Summer Intern Stream Reconnaissance Surveys 2023
Summary of Existing Conditions and Recommendations




October 2023

CLEAR CREEKS CONSULTING

1317 Knopp Road, Jarrettsville, Maryland 21084

(410) 692-2164

Summer Intern Stream Reconnaissance Surveys 2023
Summary of Existing Conditions and Recommendations

Prepared for

Quittapahilla Watershed Association

Doc Fritchey Trout Unlimited

The Lebanon Valley Conservancy

and

Lebanon County Conservation District

Prepared by

Clear Creeks Consulting, LLC

October 2023

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Introduction

A major component of the overall Quittapahilla Creek Watershed Assessment conducted between 2001 and 2003 was the Field Reconnaissance Surveys of the major tributaries to Quittapahilla Creek. The data collected during these surveys was utilized to identify problem areas and potential restoration projects in the subwatersheds. That information was summarized in the Quittapahilla Creek Watershed Restoration and Management Plan (Clear Creeks Consulting, 2006) and more recently in the Quittapahilla Creek Watershed Implementation Plan (Clear Creeks Consulting, 2021).

When the Quittapahilla Watershed Association (QWA) initiated the Summer Intern Program in 2017 the original data was sixteen years old. The Summer Intern Program involves conducting Field Reconnaissance Surveys of the subwatersheds that documents current stream reach conditions and determines the continued need for restoration/stabilization along the subwatershed stream reaches.

These surveys have been conducted by summer college interns funded by grants obtained by QWA and Doc Fritchey Chapter of Trout Unlimited and trained by Clear Creeks Consulting. The focus of the 2017 surveys was the stream reaches in the Snitz Creek subwatershed. Similar assessments were conducted during summer 2018 and 2019 along Beck Creek and Bachman Run subwatersheds, respectively. COVID prevented internships for 2020 and 2021. Funding was not available in 2022. The 2023 summer's interns initially focused on the Gingrich Run and Killinger Creek subwatersheds, but the effort was expanded to include Snitz Creek subwatershed. Funding for the 2023 Intern Program was provided by the Lebanon County Conservation District (LCCD) with grant administration provided by The Lebanon Valley Conservancy.

Methodology

Protocols

Clear Creeks Consulting developed the protocols for the surveys to provide information that can be utilized to evaluate overall riparian, channel stability, in-stream habitat and water quality conditions. The survey included:

- Characterization of existing riparian land use, channel and in-stream habitat conditions based on
- Visual observations, measurements, mapping and photo documentation of:
    - Riparian vegetation condition and stream buffer widths;
    - Channel morphology including channel dimensions, streambed material;
    - Channel stability including streambank erosion, streambed erosion or deposition, channel blockages, and channel alterations;
    - In-Stream Habitat including percent shading, riffle embeddedness, pool quality, riffle/pool ratio, in-stream fish cover, and aquatic insect habitat;
    - Water quality including water appearance and nutrient enrichment

Field Forms and Guidance Materials

The interns were provided with the following materials developed by Clear Creeks:

- Stream Visual Assessment Field Data Form
- Stream Visual Assessment Field Data Summary Form
- Reconnaissance Survey Field Guide Book
- Location maps (showing location of Gingrich Run, Killinger Creek and Snitz Creek relative to roads)

- Gingrich Run and Killinger Creek Property Ownership by Stream Reach with Landowner Names and Addresses
- Aerial photographs (showing Property ownership, property boundaries, Reach ID#, reach limits)
- Topographic maps (showing Reach ID#, reach limits)
- Basic Invertebrate Key for identifying stream insects and other invertebrates

Field Equipment

The interns were provided with the following field equipment by QWA:

- 100 ft. Measuring Tape / ft./ 10ths / 100ths
- Level Rod/ ft./10ths / 100ths
- Clinometer
- Ruler, 12 inch (inches and centimeters)

Intern Responsibilities

The interns were responsible for:

- Maintaining field equipment and field forms and additional field materials in good condition and return to Quittapahilla Watershed Association (QWA).
- Developing Snitz Creek Property Ownership by Stream Reach with Landowner Names and Addresses
- Developing Snitz Creek aerial photographs (showing Property ownership, property boundaries, Reach ID#, reach limits)
- Completing all Field Data Forms and Field Data Summary Forms for each stream reach evaluated. Mapping and photo-documenting the existing conditions along all stream reaches surveyed.
- Compiling a Report/Notebook Binder separated by stream reach that includes the completed field forms and data summary forms, maps and photographs. Appendices include the Aerials with Property/Reach Boundaries and a List of all Property Owners.
- After a QA/QC review by Clear Creeks, the Report/Notebook Binder will be submitted to the Lebanon County Conservation District (LCCD) for distribution to the Quittapahilla Watershed Association, Doc Fritchey Trout Unlimited and The Lebanon Valley Conservancy.

Summary Report and Recommendations

To develop the following narrative, data summary tables and revised aerials Clear Creeks Consulting:

- Analyzed the data provided on the Reconnaissance Survey Data Summary Forms prepared by the interns.
- Analyzed the reach-specific photographic documentation provided by the interns.
- Analyzed the Aerial Imagery provided on the Lebanon County Tax Assessment website's Parcel Viewer.
- Analyzed the Satellite Imagery provided on Google Earth Pro.
- Measured and recorded individual stream reach lengths using the Parcel Viewer GIS tools on the Lebanon County Tax Assessment website.
- Prepared final adjustments to some reach limits and to reach-specific information in the Reconnaissance Survey Data Summary Forms based on Clear Creeks Consulting's review of the above information and discussions with the interns. Those adjustments are included in the narrative, data summary tables and revised aerials.
- Restoration recommendations were developed by Clear Creeks Consulting based on the problems identified and best professional judgment regarding the appropriate techniques for correcting those problems.

Findings of the 2023 Field Reconnaissance Surveys

General

The land use in some of the subwatersheds has changed dramatically since the original reconnaissance surveys were conducted. Areas that were principally agricultural land with active livestock grazing or row crops have been replaced by residential subdivisions and/or commercial uses.

Riparian, channel, in-stream habitat conditions and water quality conditions vary considerably along the stream reaches surveyed. For some sections of the stream reaches, conditions have improved since the original surveys. For other sections of the stream reaches, conditions have deteriorated. Under both situations the changes appear to be directly related to the land management practices of individual property owners and their neighbors.

Gingrich Run

The reconnaissance survey of Gingrich Run covered 49,521 linear feet (9.38 miles) of stream. The results of the survey documented that 17,799 linear feet or 35.9% of the stream is currently unstable. The unstable conditions include streambank erosion; channel incision with active head cuts; aggradation, debris jams; earthen and rubble berms along the streambanks; livestock impacts; and failing infrastructure (i.e., exposed petroleum pipelines, failed dams, failing culverts). The unstable conditions vary by reach from minor, localized erosion to widespread and severe. Table 1 below summarizes the results of the survey by stream reach and property ownership.

Table 1 - Gingrich Run Existing Conditions Summary Table

Reach ID	Location	Reach Length (Feet)	Unstable Length (Feet/%)	Existing Problems
Reach 1		4,534		
1A	Reiner	462	370/80	Unstable – Eroding banks ± 80% of reach; widespread bed incision with active large head cuts
1B	Weaber	1,232	120/<10	Moderately Stable – Minor, localized erosion, aggradation; few debris jams
1C	Weaber	2,840	280/<10	Moderately Stable – Minor, localized erosion, sedimentation, few debris jams; WWTP discharges into upstream end of reach.
Reach 2		5,314		
2A	Longenberger & Grumbine	423	40/<10	Moderately Stable– Minor, localized erosion, sedimentation, few debris jams
2B	Grumbine	2,385	1,789/75	Unstable – Eroding banks ± 75% of reach; widespread bed incision with active head cuts; exposed petroleum pipelines
2C	Zimmerman	1,234	1,110/90	Unstable – Eroding banks ± 90% of reach; livestock impacts
2D	Schaffer	1,272	1,018/80	Unstable – Eroding banks ± 80% of reach; channel confined by earthen and rubble berms
Reach 3		4,772		
3A	Thousand Trails	2,022	303/15	Moderately Stable – Minor, localized erosion and aggradation (15%)
3B	Thousand Trails	985	149/15	Moderately Stable – Minor, localized erosion and aggradation (15%)
3C	Thousand Trails	1,275	191/15	Moderately Stable – Minor, localized erosion and aggradation (15%); WWTP discharges into reach.
3D	Miller	490	245/50	Unstable – Incised channel with eroding banks ± 50% of reach; rip-rap 20%
Reach 4		4,061		
4A	Alger	2,411	2,170/90	Unstable – Incised channel with eroding banks ± 90% of reach; aggradation

4B	Alger	1,650	1,485/90	Unstable – Incised channel with eroding banks ± 90% of reach; aggradation
Reach 5		5,267		
5A	Sollenberger	797	638/80	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation.
5B	Shanaman & 322 Storage	809	647/80	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation; sink holes along reach
5C	Zimmerman & Barrett	1,746	1,397/80	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation; sink holes along reach
5D	Lauver	1,915	1,532/80	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation
Reach 6		2,221		
6A	Struphar	1,251	876/70	Unstable – Incised channel with eroding banks ± 70% of reach; aggradation; failing culvert at Louser Road
6B	Hess	970	679/70	Unstable – Incised channel with eroding banks ± 70% of reach; aggradation; failing culvert at Louser Road
Reach 7		3,452		
7A	Hess, Martin & Stahlman	1,234	987/80	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation; failing culvert at Brandt Road
7B	Waldhausen & Ole McDonald Estate, LLC	2,218	1,774/80	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation; failing culvert at Brandt Road
	Total	49,521	17,799/35.9	

