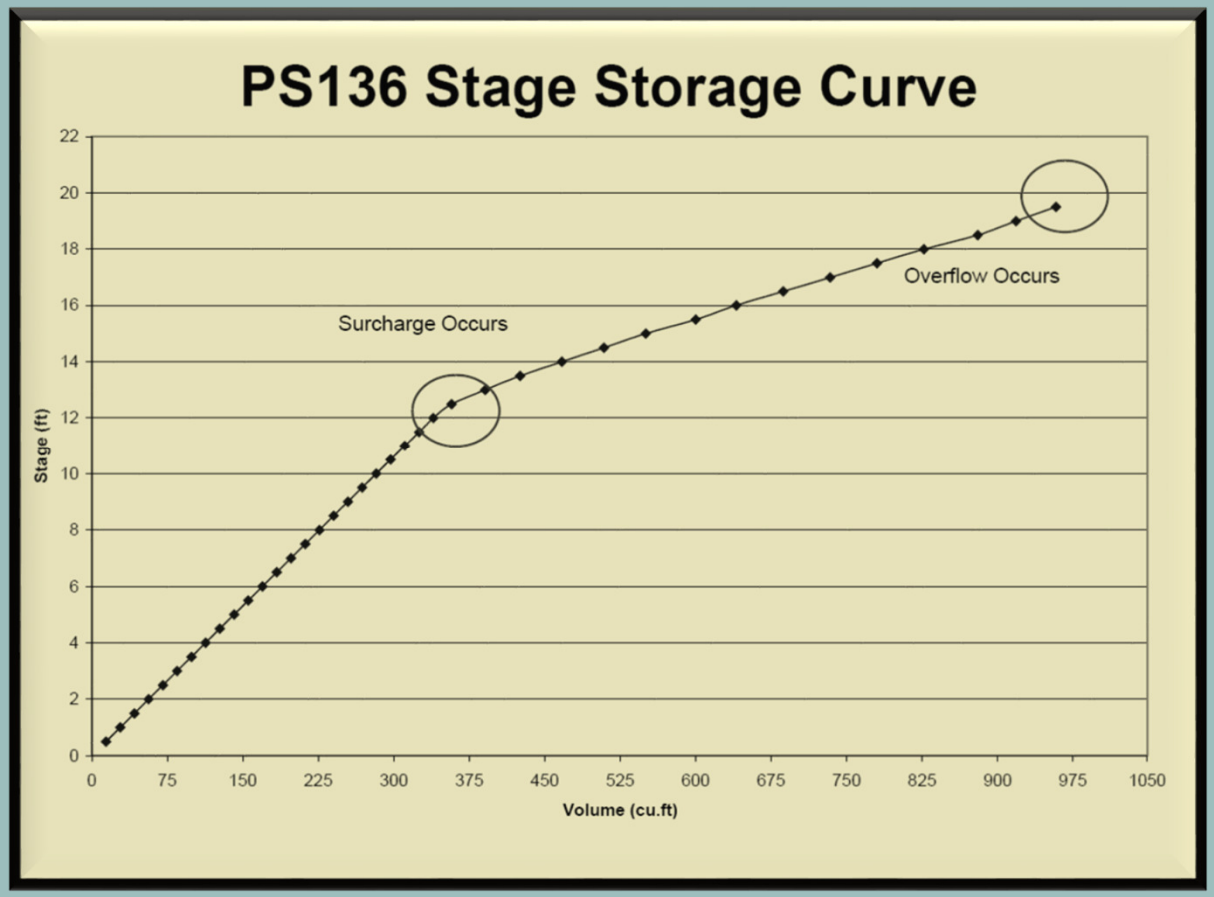


DETERMINING SANITARY SEWER GRAVITY SYSTEM STORAGE: A STANDARDIZED APPROACH

Shonia Holloway,
Pennsylvania State University, MGIS

VAMLIS 26th Annual VA GIS Conference,
October 20th, 2015

AGENDA

Background

Goals and Objectives

Design and Development

Results

Summary

BACKGROUND

Gravity Collection Systems

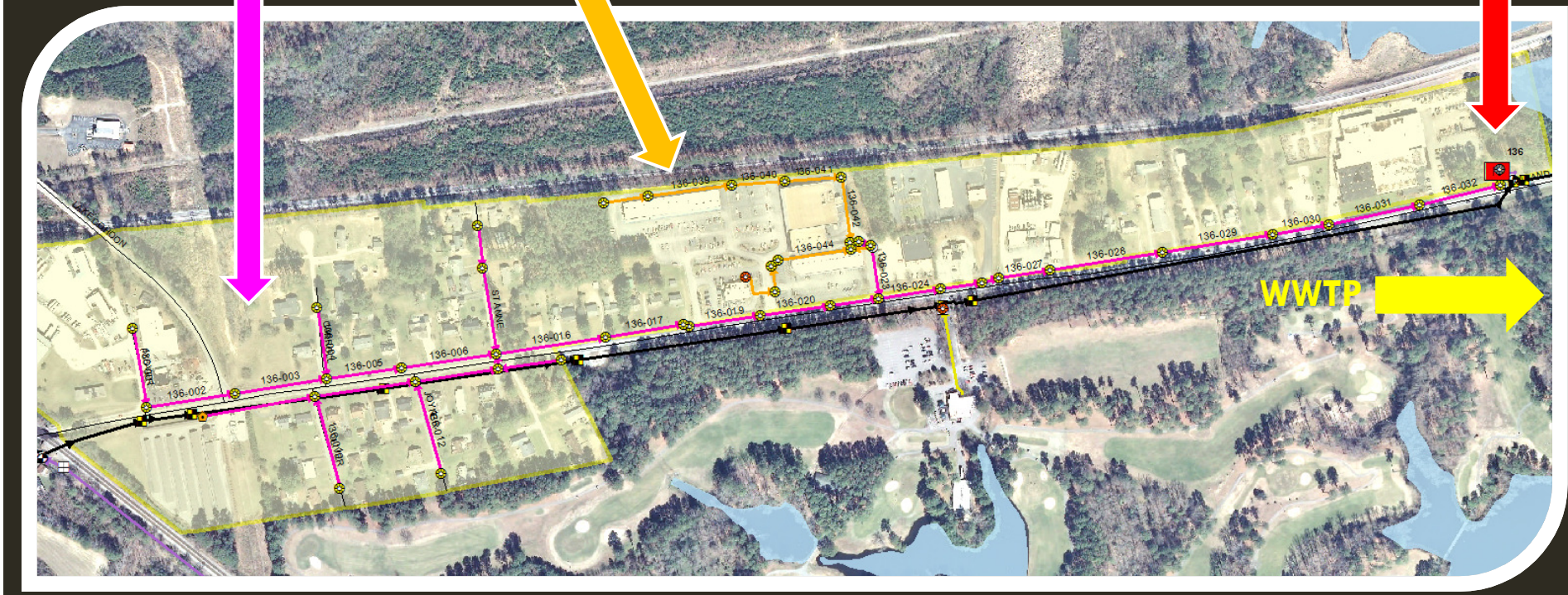
Gravity Mains
Unique ID
US Feature/Elev
DS Feature/Elev
Diameter

Manholes
Unique ID
Rim Elevation
Service Area

Pump Stations
Unique ID
Floor Elevation
Wet Well Info
Incoming GM

Collection Areas (Pump Station Service Area)

Pump Station



BACKGROUND

What is Capacity....and why do we care?

