Micro-Irrigation Design Data Worksheet

Project Owner's Name & Address:  

Project Location  
Field No: Legal Description:  

________, Section ________, T________ , R________ ; ____________________________ County, WA  

Project Designer  
Design Prepared By: Representing: (name of agency, company, etc.) Date:  

Attach Construction Drawings or other documentation that identify and locate:  
(check all that apply)  

- Site Specific Contour or Grid Elevation Map  
  Include map scale, legend, north arrow & critical elevations  

- Irrigation well(s) or Other Water Source  
  Indicate design capacity (gpm) and operating pressure (psi)  

- Delivery Pipeline (from source to system controller)  
  Indicate sizes, lengths, locations, material type, pressure ratings  

- Control Station & Filter Station(s)  

- Main Distribution Line & Sub-main Lines  
  Indicate sizes, lengths, locations, material type, pressure ratings  

- Manifolds, Headers, and Flush Lines  
  Indicate sizes, lengths, locations, material type, pressure ratings  

- Valves  
  Indicate type, make, model, & size  

- Zones or Blocks  
  Identify zones & provide drip tape layout, number of tapes, and material type  

Attach Supporting Documentation that includes:  

- Construction Specifications  
- Material List and Itemized Cost Estimate  
- Recent (< 1 year old) Pump Test Data  
- Filter Selection & Design Computations  
- Hydraulic Design Computations
**Micro-Irrigation Design Data Worksheet, cont.**

*Project Owner’s Name:*

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## CROP & SOILS DATA SUMMARY

### Basic Crop Data

<table>
<thead>
<tr>
<th>Crop to be Irrigated</th>
<th>Rooting Depth (feet)</th>
<th>Plant Spacing (feet)</th>
<th>Row Spacing (inches)</th>
<th>Threshold Salinity (mmhos/cm)</th>
<th>Net Water Requirement (inches/yr)</th>
<th>Peak Daily ET&lt;sub&gt;c&lt;/sub&gt; (inches/day)</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

1 Threshold salinity, EC<sub>e(ch)</sub>, is the maximum mean root zone soil salinity at which yield reductions will not occur.

Computed: 

\[
Q_{\text{max}} = 23 \times ET_{\text{max}} = 23 \times _____ \text{ in/day} = _______ \text{ gpm/acre}
\]

where: 

- \( Q_{\text{max}} \) = max. water requirement, gpm/day,
- \( ET_{\text{max}} \) = highest peak daily ET<sub>c</sub>, inches/day, from above.

(assumes a maximum operating period of 22 hours/day and a design efficiency of 90%)

### Basic Soil Data

<table>
<thead>
<tr>
<th>Soil Type/Name</th>
<th>Dominant Texture</th>
<th>Design Soil Intake Rate (Inches/hour)</th>
<th>Available Water Holding Capacity (inches/foot)</th>
<th>MAD&lt;sup&gt;1&lt;/sup&gt; (%)</th>
<th>EC&lt;sub&gt;e(ave)&lt;/sub&gt;&lt;sup&gt;2&lt;/sup&gt; (mmhos/cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

1 MAD is Management Allowed Deficit

2 EC<sub>e(ave)</sub> is Average Soil Extract Electrical Conductivity

Irrigation Water Electrical Conductivity, EC<sub>w</sub> ____ mmhos/cm. Compute Leaching Fraction, LF, where:

\[
LF = \frac{0.1794}{\left( \frac{EC_{\text{e(ch)}}}{EC_w} \right)^{3.0417}} = \frac{0.1794}{\left( \frac{_____}{_____} \right)^{3.0417}} = \underline{________}. \quad \text{Use } LF = _____
\]

### Attach Supporting Documentation that includes:

(check all that apply)

- Method for determining net annual water requirement and peak daily ET<sub>c</sub>
- Rationale for selected Management Allowed Deficit (MAD)
- Rationale for selected leaching fraction
- Laboratory analysis of irrigation water with suitability assessment for drip irrigation including analysis to determine filtration requirements
- Proposed chemical treatments of irrigation water
Micro-Irrigation Design Data Worksheet, cont.

**BASIC SYSTEM DATA**
(Refer to NRCS Standard 441- Irrigation System, Micro Irrigation, for design requirements)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total area irrigated</td>
<td></td>
</tr>
<tr>
<td>Available water supply flow rate</td>
<td></td>
</tr>
<tr>
<td>System design flow rate</td>
<td></td>
</tr>
<tr>
<td># Zones Planned</td>
<td></td>
</tr>
<tr>
<td># Zones irrigated concurrently</td>
<td></td>
</tr>
<tr>
<td>Lateral line material</td>
<td></td>
</tr>
<tr>
<td>Drip tape/line material</td>
<td></td>
</tr>
<tr>
<td>Drip tape/line spacing</td>
<td></td>
</tr>
<tr>
<td>Flushing velocity</td>
<td></td>
</tr>
<tr>
<td>Flushing flow rate</td>
<td></td>
</tr>
<tr>
<td>Describe Emitter</td>
<td></td>
</tr>
<tr>
<td>Type (circle one):</td>
<td></td>
</tr>
<tr>
<td>Emitter path width</td>
<td></td>
</tr>
<tr>
<td>Describe Filter system</td>
<td></td>
</tr>
<tr>
<td>Pressure loss across filter</td>
<td></td>
</tr>
<tr>
<td>Time required for backwash</td>
<td></td>
</tr>
<tr>
<td>Describe Sand Separator</td>
<td></td>
</tr>
<tr>
<td>Describe Chemigation Valve</td>
<td></td>
</tr>
<tr>
<td>Describe Check Valve</td>
<td></td>
</tr>
</tbody>
</table>

