Quaker Run and Buck Run Watershed Assessment and Restoration Plan

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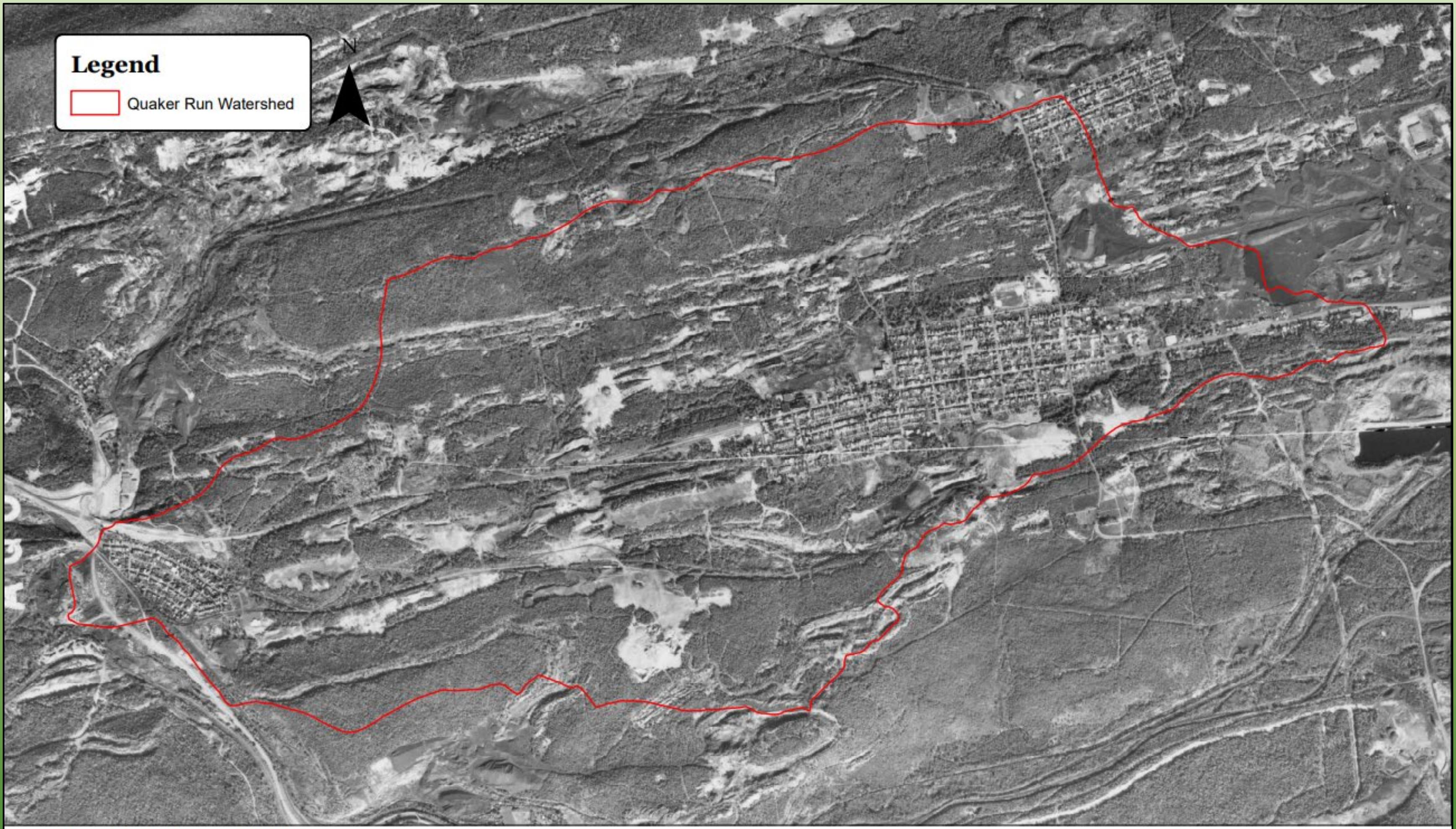
Restoration Process

