



City of Philadelphia Litter Index

Distributed Data Collection via Survey123 for ArcGIS

Nick Fink

Nicholas.fink@phila.gov



Office of Innovation & Technology

CityGeo

DATA ANALYSIS APPLICATION



History

"Originally created in 2007, the Litter Index is used to compare the relative cleanliness of different areas of the city. The Litter Index is scored on a 1-4 scale with 1 being minimal litter and 4 being extremely littered."

- City of Philadelphia Metadata Catalog

- Based on police districts
- Paper surveys



Zero Waste and Litter Initiative

"The Zero Waste and Litter Cabinet is an interdepartmental effort to continually reduce the waste entering landfills or conventional incinerators, combat litter, and enhance the cleanliness of streets and public spaces"

- CleanPHL.org

- More compact areas to generate scores
- Cloud based surveys



Project Needs

- Mobile field data collection method that is robust, flexible, scalable, and easy to use
- Data schema that easily and quickly allows aggregation of the surveys by multiple departments into a uniform core set of data
- Compact and stable area boundaries for litter index data aggregation
- Web GIS and data support

Devices

- Samsung Galaxy Tab S2
 - WiFi only
 - Consumer grade GPS
- Samsung Galaxy S6
 - 4G, WiFi
 - Consumer grade GPS



Image: Samsung

Survey123 Connect for ArcGIS

- Spreadsheet based
- Highly customizable
- Allows for a uniform schema across departments

type	name	label
note	title	<center>City of Philadelphia Litter Survey</center>
start	survey_start	
end	survey_end	
geopoint	geometry	Location
integer	litter_count	Litter Count
select_one rating	rating	Litter Rating
select_one action	action	Requires Immediate Action
text	location	Address
image	image	Photo
hidden	department	Department
note	note	Fields with a red asterisk (*) are required before submitting a survey.





Data Workflow

Field Data Collection

- 6 entities (Streets, Water, Community Life Improvement Program (CLIP), School District, SEPTA)
- 38 active field surveyors
- Managed in ArcGIS Online
- Every department has a unique survey to fit their portion/needs

Data Workflow (continued)

Field Data Collection

My Survey

City of Philadelphia Litter Index Test

Location *

No Location
Position source closed error

Press to capture location using a map

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, L

Litter Count *

Litter Rating *

Requires Immediate Action *

Address *

Photo *

Litter_Survey_XCLIPX (Features: 14140, Selected: 0)

GlobalID	survey_start	survey_end	Litter Count	Litter Rating	Requires Immedi...	Address	department	CreationDate
a1464e05-e2ed-413b-b94d-218bfd90214b	7/3/2017, 11:13 AM	7/3/2017, 11:14 AM	25	2 - litter in an amount that can be picked up by one person	No	4052 Parkside ave	CLIP	7/3/2017, 1:19 PM
b006d294-7cfa-4884-be96-31090212a23c	7/3/2017, 11:12 AM	7/3/2017, 11:12 AM	5	1 - no or almost no litter on a street	No	4062 Parkside ave	CLIP	7/3/2017, 1:19 PM
ed8e655b-585a-4d7e-b16e-549d31bb8db7	7/3/2017, 11:03 AM	7/3/2017, 11:06 AM	10	1 - no or almost no litter on a street	No	4245 W Leidy ave	CLIP	7/3/2017, 1:19 PM
b23effbd-1cb3-4b6e-a69e-14bcc0e57beb	7/3/2017, 11:05 AM	7/3/2017, 11:06 AM	5	1 - no or almost no litter on a street	No	4273 W Leidy ave	CLIP	7/3/2017, 1:19 PM
e6983772-c5d3-49f8-aa4b-486038c2a4b4	7/3/2017, 10:59 AM	7/3/2017, 11:00 AM	0	1 - no or almost no litter on a street	No	4185 W Leidy ave	CLIP	7/3/2017, 1:20 PM
1183e2a7-0ef1-4e88-b19e-d270dfa7fb31	7/3/2017, 10:58 AM	7/3/2017, 10:59 AM	45	2 - litter in an amount that can be picked up by one person	No	4154 W Leidy ave	CLIP	7/3/2017, 1:20 PM
ebded408-4a4d-49bb-8a71-416efc1882d1	7/3/2017, 10:57 AM	7/3/2017, 10:58 AM	5	1 - no or almost no litter on a street	No	4164 W Leidy ave	CLIP	7/3/2017, 1:20 PM
b0d384f0-7e27-408a-0707	7/3/2017, 10:50 AM	7/3/2017, 10:50 AM	15	1 - no or almost no litter on a street	No	4124 W Leidy ave	CLIP	7/3/2017, 1:20 PM

