

Amity Creek Sediment and Erosion Reconnaissance



South St. Louis SWCD
November 20th – November 25th, 2009

Background

Amity Creek was listed on the 303(d) list in 2004 as impaired for excess turbidity. Several other North Shore streams are currently impaired for excess turbidity and there are several more that would likely be listed if the assessment data were available. Many North shore streams have large clay banks due to the geology of the area, and Amity Creek is no exception. While many of comparable streams have failing clay banks, Amity has the extra stress of increasing development in the watershed. This increasing development has created new sources of sediment from stormwater, and it is likely that the stormwater runoff is increasing peak flows and destabilizing the banks of Amity Creek.

Process

Amity Creek enters Lester River just upstream of Superior St in the Lakeside area of Duluth, MN. The reconnaissance began at the first bridge upstream of the Superior St Bridge (the portion between the two bridges is bedrock controlled).

The stream was walked going upstream from that point. A GPS point was collected at any location that was a potential source of sediment. These included failing banks, gullies, stormwater outlets, and increased runoff producing landuse. Each GPS point corresponds to at least one photo and a brief description of the problem.

Results

A total of 60 locations were documented as potential project sites. Many of these sites are minor sediment sources, and several would be very difficult to access. The following sites were highlighted because of the potential for project implementation and the potential benefit from implementation. In order to organize potential project sites, the watershed was broken into 7 regions. The following are the regions.

1. **7 bridges Rd:** Amity Creek from Maxwell Rd/Skyline Pkwy/Occidental Blvd intersection to Superior St.
2. **Amity Park:** Amity Creek from Maxwell Rd/Skyline Pkwy/Occidental Blvd to East/West Branch Amity Split
3. **Amity Park West:** West Branch of Amity Creek from East/West Branch split to Jean Duluth Rd
4. **Pollay Park:** East Branch of Amity Creek from East/West Branch split to Jean Duluth Rd
5. **Downer Park:** West Branch of Amity Creek from Vermilion Rd to Woodland Ave
6. **Lake Park:** Jean Duluth Rd to Riley Rd
7. **Calvary Area:** Woodland Ave to Mud Lake

Each area has specific project sites or general landuse suggestions. The possible solutions presented are very preliminary most require further investigation to refine the proposed solution to the problem identified. The project GIS database is included in this package. The project numbers used when prioritizing projects in each reach can be found in the Proj_Num field in the amity_recon_F shapefile.

7 Bridges Rd

The 7 Bridges Rd stream reach is defined by a steep gradient and mostly bedrock controlled streambed. This stretch of stream drops approximately 300 feet over approximately 11,500 feet. This works out to approximately 138 feet of vertical drop per mile of stream. Much of this reach is contained in a bedrock canyon, but roads, ditches, and development at the top of the canyon are causing some erosion of the layer of clay above the bedrock.

Project #4 and 5: These two banks are large eroding banks above a bedrock channel. It appears the failure is related to the road above the banks or natural causes. These two banks appear to be the source of significant sediment.

Access: Access to this project site is not a problem. Sites located immediately off roadside.

Problems: Very steep and high bank approximately 75 feet.

Possible solutions: Anchored chain-link with erosion blanket and seeding. Further investigation may result in different approach.

Comments: These banks may impact the roadway.

Project #14: Area of historic channelization. The stream has overwidened and has very little buffer/canopy. This is not a sediment problem but potentially an area that restricts the movement and capacity of the stream to support trout.

Access: Access to this project is not a problem. Site is located immediately off roadside.

Problems: Overwidening restricts fish access at low flow and allows increased sunlight. Reduced buffer allows increased stormwater flow rate and increased sunlight.

Possible solutions: Cross-vanes to narrow and deepen channel and riparian planting to increase buffer and canopy.

Comments: Opportunity for habitat restoration.

Amity Park

The Amity Park stream reach is defined by a steep gradient (not as steep as 7 Bridges Rd) and some bedrock outcrops. This reach drops at approximately 62 feet per mile. This reach contains a lot of gravel/cobble mix and areas of clay in the banks. The immediate watershed land use has much higher percentage of abandoned pasture as compared with other areas of the watershed. This stretch has similar eroding banks as the 7 Bridges Rd stretch, but in this reach, the stream is actively eroding the toe of bank slope.

Project #24: Extremely turbid water was noticed during reconnaissance, but very little of this water was being discharged to stream during that time. Upon further investigation it appears that a gully is forming in an old beaver pond and the settled fines from the bottom of the pond are being suspended and discharged to Amity Creek.

Access: Via powerline to old Springhill Dairy field. Access is possible, but may be difficult.