Gingrich Run - Reach 1

5/19/2023, 2:17:29 PM

2022 Imagery

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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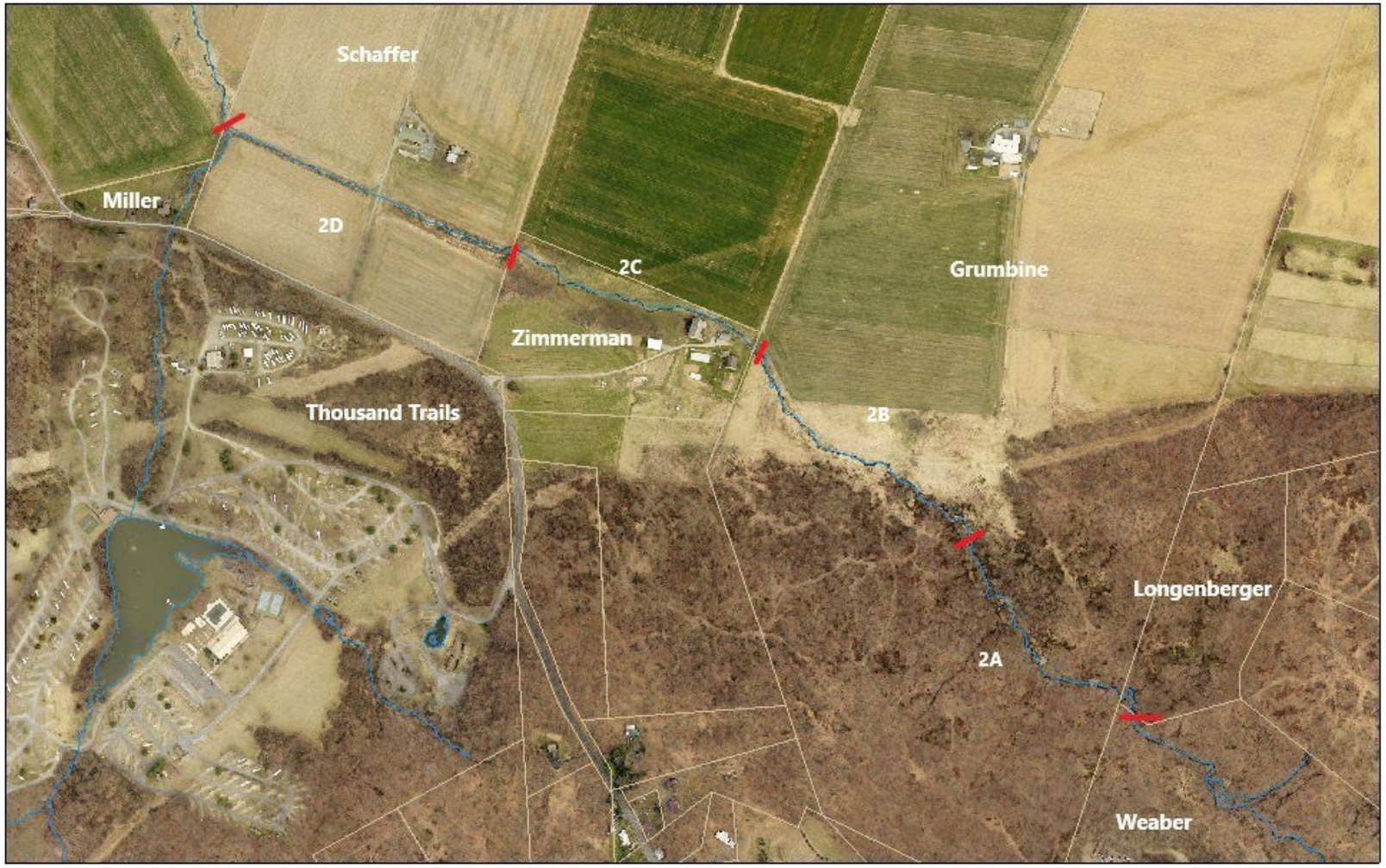
Lebanon County

Disclaimer: Tax maps show the approximate boundaries of taxable and non-taxable property. The property boundaries depicted should not be interpreted as the legal boundary description. The legal boundary description can be obtained from the property's deed.

Gingrich Run - Reach 2



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2022 Imagery

1:9,028

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Gingrich Run - Reach 3

5/19/2023, 2:14:37 PM

2022 Imagery

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Gingrich Run - Reach 4

5/19/2023, 2:43:27 PM

2022 Imagery

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Gingrich Run - Reach 5

5/19/2023, 2:55:08 PM

2022 Imagery

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Gingrich Run - Reach 6

5/19/2023, 3:12:56 PM
2022 Imagery

1:9,028
0 0.05 0.1 0.2 mi
0 0.07 0.15 0.3 km

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Gingrich Run - Reach 7

5/19/2023, 3:28:22 PM

2022 Imagery

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek

The reconnaissance survey of Killinger Creek covered 34,186 linear feet (6.47 miles) of stream. The results of the survey documented that 16,219 linear feet or 47.4% of the stream is currently unstable. The unstable conditions include streambank erosion; channel incision with active head cuts; aggradation and braiding; debris jams; earthen and rubble berms, rip-rap along the streambanks; livestock impacts; and failing infrastructure (i.e., failing concrete flumes). The unstable conditions vary by reach from minor, localized erosion to widespread and severe. Table 2 below summarizes the results of the survey by stream and property ownership.

Snitz Creek

The reconnaissance survey of Snitz Creek covered 57,127 linear feet (10.82 miles) of stream. The results of the survey documented that 30,575 linear feet or 53.5% of the stream is currently unstable. The unstable conditions include streambank erosion; channel incision with active head cuts; aggradation; debris jams; earthen and rubble berms, rip-rap, cinder block or rock walls along the streambanks; livestock impacts; dams and failing infrastructure (i.e., failing bridges and dams). The unstable conditions vary by reach from minor, localized erosion to widespread and severe. Table 3 below summarizes the results of the survey by stream and property ownership.

Table 2 - Killinger Creek Existing Conditions Summary Table

Reach ID	Location	Reach Length (Feet)	Unstable Length (Feet/%)	Existing Problems
Reach 1		4,783		
1A	CF Land Holdings, LLC, Campbelltown Vol. Fire Co. & Bucks AP Sons, Inc	3,416	683/20	Moderately Unstable – Upper section deeply incised with eroding banks throughout Middle and lower sections active floodplain along one side; five relatively long, high slopes failing ± 20% of reach; leaning and falling trees, several large debris jams
1B	Bucks AP Sons, Inc	1,367	1,094/80	Unstable – Eroding banks ± 80% of reach; channel severely trampled by livestock with multiple channels from cattle trails.; Banks along yard confined by earthen berms; rip-rap
Reach 2		4,074		
2A	Blauch, Allebach, Musser, Martin & DeCarlo	1,748	175/10	Moderately Stable – Minor, localized erosion (10%)
2B	DeCarlo, Heim, Braden & Davis	1,035	1,035/100	Unstable – Moderately incised channel with eroding banks ± 100% of reach; rip-rap (10%)
2C	Bucks AP Sons, Inc	1,291	1,291/100	Unstable – Deeply incised channel with eroding banks ± 100% of reach; significant livestock impacts along upper section with cattle trails throughout and streambed bed trampled; aggradation (20%); collapsed bridge at downstream end of reach blocking channel
Reach 3		5,829		
3A	Martin	1,709	342/20	Moderately stable – Banks well vegetated; minor localized erosion ± 20% of reach; localized bed degradation, one active head cut
3B	Martin, Hitz & Marvel	4,120	618/15	Moderately Stable – Minor, localized erosion (10%); rip-rap (5%); collapsed bridge at top of reach blocking channel
Reach 4		4,380		
4A	Marvel	1,204	241/20	Moderately Unstable – Minor, localized erosion (15%); aggradation (5%); rip-rap, dams, water withdrawal (10%)
4B	Jobi	1,043	939/90	Unstable – Moderately incised channel with eroding banks ± 90% of reach; rip-rap (10%)

