ALLEVIATE SEDIMENTATION TO ONONDAGA CREEK FROM MUDBOIL ACTIVITY TULLY VALLEY, ONONDAGA COUNTY, NEW YORK

Scoping Document

The National Environmental Policy Act uses the scoping process "…not only to identify significant environmental issues deserving of study, but also to deemphasize insignificant issues …(Sec. 1501.7)."

October 2010
USEPA Region 2

Introduction

Mudboils, or muddy springs, occur along a corridor approximately 300 feet wide by 1500 feet long near the center of Tully Valley in Onondaga County, New York. These mudboils are locations where groundwater wells up to the surface as a result of the pressure created from surface water entering the aquifer system through the valley walls (Figure 1).

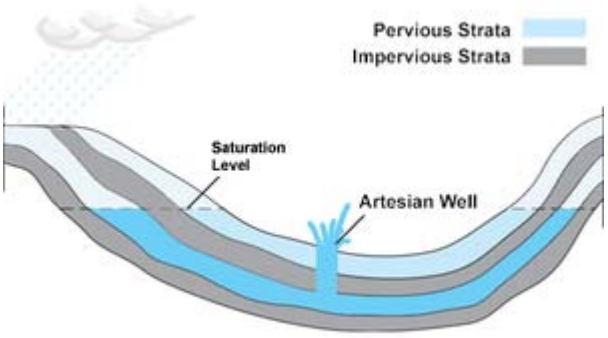

Figure 1. Geological strata giving rise to an artesian well

This artesian pressure occurs because confined aquifers in this area limit the flow pathways of groundwater (USGS 1998). The groundwater moves upward from the two deep sand and gravel aquifers through a 60-foot layer of dense silt and clay, from which large quantities of fine particulates are mobilized and transported to the surface (USGS 1998; Kappel 2009a). Artesian pressure (a pressure head higher than the land surface) forces the upward movement and discharges the water and sediment at the mudboils (Kappel and Miller 2003; Yager et al. 2007a; Kappel 2008; Kappel and Yager 2008). In the mudboil area, the pressure head is typically 20-30 feet above land surface (Kappel et al. 1996; Kappel and Yager 2008).

The Environmental Protection Agency (EPA) is a member of the Onondaga Lake Partnership (OLP) which coordinates the development and implementation of ongoing projects to restore, conserve, and manage Onondaga Lake and its tributaries. One of the goals of the OLP is to control Tully Valley mudboils to improve water quality in Onondaga Creek and Onondaga Lake.

As one of the members of the OLP, EPA has in the past provided funding for various projects to help achieve the Partnership mission. The National Environmental Policy Act (NEPA) requires federal agencies to integrate environmental values into their decision making processes, which includes the funding of activities, by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. EPA has complied accordingly with the procedural requirements of NEPA for projects previously funded through EPA annual Appropriations Acts. EPA's October 29, 1998 Federal Register Notice of Policy and Procedures for Voluntary Preparation of NEPA Documents policy encourages expansion of the discretionary use of NEPA procedures voluntarily in circumstances where they can be particularly helpful for decision making involving other federal agencies, public involvement, cross-media issues, or other concerns such as environmental justice. Therefore, EPA is preparing an environmental assessment (EA) of alternatives to solicit Indian Nation and public comments and inform decision makers about potential options to alleviate sedimentation to Onondaga Creek from mudboil activity in Tully Valley, Onondaga County, New York.

Scoping Process

Scoping is that part of the NEPA process where the lead agency solicits input from interested governments and the public. While the NEPA regulations do not require scoping for the preparation of an EA, the regulations do not preclude scoping either. As a useful tool for identifying alternatives and potential impacts, EPA has decided to conduct scoping and hold a scoping meeting in order to receive input from local citizens, organizations and the Indian Nations.

Background

Reports of mudboil discharge into water with suspended solids to the land surface near and into Onondaga Creek have been documented since at least the early 1900s. The mudboil area is approximately 15 miles south of Onondaga Lake, and approximately 10 miles from the southern boundaries of the City of Syracuse (Figure 2).

