



7 November 2017

TECHNICAL MEMORANDUM

TO: Eric Earls, PE, City of Warwick **LOCATION:** Warwick, Rhode Island
FROM: Amy Hunt, PE, Project Manager **LOCATION:** EA Engineering, Science,
and Technology, Inc., PBC
SUBJECT: HEC-RAS Model for Buckeye Brook
Warwick, Rhode Island
EA Project No. 63172.01

1. INTRODUCTION

This memorandum has been prepared by EA Engineering, Science, and Technology, Inc., PBC (EA) on behalf of the City of Warwick to summarize the model inputs and outputs that have been developed for Buckeye Brook between Warwick Pond and the Warwick Avenue crossing. An existing conditions model was setup to approximate the current conditions of the brook, and two proposed conditions models were built to simulate proposed modifications to the brook.

Background

Buckeye Brook originates at Spring Green Pond in Warwick, Rhode Island, flows through Warwick Pond, and outlets at the Narragansett Bay via Apponaug Cove and Mill Cove Beach. The proposed project extends approximately 7,200 linear feet (ft), from Warwick Pond to Warwick Avenue, where the Brook flows under the roadway via a concrete box culvert. Channel widths vary, with the greatest width at the outlet of Warwick Pond and the least widths in places constricted by *Phragmites australis*. Judging from a comparison of 1997 aerial photography to 2016 aerial photography, channel widths have decreased. The significant expansion of stands of *Phragmites australis* was also noted in the August 2014 aerial photographs. Between 1997 and 2013, the horizontal location of Buckeye Brook did not appear to vary noticeably; however, historic aerial photographs, dating back to 1939, do make it apparent that sometime in the past a substantial meandering bend was cut off by a chute channel at the upstream end of the Brook.

Substantial development has occurred since this 1939 photographic benchmark, most notably the expansion of T.F. Green Airport and the increased density of residential structures. Both these intensifications in land use have likely increased stormwater runoff to Buckeye Brook, suggesting that an improvement in flow capacity might be necessary to prevent upstream flooding.

Geometric Data

EA collected cross section data from thirteen locations along Buckeye Brook, including five cross sections near the outlet of Warwick Pond (Figure 1 – attached). Other cross sections were collected in areas that were accessible, and provided representative cross sections of certain

reaches of the brook. Conditions immediately upstream and downstream of the Warwick Avenue culvert were also collected. Field staff observed the brook in the field between these locations, and determined that the thirteen cross could be collected. Additional data such as water depth, sediment depth, sediment composition, and prevalent vegetation was also collected at intervals across the width of the brook at each cross section location. Relevant data was input into the Hydraulic Engineering Center-River Analysis System (HEC-RAS) modeling software. Supplementary cross sections were interpolated between the measured cross sections to allow the program to calculate the water surface elevation and other parameters at additional locations along the brook. Manning’s n values are input for each cross section on the right bank, left bank, and channel area. Manning’s n values were selected to represent the existing surface features at the brook under current conditions. The Manning’s n values used for the Buckeye Brook model include:

- 0.03 for compacted soil areas, no vegetation or rocks
- 0.048 for winding areas with ineffective slopes, pools, and weeds
- 0.08 for banks where large trees or brush obstructed flow
- 0.12 for thick mats of *Phragmites australis*.

Some areas, such as thick *Phragmites australis* vegetation, are obstructed sufficiently enough to create ineffective flow areas. These banks will store water, but the flow only occurs in a narrow area near the center of the channel where *Phragmites australis* is not present. Ineffective flow areas were entered in those cross sections. Figure 2 provides an example of the ineffective flow area at Cross Section G-G’ from the existing conditions model.

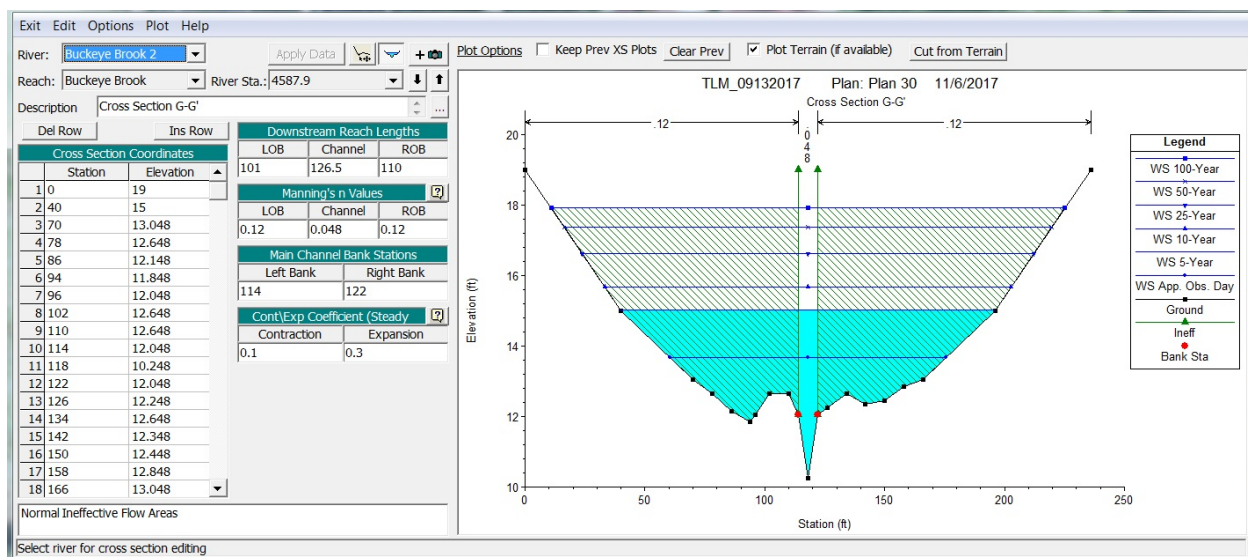


Figure 2 Cross Section G-G’ Input Data and Diagram

The flow inputs used in the model were developed from available information from the United States Geographic Survey StreamStats program (2017). Four locations spaced throughout the length of Buckeye Brook were selected within StreamStats, and the output flow values for the 100-Year, 50-Year, 25-Year, 10-Year, and 5-Year flow were used. In addition, the water surface elevation from the field event was used to approximate the flows observed on that day to represent an observed average-high flow. This is represented by the approximate observed day flow (App. Obs. Day). Figure 3 depicts the flow data used in the model and the input location along the brook.

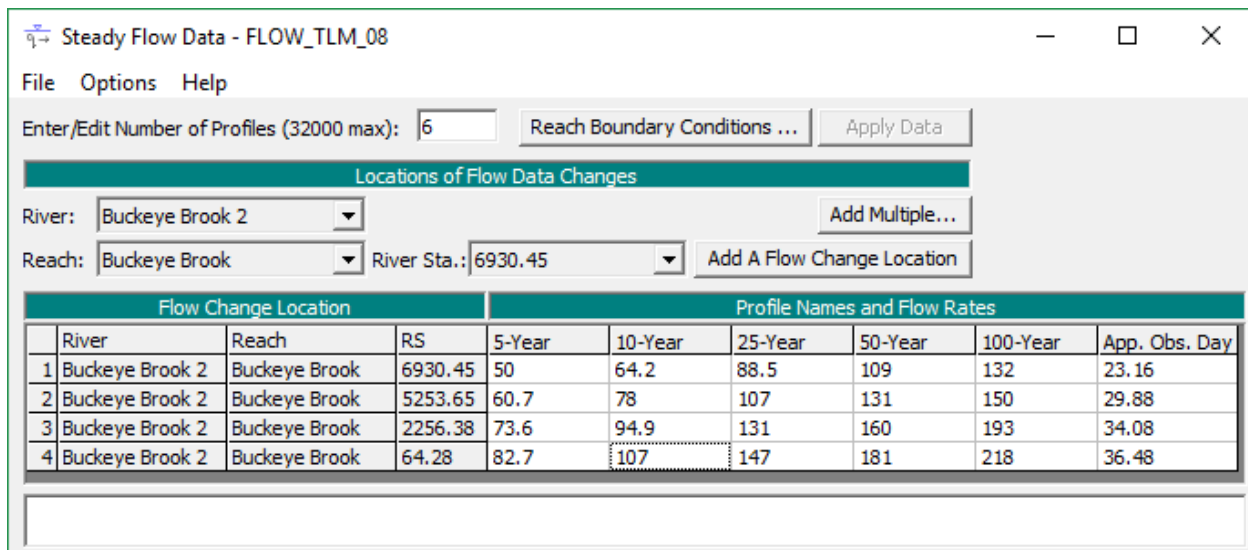


Figure 3 Flow Input Data

Proposed Conditions

Two scenarios were considered for the proposed condition based on feedback from stakeholders.

Scenario 1

The first scenario includes the elimination of *Phragmites australis* from within the brook and banks, approximately 470 feet upstream and 450 feet downstream of Cross Section G-G’ (Conceptual *Phragmites australis* Removal, attached). This was accomplished within the model by removing the ineffective flow area and revising the Manning’s n values to 0.048 (as opposed to 0.12). It has been conservatively assumed that mechanical removal of *Phragmites australis* will result in a 2-foot reduction in channel bottom elevation due to the mean depth of plant rhizomes and roots (i.e. root mat). The total volume of material removed (plant material and sediment within the root mat) is approximately 4,900 CY. Figure 4 depicts Cross Section G-G’ under scenario 1 with *Phragmites australis* removal. Results from this alternative are discussed below.

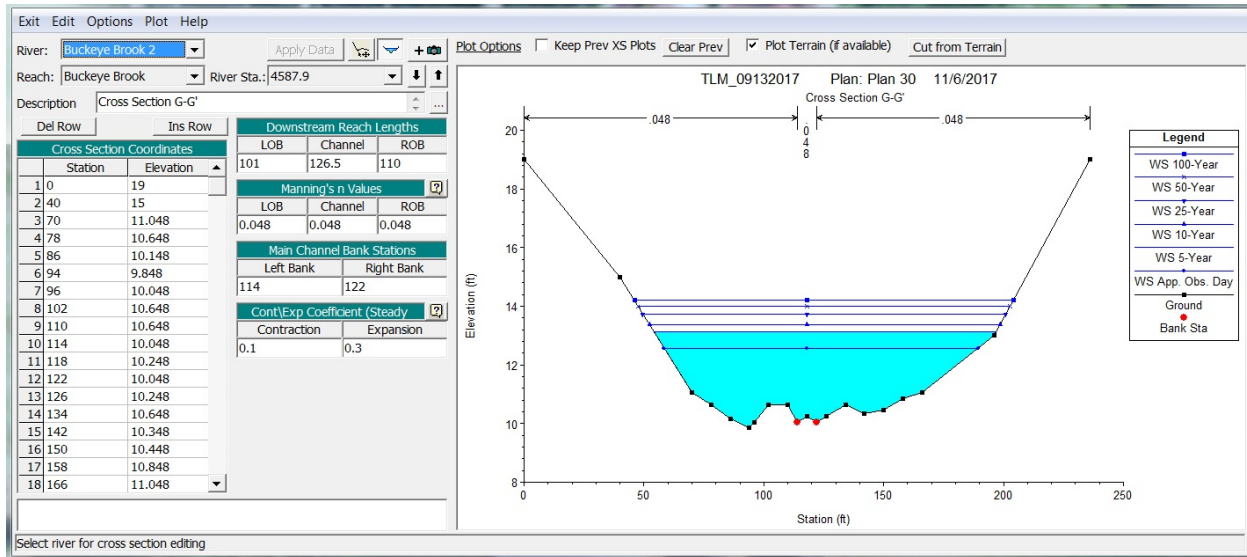


Figure 4 Phragmites australis Removal Scenario Cross Section G-G'

Scenario 2

The second scenario considered removal of the *Phragmites australis*, inclusive of the removal of the associated root mat identical to scenario 1, and additional excavation of sediment within the channel. The total volume of material removed (root mat, sediment within the root mat and sediment from the center of the channel) is 5,270 CY. The new elevation of the channel would be equivalent to the elevation of the adjacent banks where *Phragmites australis* has been removed to allow flow through the system in a greater volume than under previous conditions. Figure 5 depicts Cross Section G-G' under scenario 2, with *Phragmites australis* removal and channel modification.

