

NJWEA - Fall Tech Transfer 2024 – Infiltration and Inflow

NJWEA 2024

presented by **ADS**

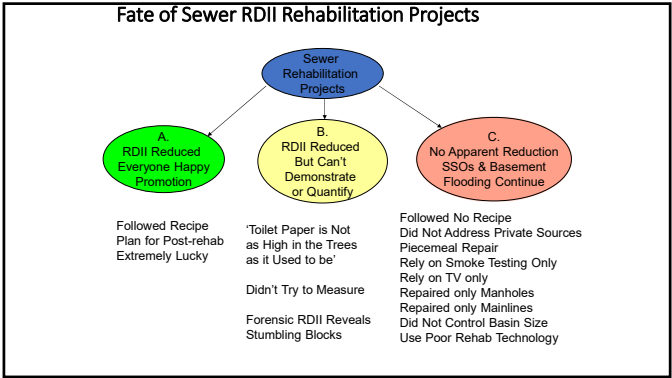


Lessons Learned – Inflow & Infiltration Programs

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Agenda

- Company Overview – What makes us experts?
- Rainfall Measurement
- Depth and Velocity Measurement
- Basin Size
- Timing and Duration
- Analytical Tools
- Questions and Comments



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Why do RDII studies go wrong?

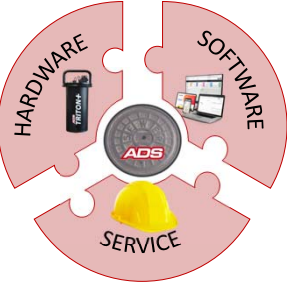
Stumbling Blocks

- Rainfall Strategy
- Monitoring Technology
- QA/QC Analytics (Scattergraphs and Q vs. i)
- Basin Size and Control Basin
- Duration and Seasons
- Questions on approach
- Sewer Dynamics and Site Hydraulics
- Method of Calculating RDII



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Who Is ADS?



- 49 Years' experience focusing on sewers.
- Technology and innovation leaders.
- Over 7 billion feet of pipe studied in over thousands of projects.
- Projects range from RDII, billing networks, capacity studies, to CSO public notification.

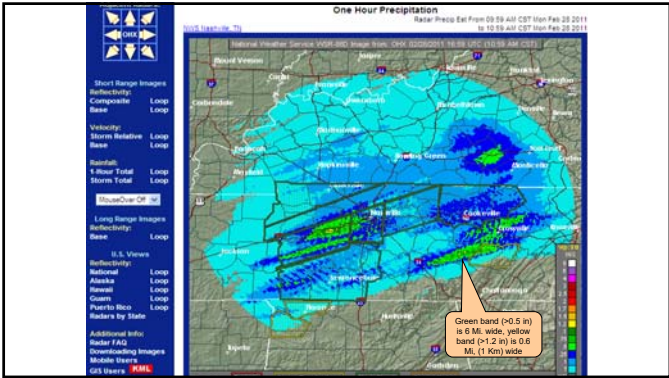
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Rain Gauge and Rainfall Measurement Strategy

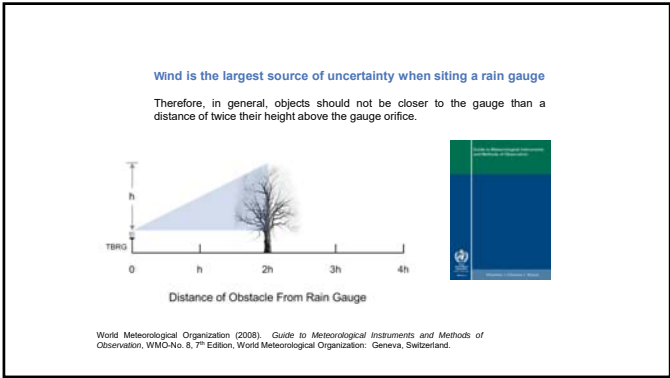
- Never Less than Two (always assume one will fail)
- 1 -2 Mi²/RG in convective storm season or in hilly area.
- 3 -4 Mi²/RG in cyclonic/frontal storm season.
- Rain gauge layout in grid not by sewershed.
- Don't rely on airport rain gauge



