



**Ferguson Township Municipal  
Separate Storm Sewer System  
(MS4) Permit**

**Pollution Reduction Plan  
(PRP) Projects Update/Next  
Steps**

**December 5th, 2023 Board of Supervisors Meeting**


Good Evening! For those who don't know me, my name is Aaron Jolin, Ferguson Townships Stormwater Engineer. Also with us, virtually, is Shannon Lucas of KCI Technologies, Inc. who led the design team completing the concept/preliminary design scope for the PRP projects in the Township as authorized in June this year. We are excited to be here to present updates on the PRP projects. A lot of effort and collaboration has taken place to get to this stage. This presentation builds on the Board work session completed in January (earlier this year). There will be a lot of information presented, some technical, some representing new developments. Ultimately, staff hopes the presentation will provide the necessary information for the Board to provide direction on how to proceed with fulfilling the PRP requirements. A quick note, some additional information was received from PSU today, therefore there were a few minor modifications made to the slides to update them in accordance with the information we received.

# Presentation Outline



- MS4 PRP Background
  - MS4/MS4 Partners
  - Watersheds
  - PRP Pollution Loading
  - Reduction Requirements
    - Show chart of loads with loading reduction requirements for all watersheds
- PRP Project Summary
  - Beaver Branch
    - Piney Ridge
  - Slab Cabin
    - Duck Pond
    - Below E Chestnut
  - Spring Creek (Big Hollow)
    - Credit From Other Projects
  - Options
- PRP Project Updates
  - Introduce KCI (Beaver Branch/Slab Cabin)
  - Project Problems and Solutions
    - Beaver Branch
    - Slab Cabin
    - Butternut Street Culvert
  - Duck Pond Updates
- Costs
  - Beaver Branch
  - Slab Cabin Options
- Board Input/Questions

To provide a brief overview, I'll present a brief background on the MS4 PRP subject matter - as a refresher, for new board members and/or for members who could not previously attend the previous work session as well as the audience. KCI, our consultant, hired in June, is here to share design progression and present additional findings. I'll present additional updates about the Duck Pond as well as review updated cost estimates. Finally, we will open the floor to any Board/Public questions/discussion and ultimately, we hope the Board Members may advise on how they would like to proceed.



# NPDES - Phase II MS4 Permit

<b>N</b> ational	<b>M</b> unicipal
<b>P</b> ollution	<b>S</b> eparate
<b>D</b> ischarge	<b>S</b> torm
<b>E</b> limination	<b>S</b> ewer
<b>S</b> ystem	<b>S</b> ystem


To briefly review some background, Ferguson Township has an NPDES MS4 – Phase II Permit. NPDES stands for National Pollution Discharge Elimination System and MS4 stands for Municipal Separate Storm Sewer System.

# NPDES - Phase II MS4 Permit Highlights



- The MS4 Permit establishes the guidelines and requirements of Ferguson Township's Stormwater Management Program.
- First MS4 permit issued to Ferguson Township in 2003 (although sometimes they are extended). Permits are good for 5 years.
- Permit requires submission of an annual report which details how the Township has fulfilled requirements of the stormwater management program.
- MS4 partners share some responsibilities
- Current Permit cycle is July 1, 2020 to June 30, 2025.
- Phase II required Pollution Reduction Plan

The State Issued MS4 Permit provides the guidelines and requirements for the Townships Stormwater Management Program. **I'll note the Ferguson Township's stormwater management program is available on the Township Website with a link including in the Board packet. I'll also mention that** Township staff conducts a separate annual public review of the stormwater management program at a BOS meeting every Spring - to review all the MS4 requirements in more detail, including how Ferguson Township operates to meet the requirements. Continuing on, some of the MS4 responsibilities are conducted jointly with the Centre Region MS4 partners. This helps to manage some pieces of the workload – mostly public education and participation requirements. Our permit is good for 5 years. Our current permit cycle began July 1, 2020 and expires June 30, 2025. All requirements for this permit cycle must be met by June 2025 to stay in compliance. Staff is required to submit an annual report each Fall, reporting on our progress. Lastly, as Ferguson Township moved into Phase II of the permit, an additional component was added to this permit cycle, requiring a Pollution Reduction Plan (what we will talk about today).



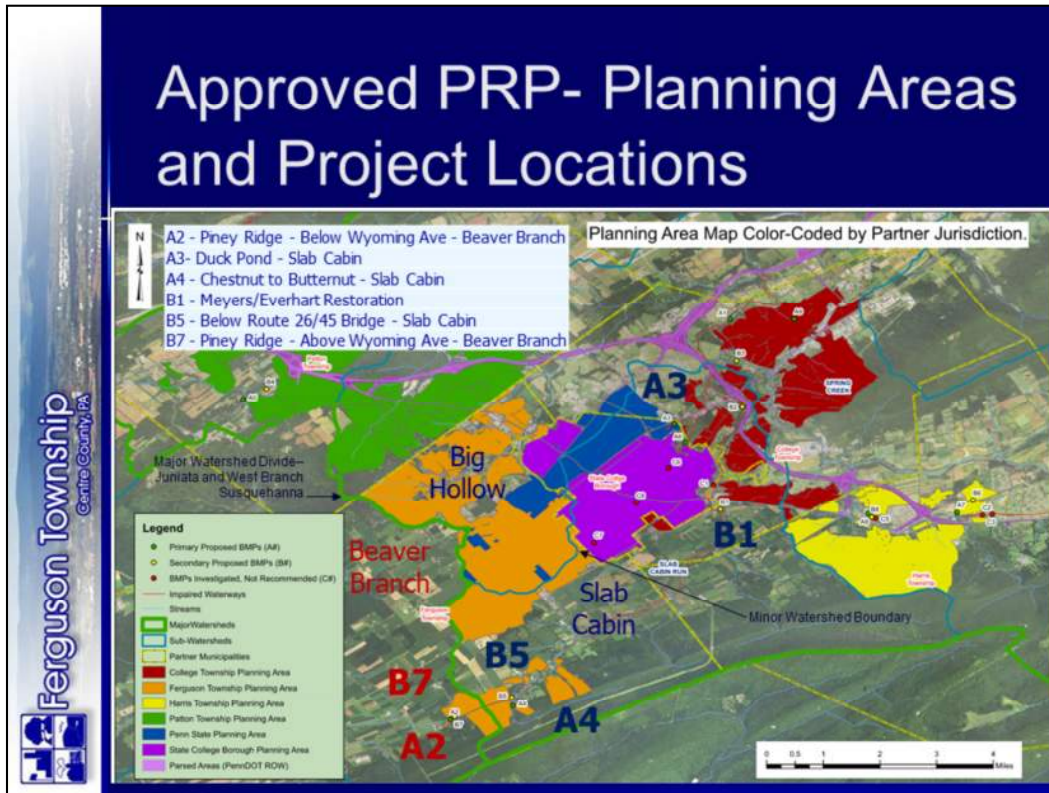
## Pollution Reduction Plan (PRP) Highlights

- Joint PRP study/plan developed for MS4 Partners by consultant
- Objective – Implement Pollution Control Measures (PCMs) to produce tangible improvements to the quality of stormwater discharges in impaired local waterways and the Chesapeake Bay Watershed.
- Plan Components:
  - Describe Planning Area / Evaluate Pollutant Loading
  - Propose PCMs to Reduce Pollutants
- Determined Required reduction of sediment pollutant loading is 10% (this permit cycle).
- Required to design, obtain easements, permitting, and construction of PCMs within the permit cycle.