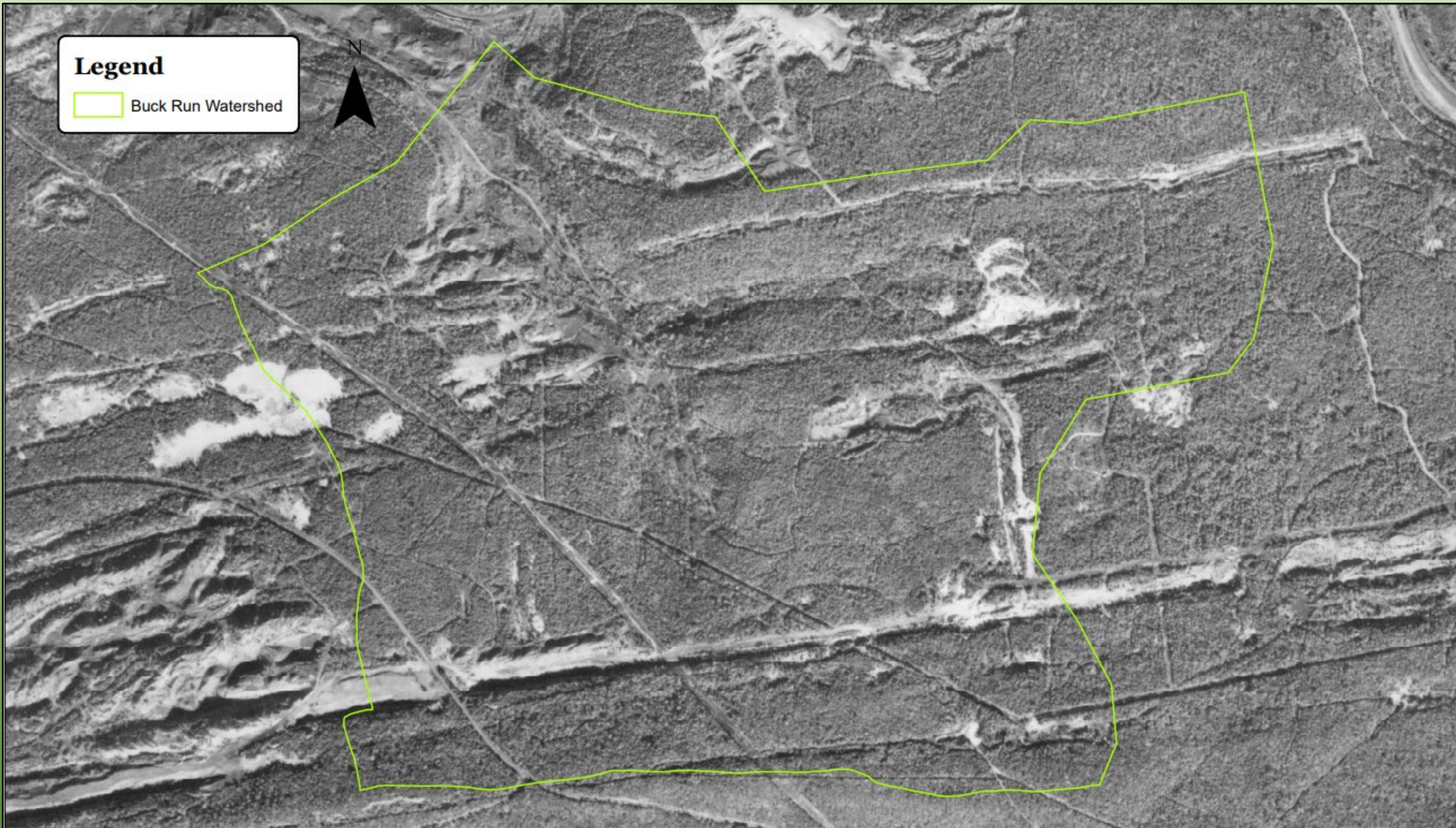
- ✓ Develop a Vision: Restore water quality
- ✓ Secure Funding and Plan Initial Investigations
- ✓ Complete Restoration Plan to Leverage Funding
- ❑ Secure Funding for Priority Restoration Projects
- ❑ Complete Design and Implementation of Priority Restoration Projects
- ❑ Evaluate Successes and Failures
- ❑ Convey Lessons Learned



