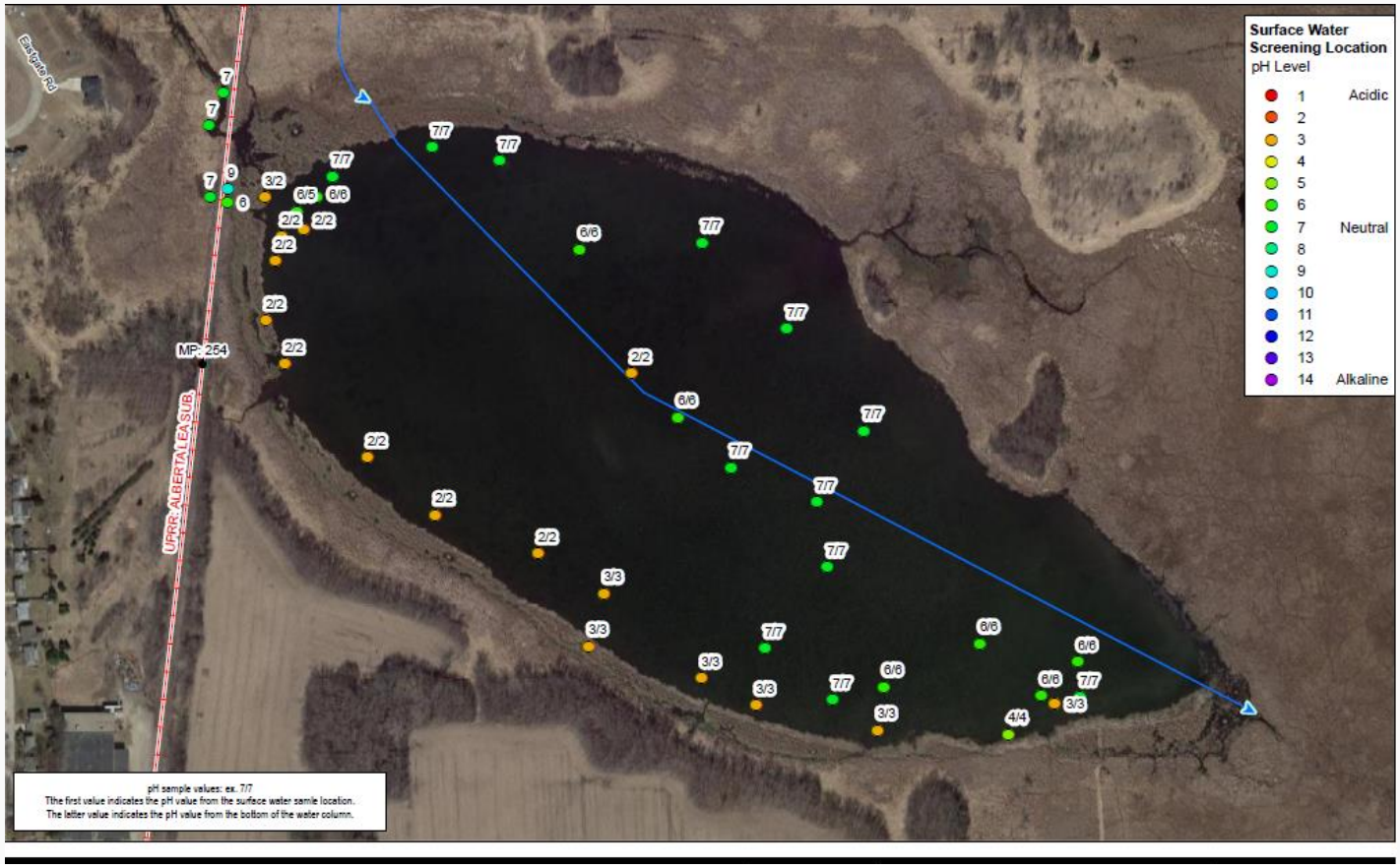


Daily sampling and data review.