Data Workflow (continued)

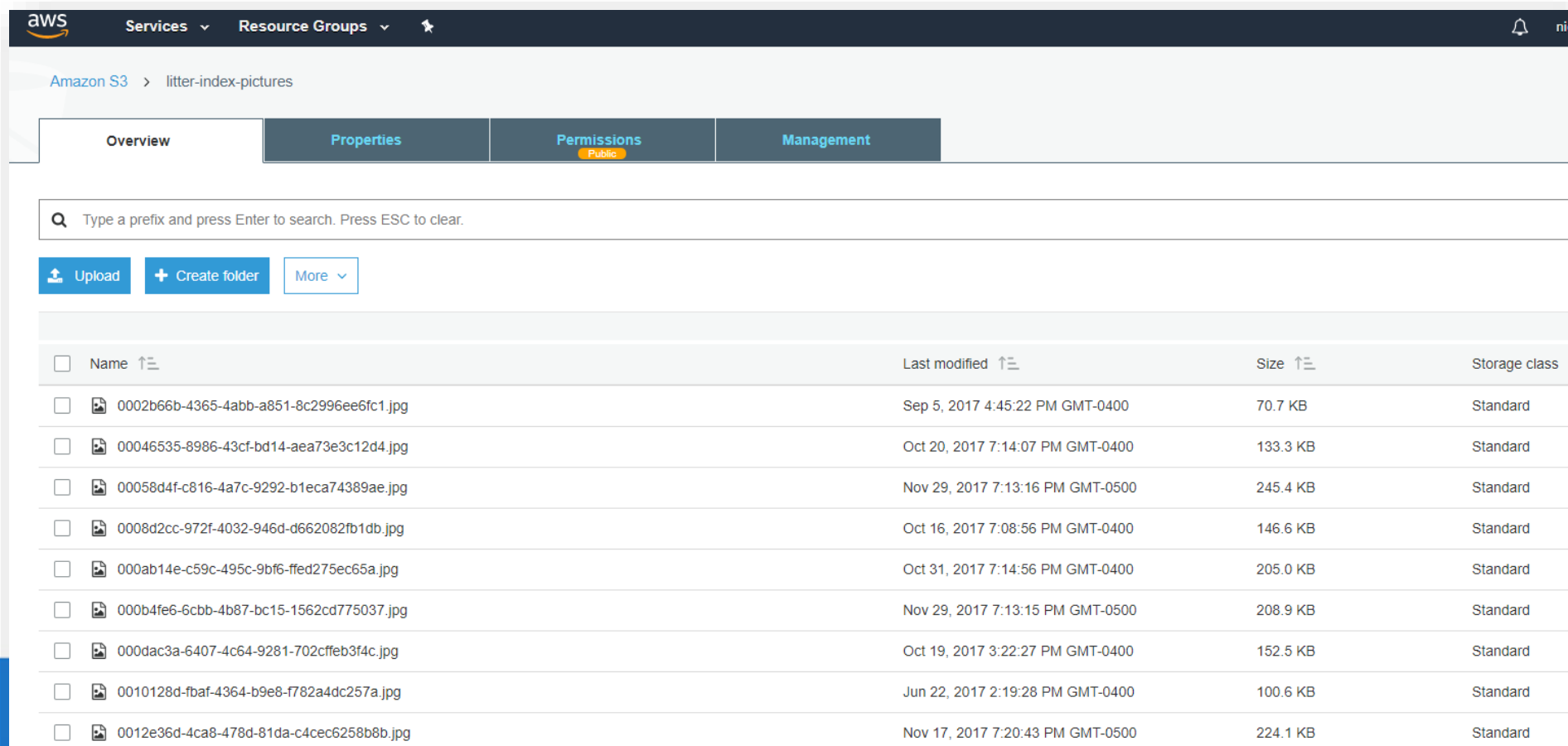
Insert to feature class after preprocessing:

1. Try geocoding new records
2. Create link to attached media

LOCATION	DEPARTMENT	CREATION_DATE	CREATOR	EDIT_DATE	EDITOR	MEDIA_URL
4052 PARKSIDE AVE	CLIP	7/3/2017 1:19:54 PM	[Redacted]	7/3/2017 1:19:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/a1464e05-e2ed-413b-b94d-218bfd90214b.jpg
4062 PARKSIDE AVE	CLIP	7/3/2017 1:19:56 PM	[Redacted]	7/3/2017 1:19:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/b006d294-7cfa-4884-be96-31090212a23c.jpg
4245 W LEIDY AVE	CLIP	7/3/2017 1:19:58 PM	[Redacted]	7/3/2017 1:19:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/ed8e655b-585a-4d7e-b16e-549d31bb8db7.jpg
4273 W LEIDY AVE	CLIP	7/3/2017 1:19:59 PM	[Redacted]	7/3/2017 1:19:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/b23effbd-1cb3-4b6e-a69e-14bcc0e57beb.jpg
4185 W LEIDY AVE	CLIP	7/3/2017 1:20:02 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/e6983772-c5d3-49f8-aa4b-486038c2a4b4.jpg
4154 W LEIDY AVE	CLIP	7/3/2017 1:20:04 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/1183e2a7-0ef1-4e88-b19e-d270dfa7fb31.jpg
4164 W LEIDY AVE	CLIP	7/3/2017 1:20:05 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/ebded408-4a4d-49bb-8a71-416efc1882d1.jpg
4124 W LEIDY AVE	CLIP	7/3/2017 1:20:07 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/b0d384f0-7e27-408e-9797-b8401d280b1d.jpg
4130 W LEIDY AVE	CLIP	7/3/2017 1:20:09 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/12d9d2d0-ba86-47c3-b0ab-28275ad71eba.jpg
4134 W LEIDY AVE	CLIP	7/3/2017 1:20:11 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/b101ef86-bf19-421e-810b-6b49b32cb8bf.jpg
4140 W LEIDY AVE	CLIP	7/3/2017 1:20:14 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/a1f8c0ab-44ce-49c8-af08-a81a648bfa49.jpg
4146 W LEIDY AVE	CLIP	7/3/2017 1:20:16 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/309d110f-44c3-4cf8-9299-6943c8d13fa5.jpg
4155 W LEIDY AVE	CLIP	7/3/2017 1:20:17 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/9beb57d3-22f3-40a5-a45a-b896a69a0775.jpg
4151 W LEIDY AVE	CLIP	7/3/2017 1:20:19 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/59efc252-4c1e-447e-a844-5e658e51be0d.jpg
4147 W LEIDY AVE	CLIP	7/3/2017 1:20:20 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/3ce26ffe-450b-4ec2-b438-0f99dcf8e9c7.jpg
4117 W LEIDY AVE	CLIP	7/3/2017 1:20:21 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/77d16180-9900-4742-83a4-75f60ac31847.jpg
4111 W LEIDY AVE	CLIP	7/3/2017 1:20:23 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/691ff91f-5e74-4217-bce5-8dfa14a807dd.jpg
4107 W GIRARD AVE	CLIP	7/3/2017 1:20:24 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/3df17b2e-e0fe-4eb3-aea5-0ff9eca35cb3.jpg
4047 W GIRARD AVE	CLIP	7/3/2017 1:20:25 PM	[Redacted]	7/3/2017 1:20:	[Redacted]	http://s3.amazonaws.com/litter-index-pictures/48f35975-469d-4bdd-bcd8-03e7ff1c04dd.jpg

Data Workflow (continued)