Data Sources:
Clauser Environmental, LLC
www.pasda.psu.edu
PennPilot

Quaker Run Watershed
1969 Aerial Photos
Northumberland County, PA

SCRA · Northumberland County Conservation District · EPCAMR · CLAUSER environmental llc



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Buck Run Watershed
1969 Aerial Photos
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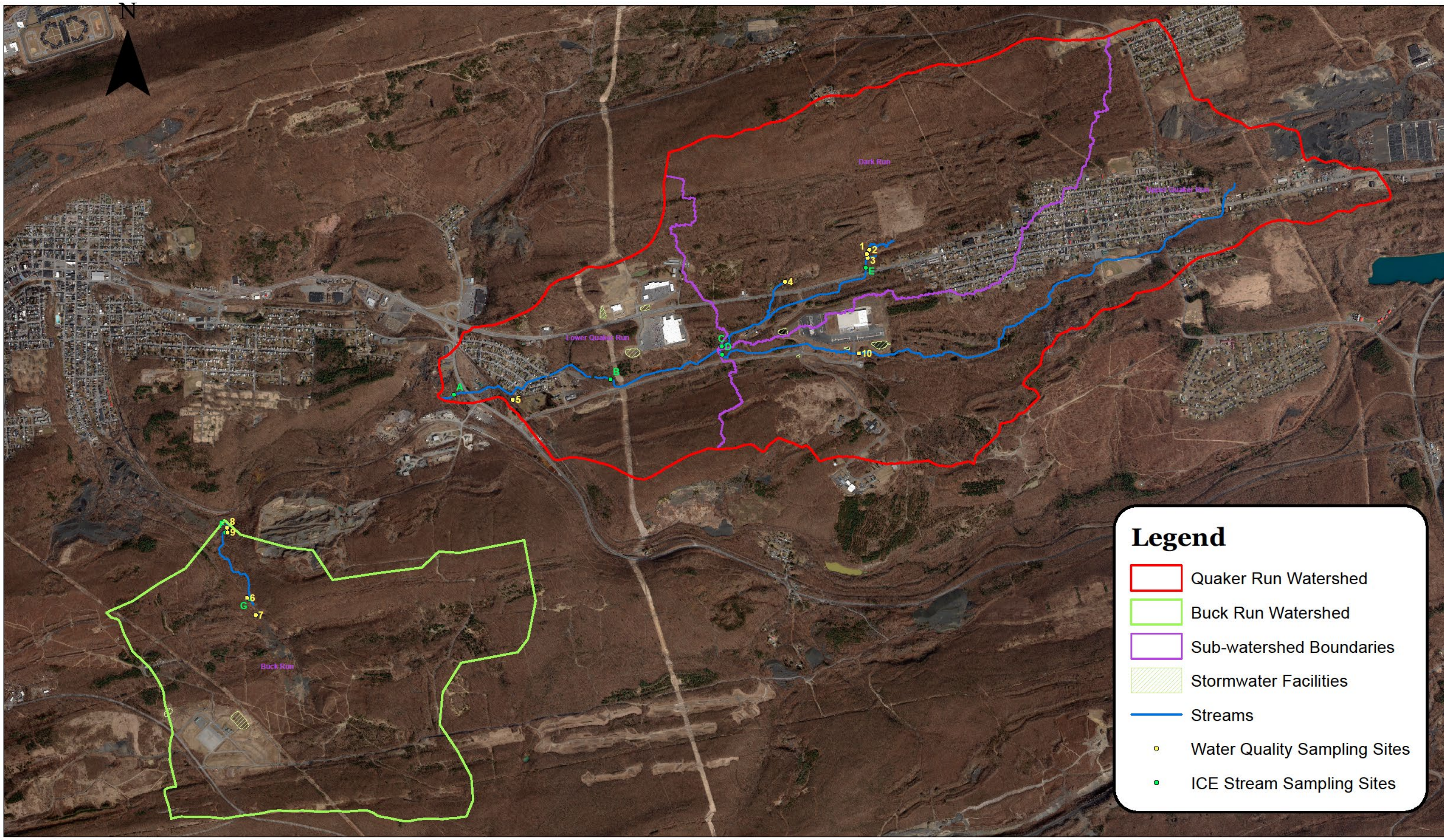
Quaker Run and Buck Run Watersheds
Percentage Impervious Cover and Forest Data

