

# Tools and Techniques for Stormwater System Mapping

CITY OF MANCHESTER

NEW ENGLAND GEOSYSTEMS

CITY OF STAMFORD

ME (UConn CLEAR)

CT DOT

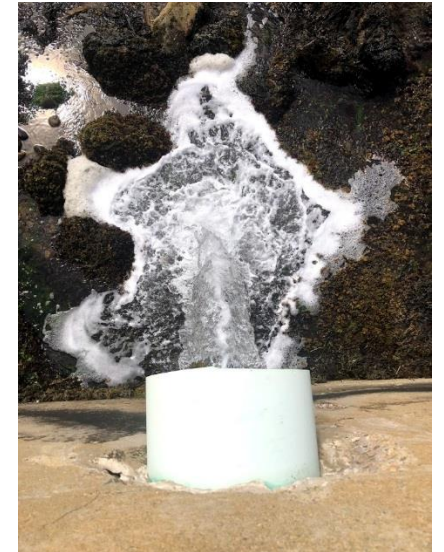
# Reminder of MS4 System Mapping Requirements

- ▶ Outfalls and receiving waters

*Town wide by July 2019 (2020 for new MS4s)*

In Priority Areas *by July 2020 (2022 for new MS4s)*

- ▶ Catch basins
- ▶ Manholes
- ▶ Pipes and open channel conveyances
- ▶ Interconnections with other MS4s and storm water systems
- ▶ Municipally-owned stormwater treatment structures
- ▶ Catchment delineations (DEEP basins)
- ▶ Impaired waterbodies (completed for you)
- ▶ Municipal sanitary sewer system & municipal combined sewer system (where applicable)



# Tools, Tips & Tricks for Stormwater System Mapping

- ▶ City of Manchester Stormwater Infrastructure Mapping  
Rich Gallacher & Liz DaRos, City of Manchester
- ▶ Mapping Stormwater Infrastructure with Collector and iForms  
Kristen LaBrie, New England Geosystems

## LUNCH BREAK

- ▶ City of Stamford Stormwater Infrastructure Mapping  
Tyler Theder, Regulatory Compliance and Administrative Officer for City of Stamford
- ▶ DIY Stormwater System Mapping on the Cheap  
Cary Chadwick, UConn CLEAR
- ▶ Mapping CT DOT's Stormwater System & Interconnections  
Jeremy Willcox and Kevin Carifa, CT DOT

