

North Oaks and Wilkinson Lake Improvements

1.0 Introduction

Barr Engineering Co. (Barr) has drafted this memo to provide a narrative for the conceptual design of several potential water quality improvement projects within the agricultural and conservation easements held by the Minnesota Land Trust (MLT) on North Oaks Company (NOC) property. The projects presented in this memo provide a range of possibilities for implementation through the Section 319 grant program. It should be noted that because the designs are in the conceptual stage, they are subject to change depending on future permitting, funding, stakeholder engagement, and final design considerations. Alternatives for Project 1 will be submitted for the spring 2021 Section 319 funding cycle, which will cover final design and construction.

2.0 Background

NOC hired Barr to create conceptual designs for stormwater management projects to be implemented on the company property, including its easements held through the MLT. The goal of the projects is to improve water quality in Wilkinson Lake (downstream of NOC property) by reducing loading of nutrients and sediment. Wilkinson Lake is listed by the Minnesota Pollution Control Agency (MPCA) as impaired for excess nutrients (phosphorus). The Vadnais Lakes Area Watershed Management Organization (VLAWMO) has completed a TMDL and several feasibility studies to identify ways to reduce phosphorus loading from the direct drainage area to Wilkinson Lake (Wilkinson subwatershed). Most recently, VLAWMO began working with the MPCA and Environmental Protection Agency (EPA) to secure Section 319 grant funding for projects that will help remove Wilkinson Lake from the MPCA's impaired waters list. In its planning process, VLAWMO identified NOC as a major partner in accomplishing this goal; its holdings are located at a critical point in the Wilkinson subwatershed where the majority of runoff from the subwatershed flows through an agricultural ditch system (see Photo 1) before entering Wilkinson Lake. Water quality monitoring (conducted by VLAWMO) shows that the runoff in these ditches has high total phosphorus (TP) concentrations and makes up a significant portion of the loading to Wilkinson Lake. However, the monitoring data also suggests that the high pollutant concentration in the ditch is driven by loading from areas east of Centerville Road in the Birch and Tamarack Lake subwatersheds.

Barr worked with NOC and VLAWMO to create conceptual designs that met several shared goals and would help remove Wilkinson from the impaired waters list. The focus of these efforts is on the agricultural ditch that runs through NOC property and within the MLT's agricultural and conservation easements. By treating poor water quality in the ditch before it enters Wilkinson Lake, we can maximize water quality improvement. Centralizing the treatment along the ditch also provides an opportunity to restore degraded areas in the easements and increase recreational use through added trails and interactive design features.



Photo 1: Existing agricultural ditches and surrounding wetland

The following sections summarize the proposed conceptual designs as of March 2021 and next steps in the process of design and securing 319 funding.

3.0 Proposed Conceptual Design

This section outlines the proposed concept design. Alternative configurations for the three project components are included in the sections below.

The focus area of this project is located in the upstream wetland in the agricultural easement. The project would be implemented between the future Red Forest Way and Gate Hill development. Currently, there are several agricultural ditches that intersect in this location and drain the surrounding wetlands. These ditches also convey flow from eastern subwatersheds (Tamarack and Birch Lakes) to Wilkinson Lake. Below are details for three alternative configurations for the upstream pond. These alternative configurations are also shown on Figures 1 through 3. It should be noted that the final design may not reflect these exact configurations but would be located within the red boxes outlined on the figures.

Project 1a (Figure 1): A pond would be excavated in upland area outside of the wetland boundary. The existing ditch would be realigned adjacent to the pond to allow flows above baseflow to spill into the pond and add a meandering aesthetic.

Project 1b (Figure 2): A smaller pre-treatment basin would be excavated in-line with the ditch to treat baseflow and small event flow. A high flow bypass would be constructed to the west of the basin to reduce the impact of high flows in the basin (scour, sediment resuspension, etc.). The pre-treatment basin would discharge into an excavated wetland basin with a meandering flow path to add improved wetland habitat and a meandering aesthetic.