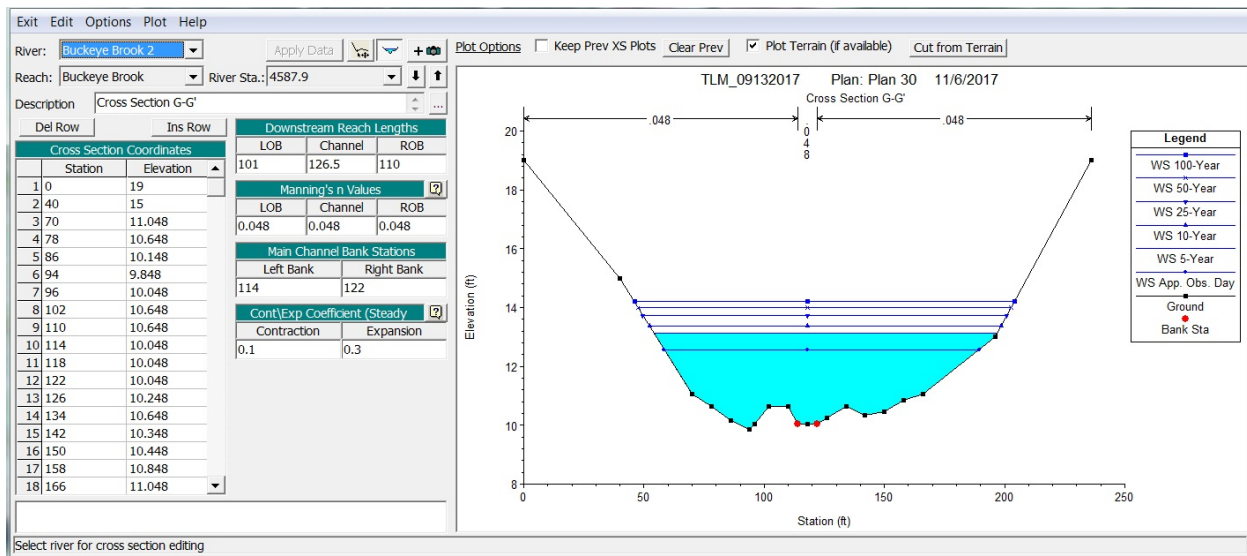


Figure 5 Phragmites australis Removal and Channel Modification Scenario Cross Section G-G'



Results

Under both scenarios, the water surface elevation is reduced at the Warwick Pond outlet. The model indicates that the scenario 2 channel modification does not significantly reduce water levels beyond the scenario 1 removal of *Phragmites australis*. Table 1 presents the data from Cross Section A-A' (located at the Warwick Pond outlet).

Table 1 Results for Cross Section A-A'

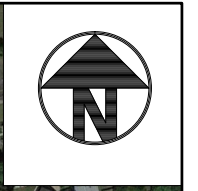
| Flow Event | Existing Conditions (Water Surface El.) | Phragmites australis Removal (Water Surface El.) | Phragmites australis Removal/ Channel Modification (Water Surface El.) |
|--------------------------|--|---|---|
| Approximate Observed Day | 13.81 | 12.73 | 12.73 |
| 5-Year | 15.21 | 13.40 | 13.40 |
| 10-Year | 15.86 | 13.69 | 13.69 |
| 25-Year | 16.85 | 14.12 | 14.11 |
| 50-Year | 17.61 | 14.43 | 14.42 |
| 100-Year | 18.17 | 14.69 | 14.69 |

Profiles of the brook under all three model runs are included as Attachment A. The full data table of outputs are included as Attachment B.

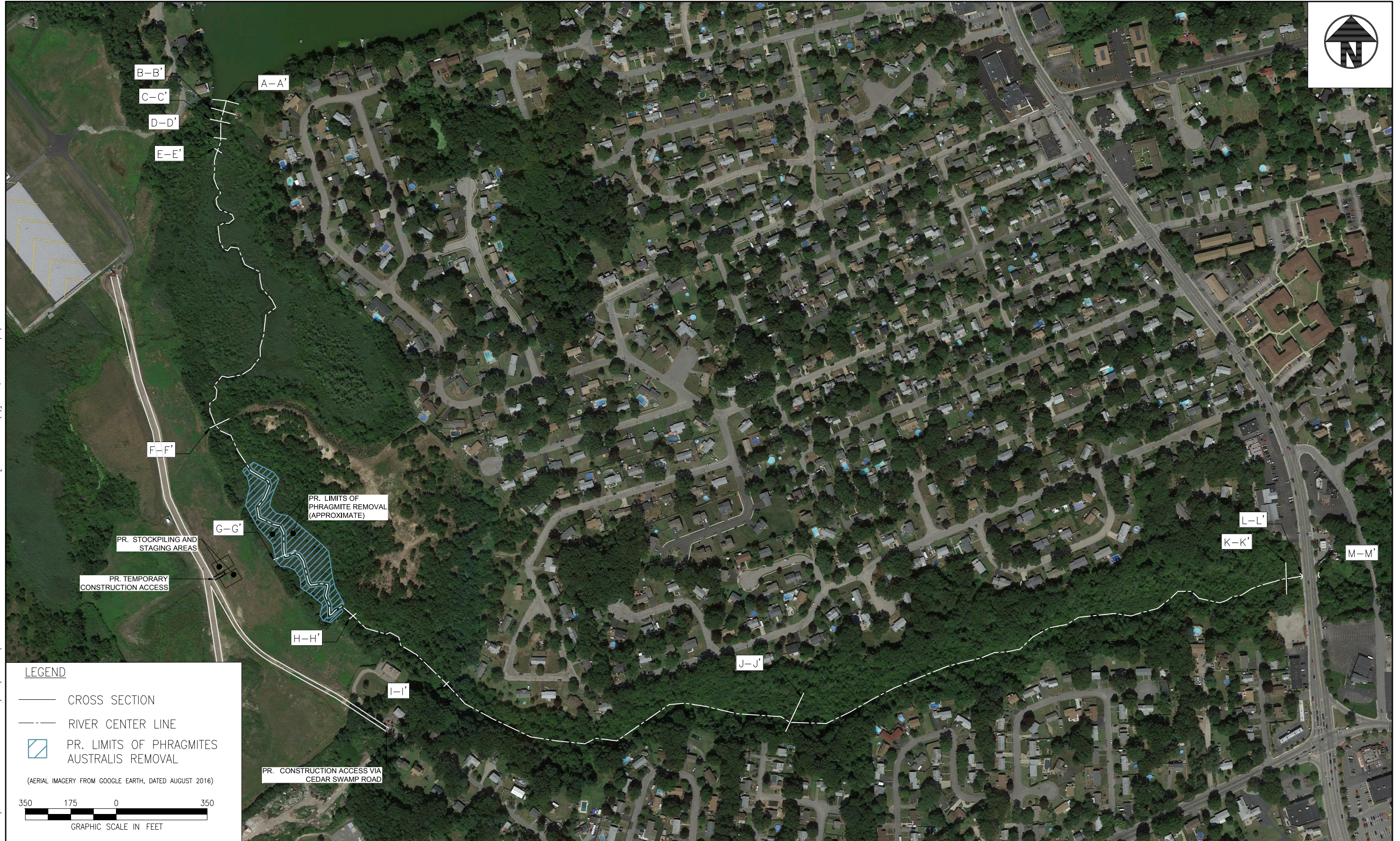
If you have any questions or require additional information, please do not hesitate to contact me at 401-287-0365.

AH/tlm
Attachments

Figure 1



FILE PATH: W:\PROJECTS\63172.01 - BUCKEYE BROOK\CAD\FIGURES\63172.01 - BUCKEYEBROOK-AERIAL FIGURES.DWG [2] TYCE, ASHLEE 11/7/2017 11:12 AM



LEGEND

- CROSS SECTION
- - - RIVER CENTER LINE
- PR. LIMITS OF PHRAGMITES AUSTRALIS REMOVAL

(AERIAL IMAGERY FROM GOOGLE EARTH, DATED AUGUST 2016)