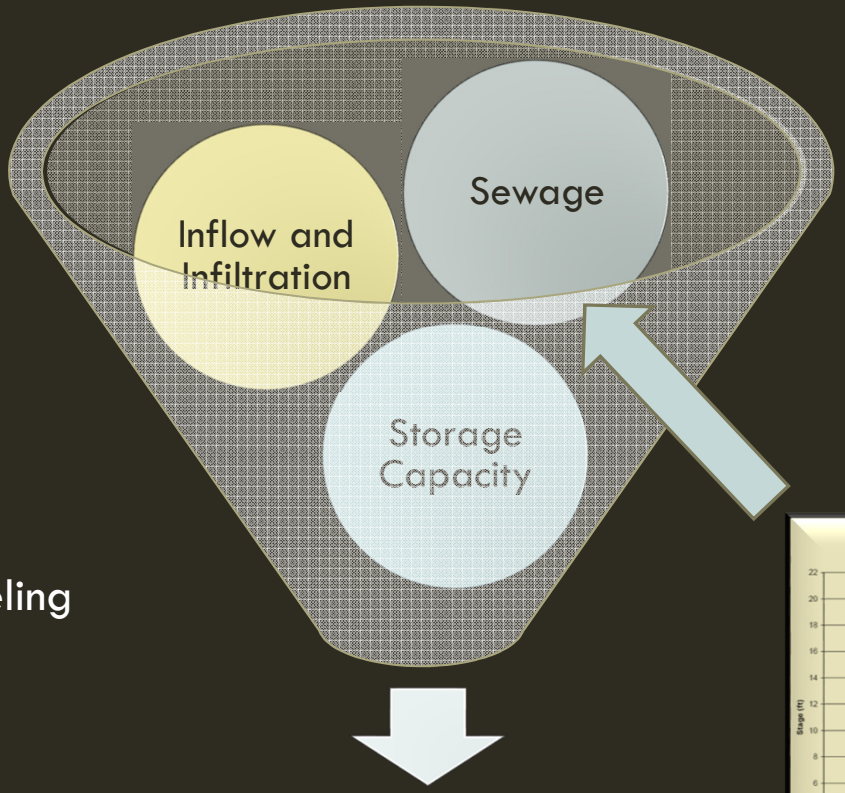
Adequate Capacity = Good

Lack of Capacity = Bad

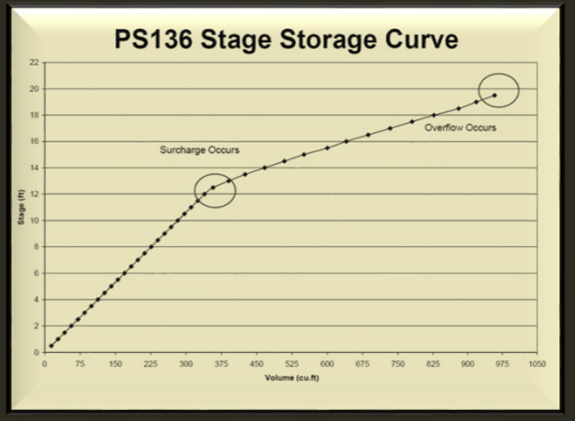
BACKGROUND

How is Capacity Analysis Conducted?

During design and/or rehabilitation of the system – through modeling



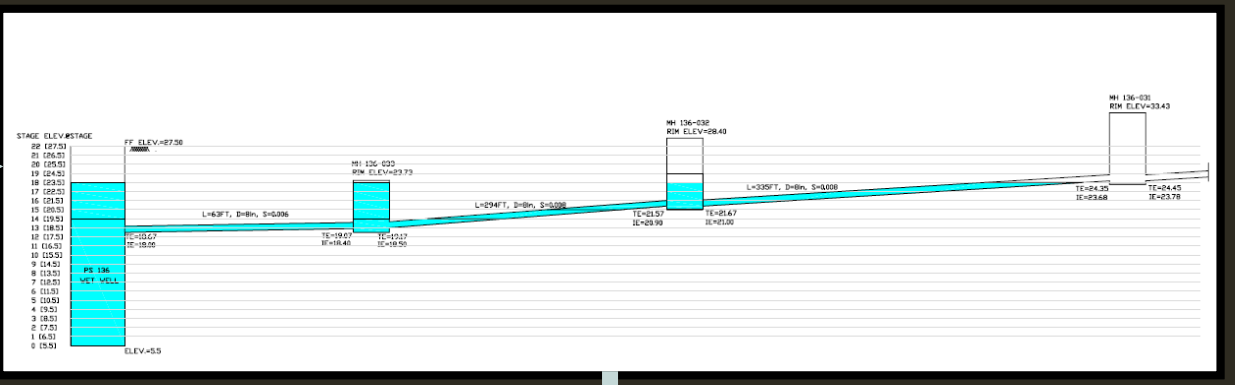
Total System Capacity Needs



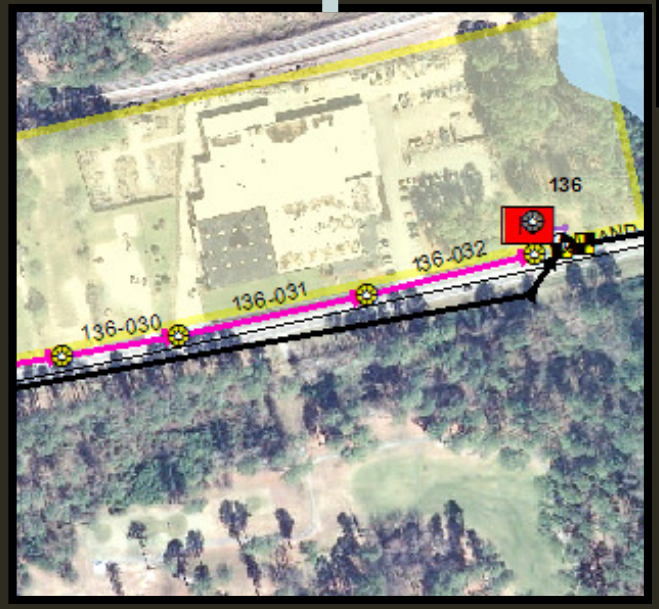
BACKGROUND

How does gravity storage play a role in capacity?