4C	Orchard View Farm, LLC, Ludwig & Eby	2,133	427/20	Moderately Unstable – Moderately incised channel with eroding banks ± 20% of reach; heavy sedimentation, rifles embedded; South Londonderry WWTP discharges into downstream end of reach
Reach 5		4,208		
5A	Horst & Alger (LFP) Palm City Park (RFP)	2,451	1,961/80	Unstable – Eroding banks ± 80% of reach; rip-rap, rubble revetment and earthen berms along trailer park (30%); overwide channel; leaning and fallen trees, debris jams and aggradation along lower section. Pal city Park WWTP discharges into middle of reach.
5B	Alger & Ole McDonald Estate, LLC	1,757	1,406/80	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and fallen trees, debris jams; aggradation (50%)
Reach 6		4,034		
6A	Landmark Homes at Summer Layne, LLC & Reiff	2,109	1,476/70	Unstable – Incised channel with eroding banks ± 70% of reach; significant aggradation; rip-rap and earthen berms (5%)
6B	Landmark Homes at Pinnacle, LLC & Snyder	1,925	1,348/70	Unstable – Incised channel with eroding banks ± 70% of reach; significant aggradation; rip-rap and earthen berms (5%)
Note	Huber & Burkholder Properties	1,400	1,400/100	Unstable – Moderately incised channel with eroding banks ± 100% of reach; significant aggradation (80%) – 1.0 to 1.5 feet of fine silt and organic muck; livestock impacts 30% Restoration of these stream reaches is currently in the design and permitting phase
Reach 7		4,061		
7A	Killinger Creek Farms, LLC (Kreider) & Reiff	2,021	808/40	Moderately Unstable - Eroding banks ± 50% of reach; aggradation (30%); livestock impacts 20%
7B	Biondi, The Hershey Co. & Narrows Glen, Inc	2,040	1,020/50	Upper Section – Moderately unstable – Eroding banks ± 20% of reach; significant aggradation and braiding; historic livestock impacts (50%). Lower Section – Concrete flume; sections failing with bank and bed erosion; sink holes
Reach 8		2,817		
8A	Narrows Glen, Inc, MFS, Inc & Rohrer	1,146	NA	Concrete Flume; sections failing with bank and bed erosion; sink holes
8B	North Londonderry Township	1,671	NA	Concrete Flume; sections failing with rip-rap repairs; North Londonderry WWTP discharges into downstream end of reach
	Total	34,186	16,219/47.4	

Killinger Creek - Reach 1

5/31/2023, 2:53:21 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek - Reach 2

6/1/2023, 8:49:31 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek - Reach 3

6/1/2023, 9:03:17 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek - Reach 4

6/1/2023, 9:20:17 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek - Reach 5

6/1/2023, 9:27:11 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek- Reach 6

6/1/2023, 9:35:56 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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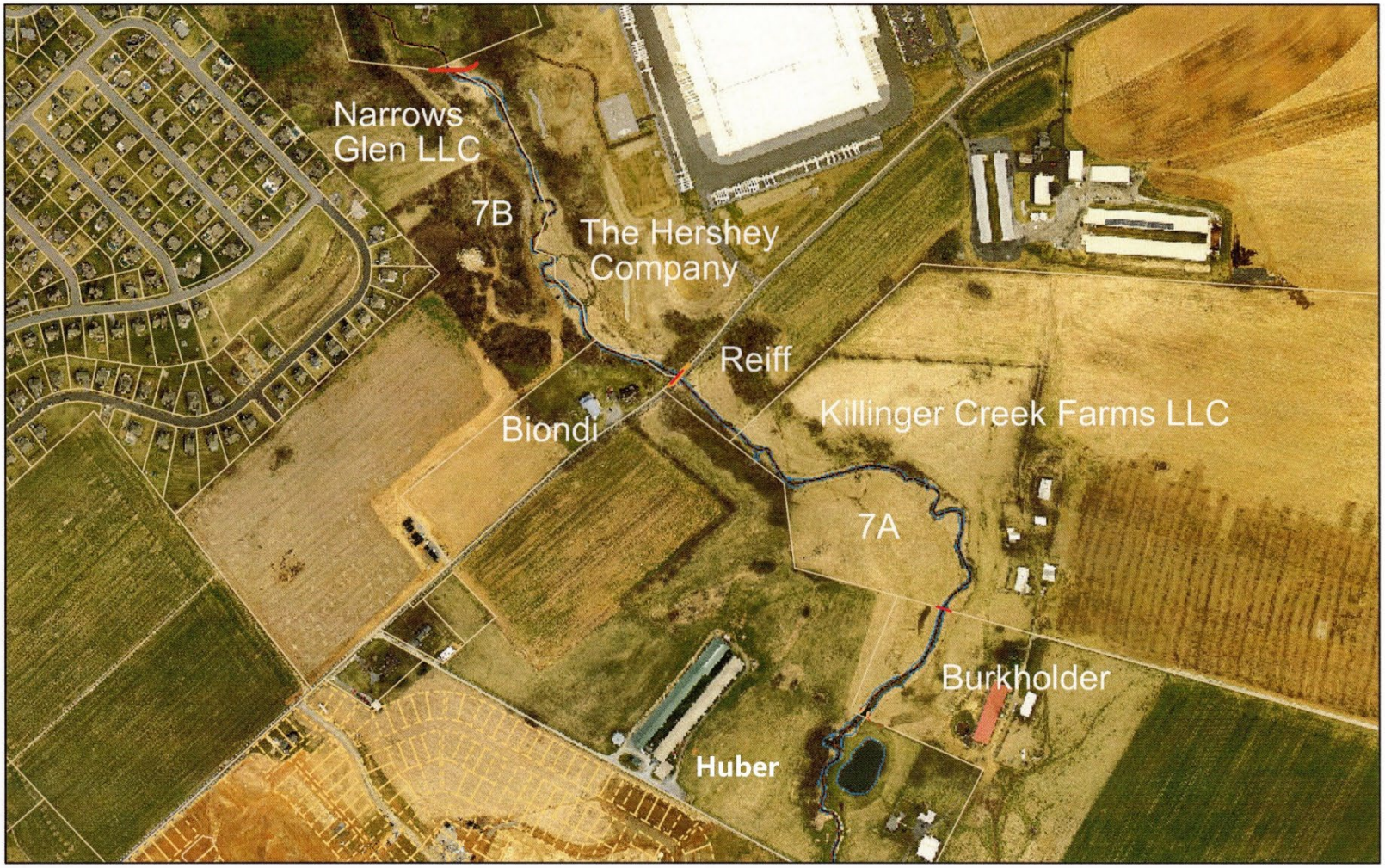
Killinger Creek- Reach 7



6/1/2023, 9:44:27 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Killinger Creek- Reach 8

6/1/2023, 9:52:10 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Table 3 - Snitz Creek and Elizabeth Run Existing Conditions Summary Table

Reach ID	Location	Reach Length (Feet)	Unstable Length (Feet/%)	Existing Problems
Reach 1	Elizabeth Run/Cornwall Borough	1,337	267/20	Moderately unstable - Minor, localized bank erosion; several active head cuts migrating upstream through the reach.
Reach 2	Elizabeth Run/Cornwall Borough	2,025	2,025/100	Upper Section - Unstable – Bank erosion along 60% of reach; incised due to earthen berms along banks; active head cuts at downstream end. Lower Section – Unstable – Severely eroding banks along 80% of reach. Incised to bed degradation and earthen berms along banks.
Reach 3	Elizabeth Run/Cornwall Borough	1,000	1,000/100	Unstable – Severely eroding banks along 90% of reach; aggradation 50%; exposed petroleum pipeline.
Reach 4	Elizabeth Run/Cornwall Borough			Unstable – Bank erosion along 60% of reach; stone walls failing along some banks.
4A		1,797	1,797/100	Currently in design and permitting phase
4B		1,185	1,185/100	Dropped due to landowner resistance
East Fork MS				
Reach 5		6,623		
5A	Cornwall Manor	4,204	420/10	Moderately stable – Minor, localized erosion 20%; few, small - moderate sized debris jams, sedimentation; one active head cut.
5B	Methodist Church Home, Hanford, Lion Secure Holdings, LLC	2,419	242/10	Stable – Minor, localized erosion 10%; rip.-rap 10%
Reach 6	Cornwall Elementary School and Cornwall Park	669	200/30	Moderately unstable – Moderately incised with eroding banks along 30% of reach.
Reach 7	Cornwall Lebanon School District	892	401/45	Unstable – Moderately incised with eroding banks along 45% of reach length; leaning and fallen trees throughout; numerous moderate – large debris jams, lower section large trees blocking channel and causing channel diversions; Multiple, large mid-channel bars.
Reach 8		3,392		
8A	Provident National Bank Trustee for Alice Freeman	2,694	2,425/90	Unstable – Eroding banks ± 90% of reach; Incised channel due to historic bed degradation; tortuous meanders; historic livestock impacts; aggradation ups of old dam on Quinn Property.

8B	Quinn & Karinch	698	314/45	Unstable – Incised to moderately incised channel with eroding banks ± 45% of reach; Leaning and falling trees. Old concrete and timber dam at upstream end of reach. Storm flows eroding along the side-walls of dam spillway. Hole along right side of dam is leaking water. Rip-rap along spring channel.
Reach 9		2,646		
9A	Karinch, Inc, Tobias, Gristick, Chobanoff, Graby & Karinch	1,250	750/60	Moderately unstable – Incised channel with extensive bank armoring (rip-rap, cinder block and rock walls) 60% of reach length; High, unaltered banks are very unstable and eroding 30%; leaning and fallen trees common along these areas. Concrete revetment along slopes at Karinch Street Culvert is failing.
9B	Krall, Starry and Leedy	1,396	419/30	Moderately stable – Banks low, generally well vegetated, minor, localized erosion 30% of reach length; rip-rap 5%; some sedimentation.
Reach 10	Brubaker	338	135/40	Moderately stable – Banks low, generally well vegetated; Minor, localized erosion 40% of reach length; frequent, small to moderate sized debris jams, some sedimentation
West Fork MS				
Reach 11		3,193		
11A (WF)	Hometown Alden Place, LLC	1,419	993/70	Unstable – Eroding banks ± 70% of reach; failed dam
11B (EF)	Cornwall Associates LP & Hometown Alden Place, LLC	1,774	1,242/70	Unstable – Severe bank erosion ± 70% of reach; bed incision with large active head cuts
Reach 12	Hometown Alden Place, LLC, Cornwall Associates, Northview Associates, Ebling	3,593	1,437/40	Moderately unstable – Eroding banks 40% of reach length. Leaning and fallen trees, numerous, moderate to large debris jams
Reach 13		2,531		
13A	Quentin Associates, LLC	811	243/30	Moderately stable – Low banks, generally well vegetated; minor, localized erosion affecting ±30% of reach length.
13B	Quentin Associates, LLC, Cooper, Guntle, Ganto & Garcia	1,720	1,290/75	Unstable – Moderately incised channel with eroding banks along ± 75% of reach; leaning and fallen trees, several moderate to large debris jams; stone walls along 10% of reach.
Reach 14	Vroman, Progin & Boland	525	263/50	Unstable – Moderately incised channel with eroding banks ± 50% of reach; leaning and fallen trees, debris jams; aggradation; failing bridge at ds end of reach
Reach 15	JTM & M FLP & Auman	1,907	1,431/75	Unstable – Moderately incised channel with eroding banks ± 75% of reach; rip-rap 20%
Reach 16		5,578		
16A	Perlmutter, Morrisey & Juppenlatz	1,492	970/65	Upper Section – Moderately stable – Minor, localized erosion. Lower section - Unstable – Deeply incised channel with severely eroding high banks ± 65% of total reach length; aggradation 20%

