Presentation Goals

Goals

- Review site plans and stormwater management report
- Identify any errors with the design
- Suggest potential solutions
Determining Applicable Design & Performance Standards

Does the Development
  • Trigger the municipality’s SCO?
  • Disturb one acre or more?
  • Increase impervious coverage by ¼ acre or more?

Determining Applicable Design & Performance Standards

Municipal Stormwater Control Ordinance:
  • Major Development:

  “Any development that provides for ultimately disturbing one or more acres of land or would create ¼ acre or more of impervious surface.”
Familiarize Yourself with the Site

What are the pre-construction conditions?
- Important in determining the requirements
- Existing land cover
- Has the existing land cover existed for the past 5 years?

Pre-Development Site
### Pre-Development Site

![Pre-Development Site Image]

### Stormwater Management Report

<table>
<thead>
<tr>
<th>Coverage Item</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Coverage</td>
<td></td>
</tr>
<tr>
<td>Parking Lot, Roof, Driveway</td>
<td>1.61 acres</td>
</tr>
<tr>
<td>Lawn</td>
<td>0.52 acres</td>
</tr>
<tr>
<td>Proposed Coverage</td>
<td></td>
</tr>
<tr>
<td>Parking Lot, Roof, Driveway</td>
<td>1.836 acres</td>
</tr>
<tr>
<td>Lawn</td>
<td>0.294 acres</td>
</tr>
</tbody>
</table>
Determining Applicable Design & Performance Standards

Disturbance & Increase in Impervious Area

- Total Disturbance:
  - 2.13 acres

- Increase in impervious area:
  - 0.226 acres

- Is the site a major development?
  - Yes
Determining Applicable Design & Performance Standards

Which standards are required?

- Water Quantity
  - Required

- Water Quality
  - Increase in impervious coverage <0.25 acre
  - Not required

- Groundwater Recharge
  - Urban redevelopment area
  - Not required, provided anyway

Proposed Site Plan
Proposed Site Plan

Post-Development Site
Pre-Development Conditions

What does this mean for this site?

Determining Applicable Design & Performance Standards

Which standards are required?

- Water Quantity
  - Required
- Water Quality
  - Increase in impervious coverage >0.25 acre
  - Required
- Groundwater Recharge
  - Urban redevelopment area
  - Not required, provided anyway
Groundwater Recharge

What is required?

- Site was exempt from groundwater recharge, designer provided it anyway
- Submitted groundwater recharge spreadsheet
- Soil testing required for any proposed infiltration BMP
Groundwater Recharge

Soil Testing
- No soil testing data submitted
- Stormwater management report:

  "...the only soil present on site is Urban land-Boonton complex (UbB). Boonton soils are classified as a type C soil and are not well suited for infiltration due to their slow permeability."

- This is not true! UL-Boonton soils are not HSG C

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Groundwater Recharge

Soil Testing
- Soil testing required to determine the permeability and separation from SHWT
- Small stream traverses the site via a culvert
- Basin will likely not drain fast enough
Groundwater Recharge

<table>
<thead>
<tr>
<th>Land Segment</th>
<th>Area (acres)</th>
<th>T1A Land Cover</th>
<th>Pull</th>
<th>Annual Recharge (in)</th>
<th>Annual Recharge (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.32</td>
<td>Open space</td>
<td>1.0</td>
<td>12.0</td>
<td>24.0</td>
</tr>
<tr>
<td>2</td>
<td>1.61</td>
<td>Improvised area</td>
<td>0.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Total          | 2.1          | 1.4            | 24.10|

Annual Recharge Requirements Calculation:

<table>
<thead>
<tr>
<th>Predevelopment and Post-Development Conditions</th>
<th>Predevelopment Annual Recharge (in)</th>
<th>Predevelopment Annual Recharge Deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Development Annual Recharge (in)</td>
<td>12.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Post-Development Annual Recharge Deficit (ft)</td>
<td>24.10</td>
<td>12.0</td>
</tr>
</tbody>
</table>

Proposed Site Plan
Groundwater Recharge

Post-D Impervious Area

- Set to the impervious area draining to recharge BMP

- Post-D:
  - From NJGRS: 26,789 sf
  - From stormwater management report: 23,784 sf