**Project Owner's Name:**
ZONE/BLOCK DATA

Refer to NRCS Standard 441- Irrigation System, Micro Irrigation, for design requirements. If all zones/blocks are identical in all design considerations, including topography, submit only one set of data and indicate “ALL” for zone number. Otherwise, submit a complete data set for each zone/block. Use the following equations to calculate system characteristics for each zone:

\[
\text{Flow Variation}, \% = \frac{q_{\text{max}} - q_{\text{min}}}{q_{\text{ave}}} \times 100;
\]

where:
- \(q_{\text{max}}\) = the maximum emitter discharge in the zone;
- \(q_{\text{min}}\) = the lowest emitter discharge in the zone; and
- \(q_{\text{ave}}\) = the average emitter discharge in the zone.

\[
\text{Emission Uniformity, (EU), } \% = 100 \left[ 1.0 - \frac{1.27C_v}{\sqrt{n}} \right] \frac{q_{\text{min}}}{q_{\text{ave}}};
\]

where:
- \(C_v\) = the manufacturer’s coefficient of variation for the emitters;
- \(n\) - for point source emitters = the number of emitters per plant; or
- \(n\) - for line source emitters = the lateral plant rooting diameter divided by length of line used to calculate \(C_v\), or 1, whichever is greater.
- \(q_{\text{min}}\) = the lowest emitter discharge in a lateral; and
- \(q_{\text{ave}}\) = the average emitter discharge in a lateral.

Zone Number: 
Type of drip tape/line: 

Emitter data (model, type, etc.) 
Spacing: (inches) 

Design manifold inlet pressure downstream of zone control valve: (psi) 

Emitter discharge = \(q = K_d H^x\) (gal/hr) 
\(K_d = \) 
\(x = \) 

Manufacturer’s Coefficient of Variation, \((C_v)\): 

Average emitter design discharge, \(q_{\text{ave}}\): (gal/hr) @ line pressure of (psi) 

Maximum emitter discharge, \(q_{\text{max}}\): (gal/hr) @ line pressure of (psi) 

Location of maximum discharge emitter: 

Minimum emitter discharge, \(q_{\text{min}}\): (gal/hr) @ line pressure of (psi) 

Location of minimum discharge emitter: 

Flow Variation = _________ % 
Emission Uniformity, (EU), = _________ %
(make additional copies of this page as needed)

Zone Number: __________ Type of drip tape/line: __________

Emitter data (model, type, etc.) __________

Spacing: __________ (inches)

Design manifold inlet pressure downstream of zone control valve: __________ (psi)

Emitter discharge = q = K_d H^x (gal/hr)  
K_d = __________  x = __________

Manufacturer’s Coefficient of Variation, (C_v): __________

Average emitter design discharge, q_{ave}: __________ (gal/hr) @ line pressure of __________ (psi)

Maximum emitter discharge, q_{max}: __________ (gal/hr) @ line pressure of __________ (psi)

Location of maximum discharge emitter: __________

Minimum emitter discharge, q_{min}: __________ (gal/hr) @ line pressure of __________ (psi)

Location of minimum discharge emitter: __________

Flow Variation = __________ %  Emission Uniformity, (EU), = __________ %

Zone Number: __________ Type of drip tape/line: __________

Emitter data (model, type, etc.) __________

Spacing: __________ (inches)

Design manifold inlet pressure downstream of zone control valve: __________ (psi)

Emitter discharge = q = K_d H^x (gal/hr)  
K_d = __________  x = __________

Manufacturer’s Coefficient of Variation, (C_v): __________

Average emitter design discharge, q_{ave}: __________ (gal/hr) @ line pressure of __________ (psi)

Maximum emitter discharge, q_{max}: __________ (gal/hr) @ line pressure of __________ (psi)

Location of maximum discharge emitter: __________

Minimum emitter discharge, q_{min}: __________ (gal/hr) @ line pressure of __________ (psi)

Location of minimum discharge emitter: __________

Flow Variation = __________ %  Emission Uniformity, (EU), = __________ %

- Attach justification/explanation pertaining to deficit irrigation
  *(When available irrigation flow rate is less than peak water requirement)*

- Attach documentation describing supplemental irrigation requirements
  *(If supplemental irrigation is necessary for germination, crop protection, or other purposes)*

- Attach Operation & Management Plan