

Cecil County, MD Uses ArcGIS and Fulcrum to Fulfill Phase II Geodatabase Requirements

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Phase II Geodatabase Requirement

Where is the requirement coming from?

- Proposed Phase II permit

What will it be used for?

- Post construction inspections/tracking
- Impervious area restoration requirements
- Update BMP inventory

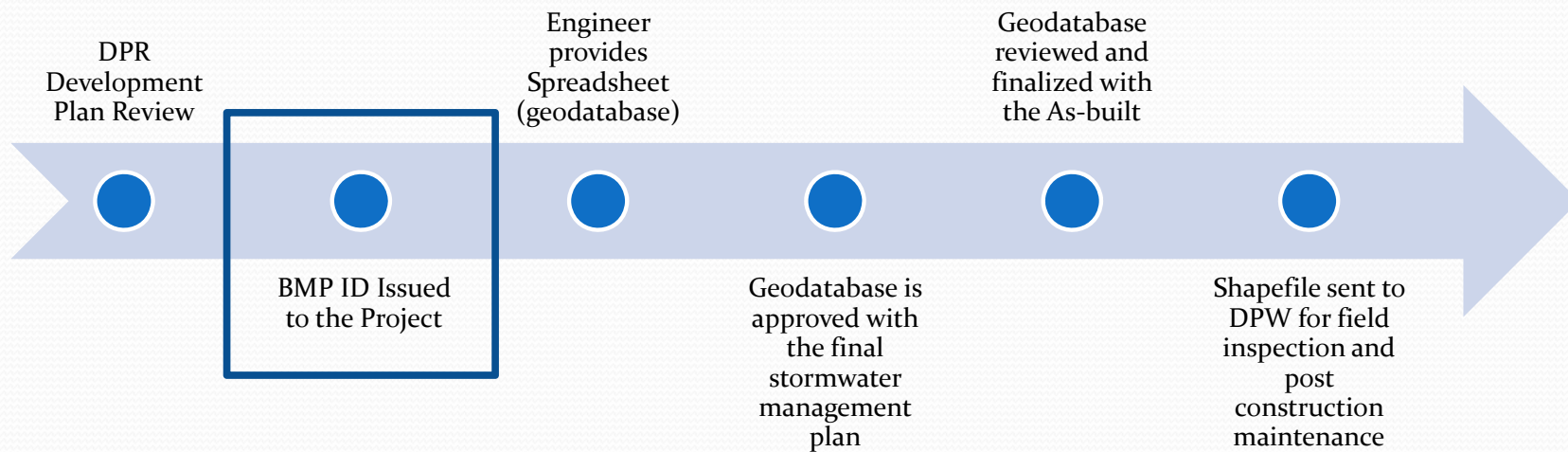


Cecil County Restrictions/Goals

1. Must use existing infrastructure
2. Intuitive BMP_ID
3. Ensure buy-in from local consultants
4. No new costs to implement
5. Nest BMPs
 1. Visualize all BMPs
6. Develop a process between Departments (when and how)
7. Provide training in house
8. Develop QA/QC process
9. Implement Jan 1, 2017

