Brown AND Caldwell

Restoring Impaired Streams to Meet TMDL Requirements and Create Public Amenities

NEWEA Joint Watershed Management & Stormwater Conference

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Outline

- Why Stream Restoration
- TMDLs - Chesapeake Bay
- TMDLs/Pollutant Load Reductions - WI
- Where do we go from here?

Why Stream Restoration?

Why Restore Ecosystems?

- Ecological Benefits
- Public Benefits
- Regulatory

Why Restore Ecosystems?

- Ecological Benefits
  - Stable, balanced biological populations & community
  - Increased biodiversity
  - Protection of selected species
  - Buffer against system stressors

Why Restore Ecosystems?

- Public Benefits
  - Recreational opportunities
  - Protection of drinking water source areas
  - Flood protection
  - Reduced health risks from exposure to contaminants
  - Increase in property values
  - Improvement in quality of life

Why Restore Ecosystems?

- Regulatory
  - Mitigation requirements
  - Water quality improvement requirements

STREAM RESTORATION: DRIVERS

- Water, Sediment, Soil Contamination
- Hydrologic & Hydraulic Modification
- Naturalization
- Threat to Structures or other Capital Improvements
- Habitat Improvement
- Migration Blockage
- Mitigation Requirements
- MS4/TMDL Requirements

TMDLs - Chesapeake Bay

TMDL Credits – Chesapeake Bay

- Many stormwater BMPs possible
- Stream Restoration Projects on the rise
  - High sediment and nutrient removal efficiency
  - Low cost per pound removed ratio – very cost effective
  - Opportunity to meet other goals
    - Habitat improvement
    - Aesthetics
    - Trails and greenways

TMDL Credits – Chesapeake Bay

Municipalities can get credit toward meeting their TMDL objectives through stream restoration practices that:

- Prevent channel or bank erosion that would otherwise result in sediment being delivered downstream - prevented sediment approach (Protocol 1)
- Include design features that promote denitrification during base flow - in-stream denitrification approach (Protocol 2)
- Reconnect stream channels to their floodplains for a wide range of storm events - floodplain wetland reconnection (Protocol 3)

TMDL/MS4 Pollutant Reduction Credit

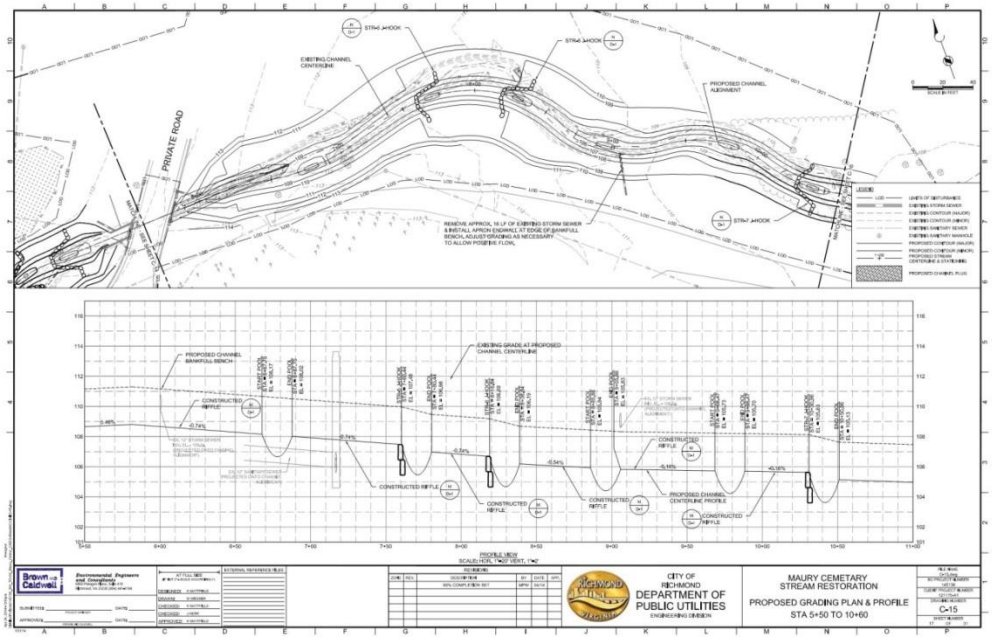
Chesapeake Bay –

Maury Cemetery Creek

and Pocosham Creek

Maury Cemetery Creek

- Goal: Restore channel function; obtain pollution reduction credit for TMDL compliance
- Relocate onto City property
- Create floodplain bench and add structures