On going consultation with Limnologists/ERT. The main parameters of concern driving mitigation efforts were:

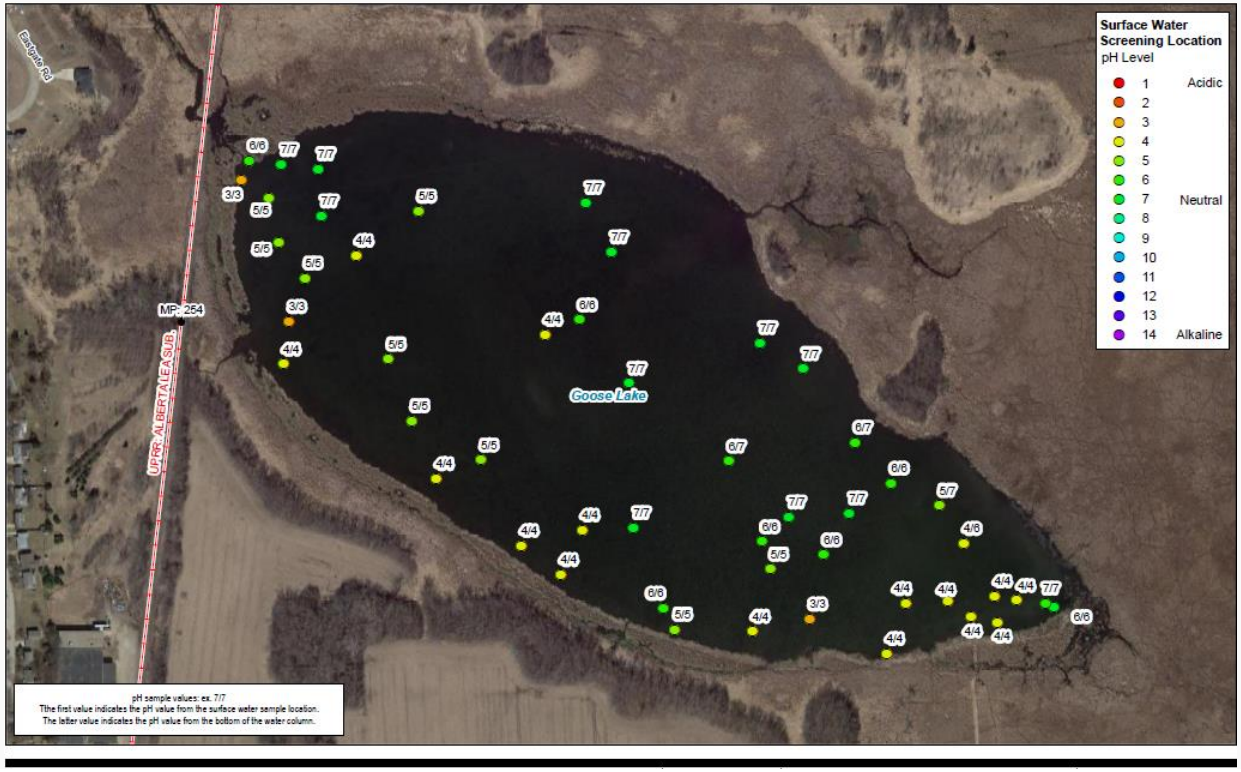
- pH
- Alkalinity
- Dissolved Oxygen
- Conductivity

The Impact Grows in the southern half of the lake



Day 4: pH drop continues across southern and eastern portions of lake, eventually all of the lake water quality was impacted to some degree.

Monitoring Day 7



By day 7, pH levels in the lake (note: not the sediments) had returned to normal.

Interim Conclusion: Calcium carbonate mitigation efforts may have helped, the thunderstorm certainly did.

Aquatic die-off

The low pH severely affected the photosynthetic production in the lake and Dissolved Oxygen (DO) levels dropped from 10 ppm down to 1 ppm in some parts of the lake.