Sub-watershed	Approx. Total Acreage	Approx. Impervious Acreage	Approx. Impervious Percent	Approx. Forested Acreage	Approx. Forested Percent
Upper Quaker Run	979	124	12%	548	56%
Dark Run	890	37	4%	712	80%
Lower Quaker Run	441	42	9%	313	71%
Quaker Run Total	2,310	203	9%	1,573	68%
Buck Run Total	934	9.34	1%	775	83%



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Data Sources:
Clauser Environmental, LLC
www.pasda.psu.edu
PEMA 2018 Aerial Photo

Quaker Run and Buck Run Watersheds
Sample Sites, Stormwater Facilities,
and Sub-Watershed Location Map
Northumberland County, PA

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Quaker Run and Buck Run Watershed

Mean Water Quality Field Sampling Data

Site	Flow gpm	Temp (°C)	DO (mg/L)	DO (% sat.)	pH	Cond. (umhos)	Specific Cond. (umhos)	TDS (mg/L)	Salinity ppt
1	1125	11.7	0.98	13.2	5.55	434.6	581.8	358.5	0.3
2	16	9.3	8.38	70.7	6.46	103.8	148.8	91.8	0.1
3	5528	11.6	3.90	34.6	5.77	432.0	580.0	355.2	0.3
4	769	11.8	8.45	75.4	5.80	406.0	542.4	351.2	0.3
5	737	11.4	3.78	34.5	6.29	413.1	559.3	345.4	0.3
6	805	11.6	1.69	15.5	4.40	503.0	678.0	418.1	0.3
7	0	11.2	2.24	20.2	5.30	307.6	417.8	259.5	0.2
8	1011	11.5	9.56	87.8	4.53	490.5	662.0	409.2	0.3
9	0	10.5	7.72	68.9	3.86	323.4	446.6	266.8	0.2
10	8	18.4	6.35	66.4	6.32	216.9	243.4	149.4	0.2

Table 6: Quaker Run and Buck Run Watersheds ICE Water Quality Field Sampling Data (3 Feb 2020)

	Temp	DO	DO	Field pH	Salinity	Cond.	Specific Cond.	Est. Flow	TDS
Site	(°C)	(mg/L)	(% sat.)		ppt	(umhos)	(umhos)	(gpm)	(mg/L)
A	11.7	10.35	95.4	6.53	0.3	409.9	550.0	8033	338.0
B	11.9	11.21	103.6	6.83	0.3	416.8	554.0	9716	346.5
C	11.7	11.60	106.9	6.79	0.3	425.1	570.0	6794	347.8
D	4.1	12.22	93.1	6.64	0.1	126.9	203.5	0	145.6
E	11.7	4.39	40.5	5.55	0.3	428.8	575.0	4097	353.0
F	11.4	10.49	96.2	4.68	0.3	482.0	651.0	709	413.4
G	11.4	8.30	75.8	4.87	0.3	517.0	699.0	539	429.0

Quaker Run and Buck Run Watersheds
Impairment Determination Values (3 Feb 2020)

Site	Macroinvertebrate IBI Value	Habitat Value
A	16.1	156
B	12.7	182
C	0.0	157
D	20.7	107
E	8.7	161
F	18.2	177
G	8.5	169

Macroinvertebrate and habitat impairment are based upon the DEP ICE protocol (March 2009 Draft).
Blue values indicate unimpaired; red values indicate impaired.

