

APPENDIX A

Stream Maintenance Pilot Program for Removal of Selected Gravel Deposits

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Stream Corridor Management Program

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Introduction

Throughout the past century, many streams, particularly tributaries to the East and West Branches of the Delaware River, have been re-located or otherwise manipulated to accommodate development, agriculture and other land-uses. Although well intended, these intervention measures have, to varying degrees, disrupted natural stream function. As a result, many of these stream reaches exhibit an excessive amount of deposition, particularly near their confluences with the larger rivers. During base flow conditions, excessive deposition at these confluences may be restrictive to fish passage. In some instances gravel deposits may have a deleterious effect on stream bank stability and flooding may be exacerbated.

During the past few decades municipalities and others easily obtained permits to clean out certain stream reaches where infrastructure or property was threatened. However, permitting for gravel removal in streams has reasonably become more restrictive perhaps with the exception of emergency situations. Currently, gravel can only be removed to an elevation six inches above the ambient waterline.

The Delaware County Soil & Water Conservation District (DCSWCD) Stream Corridor Management Program (SCMPr) is investigating stream gravel issues. The SCMPr continues to expand its science-based understanding of gravel and natural stream processes and share that knowledge to improve both the professional manager's and general public's understanding of the mobilization, transport and deposition processes of stream gravel and sediment. With an enhanced understanding of these natural relationships, informed decisions can be made regarding if and where an appropriate level of response and intervention can or should be exercised.

The following proposed procedure is based on this science.

Proposed procedure

Note: All administrative and technical work to be performed by the DCSWCD and/or Delaware County Department of Public Works (DCDPW). Excavation work to be performed by municipal forces or a hired excavating contractor.

1. Select location based on threat to public infrastructure and safety, site history and/or fish passage issues.
 - a. Selection to be mutually agreed on by the DCSWCD and DCDPW. Where fish passage issues are a concern, obtain consensus from Trout Unlimited.
2. Establish a minimum of two cross-sections through the area of the stream to be excavated. Additional cross-sections are to be established as a given situation may require, as determined in the field by DCSWCD Stream Program staff.
 - a. Establish permanent monuments on both sides of the stream at each cross-section.
 - i. Monuments shall be beyond the top of the stream bank in a location where they cannot be disturbed.
 - b. Survey existing topography at cross-sections in accordance with the Rosgen Level II procedure.
 - c. Survey existing thalweg profile a reasonable distance upstream and downstream of the cross-sections, as determined in the field by DCSWCD Stream Program staff, in accordance with the Rosgen Level II procedure and also as follows:
 - i. At a confluence, the profile shall extend to the opposite bank of the intersecting stream.
 - ii. If a significant gravel load is present in the intersecting stream, a profile along the intersecting stream thalweg shall be taken a reasonable distance upstream and downstream of the gravel deposit, as determined in the field by DCSWCD Stream Program staff.
 - iii. Additional cross-sections will be taken in the intersecting stream, as determined in the field by DCSWCD Stream Program staff.
3. Determine site drainage area in square miles
 - a. Use Digital Elevation Model (DEMs) where available
 - i. Currently available at DCSWCD for West of Hudson watershed
 - b. Use other acceptable methods where DEMs not available
4. Using appropriate Regional Hydraulic Relationship Curves, determine a design cross-sectional area, average width and average depth as follows:
 - a. West Branch and Susquehanna basins
 - i. Calculate bankfull cross-sectional area using $A_{bf} = 10.02 * DA^{0.81}$
 - ii. Calculate average bankfull width using $W_{bf} = (18 * A_{bf})^{0.5}$
 - iii. Calculate average bankfull depth (d_{bf}) using $d_{bf} = W_{bf} \div 18$
 - b. East Branch basin

- i. Calculate bankfull cross-sectional area using $A_{bf} = 7.01 * DA^{0.93}$
- ii. Calculate average bankfull width using $W_{bf} = (18 * A_{bf})^{0.5}$
- iii. Calculate average bankfull depth (d_{bf}) using $d_{bf} = W_{bf} \div 18$

Note: the calculated bankfull cross-sectional area will be hereafter referenced as the designed channel capacity.

5. Determine Baseline Channel Dimensions
 - a. Design a channel using the bankfull cross-sectional area and width as calculated above. The top width of the channel shall be the calculated average bankfull width. Channel bottom width shall be determined by using appropriate side slopes as may fit the situation while maintaining the cross-sectional area, top width and average depth as calculated above.
 - b. If conditions permit, a parabolic channel may be designed that maintain the bankfull cross-sectional area, top width and average depth as calculated above.
6. Estimate volume of gravel to be removed using the difference between existing conditions and the calculated baseline channel dimensions.
7. Establish a Threshold Channel Capacity
 - a. A threshold channel capacity is needed to determine when the channel is to be excavated back to the baseline channel dimensions. Current data suggests a reasonable threshold to be 70% of the designed channel capacity (see attached memo dated 1/11/06).
8. Obtain all necessary permits from regulatory agencies:
 - a. NYSDEC Article 15, Protection of Waters
 - b. US Army Corps of Engineers
 - i. Nationwide 3, Maintenance and/or
 - ii. Nationwide 27, Stream & Wetland Restoration Activities and/or
 - iii. Nationwide 33, Temporary Construction, Access and Dewatering and/or
 - iv. Nationwide 37, Emergency Watershed Protection & Rehabilitation
 - c. NYSDEC Stormwater Pollution Prevention Plan
 - d. NYCDEP Stormwater Pollution Prevention Plan
 - e. Local Floodplain Development Permits
 - f. This work is being performed to improve stream sediment characteristics, minimize impacts from future floods and improve fish passage. This work would be of short duration. De-watering operations could significantly increase mitigation time and create as much turbidity as the mitigation process itself. Consequently, it seems reasonable to assume that an appropriated de-watering protocol could be developed or a de-watering variance issued for work of this nature.
 - g. Since this will be a permanent maintenance situation, permits should be renewed or extended with written notification by the DCSWCD to the NYSDEC when the threshold channel capacity has been reached.

9. Establish excavation limits in the field at all cross-sections and the upstream and downstream ends of all profiles.
10. Excavate the channel to the baseline channel dimensions under the direction of DCSWCD or DCDPW.
11. Monitoring – Established sites shall be monitored by DCSWCD or DCDPW as follows:
 - a. Frequency
 - i. After every flow event of bankfull discharge or greater
 - ii. Annually if no bankfull flow events occur
 - b. Data to be collected
 - i. Re-survey established cross-sections
 - ii. Re-survey thalweg profile(s)
 - c. Analyses required
 - i. Compare current channel capacity with the designed channel capacity
 - ii. Determine if the threshold channel capacity has been reached
12. Re-excavate the channel to the baseline channel dimensions under direction of DCSWCD or DCDPW when a maintained channel becomes filled to the threshold channel capacity.
13. Benefits
 - a. Increased channel capacity and provision for a more free flowing channel
 - b. Improved streambank stability where impacted by deleterious gravel depositions
 - c. Decreased localized flooding because sufficient channel capacity is maintained
 - d. Improved fish passage, particularly at base flow conditions
 - e. Minimized emergency situations
 - i. Decreased need for emergency management funding