16B	Reager, Szajda, Gerhart, Cornwall Professional Bldg., LLC, Snavely, Murphy, Frost, Maclean, Rights, Harpel, Scala & Anderson	1,532	689/45	Unstable – Bank erosion along ± 45% of reach; several undercut and leaning trees; aggradation; stone walls and rip-rap 10%.
16C	Anderson, Arnold, Copenhaver, Bollinger, Nolt, Klink, Bollard & Schwalm	2,554	766/45	Moderately unstable - Eroding banks ± 30% of reach; several undercut and leaning trees; aggradation 20%; rip-rap and small dams 10%
Reach 17	Gingrich, Schulte & Gebhard	2,370	1,185/50	Upper Section – Stable; Middle Section - Unstable - Eroding banks ± 50% of reach; mid-channel bars; livestock crossing; Lower Section – Unstable – Artificially low bank heights due to significant bed aggradation that increases in a downstream direction. Middle of this section are several large mid-channel bars. Downstream end of channel has filled with a large volume of sediment due backwater and flattened gradient caused by dam downstream on Stefanides Property. As a result this section has transitioned from an overwide channel into a large permanently flooded wetland system.
Reach 18	Schulte, Stefanides, GBR Leb 3, LLC, Target	1,089	1,089/100	Unstable - Eroding banks ± 100% of right bank; Upper section has significant bed aggradation 65%, resulting from the backwater and flattened gradient caused by Stefanides dam. Numerous moderate to large sized debris jams are blocking the channel on Shulte and upper Stefanides Properties. The dam failed in 2021 and has been temporarily repaired. Downstream of dam the left bank is stable.
Reach 19	Schulte, Ehrgood, Zook, Showalter, ABE Associates, North Cornwall Township & Zimmerman	2,916	2,041/70	Unstable – Eroding banks ± 70% of reach; widespread aggradation 40%. Earthen and rubble berms and rip-rap along banks; two sections of split flow with vegetated islands on Ehrgood Property. Gabion baskets installed along left bank on Schulte Property to protect new sanitary sewer. Dam with water diversion to adjacent pond on Zimmerman Property.
Reach 20	Zimmerman, Yedinak, Holland and Co. LLC, CMP Resolute, LLC, Parpagene & Cini	1,400	1,120/80	Unstable – Eroding banks ± 80% of reach; undercut banks, leaning and falling trees; overwide channel with significant aggradation 30%; dams and water withdrawal structures.
Reach 21	CMP Resolute, LLC, Weimer, Yocum, McCracken, Winslow & Villages of Creekside Homeowner Association	2,969	2,375/80	Unstable – Eroding banks ± 80% of reach; undercut banks, leaning and falling trees, several moderate sized debris jams; overwide channel with significant aggradation 30%; dams

Reach 22	Miller, Heritage Run Properties, LLC, Allsop & North Cornwall Township	2,472	2,225/90	Unstable – Eroding banks ± 75% of reach; aggradation 20%; livestock impacts 25% on Miller Property; dam and stone walls on Allsop Property.
Reach 23		4,680		
23A	Snyder, Harchuska, Starry, Deitzler, Runnymede East Homeowners, Scott & Musheno	2,084	1,250/60	Unstable – Eroding banks ± 60% of reach; aggradation; channelized. Water diversion structures feed ponds on Snyder and Deitzler Properties; moderately sized debris jams along lower section.
23B	Meadow Lane Farms Limited (Open Space)	1,724	1,379/80	Unstable – Eroding banks ± 80% of reach; undercut banks, leaning and fallen trees; aggradation
23C	Dean Dairy Fluid, LLC	872	87/10	Moderately stable – Minor, localized bank erosion 10%, moderate sedimentation through out
	Total	57,127	31,011/54.3	

Snitz Creek Reach 5

7/10/2023, 9:39:37 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Lebanon County

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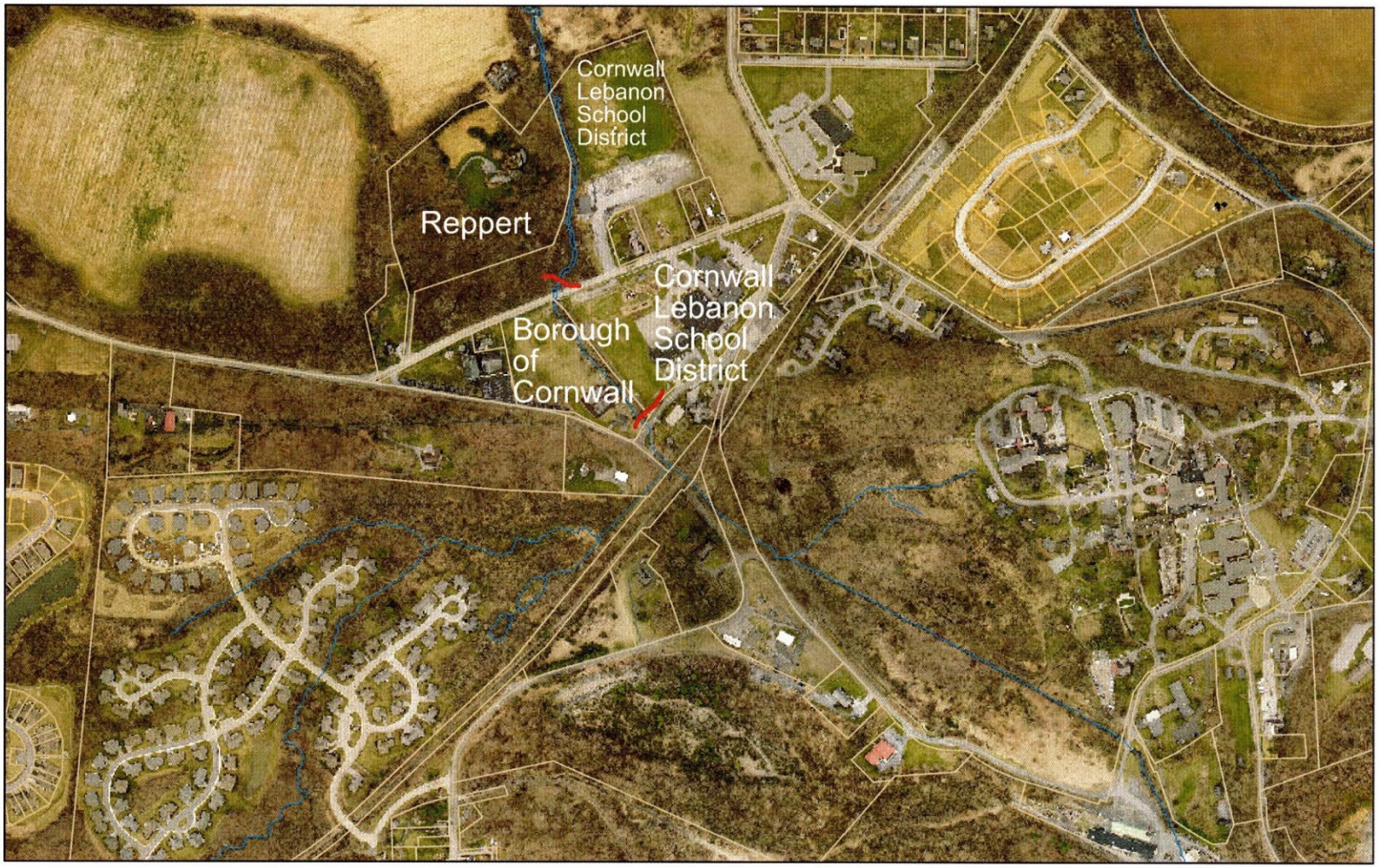
Snitz Creek Reach 6