Calculations

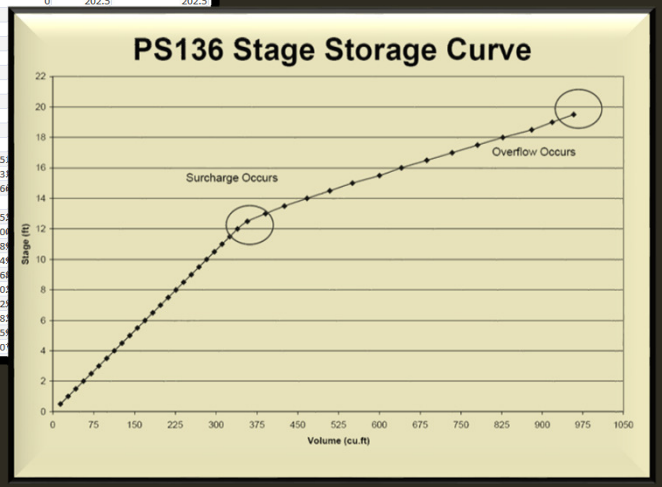


GIS



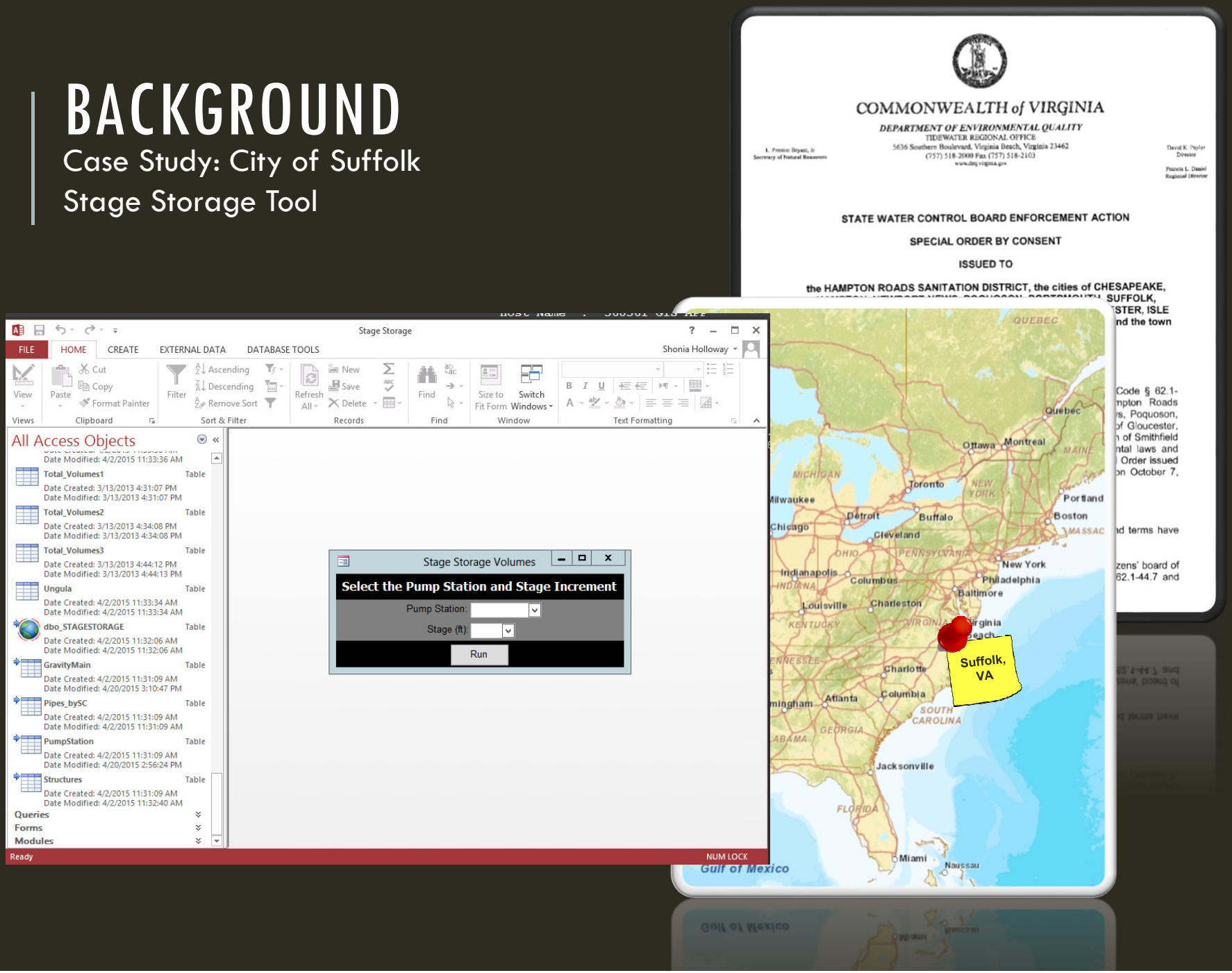
Stage	StageElev	Pipe_Volumes	Manhole_Volumes	Ungula_Volumes	VolWW	Total
0.5	12.47	0	0	0	40.5	40.5
1	12.97	0	0	0	81	81
1.5	13.47	0	0	0	121.5	121.5
2	13.97	0	0	0	162	162
2.5	14.47	0	0	0	202.5	202.5
3	14.97	0	0			
3.5	15.47	0	0			
4	15.97	0	0			
4.5	16.47	0	0			
5	16.97	0	0			
5.5	17.47	0	0			
6	17.97	0	0			
6.5	18.47	0	0			
7	18.97	0	0			
7.5	19.47	0	0			
8	19.97	12.9672940471802	2.51326549135808	3.940705		
8.5	20.47	12.9672940471802	8.79645079135808	51.42163		
9	20.97	27.3400933403712	15.0796360913581	89.830764		
9.5	21.47	293.239285858209	21.6141401747162			
10	21.97	293.239285858209	34.1805107747162	55.051453		
10.5	22.47	310.591449639564	46.7468813747162	126.36506		
11	22.97	696.32549661686	66.2247299187904	5.952358		
11.5	23.47	696.32549661686	97.6406564187904	56.31704		
12	23.97	803.674055020246	133.454804000149	67.224468		
12.5	24.47	939.422268812796	173.415853879507	55.943603		
13	24.97	1046.16041221365	228.634982312743	33.951125		
13.5	25.47	1084.95634219127	285.183650012743	48.080583		
14	25.97	1188.04687146246	344.706769005121	22.664659		
14.5	26.47	1259.84281379408	408.075197401099	18.178507		