This highlights some of the requirements of the Pollution Reduction Plan (PRP). The plan was developed in collaboration with the Centre Region Partners. The plan was started in 2018 and approved in 2020 as part of our MS4 permit renewal. For anyone who would like additional information, the full (213-page) approved PRP is located on the Township website under the stormwater pages. A link was provided in the Board packet.

The objective of the PRP is to produce tangible improvements to the quality of stormwater discharges in impaired local waterways and the Chesapeake Bay Watershed. Improvement of stormwater quality is completed via implementation of pollution control measures or PCMs -in locations impacted by urban runoff. PCMs may include stormwater facility retrofits, street sweeping, development of stream buffers, and stream restoration. Plan components consist of describing the planning area - including land uses, locations of existing stormwater facilities and evaluating pollutant loadings. For this permit cycle, pollution control measures (PCMs) are required to be implemented to achieve a 10% reduction in sediment loading. By reducing sediment, nitrogen and phosphorous are also removed. All PRP approved PCMs, including design, obtaining easements, permitting and construction must be completed by the end of the permit cycle, June 2025.

# Approved PRP- Planning Areas and Project Locations



There is a lot of information shown on this slide. The solid-colored areas show the MS4 Partners planning area. Ferguson Township’s Planning Area is shown in orange. Ferguson Township has a small amount of urban area draining to Beaver Branch in the Juniata Watershed. The remainder of the Township urban area drains to Spring Creek and the West Branch of the Susquehanna via two sub- watersheds - Big Hollow and Slab Cabin. The majority of our urban area drains to Big Hollow, with the second most to Slab Cabin and then a small amount to Beaver Branch. Ferguson Township PRP PCMs are shown on the map with project names in the upper left. Projects beginning with an “A” are primary projects and projects beginning with a “B” are secondary projects. While the plan resulting from the January work session was to keep all options for the Board open, focus shifted to further development of the primary projects, as a result of staff changes, workload shifting and bringing a consultant in to help with the design. The projects we will be focused in on today are A2 on Beaver Branch, A4 on Slab Cabin and A3 east of the State College Borough and PSU- also called the duckpond.

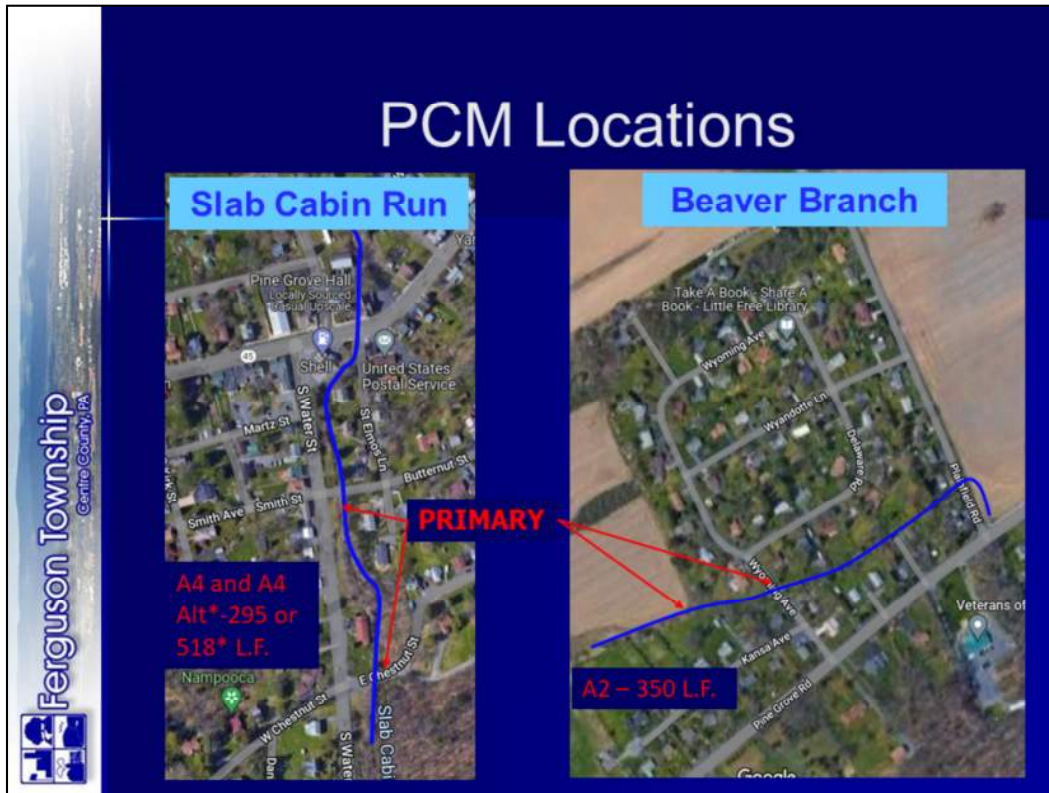
# Approved PRP- Loadings/Reductions

Table D.3-3 Ferguson Township Existing Pollutant Load Summary

Watershed/Condition	TSS (lb./yr.)	TN (lb./yr.)	TP (lb./yr.)
<b>Beaver Branch</b>			
Baseload	100,703	1,309	63
Existing BMP Credit	0	0	0
Adjusted Baseload	100,703	1,309	63
<b>Required Load Reduction</b>	<b>10,070</b>	<b>39</b>	<b>3</b>
<b>Spring Creek (Via Big Hollow)</b>			
Baseload	1,461	672	2
Existing BMP Credit	0	0	0
Adjusted Baseload	1,461	672	2
<b>Required Load Reduction</b>	<b>146</b>	<b>20</b>	<b>0</b>
<b>Slab Cabin Run</b>			
Baseload	521,100	4,552	324
Existing BMP Credit	28,010	62	10
Adjusted Baseload	493,090	4,490	314
<b>Required Load Reduction</b>	<b>49,309</b>	<b>135</b>	<b>16</b>
<b>Total Regulatory Load Reduction:</b>	<b>59,525</b>	<b>194</b>	<b>19</b>

These are the pollution loadings calculated and the required pollution reduction in pounds per year. Ferguson Township was required to reduce the urban area total sediment load by 59,525 lbs/yr. Of interest on this slide, you'll notice that our loading and subsequent reduction requirements for Spring Creek/via Big Hollow are extremely low as compared with the amount of urban land that drains to Big Hollow (which – as reviewed on the previous slide, is the majority of urban land in Ferguson Township). Without getting into the technical information provided in the PRP, this is due to the infrequency of surface flow contribution of Big Hollow to Spring Creek. As a result of the local karst topography (sinkholes), unless we receive significant rainfall events (usually above 3”) or other scenarios, -such as frozen ground conditions prevail, very little surface stormwater flows to Spring Creek via Big Hollow. I point this out as it substantially reduced the Township's overall pollution loading reduction requirements as compared with other municipalities which don't have karst geology. Because of the minimal loading and requirement for a 10% reduction, credit requirements for Spring Creek (via Big Hollow) will be generated in the Slab Cabin projects.