350 175 0 350
GRAPHIC SCALE IN FEET



BUCKEYE BROOK
CITY OF WARWICK DEPARTMENT OF PUBLIC WORKS
WARWICK, RHODE ISLAND

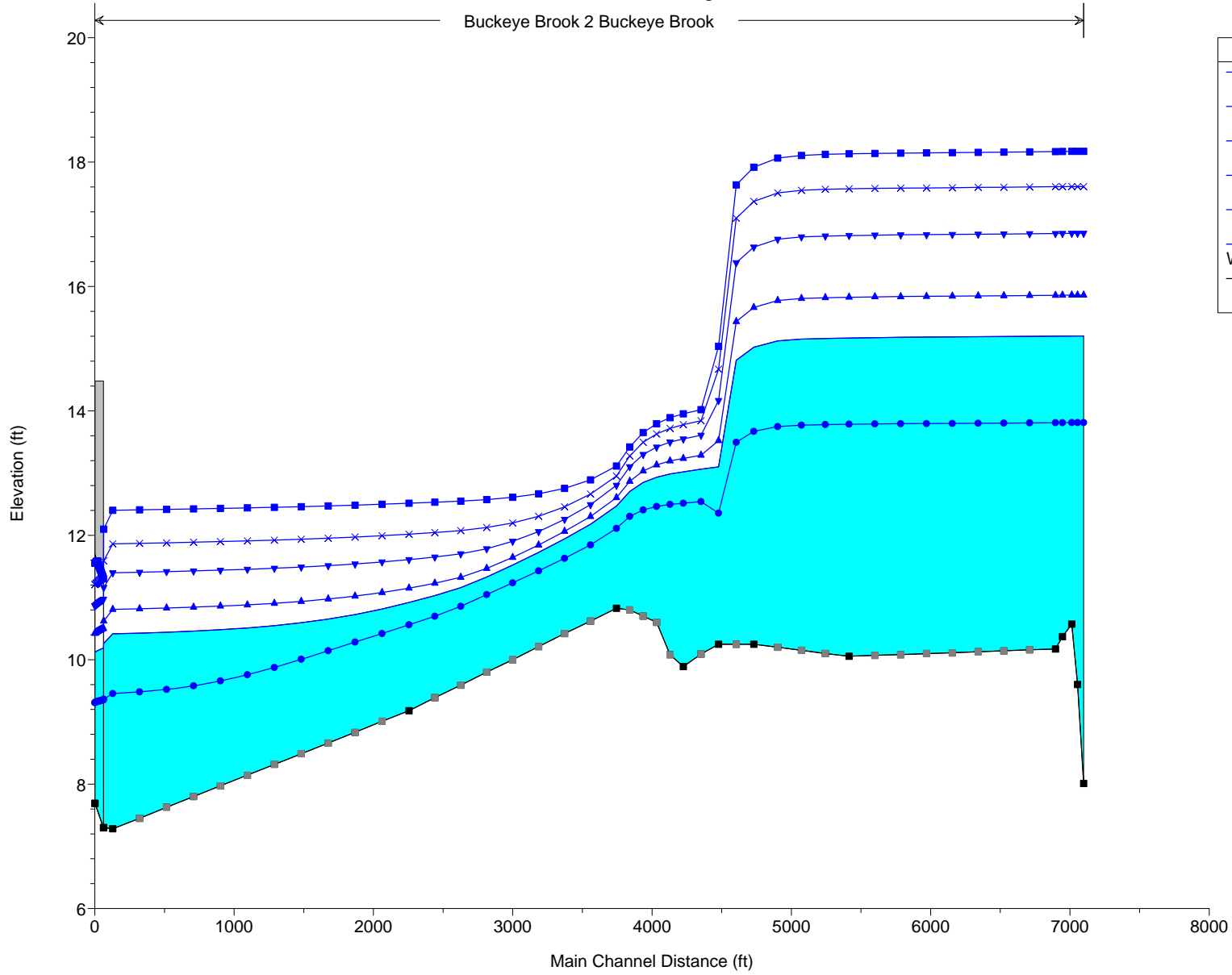
CONCEPTUAL LIMITS OF PHRAGMITES REMOVAL

| | | | |
|-----------------------------|---------------------|----------------------|-------------------------|
| PROJECT NUMBER: 63172.01 | DESIGNED BY: DTC | DRAWN BY: DPA | FIGURE: 1 |
| DATE: NOVEMBER 2017 | CHECKED BY: AEH | PROJECT MGR.: AEH | SHEET NUMBER: 1 OF 1 |

Attachment A
Exhibits

TLM_09132017 Plan: Existing Conditions AMT 11/6/2017

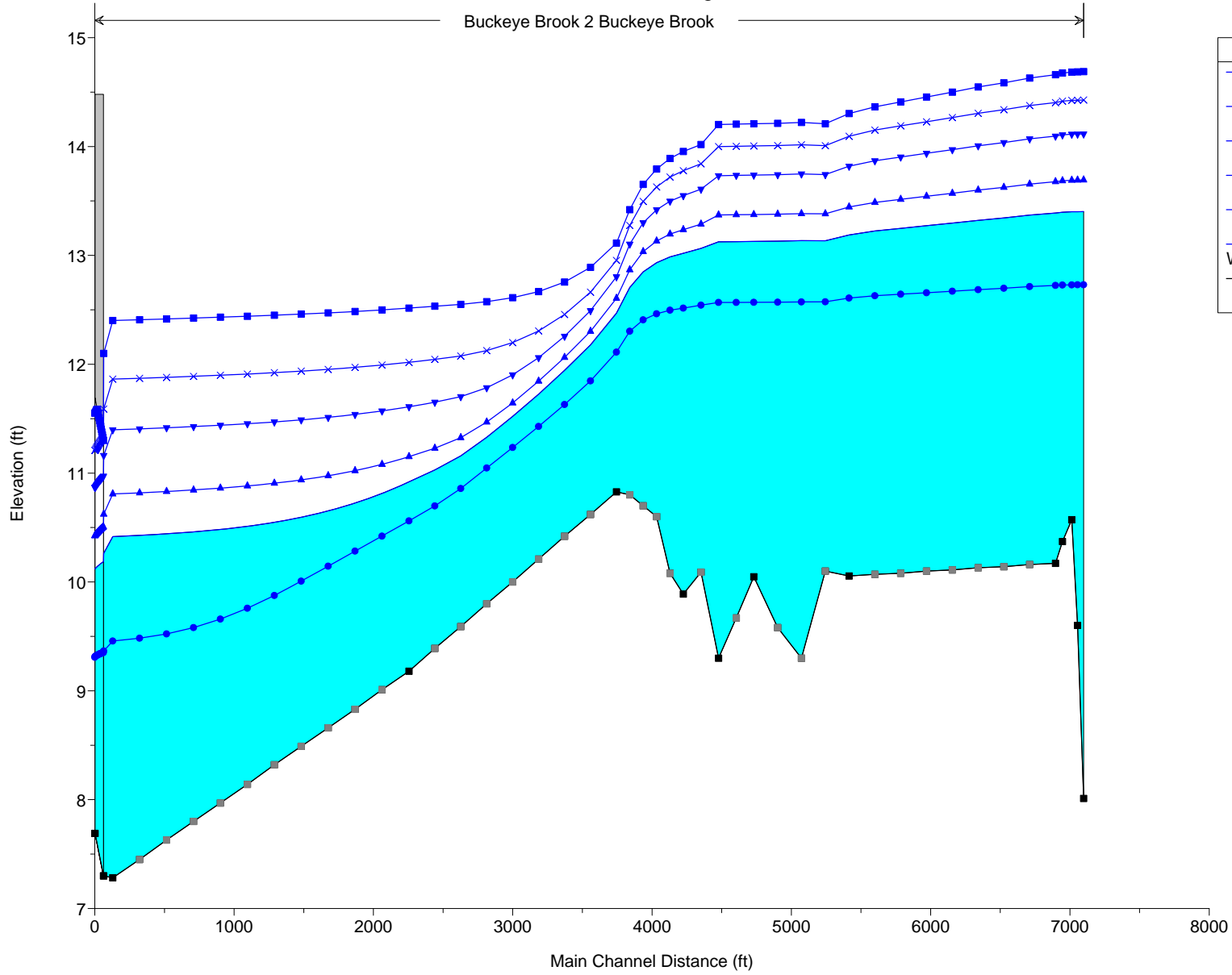
Buckeye Brook 2 Buckeye Brook



| Legend | |
|------------------|---|
| WS 100-Year | ■ |
| WS 50-Year | × |
| WS 25-Year | ▼ |
| WS 10-Year | ▲ |
| WS 5-Year | ● |
| WS App. Obs. Day | ■ |
| Ground | ■ |

TLM_09132017 Plan: Phrag Removal AMT 11/6/2017

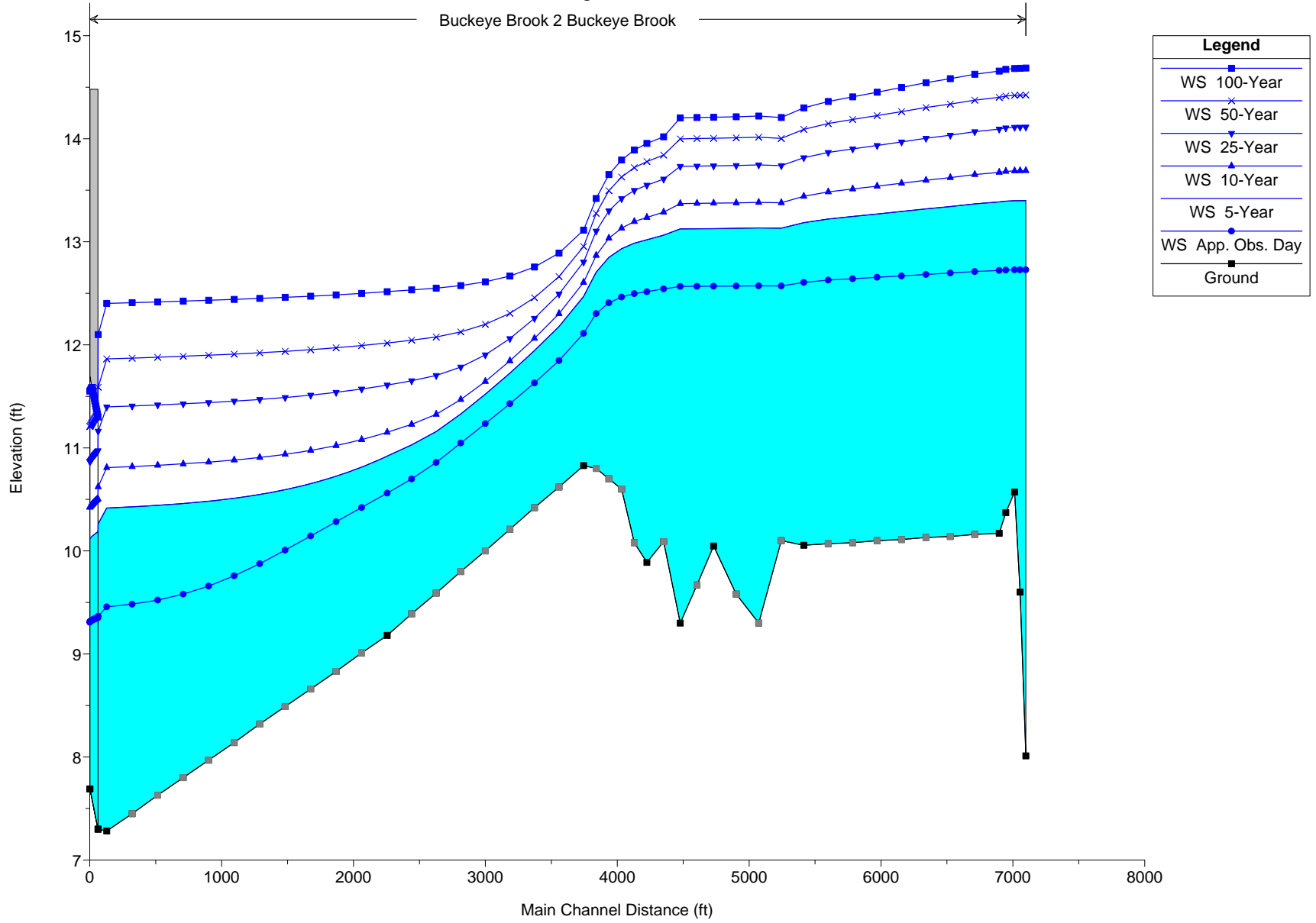
Buckeye Brook 2 Buckeye Brook



| Legend | |
|------------------|---|
| WS 100-Year | ■ |
| WS 50-Year | × |
| WS 25-Year | ▼ |
| WS 10-Year | ▲ |
| WS 5-Year | ● |
| WS App. Obs. Day | ■ |
| Ground | ■ |