Problems: Access

Possible solutions: Rebuild beaver dam and use engineered outlet structure. Investigate field area feeding the abandoned pond and further locate the source of the sediment. Consider reforesting abandoned field above site.

Comments: This could create waterfowl habitat. Current canopy would mitigate heating from ponded water.

Project #27: Eroding bank adjacent to hiking trail. This type of eroding bank is common in this reach. This particular bank is bigger than most, and immediately adjacent to trail.

Access: If the old bridges from the Seven Bridges Road can withstand construction equipment, access will not be a problem. The bank is adjacent to hiking trail wide enough for vehicles.

Problems: Vehicles must cross one bridge from near side or travel further to access from other side.

Possible solutions: Use methods similar to those used on previous Amity Bank Stabilization Project.

Comments: This project would help save hiking trail and create fish habitat.

Project #31: The remnants of an old bridge remain at the convergence of the East and West Branch of Amity Creek. The remnants are causing debris jams and some concentration of flow.

Access: There is access from two directions. One of which will probably have a weight limit.

Problems: A lot of work in the stream will be required, and the geomorphic reaction to this removal is uncertain. Some re-stabilization may be required.

Possible solutions: Remove bridge remnants, crush some of them, and use the crushed remnants as rip rap to stabilize area removal area.

Comments: This area has become highly altered due to long term impediment to flow. The streams reaction is uncertain. This bridge currently poses a safety hazard for hikers as well.

Amity Park West

Amity Park West is the stream reach between the point where Amity Creek East and West combine upstream to Jean Duluth Rd. This reach is slightly steeper than the reach immediately below. The Amity Park West reach drops at approximately 81 feet per mile. This reach consists of a predominantly cobble substrate with bedrock and sporadic clay banks. The problem that continually presented itself during the reconnaissance was stormwater issues related to culverts (plugged, perched, and blown out).

Project #33: This project is a series of bank failures on a meander bend of the stream. The bank failure is immediately adjacent to a large field, which is likely contributing to the problem through weakened soils due to the lack of tree roots.

Access: The easiest access is through the property of a landowner we previously worked with. The landowner may be willing to partner again. There is also access via the hiking trail, but would require some tree removal and traveling across floodplain.

Problems: Access could be an issue if the landowner is unwilling to cooperate.

Possible solutions: Cut slope back to a more stable grade, stabilize toe, and plant buffer on the top. A second slower solution would be to plant top of slope and leave larger grass buffer. In this case the slope would continue to fail for some time, but eventually stabilize.

Comments: This bank is a significant source of sediment and should be fixed. The solution would likely look a lot like the previously completed project on the East Branch.

Project #32, 35, 36, 37, and 39: These projects are all related to culverts. There are several locations along the trail that could use replacement or repair.

Access: All of these problems are on or immediately adjacent to the trail.

Problems: Trail would have to be shut down during construction.

Possible Solutions: Replace culverts and provide necessary energy dissipation.

Comments: This project could be implemented at individual sites or fix all the culverts at once.

Project #61: This project is a bridge replacement or removal. The current bridge is still functioning, but in serious disrepair. It appears the bridge is used regularly by foot traffic, but is seriously impeding stream flow and causing erosion on scour on bank immediately downstream.

Access: There are 3 different points of access. The access via a city easement off of the end of Roper Rd appears to be the most direct route.

Problems: If the bridge is needed reconstruction costs could be substantial.

Possible Solutions: Either remove the bridge and stabilize area or replace bridge with one that allows unimpeded bankfull flow.

Comments: This bridge is currently in a poor condition, and should be removed or replaced regardless of stream impacts.

Pollay Park

Pollay Park is a reach of the East Branch of Amity Creek from the convergence of East and West Branches to Jean Duluth Rd. The reach is high gradient (similar to Amity Park and Amity Park West) and drops at approximately 67 feet per mile. This reach has several bedrock outcroppings, but is mostly a gravel/cobble system. The dominant feature of this reach is a very deep steep valley and a sinuous path. This stretch has very little stream side development and is the most remote of all the reaches.

Project #44: This bank is not the worst bank in this reach, but it is in an area that can be accessed with the cooperation of area landowners. The bank is a significant source of sediment, and compares to other banks chosen for restoration in this reconnaissance.

Access: Enter via Evergreen Rd. Some tree removal would be necessary to reach site.

Problems: According to the most recent GIS data our office possesses the project site is on public land, but it would require access via private property. There are some very old trees growing on the top of this bank and removal may offset any gains. This site would require more investigation to determine potential.

Possible Solutions: Cut bank back to stable slope and stabilize toe. This would provide opportunity to improve habitat as well.

