Using GIS to Access Risks of Stormwater Assets

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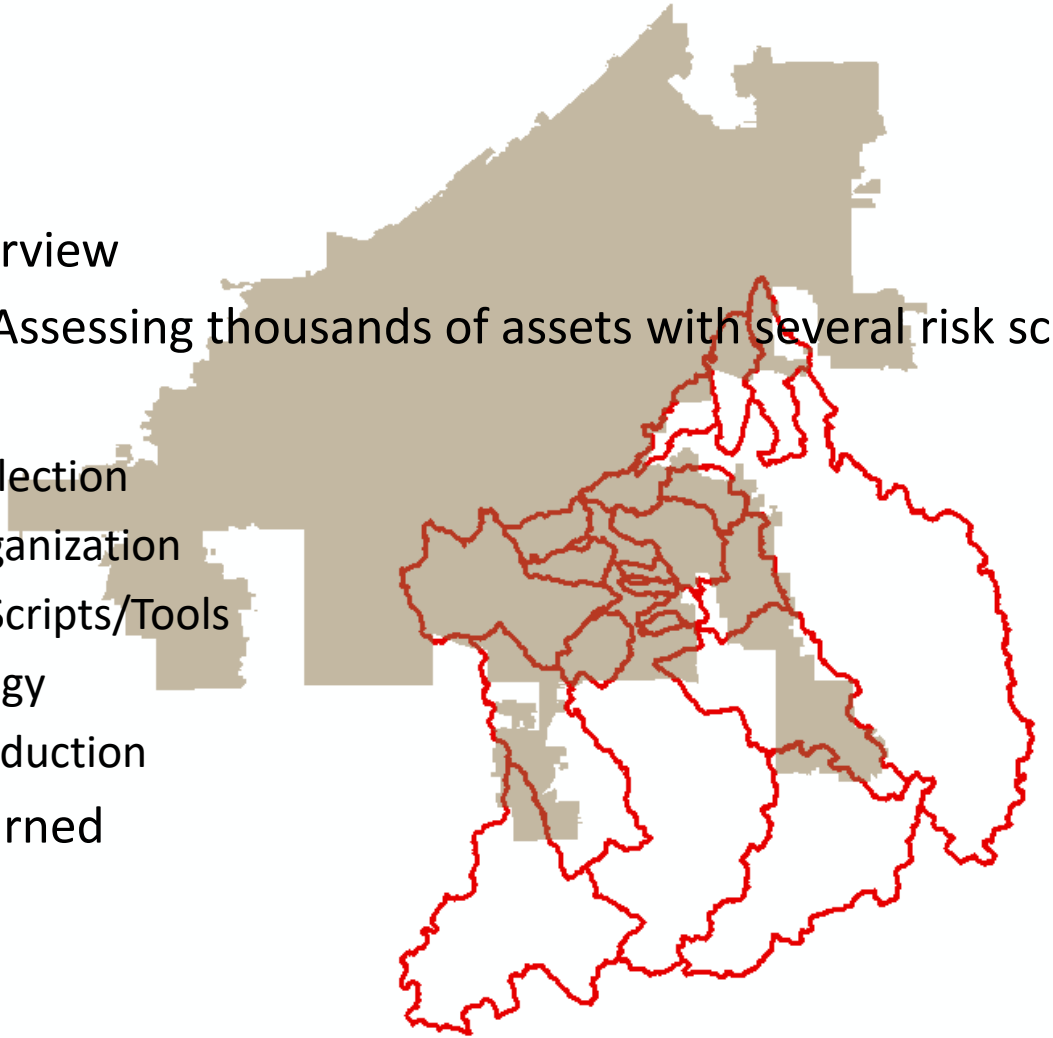
NORTHEAST OHIO REGIONAL SEWER DISTRICT
REGIONAL STORMWATER MANAGEMENT PROGRAM

Outline

- Project Overview
- Challenge: Assessing thousands of assets with several risk scores
- Solution
  - Data Collection
  - Data Organization
  - Python Scripts/Tools
  - Symbology
  - Map Production
- Lessons Learned