TLM_09132017 Plan: Phrag Removal and Channel Mod AMT 11/6/2017

Buckeye Brook 2 Buckeye Brook



Attachment B
Output Data Tables

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| A-A' | 6930.45 | 5-Year | 50 | 8.01 | 15.21 | 50 | 8.01 | 13.4 | -1.81 | 50 | 8.01 | 13.4 | -1.81 |
| | 6930.45 | 10-Year | 64.2 | 8.01 | 15.86 | 64.2 | 8.01 | 13.69 | -2.17 | 64.2 | 8.01 | 13.69 | -2.17 |
| | 6930.45 | 25-Year | 88.5 | 8.01 | 16.85 | 88.5 | 8.01 | 14.12 | -2.73 | 88.5 | 8.01 | 14.11 | -2.74 |
| | 6930.45 | 50-Year | 109 | 8.01 | 17.61 | 109 | 8.01 | 14.43 | -3.18 | 109 | 8.01 | 14.42 | -3.19 |
| | 6930.45 | 100-Year | 132 | 8.01 | 18.17 | 132 | 8.01 | 14.69 | -3.48 | 132 | 8.01 | 14.69 | -3.48 |
| | 6930.45 | App. Obs. Day | 23.16 | 8.01 | 13.81 | 23.16 | 8.01 | 12.73 | -1.08 | 23.16 | 8.01 | 12.73 | -1.08 |
| B-B' | 6883.36 | 5-Year | 50 | 9.6 | 15.2 | 50 | 9.6 | 13.4 | -1.8 | 50 | 9.6 | 13.4 | -1.8 |
| | 6883.36 | 10-Year | 64.2 | 9.6 | 15.86 | 64.2 | 9.6 | 13.69 | -2.17 | 64.2 | 9.6 | 13.69 | -2.17 |
| | 6883.36 | 25-Year | 88.5 | 9.6 | 16.85 | 88.5 | 9.6 | 14.11 | -2.74 | 88.5 | 9.6 | 14.11 | -2.74 |
| | 6883.36 | 50-Year | 109 | 9.6 | 17.61 | 109 | 9.6 | 14.43 | -3.18 | 109 | 9.6 | 14.42 | -3.19 |
| | 6883.36 | 100-Year | 132 | 9.6 | 18.17 | 132 | 9.6 | 14.69 | -3.48 | 132 | 9.6 | 14.68 | -3.49 |
| | 6883.36 | App. Obs. Day | 23.16 | 9.6 | 13.81 | 23.16 | 9.6 | 12.73 | -1.08 | 23.16 | 9.6 | 12.73 | -1.08 |
| C-C' | 6844.89 | 5-Year | 50 | 10.57 | 15.2 | 50 | 10.57 | 13.4 | -1.8 | 50 | 10.57 | 13.4 | -1.8 |
| | 6844.89 | 10-Year | 64.2 | 10.57 | 15.86 | 64.2 | 10.57 | 13.69 | -2.17 | 64.2 | 10.57 | 13.69 | -2.17 |
| | 6844.89 | 25-Year | 88.5 | 10.57 | 16.85 | 88.5 | 10.57 | 14.11 | -2.74 | 88.5 | 10.57 | 14.11 | -2.74 |
| | 6844.89 | 50-Year | 109 | 10.57 | 17.61 | 109 | 10.57 | 14.42 | -3.19 | 109 | 10.57 | 14.42 | -3.19 |
| | 6844.89 | 100-Year | 132 | 10.57 | 18.17 | 132 | 10.57 | 14.68 | -3.49 | 132 | 10.57 | 14.68 | -3.49 |
| | 6844.89 | App. Obs. Day | 23.16 | 10.57 | 13.81 | 23.16 | 10.57 | 12.73 | -1.08 | 23.16 | 10.57 | 12.73 | -1.08 |
| D-D' | 6776.36 | 5-Year | 50 | 10.37 | 15.2 | 50 | 10.37 | 13.4 | -1.8 | 50 | 10.37 | 13.39 | -1.81 |
| | 6776.36 | 10-Year | 64.2 | 10.37 | 15.86 | 64.2 | 10.37 | 13.69 | -2.17 | 64.2 | 10.37 | 13.68 | -2.18 |
| | 6776.36 | 25-Year | 88.5 | 10.37 | 16.85 | 88.5 | 10.37 | 14.11 | -2.74 | 88.5 | 10.37 | 14.1 | -2.75 |
| | 6776.36 | 50-Year | 109 | 10.37 | 17.61 | 109 | 10.37 | 14.42 | -3.19 | 109 | 10.37 | 14.41 | -3.2 |
| | 6776.36 | 100-Year | 132 | 10.37 | 18.17 | 132 | 10.37 | 14.68 | -3.49 | 132 | 10.37 | 14.67 | -3.5 |
| | 6776.36 | App. Obs. Day | 23.16 | 10.37 | 13.81 | 23.16 | 10.37 | 12.73 | -1.08 | 23.16 | 10.37 | 12.73 | -1.08 |
| E-E' | 6719.31 | 5-Year | 50 | 10.17 | 15.2 | 50 | 10.17 | 13.39 | -1.81 | 50 | 10.17 | 13.39 | -1.81 |
| | 6719.31 | 10-Year | 64.2 | 10.17 | 15.86 | 64.2 | 10.17 | 13.68 | -2.18 | 64.2 | 10.17 | 13.67 | -2.19 |
| | 6719.31 | 25-Year | 88.5 | 10.17 | 16.85 | 88.5 | 10.17 | 14.1 | -2.75 | 88.5 | 10.17 | 14.09 | -2.76 |
| | 6719.31 | 50-Year | 109 | 10.17 | 17.6 | 109 | 10.17 | 14.4 | -3.2 | 109 | 10.17 | 14.4 | -3.2 |
| | 6719.31 | 100-Year | 132 | 10.17 | 18.17 | 132 | 10.17 | 14.66 | -3.51 | 132 | 10.17 | 14.66 | -3.51 |
| | 6719.31 | App. Obs. Day | 23.16 | 10.17 | 13.81 | 23.16 | 10.17 | 12.72 | -1.09 | 23.16 | 10.17 | 12.72 | -1.09 |
| F-F' | 6536.10* | 5-Year | 50 | 10.16 | 15.2 | 50 | 10.16 | 13.37 | -1.83 | 50 | 10.16 | 13.37 | -1.83 |
| | 6536.10* | 10-Year | 64.2 | 10.16 | 15.86 | 64.2 | 10.16 | 13.65 | -2.21 | 64.2 | 10.16 | 13.65 | -2.21 |
| | 6536.10* | 25-Year | 88.5 | 10.16 | 16.85 | 88.5 | 10.16 | 14.07 | -2.78 | 88.5 | 10.16 | 14.07 | -2.78 |
| | 6536.10* | 50-Year | 109 | 10.16 | 17.6 | 109 | 10.16 | 14.38 | -3.22 | 109 | 10.16 | 14.37 | -3.23 |
| | 6536.10* | 100-Year | 132 | 10.16 | 18.16 | 132 | 10.16 | 14.63 | -3.53 | 132 | 10.16 | 14.63 | -3.53 |
| | 6536.10* | App. Obs. Day | 23.16 | 10.16 | 13.81 | 23.16 | 10.16 | 12.71 | -1.1 | 23.16 | 10.16 | 12.71 | -1.1 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| G-G' | 6352.90* | 5-Year | 50 | 10.14 | 15.2 | 50 | 10.14 | 13.34 | -1.86 | 50 | 10.14 | 13.34 | -1.86 |
| | 6352.90* | 10-Year | 64.2 | 10.14 | 15.85 | 64.2 | 10.14 | 13.63 | -2.22 | 64.2 | 10.14 | 13.62 | -2.23 |
| | 6352.90* | 25-Year | 88.5 | 10.14 | 16.84 | 88.5 | 10.14 | 14.04 | -2.8 | 88.5 | 10.14 | 14.03 | -2.81 |
| | 6352.90* | 50-Year | 109 | 10.14 | 17.6 | 109 | 10.14 | 14.34 | -3.26 | 109 | 10.14 | 14.34 | -3.26 |
| | 6352.90* | 100-Year | 132 | 10.14 | 18.16 | 132 | 10.14 | 14.59 | -3.57 | 132 | 10.14 | 14.58 | -3.58 |
| | 6352.90* | App. Obs. Day | 23.16 | 10.14 | 13.8 | 23.16 | 10.14 | 12.7 | -1.1 | 23.16 | 10.14 | 12.7 | -1.1 |
| H-H' | 6169.69* | 5-Year | 50 | 10.13 | 15.19 | 50 | 10.13 | 13.32 | -1.87 | 50 | 10.13 | 13.32 | -1.87 |
| | 6169.69* | 10-Year | 64.2 | 10.13 | 15.85 | 64.2 | 10.13 | 13.6 | -2.25 | 64.2 | 10.13 | 13.6 | -2.25 |
| | 6169.69* | 25-Year | 88.5 | 10.13 | 16.84 | 88.5 | 10.13 | 14.01 | -2.83 | 88.5 | 10.13 | 14 | -2.84 |
| | 6169.69* | 50-Year | 109 | 10.13 | 17.59 | 109 | 10.13 | 14.31 | -3.28 | 109 | 10.13 | 14.3 | -3.29 |
| | 6169.69* | 100-Year | 132 | 10.13 | 18.16 | 132 | 10.13 | 14.55 | -3.61 | 132 | 10.13 | 14.54 | -3.62 |
| | 6169.69* | App. Obs. Day | 23.16 | 10.13 | 13.8 | 23.16 | 10.13 | 12.68 | -1.12 | 23.16 | 10.13 | 12.68 | -1.12 |
| I-I' | 5986.48* | 5-Year | 50 | 10.11 | 15.19 | 50 | 10.11 | 13.3 | -1.89 | 50 | 10.11 | 13.29 | -1.9 |
| | 5986.48* | 10-Year | 64.2 | 10.11 | 15.84 | 64.2 | 10.11 | 13.57 | -2.27 | 64.2 | 10.11 | 13.57 | -2.27 |
| | 5986.48* | 25-Year | 88.5 | 10.11 | 16.84 | 88.5 | 10.11 | 13.97 | -2.87 | 88.5 | 10.11 | 13.97 | -2.87 |
| | 5986.48* | 50-Year | 109 | 10.11 | 17.59 | 109 | 10.11 | 14.27 | -3.32 | 109 | 10.11 | 14.26 | -3.33 |
| | 5986.48* | 100-Year | 132 | 10.11 | 18.15 | 132 | 10.11 | 14.5 | -3.65 | 132 | 10.11 | 14.5 | -3.65 |
| | 5986.48* | App. Obs. Day | 23.16 | 10.11 | 13.8 | 23.16 | 10.11 | 12.67 | -1.13 | 23.16 | 10.11 | 12.67 | -1.13 |
| | 5803.27* | 5-Year | 50 | 10.1 | 15.19 | 50 | 10.1 | 13.27 | -1.92 | 50 | 10.1 | 13.27 | -1.92 |
| | 5803.27* | 10-Year | 64.2 | 10.1 | 15.84 | 64.2 | 10.1 | 13.54 | -2.3 | 64.2 | 10.1 | 13.54 | -2.3 |
| | 5803.27* | 25-Year | 88.5 | 10.1 | 16.83 | 88.5 | 10.1 | 13.94 | -2.89 | 88.5 | 10.1 | 13.93 | -2.9 |
| | 5803.27* | 50-Year | 109 | 10.1 | 17.58 | 109 | 10.1 | 14.23 | -3.35 | 109 | 10.1 | 14.22 | -3.36 |
| | 5803.27* | 100-Year | 132 | 10.1 | 18.15 | 132 | 10.1 | 14.45 | -3.7 | 132 | 10.1 | 14.45 | -3.7 |
| | 5803.27* | App. Obs. Day | 23.16 | 10.1 | 13.8 | 23.16 | 10.1 | 12.66 | -1.14 | 23.16 | 10.1 | 12.65 | -1.15 |