Aeration System installed.

Aeration System

Consultations with Natural Resources Trustees

Consultations on Threatened and Endangered (T&E) species.

- No site-specific Federal species except Northern Long-Eared Bat in wooded areas.
- Several potential waterfowl, none observed except for a bald eagle in daily watches.
- Blanding's Turtle noted as State threatened species.

ATTACHMENT A
OFFICIAL SPECIES LIST

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Minnesota-Wisconsin Ecological Services Field Office
4101 American Blvd E
Bloomington, MN 55425-1665
Phone: (952) 252-0092 Fax: (952) 646-2873
http://www.fws.gov/midwest/Endangered/section7/s7process/step1.html

May 18, 2021

In Reply Refer To:
Consultation Code: 03E19000-2021-SLI-1504
Event Code: 03E19000-2021-E-04532
Project Name: UPRR Spill-Goose Lake

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

This response has been generated by the Information, Planning, and Conservation (IPaC) system to provide information on natural resources that could be affected by your project. The U.S. Fish and Wildlife Service (Service) provides this response under the authority of the Endangered Species Act of 1973 (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d), the Migratory Bird Treaty Act (16 U.S.C. 703-712), and the Fish and Wildlife Coordination Act (16 U.S.C. 661 *et seq.*).

Threatened and Endangered Species

The enclosed species list identifies threatened, endangered, proposed and candidate species, as

HAVE YOU SEEN A BLANDING'S TURTLE ?

State-listed Threatened Species

Carapace

Carapace (upper shell): Round, dome-shaped, very smooth, dull black with specks and streaks of yellow throughout.

Plastron (lower shell): Yellow with dark splotches on each scute (section); hinged between 3rd and 4th pair of scutes (front closes like a drawbridge) So the Blanding's turtle is sometimes called a "semi-Box Turtle"

The **bright yellow chin** and **underside of the long neck** is one of the most conspicuous features of this turtle.

Marshes, ponds, rivers & streams, adjacent uplands; Also travel overland & cross

Yellow neck/chin; no stripes

Serious benthic die-off. Thousands of mollusks, particularly of the (common) *Giant Floater* and the (Invasive) *Chinese Mystery Snail.*

Documenting Harm from an acid spill.