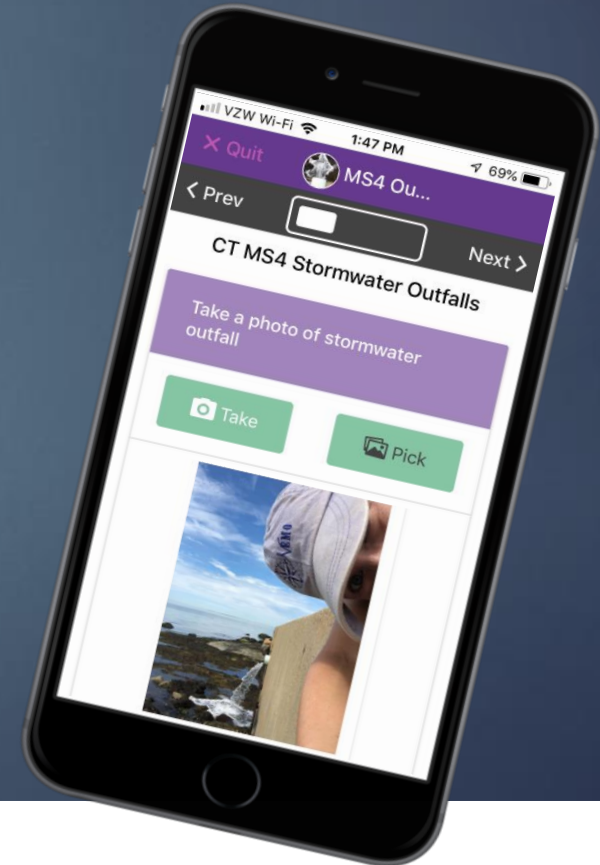


# DIY System Mapping on the Cheap (the “Good Enough” method)

CARY CHADWICK, UCONN CLEAR



**NEMO**





# MS4 System Mapping Requirements

- ▶ Outfalls and receiving waters (town wide)
- ▶ Catch basins
- ▶ Manholes
- ▶ Pipes and open channel conveyances (in priority areas)
- ▶ Interconnections with other MS4s and storm water systems
- ▶ Municipally-owned stormwater treatment structures



# MS4 System Mapping Requirements

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- ▶ Catch basins
- ▶ Manholes
- ▶ Pipes and open channel conveyances (in priority areas)
- ▶ Interconnections with other MS4s and storm water systems
- ▶ Municipally-owned stormwater treatment structures
- ▶ Water quality monitoring requirements

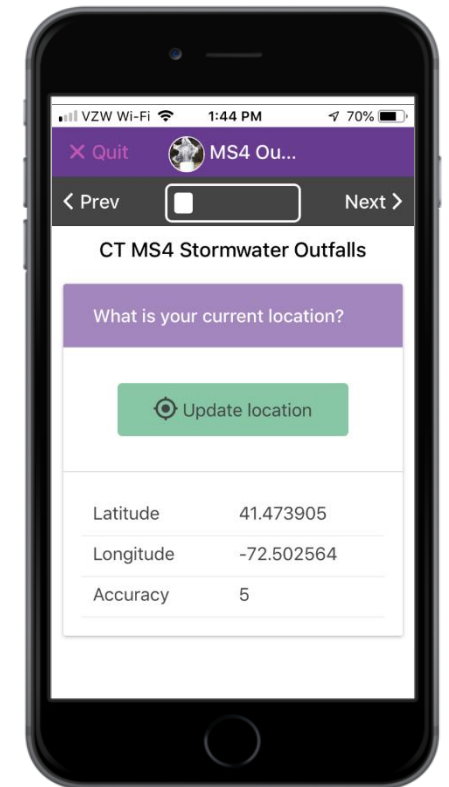
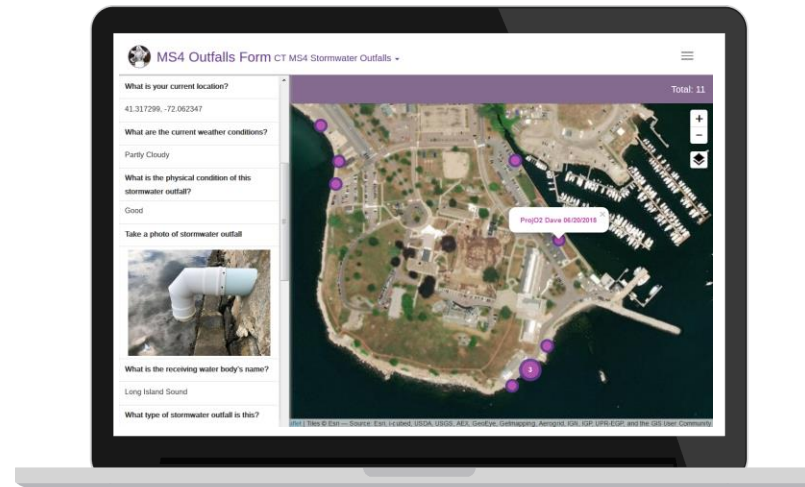




