FEASIBILITY STUDY OF MUDBOIL MITIGATION ALTERNATIVES: SETTLING BASINS, CONSTRUCTED WETLANDS, AND CREEK RELOCATION, IN THE UPPER ONONDAGA CREEK WATERSHED (TULLY VALLEY, NY)

A PROJECT FUNDED BY USEPA & NYSDEC through CNYRPDB via:
MUDBOIL TECHNICAL ADVISORY GROUP

September 15, 2021

Onondaga Environmental Institute

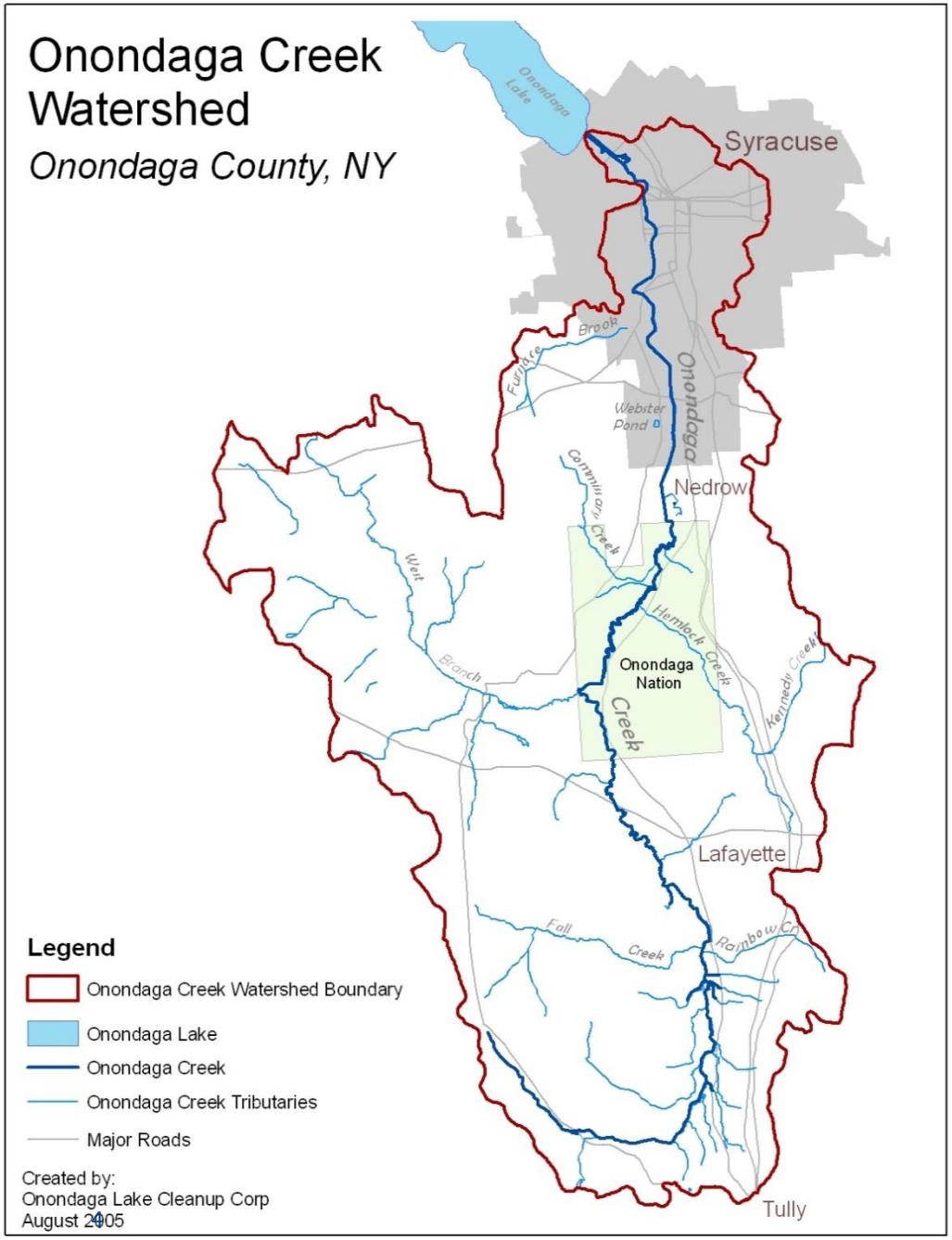
Background

- The *Mudboil Feasibility Study* (*MBFS*)
- proposed by Onondaga Environmental Institute (OEI) to evaluate feasibility of three conceptual alternatives identified in prior study, *Mudboil Alternatives Analysis* (*MBAA*).
- The *MBAA* identified and assessed conceptual options to address and mitigate discharge of mudboil sediments released to Upper Onondaga Creek.

Upper Onondaga Creek

- Multiple problems,
- Regionally unique in character and habitat,
- Capable of supporting brook and brown trout fish populations, & a potential affluvial salmon run