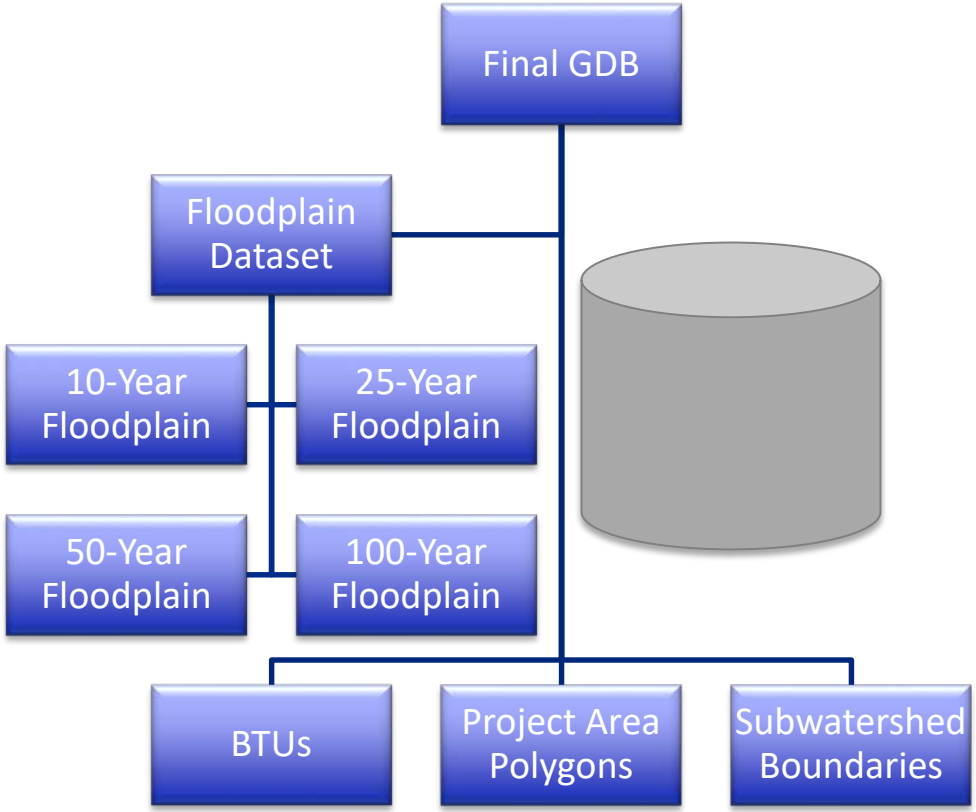
Cuyahoga River South Stormwater Master Plan

Northeast Ohio Regional Sewer District (NEORSD)

Operational Performance Evaluation	Identify areas of erosion and flooding through modeling, field assessments, and monitoring
Alternatives Development & Evaluation	Comprehensive set of solutions, incorporating stream health, function, habitat, and water quality improvements
Development of Master Plans	Recommended policies, construction projects, maintenance activities, and areas for preservation

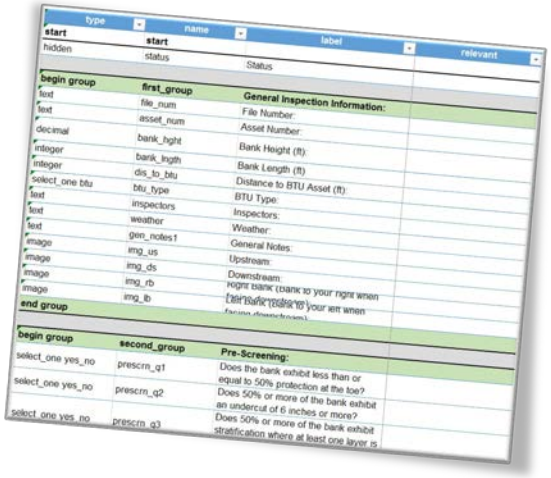
Data Organization

- File Geodatabase
  - Utilization of datasets
  - No storage limit
  - Works with many data formats
  - Can upload to an enterprise
    ArcGIS Online account/system
- Shared Server Space
  - All access
  - Create scratch workspace
  - Export figures to same location

