Illicit Discharge Detection and Elimination:
Desktop Analysis of Illicit Discharge Potential (IDP)
Desktop Assessment of Illicit Discharge Potential (IDP)

Purpose:
- Determine the potential severity for illicit discharges
- Identify which subwatersheds or generating land use merit priority investigation

Elements:
- Delineate subwatersheds
- Compile mapping and data
- Compute discharge screening factors
- Characterize IDP across subwatersheds
- Generate maps to support field investigation
Screening Factors

- Past Discharge Complaints
- Poor Dry Weather Water Quality
- Density of Generating Sites
- Density of Industrial NPDES Permits
- Stormwater Outfall Density
- Age of Subwatershed Development
- Former Combined Sewers
- Older Industrial Operations
- Aging or Failing Sewers
- Density of Older Septic Systems
- Past Sewer Conversions

Select the factors that apply most to your community
# Prioritizing Subwatersheds Using IDP Screening Factors

<table>
<thead>
<tr>
<th>Subwatershed</th>
<th>Past discharge complaints</th>
<th>Poor dry weather WQ</th>
<th>Density of SW outfalls</th>
<th>Average age of dev.</th>
<th>Raw IDP score</th>
<th>Normalized IDP score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subwatershed A</td>
<td>8 (2)</td>
<td>30% (2)</td>
<td>14 (2)</td>
<td>40 (2)</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Subwatershed B</td>
<td>3 (1)</td>
<td>15% (1)</td>
<td>10 (2)</td>
<td>10 (1)</td>
<td>5</td>
<td>1.25</td>
</tr>
<tr>
<td>Subwatershed C</td>
<td>13 (3)</td>
<td>60% (3)</td>
<td>16 (2)</td>
<td>75 (3)</td>
<td>11</td>
<td>2.75</td>
</tr>
<tr>
<td>Subwatershed D</td>
<td>1 (1)</td>
<td>25% (1)</td>
<td>9 (1)</td>
<td>15 (2)</td>
<td>5</td>
<td>1.25</td>
</tr>
<tr>
<td>Subwatershed E</td>
<td>5 (1)</td>
<td>15% (1)</td>
<td>21 (3)</td>
<td>20 (1)</td>
<td>6</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Basis for Assigning Scores...**

<table>
<thead>
<tr>
<th>Basis for Assigning Scores...</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past discharge complaints/reports (total # logged)</td>
<td>&lt; 5</td>
<td>5 - 10</td>
<td>&gt; 10</td>
</tr>
<tr>
<td>Dry weather water quality (# times bacteria stds exceeded)</td>
<td>&lt; 25%</td>
<td>25 - 50%</td>
<td>&gt; 50%</td>
</tr>
<tr>
<td>Storm water outfall density (# outfalls / stream mile)</td>
<td>&lt; 10</td>
<td>10 - 20</td>
<td>20</td>
</tr>
<tr>
<td>Average age of development (years)</td>
<td>&lt; 25</td>
<td>25 - 50</td>
<td>&gt; 50</td>
</tr>
</tbody>
</table>
Communities with...

- Low IDP risk
- Medium IDP risk
- High IDP risk

Key:
- Yellow: Low IDP risk
- Light Brown: Medium IDP risk
- Red: High IDP risk

Clusters of Illicit Discharge Problems:
- Minimal Illicit Discharge Problems
- Clustered Illicit Discharge Problems
- Severe Illicit Discharge Problems
Conditions Driving Program Setup

- **Minimal problems**
  - broader stream assessment program
- **Clustered problems**
  - confined subwatersheds, reaches, or specific industries where history of suspect discharges exist
- **Severe problems**
  - recognize that IDDE program will need significant commitment (staff, equipment, budget) for improvements to be realized
Wissahickon IDP
Wissahickon IDP – Subwatershed Screening Factors

- Outfalls per mile*
- Flowing outfalls per mile*
- Number of permitted dischargers
- Percent of subwatershed without stormwater controls
- Land use*
- Thermal anomalies per mile (2 scenarios run – with and without thermal anomalies)*

*Data from Philadelphia Water Department & national GIS data sources
Metric Breakdown

- Outfalls per mile – clip streams and outfalls each to subwatershed boundaries for ratio
- Flowing outfalls per mile – same as above; obtained from attribute field of PWD’s field verification of thermal imagery data that indicated flow was present
- No. of permitted dischargers – from EPA’s Enforcement and Compliance History (ECHO)
Metric Breakdown

- Percent of subwatershed developed prior to stormwater regulations – surrogate for age of development
- Map was digitized into GIS

Metric Breakdown

- Land Use – broken down as percent of subwatershed institutional/industrial/commercial and percent of subwatershed residential
- Thermal anomalies per mile – same as outfall
Thermal anomalies

- Use of infrared video camera from the air to record images of heat radiating from the Earth; uses differential temperature between ground and stream surfaces (which remain relatively constant) and warmer areas to locate possible pollution sources.
## Metric ranking for IDP

<table>
<thead>
<tr>
<th>Metric</th>
<th>Low (1)</th>
<th>Medium (2)</th>
<th>High (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outfalls per mile</td>
<td>&lt;10</td>
<td>10-20</td>
<td>&gt;20</td>
</tr>
<tr>
<td>No of permitted dischargers</td>
<td>&lt;1</td>
<td>1-3</td>
<td>&gt;4</td>
</tr>
<tr>
<td>Flowing outfalls per mile</td>
<td>&lt;1</td>
<td>2-3</td>
<td>&gt;3</td>
</tr>
<tr>
<td>% of subshed developed w/o SWM</td>
<td>&lt;50%</td>
<td>50-75%</td>
<td>&gt;75%</td>
</tr>
<tr>
<td>Thermal anomalies per mile</td>
<td>&lt;1</td>
<td>2-3</td>
<td>&gt;3</td>
</tr>
<tr>
<td>% of subshed w/ commercial land use</td>
<td>&lt;10%</td>
<td>10-20</td>
<td>&gt;20</td>
</tr>
<tr>
<td>% of subshed w/ residential land use</td>
<td>&lt;30%</td>
<td>30-45%</td>
<td>&gt;45%</td>
</tr>
</tbody>
</table>
Results

- Results of individual ranks are summed and normalized (divided by total number of ranking factors)
Other information to add into analysis...

- Water quality monitoring data – esp. dry weather data for nutrients and bacteria
- Aging or failing sewers
- Past discharge complaints
- Other pertinent locally collected data (e.g. field verified outfall data)
Q/A