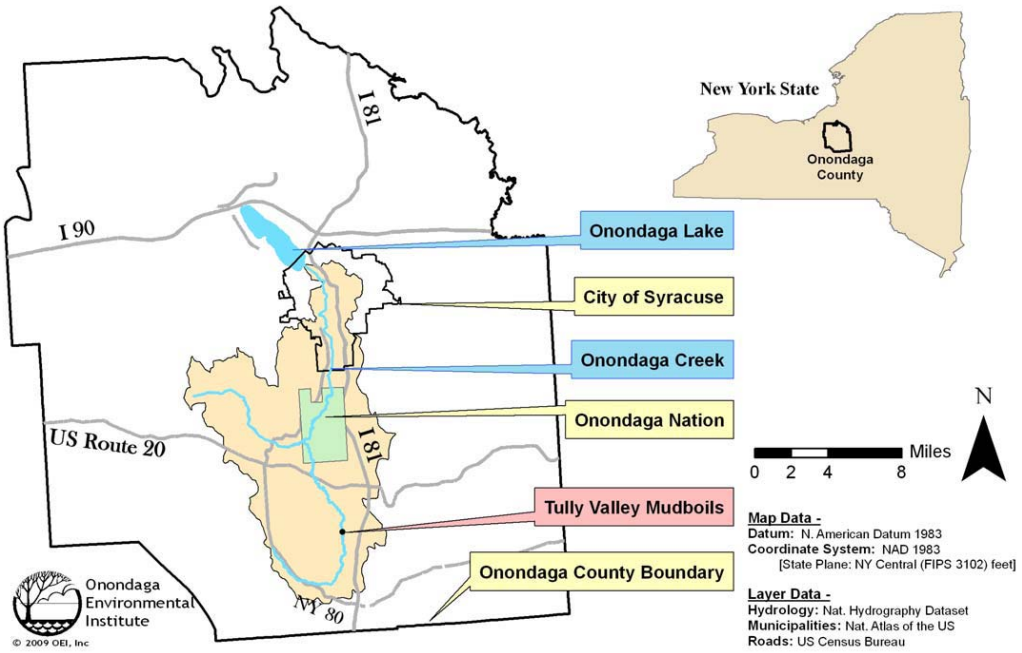

Figure 2. Location of Tully Valley Mudboils in the Watershed of Onondaga Creek (tan), Onondaga County, New York

From the late 1980s to present, persistent year-round mudboil flow has been observed; prior to that time, flow appeared to be seasonal (Kappel et al. 1996). The suspended sediments from the mudboils that flow into Onondaga Creek are adversely affecting water quality in the Creek (Figure 3) and in Onondaga Lake. In the early 1990s, with mudboil activity being persistent and year-round, sediment loading to Onondaga Creek was occurring at approximately 30 tons a day. Deposited sediments affect fish, plant and macro-invertebrate habitat conditions. Both the in-stream bed sediment load and new sediment inputs negatively affect conditions for hunting, fishing, and plant collection for food and medicine by people of the Onondaga Nation. In addition, subsidence has

Figure 3 Water quality of Onondaga Creek being affected by mudboil.

resulted in two road bridge collapses and rerouting of a major petroleum pipeline and a buried telephone cable.

Twentieth century mining of halite by injection wells, also known as brine mining, in Tully Valley had altered the pattern of water pressure in the valley aquifers (Getchell 1983; Tully 1983; Haley and Aldrich of New York 1991; Rubin et al. 1992; Sanford 1996; Yanosky and Kappel 1997a, b; Hayes 1998; Kappel 2000; Kappel and Miller 2003; Kappel and Miller 2005). The altered hydrostatic pressure pattern is thought to have exacerbated sediment discharge to surface water in the Onondaga Creek watershed (Haley and Aldrich of New York et al 1991; Kappel et al. 1996). Local land subsidence around the mudboils and the surface water quality in Onondaga Creek are affected by the mudboils (Kappel et al. 1996).

Some pilot remediation measures have been put in place by the OLP at the mudboils to reduce both sediment loading to Onondaga Creek and the risk of land subsidence. In 1992, Tributary 6 of Onondaga Creek was diverted around the mudboils, thus reducing its role in transport and discharge of sediments to Onondaga Creek. An impoundment dam and depressurizing wells, installed from 1992 through 1996, further reduced the sediment load to Onondaga Creek to less than one ton per day in 1997, and sustained low levels of suspended sediment in years following (Kappel 2009a).

The earthen impoundment dike constructed in 1996 slows the flow of the local discharge as it leaves the mudboils. In the impoundment, most of the mudboil sediment settles out of the water column. The impoundment is maintained through periodic dredging. Downstream of the impoundment structure (Figure 4), a mudboil appeared in early 1997. Over the next several years, mudboil activity increased at this “Rogue” mudboil and a berm structure was built between it and Onondaga Creek. Prior to the winter of 2009-2010, the sediment discharge from the Rogue Mudboil was contained within the constructed earthen berm. The EA will include additional information regarding the results of the piloted remedies.