7/10/2023, 9:37:42 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

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0 0.07 0.15 0.3 km

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Snitz Creek Reach 7

7/10/2023, 9:36:54 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 8

7/7/2023, 10:45:24 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 9

7/7/2023, 10:46:38 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 10

7/7/2023, 10:48:53 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 11

7/7/2023, 1:27:25 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 12

7/7/2023, 1:40:20 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 13

7/7/2023, 1:21:14 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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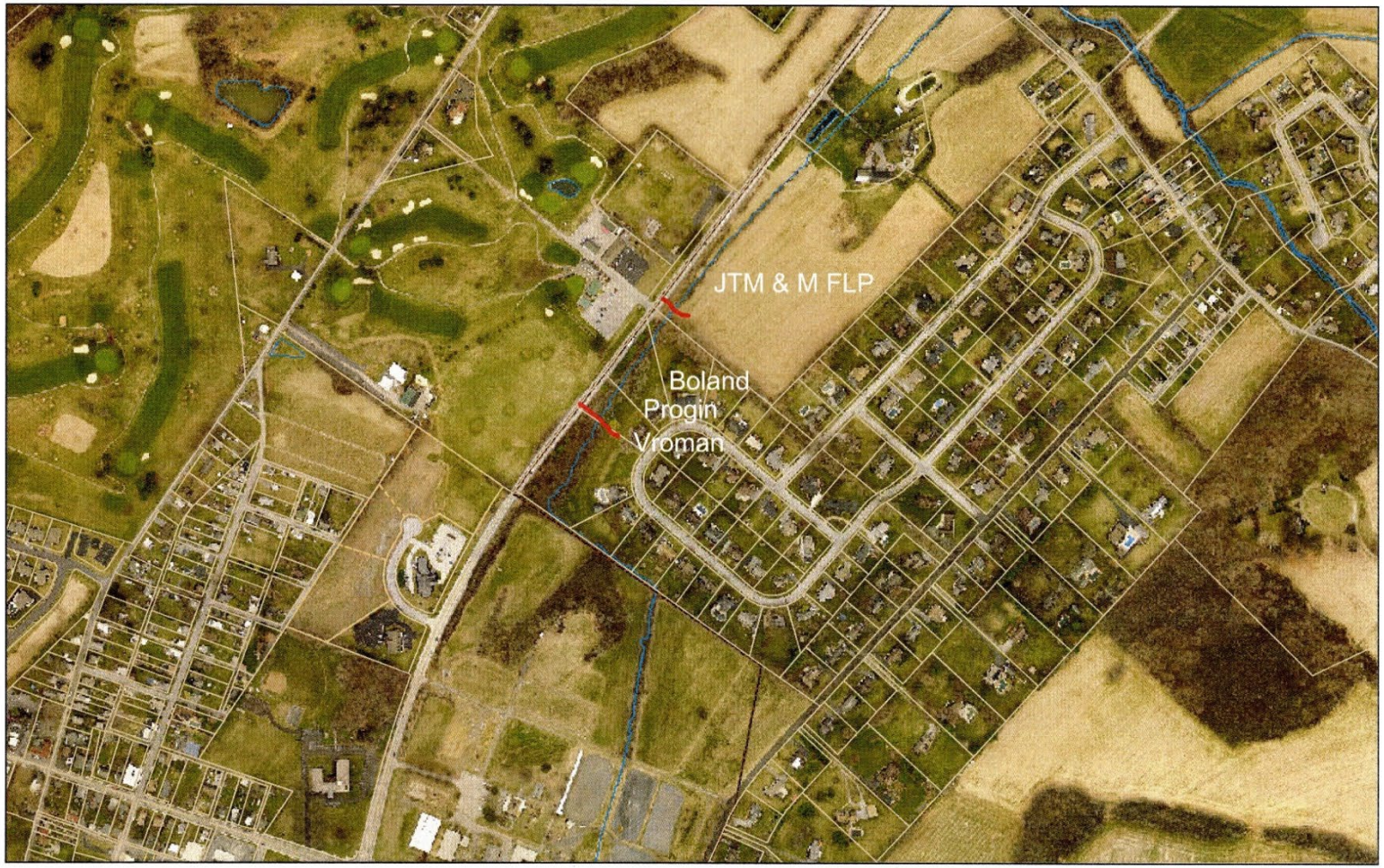
Snitz Creek - Reach 14



7/7/2023, 1:20:04 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 15

7/7/2023, 1:18:58 PM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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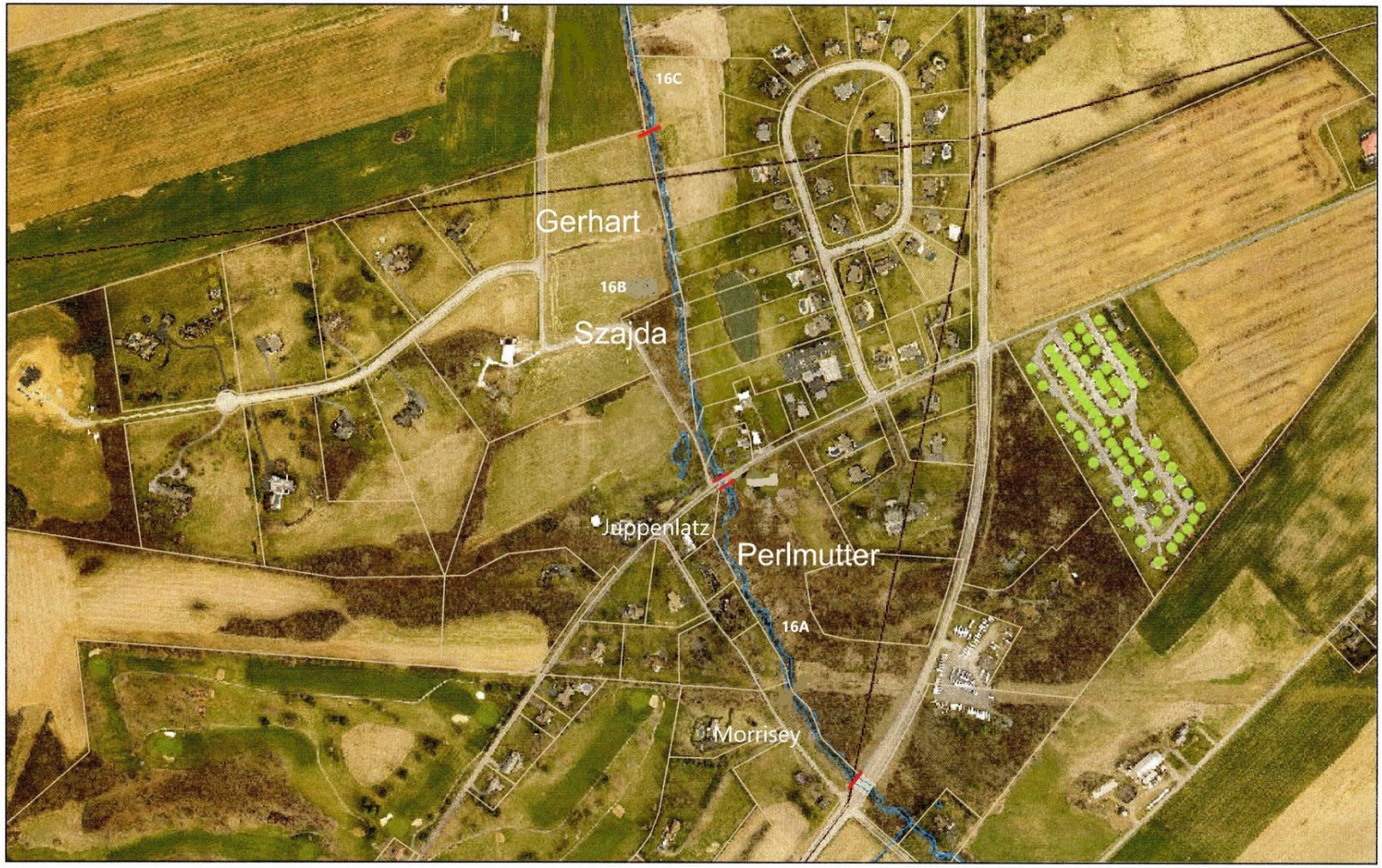
Snitz Creek - Reach 16 Upper



