LICK CREEK AND LITTLE LICK CREEK
FINAL REPORT
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WORK ASKED FOR IN PETITION

The petition filed on May 19, 2008 for the Lick Creek and Little Lick Creek asked for the following work to be provided:

Lick Creek: From US Route 6 to the junction of Prairie Creek-Remove log jams, remove sand bars, remove leaning trees @ 45 degree angle or less, provide ditch bank repair as needed and ditch reconstruction as needed.

Little Lick Creek: In Defiance County-Remove log jams, remove sand bars, remove leaning trees @ 45 degree angle or less, provide ditch bank repair as needed and ditch bank reconstruction as needed.

Assessments made to entire Lick Creek watershed area.

This petitioned for scope of work was approved for final design by the Joint Board of County Commissioners on October 6, 2008

ESTIMATE OF COST:

LICK CREEK EAST OF JUNCTION WITH LITTLE LICK

LEANING TREE REMOVAL			
1"-3"	0 EACH	$50.00	$0.00
4"-7"	39 EACH	$50.00	$1,950.00
8"-12"	86 EACH	$70.00	$6,020.00
13"-24"	74 EACH	$150.00	$11,100.00
25"-36"	17 EACH	$700.00	$11,900.00
37"+	0 EACH	$2,000.00	$0.00
LOG JAM			
SMALL	56 EACH	$500.00	$28,000.00
MEDIUM	15 EACH	$700.00	$10,500.00
LARGE	17 EACH	$4,000.00	$68,000.00
SAND BAR REMOVAL	0 LF	$10.00	$0.00
			$137,470.00
CONTINGENCY ~8%			$11,000.00
ENGINEERING/AUDITOR ~4%			$5,530.00
1ST YEAR MAINT ~5%			$7,000.00
			$161,000.00

LITTLE LICK CREEK

LEANING TREE REMOVAL			
1"-3"	0 EACH	$50.00	$0.00
4"-7"	109 EACH	$50.00	$5,450.00
8"-12"	221 EACH	$70.00	$15,470.00
13"-24"	112 EACH	$150.00	$16,800.00
25"-36"	20 EACH	$700.00	$14,000.00
37"+	2 EACH	$2,000.00	$4,000.00
LOG JAM			
SMALL	57 EACH	$500.00	$28,500.00
MEDIUM	33 EACH	$700.00	$23,100.00
LARGE	36 EACH	$4,000.00	$144,000.00
SAND BAR REMOVAL	0 LF	$10.00	$0.00
			$251,320.00
CONTINGENCY ~8%			$20,680.00
ENGINEERING/AUDITOR ~4%			$10,000.00
1ST YEAR MAINT ~5%			$13,000.00
			$295,000.00

LICK CREEK NORTH OF JUNCTION WITH LITTLE LICK

LEANING TREE REMOVAL			
1"-3"	0 EACH	$50.00	$0.00
4"-7"	99 EACH	$50.00	$4,950.00
8"-12"	281 EACH	$70.00	$19,670.00
13"-24"	153 EACH	$150.00	$22,950.00
25"-36"	35 EACH	$700.00	$24,500.00
37"+	23 EACH	$2,000.00	$46,000.00
LOG JAM			
SMALL	50 EACH	$500.00	$25,000.00
MEDIUM	42 EACH	$700.00	$29,400.00
LARGE	19 EACH	$4,000.00	$76,000.00
SAND BAR REMOVAL	0 LF	$10.00	$0.00
			$248,470.00
CONTINGENCY ~8%			$20,000.00
ENGINEERING/AUDITOR ~4%			$10,000.00
1ST YEAR MAINT ~5%			$12,530.00
			$291,000.00

Current Situation

The bottom end of Lick Creek is already under maintenance as part of Williams-Defiance Joint Watershed project. The channel is continuing to widen on its own, but orderly. It is removing 20-25 new leaning trees per year per mile.

This is likely to happen to the balance of the channel as well, to some degree. All of this land was originally woods, which has a runoff coefficient of 0.20. The spreadsheets below show the current runoff

increases for both Defiance and Williams Counties. They are almost identical for both Counties.

Williams County

Acres	Use	Runoff Coefficient		
1240	Commercial/Roads	0.75	930	
1332	Residential	0.6	799.2	
17330	Tilled	0.3	5199	
15	Pasture	0.25	3.75	
3370	Woods	0.2	674	
1240	Waste	0.2	248	
24527			7853.95	0.320

Defiance County

Acres	Use	Runoff Coefficient		
503	Commercial/Roads	0.75	377.25	
461	Residential	0.6	276.6	
15881	Tilled	0.3	4764.3	
0	Pasture	0.25	0	
1788	Woods	0.2	357.6	
428	Waste	0.2	85.6	
19061			5861.35	0.308

These charts were presented as part of the preliminary report. As part of the assessment calculations, the land use was categorized from the most recent aerial photography from both counties with very similar results. Conservatively, we are asking this channel to carry at least 50% more water than it historically did. The channel is trying to get wider to

accommodate the additional flow. As the channel widens, it undercuts trees. They fall in and create log jams, backing up water until the creek can cut a new channel around it.