- Important resource in establishment of cold and cool water fisheries in Onondaga Lake
- of profound cultural and spiritual significance to Onondaga Nation

Onondaga Creek Watershed



What is a mudboil?

- Volcano-like cones of fine sediment caused by artesian pressure that pushes groundwater to the surface
- Discharges fine sediment and varying degrees of saline waters into Onondaga Creek
- Discharge can occur several days to several years (Kappel 2014, OEI 2010)

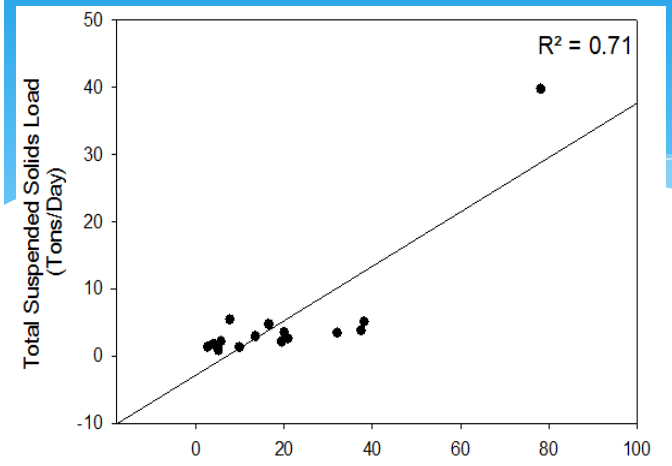
Tully Valley Mudboils

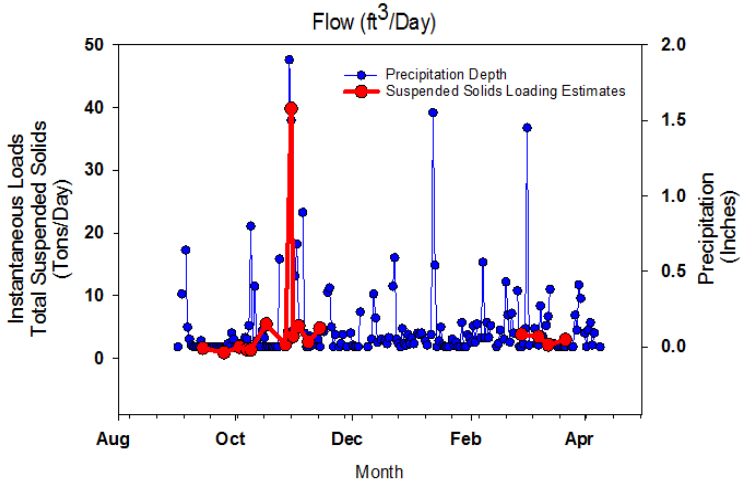
Land subsidence in Mudboil Depression Area

Mudboil Loading to Onondaga Creek

Onondaga Creek Sediment Loading to Onondaga Lake

Mudboil Sediment Loading





- Otisco Rd: August 2017 – March 2018
- **Loading Estimates (tons/day):**
  - Minimum = 0.90
  - Average = 5.18
  - Maximum = 39.80
- Increases in precipitation generally correspond with an increase in sediment loads

What do mudboils discharge, besides 'mud'?