Restoration Planning

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Plan Components

- GPS point locations and action items
- Prioritized projects
- Cost estimates
- Ideas for outreach and implementation
- List of potential partners
- Restoration BMP handout sheets

Stream Walk

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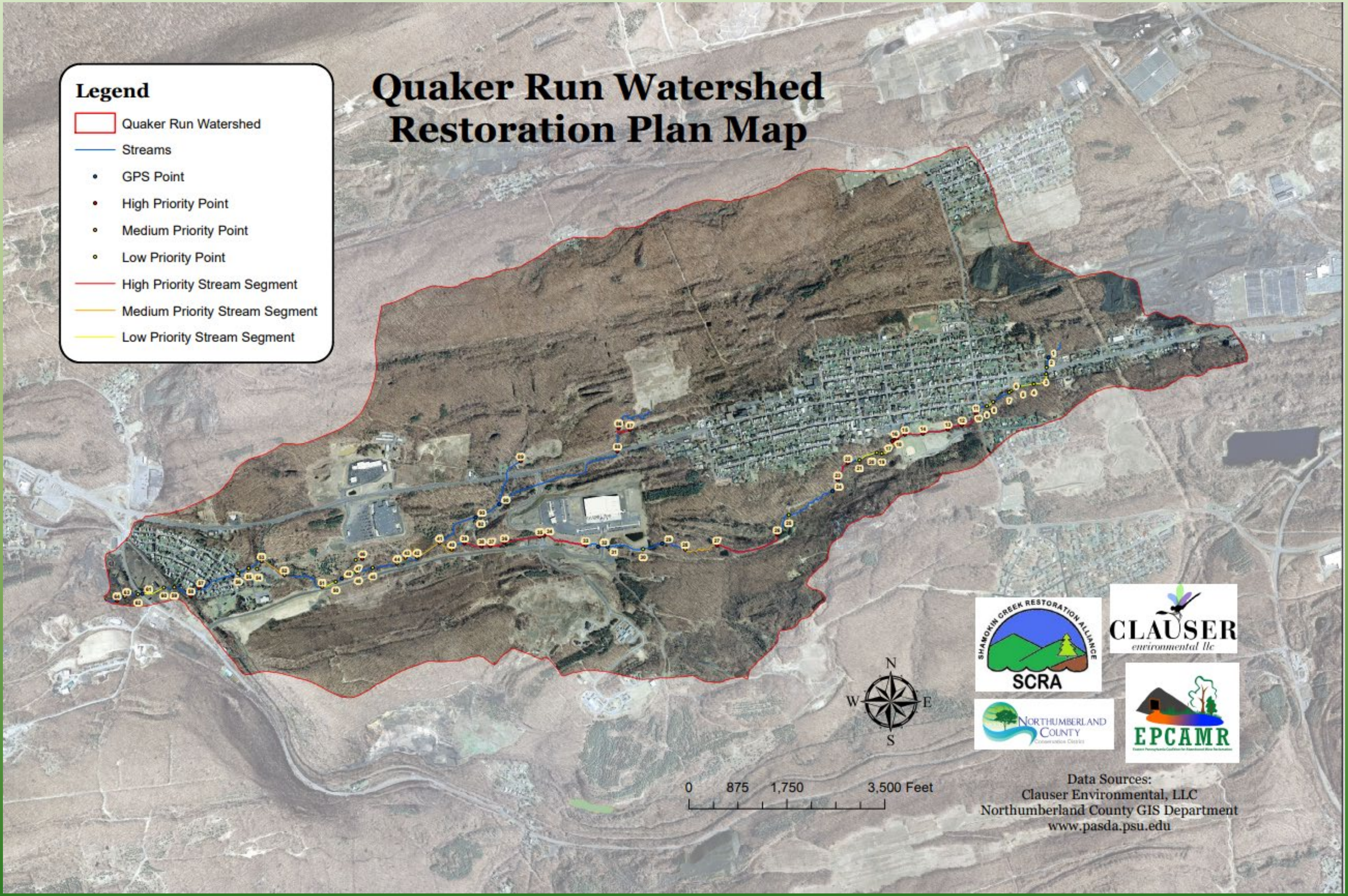
Point #	Description	Action Item	Key Partners	Priority	Comments
24	At this point, multiple braided channels converge into a single thread channel that contains water. The multiple braided channels are in an area of substantial deposition from the upstream eroding streambanks. The channel is stable downstream of this point.				
25	Upstream of this point, the stream channel is connected to the floodplain, is stable, and contains flowing water. A culvert at this point carries the stream under an existing dirt road.	Stabilize the road with gravel or driving surface aggregate	Landowner	Low	
26	The stream is diverted to the south of a strip mine pit that is located in the central part of the valley floor in this location.	Mine reclamation	SCRA, BAMR, Landowner	High	
27	The streambanks are eroded and 2-3' high downstream and for approximately 100' upstream of this point. The upstream channel is diverted around strip mine pits and is not located in the historic location on the valley floor. Clay is present on the bottom of the channel. Flowing water was present on the day of the streamwalk. No fish were observed in this area.	Mine reclamation, streambank stabilization	SCRA, BAMR, NCCD, Municipality, Landowner	High	
28	The streambanks upstream of this point are 2-3' high and actively eroding. Downstream of this point, the streambanks are stable and connected to the floodplain.	Streambank stabilization	SCRA, BAMR, NCCD, Municipality, Landowner	Medium	
29	Upstream end of large created wetlands				
30	At this point, an unstable ford crosses over the downstream portion of the constructed wetlands. Downstream of the ford, the wetland drains back into a stream channel.	Stabilize ford crossing	SCRA, NCCD, Landowner	Low	
31	The access road to Reinhart Foodservice crosses over the stream in this location.				The upstream restoration area is providing excellent habitat and improving water quality.
32	The outfall from the road crossing has created a scour hole that contains sunfish and other fish. The downstream corridor was previously restored and planted with riparian vegetation.				