7/7/2023, 11:04:17 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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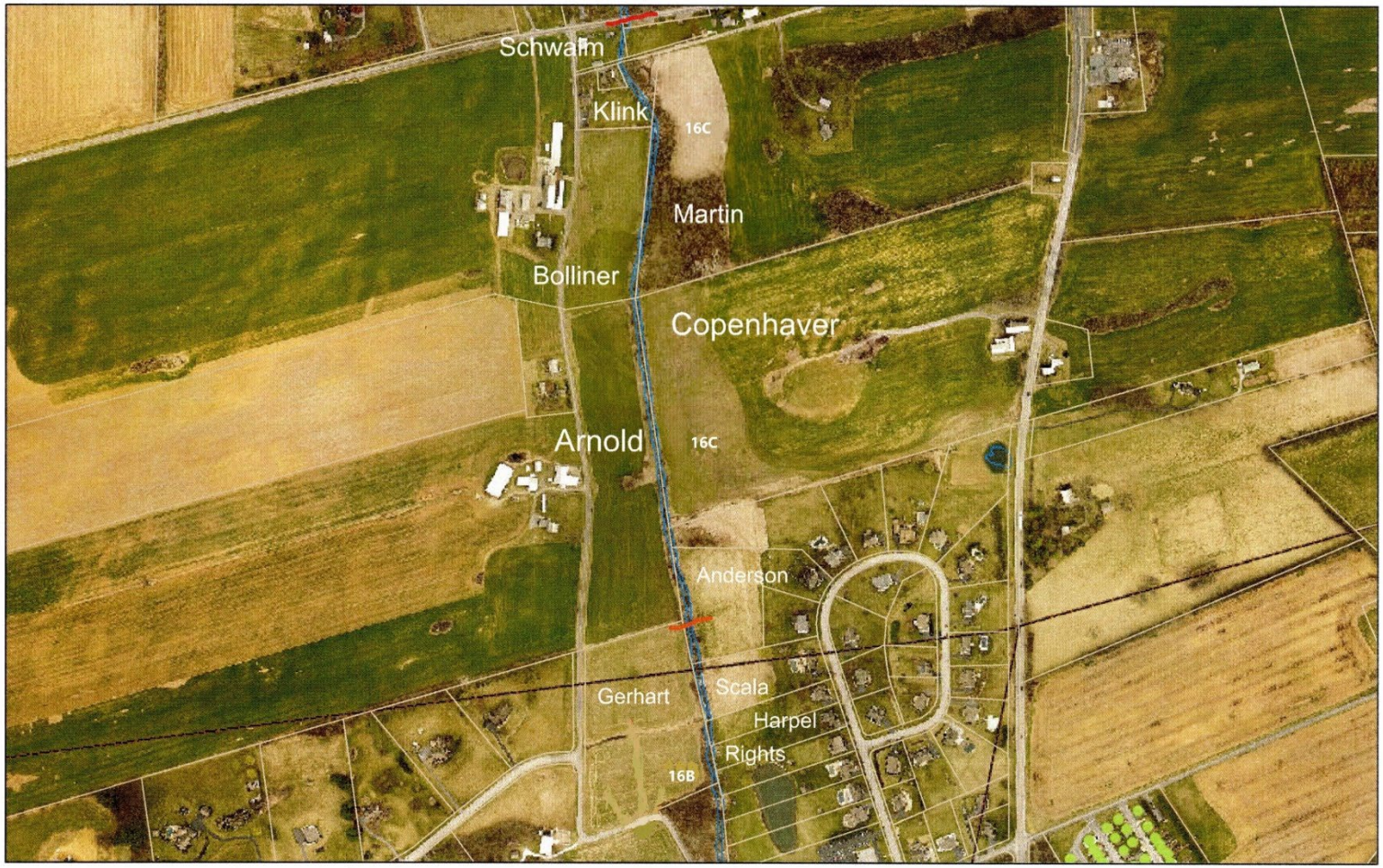
Snitz Creek - Reach 16 Lower



7/7/2023, 11:05:21 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 17

7/7/2023, 11:07:47 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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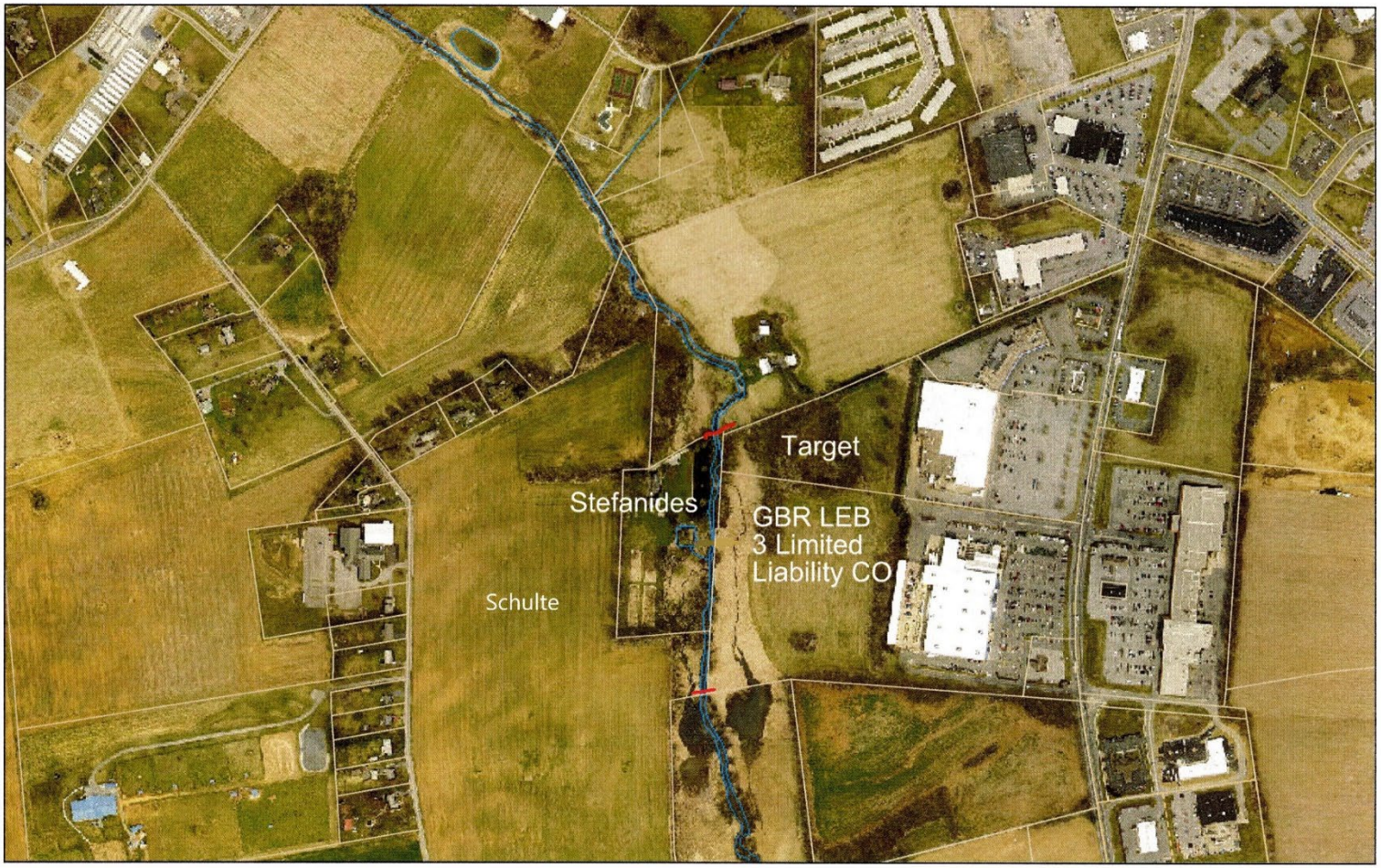
Snitz Creek - Reach 18



7/7/2023, 11:10:53 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 19

7/7/2023, 11:14:28 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 20

7/7/2023, 11:19:27 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 21

7/7/2023, 11:21:13 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek Reach 22

7/7/2023, 11:22:23 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Snitz Creek - Reach 23

7/7/2023, 11:32:33 AM

2022 Imagery

Red: Band_1

Green: Band_2

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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Lebanon County

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Recommendations

Based on the results of the reconnaissance survey, potential restoration projects and best management practices have been identified to correct the problems documented along Gingrich Run, Killinger Creek and Snitz Creek. Some of these projects were previously identified in the Quittapahilla Creek Watershed Implementation Plan (Clear Creeks Consulting, 2021).

The restoration of Gingrich Run would include 7 projects across 15 stream reaches. The restoration of Killinger Creek would include 8 projects across 13 stream reaches. The restoration of Snitz Creek would include 20 projects across 26 stream reaches.

Tables 4, 5 and 6 below summarize the recommended restoration projects and best management practices by subwatershed, stream reach and property ownership. Unlike the tables in the Watershed Implementation Plan, no cost estimates have been included for design ad permitting or construction, given that the actual start of a specific project could be years out.

As in the WIP stream reach projects are prioritized in order of their location, that is, starting in the headwaters and working in a downstream direction. Some shorter length stream reaches have been combined into a single project if they are immediately upstream or downstream of each other. In order to improve the likelihood of obtaining funding, a general rule of thumb has been applied that limits the maximum length of a single project to less than 4,000 linear feet.

Table 4 - Gingrich Run Prioritized Projects Summary Table

Project ID/ Reach ID	Location	Project/ Reach Length (Feet)	Existing Problems	Proposed Solution
Project 1/ Reach 1A	Reiner	370	Unstable – Eroding banks ± 80% of reach; widespread incision with active large head cuts	Raise streambed, gradually transitioning downstream with boulder steps. Grade eroding banks and stabilize with native trees and shrubs.
Project 2/ Reach 2B	Grumbine	1,789	Unstable – Eroding banks ± 75% of reach; widespread incision with active head cuts	Raise streambed, gradually transitioning downstream with boulder steps. Grade eroding banks and stabilize with native trees and shrubs. Maintain existing buffer widths.
Project 2/ Reach 2C	Zimmerman	1,110 2,899	Unstable – Eroding banks ± 90% of reach; livestock impacts	Restore channel as a stable C4 channel and establish a minimum 15 foot riparian buffer planted with native trees and shrubs.
Project 3/ Reach 2D	Schaffer	1,018	Unstable – Eroding banks ± 80% of reach; channel confined by earthen and rubble berms	Restore channel as a stable B4c channel with a floodprone area. Replace earthen/rubble berms with low earthen berms setback from top of bank. Establish a minimum 15 foot riparian buffer with native trees and shrubs.
Project 4/ Reach 3D	Miller	245	Unstable – Incised channel with eroding banks ± 50% of reach; rip-rap 20%	Leave large rip-rap undisturbed. Replace small stone revetment with large rip-rap. Rebuild eroding banks with soil lifts.
Project 4/ Reach 4A	Alger	2,170	Unstable – Incised channel with eroding banks ± 90% of reach; aggradation	Grade eroding streambanks. Establish a minimum 15 foot riparian buffer with native trees and shrubs.
Project 4/ Reach 4B	Alger	1,485 3,900	Unstable – Incised channel with eroding banks ± 90% of reach; aggradation	Grade eroding streambanks. Establish a minimum 15 foot riparian buffer with native trees and shrubs.
Project 5/ Reach 5A	Sollenberger	638	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation.	Remove debris jams and fallen trees. Rebuild eroding banks with soil lifts. Install toe benches to narrow bankfull and baseflow channel and improve sediment transport.

