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
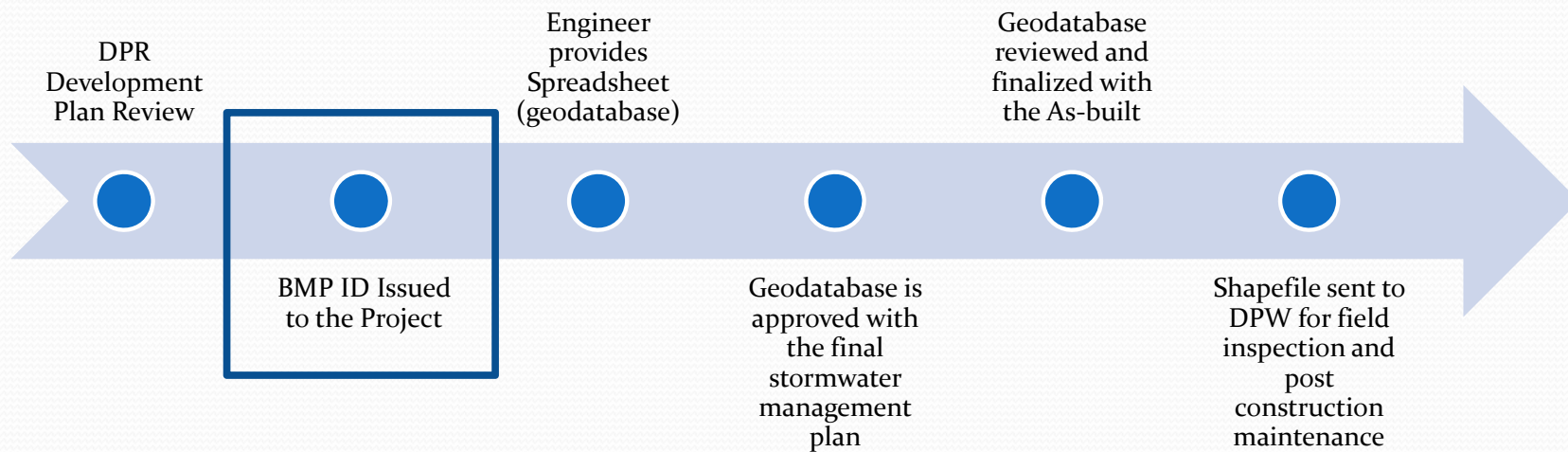- Impervious area restoration requirements
- Update BMP inventory

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

DPR Development Plan Review

BMP ID Issued to the Project

Engineer provides Spreadsheet (geodatabase)