Goose Lake shoreline

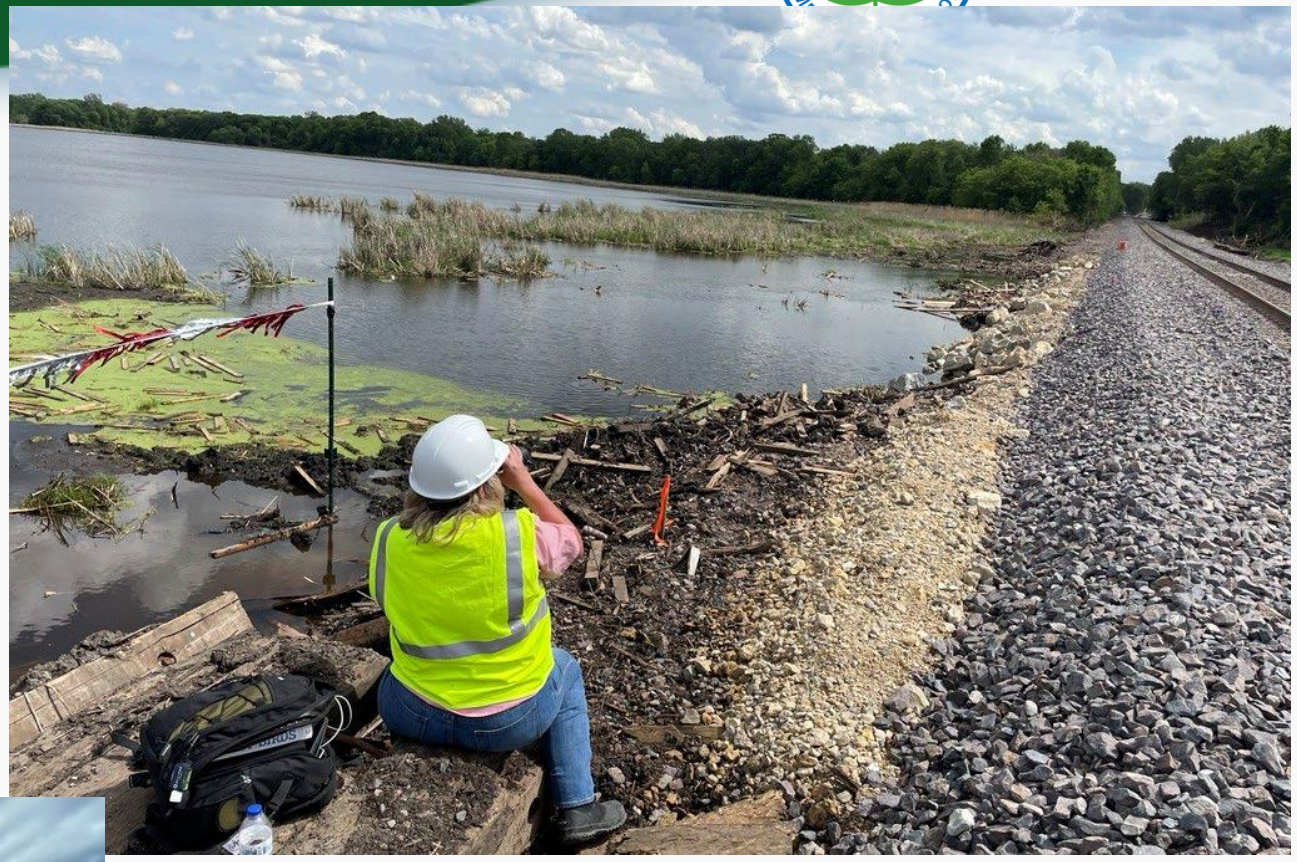
Piles collected and counted/assessed by consulting firm.

Wildlife Management Plan Developed.

Disturbed areas fencing to prevent turtle nesting temptation.

Waterfowl Deterrent measures for critical areas.