Maury Cemetery Creek

- Creating stable dimension, pattern, and profile to reduce bank erosion
- Upstream reaches – creating bankfull bench
- Downstream reaches – connecting sections to existing floodplain

Maury Cemetery Creek

- Some areas were armored with rock so no existing erosion
- Some areas already connected to floodplain so no credit for floodplain reconnection
- Floodplain not accessed until approximately 2-inches of rain occurred so no TN and TP removal

Maury Cemetery Creek

Preliminary numbers

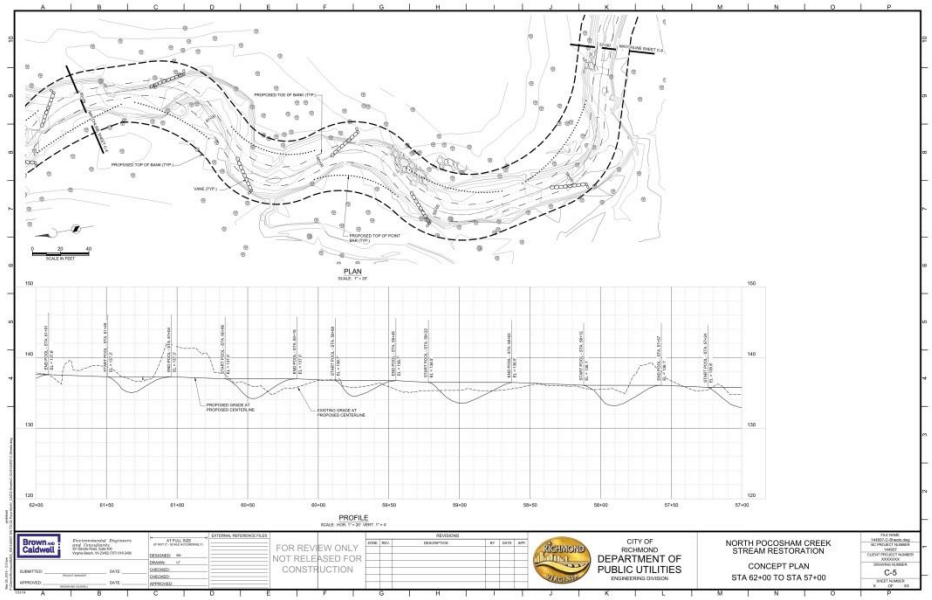
- Restored stream length = Approx. 2,500 linear feet
- Protocol 1
  - Sediment = 678 tons/yr
  - TP = 4,065 lbs/yr
  - TN = 8,828 lbs/yr
- Protocol 2
  - TN = 523 lbs/yr
- Protocol 3 – Floodplain not accessed in very small storms

Maury Cemetery Creek - Amenities

- Naturalized channel
- Improved access to stream
- Improved biodiversity – plant and animal
- Visually more appealing

Pocosham Creek

- Goal: Restore channel function; obtain pollution reduction credit for TMDL compliance; develop park amenities – walking and biking trails; greenways
- Create floodplain bench and add structures



Pocosham Creek

- Creating stable dimension, pattern, and profile to reduce bank erosion
- Creating bankfull bench
- Some areas were armored with rock so no existing erosion
- Floodplain not accessed in smaller storm events so no TN and TP removal

Pocosham Creek

Preliminary numbers using interim rates

- Restored stream length = 7,630 feet
- Sediment = 946 tons/yr
- TP = 518 lbs/yr
- TN = 572 lbs/yr

TMDLs/Pollutant Load Reductions - Wisconsin

MS4/TMDL Credits – Wisconsin

- No defined protocol yet
- Only applicable to channels that are not considered part of MS4
- Only applicable in reachsheds that have already met their TMDL load allocations
- Use pollutant trading guidelines to determine amount of credit from stream restoration

Reid Golf Course – Pollutant Removal

- Stormwater management
- Pollutant removal
- Flood control
- Channel naturalization

Reid Golf Course - Amenities

- Enhanced golf course play
- More visually attractive
- Reduced course maintenance
- Award winning golf course improvements

Where Do We Go From Here?

STREAM RESTORATION and TMDLs – Where Do We Go From Here?

- Several areas are looking at restoration as a BMP
- Dependent on how TMDLs were developed – did baseline modeling during development assume streams were stable?
- Constantly changing regulatory environment

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