## Using GIS Tools to Facilitate MS4 Inspections and Maintenance

Will Huff Kelsey Calvez Ryan Deal



		Measure	SCM) Inspection Report								
Project Name:		Inspection I									
SCM Location:		SCM ID Num	nber: Nicable and as labeled on Town-approved Ci	onstruction Plans)							
		10 -11	~								
Code Key: N/A = Not Applicable M = Monitor (	potential for	future problem)	· NPE	5							
		nsistent with app	proved plans)	) YN							
INFLOW POINT(S)			CA.	·/							
Assessment	Code		Comments								
Obstruction: vegetation/debris/sediment											
Structural condition											
Erosion/undercutting											
Dissipator pad condition											
Other (describe)											
FOREBAY				-							
Assessment Sediment/debris accumulation	Code		Comments								
	-										
Side slope erosion Invasive vegetation											
Other (describe)											
VEGETATED SHELF / MAIN TREATMENT AREA Assessment	Code		Comments								
Assessment Visible pollution/muddiness	Lode		Comments								
Sediment/debris accumulation	-										
Plants are dead, diseased, or dying (Replace	-										
such plants as necessary per original approved construction plans. )											
Vegetation length (too short/too long)											
Bare soil/erosive gullies											
Invasive vegetation (estimate a %)											
Algae cover (estimate a %)											
Other (describe)		-	в						н		
				C	p	E	F	G			1
		Month Due (2022)	SCM Site	C SCM(s)	1	E Report Received	F Result		H Re-test passed	Inspection Company	J Routine Maintenance
Wet Pond Inspection Report		Month Due (2022) Page		C SCM(s)	1	E Report Received	F Result		-	Inspection Company	J Routine Maintenance
Wet Pond Inspection Report		120221		C SCM(s)	1	E Report Received	F Result		-	Inspection Company	J Routine Maintenance
Wet Pond Inspection Report		120221	SCM Site		30-day Sent			Re-test due	-		J Routine Maintenance
Wet Pond Inspection Report		120221	SCM Site	1 wet pond	30-day Sent	1/24/2022	F40.	Re-test due	Re-text passed	Harris Engineering	Ducks Ponds
Wet Pond Inspection Report		120221	SCM Site	1 wet pond 1 dry pond, 1 HOS 1 wet pond,	30 day Sent 12/20/2021 12/20/2021	1/24/2022	Fact PASS	Re-test due 4/24/2022 N/A	Re-text passed	Harris Engineering 62	Ducks Ponds In-House
Wet Pond Impection Report		Fage (2022)	SCM Site	1 wet pond 1 dry pond, 1 H05 1 wet pond, 2 bio cells 1 sand filter, 1	33-day Sent 13/20/2021 12/20/2021 12/20/2021	1/24/2022 1/11/2022 2/2/2022	FAIL PASS PASS	Re-test due 4/24/2022 N/A N/A	Re-text passed	Harris Engineering 62 62	Ducks Ponds In-House Triangle Pond Mgmt.
Wet Pond Impection Report		120221	SCM Sile Ages Pres Torrage Ages Free Torrage Ages Free Torrage Control to the Control of	1 wet pond 1 dry pond, 1 HOS 1 wet pond, 2 bio cells 1 sand filter, 1 level spreader 1 wet pond.	30-day Sent 12/20/2021 12/20/2021 12/20/2021 12/20/2021	1/24/2022 1/11/2022 2/2/2022 1/26/2022	FAIL PASS PASS PASS	Re-test due 4/24/2022 N/A N/A N/A	Re-test passed N/A N/A	Harris Engineering 62	Ducks Ponds In-House Triangle Pond Mgmt In-House
Wet Pend Inspection Report		Fage (2022)	SOM life April Floringer April Floringer April Floring Home Exception and April Provided Home Exception April Apri	1 wet pond 1 dry pond, 1 HOS 1 wet pond, 2 bio cells 1 sand filter, 1 level spreader 1 wet pond, 1 sand filter	30-day Sent 12/30/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021	1/24/2022 1/11/2022 2/2/2022 1/26/2022 2/2/2022	FAL PASS PASS PASS PASS	Re-test due 4/24/2022 N/A N/A N/A N/A	Re-test passed N/A N/A N/A	Harris Engineering 62 62 The Site Group 62	Ducks Ponds In-House Triangle Pund Mgnet. In-House Dragonfly