Daily Intervention – post shoreline work

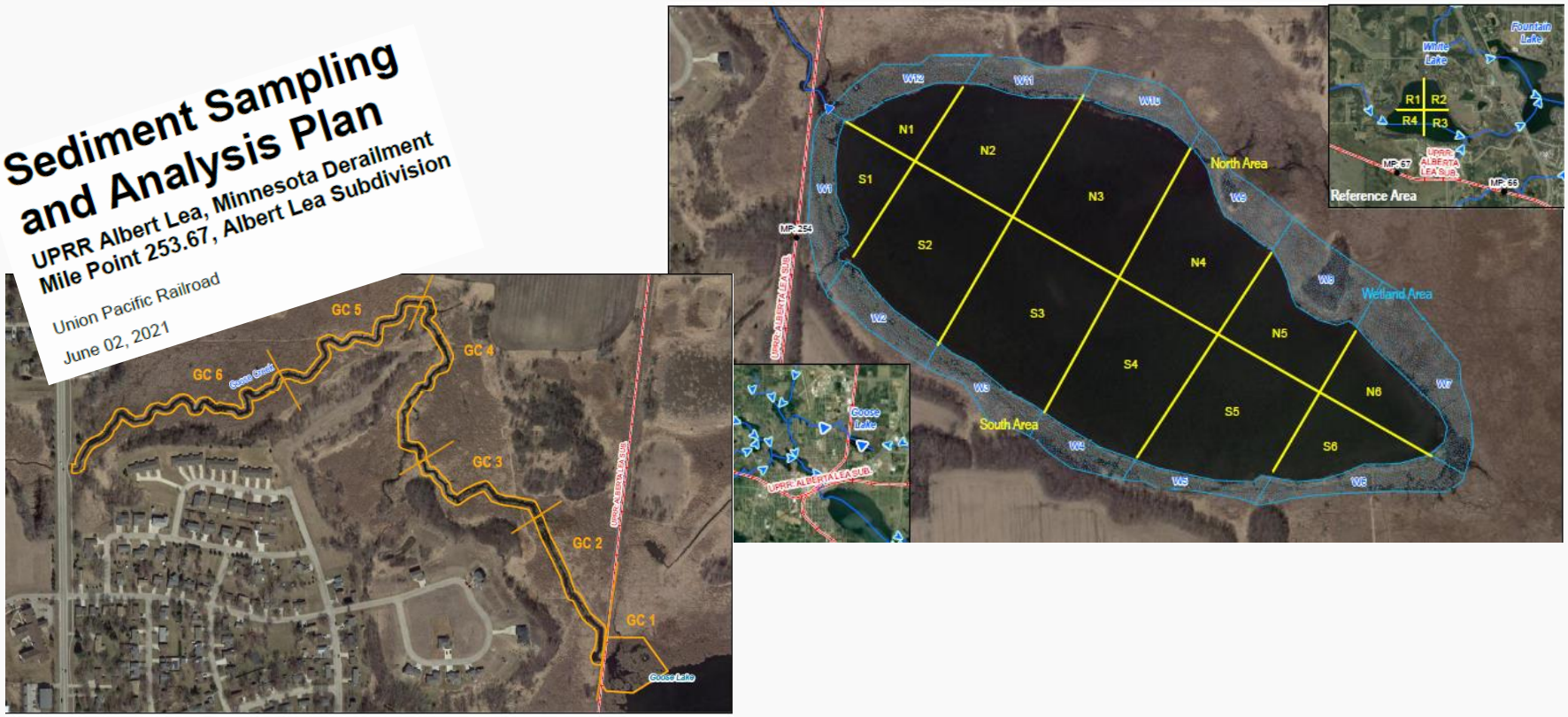


Daily Wildlife observers.
Wildlife Trained Services.