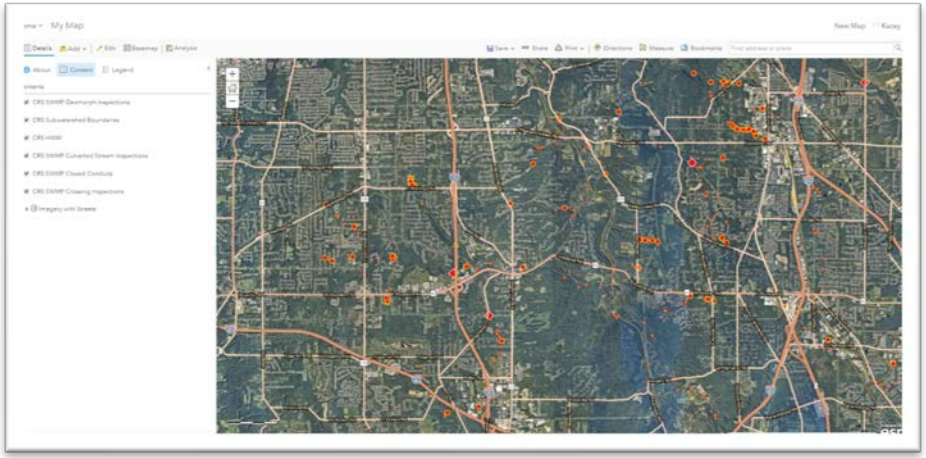


Data Collection

- Survey 123
  - Flexibility
  - Easy to Use
  - Syncs with ArcGIS Online (AGOL)