Wet Pond Inspection Report		Fage (2022)	SCM Site Aprel Price Site and Aprel Price Site and Aprel Price Site and Aprel Price Site and Aprel Price State Aprel Pri	1 wet pond 1 dry pond, 1HO5 1 wet pond, 2 bio cells 1 send filter, 1 fevel spreader 1 wet pond, 2 send filter	30-day Sent 12/20/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021	1/24/2022 1/11/2022 2///2022 1/26/2022 2/3/2022 1/12/2022	FAIL PASS PASS PASS PASS PASS	Re-test due 4/24/2022 N/A N/A N/A	Re-test passed N/A N/A	Harris Engineering 62 62 7 The Site Group 62 Ross Environmental	Ducks Ponds In-House Triangle Pond Mgmt In-House
Wet Pond Impection Report		Fage (2022)	SCM Site Aprel Price Site and	1 wet pond 1 dry pond, 1 HOS 1 wet pond, 2 bio cells 1 send filter, 1 1 wet pond, 1 wet pond 1 wet pond 1 wet pond 1 wet pond,	30-day Sent 12/30/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021 12/20/2021	1/24/2022 1/11/2022 2/2/2022 1/26/2022 2/2/2022 1/22/2022 1/12/2022	FAIL PASS PASS PASS PASS PASS PASS	Re-test due 4/24/2022 N/A N/A N/A N/A N/A N/A	Re-text passed N/A N/A N/A N/A N/A N/A	Harris Engineering 62 62 The Site Group 62 Ress Environmental Giles Pijshe Engineers	Ducks Pends In-House Triangle Rond Mgent. In-House Dragonfly Dragonfly In-House
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Wet Pond Inspection Report		Fage (2022)	SOM Bite Apro Processor Apro Processor Apro Processor Apro Processor Apro Processor Apro Processor April Processor Product Processor Processor Product Processor Product Processor Product Processor Pro	I wet pond I dry pond, I HOS I wet pond, I send filter. I I wet pond. I wet pond.	30-day Seat	1/24/2022 1/11/2022 2/2/2022 1/26/2022 2/3/2022 1/12/2022 1/12/2022 2/25/2022 2/4/2022	FAIL PASS PASS PASS PASS PASS PASS PASS PAS	Re-test due 4/24/2022 N/A N/A N/A N/A A/25/2022 N/A	Re-text passed N/A N/A N/A N/A N/A N/A A/J/2022 N/A	Harris Engineering 62 62 62 865 Environmental Giles Pithe Engineers Kola Bass Engineering Infocus Engineering	Ducks Pands In-House Triangle Paol Mgmt. In-House Dragonfly Dragonfly In-House Greenscopes/Dragonf Poster Lake & Pand
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Wet Pond Inspection Report		Page JANUARY	SOM Site Acce Free Storage Acce Free Storage Action Children's Lighthouse Dayclars (Parkway) Conton	1 wet pood 1 dr y pood, 1 dr y pood, 2 bis cells, 2 bis cells, 2 bis cells, 1 wet pood, 1	33-day text 13/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 12/20/2011 1/19/2022 1/19/2022 1/19/2022	1/24/002 2/3/002 2/3/002 2/3/002 2/3/002 2/3/002 2/3/002 2/3/002 2/4/002 2/4/002 2/4/002	FAIL           PASS           PASS	Pertext due 4/24/2022 N/A N/A N/A N/A N/A N/A N/A N/A	Re-feet passed N/A N/A N/A N/A N/A N/A N/A N/A	Herrs Egioening 42 42 43 43 45 Sta Group 43 45 Sta Group 44 45	Oct3 Pands Inthose Tracely fand Ager. Inthose Oregoty Dregoty Corestcape: Dregoty Formation and Core Care Noters Stationary. Int Note: Stationary. Int Not.
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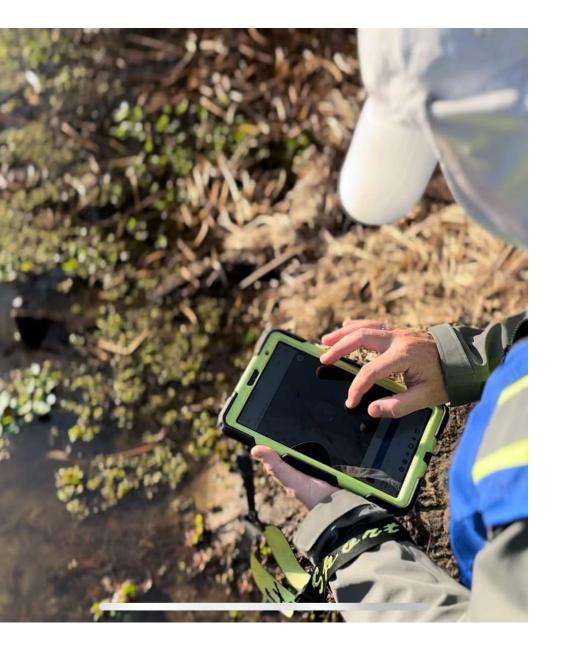
## Traditional Inspection Workflow