Total Volume



BACKGROUND

Case Study: City of Suffolk Stage Storage Tool

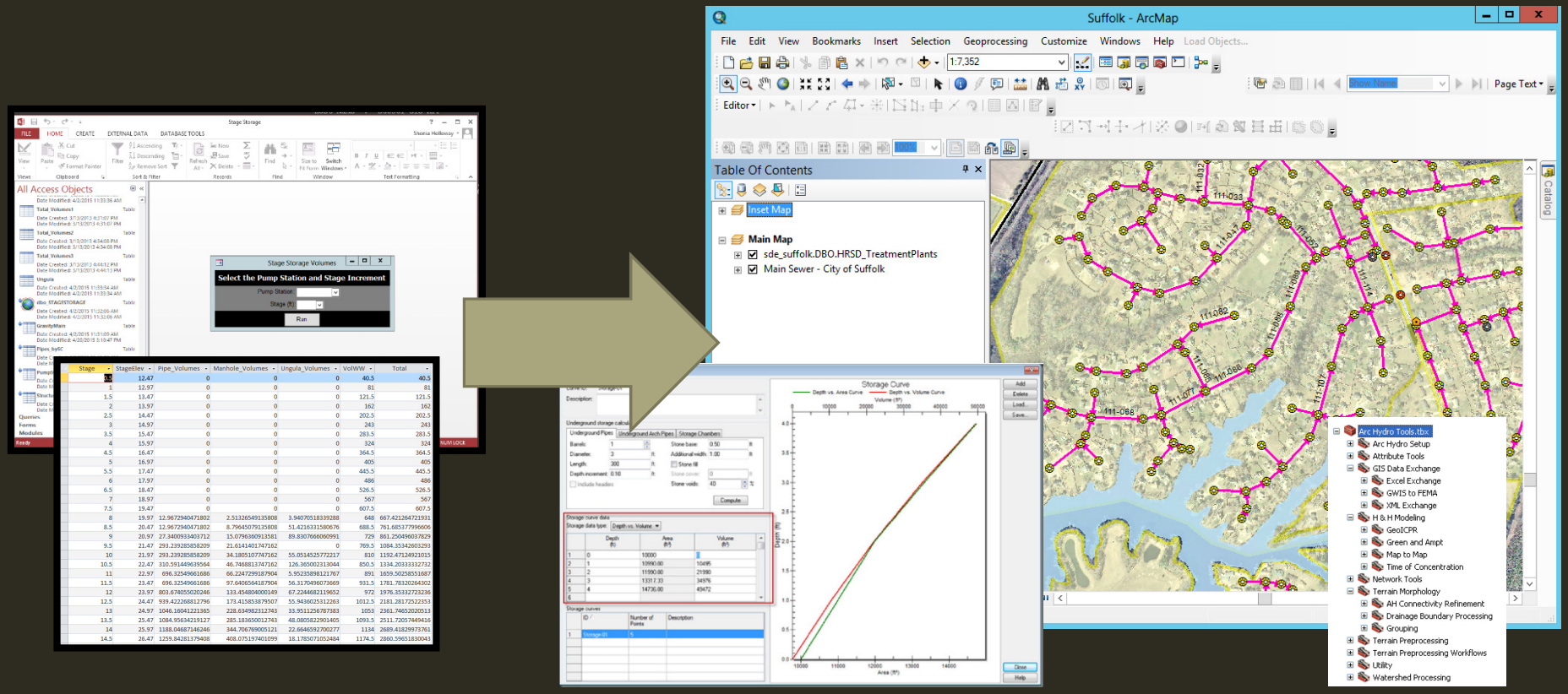


GOALS AND OBJECTIVES

Why the change?

Compact

Portable

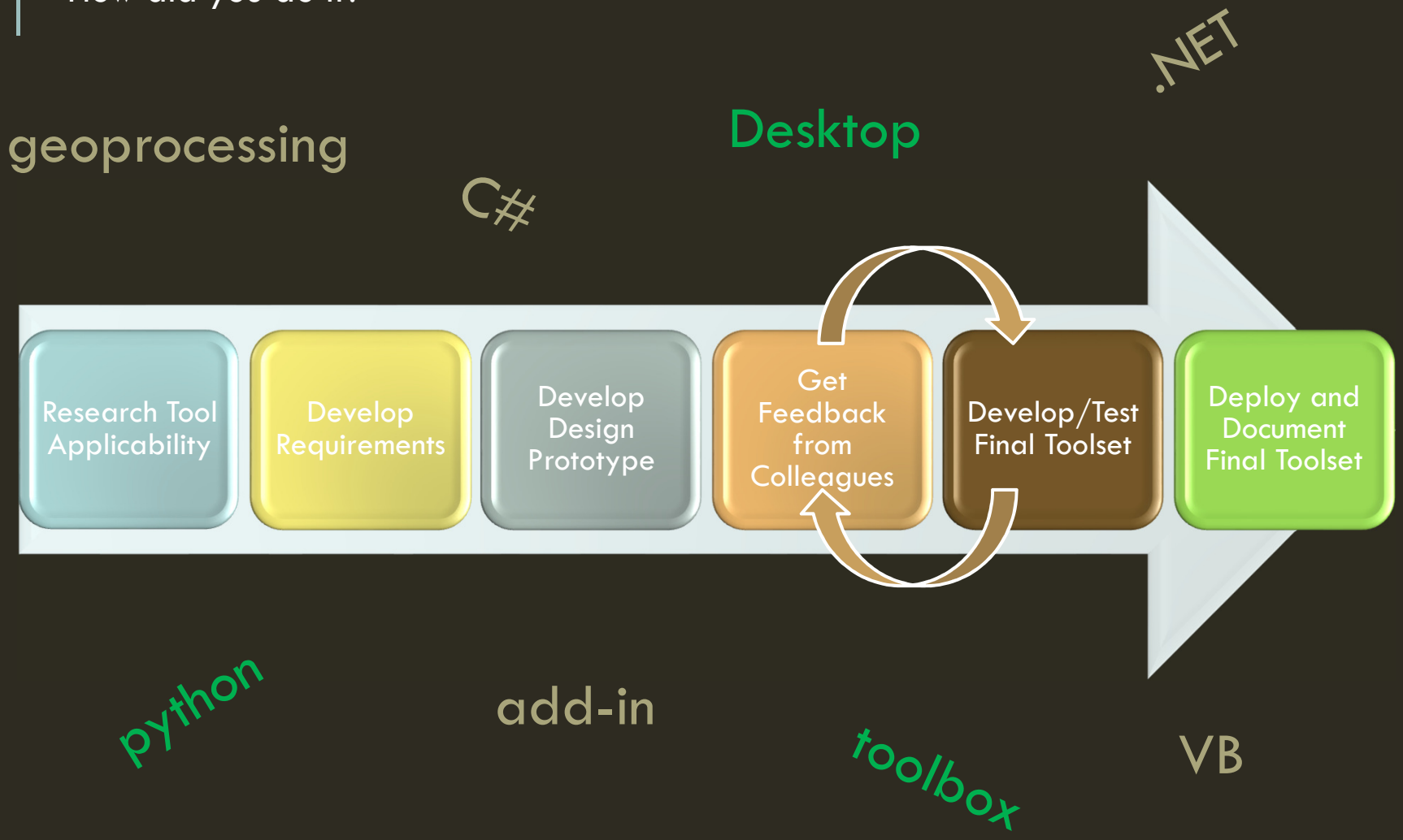


Map Centric

Standardized

DESIGN AND DEVELOPMENT

How did you do it?