BMP Geodatabase: Where it all starts in Cecil County

- Department of Land Use & Development Services



MDE's Geodatabase

CC17BMPo43501

Column Name	Data Type	Size	Description
BMP_ID	TEXT	13	BMP ID code ¹
MD_NORTH	NUMBER	8	Maryland grid coordinate (NAD 83 meters) Northing
MD EAST	NUMBER	8	Maryland grid coordinate (NAD 83 meters) Easting
WATERSHED8DGT	NUMBER	8	Maryland 8-digit hydrologic unit code
WATERSHED12DGT	NUMBER	12	USGS 12-digit hydrologic unit code
BMP_NAME	TEXT	50	Name of BMP
BMP_CLASS	TEXT	1	BMP classification category (see list of BMPs: E, S, or A)
BMP_TYPE	TEXT	5	Type of BMP (see list of BMP classifications: enter code) ²
NUM BMPS	NUMBER	2	Number of all BMPs used to meet PE_REQ
ESD_MEP	TEXT	75	Type of all BMPs used to meet PE_REQ
LAND_USE	NUMBER	3	Predominant land use ³
PERMIT_NUM	TEXT	11	MDE permit number
ADDRESS	TEXT	25	BMP address
CITY	TEXT	15	BMP City
STATE	TEXT	2	BMP State
ZIP	NUMBER	10	BMP zip code
ON OFF SITE	TEXT	10	On or offsite structure
CON_PURPOSE	TEXT	4	New development (NEWD), Redevelopment (REDE), or Restoration (REST)
CONVERTED FROM	TEXT	5	If conversion of existing BMP then prior BMP type is required
BMP_STATUS	TEXT	10	Status of BMP (active, removed)
DRAIN_AREA	NUMBER	6	Structure drainage area (acres) ⁴
IMP_ACRES	NUMBER	8	Structure impervious drainage area (acres) ⁴
PE_REQ	NUMBER	8	P _F required ⁵
PE_ADR	NUMBER	8	P _F address ⁴
IMP_ACRES_REST	NUMBER	4	Equals IMP_ACRES when PE_ADR = 1 inch (for restoration only)
RCN_PRE	NUMBER	2	Rumoff curve number (weighte d) ⁷
RCN_PCST	NUMBER	2	Rumoff curve number (weighte d) ⁷
RCN_WOODS	NUMBER	2	Rumoff curve number (weighte d) ⁷
APPR_DATE	DATE/TIME	8	Permit approval date
BUILT_DATE	DATE/TIME	8	As Built completion date (MM/DD/YYYY)
GEN_COMNT	TEXT	60	General comments

ADDITIONAL DATA REQUIREMENTS FOR ALL ALTERNATIVE BMPS			
PROJECT_NAME	TEXT	25	Name of project
PROJECT_DESCR	TEXT	75	Description of project
PROJECT_LENGTH	NUMBER	6	For stream restoration, shoreline stabilization, or outfall stab in feet
ACRES_SWEPT	NUMBER	6	Acres swept for street sweeping
TIMES_SWEPT	NUMBER	6	Number of times per year area is swept
ACRES_PLANTED	NUMBER	6	Acres of trees planted on urban impervious (IMPF)
ACRES_PLANTED	NUMBER	6	Acres of trees planted on pervious (FPU)
IMPERV_ACR_ELIM	NUMBER	6	Impervious acres removed to pervious land (IMPF)
EQ_IMP_ACRES	NUMBER	6	Equivalent impervious acres treated by alternative BMP (see Table 5)
INSPECTION/MAINTENANCE DATA REQUIRED FOR ALL NEW, REDEVELOPMENT, RETROFIT, AND ALTERNATIVE BMPS			
BMP_STATUS	TEXT	4	Pass/Fail
LAST_INSP_DATE	DATE/TIME	8	Last inspection date
MAIN_DATE	DATE	8	Last date maintenance was performed (MM/DD/YYYY)
REINSP_STATUS	DATE/TIME	4	Pass/Fail
REINSP_DATE	DATE/TIME	8	Next planned inspection date (MM/DD/YYYY)
REPORTING_YEAR	TEXT	4	State fiscal year (YYYY)
GEN_COMNT	TEXT	60	General comments

What's a BMP_ID?

- Unique Identifier for nested BMPs or an individual BMP
- Guidance provided in the proposed MS₄ Phase II permit

CC₁₇BMP₀₄₃₅₀₂

Goal #2 Make the BMP_ID intuitive

The BMP ID: The most important part!?

- Why?
- Data based on the BMP's are summarized based on other rules.



Oh no... More rules...

- BMP IDs are determined based on:
 - Maintenance responsibility
 - Drainage area
 - Type of BMP (is there a pond on site?)



Goal #1 Must use existing infrastructure

Goal #5 : Nest BMPs to the greatest extent to simplify reporting requirements

The engineer provides 25 cells of data.