Project 1c (Figure 3): A large pond would be excavated in-line with the ditch to treat baseflow and small event flow. The pond excavation would remove existing agricultural ditches to improve

aesthetics in the area. A high flow bypass would be constructed to the west of the basin to reduce the impact of high flows in the basin (scour, sediment resuspension, etc.).

For Options 2 and 3, the proposed basin would be constructed in the wetland. Several agencies will likely require permitting prior to construction of these options, including the United States Army Corps of Engineers (USACE) and the Board of Water and Soil Resources (BWSR) under the Wetland Conservation Act (WCA). Regulated activities in the wetland may include filling (grading above existing wetland bottom), excavation, and functional change. Wetland mitigation (replacement, banking/credits purchase) may be needed depending on the functional assessment of the existing wetland area and the extent of impact determined by the regulatory agencies.

Below in Table 1 is a summary of pros, cons, and unknowns for the proposed upstream pond configurations. The unknowns will be investigated and resolved prior to final design. The shape and placement of the basins shown on Figures 1

Table 1. Pros and cons for upstream pond alternatives

Project Component	Pros	Cons	Unknowns
Project 1a: Upland Pond	<ul style="list-style-type: none"> Minimal work within the wetland 	<ul style="list-style-type: none"> High excavation costs Smaller water quality treatment (off-line basin) Need to establish maintenance access. More frequent maintenance relative to Project 1c 	<ul style="list-style-type: none"> Flow regime in the ditch for hydraulic design
Project 1b: Pre-treatment Basin and Wetland with Meander	<ul style="list-style-type: none"> Moderate water quality treatment Habitat creation Lower excavation costs 	<ul style="list-style-type: none"> Work within wetland Need to establish maintenance access More frequent maintenance relative to Project 1c 	<ul style="list-style-type: none"> Potentially complex wetland permitting Wetland soil types (i.e., deep peat layer may cause constructability issues) Existing wetland function (may impact complexity of permitting) Flow regime in the agricultural ditch (impacts hydraulic design)
Project 1c: In-line Pond	<ul style="list-style-type: none"> Significant water quality treatment Habitat creation Lower excavation costs 	<ul style="list-style-type: none"> Work within wetland Need to establish maintenance access 	<ul style="list-style-type: none"> Potentially complex wetland permitting Wetland soil types (i.e., deep peat layer may cause constructability issues) Existing wetland function (may impact complexity of permitting) Flow regime in the agricultural ditch (impacts hydraulic design)