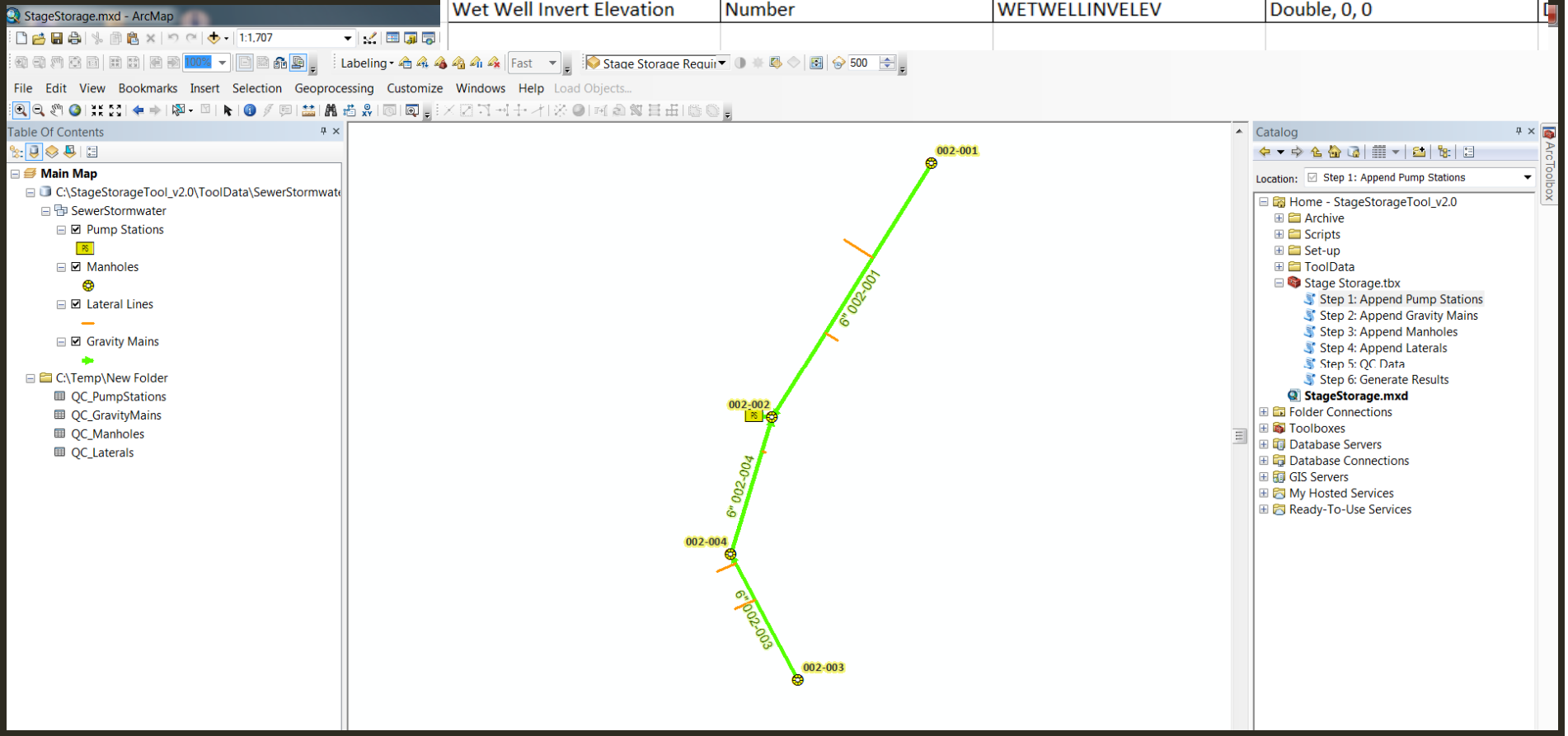


RESULTS

So....did it work?

SewerStormwater:ssNetworkStructure

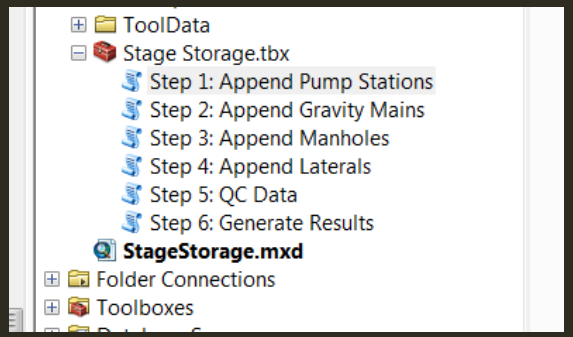
Field Needed	Field Type Needed	Target Field Name	Target Field Type
Asset ID	Text	FacilityID	Text, 20
Floor Elevation	Number	FLOORELEV	Double, 0, 0
Wet Well Shape	Text	WETWELLSHAPE	Text, 1
Wet Well Width/Diameter	Number	WETWELLDIA	Double, 0, 0
Wet Well Length	Number	WETWELLLEN	Double, 0, 0
Wet Well Depth	Number	WETWELLDEPTH	Double, 0, 0
Incoming Gravity Main ID	Text	WETWELLINCOMINGPIPE	Text, 50
Wet Well Invert Elevation	Number	WETWELLINVELEV	Double, 0, 0

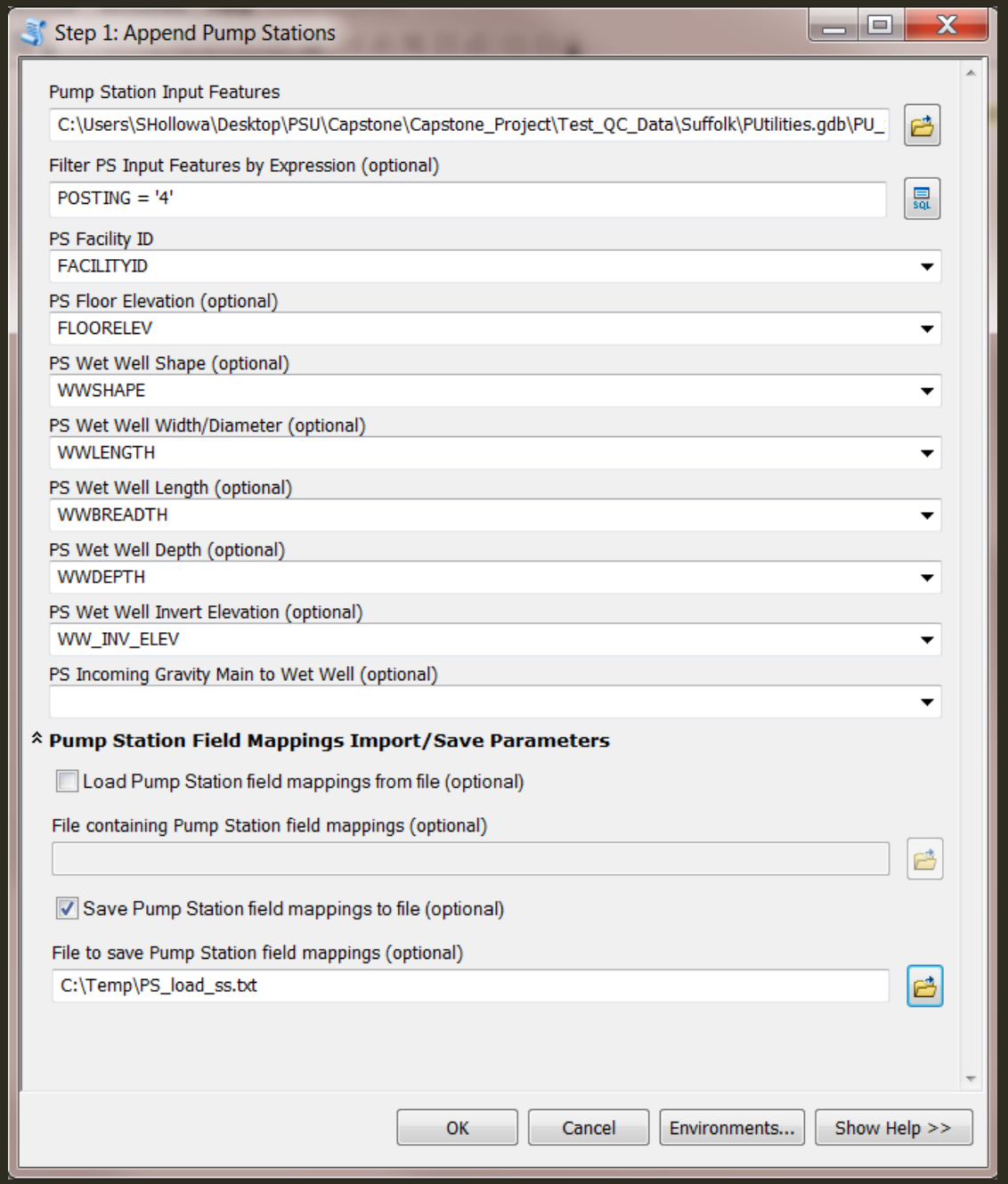


✓ Portable ✓ Standardized ✓ Map Centric

RESULTS

So....did it work?