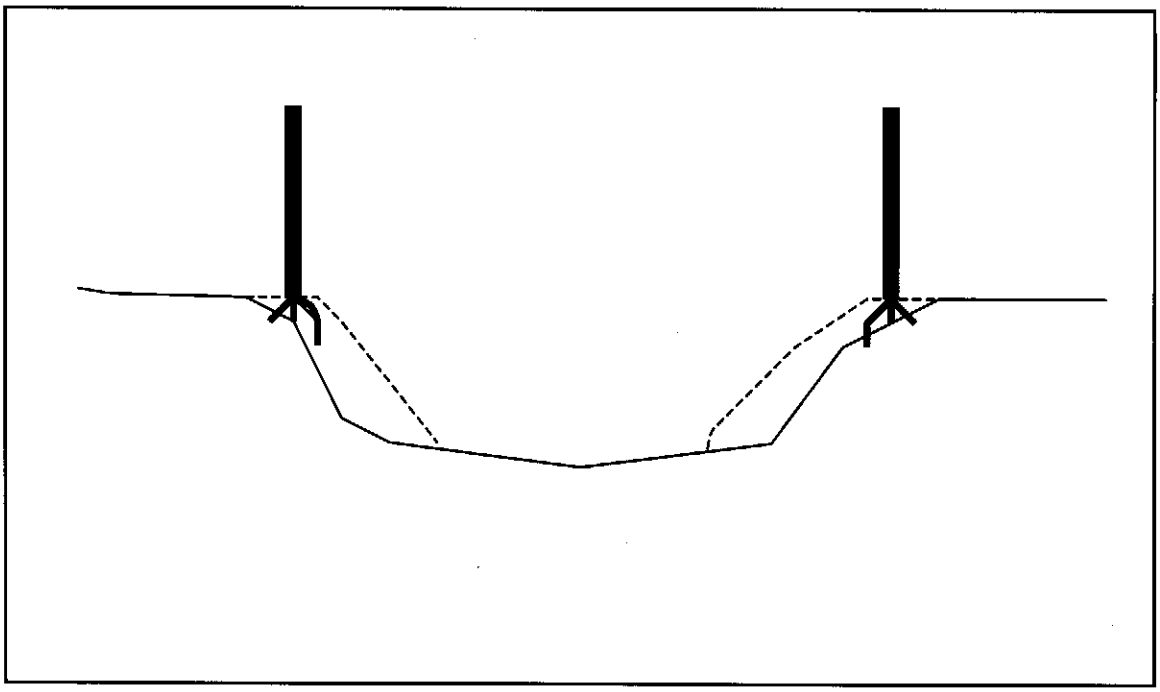
During the visual survey of the channel (November 2008-February 2009) all log jams and leaning trees were inventoried with a handheld GPS unit. The log jams were categorized as large, medium or small using a similar categorization to that used by the Defiance County Soil and Water Conservation District on similar projects. Leaning trees meeting the definition in the petition were also inventoried. The current inventories were compared against the channel inventory done by the Williams County Engineer's Office in the winter of 2007-2008 with the following observations:

1. The large log jams identified in the 2007-2008 inventory existed in the same locations. Most appear to continue to collect logs, blocking the flow of the channel until the channel cuts around the collection of logs, generally destructively removing large amounts of soil.

2. The smaller log jams identified in the 2007-2008 inventory were less consistent. Some had collected additional logs until completely blocking the channel and some had broken up and continued downstream.

3. Several large log jams had formed where none were identified in the previous inventory.

4. There were many trees along the channel with the soil carried away from their roots. Many were on the outside bank of curves where that would be expected, but many were similar to the following figure on straight sections of channel where it was obvious that the soil inside the dashed lines has been removed by the channel since the trees sprouted.



5. Many of these trees are still upright and would not be removed as part of this project as they do not meet the criteria asked for by the petition.

6. The number of trees meeting the definition of leaning tree in the petition are fewer than those that met the criteria used in the previous inventory. It is likely that many of those trees will continue to fall over time with a need to be removed.

7. The majority of the trees inventoried in 2008-2009 as leaning trees have already fallen into the channel.

8. The majority of the stream bank is consistent and on a stable slope throughout the petitioned portion of the channel. Most of the unstable channel bank had a log jam or fallen tree which seemed to be triggering the erosion. It appears that removing the obstacle would allow the channel bank to stabilize on its own in most cases.