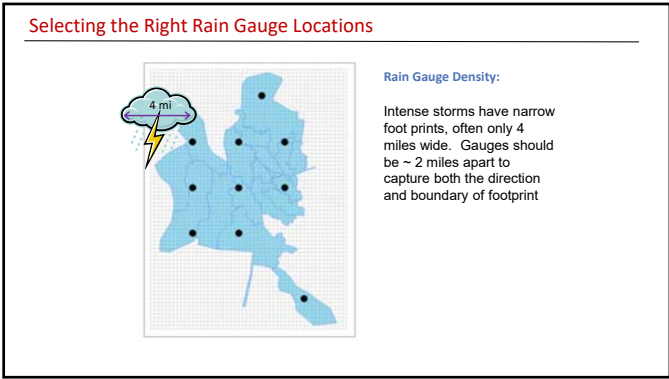
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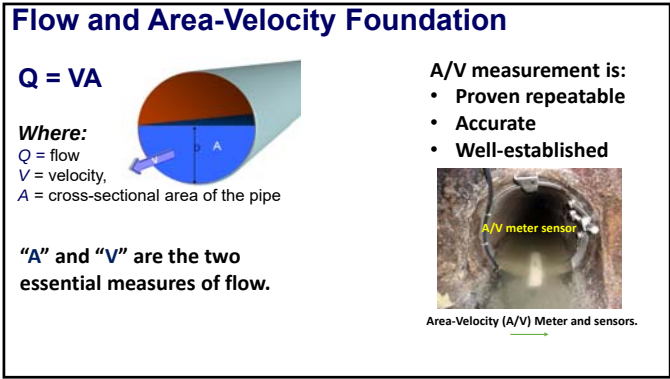
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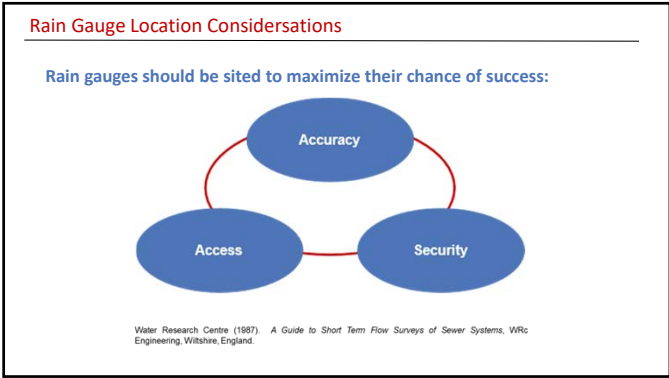
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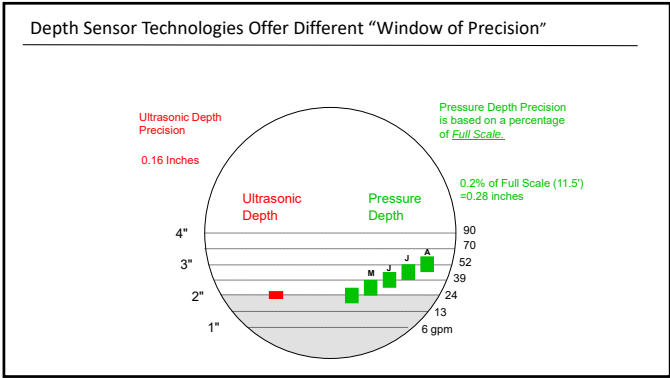
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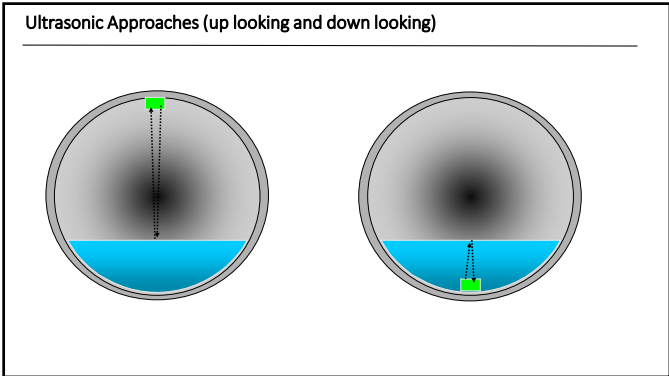
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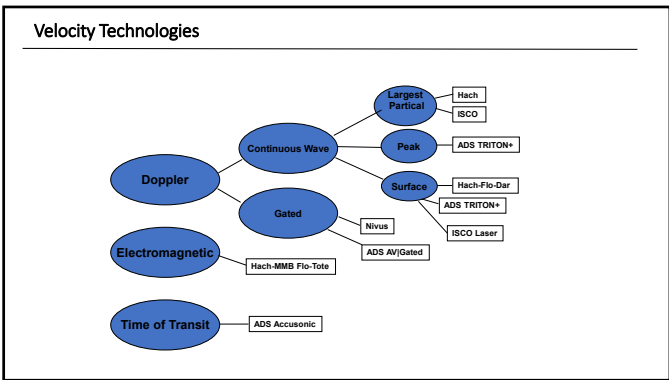