# For the Low-Budget Adventurous Types

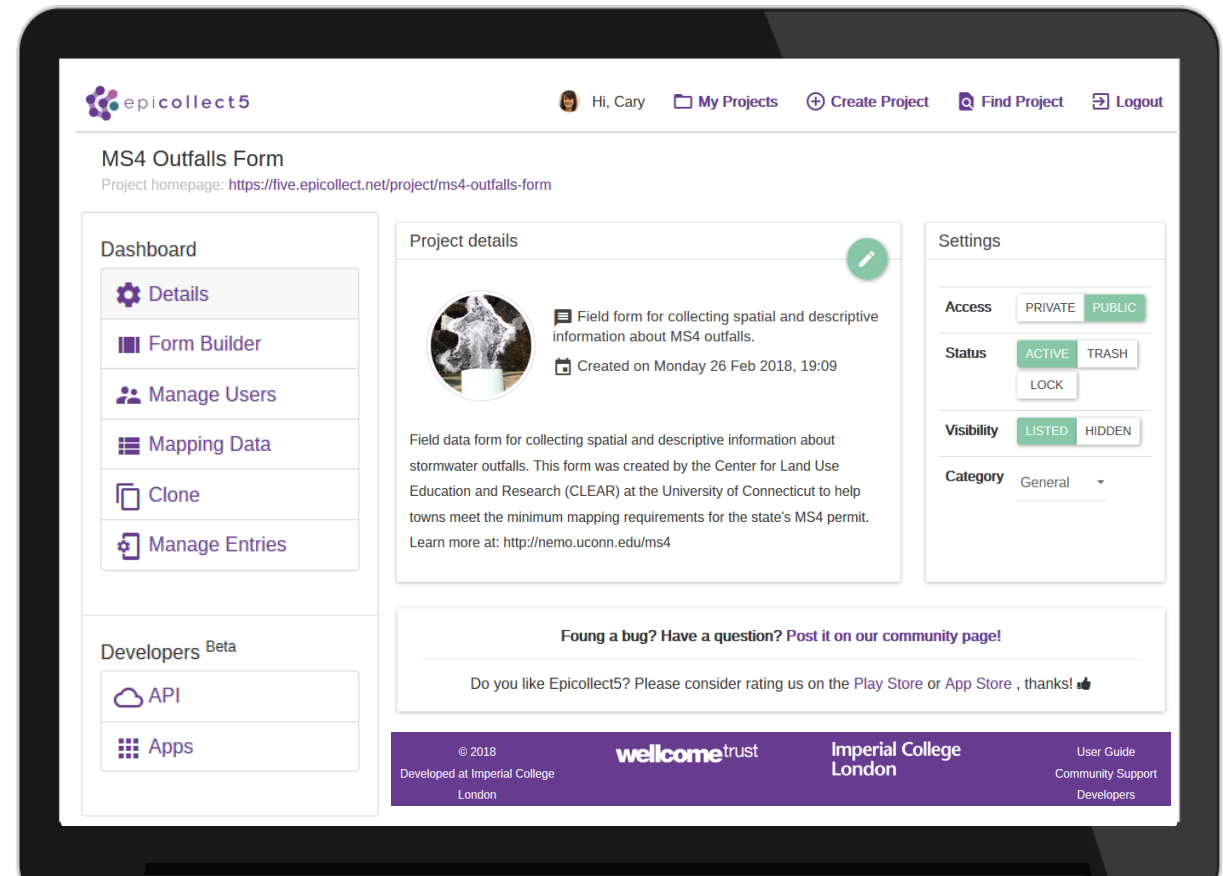
## EpiCollect5

- ▶ Free mobile app (iOS and Android)
- ▶ Intuitive web-based form builder
- ▶ Spatially referenced form responses (points only)
- ▶ Cellular not required
- ▶ Unlimited online storage
- ▶ Export to spatial formats
- ▶ Sharing is caring
- ▶ Easy-peasy.