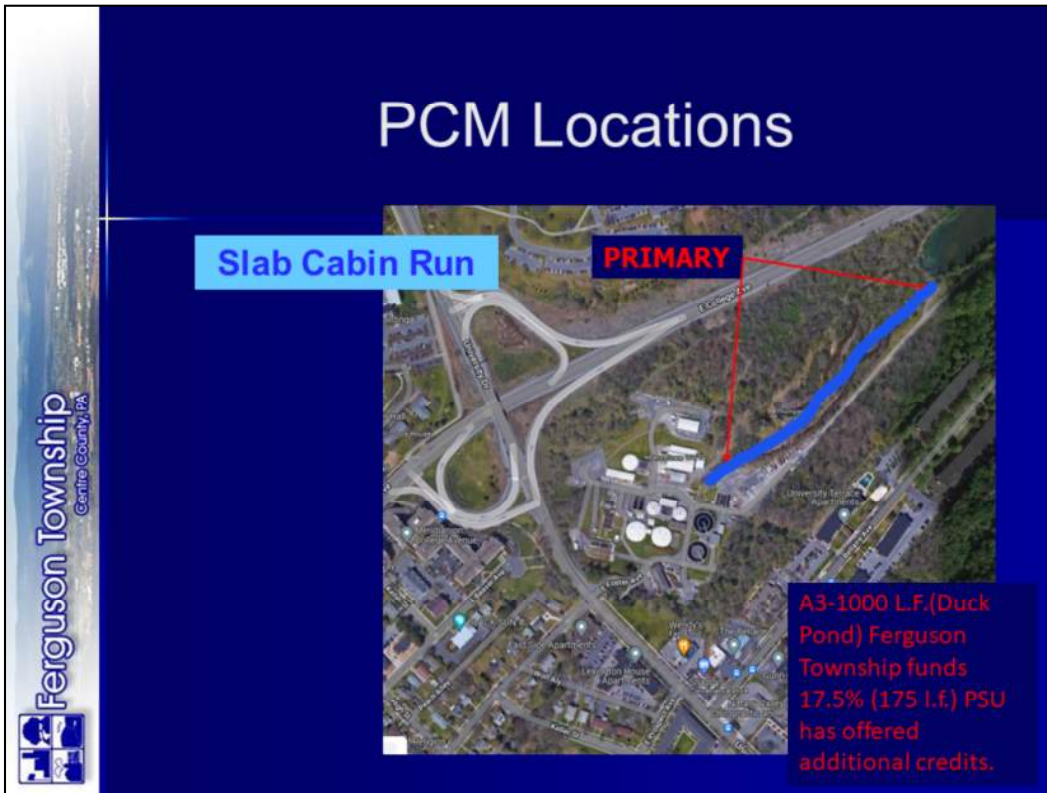
# PCM Locations



The next slides presents a more detailed view of our primary projects in the PRP. Project A2 on Beaver Branch (in the Juniata Watershed) proposed 350 LF of restoration below Wyoming Ave. Project A4 on Slab Cabin (Spring Creek), proposed 295 LF of restoration below East Chestnut Street with an alternative (A4 Alt) for completing restoration of the whole stretch between East Chestnut and Butternut Street.



# PCM Locations



The approved PRP allowed for Ferguson Township to receive 17.5% credit for restoration work, or approximately 175 l.f. of restoration for Project A3 – the Duck Pond. A letter from PSU, included with the Board Packet, extends additional credit opportunity - up to 506 l.f. of credit. We will talk more about the recently extended opportunities associated with A3- the Duck Pond later in the presentation.



## Options to Meet Goals

Project Combinations to Meet Minimum Goals	
<b>Option 1</b>	<b>Beaver Branch</b> A2 - Below Wyoming Ave
	<b>Slab Cabin/Big Hollow</b> A3- Duck Pond A4 - Below E. Chestnut
<b>Option 2</b>	<b>Beaver Branch</b> A2 - Below Wyoming Ave
	<b>Slab Cabin/Big Hollow</b> A4 Alt - Chestnut to Butternut
<b>Option 3</b>	<b>Beaver Branch</b> A2 - Below Wyoming Ave
	<b>Slab Cabin/Big Hollow</b> A3 Alt - Duck Pond*

Summarizing the above information, and something that may help to keep in mind as we move forward with presentation of detailed project information and costs, the following slide highlights possible project combinations to meet our PRP goals. All of the options require the Township to complete primary project A2 in Piney Ridge – below Wyoming Ave. There are several options for how we can complete our goals to Slab Cabin/Big Hollow (in the Spring Creek Watershed). In no significant order, option 1 would require us to complete a portion of A3- Duck Pond and A4 – below East Chestnut. Option 2 would require the Township to complete A4 Alt only– from East Chestnut to Butternut. Option 3 require additional participation in the Duck Pond Project – by purchasing additional credit from PSU – what we will call A3 Alt - Duck Pond. We will come back to this slide and add costs, but first I would like to introduce Shannon Lucas from KCI Technologies, to provide a review updated design details for Township projects A2, A4 and A4 Alt, as well as some additional findings. KCI has a highly experienced team and was chosen as the consultant to complete the environmental assessments concept and preliminary design for both PRP projects in the Township. Shannon is a senior project manager in the Natural Resources Practice, at KCI, where she oversees all aspects of the assessment, design, and construction implementation of stream restoration projects. I want to extend my sincerest thanks to KCI for the professional and collaborative role they have played to develop the projects- to this point, in a very short amount of time. Shannon.

# Existing Condition Assessments



- Agency Coordination (PNDI & PHMC)
- Wetland Delineations
- Invasive Species
- Geomorphic Survey
  - Cross Section & Profile
  - Bed Material
  - Bank Erosion
- Storm Drain & Culvert Assessment



In July KCI performed existing conditions assessments including

-Agency coordination to identify RTE's; Both projects are in the vicinity of northern long-eared bat habitat and therefore should not conduct tree removal from May 15 to August 15.

-Wetland Delineations – neither Beaver Branch nor Slab Cabin has wetlands beyond the channels

-Baseline Invasive Species Documentation ; both sites had Norway maple, amur honeysuckle, multiflora rose, Japanese knotweed, among others

-Geomorphic Survey (cross section and longitudinal profile, bed material measurements, bank erosion potential)

-and performed Storm Drain and Culvert Assessments



# Design Objectives

- Water Quality:
  - Reduce Sediment and Nutrients Loads (MS4 req)
- Resilience:
  - Self Maintaining System
  - Maximize floodplain connection
  - No increase to 100-yr floodplain elevation
  - Infrastructure Improvement
  - Native planting – biodiversity/habitat
- Residential Concerns:
  - Address property loss due to erosion
  - Address flooding
- Minimize Cost:
  - Minimize easements and rock armoring

the restoration design objectives include:

-reducing sediment and Nutrients loads by arresting erosion to improve WQ, this is to fulfil the MS4 permit requirements.