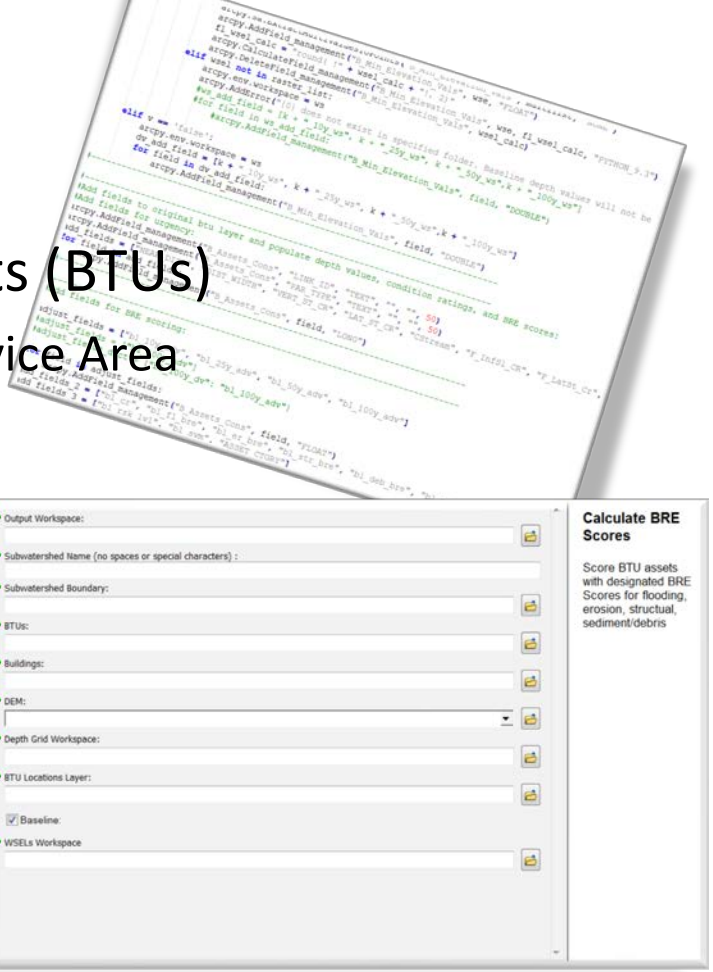


type	name	label	relevant
start	start		
hidden	status	Status	
begin group	first_group	General inspection information:	
text	file_num	File Number:	
text	asset_num	Asset Number:	
decimal	bank_hght	Bank Height (ft):	
integer	bank_lngth	Bank Length (ft):	
integer	dis_to_btu	Distance to BTU Asset (ft):	
select_one btu	btu_type	BTU Type:	
text	inspectors	Inspectors:	
text	weather	Weather:	
text	gen_notes1	General Notes:	
image	img_us	Upstream:	
image	img_ds	Downstream:	
image	img_rb	Right bank (bank to your right when	
image	img_lb	Left bank (bank to your left when	
end group			
begin group	second_group	Pre-Screening:	
select_one yes_no	prescrn_q1	Does the bank exhibit less than or equal to 50% protection at the toe?	
select_one yes_no	prescrn_q2	Does 50% or more of the bank exhibit an undercut of 6 inches or more?	
select_one yes_no	prescrn_q3	Does 50% or more of the bank exhibit stratification where at least one layer is	