Quaker Run Watershed
Restoration Plan Map
Legend
Quaker Run Watershed
Streams
GPS Point
High Priority Point
Medium Priority Point
Low Priority Point
High Priority Stream Segment
Medium Priority Stream Segment
Low Priority Stream Segment
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Data Sources:
Clauser Environmental, LLC
Northumberland County GIS Department
www.pasda.psu.edu

High Priority Projects

Impacted Stream Segment #11-18:

- Substantial infiltration of Quaker Run into underground mine pool
- Infiltration results in downstream areas being dry most days, despite upstream flow
- Eroding streambanks
- Trash and debris dumped upslope

Solution:

- Restoration of existing channel
- Stormwater retrofits including a bioretention area
- Streambank stabilization
- Litter cleanup

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High Priority Projects

Impacted Stream Segment #22-23:
- Stream previously moved for mining operations
- Extreme erosion of 5-15’ streambanks
- Erosion contributing to sediment pollution in stream channel

Solution:
- Riparian zone restoration
- Connection to active floodplain
- Streambank stabilization

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NCCD NORTHUMBERLAND COUNTY Conservation District

EPCAMR Eastern Pennsylvania Coalition for Abandoned Mine Reclamation

High Priority Projects

Impacted Stream Segment #26-27:
- No active floodplain
- Section of Quaker Run diverted south of strip mine pit

Solution:
- Reclaim strip mine pit
- Streambank stabilization
- Restore an active floodplain to the area
- Install a clay liner in stream bed
- Plant native vegetation