Impacted Lake Bottom Sediments

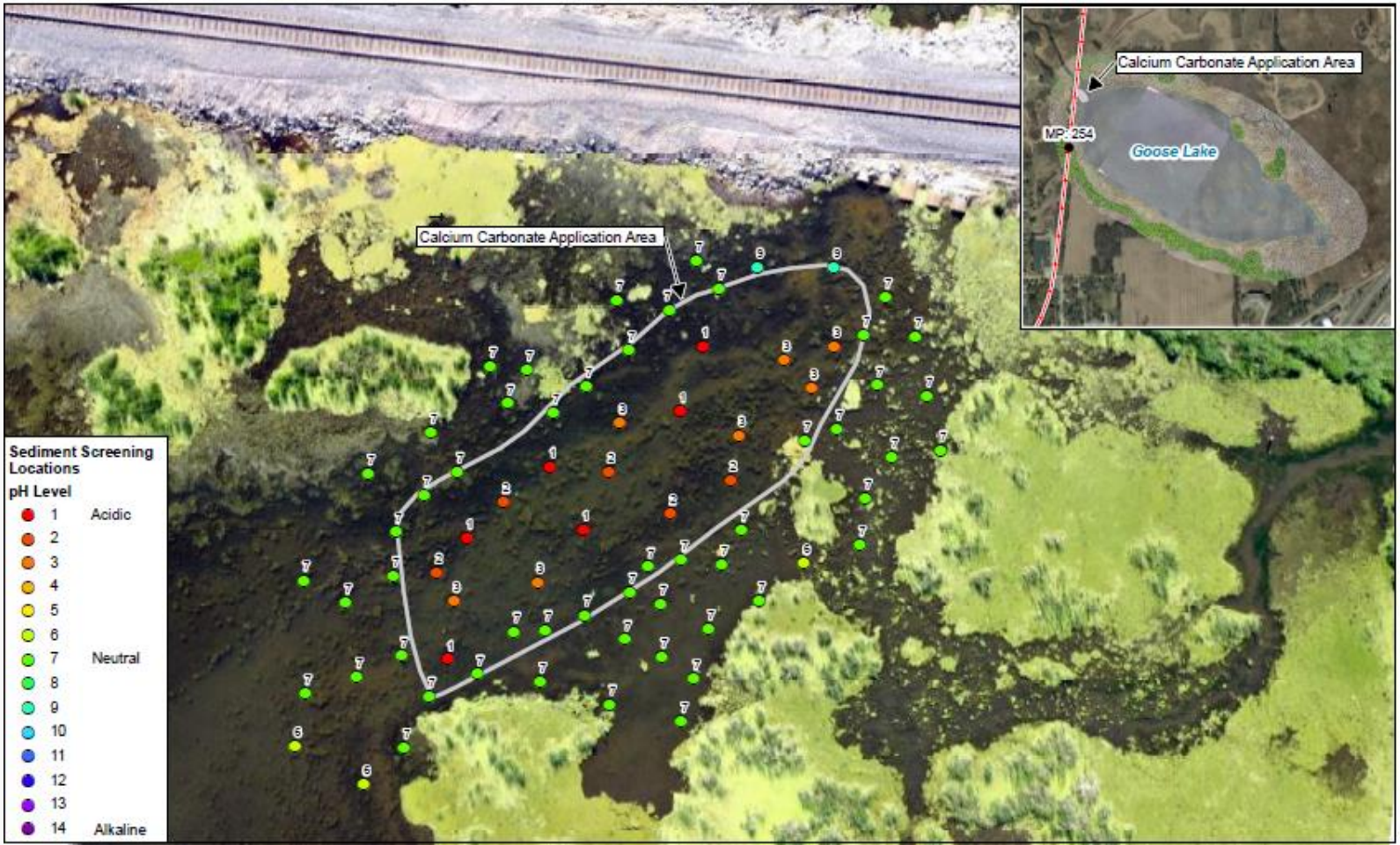
Sediment Assessment:

- more sampling, residual acidity in the wetland and lake.
- Sediment pH analyses found one significant area of pH in sediments in the lake near the release site.