- Hard-copy inspection forms
- Photos using phone or separate camera
- Prepare final report in office
- Data maintained on spreadsheet



## GIS Inspection Workflow/ Efficiencies

- Perform inspection using app in phone or tablet
- Photos and text are incorporated into report automatically
- Allows for automatic population of certain fields
- Inspection report can be generated on demand
- Entries are saved to a database and can be referenced in the future
- Sustainable (decrease in paper)
- Decrease in time spent in potentially hazardous conditions

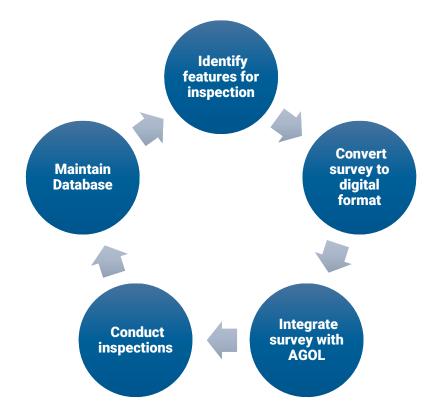


## **Geographic Information Systems (GIS)**

- GIS is a powerful tool for capturing, storing, analyzing, and managing spatial and geographic data.
- ESRI has robust tools for integrating GIS into projects
  - AGOL
  - Field Maps w/ Smart Forms
  - o Survey123
  - Dashboards

#### **Current and Future Data Needs for Building a GIS Application**

- Discuss what data is needed to build a database and app
  - GIS file with features to be inspected
    - KMZ, shapefile, CAD file
  - Tabular data
  - Inspection form template
    - What questions do inspectors need to answer to determine if the feature is being adequately maintained?



### **GIS Application Best Practices**

- Identify what data needs to be collected and what platform will be most efficient
- Spend extra time on the front end and coordinate with stakeholders for input before developing the app
- Utilize visuals and mockups
- Target incremental gains
- Make sure all users have their own license
- Archive data regularly

#### **ESRI Platform: ArcGIS Field Maps (Smart Forms)**

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- Give brief overview of ArcGIS Field Maps
- Discuss situations when Field Maps would be useful

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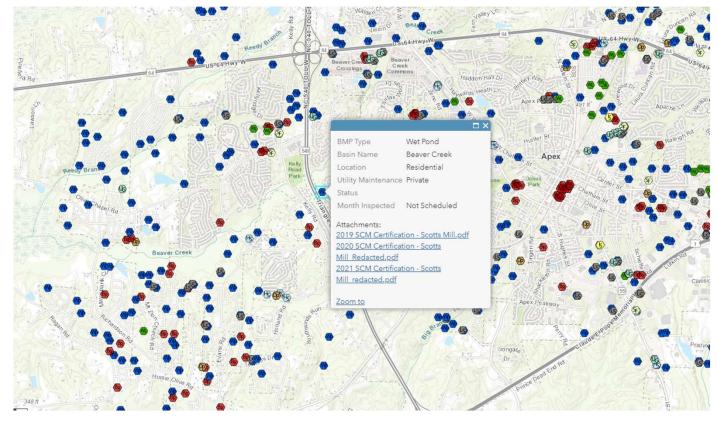
PLACEHOLDER IMAGE

## **ESRI Platform: Survey123**

- Give brief overview of ArcGIS Survey123
- Discuss differences between ArcGIS Survey123 and Field Maps Smart Forms
- Discuss situations when Survey123 would be useful (instead of field maps)



	<b>GIS Survey</b>	<b>123</b>						
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P		original design specs.						5
Files		Obstruction (veget	tation/debris/sedir	ment) Unsatisfactory	○ N/A		-	
P		Notes:		Unsatisfactory			-	
Tools								
		Corrective Actions:						
Publish		•						
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		Notes:					-	
		Corrective Actions:					-	
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Apex\_SCM\_Inspection\_WFL1