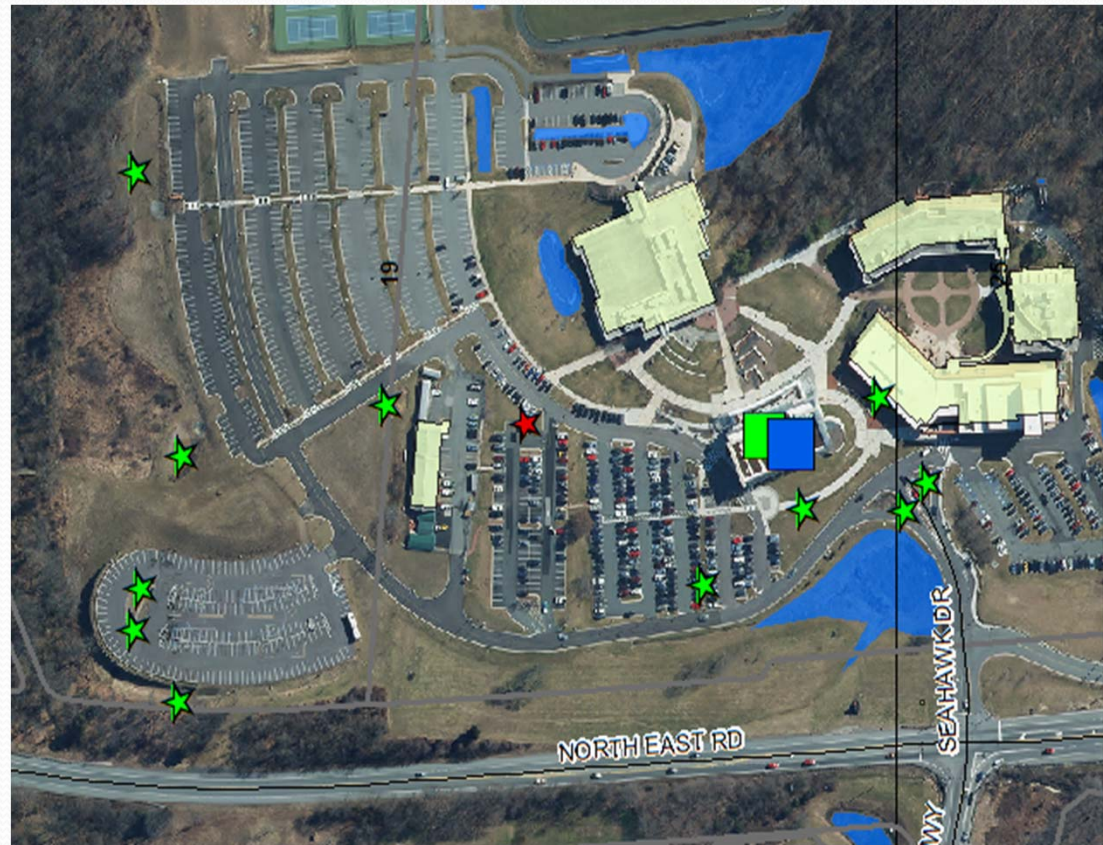
- **MD_NORTH** and **MD_EAST** = Maryland grid coordinate (NAD 83 Meters)
- **WATERSHED8DGT** and **WATERSHED12DGT** = 8 and 12 HUC
- **BMP_NAME** = name associated with the project.
- **BMP_CLASS** = Class category (must be looked up; see document)
- **BMP_TYPE** = Predominate BMP type (look up code; see document)
- **NUM_BMPS** = # of BMPs
- **ESD_MEP** = list all BMPs using the abbreviations (separated by commas).
- **LAND_USE** = Predominate land use (look up code in document).
- **PERMIT_NUM** = MDR055500
- **ADDRESS** = BMP Address
- **CITY** = BMP City
- **STATE** = MD
- **ZIP** = BMP Zip code
- **ON_OFF_SITE** = is the BMP on site or off site.
- **CON_PURPOSE** = What type of development is it? 3 options: new development, redevelopment, restoration.
- **CONVERTED_FROM** = only applicable if a BMP is changing BMP Classifications.
- **BMP_STATUS** = should be active except if the BMP is changing BMP classifications.
- **DRAIN_AREA** = drainage area to outfalls designated by the Department. Most of the time it will be the outfall of the single BMP or a treatment train.
- **IMP_ACRES** = Impervious area to outfalls designated by the Department. Most of the time it will be the outfall of the single BMP or a treatment train.
- **PE_REQ** = Target Pe
- **PE_ADR** = Pe addressed
- **IMP_ACRES_REST** = Only use when dealing with restoration projects. It will be the total impervious area treated if the Pe addressed is equal to 1.
- **RCN_PRE** = as described
- **RCN_POST** = as described
- **RCN_WOODS** = as described

The Cecil College Example



How many BMP IDs?