Mud:

- **Total Suspended Solids** = particles suspended in water (visible)

Salts:

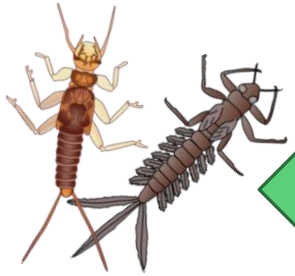
- **Total Dissolved Solids** = particles dissolved in water (minerals, salts, metals; not visible)
- **Conductivity** = ability for water to pass electrical current
  - Particles in water
  - More particles > conductivity
  - Salts are a large contributor to conductivity
- **Salinity** = amount of dissolved salts in water

Impacts to Biota

Mudboil sediment covers coarse substrate, decreases water quality

Fine sediment smothers habitat for fish and insects

Important prey disappear



Sensitive fish species leave/die, reproduce elsewhere

Mudboil Technical Advisory Group (TAG)

* The TAG is comprised of:

1. Representatives of the Onondaga Nation,
2. Region 2 of U.S. Environmental Protection Agency (USEPA),
3. U.S Geological Survey (USGS),
4. New York State Department of Environmental Conservation (NYSDEC),
5. New York State Office of the Attorney General (NYSAG),
6. Central New York Regional Planning and Development Board (CNYRPDB),
7. Onondaga County, and
8. City of Syracuse.

Project Team

Design team includes engineers, scientists, and restoration specialists from private, academic, and agency organizations consisting of:

1. Donald Lake, P.E. of Dulac Engineering ,
2. Jock Conyngham, Principal at River Research and Restoration LLC ,
3. Kyle Thomas, P.E. of Natural Systems Engineering, PLLC ,
4. Tim Seeler, P.E. of Seeler Engineers ,
5. Theodore Endreny, Ph.D. P.E. of the College of Environmental Science and Forestry ,
6. John Williams, M.S. USGS ,
7. Paul Hessig, M.S. USGS ,
8. Ed Michalenko, Ph.D. of OEI.

Three Selected Alternatives:

1. Alternative 1: Offline settling with post-settling polishing wetlands;
2. Alternative 2: Creek relocation with at-source settling;
3. Alternative 3: Inline settling with at-source settling

FS Goals

To identify an alternative capable of accomplishing the two overarching goals:

1. mitigate sediment and saline discharges to Onondaga Creek, and
2. restore in-stream brook trout habitat

Objectives

The selected mudboil mitigation measure(s) should:

1. significantly reduce sediment and salinity inputs into Onondaga Creek,
2. enhance the natural system's ecological integrity and resiliency,
3. restore habitat for fish and wildlife,
4. reconnect and/or restore spawning, nursery, and thermal refugia for recreational and culturally important fish species such as brook trout, and
5. improve water quality and remove all of Onondaga Creek from the NYS 303(d) list of impaired waterbodies for environmental degradation due to turbidity