✓ Standardized

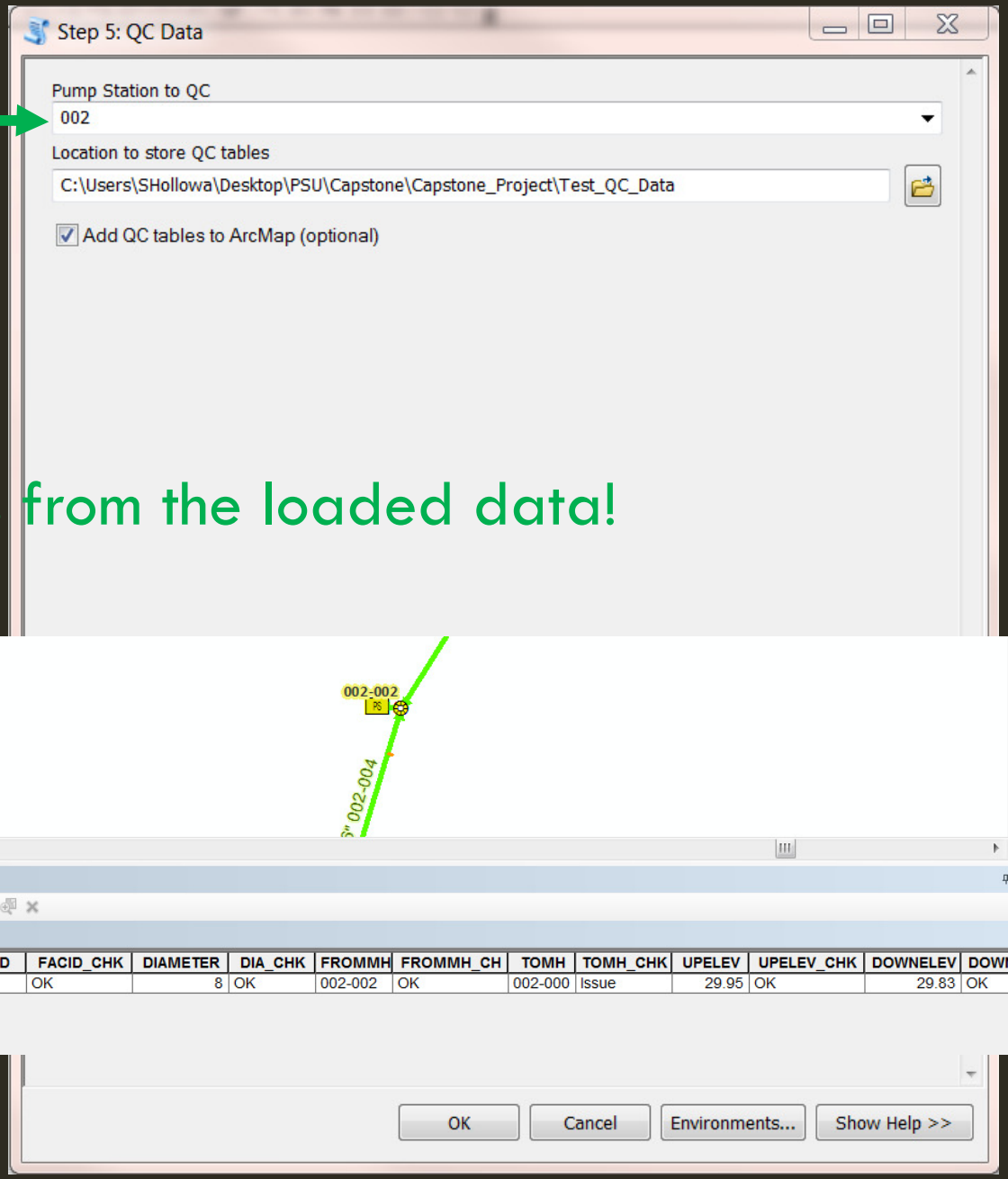
✓ Compact

arcpy.Append_management(inputLyr, targetFC, 'NO_TEST', fms)

RESULTS

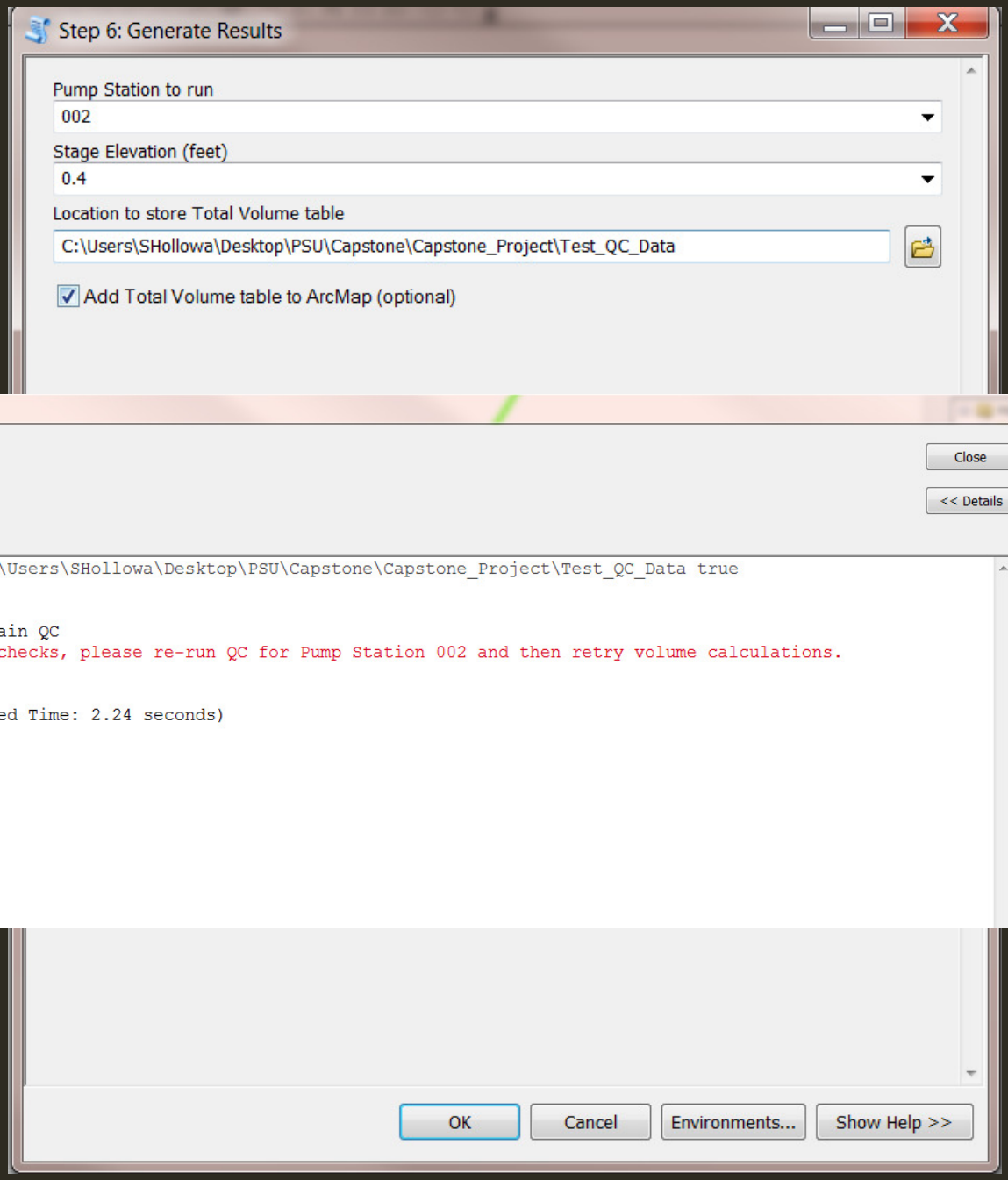
So....did it work?