Resilience benefits by:

-establishing a self maintaining stream system,

-maximizing floodplain connection

-maintaining or reducing the 100-yr water surface elevation


-improving storm infrastructure

-establishing native plantings to improve habitat, stability, and biodiversity.

Addressing residents' concerns (flooding/property loss).

Minimizing cost by reducing easement needs and imported rock.

We looked to optimize use of existing easements and balance private ownership vs. work that has to be done;

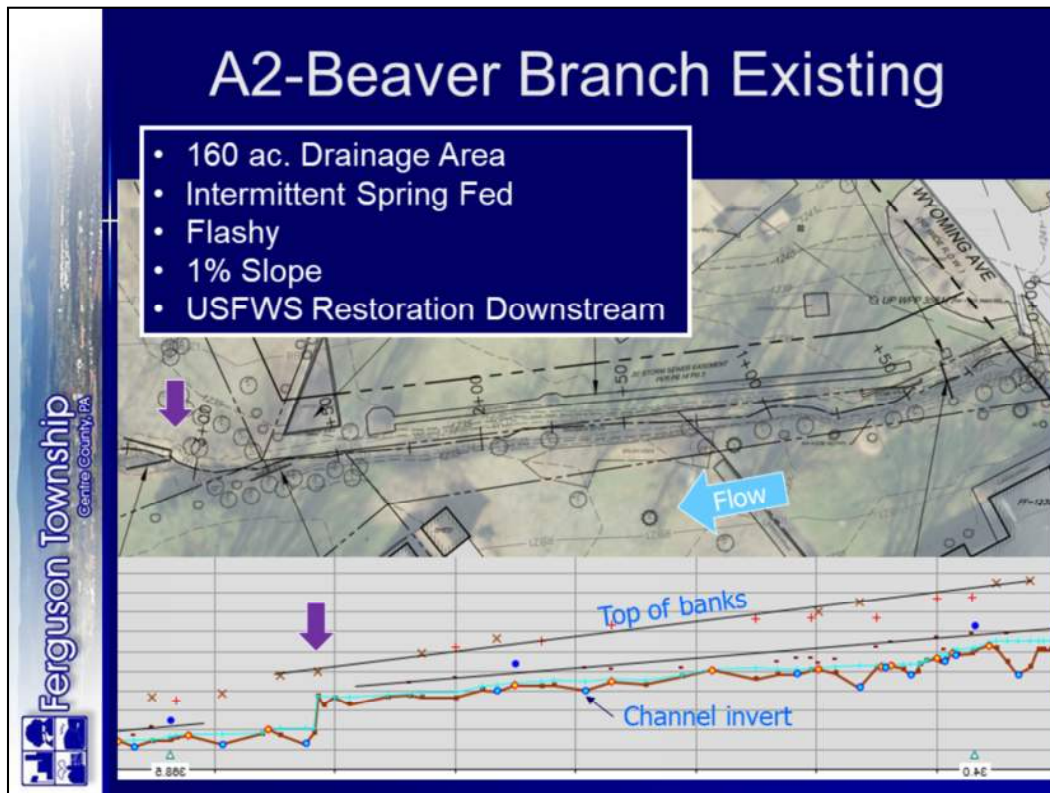


# Design Approach

- Natural Channel Design
  - Mimic natural stable stream systems.
  - Apply scaled dimensions and pattern of stable reference
  - Improve Bed Diversity
  - Utilize natural materials (rock, wood, vegetation)
- Optimize floodplain connection
- Validate stability (e.g. rock sizing) over a range of flows up to 100-yr
- Reduced maintenance and life cycle costs

KCI applies a Natural Channel Design Approach to mimic natural stable self sustaining streams.

- We apply scaled dimensions and relationships from a reference reach (like pool to pool spacing or radius of curvature)
- Look to provide bed diversity by introducing riffles and pools and
- We use native materials including salvaged rock, and native vegetation
- One of the most valuable elements of stream restoration is floodplain connection. In other words, giving the water a place to spread out, this can reduce the power and velocities that erode the channel bed and banks, reduce nutrients, attenuate flows to reduce downstream flooding , improve drought resilience, and create floodplain wetlands.
- We validate our designs, sizing rock and specifying materials to ensure long term stability over a range of flows – up to the 100-yr storm event.
- The result is reduced maintenance costs as compared to other alternatives including stormwater facilities.



We'll start with Beaver Branch,

According to the USGS streamstats, the channel receives runoff from about 160 acres of which 77% is forested, 17% is urban cover with 3% impervious surfaces.

Beaver Branch is an intermittent spring fed headwater stream that flows through a riparian buffer of maintained lawn and agricultural fields with scattered trees.

The channel is relatively flat with an average slope of approximately 1.0%,

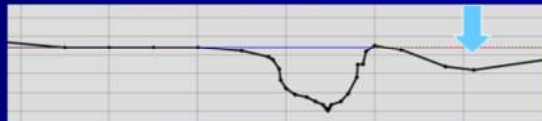
In 2017, United States Fish and Wildlife Service (USFWS) completed a stream restoration project beginning at the downstream extent of our A2 PRP reach.

This restored reach has incised or downcut since the restoration, however the cross vane is successfully holding

the grades upstream. (see purple arrows)