4.0 Next Steps

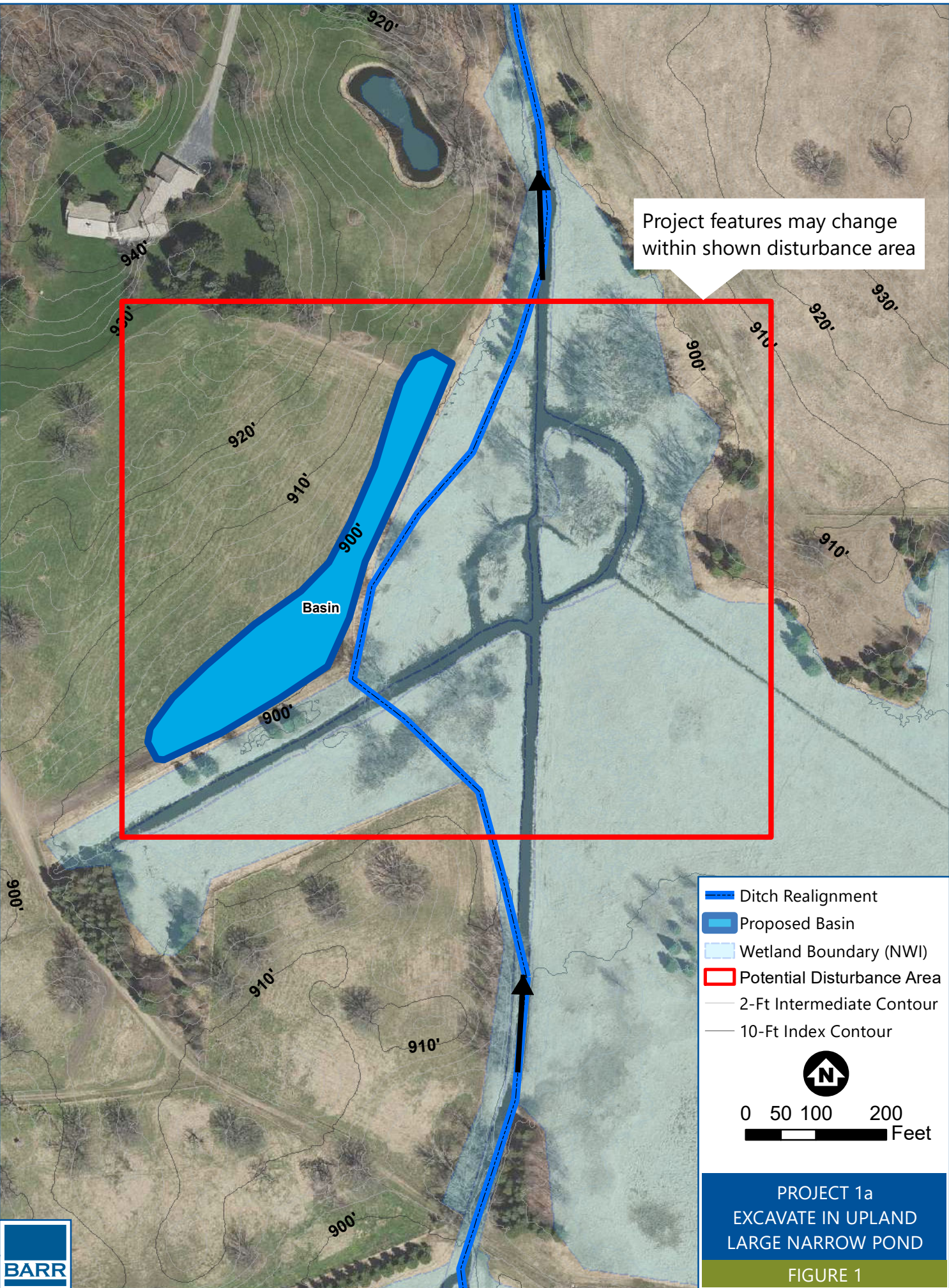
VLAWMO is in the process of securing Section 319 grant funding for the Wilkinson Lake subwatershed. The district was selected as a priority watershed to receive grant funding over the next 16 years. The first grant cycle will open late spring 2021, and subsequent cycles will open every four years following (2025, 2029, and 2033). Each grant cycle will have approximately \$540,000 in total grant funding available (for engineering, plans, specifications, and construction), with a required 40% local match.

In discussions with VLAWMO staff, the projects located on NOC property will be eligible for funding in any of the grant cycles. If funding is secured in 2021, design and construction of this project will most likely take place in 2022, based on the timeline of the distribution of funds. The activities outlined under each phase below are subject to change.

Prior to applying for funding in the spring 2021, the following activities will be accomplished:

- High-level pollutant-removal estimates
- Conceptual-level cost estimating
- Preparation of funding application
- Coordination with all stakeholders (NOC, VLAWMO, MLT, Saint Paul Regional Water Services)

The designs, pollutant-removal estimates, cost estimates, and approximate schedule will be shared with the VLAWMO board in April 2021 for approval. The RFP for the first round of funding will be announced in April 2021 and will remain open for 60 days, closing in June 2021.



- Ditch Realignment
- Proposed Basin
- Wetland Boundary (NWI)
- Potential Disturbance Area
- 2-Ft Intermediate Contour
- 10-Ft Index Contour