This drop-down comes from the loaded data!



RESULTS

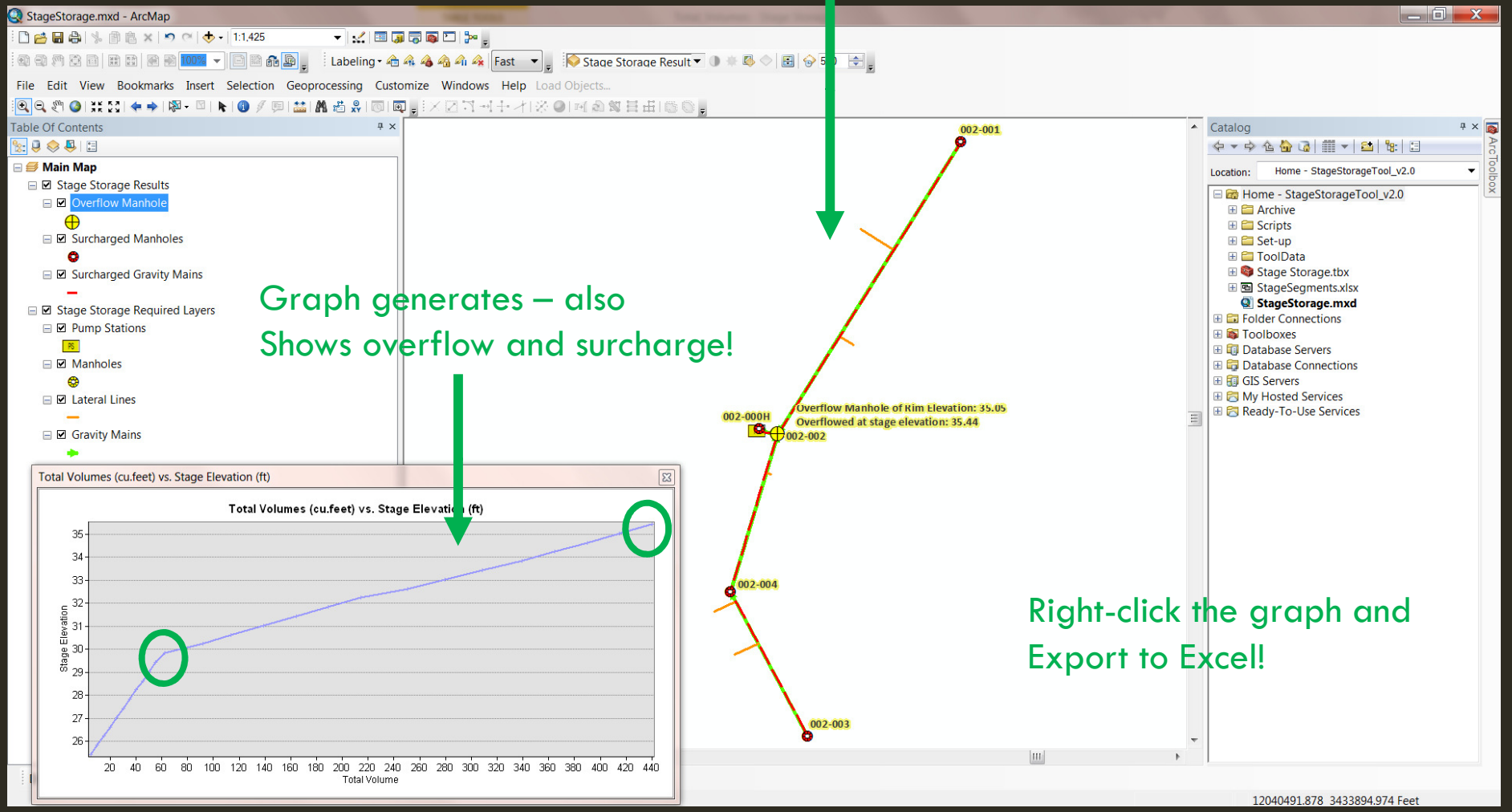
So....did it work?



RESULTS

So....did it work?

Map updates to show
Overflow location and Surcharged system



Graph generates – also
Shows overflow and surcharge!

Right-click the graph and
Export to Excel!

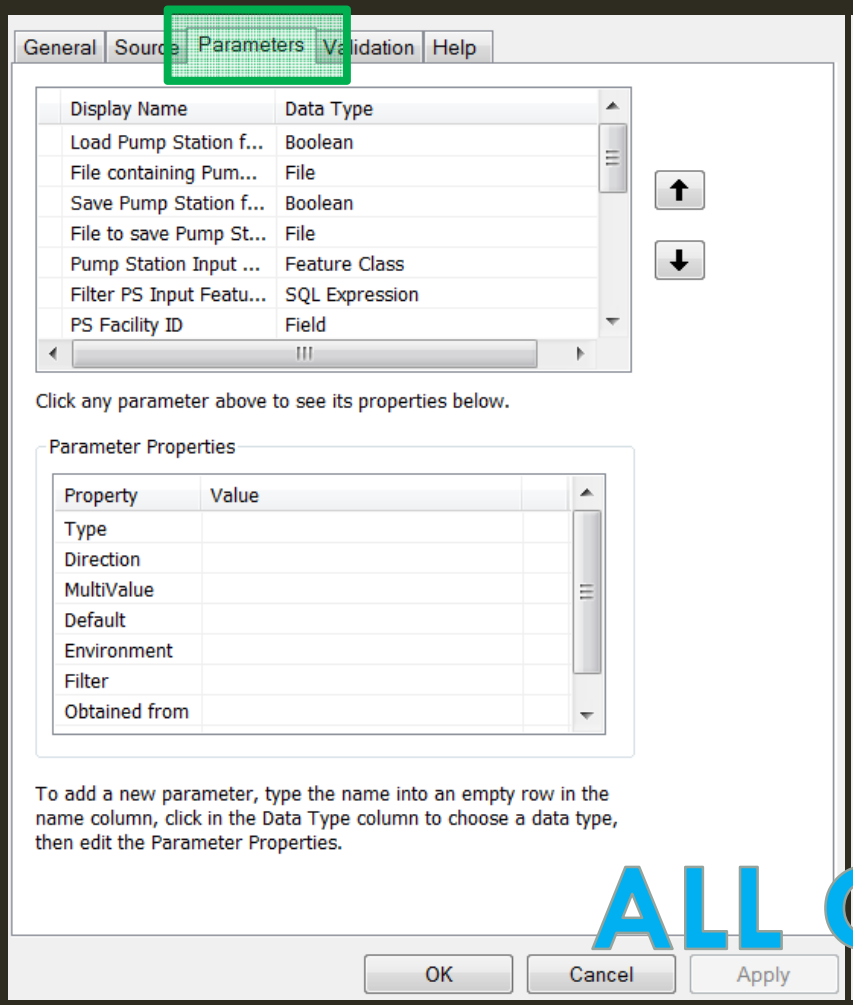
RESULTS

How did you do that?

