

Evaluation for the Relative Comparison of Erosion Potential between
Potential Project Sites

and

How to Use the Concept as a Planning Tool

Method 1: GIS Analysis for Ranking Potential Sites in Site Searches

Compile GIS data for:

- Stormwater infrastructure (outfalls, pipes, inlets, etc.)
- Right-of-way
- Digital Elevation Model (DEM)
- Stream and ditch network

GIS Analysis

- Develop an automated GIS model that will analyze outfall and/or headwater channel locations to determine the downstream distance from the outfall to the edge of right-of-way and the net change in elevation over this distance.
- The GIS model can generate a polyline feature class with lines originating from the outfalls and extending along the stream network to the edge of right-of-way. For each line generated by the model, attributes will be populated for a unique outfall identifier, the distance of the line, the elevation at the start of the line, the elevation at the end of the line, and the net change in elevation.
- After processing, potential projects lists can be generated for each watershed, ranked in distance to the right-of-way and in elevation change. Outfalls with the greatest distance and elevation change are prioritized for future detailed assessment.

Method 2 - Development of a Planning Tool Using One Field Visit

(Likely Higher Accuracy than GIS method)

- Locate outfall assets and/or headwater channels, identify length of site and location of headcut features and base level control
- Digitally connect a stream centerline to site features (available data, low point in topography, flow path derivation analysis)
- Snap each knickpoint to the stream centerline (via map markup or GPS).
- Delineate the stream centerline at the downstream most knickpoint. Everything upstream of the most downstream knickpoint is considered the “reach”. Verify/document the closest downstream and upstream base control (road crossing, utility, bed rock, etc.)
- Working the way upstream, if multiple knickpoints are evident within the reach line, set breaks at each knickpoint, designate as “segments”.
- For each segment, compute the depth as the cumulative total of the knickpoint depths located downstream. Labeled the depth of each knickpoint in the mapping, along with the cumulative segment depth.
- Stream width should be calculated using an appropriately selected Regional Curve relationship (based on Physiographic Province and Drainage Area). Or top and bottom channel widths can be measured.
- Compute the volume for each segment (length * width * cumulative depth). (Slope is not used, depth is assumed to follow slope)
- Convert to proper units using bulk density and nutrient concentration assumptions

Method 3 - Development of a Planning Tool Using GIS and Empirical Data

- Locate outfall assets, identify length of site from outfall to confluence or other base level control point
- Digitally connect to a stream centerline as a reach (available data, low point in topography, flow path derivation analysis)
- Determine the elevation change from the asset to the control point (most often will be confluence)
- Calculate elevation change x Site Length metric
- For each reach use the equations identified on the next slide within these data set ranges:
 - Elevation Change x Site Length between 0 and 1,200
 - Elevation Change x Site Length between 1,200 and 17,000
- Convert to proper units using bulk density and nutrient concentration assumptions

Erosion Potential for Sites with Elevation Change x Site Length between 0 and 17,000

