Technical Memorandum

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Water Resources Program Manager

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Subject: Water Quality Benefits of Phase 3 Trout Brook Stream Restoration

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INTRODUCTION

The purpose of this technical memorandum is to provide a reasonable estimate of the potential sediment and phosphorus reductions that will occur from performing restoration and stream stabilization practices to 3,780 linear feet of Trout Brook stream. Of this 3780 linear feet, 690 consists of floodplain bench excavation, 1020 consists of a channel re-meander, and 2070 consists of localized stabilization and ecological improvements. The estimates from this memo are intended to document possible water quality benefits from an "prevented sediment approach".

METHODS

South Washington Watershed District is currently pursuing 3,780 linear feet of stream restoration practices on Trout Brook stream as part of a phased approach to improving the quality of resource and providing benefits to downstream waters. The Minnesota Department of Natural Resources (DNR) completed a Bank Assessment for Non-point source Consequences of Sediment (BANCS) in 2013. This assessment indicates that Trout Brook stream, below the impoundment, produces about 351.44 tons/year of sediment. In addition, DNR field staff have estimated that after year one of stream restoration projects, 75% to 85% of the loading is typically reduced (personal communication with DNR Staff). We applied this percentage as a conservative estimate of the load reduction benefits that would be realized from the Trout Brook stream restoration.

We used this existing estimate of bank erosion to estimate the sediment and total phosphorus reductions that would be realized from Trout Brook stream and the downstream receiving water, the St Croix River for the planned 3,780 linear feet of stream restoration. We used the average erosion rates documented by the DNR at the specific sites where stream practices would be implemented (about 0.12 tons/year/foot) to establish the expected rate of erosion for the project sites.

We used USDA NRCS SSURGO soils data to determine that the primary soil in the area is a Silt Loam, and from the Minnesota Board of Soil and Water Resources (BWSR) pollution reduction estimation spreadsheet

(available online: https://bwsr.state.mn.us/water-quality-tools-and-models) assumed an empirical relationship between total phosphorus and silts of 1 ton of silt soil to 1.15 pounds of total phosphorus.

RESULTS

The application of restoration and stream stabilization practices as described above on Trout Brook should result in the sediment and total phosphorus reductions described in the table below.

Proposed Work	Length (Linear Feet)	Sediment Reduction (tons/year)	Total Phosphorus Reduction (lbs/year)
Floodplain Excavation	690	62	71
Channel Re-meander	1020	92	106
Localized Stabilization Practices	2070	0*	0*
Total	**3780**	**154**	**177**

*Assumed to be minimal to provide a conservative estimate.

These are conservative estimates of the water quality benefits that will be generated by the Trout Brook stream restoration. They do not account for in-channel denitrification or floodplain treatment. Depending on total project costs received following construction bidding, the floodplain excavation portions of the project may be completed during a subsequent phase or removed from the project. Future work might consider estimating the benefits of in-channel denitrification as well as floodplain treatment.