Power of Python Parameters!

Script Parameters

Tool Validator Class



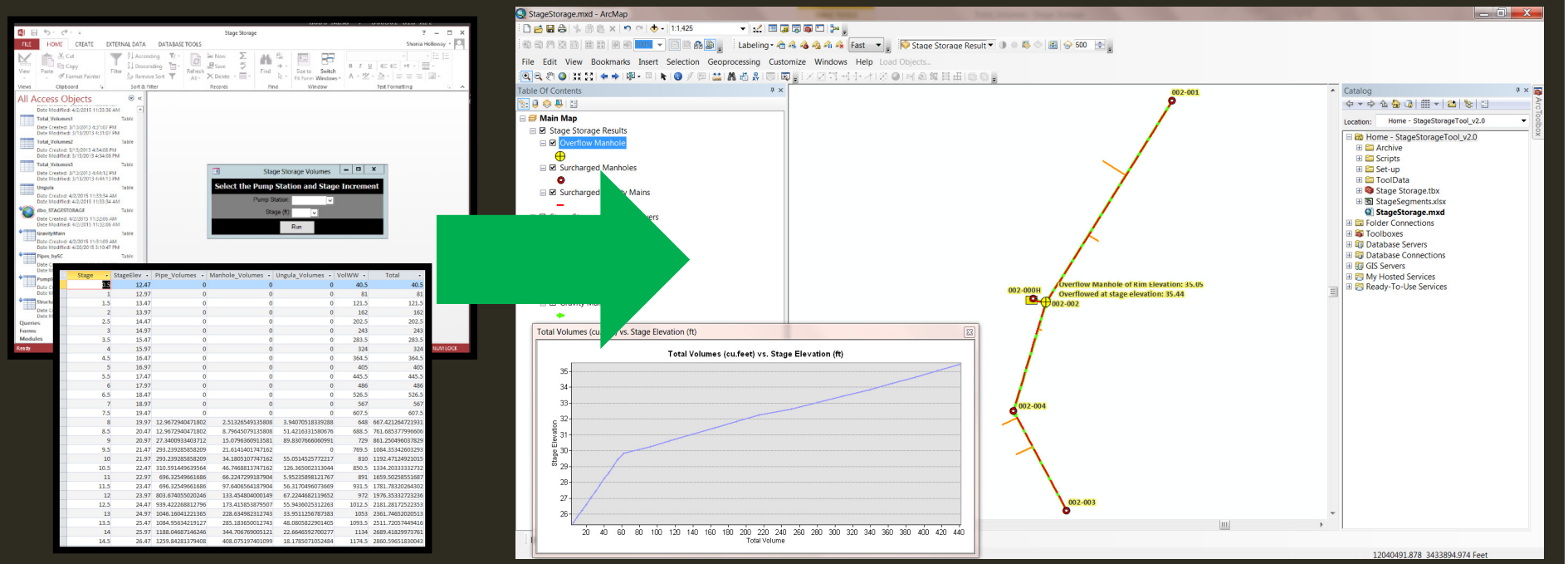
ALL OTB!!

SUMMARY

Desktop

python

toolbox



✓ Portable

✓ Compact

✓ Standardized

✓ Map Centric

THANK YOU

PSU Advisor, Barry Evans

City of Suffolk

City of Virginia Beach

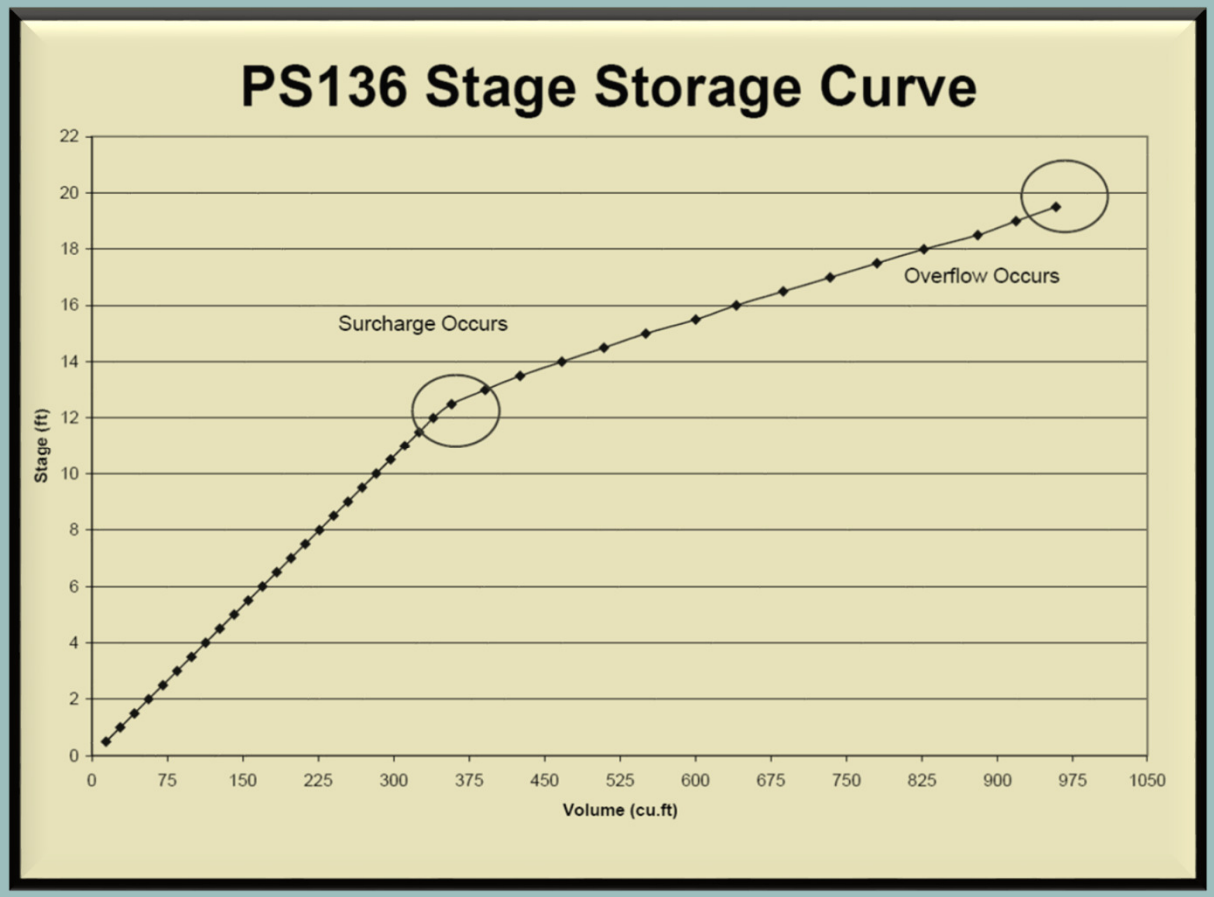
City of Portsmouth

CH2M HILL

GIS Reviewer, Beckie Haney

Engineering/QC Reviewer, Monica Quinones

My Family - Dan, Grace, and Kate Holloway



QUESTIONS?

...thank you for coming