# Giving You a Head Start

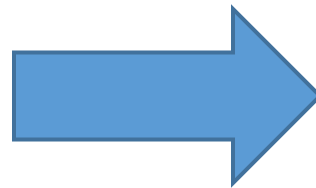
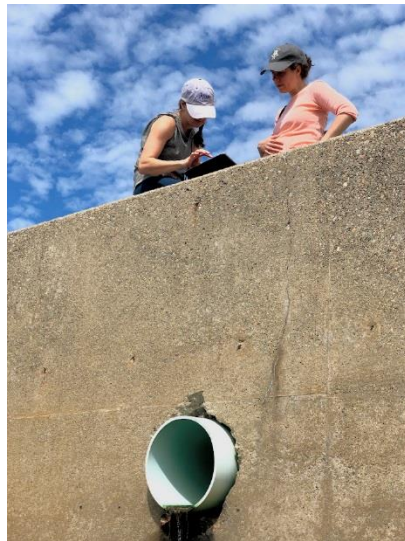
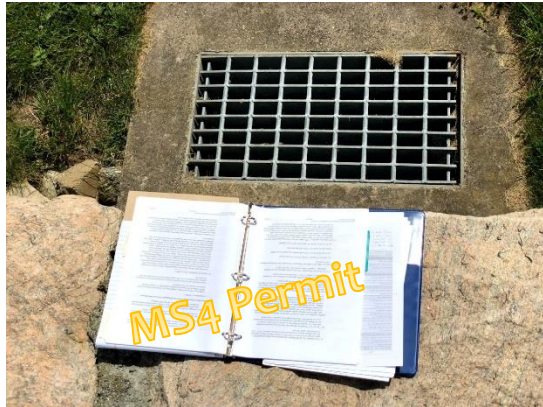
- ▶ UConn CLEAR published forms for:
  - ▶ Outfalls
  - ▶ Catch Basins
- ▶ Duplicate, replicate, edit
- ▶ Public or private
- ▶ Multi-user roles
- ▶ Free and Forever Online storage
- ▶ Visualization tools
- ▶ Export .csv or json
- ▶ API for developers





# EpiCollect5 Field Forms

<https://five.epicollect.net>

A screenshot of the EpiCollect5 MS4 Outfalls Form interface on a laptop screen. The form is titled "MS4 Outfalls Form" and includes a "Back" button and an "Exit" button. The form is divided into sections: "Text", "Numeric", "Phone", "Date", "Time", "Dropd...", "Radio", "Checkb...", "Text Box", "Readme", "Location", "Photo", "Audio", "Video", "Barcode", "Branch", and "Group". The form is currently editing the "CT MS4 Stormwater Outfalls" form. The form includes questions such as "What is the unique outfall identifier?", "What is your current location?", "What are the current weather conditions?", "What is the physical condition of this stormwater...", "Take a photo of stormwater outfall", "What is the receiving water body's name?", "What type of stormwater outfall is this?", "What type of material is the outfall made of?", "Describe the type of material:", "What is the shape of this outfall?", "Describe the shape of the outfall:", "Measure the diameter of the inside of the outfall...", "Have you identified any indicators of non-stormwa...", "Describe any non-stormwater indicators present", and "Is there any maintenance required for this". The form also includes a "Possible answers" section with options like "Storm sewer (closed pipe)" and "Open drainage (swale/ditch)".