Delete attached images from AGO and add to AWS S3

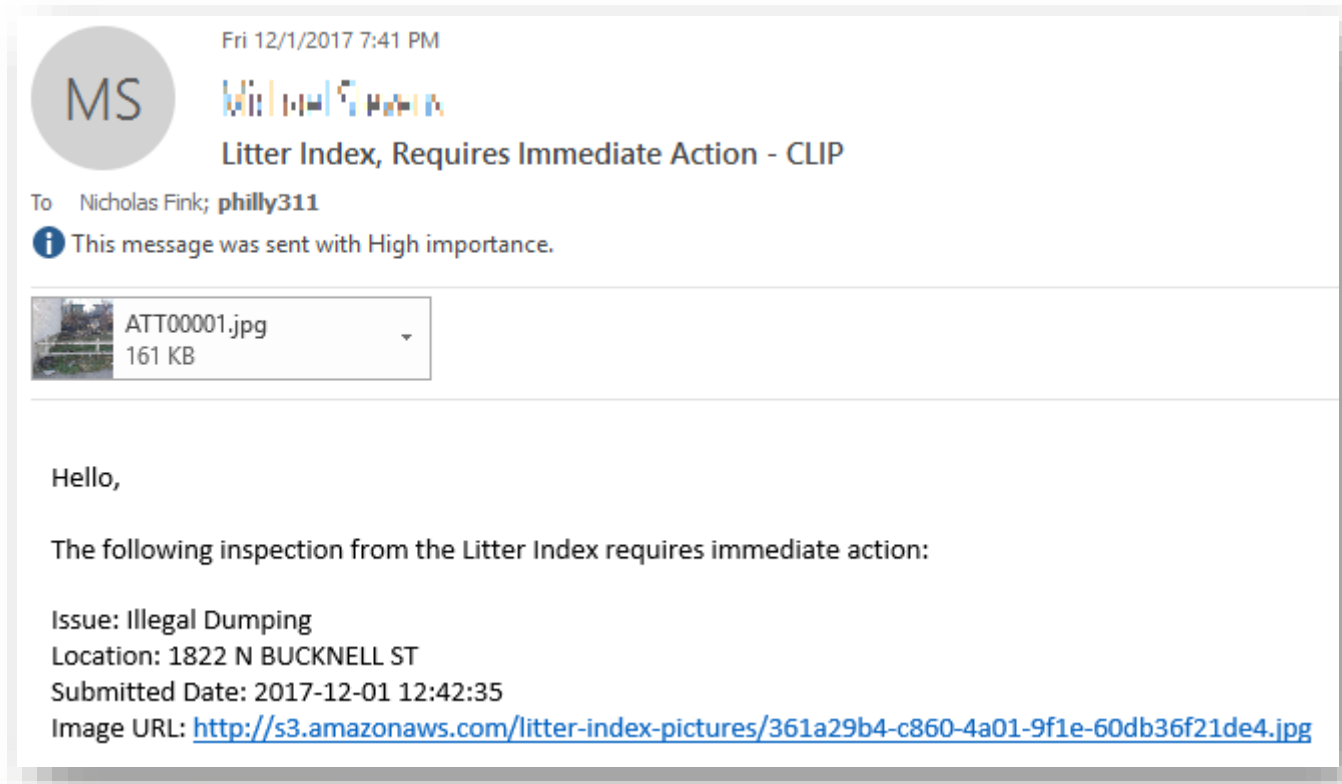


The screenshot displays the AWS S3 console interface for a bucket named 'litter-index-pictures'. The console shows a navigation bar with 'Services' and 'Resource Groups' menus. Below the navigation bar, there are tabs for 'Overview', 'Properties', 'Permissions', and 'Management'. A search bar is present with the placeholder text 'Type a prefix and press Enter to search. Press ESC to clear.' Below the search bar, there are buttons for 'Upload', 'Create folder', and 'More'. The main content area displays a table of objects in the bucket.