- DA to recharge basin (including pervious): 26,092 sf
Groundwater Recharge

BMP Area

- Measured from site plan
- Infiltration volume must be equal to BMP Area times effective depth
- Provided effective depth = 2.4 inches

BMP Effective Depth

<table>
<thead>
<tr>
<th>Structure</th>
<th>No.</th>
<th>Outfall</th>
<th>Ki, ft</th>
<th>E2, ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orifice-Circular</td>
<td>02</td>
<td>TW</td>
<td>98.750</td>
<td>100.500</td>
</tr>
<tr>
<td>Orifice-Circular</td>
<td>01</td>
<td>TW</td>
<td>97.500</td>
<td>100.500</td>
</tr>
<tr>
<td>TW SETUV, DS Channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Groundwater Recharge

BMP Effective Depth

- Infiltration depth = 6 inches
- Storage media porosity = ?
- Provided effective depth = 2.4 inches

Groundwater Recharge

dBMPu and dEXC

- dBMPu: depth to upper level of BMP surface
- dEXC: depth to lower level of BMP surface
- Found using elevations on the plan and/or detail sheets

- Bottom of chambers: El. 97 ft
- Maximum infiltration elevation: El. 97.5 ft
- Ground surface: El. 102-105 ft
Groundwater Recharge

dBMPu and dEXC

- dBMPu: 54 inches
- dEXC: 60 inches

- As a quick check, the difference should be the maximum infiltration depth (6 inches)

Groundwater Recharge

SegBMP

- Land segment on which BMP is located
- Located on segment 2 (impervious area)

- Important to properly assign soil data, even for impervious areas
Groundwater Recharge

Review Issues:

• No soil testing
• Post-development conditions do not match plans
• Overestimated amount of impervious area to recharge BMP
• Did not provide sufficient information to verify effective depth
Water Quantity

What needs to be reviewed?

- Time of concentration
- Curve numbers
- Proper routing
- Basin design

Time of Concentration

- Assumed to be 0.167 hours (10 minutes)

- Minimum time of concentration in NRCS method is 0.1 hours (6 minutes)

- No calculations to verify this under existing conditions
## Water Quantity

### Curve Numbers and Routing

<table>
<thead>
<tr>
<th>Soil/Surface Description</th>
<th>CN</th>
<th>Area (acres)</th>
<th>%C</th>
<th>%UC</th>
<th>Adjusted CN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good condition; grass cover &gt; 75%</td>
<td>74</td>
<td>.520</td>
<td>74.00</td>
<td>74.00</td>
<td></td>
</tr>
<tr>
<td>Paved parking lots, roofs, driveway</td>
<td>98</td>
<td>1.260</td>
<td>98.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roof Area</td>
<td>98</td>
<td>.350</td>
<td>98.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**COMPOSITE AREA & WEIGHTED CN**

2.130 \[ \rightarrow \]

**Adjusted CN**

92.14 (92)

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### Water Quantity

#### Curve Numbers and Routing

- Open space (lawns, parks, golf courses, cemeteries, etc.): 74
- Poor condition (grass cover < 50%)
- Fair condition (grass cover 50% to 70%)
- Good condition (grass cover > 75%)
- Impervious areas:
  - Paved parking lots, roofs, driveways, etc. (excluding right-of-way)

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**Water Quantity**

**Curve Numbers and Routing**

- Open space (lawns, parks, golf courses, cemeteries, etc.): 74
- Poor condition (grass cover < 50%)
- Fair condition (grass cover 50% to 70%)
- Good condition (grass cover > 75%)
- Impervious areas:
  - Paved parking lots, roofs, driveways, etc. (excluding right-of-way)
Water Quantity

Water Quantity Analysis:

• Stormwater management report:

  “Infiltration occurring within the basin has not been considered in the calculations to be conservative.”

• This is not just conservative, it is required!

Water Quantity Analysis:

• Proposed peak flows:
  o 2-year storm: 47% pre-development
  o 10-year storm: 63.3% pre-development
  o 100-year storm: 76.1% pre-development

• Water quantity not met – all of the inputs were wrong!
Plan Review Example 5

New Jersey
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