## A2-Beaver Branch Existing

- Bed and Bank Erosion
- Entrenched
- Silty Bed



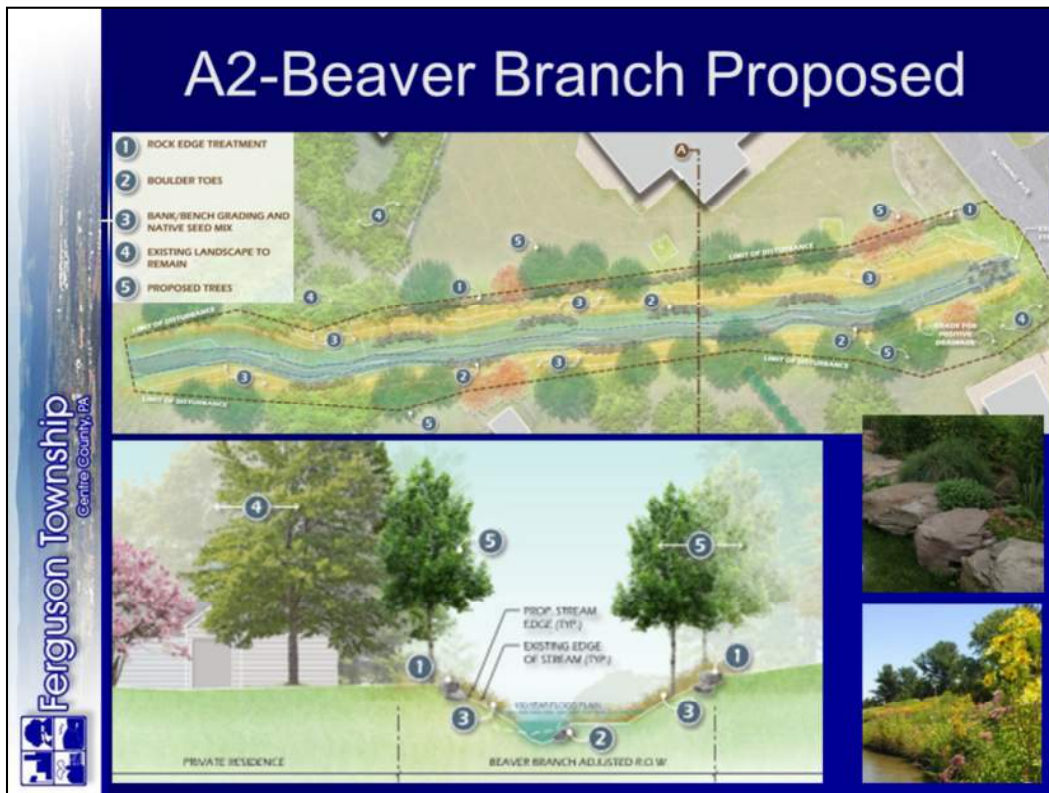
During runoff events, adjacent residents have experienced flooding. You can see the low area on the right looking upstream (blue arrows).

The channel is entrenched with little area for flood flows to spread out, the channel bed is dominated by silty material.

There is active bed and bank erosion.

There are Overhead lines span the stream at Wyoming Avenue.





The proposed restoration begins with a rock plunge pool to dissipate energy from the confined flows discharging from the Wyoming Ave.

We proposed to begin at the existing invert elevation, then lower the channel invert as we move toward the downstream end where we proposed to tie into the existing grade downstream of the cross vane.

The berms are graded down to allow for positive drainage to the channel to prevent flooding in yards.

The channel will be positioned to maximize use of existing easements

A edge treatment (for example the rock edge treatment depicted here) will delineate the residential yards from the Township maintained easement. Some meanders and pools will be graded in along with gravel riffles. Small boulder rock toe treatments and grade control elements to prevent future erosion.


The section view shows a proposed staged channel sized to convey flood flows up to a 100-yr storm.

A 6+' wide bench is graded in to allow for increased floodplain connection as well as serve as maintenance access.

Wisa – renderings☺

# A4-Slab Cabin

- 1.28 s.m. or 819 acres Drainage Area
- Class A Wild Trout water / Agency Coordination
  - Minimize Bed Disturbance
  - Reference reach evaluation and design



Ferguson Township  
Centre County, PA


Slab Cabin -Based on USGS StreamStats the drainage area (DA) is 1.28 sq. mi. or 819 acres of which: 97% is forest cover

-There are flashy flows with significant debris and bedload supply.

-classified by PA Fish and Boat as a Class A Wild Trout water and high quality stream  
DEP requested a reference reach evaluation and a design to match what occurs naturally.  
They also requested that the channel bed disturbance be minimized.

Other Permitting agencies concerns and requests include:

# A4-Slab Cabin



Other Permitting agencies concerns and requests include:

- Potential for creation of fish barriers
- Stream bed impacts and biological disturbance
- Ecological species establishment
- Assessment of an upstream reference reach for comparison
- Floodplain stability
- The entire disturbed area shall be planted with native species and monitored annually for invasives.
- Design water quality devices for incoming storm drain structures from Route 26, to reduce the fines from road salting
- Conceptual plan for revised future road crossing box culverts which allow fish passage
- ESA Clearance for bats. Run the PNDI and get clearance for any potential conflicts
- Construction details/sequencing to minimize impacts and meet permitting requirements
- Requires PASPGP-6 permitting with monitoring
- Complete Historic Clearance from PHMC Section 106


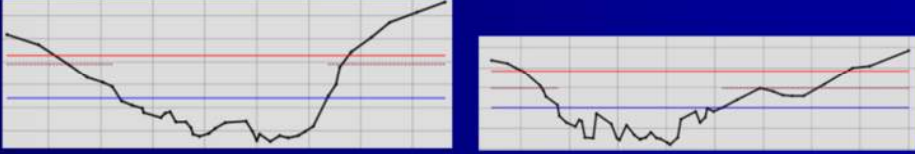
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# Slab Cabin Reference Reach

- 2% to 7%, cobble, moderately entrenched
- Step Pools, Cascades, Pocket Water Pools



Ferguson Township  
Centre County, PA

The Slab Cabin Reference reach located just upstream of E. Chestnut St. is a stable, moderate to steep (2% to 7% slope) cobble bed channel. It's moderately entrenched with low sinuosity (straight) with step-pools and cascades with pocket water pools, which play an important role in dissipating energy and providing velocity refuge for fish in fast waters."

(Rosgen, 2023).

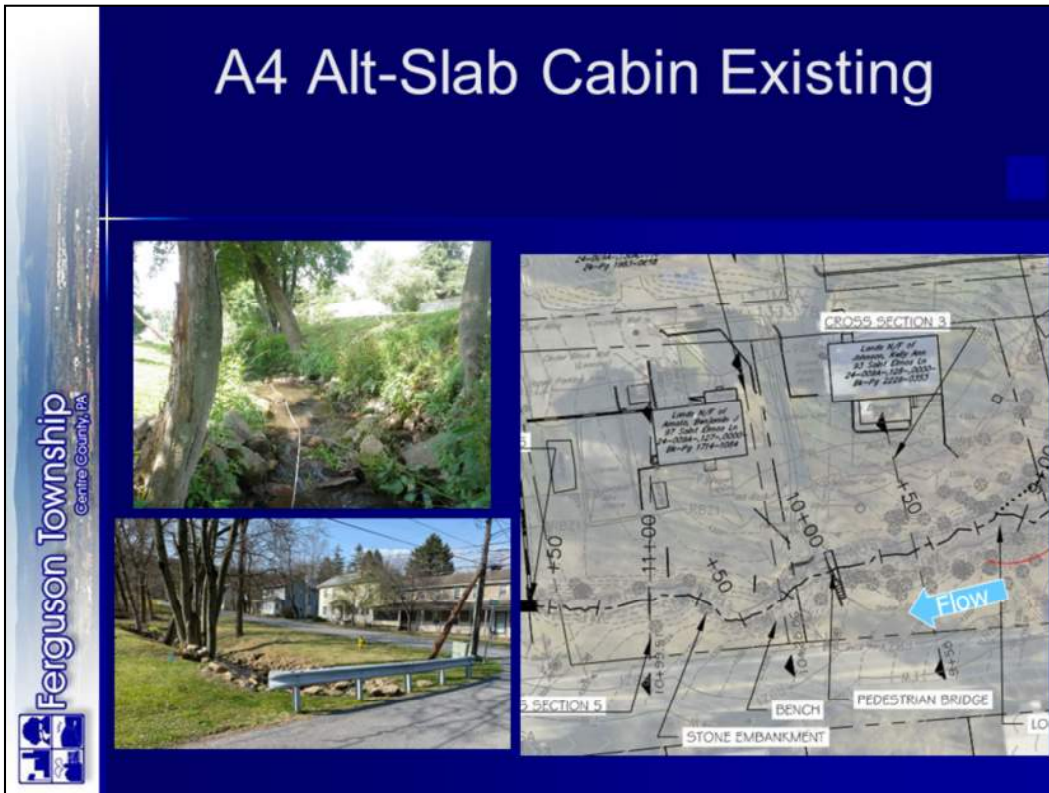
# A4-Slab Cabin Existing



The impaired A4 PRP reach just downstream of E. Chestnut st. has:

1. Scour at the downstream end of the culvert.
2. Property loss due to bank erosion. The red lines reflect areas of very high or extreme bank erosion.
3. Antiskid deposition from Water St. clogging the stormdrain outfall

# A4 Alt-Slab Cabin Existing



Continuing Downstream beyond the original 295 LF A4 reach to Butternut Street, the A4-Alt extended reach is

1. more narrow , and more entrenched (ie less floodplain connection)
2. The riparian corridor is Denuded with overhead and underground utilities;



The proposed design for the A4 295 LF reach involves

1. Adding a step pool to raise the bed of the channel to the culvert invert at E. Chestnut street to provide fish passage and dissipate energy.

1. Realign the channel away from the house with Step pools based on the reference reach.

By realigning the channel, We were able to minimize the amount of rock retaining walls needed reducing cost

2. Similar to Beaver branch, we've proposed rock edge treatments to delineate the easement and Township maintenance area.

3, Per the DEP request, we were also able to Minimize disturbance to the channel bed and the amount of in channel structures needed. Specifically, grading benches to improved floodplain connection, thereby reducing velocities and power currently confined to the channel.

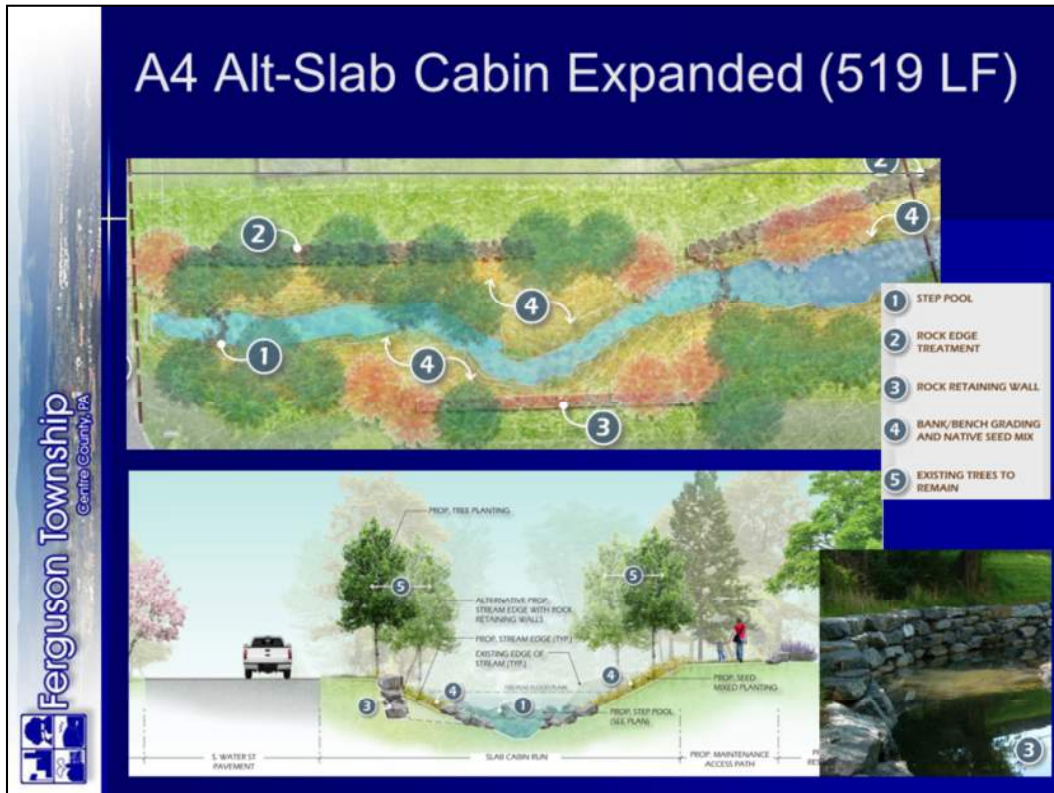
5. Leave mature trees where possible for habitat, shade and viewshed;

8. For the storm drain outfall , we propose a Snout insert to provide water quality treatment.





# A4 Alt-Slab Cabin Expanded (519 LF)



The proposed work for the expanded A4 Alt scenario includes

Strategic structure placement where other improvements are desired (ie pedestrian bridge removal; bank grading...). These will prevent downcutting and improve bed diversity.

This also meets DEP request to minimize bed disturbance and reduces costs.

We have done preliminary evaluation of the 100 year WSEL and rock sizing.

Overall the realignment, bank grading, and analysis, have allowed us to reduce the need for expensive retaining walls.