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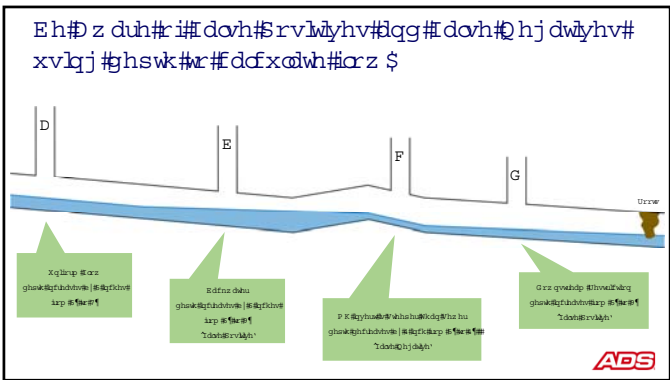
How to determine if an AV Meter can be Switched Out for Depth-only device

- Is slope of MH channel close to that of incoming pipe? Can use same pipe curve.
- Is pipe large enough and flow deep enough so that slope change has minor effect?
- Is the shape of the invert channel close to shape of a round pipe?
- Does the site ever move into backwater/restricted flow?

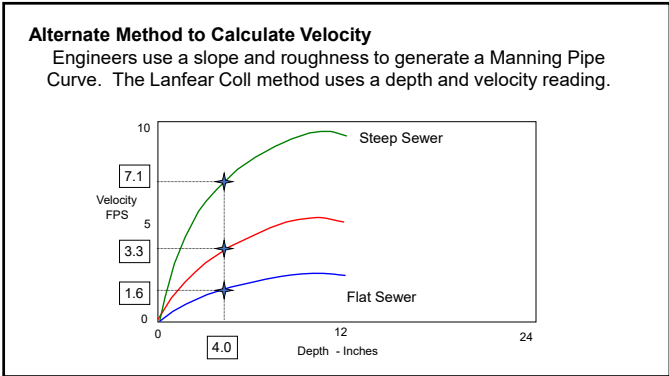
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Switch A/V to Depth-Only for Avg Dry-Day Flows

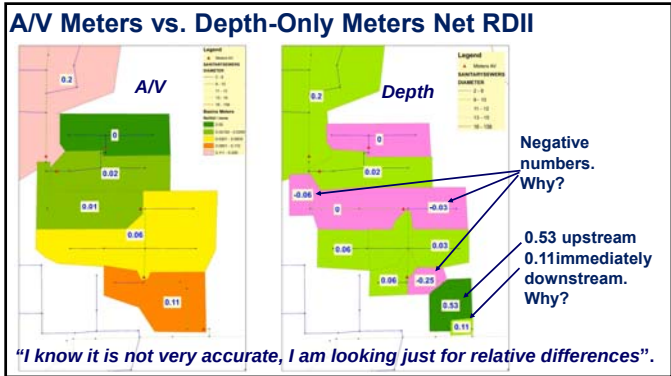
10-years A/V data
Slope, Roughness transferred to Depth-only calculation

Meter	A/V Meters			Level Meters			% Change Level vs. A/V		
	GrossAvg	GrossWW	GrossBI	GrossAvg	GrossWW	GrossBI	GrossAvg	GrossWW	GrossBI
ARE1200	3.01	2.34	0.68	0.69	0.48	0.20	22%	20%	29%
ARE6750	5.62	4.37	1.25	3.03	2.21	0.81	54%	50%	65%
ARE9877	3.54	2.82	0.72	4.99	3.00	1.97	130%	107%	207%
BER0345	3.28	2.52	0.76	2.35	1.70	0.65	71%	67%	85%
BER3433	1.65	1.31	0.34	2.15	1.36	0.79	130%	103%	231%
CM07760	4.63	3.43	1.20	3.18	2.24	0.94	69%	65%	78%
OLE5540	3.52	2.64	0.88	2.57	1.68	0.88	73%	64%	99%
OLE8723	1.28	0.74	0.55	0.79	0.42	0.38	62%	56%	69%
PCT2022	1.41	1.12	0.30	2.39	1.84	0.55	169%	164%	186%
TIN1285	1.86	1.40	0.38	0.70	0.51	0.20	38%	34%	53%