| | 5620.07* | 5-Year | 50 | 10.08 | 15.18 | 50 | 10.08 | 13.25 | -1.93 | 50 | 10.08 | 13.25 | -1.93 |
| | 5620.07* | 10-Year | 64.2 | 10.08 | 15.84 | 64.2 | 10.08 | 13.51 | -2.33 | 64.2 | 10.08 | 13.51 | -2.33 |
| | 5620.07* | 25-Year | 88.5 | 10.08 | 16.83 | 88.5 | 10.08 | 13.9 | -2.93 | 88.5 | 10.08 | 13.9 | -2.93 |
| | 5620.07* | 50-Year | 109 | 10.08 | 17.58 | 109 | 10.08 | 14.19 | -3.39 | 109 | 10.08 | 14.19 | -3.39 |
| | 5620.07* | 100-Year | 132 | 10.08 | 18.14 | 132 | 10.08 | 14.41 | -3.73 | 132 | 10.08 | 14.41 | -3.73 |
| | 5620.07* | App. Obs. Day | 23.16 | 10.08 | 13.79 | 23.16 | 10.08 | 12.64 | -1.15 | 23.16 | 10.08 | 12.64 | -1.15 |
| | 5436.86* | 5-Year | 50 | 10.07 | 15.18 | 50 | 10.07 | 13.22 | -1.96 | 50 | 10.07 | 13.22 | -1.96 |
| | 5436.86* | 10-Year | 64.2 | 10.07 | 15.83 | 64.2 | 10.07 | 13.49 | -2.34 | 64.2 | 10.07 | 13.48 | -2.35 |
| | 5436.86* | 25-Year | 88.5 | 10.07 | 16.83 | 88.5 | 10.07 | 13.87 | -2.96 | 88.5 | 10.07 | 13.87 | -2.96 |
| | 5436.86* | 50-Year | 109 | 10.07 | 17.58 | 109 | 10.07 | 14.15 | -3.43 | 109 | 10.07 | 14.15 | -3.43 |
| | 5436.86* | 100-Year | 132 | 10.07 | 18.14 | 132 | 10.07 | 14.36 | -3.78 | 132 | 10.07 | 14.36 | -3.78 |
| | 5436.86* | App. Obs. Day | 23.16 | 10.07 | 13.79 | 23.16 | 10.07 | 12.63 | -1.16 | 23.16 | 10.07 | 12.63 | -1.16 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| F-F' | 5253.65 | 5-Year | 60.7 | 10.06 | 15.17 | 60.7 | 10.06 | 13.19 | -1.98 | 60.7 | 10.06 | 13.19 | -1.98 |
| | 5253.65 | 10-Year | 78 | 10.06 | 15.83 | 78 | 10.06 | 13.44 | -2.39 | 78 | 10.06 | 13.44 | -2.39 |
| | 5253.65 | 25-Year | 107 | 10.06 | 16.82 | 107 | 10.06 | 13.82 | -3 | 107 | 10.06 | 13.82 | -3 |
| | 5253.65 | 50-Year | 131 | 10.06 | 17.57 | 131 | 10.06 | 14.09 | -3.48 | 131 | 10.06 | 14.09 | -3.48 |
| | 5253.65 | 100-Year | 150 | 10.06 | 18.13 | 150 | 10.06 | 14.3 | -3.83 | 150 | 10.06 | 14.3 | -3.83 |
| | 5253.65 | App. Obs. Day | 29.88 | 10.06 | 13.79 | 29.88 | 10.06 | 12.61 | -1.18 | 29.88 | 10.06 | 12.61 | -1.18 |
| | 5087.21* | 5-Year | 60.7 | 10.1 | 15.17 | 60.7 | 10.1 | 13.13 | -2.04 | 60.7 | 10.1 | 13.13 | -2.04 |
| | 5087.21* | 10-Year | 78 | 10.1 | 15.82 | 78 | 10.1 | 13.38 | -2.44 | 78 | 10.1 | 13.38 | -2.44 |
| | 5087.21* | 25-Year | 107 | 10.1 | 16.81 | 107 | 10.1 | 13.74 | -3.07 | 107 | 10.1 | 13.74 | -3.07 |
| | 5087.21* | 50-Year | 131 | 10.1 | 17.56 | 131 | 10.1 | 14.01 | -3.55 | 131 | 10.1 | 14 | -3.56 |
| | 5087.21* | 100-Year | 150 | 10.1 | 18.12 | 150 | 10.1 | 14.21 | -3.91 | 150 | 10.1 | 14.21 | -3.91 |
| | 5087.21* | App. Obs. Day | 29.88 | 10.1 | 13.78 | 29.88 | 10.1 | 12.57 | -1.21 | 29.88 | 10.1 | 12.57 | -1.21 |
| | 4920.78* | 5-Year | 60.7 | 10.15 | 15.15 | 60.7 | 9.3 | 13.14 | -2.01 | 60.7 | 9.3 | 13.13 | -2.02 |
| | 4920.78* | 10-Year | 78 | 10.15 | 15.81 | 78 | 9.3 | 13.38 | -2.43 | 78 | 9.3 | 13.38 | -2.43 |
| | 4920.78* | 25-Year | 107 | 10.15 | 16.8 | 107 | 9.3 | 13.75 | -3.05 | 107 | 9.3 | 13.75 | -3.05 |
| | 4920.78* | 50-Year | 131 | 10.15 | 17.55 | 131 | 9.3 | 14.02 | -3.53 | 131 | 9.3 | 14.01 | -3.54 |
| | 4920.78* | 100-Year | 150 | 10.15 | 18.11 | 150 | 9.3 | 14.22 | -3.89 | 150 | 9.3 | 14.22 | -3.89 |
| | 4920.78* | App. Obs. Day | 29.88 | 10.15 | 13.77 | 29.88 | 9.3 | 12.57 | -1.2 | 29.88 | 9.3 | 12.57 | -1.2 |
| | 4754.34* | 5-Year | 60.7 | 10.2 | 15.12 | 60.7 | 9.58 | 13.13 | -1.99 | 60.7 | 9.58 | 13.13 | -1.99 |
| | 4754.34* | 10-Year | 78 | 10.2 | 15.77 | 78 | 9.58 | 13.38 | -2.39 | 78 | 9.58 | 13.38 | -2.39 |
| | 4754.34* | 25-Year | 107 | 10.2 | 16.76 | 107 | 9.58 | 13.74 | -3.02 | 107 | 9.58 | 13.74 | -3.02 |
| | 4754.34* | 50-Year | 131 | 10.2 | 17.51 | 131 | 9.58 | 14.01 | -3.5 | 131 | 9.58 | 14.01 | -3.5 |
| | 4754.34* | 100-Year | 150 | 10.2 | 18.06 | 150 | 9.58 | 14.21 | -3.85 | 150 | 9.58 | 14.21 | -3.85 |
| | 4754.34* | App. Obs. Day | 29.88 | 10.2 | 13.75 | 29.88 | 9.58 | 12.57 | -1.18 | 29.88 | 9.58 | 12.57 | -1.18 |
| G-G' | 4587.9 | 5-Year | 60.7 | 10.25 | 15.02 | 60.7 | 10.05 | 13.13 | -1.89 | 60.7 | 10.05 | 13.13 | -1.89 |
| | 4587.9 | 10-Year | 78 | 10.25 | 15.66 | 78 | 10.05 | 13.38 | -2.28 | 78 | 10.05 | 13.37 | -2.29 |
| | 4587.9 | 25-Year | 107 | 10.25 | 16.63 | 107 | 10.05 | 13.74 | -2.89 | 107 | 10.05 | 13.74 | -2.89 |
| | 4587.9 | 50-Year | 131 | 10.25 | 17.37 | 131 | 10.05 | 14 | -3.37 | 131 | 10.05 | 14 | -3.37 |
| | 4587.9 | 100-Year | 150 | 10.25 | 17.92 | 150 | 10.05 | 14.21 | -3.71 | 150 | 10.05 | 14.21 | -3.71 |
| | 4587.9 | App. Obs. Day | 29.88 | 10.25 | 13.67 | 29.88 | 10.05 | 12.57 | -1.1 | 29.88 | 10.05 | 12.57 | -1.1 |
| | 4493.95* | 5-Year | 60.7 | 10.25 | 14.81 | 60.7 | 9.67 | 13.13 | -1.68 | 60.7 | 9.67 | 13.13 | -1.68 |
| | 4493.95* | 10-Year | 78 | 10.25 | 15.44 | 78 | 9.67 | 13.37 | -2.07 | 78 | 9.67 | 13.37 | -2.07 |
| | 4493.95* | 25-Year | 107 | 10.25 | 16.38 | 107 | 9.67 | 13.73 | -2.65 | 107 | 9.67 | 13.73 | -2.65 |
| | 4493.95* | 50-Year | 131 | 10.25 | 17.1 | 131 | 9.67 | 14 | -3.1 | 131 | 9.67 | 14 | -3.1 |
| | 4493.95* | 100-Year | 150 | 10.25 | 17.63 | 150 | 9.67 | 14.21 | -3.42 | 150 | 9.67 | 14.21 | -3.42 |
| | 4493.95* | App. Obs. Day | 29.88 | 10.25 | 13.49 | 29.88 | 9.67 | 12.57 | -0.92 | 29.88 | 9.67 | 12.57 | -0.92 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|----------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| G1-G1' | 4400 | 5-Year | 60.7 | 10.25 | 13.1 | 60.7 | 9.3 | 13.12 | 0.02 | 60.7 | 9.3 | 13.12 | 0.02 |
| | 4400 | 10-Year | 78 | 10.25 | 13.52 | 78 | 9.3 | 13.37 | -0.15 | 78 | 9.3 | 13.37 | -0.15 |
| | 4400 | 25-Year | 107 | 10.25 | 14.17 | 107 | 9.3 | 13.73 | -0.44 | 107 | 9.3 | 13.73 | -0.44 |
| | 4400 | 50-Year | 131 | 10.25 | 14.67 | 131 | 9.3 | 14 | -0.67 | 131 | 9.3 | 14 | -0.67 |
| | 4400 | 100-Year | 150 | 10.25 | 15.04 | 150 | 9.3 | 14.2 | -0.84 | 150 | 9.3 | 14.2 | -0.84 |
| | 4400 | App. Obs. Day | 29.88 | 10.25 | 12.36 | 29.88 | 9.3 | 12.57 | 0.21 | 29.88 | 9.3 | 12.57 | 0.21 |
| 4307.95* | 4307.95* | 5-Year | 60.7 | 10.09 | 13.06 | 60.7 | 10.09 | 13.06 | 0 | 60.7 | 10.09 | 13.06 | 0 |
| | 4307.95* | 10-Year | 78 | 10.09 | 13.29 | 78 | 10.09 | 13.29 | 0 | 78 | 10.09 | 13.29 | 0 |
| | 4307.95* | 25-Year | 107 | 10.09 | 13.61 | 107 | 10.09 | 13.61 | 0 | 107 | 10.09 | 13.61 | 0 |
| | 4307.95* | 50-Year | 131 | 10.09 | 13.84 | 131 | 10.09 | 13.84 | 0 | 131 | 10.09 | 13.84 | 0 |
| | 4307.95* | 100-Year | 150 | 10.09 | 14.02 | 150 | 10.09 | 14.02 | 0 | 150 | 10.09 | 14.02 | 0 |
| | 4307.95* | App. Obs. Day | 29.88 | 10.09 | 12.54 | 29.88 | 10.09 | 12.54 | 0 | 29.88 | 10.09 | 12.54 | 0 |
| H-H' | 4215.9 | 5-Year | 60.7 | 9.89 | 13.02 | 60.7 | 9.89 | 13.02 | 0 | 60.7 | 9.89 | 13.02 | 0 |