Project Name

Inspection Date

Date
SCM Location

SCM Location

SCM Unique ID
SWSCM748

Additional Comments

INFLOW POINTS

FOREBAY
VEGETATED SHELF AND MAIN TREATMENT AREA

EMBANKMENT



	nnual pections	NPDES Permit	Ann	ual	SCM Ins	spection	าร	
30-day R	eminder	Letters	Annual SC (days since 3			Annual SCM Ins		
Sent	Last Month	1: 23	30 - 6	60 Days: 13		2 - 4 Weeks	: 13	
To Sen	d This Mon	th: 40	> 60	0 Days: 20		> 4 Weeks	20	9
To Sen	d Next Mor	nth: 25	< 30	0 Days: 45		< 2 Weeks	45	
Project Site	Number of	30-day Letter Sent	Report Received	Result	Re-test Due	Re-test Result	Inspection Company	Company: Costco Wholesale Corp.
Costco	2	December 21, 2020	January 28, 2021	Fail	March 28, 2021	Pass	G2	Address: 1021 Pine Plaza Dr.
Deer Creek		November 5, 2020	November 12, 2020*	Fail				City, State, ZIP: Apex, NC, 27523 Contact: Lanny Staples
Regency at White Oak		July 1, 2021*	N/A	Fail				Phone #: (919)-XXX-XXXX
Salem Creek		Not Submitted	N/A	Pass				Email: lstaples@costco.com*
Townhomes								O&M: Recorded

Search SCM Site Info		Search SCM Info	Q			SCM	Asset Viewer		
Inspection Month: 0 Selected			CM Type: 0 Selected	Inspecti 0 Sele	Store Contraction of the	Inspection Status: 0 Selected	R · R	Morris	rille
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1101 MARCO DRIVE		Wet Pond Site   Wet Pond   Approve	d Not Constructed		2023				Piney Plains
2600 SCHIEFFELIN ROAD		Wet Pond Site   Wet Pond   Approve	d Not Constructed		SWSCM3   2022   FAILE	Ð	B Everett Jordan	1.00	· · · ·
540 FLEX STORAGE		Storm Water Wetland Site   Storm W	/ater Wetland   Approved Not Constru	ucted	SWSCM16   2022   FAII	LED	Loke		· ·
540 TOWNES (Beaver Creek at 540 S	GCM #1)	Wet Pond Site   Wet Pond   Approve	d Not Constructed	SWSCM17   2022   FAII	LED		Feltony Feltony	lie 🙃	
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SCM Site	1101 MARCO DRIVE	SCM Name	Wet Pond Site		Inspection Status		Wake County, Esri, HERE, Garmin	SafeGraph, METI/NASA, USGS, EP	A, NPS, USDA Powered by Esri
Inspection Month	10OCTOBER	SCM Type	Wet Pond		Report Received Date	12/29/2022			88
Site Address		SCM Construction Status	Approved Not Constructed		Retest Due Date	12/29/2022		Inspection Status	
Mgmt Organization	JVI Development II, Inc.	Approval Year			Retest Passed Date	12/29/2022		inspection Status	
Mgmt Contact	Joey lannone	O&M Notes			NOV Letter Sent	12/29/2022		PENDING 225	5
Mgmt Mailing Address	2509 Southwinds Run	Plan Notes	\\apex-ss-		Inspection Year	2023			
Mgmt Mailing Site City, State, Zip	Apex, NC 27502		1\PUBLICGIS\Construction_Plans\ D\Peak 502 at Beaver	VArea	SCM ID				
Mgmt Site Contact Phone Number	919-387-8846	c	Creek\Construction Plans						
Mgmt Email		General Notes							
Owner Organization	JVI Development II, Inc.	SCM ID	SWSCM433						
Owner Contact	Joey lannone	SCM Site ID					PASSED 125		
Owner Mailing Address	2509 Southwinds Run						TASSED 125		
Owner Mailing Site City, State, Zip	Apex, NC 27502								
Owner Contact Phone Number	919-387-8846								
Owner Email								FAILED	184
Inspection Company		Submitted for Approval	Approved not Constructed	Roads	y for Inspection	Constructed	30 Day Notice Sent	Ratest Due	Active NOV
Routine Maintenance Company		13	78	(isod)	13	516	90	399	145
SCM Site ID	10917								1.161.87.1

#### Case Study: MS4 Compliance Inspections







#### Case Study: MS4 Compliance Inspections

#### **General Workflow**



#### **Example Survey**

Х	2024 Annual Stormwater Inspection - Site Visit & Documentaion Review	E 🔌
1. Facility Information		
Inspection Name:		
Tenant Name:		
Tenant Address:		
Tenant Building No.:		
Contact Name (PPT):		
Contact Phone Number:		
Contact Hone Humber.		
C T 1		
Contact Email:	1 of 22	3
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# Thank you

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