Asset Inspections with Collector App
Using disconnected editing for storage tank inspections

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22nd July 2015
Overview

Project Requirements

Previous Approaches

Project Approach and GIS Workflow

Lessons Learned

Further Developments
Project Requirements

Response to 2014 WV Aboveground Storage Tank Act

- Spill Prevention Response Plan for each facility
- Inspection and Certification of each AST

Project Schedule and Delivery Requirements

- ~1,000 tanks to be inspected
- Large rural project area
- Integrated reports (maps, photos, inspections)
- < 2 months to complete project
Previous Approaches

Discrete data collection (Notepad, GPS, Camera, Tablet)
Automated reporting via MS Office Tools
Previous Approaches Lessons Learned

Multiple collection tools are inefficient

Transcription into reporting tools generates errors

Need to standardize associated files (photos, maps etc.)

Reporting formats limit access for QA

- Empower field teams to control information
- Use of Excel and MS Publisher most successful
Project Approach

Agree inspection protocol with client

- Information to be collected (attributes, photos)
- Mapping requirements (features, scale)
- Template for final report

Determine collection workflow

- Desktop study – baseline mapping
- Generate inspection forms
- Undertake inspections
- Populate reporting template
GIS Workflow - Overview

1. Desktop (GIS Team)
   - Locate tank positions
   - Delineate tank containment areas
   - Determine closest receptors
   - Configure mobile collection template

2. Mobile (Field Team)
   - Populate tank inspection attributes
   - Capture photos

3. Desktop (GIS/Field Team)
   - QA data and maps
   - Publish reports
GIS Workflow - Desktop

Developed desktop editing template

1. Data driven pages from source coordinates
2. Reposition tanks
3. Add containment area
4. Determine receptors
5. Add field editing attributes

<table>
<thead>
<tr>
<th>Tank_ID</th>
<th>Construct_Year</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Coord_Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/21/1946</td>
<td>37.994</td>
<td>-81.380</td>
<td>Google Earth</td>
</tr>
<tr>
<td>3</td>
<td>9/18/1994</td>
<td>37.981</td>
<td>-81.301</td>
<td>Google Earth</td>
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<td>5</td>
<td>2/6/2013</td>
<td>38.020</td>
<td>-81.093</td>
<td>Google Earth</td>
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<tr>
<td>6</td>
<td>5/21/2001</td>
<td>38.511</td>
<td>-81.367</td>
<td>Google Earth</td>
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<td>7</td>
<td>8/2/1978</td>
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<td>-81.208</td>
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<tr>
<td>8</td>
<td>6/18/2002</td>
<td>38.229</td>
<td>81.712</td>
<td>Google Earth</td>
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<td>10</td>
<td>11/19/2009</td>
<td>38.449</td>
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<td>Google Earth</td>
</tr>
</tbody>
</table>

Legend
- Source Tank Location
- Corrected Tank Location
- Containment Area
GIS Workflow – Field Preparation

1. Check mobile coverage
2. Determine field devices
3. Define survey areas for each team
4. Load data to devices
AGOL hosted features

- Tank Inspections
- Containment Areas
- Flow Direction
- Additional Comments
  - (Point/Line/Polygon)
- Download Area
### GIS Workflow – Field Prep - Basemap

#### 100,000 tile limit for ESRI services

<table>
<thead>
<tr>
<th>Layer level</th>
<th>Map scale</th>
<th>Tile (feet)</th>
<th>Area (sq. miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L17</td>
<td>1:4,514</td>
<td>1,003</td>
<td>3,609</td>
</tr>
<tr>
<td>L18</td>
<td>1:2,257</td>
<td>502</td>
<td>902</td>
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<tr>
<td>L19</td>
<td>1:1,128</td>
<td>251</td>
<td>226</td>
</tr>
</tbody>
</table>

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GIS Workflow – Report Development

1. Data received from field
   ■ Overnight synchronization

2. Basic QA check
   ■ Download as FGDB – attributes/spelling

3. Generate draft report
   ■ Direct connect to hosted service

4. Comment from field
   ■ Edit in Collector or Online

5. Generate final report
   ■ Complete 1-2 days post survey
GIS Workflow – Report Development

Tank T1 - Inspection Report 2014

Evaluation of Tank System

<table>
<thead>
<tr>
<th>System Component</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundation and tank supports</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Tank shell</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Tank roof</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Tank bottom/floor</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Internal linings and coatings</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>External deterioration protection</td>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>Ancillary equipment</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>Cathodic protection system</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Inspector: John Smith
Inspection Date: 11/22/2014

Additional Comments
Tank is currently structurally sound. Replacement of internal lining and external protective coating recommended within 6 months to limit further deterioration. Schedule follow-up inspection 6 months after installation.

Evaluation of Sensitive Receptors

<table>
<thead>
<tr>
<th>Surface Water (NHD)</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straight line distance</td>
<td>882 feet</td>
</tr>
<tr>
<td>Flow path distance</td>
<td>1057 feet</td>
</tr>
<tr>
<td>Type of waterbody</td>
<td>Stream/River: Hydrographic Category = Intermittent</td>
</tr>
</tbody>
</table>

Wetlands (NWI)

| Straight line distance                | 870 feet  |
| Flow path distance                    | 1049 feet |
| Type of wetland                       | PEM1C - Freshwater Emergent Wetland |
Lessons Learned

Preparation
- GIS required for form setup and design
- Basemap preparation/download concepts

Collection
- Inspection forms intuitive but “clunky” – too many clicks
- Unable to switch to online basemap in mobile coverage
- Photo collection
  - Consistent orientation for device
  - Large image sizes from some devices

Reporting
- Use of desktop GIS restricted editing/update process
- Performance issues using hosted feature services
Further Developments

Data Preparation
- Created form request template
- Evaluating custom template builder
- Upgraded internal servers to support custom basemaps

Collection
- Evaluating potential for BYOD
- Defining AGOL roles and governance for deployment

Reporting
- Create online reporting templates
- Internal hosting of feature services
- Access data from alternate reporting tools
Questions

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