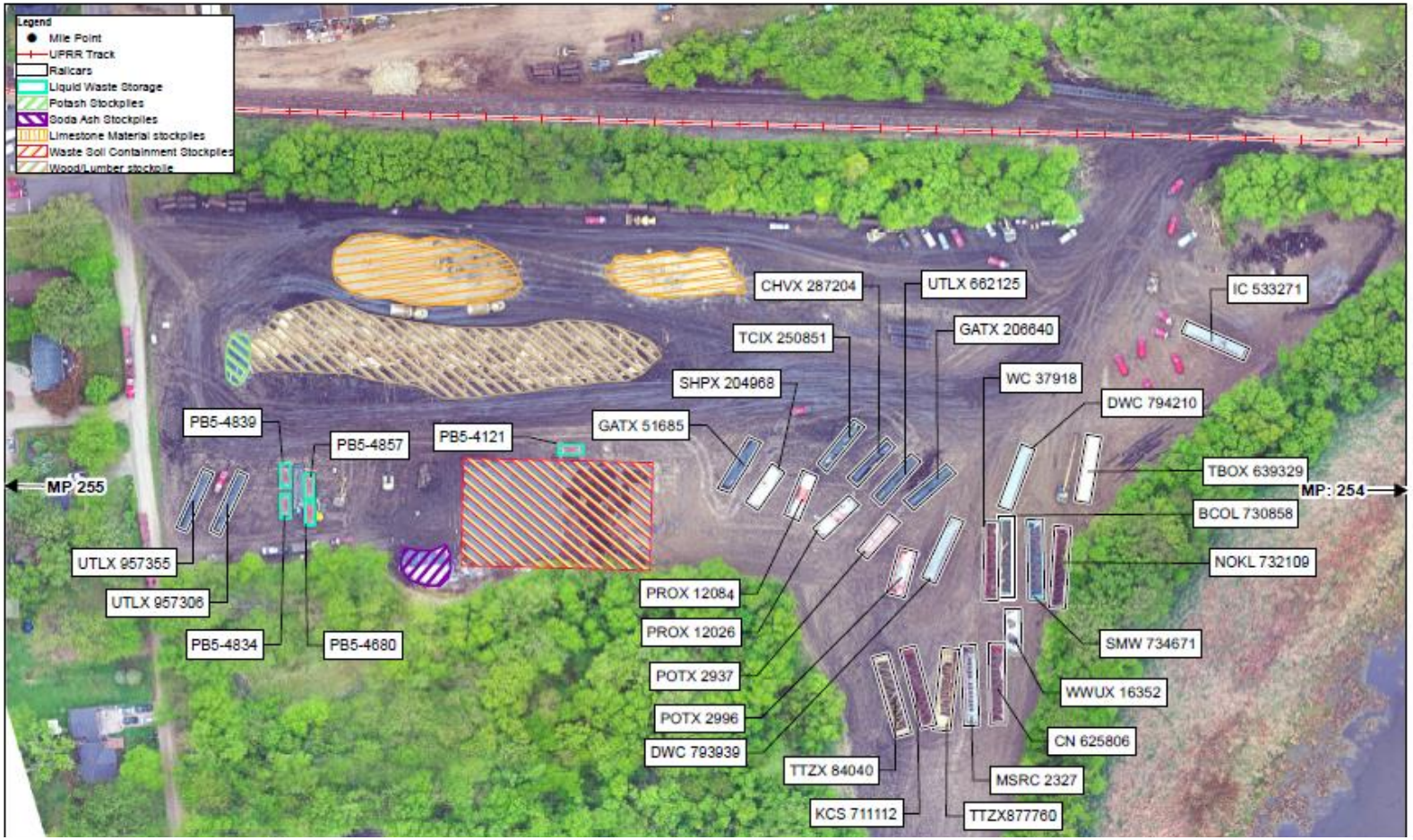
On-Going Lake Impacts

Well over a month later, further sediment pH delineation.
An additional 5.65 tons of calcium carbonate (pH 9.2)
was placed in the lake to address/buffer lake bottom sediment acidity.



Staging Area management

– farm field lease.



Pure Product HCL frac tank transfers - also, tank cleaning wastes.

On-Going Air Monitoring

Activity-based air monitoring during all transfers.
Area-Rae Network running continually throughout site.