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High Priority Projects

Impacted Stream Segments #33-39:

- Infiltration to an underground mine pool leaves the downstream portion of the channel dry
- Active erosion of 3-10' high stream banks
- Invasive plants dominate that floodplain

Solution:

- Re-mining of the stream section and reclamation of the valley
- Elimination of underground mine workings
- Streambank stabilization
- Reconnection of floodplains
- Removal of invasive species and planting of natives

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High Priority Projects

Impacted Stream Segments #46, 58:

- Mine drainage discharge contaminates stream channel
- Heavy contamination of metals
- pH of 6.18-6.45

Solution:

- Reduce mine infiltration, removal of waste coal
- Elimination of underground mine operations
- Blocking the mine entrance with a cage that still allows for the passage of bats

High Priority Projects

Impacted Stream Segments #62-64:

• Sewer overflow directly discharged into Quaker Run
• Only treatment of this sewage is bleach
• Quaker Run contaminated with feces, urine, grease, and harmful chemicals
• This puts downstream communities at risk

Solution:

• Separation of stormwater discharges and sewer systems
• Local authorities already working on this separation

High Priority Projects

Impacted Stream Segments #85-87:

- Scott Ridge Mine Tunnel Discharge
- Discharge to Dark Run contaminated with mine drainage
- Heavy contamination of metals
- pH of 5.77

Solution:

- Reclamation of above and below ground mine workings
- Limiting surface water drainage
- Treatment of mine discharge

High Priority Projects

Impacted Stream Segment #89:

- Colbert Mine Discharge
- Heavy contamination of metals
- Discharge has pH range of 5.68 to 5.86

Solution:

- Remining, reclamation and limiting flow to the mine pool
- Treatment of the mine discharge

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Buck Run Watershed
Restoration Plan Map
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NORTHUMBERLAND
COUNTY
EPCAMR
Legend
Buck Run Watershed
Streams
GPS Point
High Priority Point
Medium Priority Point
Low Priority Point
High Priority Stream Segment
Medium Priority Stream Segment
Low Priority Stream Segment
Data Sources:
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0
625
1,250
2,500 Feet
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High Priority Projects

Impacted Stream Segment #67-71:

• The Big Mountain Discharge is the principal contributor to Buck Run flow
• Heavy contamination of metals
• Average pH of 4.40

Solution:

• Remining, reclamation and limiting flow to the mine pool
• Treatment of the mine discharge

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High Priority Projects

Quaker Run and Buck Run Reclamation:

•Bulk of the watershed has been impacted by surface and/or deep mining for anthracite coal
•Metals and siltation from the abandoned deep mine discharges and waste coal piles
• Highly disturbed headwaters of both Quaker Run and Buck Run

Solution:

•Continued reclamation of mine scarred lands
•Remining of areas where abandoned deep mines can be eliminated
•Removal of culm (waste coal) piles
•Reduction of water infiltration into existing mine pools
•Treatment of abandoned mine drainage discharges

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Restoration BMP Handouts

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Streambank Stabilization

Within the Buck Run and Quaker Run Watersheds, some stream segments are impaired by erosion and sedimentation within the stream itself. When streambanks erode, sediment that is discharged to the stream channel smothers the small nooks and crannies between the rocks on the streambed that provide micro-habitat areas for the instream community. Sediment discharges are often partnered with the release of soil bound nutrients. Within these areas, stream restoration and stabilization are often effective tools to improve in-stream habitat and water quality.

Stream restoration within the watershed should focus on long-term stability of the stream by looking at the stream's pattern, profile, and dimension. Where streambanks are actively eroding, stabilization that focuses on establishing native vegetation is often the best long-term option. As the vegetation becomes established, a combination of rip-rap and vegetation are often implemented to provide stabilization. The use of well positioned in-stream deflectors, cross-vanes, j-hooks, and straight vanes can help to hold the streambanks in place as the vegetation becomes established. These structures, when utilized effectively, minimize streambank erosion by reducing the force of water that is scouring the bank surface and provide habitat for many types of aquatic life.