By April 2010, the berm collapsed due to subsidence which now allows uncontained sediments to flow into Onondaga Creek at an estimated rate of five to eight tons per day.

Two depressurizing wells were drilled in late August, 2010 to reduce activity at the Rogue mudboil. However, neither of the wells penetrated the sand and gravel aquifer that apparently drives mudboil activity in the Rogue area. Mudboil Activity in and around the Rogue area continues to cause subsidence and discharge of sediment to Onondaga Creek.

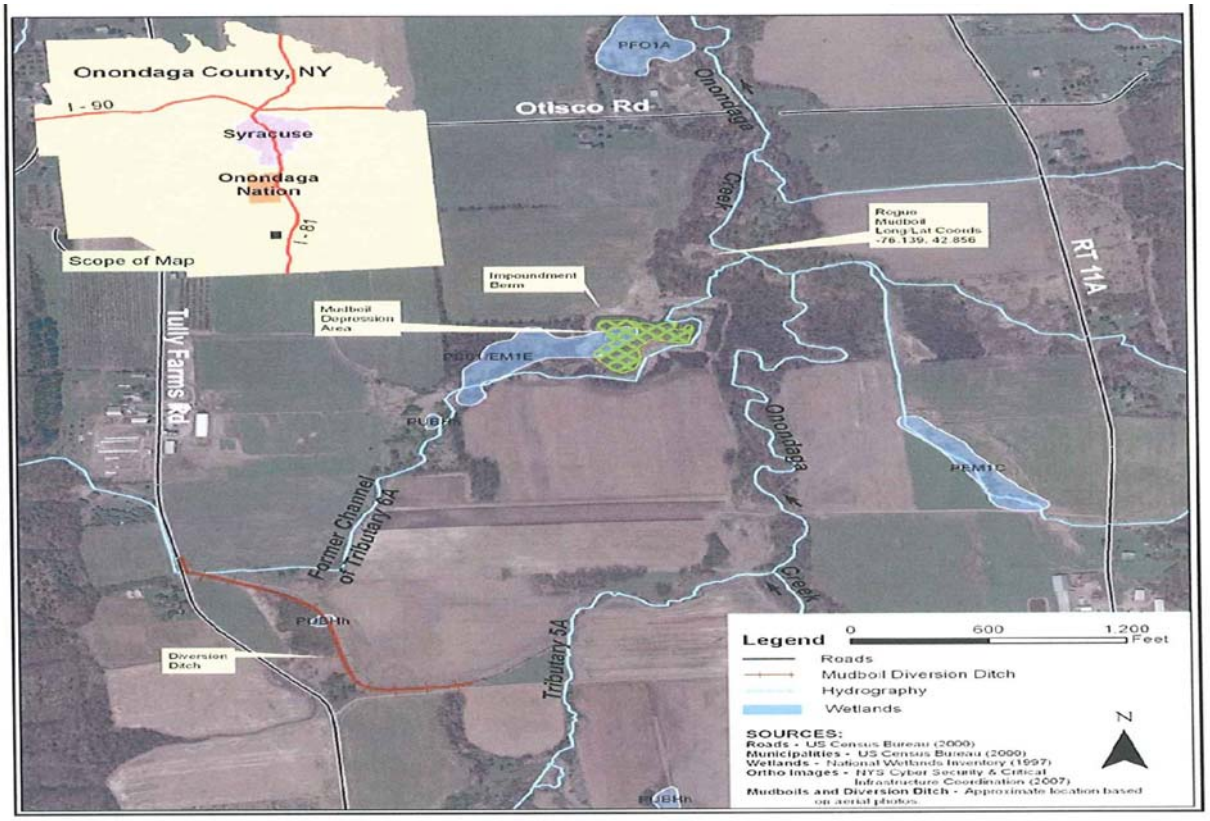

Figure 4. Tully Valley Mudboils –Primary Remediation Sites

Purpose and Need

The purpose and need of this project is to determine the preferred management practice(s) for reducing the amount of mudboil sediment entering Onondaga Creek. Effective sediment management would improve water quality in Onondaga Creek and Onondaga Lake and facilitate use of the water for subsistence, cultural, and social/recreational activities.