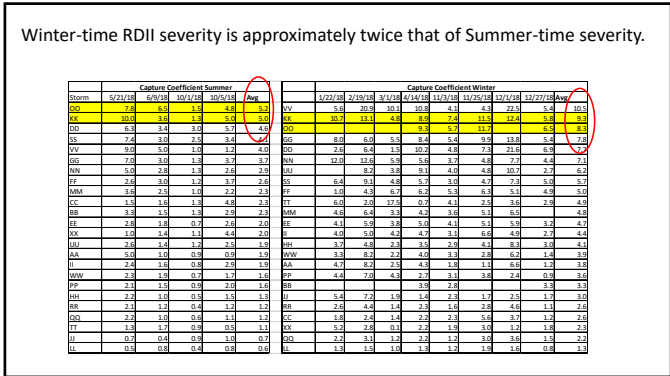
Does data instill confidence to plan, budget and invest? Does low-cost depth-only bring value?

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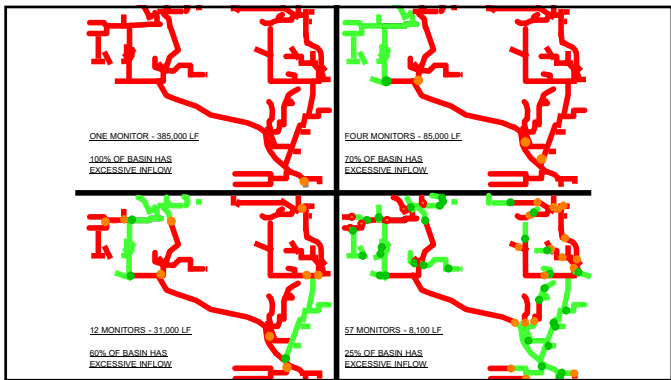
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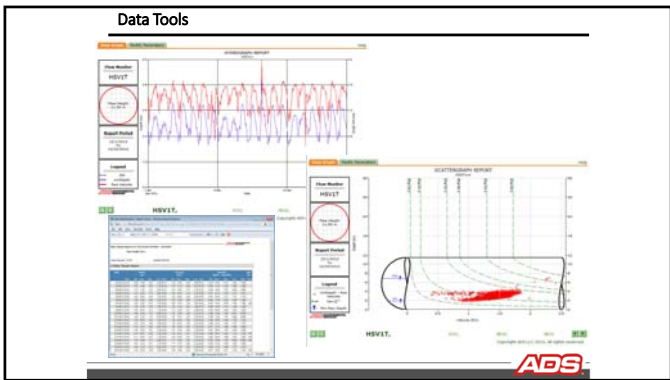
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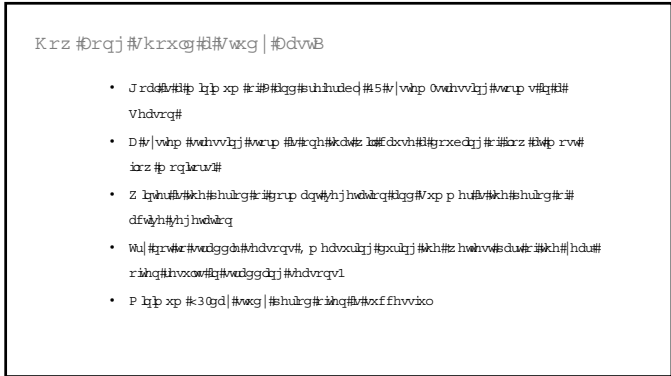
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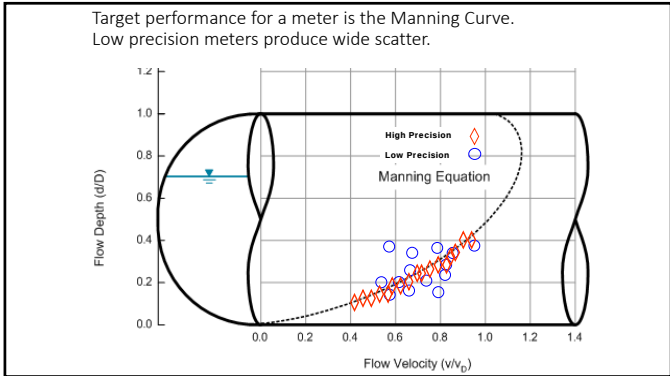
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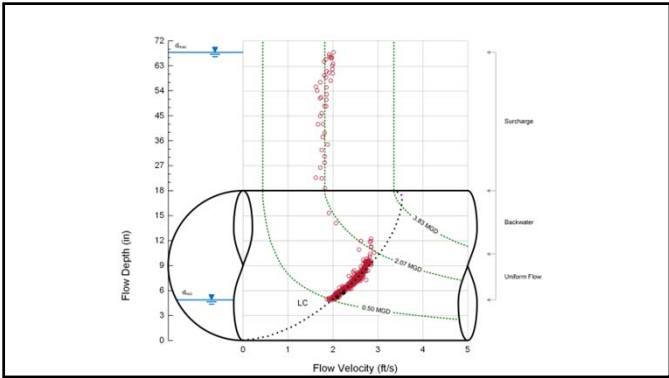