<input type="checkbox"/>	Name ↑	Last modified ↑	Size ↑	Storage class
<input type="checkbox"/>	0002b66b-4365-4abb-a851-8c2996ee6fc1.jpg	Sep 5, 2017 4:45:22 PM GMT-0400	70.7 KB	Standard
<input type="checkbox"/>	00046535-8986-43cf-bd14-aea73e3c12d4.jpg	Oct 20, 2017 7:14:07 PM GMT-0400	133.3 KB	Standard
<input type="checkbox"/>	00058d4f-c816-4a7c-9292-b1eca74389ae.jpg	Nov 29, 2017 7:13:16 PM GMT-0500	245.4 KB	Standard
<input type="checkbox"/>	0008d2cc-972f-4032-946d-d662082fb1db.jpg	Oct 16, 2017 7:08:56 PM GMT-0400	146.6 KB	Standard
<input type="checkbox"/>	000ab14e-c59c-495c-9bf6-ffed275ec65a.jpg	Oct 31, 2017 7:14:56 PM GMT-0400	205.0 KB	Standard
<input type="checkbox"/>	000b4fe6-6cbb-4b87-bc15-1562cd775037.jpg	Nov 29, 2017 7:13:15 PM GMT-0500	208.9 KB	Standard
<input type="checkbox"/>	000dac3a-6407-4c64-9281-702cfeb3f4c.jpg	Oct 19, 2017 3:22:27 PM GMT-0400	152.5 KB	Standard
<input type="checkbox"/>	0010128d-fbaf-4364-b9e8-f782a4dc257a.jpg	Jun 22, 2017 2:19:28 PM GMT-0400	100.6 KB	Standard
<input type="checkbox"/>	0012e36d-4ca8-478d-81da-c4cec6258b8b.jpg	Nov 17, 2017 7:20:43 PM GMT-0500	224.1 KB	Standard

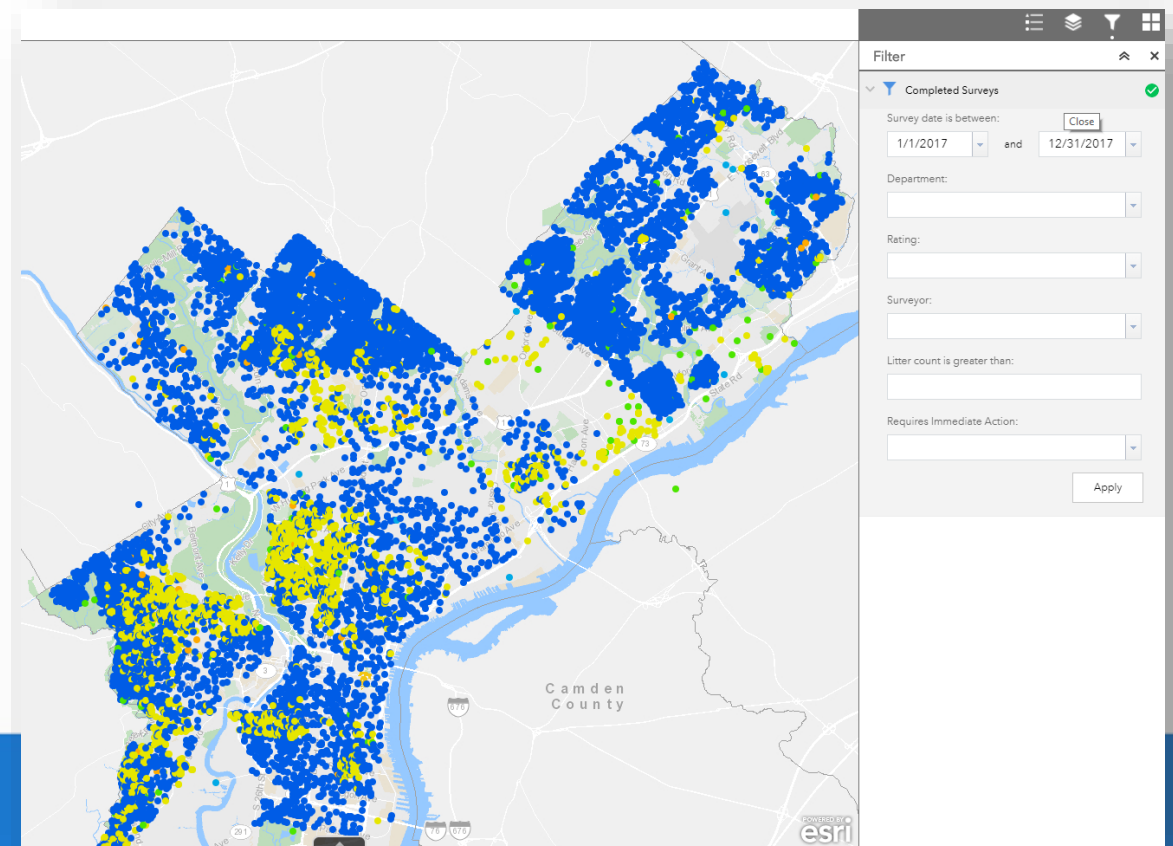
Data Workflow (continued)