Geodatabase is approved with the final stormwater management plan

Geodatabase reviewed and finalized with the As-built

Shapefile sent to DPW for field inspection and post construction maintenance

MDE's Geodatabase

CC17BMP043501

Column Name	Data Type	Size	Description
YEAR	NUMBER	4	Annual report year
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_E required[5]
PE_ADR	NUMBER	8	P_E addressed[6]
IMP_ACRES_REST	NUMBER	4	Equals IMP_ACRES when PE_ADR = 1 inch (for restoration only)
RCN_PRE	NUMBER	2	Runoff curve number (weighted)[7]
RCN_POST	NUMBER	2	Runoff curve number (weighted)[7]
RCN_WOODS	NUMBER	2	Runoff curve number (weighted)[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 (IMPP)
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 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 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?)
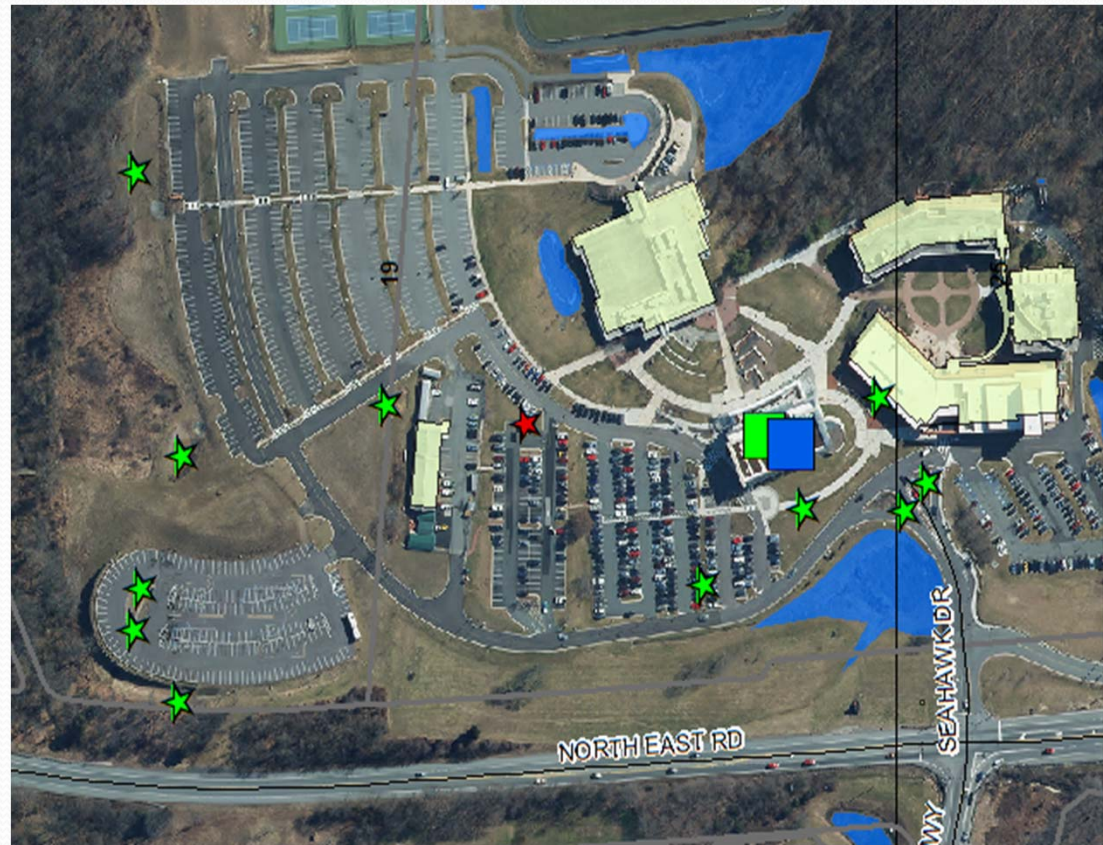
So how many BMP IDs?

- 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

DPR $\longrightarrow$ DPW
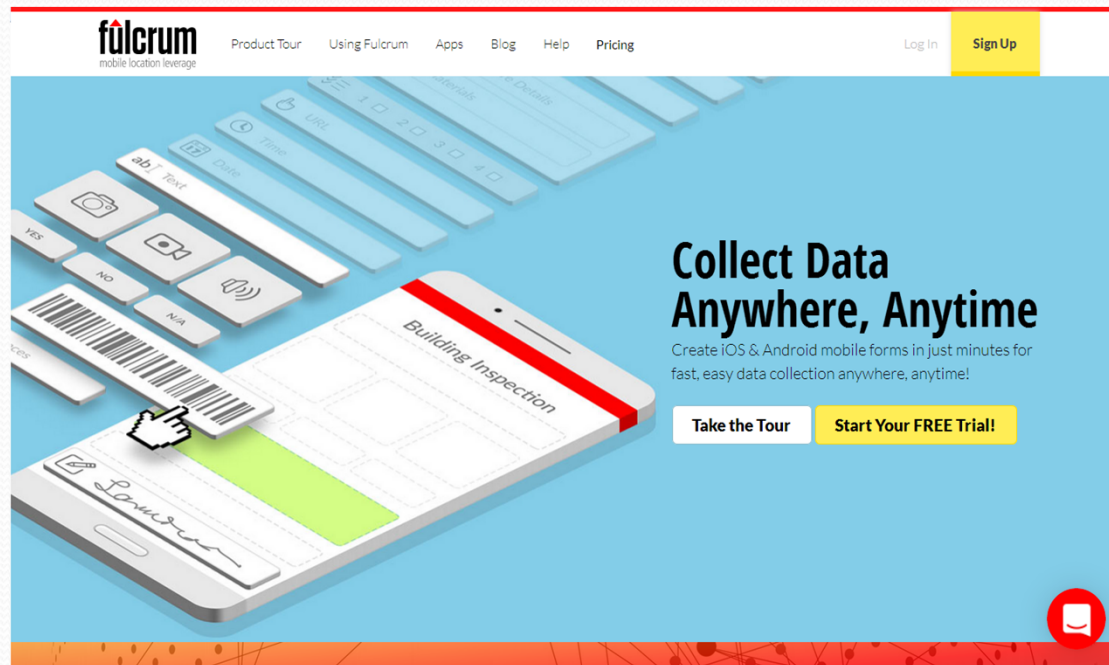
Fulcrum: Where it all starts in Cecil County