Project 5/ Reach 5B	Shanaman & 322 Storage	647	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation; sink holes along reach	Remove debris jams and fallen trees. Rebuild eroding banks with soil lifts. Install toe benches to narrow bankfull and baseflow channel and improve sediment transport. Investigate methods to seal sinkholes.
Project 5/ Reach 5C	Zimmerman & Barrett	1,397 2,682	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and falling trees, debris jams; aggradation; sink holes along reach	Remove debris jams and fallen trees. Rebuild eroding banks with soil lifts. Install toe benches to narrow bankfull and baseflow channel and improve sediment transport.
Project 6/ Reach 5D	Lauver	1,532	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation	Remove concrete slabs revetment. Grade streambanks and plant native trees and shrubs.
Project 6/ Reach 6A	Struphar	876 2,408	Unstable – Incised channel with eroding banks ± 70% of reach; aggradation; culvert at Louser Road failing	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs. Notify South Annville Township regarding culvert failure.
Project 7/ Reach 6B	Hess	679	Unstable – Incised channel with eroding banks ± 70% of reach; aggradation; culvert at Louser Road failing	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs. Notify South Annville Township regarding culvert failure.
Project 7/ Reach 7A	Hess, Martin & Stahlman	987	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation; culvert at Brandt Road failing	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs. Notify South Annville Township regarding culvert failure.
Project 7/ Reach 7B	Waldhausen & Ole McDonald Estate, LLC	1,774 3,440	Unstable – Incised channel with eroding banks ± 80% of reach; aggradation; livestock impacts; culvert at Brandt Road failing	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs. Notify South Annville Township regarding culvert failure.
	Total	16,717		

Table 5 - Killinger Creek Prioritized Projects Summary Table

Reach ID	Location	Reach Length (Feet)	Existing Problems	Proposed Solution
Project 1/ Reach 1A	CF Land Holdings, LLC, Campbelltown Vol. Fire Co. & Bucks AP Sons, Inc	683	Moderately Unstable – Upper section deeply incised with eroding banks throughout Middle and lower sections active floodplain along one side; five relatively long, high slopes failing ± 20% of reach; leaning and falling trees, several large debris jams	Use a combination of grading for lower eroding banks and installation of bankfull benches comprised of soil lifts along high eroding banks and slopes.
Project 1/ Reach 1B	Bucks AP Sons, Inc	1,094 1,777	Unstable – Eroding banks ± 80% of reach; channel severely trampled by livestock with multiple channels from cattle trails.; Banks along yard confined by earthen berms; rip-rap	Remove collapsed bridge. Restore channel as a stable E4 channel. Fence along channel to limit livestock access. Install alternative livestock water source. Establish minimum 15 foot riparian buffer along both sides of stream.
Project 2/ Reach 2B	DeCarlo, Heim, Braden & Davis	1,035	Unstable – Eroding banks ± 100% of reach; channel incision; rip-rap (10%)	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 3/ Reach 2C	Bucks AP Sons, Inc	1,291	Unstable – Deeply incised channel with eroding banks ± 100% of reach; significant livestock impacts along upper section with cattle trails throughout and streambed bed trampled; aggradation (20%); collapsed bridge at downstream end of reach blocking channel	Remove failed bridges and crossings from channel. Restore channel as a stable C4 channel. Fence along channel to limit livestock access. Install alternative livestock water source.
Project 4/ Reach 4A	Marvel	241	Moderately Unstable – Minor, localized erosion (15%); aggradation (5%); rip-rap, dams, water withdrawal (10%)	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 4/ Reach 4B	Jobi	939	Unstable – Moderately incised channel with eroding banks ± 90% of reach; rip-rap (10%)	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 4/ Reach 4C	Orchard View Farm, LLC, Ludwig & Eby	427 1,607	Moderately Unstable – Moderately incised channel with eroding banks ± 20% of reach; heavy sedimentation, rifles embedded; South Londonderry WWTP discharges into downstream end of reach	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs

Project 5/ Reach 5A	Horst & Alger (LFP) Palm City Park (RFP)	1,961	Unstable – Eroding banks ± 80% of reach; rip-rap, rubble revetment and earthen berms along trailer park (30%); overwide channel; leaning and fallen trees, debris jams and aggradation along lower section. Pal city Park WWTP discharges into middle of reach.	Remove debris jams. Grade eroding banks. Replace rubble and concrete revetment with imbricated rock walls. Narrow overwide section by installing toe benches.
Project 5/ Reach 5B	Ole McDonald Estate, LLC	1,406 3,367	Unstable – Incised channel with eroding banks ± 80% of reach; leaning and fallen trees, debris jams; aggradation (50%);	Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 6/ Reach 6A	Landmark Homes at Summer Layne, LLC & Reiff	1,476	Unstable – Incised channel with eroding banks ± 70% of reach; overwide sections, significant aggradation; rip-rap and earthen berms (5%)	Narrow overwide sections by installing toe benches. Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 6/ Reach 6B	Landmark Homes at Pinnacle, LLC & Snyder	1,348 2,824	Unstable – Incised channel with eroding banks ± 70% of reach; overwide sections, significant aggradation; rip-rap and earthen berms (5%)	Narrow overwide sections by installing toe benches. Grade streambanks and plant native trees and shrubs. Establish a minimum 15 foot riparian buffer with native trees and shrubs
Project 7/ Reach 7A	Killinger Creek Farms, LLC (Kreider) & Reiff	2,021	Moderately Unstable - Eroding banks ± 50% of reach; aggradation (30%); livestock impacts 20%	Restoration of these stream reaches are currently in the planning phase
Project 8 Note	Huber & Burkholder Properties	1,400	Unstable – Moderately incised channel with eroding banks ± 100% of reach; significant aggradation (80%) – 1.0 t0 1.5 feet of fine silt and organic muck; live stock impacts 30%	Restoration of these stream reaches are currently in the design and permitting phase
	Total	15,322		

Table 6 - Snitz Creek and Elizabeth Run Prioritized Projects Summary Table

Project ID/Reach ID	Location	Reach Length (Feet)	Existing Problems	Proposed Solution
Project 1/ Reach 1	Elizabeth Run/Cornwall Borough	267	Moderately unstable - Minor, localized bank erosion; several active head cuts migrating upstream through the reach.	Repaired by Borough, Dropped after 2017 Reconnaissance Survey
Project 2/ Reach 2	Elizabeth Run/Cornwall Borough	2,025	Upper Section - Unstable – Bank erosion along 60% of reach; incised due to earthen berms along banks; active head cuts at downstream end. Lower Section – Unstable – Severely eroding banks along 80% of reach. Incised to bed degradation and earthen berms along banks.	Designed and permitted; Applying for Construction Funding 2024
Project 3/ Reach 3	Elizabeth Run/Cornwall Borough	1,000	Unstable – Severely eroding banks along 90% of reach; aggradation 50%; exposed petroleum pipeline.	Designed and permitted; Applying for Construction Funding 2024
Project 4/ Reach 4A	Elizabeth Run/Cornwall Borough	1,797	Unstable – Bank erosion along 60% of reach; stone walls failing along some banks.	Currently in design and permitting phase
East Fork MS				
Project 5/ Reach 6	Cornwall Elementary School and Cornwall Park	200	Moderately unstable – Moderately incised with eroding banks along 30% of reach.	To avoid tree clearing, grade eroding banks along narrower sections with no large bank trees. Rebuild eroding banks with soil lifts and/or imbricated rock walls along wider sections with mature bank trees.
Project 5/ Reach 7	Cornwall Lebanon School District	401	Unstable – Moderately incised with eroding banks along 45% of reach length; leaning and fallen trees throughout; numerous moderate – large debris jams, lower section large trees blocking channel and causing channel diversions; Multiple, large mid-channel bars	Remove debris jams and fallen trees. Grade eroding banks along narrower sections, rebuild eroding banks with toe wood and soil lifts along wider sections. Install imbricated rock walls along outside of bends adjacent to ballfield. Establish 25 foot riparian buffer along edge of ballfield.
Project 6/ Reach 8A	Provident National Bank Trustee for Alice Freeman	2,425	Unstable – Eroding banks ± 90% of reach; Incised channel due to historic bed degradation; tortuous meanders; historic livestock impacts; aggradation ups of old dam on Quinn Property.	Restore channel as a stable C4 channel. If future land use includes livestock grazing install fencing along both banks. Establish a riparian buffer a minimum of 35 feet along both banks.