# Proposed Landscaping



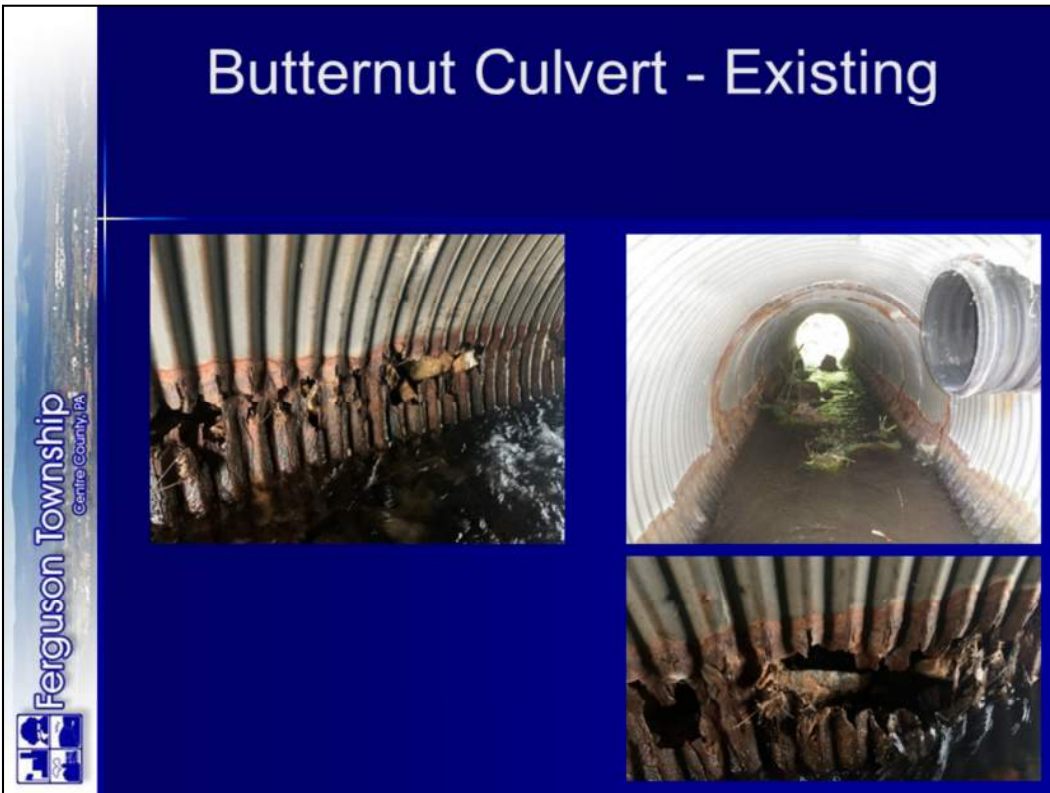
Native vegetation is a key component in all stream restoration projects,. They provide shade, habitat, soil stability, and are aesthetically pleasing for residents. Both projects would have native vegetation: Trees; shrubs; seed mixes as shown here and on the next slide.

# Proposed Landscaping



Both projects would have native vegetation: Trees; shrubs; seed mixes.

## Butternut Culvert - Existing



While not part of the PRP, KCI evaluated the Butternut Str. Culvert in July and found the condition Severely corroded

Township staff believes this should be designed and permitted for replacement within the next 5 years.


Downstream of the Culvert, there is a vertical drop.

# Butternut Culvert – Proposed



If the township wishes to pursue the design and permitting for this project, we would propose to replace the culvert with a depressed concrete box culvert, with Step pools downstream of the culvert to tie into the existing grade downstream of the vertical drop.

While this is not required as part of the PRP, doing the design and permitting concurrently with the A4 project, would provide significant efficiencies and cost saving for the design and permitting work.



# PSU Duck Pond Updates


PSU Additional Credit Offer (See letter in Board Packet) Highlights

- Increased offer of up to 506 L.F. of credit (up from 175 l.f.)
- Buy-In Costs are \$4.95 lb/year or \$569.25 per l.f.
- Routine maintenance covered by PSU.
- Restoration maintenance required proportional to % buy-in
- Subject to cost sharing agreement to be determined if Board/Manger provides a formal commitment.
  - PSU covers O&M at no additional costs
  - Cost sharing would require lump sum payment at the time work is completed.
- There are currently no known problems that need to be addressed.
- PSU's Stormwater Engineer extended invite to Board to visit the site.

Thank You Shannon. As stated earlier, PSU has offered Ferguson Township additional credit for the Duck Pond Project. The approved PRP allocated 175 l.f. of credit to Ferguson Township. As of 11/16/2023, PSU has offered up to 506 l.f. of credit. Ferguson Township now has an option to purchase as little or as much credit as we need, including enough to meet all requirements for PRP pollution reduction in Slab Cabin/Big Hollow (Spring Creek) watershed. The memo is included in the Board Packet. PSU has also provided some updated information as of today, so a few slides in the Board packet have been modified to reflect the additional information provided by PSU. Routine maintenance would be covered by PSU with no additional costs to the Township. Restoration maintenance would be proportionally financed by the cost-sharing partner equivalent to each partner's buy-in. A cost sharing agreement would be required. Costs sharing would require lump sum payments at the time work is completed. As the memo states, Penn State will not provide a draft agreement until a formal commitment is made by Ferguson Township. There are currently no known problems that need to be

addressed due to storm damage. PSU's Stormwater Engineer has extended the offer for the Board to visit the site. If the Board is obliged, I will be happy to coordinate through the manager for setting something up.





## Pros/Cons of Buying Into PSU Duck Pond

**Pros:**

- Township initial buy-in costs are significantly lower than costs for completing other PRP Projects.
- Everyday maintenance taken care of by PSU (reduction in staff time/costs).
- Goals for Slab Cabin/Big Hollow (Spring Creek) may be fulfilled with project already completed.

**Cons:**

- Gabions are a hard armor with a finite life span. Generally, gabions have a life expectancy of 10-75 years.
- Stream restoration proposed in Slab Cabin and Beaver Branch are intended to be a self-maintaining solutions.
- Does not address known problems in the Township.

There are several pros and cons to partnering with PSU on the Duck Pond. To begin with some of the pros, the up-front purchase cost of credits is comparably less than the costs of credits estimated for the projects in the Township. I will review this with the Board in detail at the end of the presentation. Routine maintenance would be covered by Penn State resulting in a reduction of staff time/costs. Depending on the amount of credit purchased, the Township could complete the goals for Slab Cabin/Big Hollow by purchasing 431 I.f. (43.1% share of the project) and we can focus on the final design and construction on Beaver Branch only.

There are also several cons. The gabion baskets are made of metal which will break down over time and will need to be replaced at some future point. Unlike the self-sustaining design proposed for the Slab Cabin and Beaver Branch Designs, the gabion system has a life expectancy of 10-75 years. Secondly the Township would not be addressing known problems in the Township. The impairments to the downstream will not be addressed. Whether the Board decides to include Butternut Street Culvert as part of the design and permitting, completion of the stream modeling could help to advance understanding and future design considerations of the Butternut Street Culvert. Finally, there are a lot of unknowns as far as future costs. This project was completed prior to the wild inflation that has occurred the last few years. Based on inflationary rates, project construction for the Duckpond would be estimated at a minimum of \$800,000 or more today. Staff looked at several example of future costs for reconstruction based on a 50-year life cycle and

2-3% inflationary rate scenarios. If the Township were to purchase 43.1%, construction costs and a lump sump payment of between \$950,000 and \$1.5 million should be anticipated if the entire system needs to be replaced in 50 years—excluding any additional design and permitting costs.