# EpiCollect FormBuilder – MS4 Outfalls Form

## Outfall Attributes

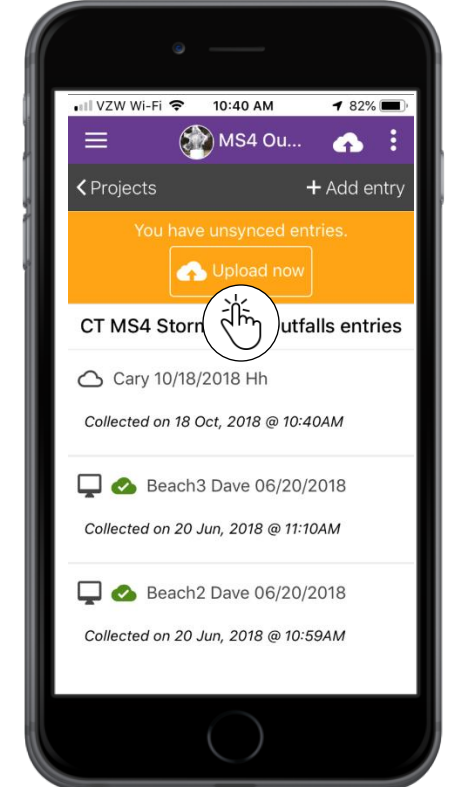
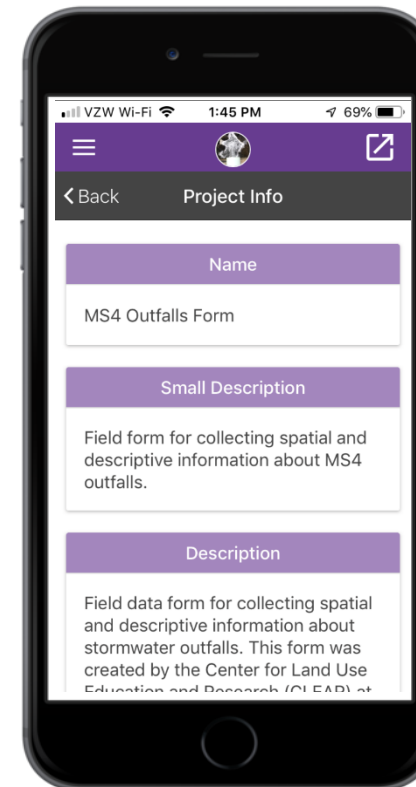
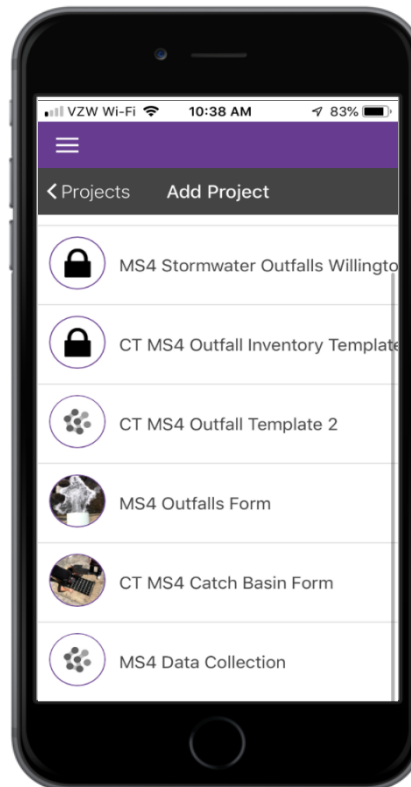
- ▶ Unique Identifier
- ▶ Receiving water body
- ▶ Type
- ▶ Material
- ▶ Size
- ▶ Location
- ▶ Condition
- ▶ Indicators of non-stormwater discharge
- ▶ Maintenance requirements

The screenshot displays the EpiCollect FormBuilder interface for the 'MS4 Outfalls Form'. The interface is divided into several sections:

- Left Panel:** A vertical toolbar containing various form field types: Text, Numeric, Phone, Date, Time, Dropdo..., Radio, Checkb..., Text Box, Readme, Location, Photo, Audio, Video, Barcode, Branch, and Group.
- Central Panel:** A list of form questions being edited. Each question is preceded by an icon indicating its type (e.g., text, location, radio, photo, checkbox). The questions are:
  - What is the unique outfall identifier? (Text, green checkmark)
  - What is your current location? (Location, green checkmark)
  - What are the current weather conditions? (Text, green checkmark)
  - What is the physical condition of this stormwater... (Radio, green checkmark)
  - Take a photo of stormwater outfall (Photo, green checkmark)
  - What is the receiving water body's name? (Text, green checkmark)
  - What type of stormwater outfall is this? (Text, green checkmark, highlighted)
  - What type of material is the outfall made of? (Radio, green checkmark)
  - Describe the type of material: (Text, green checkmark)
  - What is the shape of this outfall? (Radio, green checkmark)
  - Describe the shape of the outfall: (Text, green checkmark)
  - Measure the diameter of the inside of the outfall... (Text, green checkmark)
  - Have you identified any indicators of non-stormwa... (Checkbox, green checkmark)
  - Describe any non-stormwater indicators present (Text, green checkmark)
  - Is there any maintenance required for this (Radio, green checkmark)
- Right Panel:** A detailed view of the selected question, 'What type of stormwater outfall is this?'. It shows the question text, a 'Properties' tab, and a 'Possible answers' section. The 'Possible answers' section includes a list of predefined answers: 'Storm sewer (closed pipe)' and 'Open drainage (swale/ditch)', each with a delete icon (x).

