

## Subsurface Discharge of Treated Wastewater Effluent

### Oregon Permitting Options and Standards

#### Technical Issues and Standards

Type of Discharge System	Preferred Site Conditions	Technical Issues to Watch For	Environmental Performance Standards	Potential Environmental Opportunities
<b>For all Systems listed below</b>	<ul style="list-style-type: none"> <li>-Permeable subsurface</li> <li>-Underlying Confined Layer</li> <li>-Groundwater is not an underground source of drinking water (USDW)</li> <li>-Connection to surface water</li> <li>-Not a UIC by definition, exempted, or permitted</li> <li>-Good, reliable treatment processes (routinely meeting Level 3 or 4 reclaimed water – See OAR)</li> </ul>	<ul style="list-style-type: none"> <li>-Drinking water withdrawals</li> <li>-Habitat degradation</li> <li>-Quality of effluent (industrial impacts/pass through/break thru)</li> <li>-Mounding</li> <li>-Water right implications</li> <li>-Thermal loading</li> <li>-Cost of remediation if it doesn't work</li> <li>-Measuring and monitoring performance</li> <li>- Soil pore space clogging for slow infiltration or percolation discharge systems</li> </ul>	<p>Groundwater</p> <ul style="list-style-type: none"> <li>-Federal = MCLs</li> <li>-State = Background, MCLs or Con. Limit or Con. Limit Variance (CLV)</li> </ul> <p>Surface Water</p> <ul style="list-style-type: none"> <li>-Div. 41 for mixing zones, basin standards, existing cold water protection and TMDLs</li> <li>-Div. 45 for the permitting process</li> <li>-If a UIC, the point of compliance: State = as defined in permit</li> </ul>	<ul style="list-style-type: none"> <li>-Cooling of effluent</li> <li>-Potential stream cooling</li> <li>-Maintains flow</li> <li>-Provides effluent polishing (nutrient removal and metals binding)</li> <li>-Subsurface irrigation</li> <li>-Groundwater recharge</li> </ul>
<p><b>Surface Discharge</b> <i>Not Likely Regulated as a UIC</i></p>				
<b>Unlined Ponds or Lagoons</b>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Adequate area (size)</li> <li>-Not a wildlife vector attraction (airport issues)</li> <li>-Subsurface permeability matched with design discharge</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Vector attraction including rodents</li> <li>-Public exclusion – creating a public nuisance</li> <li>-Federal and state wetland protection laws and regulations</li> <li>-Point of Compliance for discharging and for holding (related to legal definition of “waters of the US”)</li> <li>-Mercury methylation</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Improved indirect or direct recreation</li> <li>-Ecological services for area residents, such as bird watching</li> </ul>

		<ul style="list-style-type: none"> <li>-Evaporative concerns</li> <li>-Thermal heating of water in ponds</li> <li>-Structural integrity of levees</li> </ul>		
<b>Land Application Over Agronomic Rates</b>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Land suitable for agriculture, vegetation, or trees</li> <li>-High infiltration rate in surface and subsurface</li> <li>-Minimum slope (soil erosion concerns)</li> <li>-Productive soil</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-SB 212 land use citing issues and the need for DEQ to approve that site productivity will not be impacted by activities.</li> <li>-Long term soil productivity specially flushing nutrients and build up of salts</li> <li>-Habitat issues (site specific)</li> <li>-Crop management practices</li> <li>-Land use planning regulations</li> <li>-Thermal loading in soil</li> <li>-Erosion runoff</li> <li>-Need detailed information on irrigation system design</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Div. 55 for water reuse</li> </ul>	<p>In addition to those listed in the first row:</p>
<b>Rapid Infiltration</b>	<p>In addition to those in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Magnet for endangered fish</li> <li>-Disinfection by-products</li> <li>-Plugging aquifer</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Vector attraction reduction</li> </ul>
<b>Constructed Trenches</b>	<ul style="list-style-type: none"> <li>-Connection to surface water</li> <li>-Adequate area (size)</li> <li>-Not a wildlife vector attraction (airport issues)</li> <li>-Subsurface permeability matched with design discharge</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Vector attraction</li> <li>-Public exclusion – creating a public nuisance</li> <li>-Federal and state wetland protection laws and regulations</li> <li>-Point of Compliance for discharging and for holding</li> <li>--Mercury methylation</li> <li>-Evaporative concerns</li> <li>-Thermal heating of water in ponds</li> <li>-Man-made trenches vs. irrigation canals - need to be watched for “waters of the US” definition</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Improved indirection or direct recreation</li> <li>-Ecological services for area residents such as bird watching</li> </ul>