# Costs Update

PRP Cost Estimates For Project Completion / MS4 Permit Compliance										
Primary Project Options	Length	Actual Length	Construction Cost Low (January Work Session)	Construction Cost High (January Work Session)	Updated Estimated Construction Costs (w/ 10% Contingency)	Design/ Permit/ROW Acquisition (January Work Session)	Updated Design/ Permit/ROW Acquisition Estimate	Total Cost Low (January Work Session)	Total Cost High (January Work Session)	Total Additional Anticipated Cost (For Completion)
A2 - Piney Ridge - Below Wyoming Ave - Beaver Branch <sup>1,2</sup>	350	359	\$ 210,000	\$ 245,000	\$ 177,065	\$ 64,000	\$ 118,546	\$ 274,000	\$ 309,000	\$ 245,611
A3 - Duck Pond - Slab Cabin <sup>1</sup>	175	136	NA	NA	NA	NA	NA	NA	NA	\$ 77,418
A3 Alt - Duck Pond - Slab Cabin Extended <sup>1</sup>	431	NA	NA	NA	NA	NA	NA	NA	NA	\$ 245,347
A4 - Chestnut to Butternut - Slab Cabin <sup>1</sup>	300	295	\$ 495,000	\$ 666,140	\$ 532,868	\$ 217,181	\$ 219,105	\$ 712,181	\$ 883,321	\$ 751,974
A4 Alt - Chestnut to Butternut - Slab Cabin <sup>1,2,3</sup>	518	519	\$ 847,000	\$ 1,150,200	\$ 709,524	\$ 375,000	\$ 291,234	\$ 1,222,000	\$1,525,200	\$ 1,000,759

- 431 l.f. required to meet goals Slab Cabin /Big Hollow (Spring Creek) pollution reduction for this permit cycle
- Township must complete Beaver Branch Project
- Anticipating credit banking for next PRP cycle (DEP has not provided direction on banking with next permit cycle to date)

Getting into the costs, this slide provides a updates on all the primary projects. For the benefit the Board, information previously presented at the Board work session is shown in black, and updates/new information are in red. One trend you will notice with the updated costs is that the Total Costs are anticipated to be at or below the low costs presented at the work session. The reductions were due to the design updates made by KCI, eliminating walls/hard armoring in favor of grading to expand the floodplain/reduce velocities. Construction costs for A2 on Beaver Branch are estimated at \$515 per l.f. with an additional \$120,000 required for ROW acquisition, final design and permitting, for an estimated linear foot completion costs of \$702 per linear foot or \$246,000. Costs for construction of the A3- the Duck Pond were \$569.25 per l.f. and therefore costs for A3- 131 l.f. or A3 Alt- 431 l.f, are \$77,418 or \$245,347 respectively. Construction cost for A4 – 295 l.f. is estimated at \$1,806 per l.f with an additional \$220,000 required for ROW acquisition, final design and permitting – for a estimated completion cost of \$2,549 per l.f. or \$752,000. Construction costs for Alt A4 are estimated at \$710,000 or \$1,368 per l.f. with an additional \$290,000 for ROW acquisition, final design and permitting which is a total estimated completion costs of \$1,928 per l.f. or \$1,001,000. Please note that for any additional linear footage of stabilization required to meet PRP goals (namely - projects A2 beaver branch and A4-Alt on slab cabin), the Township should anticipate banking additional credit for the next PRP cycle. No details on Pollution reduction credit requirements or banking- for the next PRP cycle requirements, have been provided by DEP to date; however the Township can anticipate 271 l.f. of banking for A2 on Beaver Branch and 88 l.f. Alt – A4 Slab Cabin.



## Next Steps / Schedule

Board decision on whether to buy-in to PSU Duck Pond (and what percentage) is required before staff can move forward.

Tentative Schedule For Projects in the Township (A2, A4, A4 Alt)

- December 2023- Incorporate any Board comments into projects preliminary design
- January 2024- Obtain proposals from KCI for final design, permitting and construction drawings
- January 2024- Obtain approval from Board for consultants to continue with final design, permitting and preparation of construction drawings
- March - Prepare easements/claims
- June – Submit permits
- October – Obtain easements/finish processing claims Claims
- January 2025 Permitting/final design/construction drawings complete
- January/February 2025- Bid work for completion

Time is of the essence for completion of Township projects.

Ultimately, staff hopes the Board will decide what direction to take for completion of the PRP Goals. Will the Township participate in the Duck Pond and if so, how much? If the Board buys into the Duck pond for the total amount of credit, then the Township is only concerned with completing the project on Beaver Branch. The schedule for final design, permitting and construction - for any of the Township projects is extremely tight. After tonight, Staff will direct KCI to incorporate any Board comments from this meeting or comments provided soon after – into the projects. Staff will notify KCI of the Townships intentions. In Early January, we will obtain the proposal(s) from KCI for final design, permitting and construction drawings (again based on which projects the Board would like to complete, but at a minimum for Beaver Branch). Staff will seek board approval for the proposal(s) in January, so the design work can continue. After direction is set, staff will contact residents to provide updates. In March, the consultants will need to provide the limits of the easements so that the Township can begin the claims process. By June the final design will be completed, and permits submitted. By October we will need to have the claims finished so that approved easements are in place to receive permitting. We anticipate all permitting construction drawings, and other details will be completed January 2025 for the project to bid. The project needs to be completed by June 2025. Timely Board input and direction for moving forward will be critical to completing the work.

# Board Discussion/Input



Project Combinations to Meet Minimum Goals		Completion Cost Estimates
Option 1	Beaver Branch A2 - Below Wyoming Ave	\$1,075,002
	Slab Cabin/Big Hollow A3- Duck Pond A4 - Below E. Chestnut	
Option 2	Beaver Branch A2 - Below Wyoming Ave	\$1,246,370
	Slab Cabin/Big Hollow A4 Alt - Chestnut to Butternut	
Option 3	Beaver Branch A2 - Below Wyoming Ave	\$490,958
	Slab Cabin/Big Hollow A3 Alt - Duck Pond	

Questions?

This slide presents the three main options for meeting the PRP goals. Again, it is noted that all options result in potential credit banking for Beaver Branch and Option 2 (the most expensive) results in credit banking for Slab Cabin. Butternut Street Culvert is not included with any of these options; however there are additional alternatives associated with that as well – namely that if the Board wished to visit an option to complete design and permitting for a culvert, there would be some efficiency (savings) to completing design/and permitting if completed together with permitting for Slab Cabin (versus design and permitting as a separate project). With that, I will turn it over to the Board for questions/discussion and advisement for how staff should proceed.

# Board Discussion/Input

Primary Project Options	Length	Actual Length	Updated Estimated Construction Costs (w/ 10% Contingency)	Construction Cost Estimate Per LF	Updated Design/ Permit/ROW Acquisition Estimate	Total Additional Anticipated Cost (For Completion)	Completion Estimate Per LF
A2 - Piney Ridge - Below Wyoming Ave - Beaver Branch <sup>2,3</sup>	350	359	\$ 177,065	\$ 493	\$ 118,546	\$ 245,611	\$ 684
A3- Duck Pond - Slab Cabin <sup>1</sup>	175	136	NA	\$ 569	NA	\$ 77,418	569.25
A3 Alt - Duck Pond - Slab Cabin Extended <sup>1</sup>	431	NA	NA	\$ 569	NA	\$ 245,347	569.25
A4 - Chestnut to Butternut - Slab Cabin <sup>1</sup>	300	295	\$ 532,868	\$ 1,806	\$ 219,105	\$ 751,974	\$ 2,549
A4 Alt - Chestnut to Butternut - Slab Cabin <sup>1,2,3</sup>	518	519	\$ 709,524	\$ 1,367	\$ 291,234	\$ 1,000,759	\$ 1,928



Questions?