- Department of Public Works

DPW receives shapefile from DPR

Shapefile is imported into Fulcrum

Fulcrum self populates based on column labels*

Inspectors conduct field inspections

Inspection reports are emailed to the owner

Project is finalized based on field inspection; then the shapefile is sent to Cecil County's GIS Coordinator to update inventory map
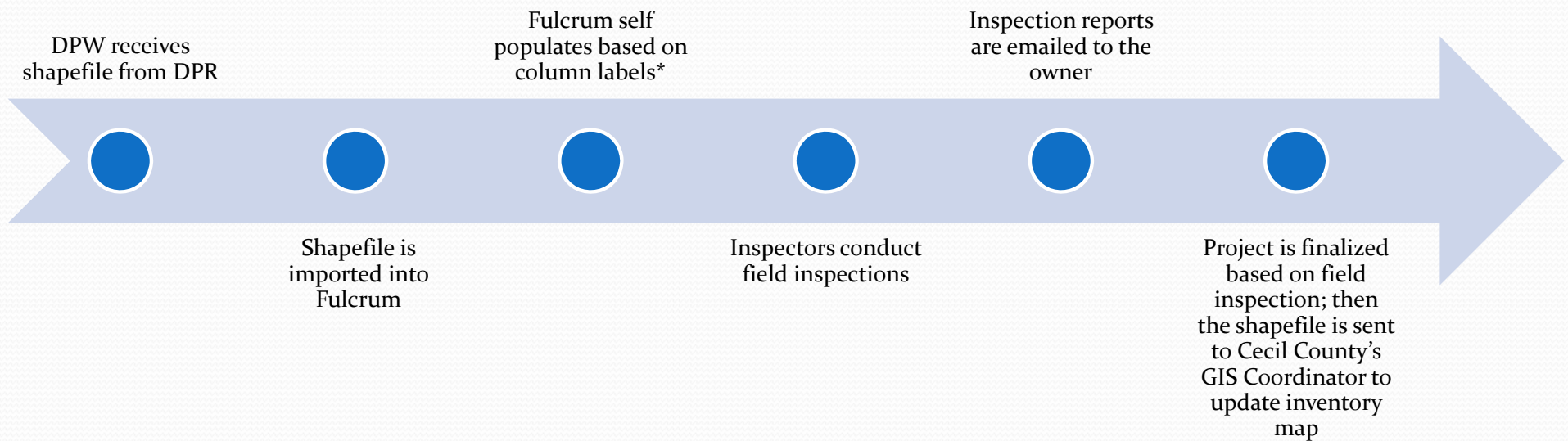
What in the world is Fulcrum?

- Build
- Deploy
- Collect
- Report
- Extend

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

Inspection Reports

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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