| | 4215.9 | 10-Year | 78 | 9.89 | 13.24 | 78 | 9.89 | 13.24 | 0 | 78 | 9.89 | 13.24 | 0 |
| | 4215.9 | 25-Year | 107 | 9.89 | 13.55 | 107 | 9.89 | 13.55 | 0 | 107 | 9.89 | 13.55 | 0 |
| | 4215.9 | 50-Year | 131 | 9.89 | 13.78 | 131 | 9.89 | 13.78 | 0 | 131 | 9.89 | 13.78 | 0 |
| | 4215.9 | 100-Year | 150 | 9.89 | 13.95 | 150 | 9.89 | 13.95 | 0 | 150 | 9.89 | 13.95 | 0 |
| | 4215.9 | App. Obs. Day | 29.88 | 9.89 | 12.52 | 29.88 | 9.89 | 12.52 | 0 | 29.88 | 9.89 | 12.52 | 0 |
| 4122.83* | 4122.83* | 5-Year | 60.7 | 10.08 | 12.99 | 60.7 | 10.08 | 12.99 | 0 | 60.7 | 10.08 | 12.99 | 0 |
| | 4122.83* | 10-Year | 78 | 10.08 | 13.2 | 78 | 10.08 | 13.2 | 0 | 78 | 10.08 | 13.2 | 0 |
| | 4122.83* | 25-Year | 107 | 10.08 | 13.5 | 107 | 10.08 | 13.5 | 0 | 107 | 10.08 | 13.5 | 0 |
| | 4122.83* | 50-Year | 131 | 10.08 | 13.72 | 131 | 10.08 | 13.72 | 0 | 131 | 10.08 | 13.72 | 0 |
| | 4122.83* | 100-Year | 150 | 10.08 | 13.89 | 150 | 10.08 | 13.89 | 0 | 150 | 10.08 | 13.89 | 0 |
| | 4122.83* | App. Obs. Day | 29.88 | 10.08 | 12.5 | 29.88 | 10.08 | 12.5 | 0 | 29.88 | 10.08 | 12.5 | 0 |
| 4029.76* | 4029.76* | 5-Year | 60.7 | 10.6 | 12.93 | 60.7 | 10.6 | 12.93 | 0 | 60.7 | 10.6 | 12.93 | 0 |
| | 4029.76* | 10-Year | 78 | 10.6 | 13.13 | 78 | 10.6 | 13.13 | 0 | 78 | 10.6 | 13.13 | 0 |
| | 4029.76* | 25-Year | 107 | 10.6 | 13.42 | 107 | 10.6 | 13.42 | 0 | 107 | 10.6 | 13.42 | 0 |
| | 4029.76* | 50-Year | 131 | 10.6 | 13.63 | 131 | 10.6 | 13.63 | 0 | 131 | 10.6 | 13.63 | 0 |
| | 4029.76* | 100-Year | 150 | 10.6 | 13.79 | 150 | 10.6 | 13.79 | 0 | 150 | 10.6 | 13.79 | 0 |
| | 4029.76* | App. Obs. Day | 29.88 | 10.6 | 12.46 | 29.88 | 10.6 | 12.46 | 0 | 29.88 | 10.6 | 12.46 | 0 |
| 3936.69* | 3936.69* | 5-Year | 60.7 | 10.7 | 12.85 | 60.7 | 10.7 | 12.85 | 0 | 60.7 | 10.7 | 12.85 | 0 |
| | 3936.69* | 10-Year | 78 | 10.7 | 13.03 | 78 | 10.7 | 13.03 | 0 | 78 | 10.7 | 13.03 | 0 |
| | 3936.69* | 25-Year | 107 | 10.7 | 13.3 | 107 | 10.7 | 13.3 | 0 | 107 | 10.7 | 13.3 | 0 |
| | 3936.69* | 50-Year | 131 | 10.7 | 13.5 | 131 | 10.7 | 13.5 | 0 | 131 | 10.7 | 13.5 | 0 |
| | 3936.69* | 100-Year | 150 | 10.7 | 13.65 | 150 | 10.7 | 13.65 | 0 | 150 | 10.7 | 13.65 | 0 |
| | 3936.69* | App. Obs. Day | 29.88 | 10.7 | 12.41 | 29.88 | 10.7 | 12.41 | 0 | 29.88 | 10.7 | 12.41 | 0 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| | 3843.62* | 5-Year | 60.7 | 10.8 | 12.7 | 60.7 | 10.8 | 12.7 | 0 | 60.7 | 10.8 | 12.7 | 0 |
| | 3843.62* | 10-Year | 78 | 10.8 | 12.87 | 78 | 10.8 | 12.87 | 0 | 78 | 10.8 | 12.87 | 0 |
| | 3843.62* | 25-Year | 107 | 10.8 | 13.1 | 107 | 10.8 | 13.1 | 0 | 107 | 10.8 | 13.1 | 0 |
| | 3843.62* | 50-Year | 131 | 10.8 | 13.28 | 131 | 10.8 | 13.28 | 0 | 131 | 10.8 | 13.28 | 0 |
| | 3843.62* | 100-Year | 150 | 10.8 | 13.42 | 150 | 10.8 | 13.42 | 0 | 150 | 10.8 | 13.42 | 0 |
| | 3843.62* | App. Obs. Day | 29.88 | 10.8 | 12.3 | 29.88 | 10.8 | 12.3 | 0 | 29.88 | 10.8 | 12.3 | 0 |
| | | | | | | | | | | | | | |
| | 3750.55 | 5-Year | 60.7 | 10.83 | 12.47 | 60.7 | 10.83 | 12.47 | 0 | 60.7 | 10.83 | 12.47 | 0 |
| | 3750.55 | 10-Year | 78 | 10.83 | 12.61 | 78 | 10.83 | 12.61 | 0 | 78 | 10.83 | 12.61 | 0 |
| I-I' | 3750.55 | 25-Year | 107 | 10.83 | 12.8 | 107 | 10.83 | 12.8 | 0 | 107 | 10.83 | 12.8 | 0 |
| | 3750.55 | 50-Year | 131 | 10.83 | 12.95 | 131 | 10.83 | 12.95 | 0 | 131 | 10.83 | 12.95 | 0 |
| | 3750.55 | 100-Year | 150 | 10.83 | 13.11 | 150 | 10.83 | 13.11 | 0 | 150 | 10.83 | 13.11 | 0 |
| | 3750.55 | App. Obs. Day | 29.88 | 10.83 | 12.11 | 29.88 | 10.83 | 12.11 | 0 | 29.88 | 10.83 | 12.11 | 0 |
| | | | | | | | | | | | | | |
| | 3563.78* | 5-Year | 60.7 | 10.62 | 12.18 | 60.7 | 10.62 | 12.18 | 0 | 60.7 | 10.62 | 12.18 | 0 |
| | 3563.78* | 10-Year | 78 | 10.62 | 12.3 | 78 | 10.62 | 12.3 | 0 | 78 | 10.62 | 12.3 | 0 |
| | 3563.78* | 25-Year | 107 | 10.62 | 12.49 | 107 | 10.62 | 12.49 | 0 | 107 | 10.62 | 12.49 | 0 |
| | 3563.78* | 50-Year | 131 | 10.62 | 12.66 | 131 | 10.62 | 12.66 | 0 | 131 | 10.62 | 12.66 | 0 |
| | 3563.78* | 100-Year | 150 | 10.62 | 12.89 | 150 | 10.62 | 12.89 | 0 | 150 | 10.62 | 12.89 | 0 |
| | 3563.78* | App. Obs. Day | 29.88 | 10.62 | 11.85 | 29.88 | 10.62 | 11.85 | 0 | 29.88 | 10.62 | 11.85 | 0 |
| | | | | | | | | | | | | | |
| | 3377.01* | 5-Year | 60.7 | 10.42 | 11.94 | 60.7 | 10.42 | 11.94 | 0 | 60.7 | 10.42 | 11.94 | 0 |
| | 3377.01* | 10-Year | 78 | 10.42 | 12.06 | 78 | 10.42 | 12.06 | 0 | 78 | 10.42 | 12.06 | 0 |
| | 3377.01* | 25-Year | 107 | 10.42 | 12.26 | 107 | 10.42 | 12.26 | 0 | 107 | 10.42 | 12.26 | 0 |
| | 3377.01* | 50-Year | 131 | 10.42 | 12.46 | 131 | 10.42 | 12.46 | 0 | 131 | 10.42 | 12.46 | 0 |
| | 3377.01* | 100-Year | 150 | 10.42 | 12.76 | 150 | 10.42 | 12.76 | 0 | 150 | 10.42 | 12.76 | 0 |
| | 3377.01* | App. Obs. Day | 29.88 | 10.42 | 11.63 | 29.88 | 10.42 | 11.63 | 0 | 29.88 | 10.42 | 11.63 | 0 |
| | | | | | | | | | | | | | |
| | 3190.24* | 5-Year | 60.7 | 10.21 | 11.73 | 60.7 | 10.21 | 11.73 | 0 | 60.7 | 10.21 | 11.73 | 0 |
| | 3190.24* | 10-Year | 78 | 10.21 | 11.84 | 78 | 10.21 | 11.84 | 0 | 78 | 10.21 | 11.84 | 0 |
| | 3190.24* | 25-Year | 107 | 10.21 | 12.06 | 107 | 10.21 | 12.06 | 0 | 107 | 10.21 | 12.06 | 0 |
| | 3190.24* | 50-Year | 131 | 10.21 | 12.31 | 131 | 10.21 | 12.31 | 0 | 131 | 10.21 | 12.31 | 0 |
| | 3190.24* | 100-Year | 150 | 10.21 | 12.67 | 150 | 10.21 | 12.67 | 0 | 150 | 10.21 | 12.67 | 0 |
| | 3190.24* | App. Obs. Day | 29.88 | 10.21 | 11.43 | 29.88 | 10.21 | 11.43 | 0 | 29.88 | 10.21 | 11.43 | 0 |
| | | | | | | | | | | | | | |
| | 3003.47* | 5-Year | 60.7 | 10 | 11.52 | 60.7 | 10 | 11.52 | 0 | 60.7 | 10 | 11.52 | 0 |
| | 3003.47* | 10-Year | 78 | 10 | 11.64 | 78 | 10 | 11.64 | 0 | 78 | 10 | 11.64 | 0 |
| | 3003.47* | 25-Year | 107 | 10 | 11.9 | 107 | 10 | 11.9 | 0 | 107 | 10 | 11.9 | 0 |
| | 3003.47* | 50-Year | 131 | 10 | 12.2 | 131 | 10 | 12.2 | 0 | 131 | 10 | 12.2 | 0 |
| | 3003.47* | 100-Year | 150 | 10 | 12.61 | 150 | 10 | 12.61 | 0 | 150 | 10 | 12.61 | 0 |
| | 3003.47* | App. Obs. Day | 29.88 | 10 | 11.24 | 29.88 | 10 | 11.24 | 0 | 29.88 | 10 | 11.24 | 0 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| | 2816.69* | 5-Year | 60.7 | 9.8 | 11.33 | 60.7 | 9.8 | 11.33 | 0 | 60.7 | 9.8 | 11.33 | 0 |
| | 2816.69* | 10-Year | 78 | 9.8 | 11.47 | 78 | 9.8 | 11.47 | 0 | 78 | 9.8 | 11.47 | 0 |
| | 2816.69* | 25-Year | 107 | 9.8 | 11.78 | 107 | 9.8 | 11.78 | 0 | 107 | 9.8 | 11.78 | 0 |
| | 2816.69* | 50-Year | 131 | 9.8 | 12.13 | 131 | 9.8 | 12.13 | 0 | 131 | 9.8 | 12.13 | 0 |
| | 2816.69* | 100-Year | 150 | 9.8 | 12.57 | 150 | 9.8 | 12.57 | 0 | 150 | 9.8 | 12.57 | 0 |
| | 2816.69* | App. Obs. Day | 29.88 | 9.8 | 11.05 | 29.88 | 9.8 | 11.05 | 0 | 29.88 | 9.8 | 11.05 | 0 |