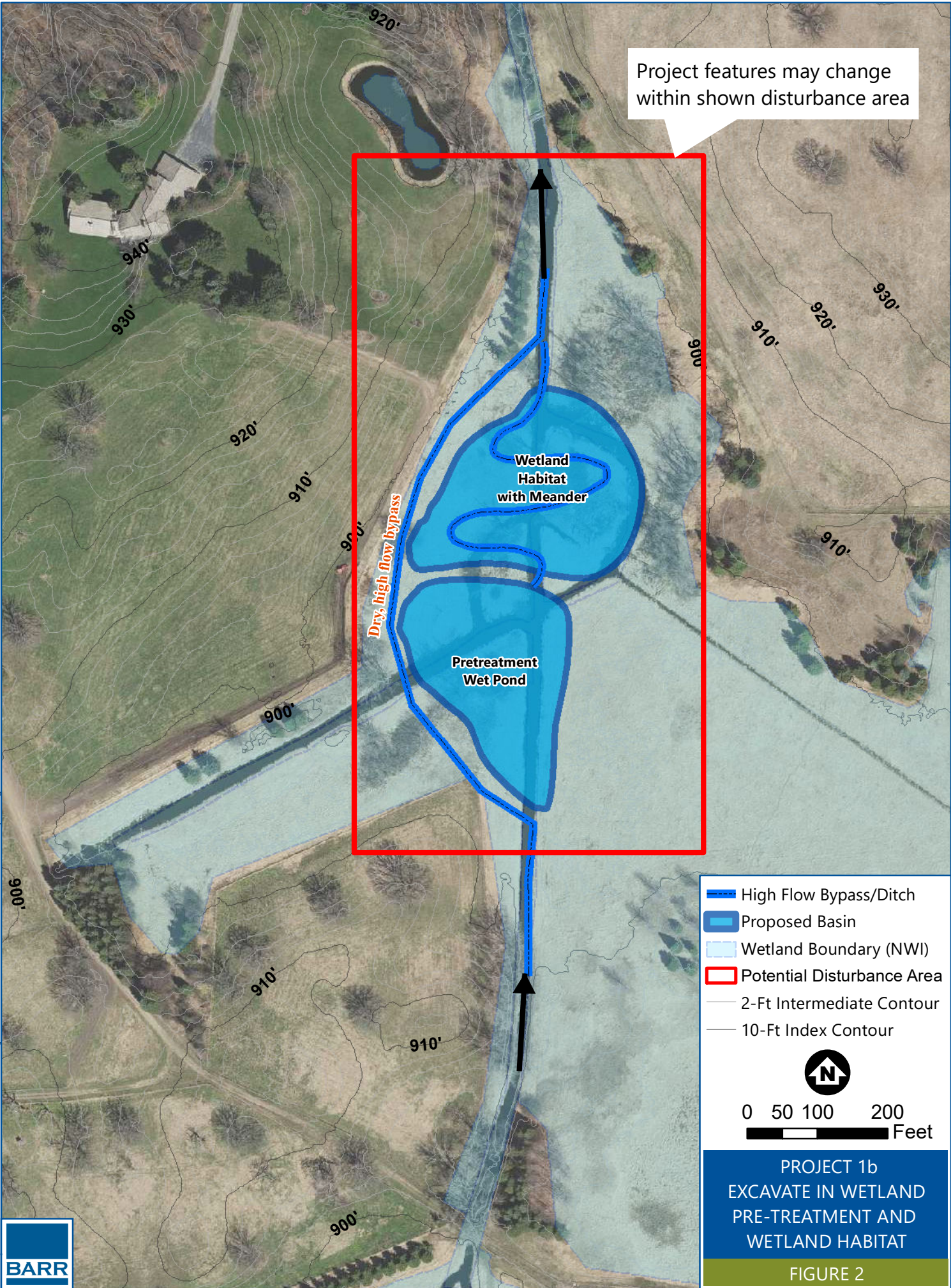
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0 50 100 200 Feet

PROJECT 1a
EXCAVATE IN UPLAND
LARGE NARROW POND

FIGURE 1

Project features may change within shown disturbance area



- High Flow Bypass/Ditch
- Proposed Basin
- Wetland Boundary (NWI)
- Potential Disturbance Area
- 2-Ft Intermediate Contour
- 10-Ft Index Contour