FEASIBILITY OF PROJECT

Similar to the statement in the preliminary report, this project is certainly feasible to construct and maintain. It is similar in type of work to the Lower end of Ditch 40, restored in 2001-2002 and to Lost Creek which was restored in 2007. The inventoried work was less than that estimated in the preliminary report. The majority of the log jams and leaning trees on Little Lick were concentrated near Ney so all of Little Lick was combined together in the plan and assessments rather than an upper and lower portion as presented in the preliminary report.

It does appear that there will continue to be a large number of trees that are already undermined and likely to fall over time. While currently upright and not meeting the petition criteria of 45 degrees or less, the exposed root ball looks similar to those that have already fallen. It is likely that these trees will be an ongoing maintenance expense.

BENEFITS

Definition in the law

- (F) "Benefit" or "benefits," except as ordered in section 6131.31 of the Revised Code, means advantages to land and owners, to public corporations as entities, and to the state resulting from drainage, conservation, control and management of water, and environmental, wildlife, and recreational improvements. Factors relevant to whether such advantages result include:
- (1) The watershed or entire land area drained or affected by the improvement;
- (2) The total volume of water draining into or through the improvement and the amount of water contributed by each land owner;
- (3) The use to be made of the improvement by any owner, public corporation, or the state.
- "Benefit" or "benefits" includes any or all of the following factors:

- Elimination or reduction of damage from flood;
- Removal of water conditions that jeopardize public health, safety, or welfare;
- Increased value of land resulting from the improvement;
- Use of water for irrigation, storage, regulation of stream flow, soil conservation, water supply, or any other purpose incidental thereto;
- Providing an outlet for the accelerated runoff from artificial drainage whenever the stream, watercourse, channel, or ditch under improvement is called upon to discharge functions for which it was not designed by nature; it being the legislative intent that uplands that have been removed from their natural state by deforestation, cultivation, artificial drainage, urban development, or other manmade causes shall be considered as benefited by an improvement required to dispose of the accelerated flow of water from the uplands.

BENEFIT CALCULATION

With the work asked for in the petition, only reduction in flooding and providing an outlet for increased runoff were used in calculating benefit. Another way to describe the outlet benefit would be to term it *responsibility to correct the damage caused by increased runoff.* Both are difficult to quantify in dollars.

FLOODING REDUCTION

In briefly studying the effects of the current log jams on flooding, they primarily have a local effect. The channel without log jams has a nearly linear slope. Log jams basically create nearly level increases in the water surface behind them that raise the water surface until it intersects the "natural" slope of the channel. This effectively increases the flooding frequency (i.e. something that used to flood every 10 years now floods every 2 years) behind the log jams. Areas sufficiently upstream of a log jam are unaffected.

There are two extremes to calculate the benefit of flooding reduction: basing it on the land in the 100 year flood plain from the Auditors ($400 per acre woodland, $1200 per acre farmland) or the land that touches the creek. The true answer lies somewhere between these extremes, but would not be possible to pinpoint exactly without detailed (expensive) study of each log jam and is subject to change over time as new log jams form and existing log jams are bypassed by the channel. The situation is also difficult to quantify because there are a number of new large log jams that were formed between the 2007-2008 inventory and the 2008-2009 inventory. Each storm rearranges the situation and the situation appears to be continuing to deteriorate (more rather than fewer blockages)

Section	Land in 100 Year Flood Plain	Land Touching Creek
Lick Creek East of Ney	$440,000	$2,700,000
Lick Creek North of Ney	$460,000	$4,000,000
Little Lick Creek US127 to Ney	$123,000	$1,700,000
Little Lick Creek Co Line to US127	$145,000	$2,800,000

It is difficult to get an exact number for this type of calculation because currently only half of this land is likely impacted and the risk is approximately doubled. There is not enough value to justify this project on flood reduction alone, but too much value to buy out damaged properties for less than the cost of log jam removal as a method of mitigation.

INCREASED RUNOFF

Property owners have a responsibility to mitigate the effects of increased runoff from their clearing or developing of land. Courts have found this

to be true in civil cases and it is specifically mentioned in the section of the Ohio Revised Code cited earlier as a benefit. This benefit is difficult to quantify but several methods follow:

Woodland is valued at $400-$500 per acre in both Counties by the County Auditors. Today's value pre-development (woodland) would be $17-$22 million for the watershed. The actual land value today is $136 million and building value is $248 million. Other factors affected this increase in value, so the benefit is less than this difference.