| | 2629.92* | 5-Year | 60.7 | 9.59 | 11.16 | 60.7 | 9.59 | 11.16 | 0 | 60.7 | 9.59 | 11.16 | 0 |
| | 2629.92* | 10-Year | 78 | 9.59 | 11.33 | 78 | 9.59 | 11.33 | 0 | 78 | 9.59 | 11.33 | 0 |
| | 2629.92* | 25-Year | 107 | 9.59 | 11.7 | 107 | 9.59 | 11.7 | 0 | 107 | 9.59 | 11.7 | 0 |
| | 2629.92* | 50-Year | 131 | 9.59 | 12.08 | 131 | 9.59 | 12.08 | 0 | 131 | 9.59 | 12.08 | 0 |
| | 2629.92* | 100-Year | 150 | 9.59 | 12.55 | 150 | 9.59 | 12.55 | 0 | 150 | 9.59 | 12.55 | 0 |
| | 2629.92* | App. Obs. Day | 29.88 | 9.59 | 10.86 | 29.88 | 9.59 | 10.86 | 0 | 29.88 | 9.59 | 10.86 | 0 |
| | 2443.15* | 5-Year | 60.7 | 9.39 | 11.03 | 60.7 | 9.39 | 11.03 | 0 | 60.7 | 9.39 | 11.03 | 0 |
| | 2443.15* | 10-Year | 78 | 9.39 | 11.23 | 78 | 9.39 | 11.23 | 0 | 78 | 9.39 | 11.23 | 0 |
| | 2443.15* | 25-Year | 107 | 9.39 | 11.65 | 107 | 9.39 | 11.65 | 0 | 107 | 9.39 | 11.65 | 0 |
| | 2443.15* | 50-Year | 131 | 9.39 | 12.04 | 131 | 9.39 | 12.04 | 0 | 131 | 9.39 | 12.04 | 0 |
| | 2443.15* | 100-Year | 150 | 9.39 | 12.53 | 150 | 9.39 | 12.53 | 0 | 150 | 9.39 | 12.53 | 0 |
| | 2443.15* | App. Obs. Day | 29.88 | 9.39 | 10.7 | 29.88 | 9.39 | 10.7 | 0 | 29.88 | 9.39 | 10.7 | 0 |
| | 2256.38 | 5-Year | 73.6 | 9.18 | 10.92 | 73.6 | 9.18 | 10.92 | 0 | 73.6 | 9.18 | 10.92 | 0 |
| | 2256.38 | 10-Year | 94.9 | 9.18 | 11.15 | 94.9 | 9.18 | 11.15 | 0 | 94.9 | 9.18 | 11.15 | 0 |
| J-J' | 2256.38 | 25-Year | 131 | 9.18 | 11.61 | 131 | 9.18 | 11.61 | 0 | 131 | 9.18 | 11.61 | 0 |
| | 2256.38 | 50-Year | 160 | 9.18 | 12.02 | 160 | 9.18 | 12.02 | 0 | 160 | 9.18 | 12.02 | 0 |
| | 2256.38 | 100-Year | 193 | 9.18 | 12.52 | 193 | 9.18 | 12.52 | 0 | 193 | 9.18 | 12.52 | 0 |
| | 2256.38 | App. Obs. Day | 34.08 | 9.18 | 10.56 | 34.08 | 9.18 | 10.56 | 0 | 34.08 | 9.18 | 10.56 | 0 |
| | 2064.50* | 5-Year | 73.6 | 9.01 | 10.81 | 73.6 | 9.01 | 10.81 | 0 | 73.6 | 9.01 | 10.81 | 0 |
| | 2064.50* | 10-Year | 94.9 | 9.01 | 11.08 | 94.9 | 9.01 | 11.08 | 0 | 94.9 | 9.01 | 11.08 | 0 |
| | 2064.50* | 25-Year | 131 | 9.01 | 11.57 | 131 | 9.01 | 11.57 | 0 | 131 | 9.01 | 11.57 | 0 |
| | 2064.50* | 50-Year | 160 | 9.01 | 11.99 | 160 | 9.01 | 11.99 | 0 | 160 | 9.01 | 11.99 | 0 |
| | 2064.50* | 100-Year | 193 | 9.01 | 12.5 | 193 | 9.01 | 12.5 | 0 | 193 | 9.01 | 12.5 | 0 |
| | 2064.50* | App. Obs. Day | 34.08 | 9.01 | 10.42 | 34.08 | 9.01 | 10.42 | 0 | 34.08 | 9.01 | 10.42 | 0 |
| | 1872.62* | 5-Year | 73.6 | 8.83 | 10.73 | 73.6 | 8.83 | 10.73 | 0 | 73.6 | 8.83 | 10.73 | 0 |
| | 1872.62* | 10-Year | 94.9 | 8.83 | 11.02 | 94.9 | 8.83 | 11.02 | 0 | 94.9 | 8.83 | 11.02 | 0 |
| | 1872.62* | 25-Year | 131 | 8.83 | 11.54 | 131 | 8.83 | 11.54 | 0 | 131 | 8.83 | 11.54 | 0 |
| | 1872.62* | 50-Year | 160 | 8.83 | 11.97 | 160 | 8.83 | 11.97 | 0 | 160 | 8.83 | 11.97 | 0 |
| | 1872.62* | 100-Year | 193 | 8.83 | 12.48 | 193 | 8.83 | 12.48 | 0 | 193 | 8.83 | 12.48 | 0 |
| | 1872.62* | App. Obs. Day | 34.08 | 8.83 | 10.28 | 34.08 | 8.83 | 10.28 | 0 | 34.08 | 8.83 | 10.28 | 0 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|----------|---------------|---------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| 1680.74* | 5-Year | | 73.6 | 8.66 | 10.65 | 73.6 | 8.66 | 10.65 | 0 | 73.6 | 8.66 | 10.65 | 0 |
| 1680.74* | 10-Year | | 94.9 | 8.66 | 10.98 | 94.9 | 8.66 | 10.98 | 0 | 94.9 | 8.66 | 10.98 | 0 |
| 1680.74* | 25-Year | | 131 | 8.66 | 11.51 | 131 | 8.66 | 11.51 | 0 | 131 | 8.66 | 11.51 | 0 |
| 1680.74* | 50-Year | | 160 | 8.66 | 11.95 | 160 | 8.66 | 11.95 | 0 | 160 | 8.66 | 11.95 | 0 |
| 1680.74* | 100-Year | | 193 | 8.66 | 12.47 | 193 | 8.66 | 12.47 | 0 | 193 | 8.66 | 12.47 | 0 |
| 1680.74* | App. Obs. Day | | 34.08 | 8.66 | 10.15 | 34.08 | 8.66 | 10.15 | 0 | 34.08 | 8.66 | 10.15 | 0 |
| 1488.86* | 5-Year | | 73.6 | 8.49 | 10.59 | 73.6 | 8.49 | 10.59 | 0 | 73.6 | 8.49 | 10.59 | 0 |
| 1488.86* | 10-Year | | 94.9 | 8.49 | 10.94 | 94.9 | 8.49 | 10.94 | 0 | 94.9 | 8.49 | 10.94 | 0 |
| 1488.86* | 25-Year | | 131 | 8.49 | 11.49 | 131 | 8.49 | 11.49 | 0 | 131 | 8.49 | 11.49 | 0 |
| 1488.86* | 50-Year | | 160 | 8.49 | 11.94 | 160 | 8.49 | 11.94 | 0 | 160 | 8.49 | 11.94 | 0 |
| 1488.86* | 100-Year | | 193 | 8.49 | 12.46 | 193 | 8.49 | 12.46 | 0 | 193 | 8.49 | 12.46 | 0 |
| 1488.86* | App. Obs. Day | | 34.08 | 8.49 | 10.01 | 34.08 | 8.49 | 10.01 | 0 | 34.08 | 8.49 | 10.01 | 0 |
| 1296.98* | 5-Year | | 73.6 | 8.32 | 10.55 | 73.6 | 8.32 | 10.55 | 0 | 73.6 | 8.32 | 10.55 | 0 |
| 1296.98* | 10-Year | | 94.9 | 8.32 | 10.91 | 94.9 | 8.32 | 10.91 | 0 | 94.9 | 8.32 | 10.91 | 0 |
| 1296.98* | 25-Year | | 131 | 8.32 | 11.47 | 131 | 8.32 | 11.47 | 0 | 131 | 8.32 | 11.47 | 0 |
| 1296.98* | 50-Year | | 160 | 8.32 | 11.92 | 160 | 8.32 | 11.92 | 0 | 160 | 8.32 | 11.92 | 0 |
| 1296.98* | 100-Year | | 193 | 8.32 | 12.45 | 193 | 8.32 | 12.45 | 0 | 193 | 8.32 | 12.45 | 0 |
| 1296.98* | App. Obs. Day | | 34.08 | 8.32 | 9.88 | 34.08 | 8.32 | 9.88 | 0 | 34.08 | 8.32 | 9.88 | 0 |
| 1105.10* | 5-Year | | 73.6 | 8.14 | 10.51 | 73.6 | 8.14 | 10.51 | 0 | 73.6 | 8.14 | 10.51 | 0 |
| 1105.10* | 10-Year | | 94.9 | 8.14 | 10.88 | 94.9 | 8.14 | 10.88 | 0 | 94.9 | 8.14 | 10.88 | 0 |
| 1105.10* | 25-Year | | 131 | 8.14 | 11.45 | 131 | 8.14 | 11.45 | 0 | 131 | 8.14 | 11.45 | 0 |
| 1105.10* | 50-Year | | 160 | 8.14 | 11.91 | 160 | 8.14 | 11.91 | 0 | 160 | 8.14 | 11.91 | 0 |
| 1105.10* | 100-Year | | 193 | 8.14 | 12.44 | 193 | 8.14 | 12.44 | 0 | 193 | 8.14 | 12.44 | 0 |
| 1105.10* | App. Obs. Day | | 34.08 | 8.14 | 9.76 | 34.08 | 8.14 | 9.76 | 0 | 34.08 | 8.14 | 9.76 | 0 |
| 913.21* | 5-Year | | 73.6 | 7.97 | 10.48 | 73.6 | 7.97 | 10.48 | 0 | 73.6 | 7.97 | 10.48 | 0 |
| 913.21* | 10-Year | | 94.9 | 7.97 | 10.86 | 94.9 | 7.97 | 10.86 | 0 | 94.9 | 7.97 | 10.86 | 0 |
| 913.21* | 25-Year | | 131 | 7.97 | 11.44 | 131 | 7.97 | 11.44 | 0 | 131 | 7.97 | 11.44 | 0 |
| 913.21* | 50-Year | | 160 | 7.97 | 11.9 | 160 | 7.97 | 11.9 | 0 | 160 | 7.97 | 11.9 | 0 |
| 913.21* | 100-Year | | 193 | 7.97 | 12.43 | 193 | 7.97 | 12.43 | 0 | 193 | 7.97 | 12.43 | 0 |
| 913.21* | App. Obs. Day | | 34.08 | 7.97 | 9.66 | 34.08 | 7.97 | 9.66 | 0 | 34.08 | 7.97 | 9.66 | 0 |
| 721.33* | 5-Year | | 73.6 | 7.8 | 10.46 | 73.6 | 7.8 | 10.46 | 0 | 73.6 | 7.8 | 10.46 | 0 |
| 721.33* | 10-Year | | 94.9 | 7.8 | 10.84 | 94.9 | 7.8 | 10.84 | 0 | 94.9 | 7.8 | 10.84 | 0 |
| 721.33* | 25-Year | | 131 | 7.8 | 11.43 | 131 | 7.8 | 11.43 | 0 | 131 | 7.8 | 11.43 | 0 |
| 721.33* | 50-Year | | 160 | 7.8 | 11.89 | 160 | 7.8 | 11.89 | 0 | 160 | 7.8 | 11.89 | 0 |
| 721.33* | 100-Year | | 193 | 7.8 | 12.42 | 193 | 7.8 | 12.42 | 0 | 193 | 7.8 | 12.42 | 0 |
| 721.33* | App. Obs. Day | | 34.08 | 7.8 | 9.58 | 34.08 | 7.8 | 9.58 | 0 | 34.08 | 7.8 | 9.58 | 0 |