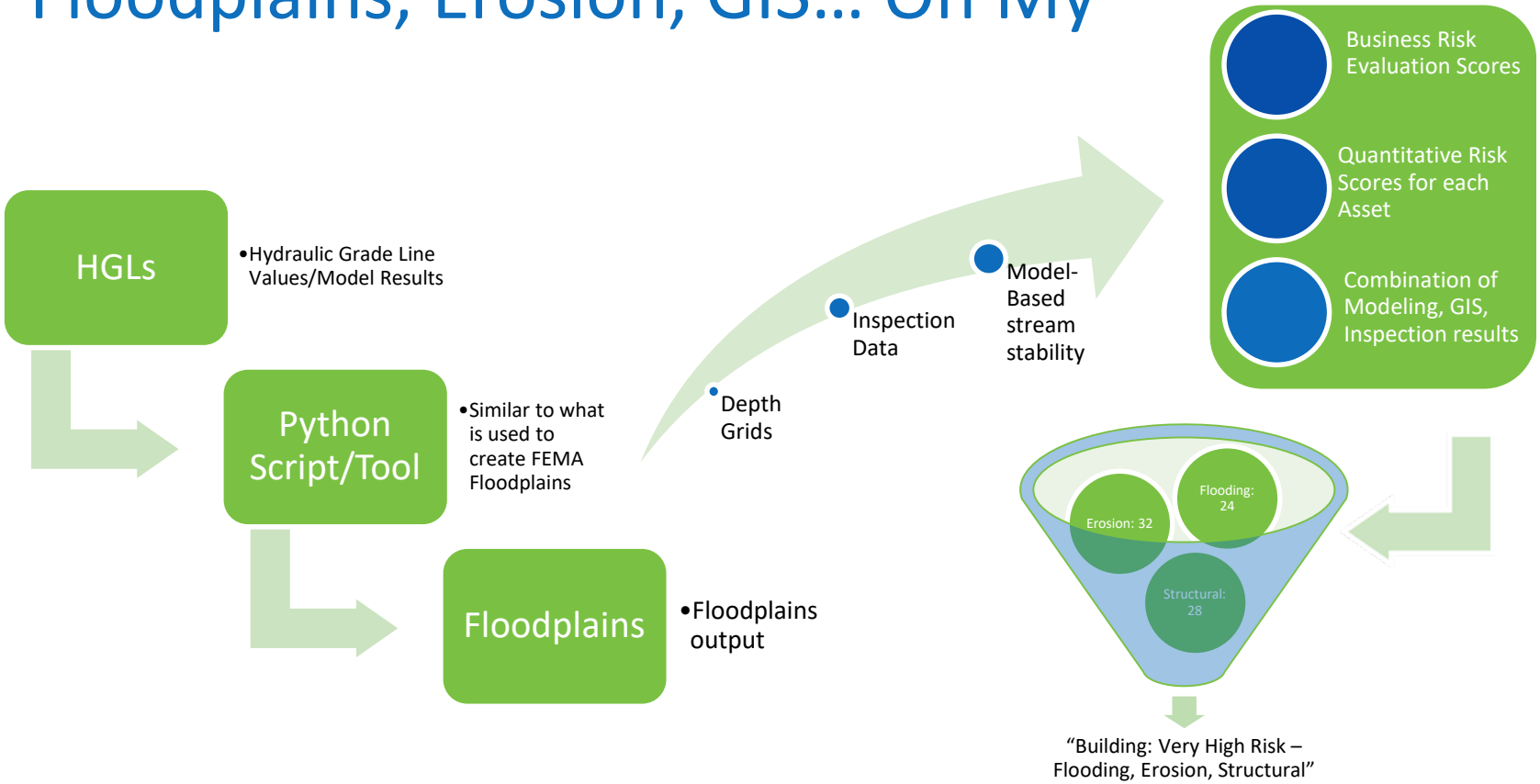


Assessing The Assets

- Building, Transportation, Utility Assets (BTUs)
  - 2000+ Assets in District Stormwater Service Area
  - 600+ inspections
- Risk Factors
  - Flooding (GIS and Inspection Analysis)
  - Erosion (GIS and Inspection Analysis)
  - Structural (Inspection Analysis)
  - Sediment/Debris (Inspection Analysis)
    - Hydraulic and Hydrologic Modeling



Floodplains, Erosion, GIS… Oh My



Metrics used to define Erosion Risks

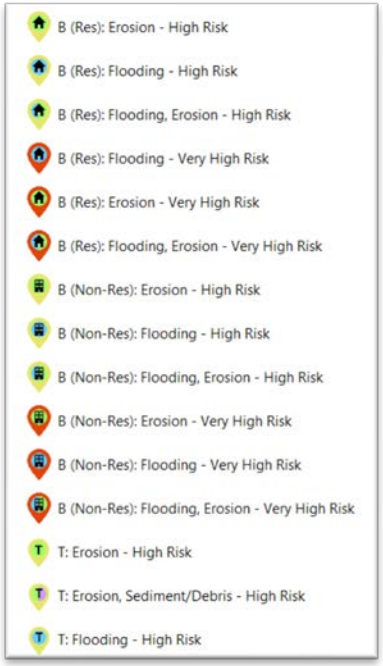
Flooding Risks

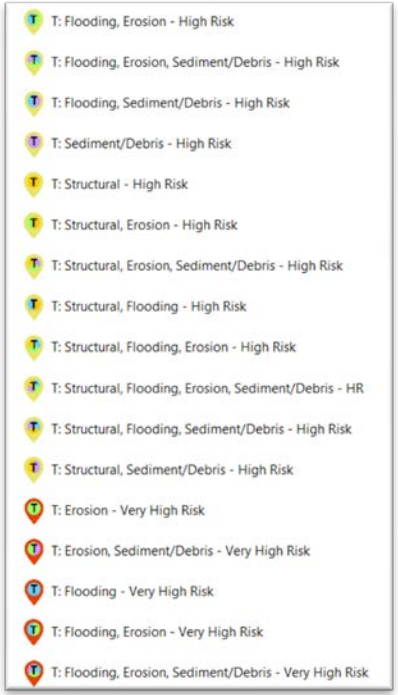
- H&H Modeling
  - HGL results used in GIS Floodplain Tool
- GIS
  - Depth Grids and criticalities used to determine severity of flooding and priority of asset

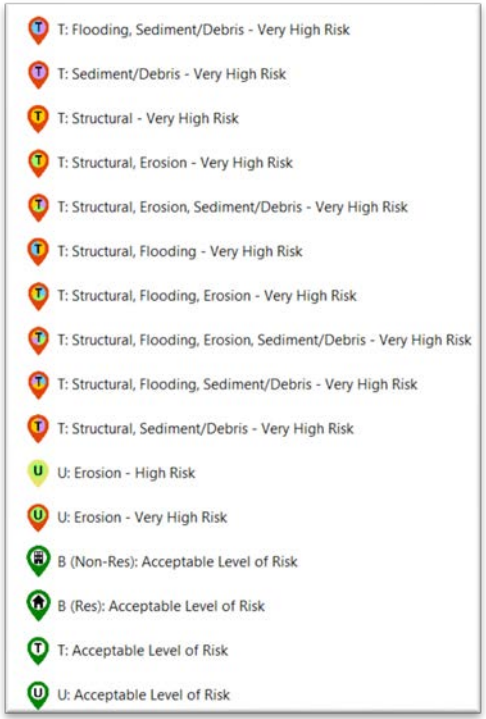
Erosion Risks

- H&H Modeling
  - Vertical and Lateral Stability values
- Inspections
  - BEHI scores
- GIS
  - Stability values, BEHI Scores, and criticality values used to determine severity of erosion and priority of asset