- 13 ESD Practices
 - 3 Ponds
 - Single 12 digit HUC
 - Single ownership
1. Maintenance responsibility
 2. Drainage area
 3. Type of BMP (is there a pond on site?)



So how many BMP IDs?

- 4 (by nesting BMPs)

So... What's the point...Who cares?





So how many BMP IDs...

In general:

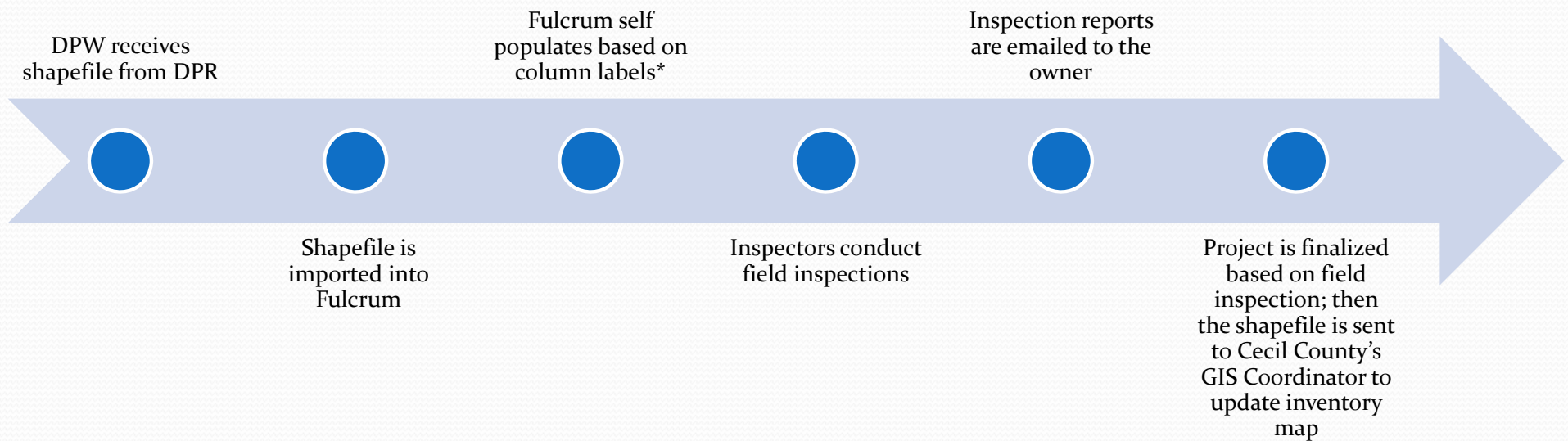
- A pond will always have its own BMP ID (outfall).
 - It includes any microscale practices draining to it.
- ESD practices not draining to a pond are nested together.
 - If they are in the same DA and maintenance responsibility.