Project 7/ Reach 8B	Quinn & Karinch	314	Unstable – Incised to moderately incised channel with eroding banks ± 45% of reach; Leaning and falling trees. Old concrete and timber dam at upstream end of reach. Storm flows eroding along the side-walls of dam spillway. Hole along right side of dam is leaking water. Rip-rap along spring channel.	Remove dam and repair spillway walls; grade streambanks and plant native trees and shrubs.
Project 7/ Reach 9A	Karinch, Inc, Tobias, Gristick, Chobanoff, Graby & Karinch	750	Moderately unstable – Incised channel with extensive bank armoring (rip-rap, cinder block and rock walls) 60% of reach length; High, unaltered banks are very unstable and eroding 30%; leaning and fallen trees common along these areas. Concrete revetment along slopes at Karinch Street Culvert is failing.	Stabilize eroding banks with a combination of grading along lower banks, installation of soil lifts or imbricated rock walls along higher banks. Plant native trees and shrubs along top of banks in yards.
West Fork MS				
Project 8/ Reach 11A)	Hometown Alden Place, LLC	993	Unstable – Eroding banks ± 70% of reach; failed dam	Remove breached dam. Restore as a stable B4 and C4 channel.
Project 8/ Reach 11B)	Cornwall Associates LP & Hometown Alden Place, LLC	1,242	Unstable – Severe bank erosion ± 70% of reach; bed incision with large active head cuts	Restore as stable B2 step-pool channel along head cuts. Restore lower section as a stable C4 channel.
Project 8/ Reach 12	Hometown Alden Place, LLC	1,437 3,672	Moderately unstable – Eroding banks 40% of reach length. Leaning and fallen trees, numerous, moderate to large debris jams	Remove leaning and undercut trees and debris jams. Stabilize eroding banks with a combination of grading along lower banks, installation of soil lifts or imbricated rock walls along higher banks. Plant native trees and shrubs along top of banks in yards.
Project 9/ Reach 13B	Quentin Associates, LLC, Cooper, Guntle, Ganto & Garcia	1,290	Unstable – Moderately incised channel with eroding banks along ± 75% of reach; leaning and fallen trees, several moderate to large debris jams; stone walls along 10% of reach.	Remove leaning and undercut trees and debris jams. Stabilize eroding banks with a combination of grading along lower banks, installation of soil lifts or imbricated rock walls along higher banks. Plant native trees and shrubs along top of banks in yards.
Project 9/ Reach 14	Vroman, Progin & Boland	263 1,796	Unstable – Moderately incised channel with eroding banks ± 50% of reach; leaning and fallen trees, debris jams; aggradation; failing bridge at ds end of reach	Remove leaning and undercut trees and debris jams. Stabilize eroding banks with a combination of grading along lower banks, installation of soil lifts or imbricated rock walls along higher banks. Remove failing bridge.

Project 10/ Reach 15	JTM & M FLP & Auman	1,431	Unstable – Moderately incised channel with eroding banks ± 75% of reach; rip-rap 20%	Stabilize eroding banks with a combination of grading along open grassed areas and installation of soil lifts or imbricated rock walls along wooded areas.
Project 11/ Reach 16A	Perlmutter, Morrisey & Juppenlatz	970	Upper Section – Moderately stable – Minor, localized erosion. Lower section - Unstable – Deeply incised channel with severely eroding high banks ± 65% of total reach length; aggradation 20%	Stabilize eroding banks with a combination of grading along the lower right banks, installation of toe benches with soil lifts to create a bankfull bench along the toe of the higher banks.
Project 12/ Reach 16B	Reager, Szajda, Gerhart, Cornwall Professional Bldg., LLC, Snavely, Murphy, Frost, Maclean, Rights, Harpel, Scala & Anderson	689	Unstable – Bank erosion along ± 45% of reach; several undercut and leaning trees; aggradation; stone walls and rip-rap 10%.	Remove leaning and undercut trees and debris jams. Stabilize eroding banks with a combination of grading along open grassed areas, installation of soil lifts or imbricated rock walls along wooded, or tree lined areas. Plant native trees and shrubs along top of banks in yards.
Project 12/ Reach 16C	Anderson, Arnold, Copenhaver, Bollinger, Nolt, Klink, Bollard & Schwalm	766 1,455	Moderately unstable - Eroding banks ± 30% of reach; several undercut and leaning trees; aggradation 20%; rip-rap and small dams 10%	Remove leaning and undercut trees and debris jams. Stabilize eroding banks with a combination of grading along open grassed areas, installation of soil lifts or imbricated rock walls along wooded, or tree lined areas. Plant native trees and shrubs along top of banks in yards.
Project 13/ Reach 17	Gingrich, Schulte & Gebhard	1,185	Upper Section – Stable; Middle Section - Unstable - Eroding banks ± 50% of reach; mid-channel bars; livestock crossing; Lower Section – Unstable – Artificially low bank heights due to significant bed aggradation that increases in a downstream direction. Middle of this section are several large mid-channel bars. Downstream end of channel has filled with a large volume of sediment due backwater and flattened gradient caused by dam downstream on Stefanides Property. As a result this section has transitioned from an overwide channel into a large permanently flooded wetland system.	Upper Section - Do not disturb stable section. Middle section - Rebuild eroding banks with toe benches and soil lifts along both sides to narrow bankfull and baseflow channel. Remove mid-channel bars, utilizing bar material to construct toe benches. Lower Section - Do not disturb, maintain large wetland system.

Project 14/ Reach 18	Schulte, Stefanides, GBR Leb 3, LLC, Target	1,089	Unstable - Eroding banks ± 100% of right bank; Upper section has significant bed aggradation 65%, resulting from the backwater and flattened gradient caused by Stefanides dam. Numerous moderate to large sized debris jams are blocking the channel on Shulte and upper Stefanides Properties. The dam failed in 2021 and has been temporarily repaired. Downstream of dam the left bank is stable.	Restoration of this stream reach currently in planning phase.
Project 15/ Reach 19	Schulte, Ehrgood, Zook, Showalter, ABE Associates, North Cornwall Township & Zimmerman	2,041	Unstable – Eroding banks ± 70% of reach; widespread aggradation 40%. Earthen and rubble berms and rip-rap along banks; two sections of split flow with vegetated islands on Ehrgood Property. Gabion baskets installed along left bank on Schulte Property to protect new sanitary sewer. Dam with water diversion to adjacent pond on Zimmerman Property.	Restoration of the upper section (Ehrgood and Schulte) of this stream reach currently in planning phase. Restoration of the middle and lower sections should include removing leaning and undercut trees and debris jams;; stabilizing eroding banks by installing toe benches with soil lifts along overwide aggrading sections, grading along open grassed areas, installation of soil lifts or boulder outcrops along wooded or tree lined areas. Plant native trees and shrubs along the top of banks.
Project 16/ Reach 20	Zimmerman, Yedinak, Holland and Co. LLC, CMP Resolute, LLC, Parpagene & Cini	1,120	Unstable – Eroding banks ± 80% of reach; undercut banks, leaning and falling trees; overwide channel with significant aggradation 30%; dams and water withdrawal structures.	Restoration should include removing leaning and undercut trees and debris jams;; stabilize eroding banks by installing toe benches with soil lifts along overwide aggrading sections, grading along open grassed areas, installation of soil lifts or boulder outcrops along wooded or tree lined areas. Plant native trees and shrubs along the top of banks.
Project 17/ Reach 21	CMP Resolute, LLC, Weimer, Yocum, McCracken, Winslow & Villages of Creekside Homeowner Association	2,375	Unstable – Eroding banks ± 80% of reach; undercut banks, leaning and falling trees, several moderate sized debris jams; overwide channel with significant aggradation 30%; dams	Restoration should include installation of toe wood and soil lifts along eroding meander bends, installing toe benches with soil lifts along overwide aggrading sections, grading along open grassed areas, installation of soil lifts or boulder outcrops along wooded or tree lined areas. Plant native trees and shrubs along the top of banks.

Project 18/ Reach 22	Miller, Heritage Run Properties, LLC, Allsop & North Cornwall Township	2,225	Unstable – Eroding banks ± 75% of reach; aggradation 20%; livestock impacts 25% on Miller Property; dam and stone walls on Allsop Property.	Restoration should include installation of toe benches with soil lifts along overwide sections to narrow the bankfull and baseflow channel. Installing fencing to limit livestock access to the channel along the Miller Property. Establishing a riparian buffer a minimum of 15 feet on either side of the channel.
Project 19/ 23A	Snyder, Harchuska, Starry, Deitzler, Runnymede East Homeowners, Scott & Musheno	1,250	Unstable – Eroding banks ± 60% of reach; aggradation; channelized. water diversion structures feed ponds on Snyder and Deitzler Properties; moderately sized debris jams along lower section.	Restoration should include remove of leaning and fallen trees and debris jams; installation of toe wood and soil lifts along eroding bends; grading along open grassed areas. Planting native trees and shrubs along top of banks in yards.
Project 20/ 23B	Meadow Lane Farms Limited (Open Space)	1,379	Unstable – Eroding banks ± 80% of reach; aggradation	Restoration should include installation of toe wood and soil lifts along eroding bends; grading along open grassed areas; installation of toe benches with soil lifts along overwide sections to narrow the bankfull and baseflow channel. Planting native trees and shrubs along top of banks.
	Total	30,924		

Final Thoughts

The results of this Summer's Reconnaissance Survey confirm that land use in the subwatersheds has changed and will continue to change as new development encroaches on forest and farmland. This is particularly the case in the Killinger Creek and Snitz Creek subwatersheds. In addition, land management practices will change with property ownership. The streams draining all of the subwatersheds have and will continue to adjust in response to these changes in land use and land management practices.

Therefore, providing reasonably current information on stream and riparian conditions throughout the subwatersheds is critical to the continuing restoration and management efforts of the Quittapahilla Watershed Association and their partners. The Summer Intern Program provides the most cost effective means of gathering that necessary information.