Symbology Challenge







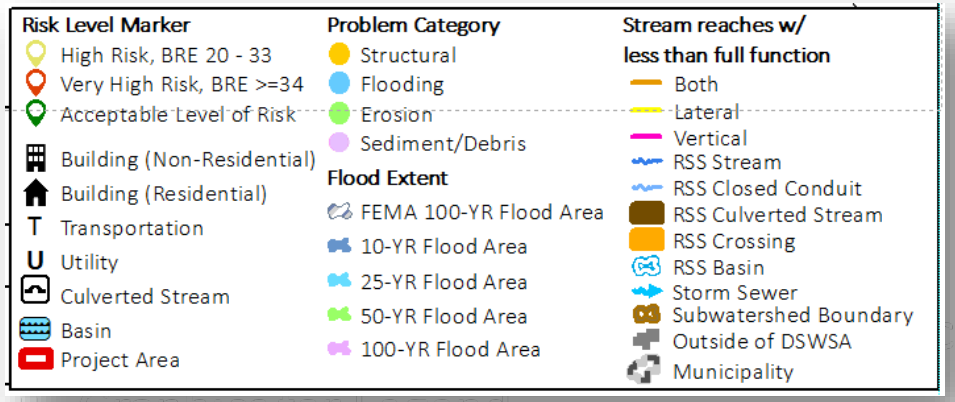
Symbology Solution

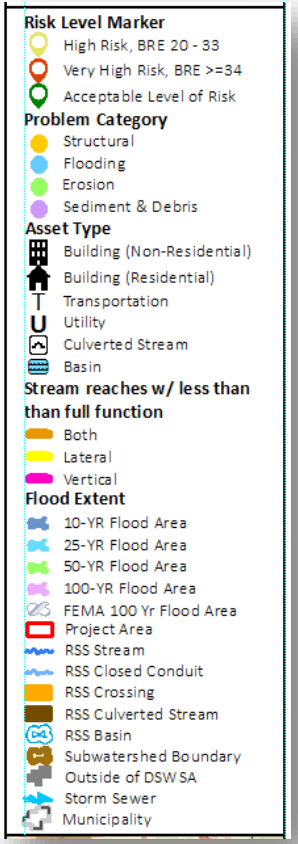
- Multi-Party Symbology
  - **BASE:** Level of Risk - Red/Yellow/Green
  - **CIRCLE:** Risk Type - Orange/Green/Blue/Purple/Mixed
  - **CENTER:** Asset Type - Pictures that correspond with Asset type
- Created in PowerPoint and added to symbology ".lyr" file

Map Production

- Challenge:
  - 8.5” X 11”
  - Over 600 Paper Maps
- Solution:
  - Data Driven Pages
  - Track map progress using shareable spreadsheet
  - Use single folder and link to single geodatabase

Legend





- Make Legend into graphics
- Break up asset risk symbology
- Use different shapes for legend symbols
- Intuitive to reduce need to constantly check legend

"Knowing where things are, and why, is essential to rational decision making" ~ **Jack Dangermond**

GIS Lessons Learned

- Automate everything and anything
  - Utilize python scripting and other tools to automate as much as possible to reduce human error and reduce re-work
- Create a GIS server to organize and store data for ease of accessibility for all involved
  - Geodatabases are excellent but it helps to have one central location with all of the finalized data for engineers and GIS Specialists to access conveniently
- Data-Driven Pages
  - Mass map production that keeps legends consistent and requires minimal adjustments between maps

Questions?