Study Area (Figure 5)

Rattlesnake Gulf serves as the northern extent; NYS Route 80 as the southern extent (approximately four miles) and the Tully town line at the western extent to mid way between 11A and Interstate 81 at the eastern extent (approximately 1.5 miles).

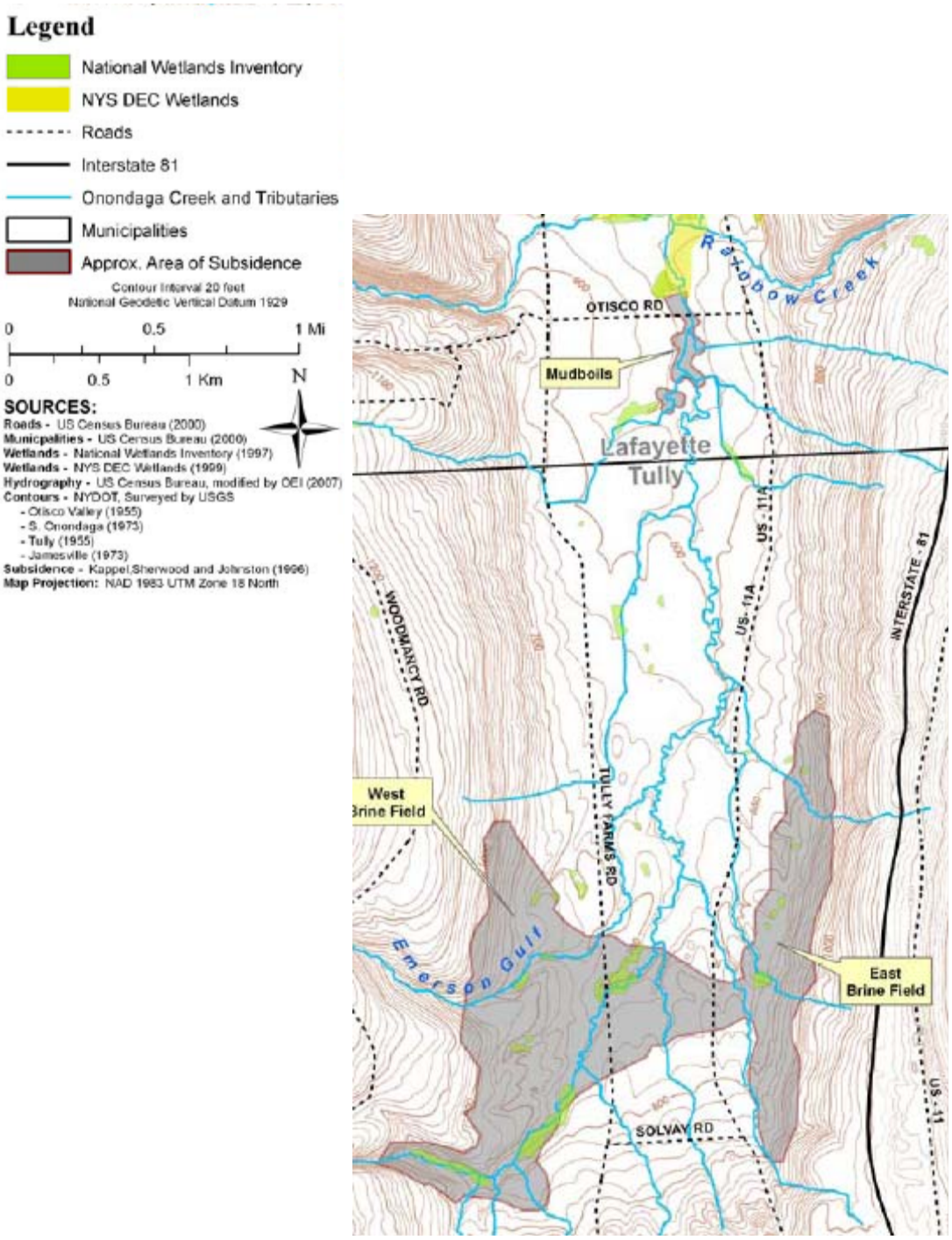

Figure 5. Study Area

Alternatives

The National Environmental Policy Act (NEPA) requires consideration of the no action alternative. In this situation, two no action alternatives have been identified and will be analyzed. The first will assume that funding for maintaining the existing remediation measures is available; the second will assume that further funding is no longer available and that the existing remediation measures will be removed consistent with the property access agreements that were established.