Hydrochloric Acid tanker cleanouts

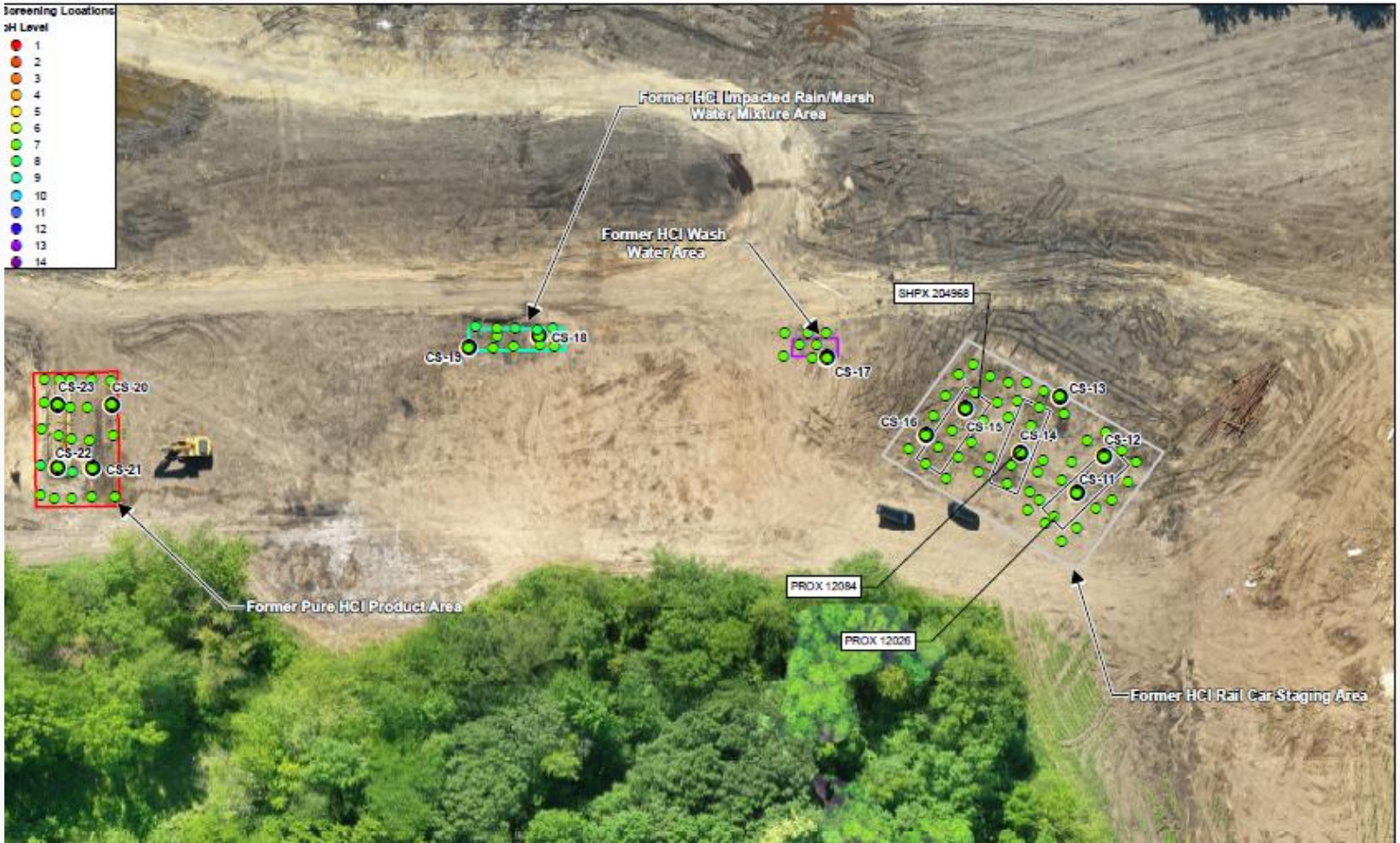
Staging Area Operations

LPG transloading.

LPG Flaring of residuals.
- Roughly 450 gallons/car.

Staging Area Closure Requirements

Post- Staging Area Use Confirmation Sampling.



Waste management issues

Not All Things Go Smoothly, there is often conflicts of interest.

- EPA may want to limit environmental footprint of incident.
- Responsible Party may want to limit liabilities.

- 36.7 tons of spilled potash-KCL was sent to a landfill even though MN Department of Agriculture had been on site and offered to help with beneficial reuse as fertilizer with a local Coop.
- A waste management plan was then developed.

Photo:
In-car potash transferred for re-use.

More work pending

Follow-up work is being conducted by the Responsible Party in the following season (2022) with U.S. Fish and Wildlife Service (FWS), Minnesota Department of Natural Resources (DNR), Minnesota Pollution Control Agency (MPCA), *and others* oversight.

Ecological Assessment

- Physical and chemical impacts to benthic and invertebrate populations,
- Impact assessment to submergent and emergent vegetation,
- Water quality

Denuded areas management plan

-Impacted areas may need reseeding to prevent invasive species from immigrating.

Culvert installation assessment - going through retroactive permitting review, particular concerns on lake-level management.

Potential Natural Resources Damage Assessment (NRDA)