# What Then? The EpiCollect5 Mobile App

- ▶ Search & Add Projects
- ▶ Option to download responses
- ▶ Stored on device
- ▶ Form-based entry
- ▶ Built in AGPS or external receiver
- ▶ Offline data entry
- ▶ Freaking easy.





# Viewing Field Data on the EpiCollect Website

epicollect5 Hi, Cary My Projects Create Project Find Project Logout

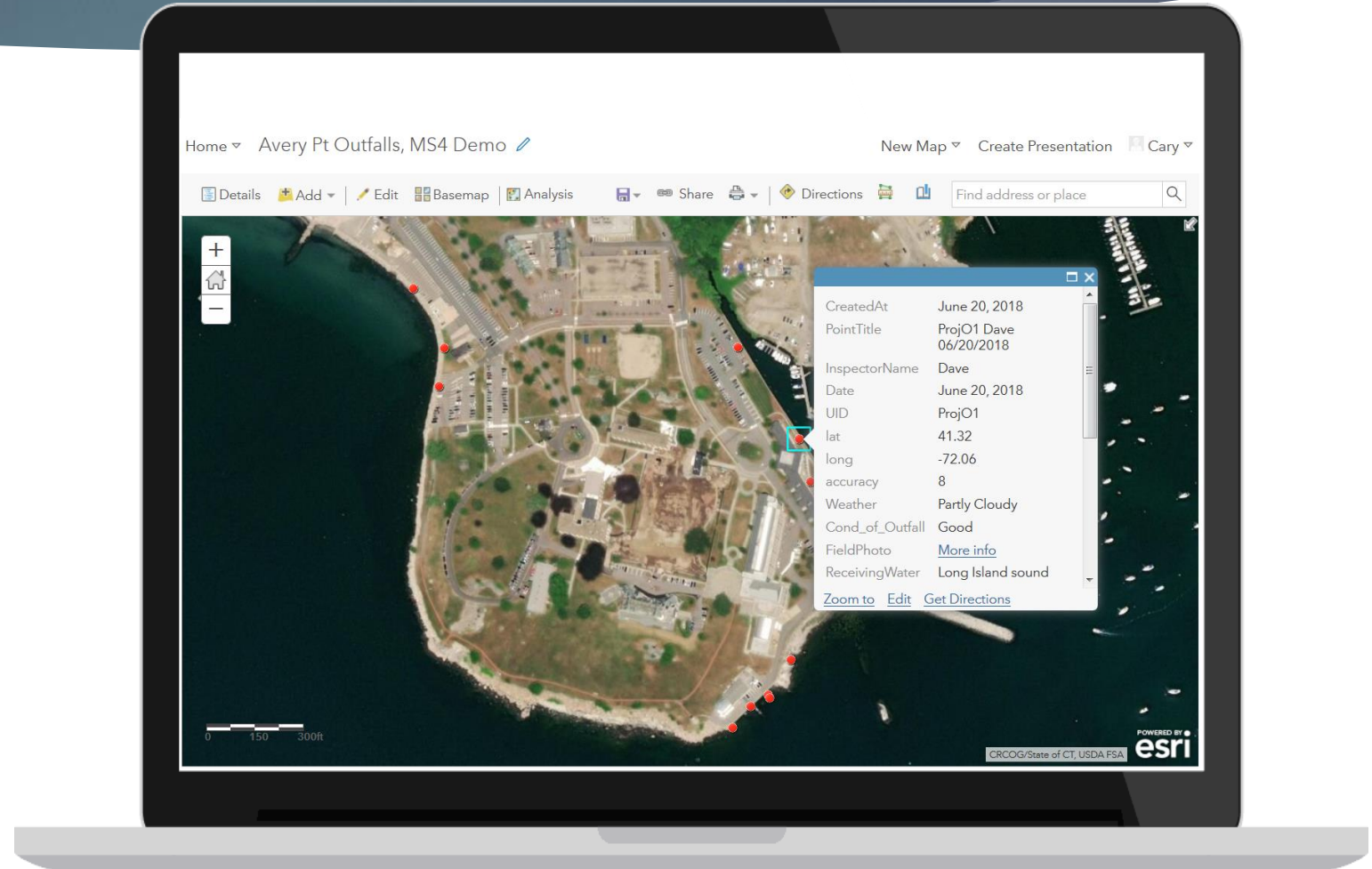
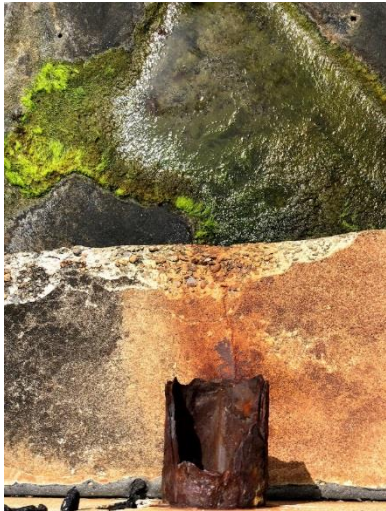
MS4 Outfalls Form CT MS4 Stormwater Outfalls Download Table Map Exit