With regard to action alternatives, some alternatives will focus on the Rogue mudboil area which is currently the primary source of sediment turbidity to Onondaga Creek. , Other alternatives will focus on a more comprehensive solution to the mudboils activity, by addressing the mudboil area in general. All alternatives either seek to reduce mudboil activity by returning the activity to seasonal or intermittent sediment discharge to Onondaga Creek, or to reduce or eliminate mudboil impacts on Onondaga Creek.

Below is the list of alternatives currently under consideration.

- **No Action with Maintenance Funding** (maintain existing remediation measures)

- **No Action without Funding** (existing remediation measures removed consistent with property access agreements)

- **Depressurization wells** – place several new wells in various locations around the mudboils and further 'away' from them to try to intercept flows prior to reaching the mudboil discharge area. This alternative might cause general valley floor subsidence as the artesian pressure does support the valley floor to a certain degree. Geophysical techniques would aid in determining the best locations for such wells. Maintenance would be needed and possible “replacement” wells as the fine-grained mudboil aquifer might seal off wells over time.

- **Impoundment –** expand individual mudboil impoundments to larger ones capturing sediment from multiple mudboils. These would contain sediments but

allow “clearer” water to discharge to Onondaga Creek. Over time, an impoundment would become full of sediment and need maintenance.

- **Creek diversion** – Rogue Mudboil By-pass Channel - construct a channel beginning south of current mudboil activity, and divert Onondaga Creek to the east, then to the north, and return the new channel to the existing Onondaga Creek. A berm would be built at the cutoff location and would be equipped with a stormwater overflow channel for large storm events. This alternative might trigger a new or a shift of mudboils in the area.

- **Stabilization of sediments –** (a) *grout the alluvial fans of Rattlesnake and Rainbow Creeks* in order to reduce natural infiltration of surface water to the mudboil aquifers. Injection of grout below the channels of both creeks and from the bedrock walls out approximately one-half to one mile downstream. This would reduce infiltration and ground water recharge to home owner wells which lie on both alluvial fans. The reduction of freshwater infiltration would then allow for further (upward) infiltration of salty water which lies below, possibly changing water quality in the overlying aquifer, possibly affecting other home-owner wells and springs.
  (b) *Sealing the streambeds of Rattlesnake and Rainbow Creeks* - cement or clay line the channel bottoms of both creeks from the bedrock walls downstream. Effects might be similar to grouting of the alluvial fans alternative.

- **Mega-depressurization wells pairing wetlands filters –** place a few mega-wells in strategic locations to try to intercept key flows in the valley combined with created wetlands located around the mudboil to absorb water and filter out sediments to allow cleaner water to flow into the creek. This alternative would need to be modeled to find suitable locations for the wells. Wetlands might need to be maintained and/or replaced over time.

- **Large scale creek diversion around entire mudboil area** - a channel beginning south of current mudboil activity, and divert Onondaga Creek to the east and then to the north, outside the present floodplain of Onondaga Creek, and return the new channel to the existing Onondaga Creek, north of Otisco Road. This mega-channel would need to be very deep and wide to handle high Onondaga Creek flows. The current path of the creek channel would remain, and a control structure would be located in the old bridge opening for the former Otisco Road bridge. A sediment retention area would be constructed and long-term maintenance would be needed. Pressure associated with this impoundment might trigger a new mudboil.

- **In-situ soil stabilization**– Amending the soils with impervious materials so that a barrier would be created which would reduce the inflow of surface water to the mudboil aquifers which would result in reducing the artesian pressure that drives the mudboil activity. This alternative would need to be modeled using different scenarios to define amounts, depths and the physical area to be considered.

- **Groundwater management** - depressurizing wells in and around the brinefield areas to return ground water and infiltrating surface water back to the surface and Onondaga Creek. Multiple wells along both valley walls and the means to transport the water to the valley floor would be needed generally from the brinefield areas to the alluvial fans of Rattlesnake and Rainbow Creeks. Interception of flow from the Tully Moraine area would also have to be considered. This alternative would need to be modeled to understand how the salty water below would react to the loss of freshwater "holding down" the denser brine waters and how that might affect the overall water quality in the upper and lower mudboil aquifers.

Tentative NEPA Schedule

Scoping meeting	**November 2010**
EA Published	**February 2011**
Public Comment Period Closes	**March 2011**

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