<p><b>Flood Channels</b></p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-No direct stream connection at low flows</li> <li>-Permeable soils</li> <li>-Not prone to constant flooding (1 in 25 year or more)</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-<b>Significant regulatory uncertainty</b> since flood channels are likely defined as “waters of the US”</li> <li>-Likely need to meet water quality standards at the end of the pipe</li> <li>-Fish magnet</li> <li>-Seasonal nature of flood channels</li> <li>-Fish stranding</li> <li>-State and federal wetland regulations</li> <li>-Endangered Species Act</li> <li>-Mercury methylation</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Improved indirect or direct recreation</li> <li>-Ecological services for area residents</li> </ul>
<p><b>Wetlands and Bogs</b></p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Constructed wetland</li> <li>-Well drained soils</li> <li>-Identification of wetland type</li> <li>-Ability to moderate water volumes</li> <li>-Ability to reclaim historic wetlands</li> <li>-Adequate area</li> <li>-Near stream</li> </ul>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-DSL may prohibit direct stormwater discharge to wetlands</li> <li>-Vector attraction</li> <li>-Public exclusion – creating a public nuisance</li> <li>-Federal and state wetland protection laws and regulations</li> <li>-Point of Compliance for discharging and for holding</li> <li>-Mercury methylation</li> <li>-Evaporative concerns</li> <li>-Thermal heating of water in wetlands/bogs</li> <li>-Endangered Species Act</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Habitat/riparian restoration</li> <li>-Improved indirect or direct recreation</li> <li>-Ecological services for area residents such as bird watching</li> <li>-Subsurface irrigation</li> </ul>
<p><b>Subsurface Discharge</b> <i>Likely Regulated as a UIC</i></p>				
<p><b>Exfiltration Gallery</b></p>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>-Magnet for endangered fish</li> <li>-Plugging aquifer</li> </ul>	<p>In addition to those listed in the first row:</p>	<p>In addition to those listed in the first row:</p> <ul style="list-style-type: none"> <li>- Subsurface irrigation</li> <li>-Vector attraction reduction</li> </ul>

<b>Hyporheic Injection</b> (direct or indirect)	In addition to those listed above: -Proximity to stream	In addition to those listed in the first row: -Magnet for endangered fish -Disinfection by-products -Use impairment - for salmon – thermal refugia and Inter Gravel DO standard -Quality of effluent related to ammonia toxicity/Oxidation/reduction/TSS) -Mixing zone implications -Multiple points of compliance -Flood events changing channels	In addition to those listed in the first row:	In addition to those listed in the first row -Vector attraction reduction
<b>Vertical Downflow (slow sand filter)</b>	In addition to those listed in the first row:	In addition to those listed in the first row: -Aquifer plugging -Soil pore space clogging	In addition to those listed in the first row:	In addition to those listed in the first row: -Vector attraction reduction (depending on design)
<b>Dry Wells</b>	In addition to those listed in the first row: -Not discharging directly into an underground source of drinking water -Aquifer is permeable but confined -Long pathway to surface water	In addition to those listed in the first row: -Disinfection by-products -Physically able to define “aquifer” -Ability to precisely define the “aquifer” that is affected -Discharged water is chemically compatible with aquifer (physical/chemical properties) to avoid plugging and scaling -Aquifer reuse -Aquifer plugging	In addition to those listed in the first row:	In addition to those listed in the first row: -Vector attraction reduction
<b>Mounds</b>	In addition to those listed in the first row: -Would be used in areas of high water	In addition to those listed in the first row: -Magnet for endangered fish -Plugging aquifer	In addition to those listed in the first row:	In addition to those listed in the first row: -Habitat/riparian restoration -Vector attraction reduction

<b>Aquifer Discharge</b> <i>Likely Regulated as a UIC</i>				
<b>Groundwater Recharge</b>	In addition to those listed in the first row:  -Not directly discharging into underground source of drinking water -Aquifer is permeable but confined -Long pathway to surface water	In addition to those listed in the first row:  -Physically able to define “aquifer” -Ability to precisely define aquifer affected -Discharged water is chemically compatible with aquifer (physical/chemical properties) to avoid plugging and scaling -Aquifer reuse	In addition to those listed in the first row:	In addition to those listed in the first row:  -Vector attraction reduction -Removes surface water discharge

Other options to be considered:

- Wastewater reuse through land application
- Irrigation canals
- Use of intermittent streams (dry channels or ditches)
- Industrial reuse of treated effluent