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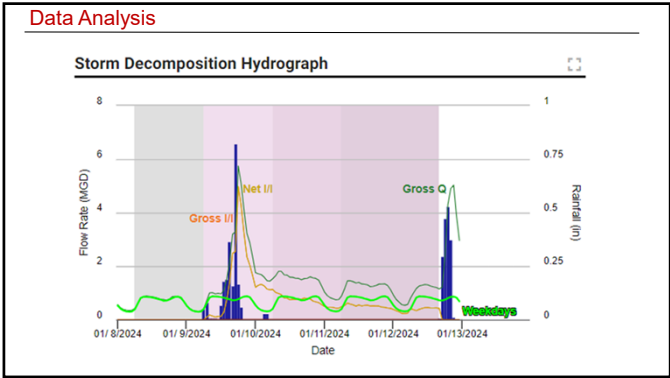


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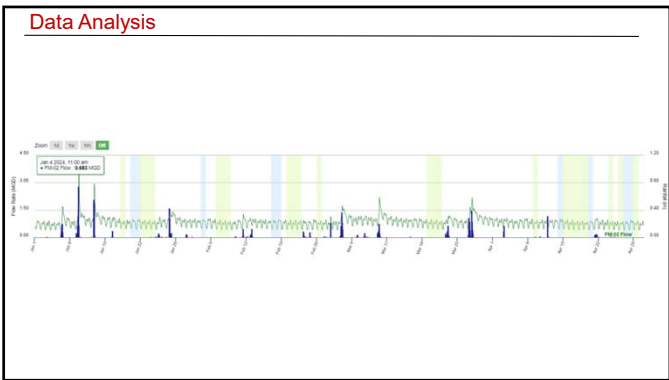
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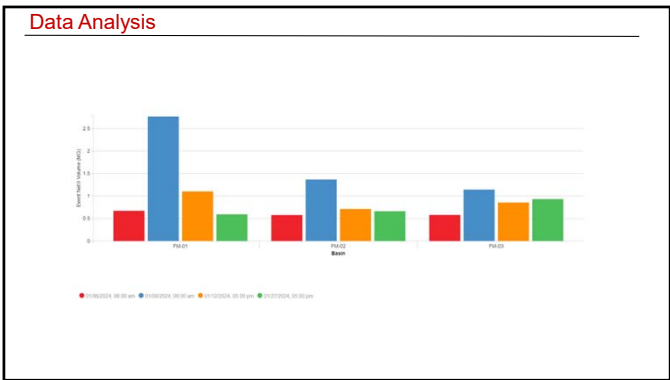
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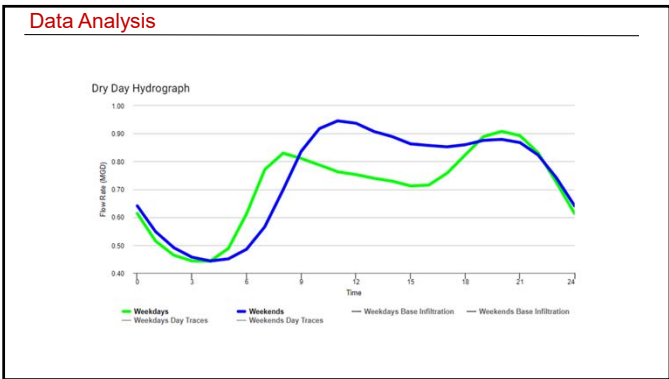
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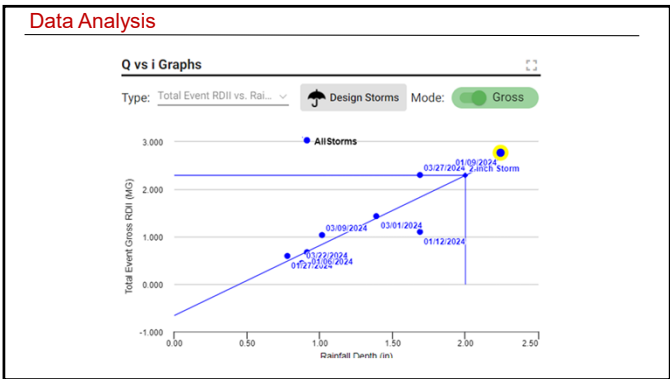
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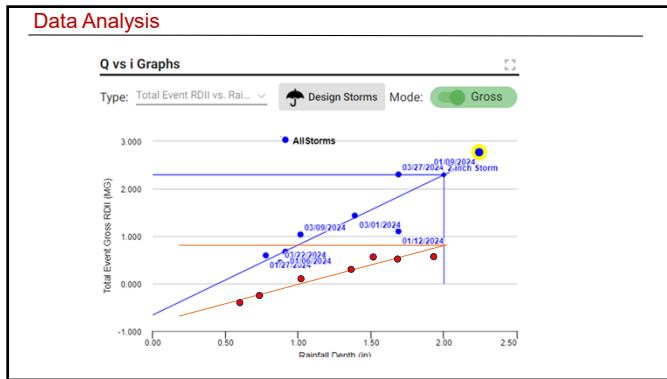