Email Philly 311 with surveys that require immediate action



Data Workflow (continued)

Monitor progress with ArcGIS Online filtering application and ArcGIS Server Feature Service





Limitations

- Survey123 Online surveys currently only allow you to define aliases for inputs
- GPS accuracy and precision
- User inputs
- Communicating completed work to field users
- Offline basemaps

Workarounds

- Online Surveys → GeoForm
- Poor GPS coordinate → Geocode based on address
- No geocode → Take GPS coordinates

1. Enter Information

Survey Date

Litter Count (required)

Litter Rating (required)

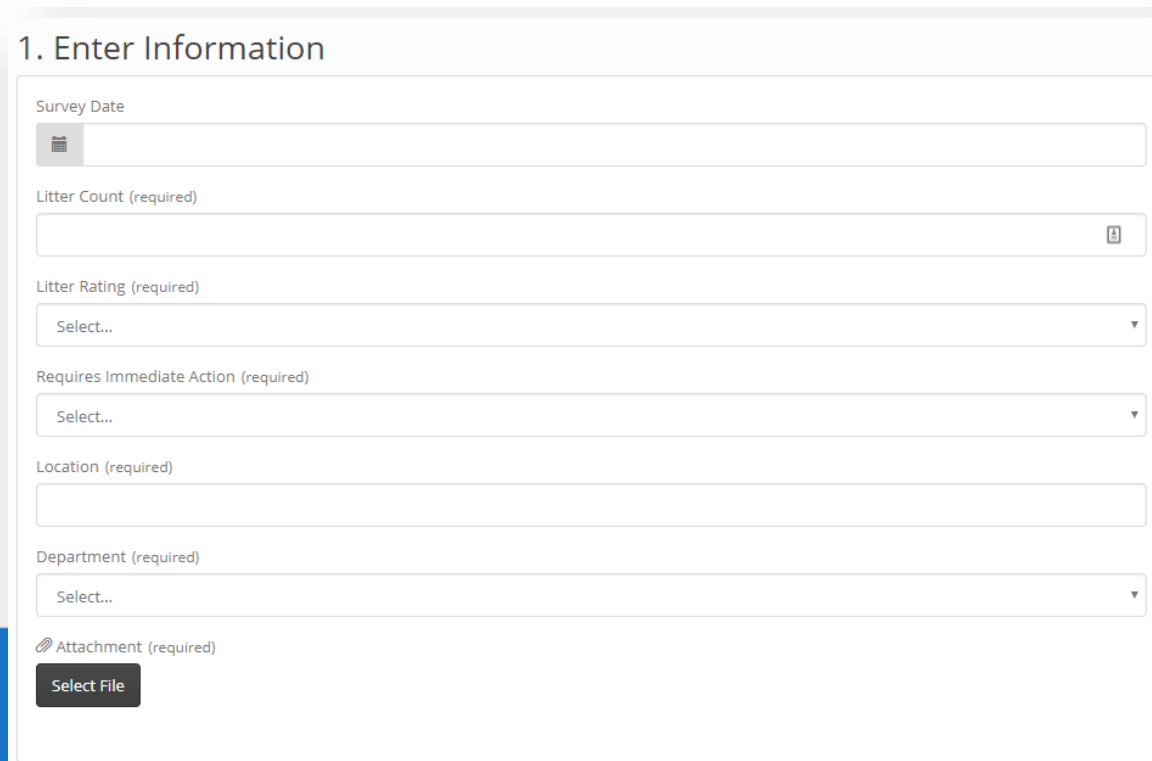
Requires Immediate Action (required)

Location (required)

Department (required)

Attachment (required)

Select File





Problems To Be Solved

- Communicating completed work to field staff
 - Link to Collector app?
 - Check Survey123 inbox?
- GPS coordinates end up in strange places
- Field inputs are incorrect on constrained fields



Questions?

maps@phila.gov