On site detention, which would be the ideal mitigation from a runoff perspective, takes 3-6% of land or $4 to $8 million in land plus the cost of construction. This would indicate a benefit of something in excess of $10 million.

Using two large detention sites (for example, one on Lick Creek near the county line and one near Ney that could impact both Lick and Little Lick Creeks) would cost approximately $3 to $4 million each.

Assuming that log jam and leaning tree removal opens the channel and that long-term the channel is able to continue widening naturally, it will be about half as effective as detention basins and would have a runoff mitigation benefit of $2 to $4 million.

COST/BENEFIT CONCLUSION

In my opinion, as defined by law, the benefits of this project as petitioned exceed the cost. The cost for the work petitioned is estimated at ~$750,000. The benefit of not installing proper detention for the accelerated runoff in the drainage basin and mitigating by clearing the channel of obstructions is between $2 and $4 million.

MAINTENANCE DISTRICT

I recommend that the project be placed under Ditch Maintenance under the Defiance County Ditch Maintenance as the majority of the work is located with Defiance County.

PROFILES AND ELEVATIONS

The work in the petition does not involve any change to the existing channel grade. For this reason, no additional benchmarks were established specifically for this project. This was done in a effort to keep cost for engineering to a minimum and can be added if the Joint Board of County Commissioners directs. A profile of the existing channel exists from the work done by the Williams County Engineer in 2007-2008. It is attached to this report. This was done in a effort to keep cost for engineering to a minimum and a new one can be added if the Joint Board of County Commissioners directs.

CONSTRUCTION ACCESS AND DAMAGES

To remove the logjams and leaning trees it will be necessary for the contractor(s) and the future maintenance to enter upon the land near the creek. A width of 75 feet is shown on the construction plans as an area where the contractor can pile logs and operate equipment. The contractor and future maintenance have the right to traverse this 75 feet and stack logs removed from the adjacent channel in this 75 feet for storage and/or disposal by the landowner. Some parcels have an additional area identified with a heavy red line on the plans that can be used as a drive for the contractor and future maintenance to access the channel. This damage has not been quantified in dollars and is assumed to be offset by the benefit that same land will enjoy by reduced flooding. This language should be repeated on the assessment notices. Any exceptions to this equal treatment of additional benefit to landowners abutting the channel and damages to landowners abutting the channel must be appealed in the same way that the monetary portion of the assessment is appealed.

EASEMENT FOR CONSTRUCTION PURPOSES

As required in ORC 6131.14 and noted above a temporary construction easement of 75 feet is specified for this project. Because the majority of the channel is wooded, no sod filter strip will be planted as part of the construction. Where cleared, it is encouraged that landowners consider creating/maintaining a grass filter strip to reduce soil erosion. The majority of the cleared portions of this channel do appear to have grass filter strips established.

ASSESSMENT CALCULATION

The assessments were calculated in the following manner.

1. All the properties including roads were divided into four categories: Hard surfaces, cleared land, wooded land and ponds.
2. Runoff coefficients of 1 for hard surfaces, 0.3 for cleared land, 0.2 for wooded land and 0 for ponds were used.
3. With the assumption that all the land in the watershed was originally woodland all the runoff coefficients were decreased by 0.2.
4. With the assumption that all development within the watershed contributes to the problem equally, all the acreage in each of the 3 watersheds was multiplied by the runoff coefficient corresponding to the current land use, the results were summed and the cost was divided equally across the sum.
5. These calculated assessments were then rounded up to the minimum assessment of $50 established by the joint board of County Commissioners.
6. The assessments larger than $50 were then reduced by the extra amount generated by the $50 minimum assessment.
7. Those rates are as follows:
    A. For land only drained by Lick Creek below its junction with Little Lick in Ney, $26.80 per acre for hard surfaces, $3.35 per acre for cleared land, $0 per acre for wooded land, and a credit of $6.70 per acre for ponds.

B. For land drained by Lick Creek above its junction with Little Lick Creek in Ney, $117.75 per acre for hard surfaces, $14.72 per acre for cleared land, $0 per acre for wooded land, and a credit of $29.44 per acre for ponds.
C. For land drained by Little Lick Creek above its junction with Lick Creek in Ney, $162.29 per acre for hard surfaces, $20.29 per acre for cleared land, $0 per acre for wooded land, and a credit of $40.57 per acre for ponds.

8. These rates were also applied to roads which contribute a significant portion of the hard surfaced areas of the watershed.
9. Landowners who directly abut the channel or whose property the channel runs through will receive an additional benefit from reduced flooding, this benefit has not been quantified in dollars and is assumed to be offset by the damages from log jam and leaning tree removal and the disposal of the trees and debris within 75' of the channel. See section on Construction Access and Damages in this report.