PHASE 1. PRELIMINARY DESIGNS

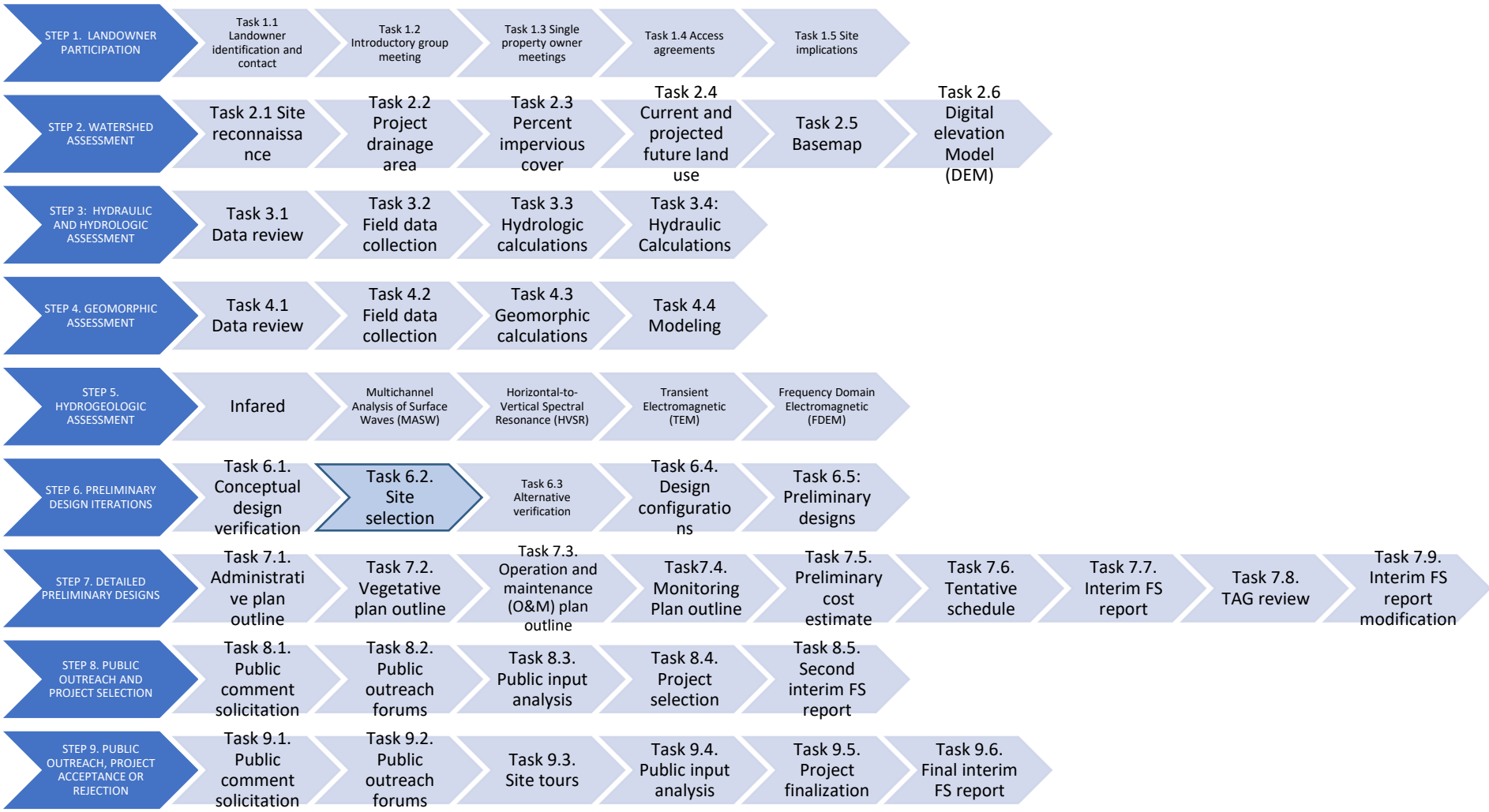
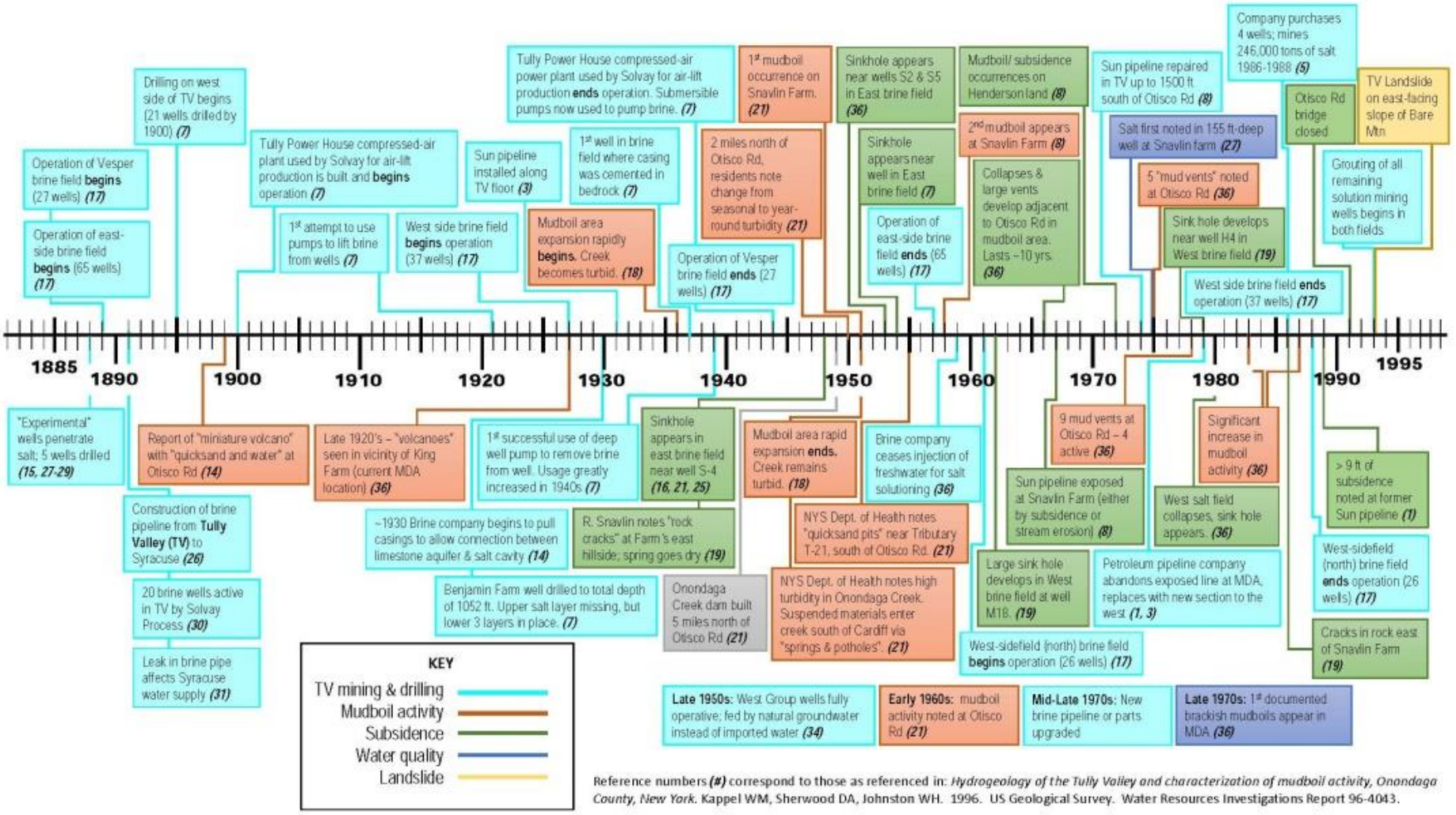


Figure 2. Phase 1: Preliminary Designs work elements.

The End

Questions?

Tully Valley Mudboils Historical Timeline



Reference numbers (#) correspond to those as referenced in: *Hydrogeology of the Tully Valley and characterization of mudboil activity, Onondaga County, New York.* Kappel WM, Sherwood DA, Johnston WH. 1996. US Geological Survey. Water Resources Investigations Report 96-4043.

Figure 1. Tully Valley Mudboils Historical Timeline (1885-1995)