RIPPLE
Natural Resources LLC

October 31, 2016

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Subject: Middlebury Main Street and Merchants Row Bridge Replacement WCRS 23

Dear Mr. DuMont,

I have completed an initial review of the Agency of Transportation's (AOT) proposed rail lowering project in Middlebury, with emphasis on impacts of the proposed project on groundwater and surface water. I reviewed the project files that have been made available, conducted a site visit on October 4, 2016, and attended a Selectboard Meeting on October 11 at which AOT gave a project update.

Groundwater seeps into the existing cut for the rail bed. There was visual evidence of groundwater seeping into the rail bed during a site visit on October 11, 2016. The water was evident on the surface just north of the Main Street Bridge crossing and appeared to be flowing south on the west side of the tracks. It is notable that this seepage was evident in spite of unusually dry conditions when groundwater levels would have been relatively low. At the time of these observations, the National Drought Management Center classified conditions in Addison County (in the center of which sits Middlebury) as Moderate Drought, and soon after upgraded the condition to Severe Drought (NDMC, http://droughtmonitor.unl.edu, accessed 10/31/2016). Under normal conditions, let alone wet conditions, considerably more seepage can be expected to enter the rail bed and from additional locations.

Lowering the rail bed as is proposed would increase the potential for groundwater seepage into the rail bed. Groundwater can enter the rail bed where the cut for the tracks intercepts the water table in adjacent soils or where the cut intercepts a water-bearing fracture in exposed ledge. Dropping the rail bed would expose soils at lower elevations that are more likely to be saturated with groundwater and would potentially expose more water-bearing fractures in ledge. The rate of groundwater discharge into the rail bed can only increase under these proposed conditions. A June 24, 2013 technical memorandum by VHB (Otter Creek Flood Elevation and Proposed Rail Profile, included as Chapter 6 of the July 23, 2013 Alternatives Analysis) indicates that the groundwater elevation will need to be lowered by 7 – 9 feet to allow for the lowering of the tracks, and they note that "significant underdrain systems will be incorporated into the design" to handle the additional groundwater. They further state that "It is likely that the final design of the drainage systems for the preferred alternative will include

even more robust groundwater control systems than those shown on the attached Preliminary Drainage Plans."

The condition of the drainage infrastructure within the existing rail bed is poor and suggests many years of deferred maintenance. Groundwater seepage was observed to be flowing south toward the Merchant's Row bridge. Just north of that bridge on either side of the tracks appear to be drainage structures of some kind. The inlets at the surface are largely obscured by stone, which reduces the ability for water to flow into the structures. Accumulated sand deposits are apparent adjacent to the inlets suggesting temporary shallow ponding of water under higher flows. Whether these drainage structures are connected to functioning outlet pipes is unknown. A properly maintained drainage system would have clear inlets with no obstructions. It would also be maintained to prevent the ponding of water at the inlets to avoid safety hazards given the proximity to the rails.

During the winter months, groundwater seeping into the rail bed from the surrounding soil and ledge has the potential to freeze, which can be nuisance or even hazardous conditions. In the absence of salt, seeping water can be expected to freeze, just as it does in ditches and on exposed ledge cuts adjacent to roadways. More groundwater discharge due to lowering of the tracks brings the potential for more ice formation. Particularly when combined with insufficient drainage infrastructure or deferred maintenance of infrastructure, ice formation could range from a nuisance to a hazard.

Lowering the tracks as proposed may lead to increased discharge of contaminants in groundwater, the introduction of contaminants to the stormwater drainage system, and increased contamination of surface water. Testing has indicated contaminants in both the soil adjacent to the rail bed and in the groundwater. It follows that an increase in groundwater discharge as discussed above will lead to an increase in the discharge of contaminants. Any contaminated water seeping in the rail bed would be delivered to the proposed drainage system. This means, regardless of any change in water volume, that a new, efficient path will be introduced to convey contaminated water directly to Otter Creek. Any delivery of contaminated groundwater to Otter Creek via seepage through the river bank will continue, and there would also be a contribution from collected seepage. The potential for contaminated groundwater in the closed pipe system would seem to have management and liability implications for the system's owner. Depending on the concentration of contaminants in the collected groundwater, there could be local impacts in Otter Creek at the outfall.

There is the potential for impacts below Ordinary High Water adjacent to Otter Creek between the Center Street and Merchants Row bridges. A June 24, 2013 VHB Memorandum (Otter Creek Flood Elevation and Proposed Rail Profile, included as Chapter 6 of the July 23, 2013 Alternatives Analysis) indicates that a wall and berm will be needed to prevent the 100-year flood flows from reaching the lowered tracks between Center Street and Merchants Row. A VHB representative at the October 11, 2016 Selectboard meeting indicated that the design of the floodwall was not yet complete. Using the available project design with the associated typical detail of the temporary access road, it appears that the limits of disturbance, particularly

if additional space is required for a flood wall and berm, may well extend below Ordinary High Water of the Otter Creek, which would necessitate clearance from the Army Corps of Engineers. In the absence of the floodwall design, it is unclear whether or how potential impacts below OHW were evaluated to determine that there would be no impacts below OHW.

If you have any questions or comments, please contact me at 802-522-3473 or by email at matt@ripplenr.com. Thank you for the opportunity to assist with this project.

Best Regards,
Ripple Natural Resources, LLC

Matthew Murawski, PE
Principal and River Engineer