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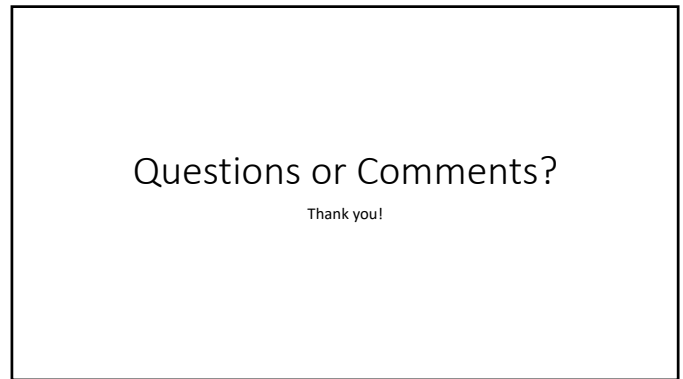


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RDII Project Elements to Specify as a Minimum	
RG Strategy	1 every 4 sq. miles (and no less than 2)
Duration	Minimum of 90 days
QA/QC Touchstones KPIs	Make sure Scattergraphs and Q vs i plots are deliverables.
Monitoring depth	Ultrasonic Depth technology - pressure backup
Basin Size	10,000 LF Upper end
Season & Duration	Start in dry - end in wet (at least 90 days)
Data Collection	Five-minute data
Tight subtractions	Net Subtraction – Limit to 20% of Gross flow
RDII Calculation	Capture Coefficient and Gallons/inch/LF (rainfall in the denominator)
Sewer Dynamics	Scattergraph and Q-i will spot restricted sewers and Potential RDII
Control basin	Identify at beginning & Use to evaluate pre- and post metering of rehabilitated basins.
Site Hydraulics	Avoid Silt, Hydraulic Jumps and Dead Dogs

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What Level of RDII is 'Bad'?

- There is no single number.
- Historically the Capture Coefficient (C_c) of 5% has been considered a 'threshold'.
- In the U.S. this 5% value was a rule of thumb from the EPA Cost Effective Analysis
- If surcharging, basement flooding or SSO's occur, it's 'Bad'
- C_c in Sanitary Sewers greater than 20% indicate direct connections.
- C_c in Sanitary Sewers greater than 30% means its time to 'get a bigger boat'.

Reference: Patrick Steven, PE and WEF Fellow

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