Project Path: DPR to DPW Recap



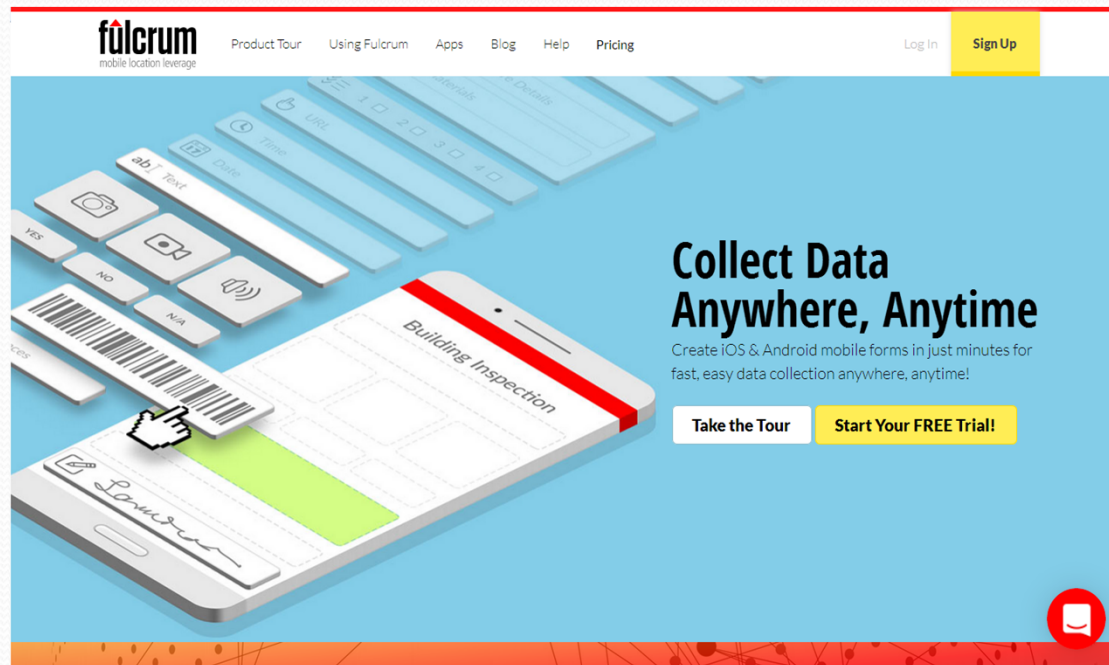
Fulcrum: Where it all starts in Cecil County

- Department of Public Works



What in the world is Fulcrum?

- Build
- Deploy
- Collect
- Report
- Extend



The screenshot shows the Fulcrum website homepage. At the top left is the Fulcrum logo with the tagline "mobile location leverage". To the right of the logo are navigation links: "Product Tour", "Using Fulcrum", "Apps", "Blog", "Help", and "Pricing". Further right are "Log In" and "Sign Up" buttons. The main content area features a large graphic of a smartphone displaying a "Building Inspection" form. The form has a green bar at the bottom with the name "Louise" written in cursive. Above the phone are various data entry options like "Text", "Date", "Time", "URL", "Barcode", "Image", "Video", "Audio", "Yes", "No", and "N/A". To the right of the phone, the text reads "Collect Data Anywhere, Anytime" followed by "Create iOS & Android mobile forms in just minutes for fast, easy data collection anywhere, anytime!". Below this text are two buttons: "Take the Tour" and "Start Your FREE Trial!". A red circular icon with a white document symbol is in the bottom right corner of the screenshot.

Source: <http://www.fulcrumapp.com/>





How Fulcrum is used in Cecil County

- In place since March 2014
- iPad Air & iPhone
- Inspectors use to track, document, photograph and generate reports for:
 - Preconstruction meeting
 - As-built inspections
 - Notice of Violations, Stop Work Orders
 - Post construction stormwater inspections

Why Fulcrum?

- Why?
 - Easy to use (customizable)
 - **Inexpensive**
 - Increases efficiency
 - Generate clear precise reports that are consistent between inspectors
 - Easy to export data to and from GIS
- Data can be imported into Fulcrum as CSV or as a ESRI Shapefile
- Data can be exported as:
 - **CSV**
 - **Microsoft Excel**
 - KML (Google Earth)
 - **Esri Shapefile**
 - GeoJSON
 - Esri File Geodatabase
 - SQLite
 - SpatiaLite
 - PostGIS

You say its inexpensive?