Comments: This is not the worst bank on this stretch of stream, but it is the worst of the banks that could be accessed without creating roads through the forest.

Project #48: A large gully enters the stream here, and there is a large section of culvert that appears to have washed down the gully. The gully appears to be stable at this point and well vegetated, but further investigation should be completed.

Access: Access to this site would be difficult. It is possible that equipment could travel down the actual ravine from Medin Rd.

Problems: Access could be difficult or require a lot of clearing.

Possible Solutions: Create a dry swale or retention basin with controlled outlet.

Comments: This gully does not appear to be actively eroding, but it also appears to carry a lot of water at times. This could potentially carry sediment laden runoff from Medin Rd.

Project #54: A series of ATV stream crossings are causing problems in this area. There is also an area between this site and the previously completed stabilization project that is currently working through alluvium that was deposited due to a beaver dam. This area has been targeted as a potential project site.

Access: Access would need to come through private land. We have worked with this landowner on the previous stabilization project, but it is not certain if we could obtain access through this landowner again.

Problems: Access could be a problem. ATV access and crossing area could be designated or eliminated, but it could spark further problems with ATVs forcing them to less desirable crossings. Stabilizing the beaver dam area has many potential problems.

Possible Solutions: Solutions for the ATV issue could be as simple as posting signs for designated crossings or blocking the existing crossings and denying access. Solutions for the beaver dam area would have to be worked out after an in-depth survey of the area.

Comments: The ATV crossing issue should be addressed. The beaver dam area project is currently being pursued, but should continue to be a priority as funding sources present themselves.

Downer Park

This stretch of stream runs from Woodland Ave to Vermilion Rd through Downer Park. This stretch is very steep and the substrate consists of boulders and cobble. The stream drops approximately 160 feet per mile, and lacks any substantial sinuosity. The stream is a series of steps and pools through most of the reach. The valley is very deep and the stream does not hit the valley wall in any part of the reach. This stretch is in great condition and the only impact in the valley is Vermilion Rd and a snowmobile trail. This reach could be significantly impacted by the Emerald Ash Borer, because most of the floodplain is Ash.

Projects: This reach is in good condition, and does not require any constructed BMPs. Planting species other than ash in the riparian area would help mitigate the impacts of a potential ash borer infestation. The snowmobile trail that goes through the upstream end park is also closer to the stream than necessary. Moving the trail and planting in its previous location would help provide a denser canopy and buffer.

Access: Access via the snowmobile trail.

Problems: Unhappy snowmobilers

Possible Solutions: Riparian plantings and moving snowmobile trail.

Comments: This project is low priority, but would be low cost.

Lake Park

The Lake Park stream reach runs from Jean Duluth Rd upstream to Riley Rd. This reach is lower gradient than all of the other reaches, and drops approximately 40 feet per mile. This area contains more wetland than the downstream reaches, and the floodplain is much wider. The low gradient and low banks do not allow for high bank failures.

Projects: Since this stream does not have the characteristic failing banks and very little concentrated stormwater it is suggested that converting high runoff landuse to forested areas. The University of Minnesota owns a large portion of the immediate watershed and much of that land is “open space.” Some of this area could be converted to forest to reduce runoff and increase buffer. A similar approach could be taken on the large city park immediately north of the University of Minnesota property.

Access: Access from all directions.

Problems: The open space may be necessary for intended use of the property.

Possible Solutions: Conversion of open space to forest. With a priority being the riparian area from the stream back 200 feet.

Comments: The University of Minnesota and the City of Duluth own a large portion of this watershed, and their property appears to be more open than necessary. Conversion of this area to a forested state would help reduce flashiness downstream and may help provide baseflow.

Calvary Area

This stretch was not walked due to time and permission constraints.

The Calvary Area reach is a lower gradient (approximately 40 feet per mile) reach that runs from Woodland Ave to Mud Lake. The reach goes through many individual property owners land, unlike the downstream reaches that are mostly in City Parks. The multiple landowners that would likely be involved in any projects would make implementation difficult.

Projects: The best way to approach any projects in this area may be to use outreach to find interested landowners, and help them treat their own stormwater. There is also a large section of channelized tributaries in the Woodland Hills and Far Par Golf Course area. This stretch is the most altered stream channel in the entire watershed, and it would benefit the stream to restore this area to a more natural state.

Access: If landowners were willing access would not be a problem.

Problems: Convincing landowners of the need for action. To restore the Woodland Hills/Far Par area would most likely be a large costly project.

Possible Solutions: Re-meander altered channels and plant riparian area. Use mailings to find willing landowners for other project in this area.

Comments: The Far Par Golf Course and Woodland Hills should be approached about possible work within their property.