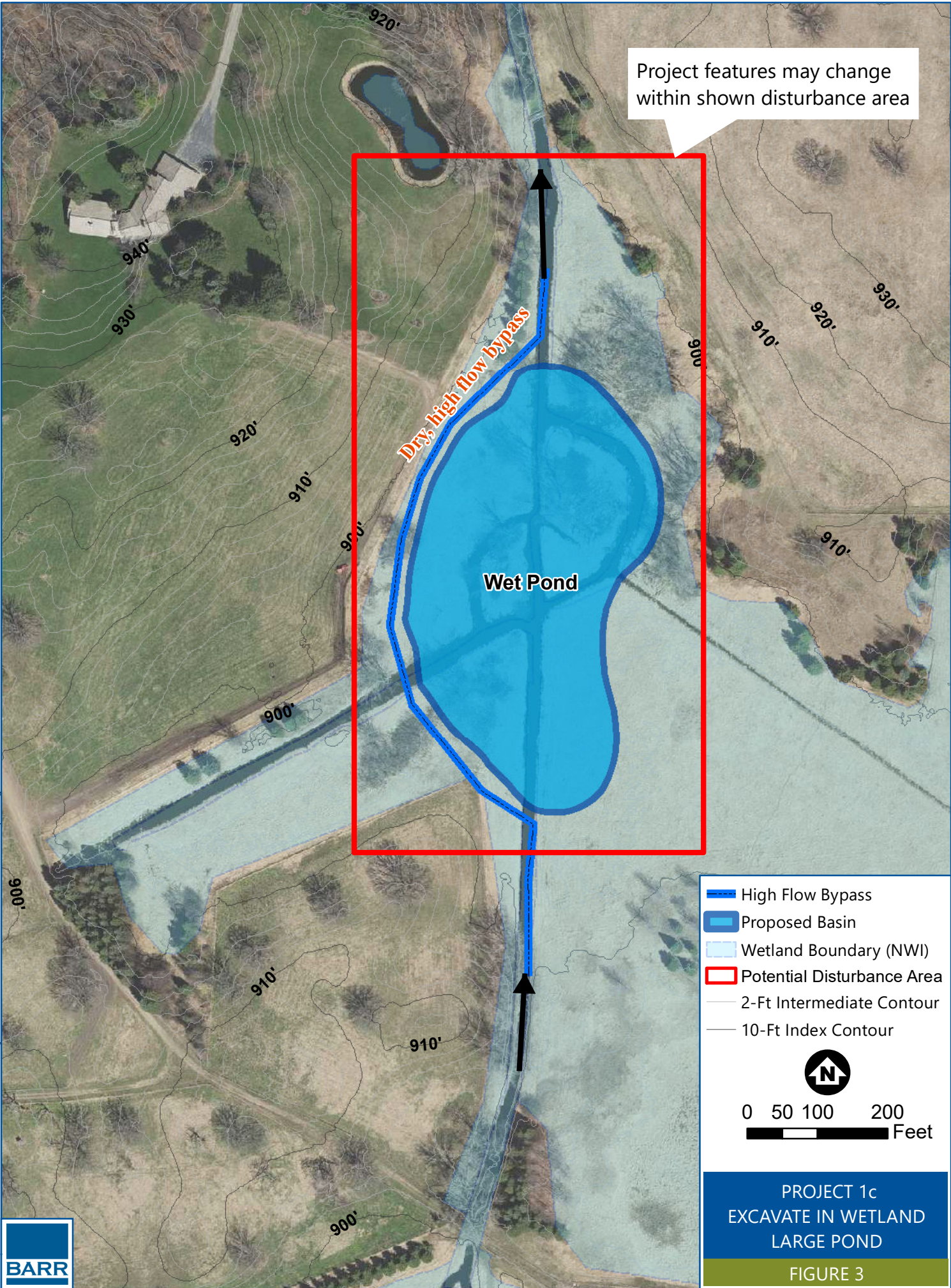


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**PROJECT 1b
EXCAVATE IN WETLAND
PRE-TREATMENT AND
WETLAND HABITAT**

FIGURE 2

Project features may change within shown disturbance area



- High Flow Bypass
- Proposed Basin
- Wetland Boundary (NWI)
- Potential Disturbance Area
- 2-Ft Intermediate Contour
- 10-Ft Index Contour

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PROJECT 1c
EXCAVATE IN WETLAND
LARGE POND
FIGURE 3