Add CT MS4 Stormwater... Total: 11, 1/1 < >

View	Delete	Edit	Title	Created At	What is your name?	What is today's date?	What is the unique outfall ide...	What is your current location?
			Beach3 Dave 06/20/2...	20th Jun, 2018	Dave	06/20/2018	Beach3	41.318931, -72.06685
			Beach2 Dave 06/20/2...	20th Jun, 2018	Dave	06/20/2018	Beach2	41.318425, -72.066505
			Beach1 Dave 06/20/2...	20th Jun, 2018	Dave	06/20/2018	Beach1	41.3181, -72.066567
			Lab4 Cary 06/20/2018	20th Jun, 2018	Cary	06/20/2018	Lab4	41.315228, -72.063228
			Lab3 Dave 06/20/2018	20th Jun, 2018	Dave	06/20/2018	Lab3	41.315405, -72.063021
			Lab2 Dave 06/20/2018	20th Jun, 2018	Dave	06/20/2018	Lab2	41.3155, -72.062832
			Lab1 Dave 06/20/2018	20th Jun, 2018	Dave	06/20/2018	Lab1	41.315471, -72.062813
			MSB1 Dave 06/20/2018	20th Jun, 2018	Dave	06/20/2018	MSB1	41.3158, -72.062572
			ProjO2 Dave 06/20/20...	20th Jun, 2018	Dave	06/20/2018	ProjO2	41.317299, -72.062347
			ProjO1 Dave 06/20/20...	20th Jun, 2018	Dave	06/20/2018	ProjO1	41.317654, -72.062477
			Dlot1 Dave 06/20/2018	20th Jun, 2018	Dave	06/20/2018	Dlot1	41.318432, -72.063179

# Export to GIS

- ▶ Download .csv or json file
- ▶ Easy import to GIS



# Easy-Peasy.

## EpiCollect5

- ▶ <https://five.epicollect.net>, search for MS4
- ▶ For iOS and Android
- ▶ FREE!
- ▶ Excellent user guide & community forum
- ▶ <http://nemo.uconn.edu/ms4>, Tasks > Mapping
- ▶ Call Dave with questions.
  - ▶ cary.chadwick@uconn.edu
  - ▶ david.dickson@uconn.edu

Thank you!