Buckeye Brook Output Tables

| XS | River Sta | Profile | Existing Conditions (G_17 F_08) | | | Phrag Removal (G_21 F_08) | | | | Phrag Removal and Channel Mod.(G_22 F_08) | | | |
|------|-----------|---------------|---------------------------------|-------------------|-------------------|---------------------------|-------------------|-------------------|--------------|---|-------------------|-------------------|--------------|
| | | | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) | Q Total (cfs) | Min Ch El (ft) | W.S. Elev (ft) | WS Δ (ft) |
| | 529.45* | 5-Year | 73.6 | 7.63 | 10.44 | 73.6 | 7.63 | 10.44 | 0 | 73.6 | 7.63 | 10.44 | 0 |
| | 529.45* | 10-Year | 94.9 | 7.63 | 10.83 | 94.9 | 7.63 | 10.83 | 0 | 94.9 | 7.63 | 10.83 | 0 |
| | 529.45* | 25-Year | 131 | 7.63 | 11.42 | 131 | 7.63 | 11.42 | 0 | 131 | 7.63 | 11.42 | 0 |
| | 529.45* | 50-Year | 160 | 7.63 | 11.88 | 160 | 7.63 | 11.88 | 0 | 160 | 7.63 | 11.88 | 0 |
| | 529.45* | 100-Year | 193 | 7.63 | 12.42 | 193 | 7.63 | 12.42 | 0 | 193 | 7.63 | 12.42 | 0 |
| | 529.45* | App. Obs. Day | 34.08 | 7.63 | 9.52 | 34.08 | 7.63 | 9.52 | 0 | 34.08 | 7.63 | 9.52 | 0 |
| | 337.57* | 5-Year | 73.6 | 7.45 | 10.43 | 73.6 | 7.45 | 10.43 | 0 | 73.6 | 7.45 | 10.43 | 0 |
| | 337.57* | 10-Year | 94.9 | 7.45 | 10.82 | 94.9 | 7.45 | 10.82 | 0 | 94.9 | 7.45 | 10.82 | 0 |
| | 337.57* | 25-Year | 131 | 7.45 | 11.41 | 131 | 7.45 | 11.41 | 0 | 131 | 7.45 | 11.41 | 0 |
| | 337.57* | 50-Year | 160 | 7.45 | 11.87 | 160 | 7.45 | 11.87 | 0 | 160 | 7.45 | 11.87 | 0 |
| | 337.57* | 100-Year | 193 | 7.45 | 12.41 | 193 | 7.45 | 12.41 | 0 | 193 | 7.45 | 12.41 | 0 |
| | 337.57* | App. Obs. Day | 34.08 | 7.45 | 9.48 | 34.08 | 7.45 | 9.48 | 0 | 34.08 | 7.45 | 9.48 | 0 |
| | 145.69 | 5-Year | 73.6 | 7.28 | 10.42 | 73.6 | 7.28 | 10.42 | 0 | 73.6 | 7.28 | 10.42 | 0 |
| | 145.69 | 10-Year | 94.9 | 7.28 | 10.81 | 94.9 | 7.28 | 10.81 | 0 | 94.9 | 7.28 | 10.81 | 0 |
| K-K' | 145.69 | 25-Year | 131 | 7.28 | 11.4 | 131 | 7.28 | 11.4 | 0 | 131 | 7.28 | 11.4 | 0 |
| | 145.69 | 50-Year | 160 | 7.28 | 11.86 | 160 | 7.28 | 11.86 | 0 | 160 | 7.28 | 11.86 | 0 |
| | 145.69 | 100-Year | 193 | 7.28 | 12.4 | 193 | 7.28 | 12.4 | 0 | 193 | 7.28 | 12.4 | 0 |
| | 145.69 | App. Obs. Day | 34.08 | 7.28 | 9.46 | 34.08 | 7.28 | 9.46 | 0 | 34.08 | 7.28 | 9.46 | 0 |
| | 64.28 | 5-Year | 82.7 | 7.3 | 10.26 | 82.7 | 7.3 | 10.26 | 0 | 82.7 | 7.3 | 10.26 | 0 |
| | 64.28 | 10-Year | 107 | 7.3 | 10.62 | 107 | 7.3 | 10.62 | 0 | 107 | 7.3 | 10.62 | 0 |
| L-L' | 64.28 | 25-Year | 147 | 7.3 | 11.16 | 147 | 7.3 | 11.16 | 0 | 147 | 7.3 | 11.16 | 0 |
| | 64.28 | 50-Year | 181 | 7.3 | 11.59 | 181 | 7.3 | 11.59 | 0 | 181 | 7.3 | 11.59 | 0 |
| | 64.28 | 100-Year | 218 | 7.3 | 12.1 | 218 | 7.3 | 12.1 | 0 | 218 | 7.3 | 12.1 | 0 |
| | 64.28 | App. Obs. Day | 36.48 | 7.3 | 9.37 | 36.48 | 7.3 | 9.37 | 0 | 36.48 | 7.3 | 9.37 | 0 |
| | 64 | | Culvert | | | Culvert | | | | Culvert | | | |
| | 0 | 5-Year | 82.7 | 7.69 | 10.12 | 82.7 | 7.69 | 10.12 | 0 | 82.7 | 7.69 | 10.12 | 0 |
| | 0 | 10-Year | 107 | 7.69 | 10.42 | 107 | 7.69 | 10.42 | 0 | 107 | 7.69 | 10.42 | 0 |
| M-M' | 0 | 25-Year | 147 | 7.69 | 10.87 | 147 | 7.69 | 10.87 | 0 | 147 | 7.69 | 10.87 | 0 |
| | 0 | 50-Year | 181 | 7.69 | 11.21 | 181 | 7.69 | 11.21 | 0 | 181 | 7.69 | 11.21 | 0 |
| | 0 | 100-Year | 218 | 7.69 | 11.55 | 218 | 7.69 | 11.55 | 0 | 218 | 7.69 | 11.55 | 0 |
| | 0 | App. Obs. Day | 36.48 | 7.69 | 9.31 | 36.48 | 7.69 | 9.31 | 0 | 36.48 | 7.69 | 9.31 | 0 |