For more information please contact:
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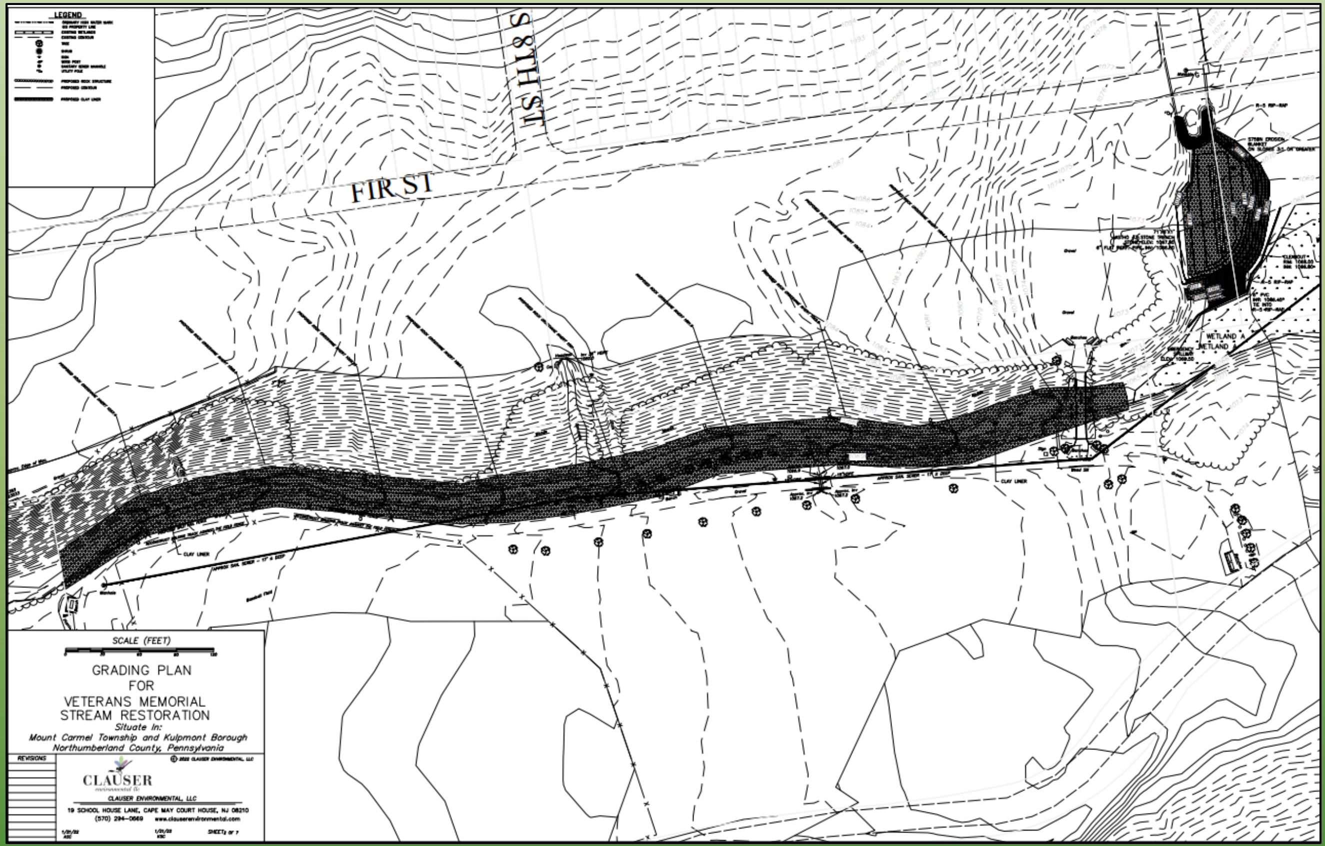
Project Design and Permitting



Implementation

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