- Professional Plan
- 5 Users
- \$25 Each per month
 - \$1500 a year
- Other Costs
 - Initial Tablet purchase (iPad Air \$629)
 - Monthly data plan \$40

Customizable Inspections and Reports

8:53 AM 69%

Cancel Stormwater Facility Inspection 2017 Save

Stormwater Management Facility Inspection

Facility name: *

Primary Inspector:
Marshall McSorley-mmcsorley@ccgov.org

Secondary Inspector:

Inspection type:

Weather condition:

Time since last precipitation:

Type of precipitation:

Quantity of last precipitation:

Inspection Results

Upon completion of this inspection, t

Overview of facility:

Flow condition:

Water level:

Additional comments:

Access:

Inspection type:

Search

- Annual
- Follow-up
- Initial
- Routine
- Tri-annual

8:55 AM 69%

Cancel Stormwater Facility Inspection 2017 Save

Is the area free of evidence of liquids other than stormwater:

Is the storage area clear of significant sedimentation:

Does this facility have an underdrain:

Additional comments on storage area:

Conclusion:

Additional photo 1:

Upon completion of this inspection, this facility requires:
Major Maintenance

Upon completion of this inspection, this facility is:
Out of Compliance

This facility requires major maintenance in order to be in compliance. Please contact Cecil County Department of Public Works at 410-996-5265 as soon as possible.

Comments on facility:

Inspector signature:

Inspection complete:

Optional Video:

Inspection Reports

Crane Fields Pond 1

Created: 2017-02-10 15:03:02 UTC by John Hash
 Updated: 2017-02-10 15:22:33 UTC by John Hash
 Location: 39.664066156845, -75.9449146315455
 Status: ■ In Compliance

CECIL COUNTY GOVERNMENT DEPARTMENT OF PUBLIC WORKS DEVELOPMENT SERVICES DIVISION

Date: 2017-01-25
 Time: 10:03
 Location: Frank Crane Ln
 North East, MD 21901

Stormwater Management Facility Inspection

Facility name: Crane Fields Pond 1
 Primary inspector: John Hash jhash@ccgov.org
 Inspection type: Follow-up
 Weather condition: Clear
 Time since last precipitation: Less than 24 hours
 Type of precipitation: Rain

Inspection Results

Upon completion of this inspection, this facility is: In compliance
 Overview of facility:



Looking at pond from south to north.

Flow condition: Clear
 Water level: Normal

Access:

Is the perimeter fence upright and intact: Not Required
 Is access to the facility unobstructed and properly maintained: Yes

Inflow

Are all pipes/swales discharging to the facility in good condition: Yes

Embankment

Is the embankment top free from uneven settlement: Yes
 Is the embankment completely stabilized with no signs of erosion: Yes
 Is the embankment clear of woody vegetation: Yes
 Is the area within 15' of the toe of the slope clear of woody vegetation: Yes
 Is the toe of the downstream slope free from wet areas or seepage: Yes
 Is the embankment free from rodent holes: Yes
 Is the area adjacent to the control structure and over the barrel free from settling: Yes

Control Structure

Are all parts of the control structure in place without damage or deterioration: Yes
 Structure:



Structure is in good shape.

Are trash racks in place and in good condition: Yes
 Are the riser and anti-vortex device or weir wall in place and in good condition: Yes
 Is the stone in extended detention device clear of sediment: Yes

Outfall:

Is the outfall properly stabilized with vegetation, gabions or rip rap: Yes



DPW is also responsible for...

- Updating Old BMP Inventory as inspections occur
- Capturing data from previously approved plans



Cecil County's SWM Inventory

- 660 currently mapped SWM features
- An ever increasing number of BMPs
- 4 inspectors

Ultimate Goal

- Permit compliance
- Complete and comprehensive BMP inventory

How the pieces fit together

- Collect data with Fulcrum
 - Generate inspection reports
- Data pushed to GIS with Unique ID (BMP ID)
- Update inventory
- Data can be quickly queried for annual reports





Lessons Learned

- Unique ID (BMP ID) is critical (must consider how inspections are conducted)
- Nested BMP IDs vs Individual BMP IDs
 - Less complicated reporting
 - Ownership is important (HOAs vs Individual BMP Owners)
 - Reports must be generated for different owners
- Missing information- How much is enough?
- Data transfer: when and how?
- Open communication with engineers/consultants
- QA/QC & SOP's
- Duplicate column names
 - Columns must be renamed or alias provided in GIS (Example Next slide)

Geodatabase Lessons Learned

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Questions



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