

Beneficial Reuse by Spray Irrigation in Delaware

Beneficial Reuse Data for Delaware

- Originated in the 1970's in Delaware
- Applied to agricultural sites, golf courses, wooded tracks and open spaces
- Currently there are ...
 - 22 active spray irrigation facilities in Delaware
 - 2300 acres of land permitted for spray irrigation
 - 1.8 Billion gallons of water reclaimed annually
 - 480,000 pounds of Nitrogen and 150,000 pounds of Phosphorus reclaimed annually



In Southern New Castle County Reclaimed Water is Used to Irrigate a Forage Crop



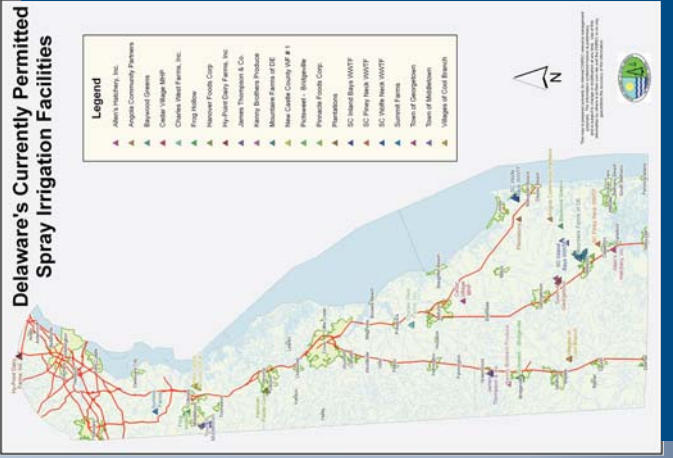
Safety Components of a Spray Irrigation Facility in Delaware

1. Wastewater treatment ponds are capable of treating or isolating shock loads.
2. Storage ponds are provided to store reclaimed water during periods of inclement weather and between irrigation cycles.
3. All ponds are lined to prevent untreated or partially treated wastewater from entering the ground water table.
4. Buffers are established to contain aerosols within the spray fields and to prevent runoff from reaching surface waters.
5. Monitoring wells are regularly sampled to verify that water quality standards are met.
6. Soil samples are analyzed annually to determine crop nutrient needs.



Delaware's Currently Permitted Spray Irrigation Facilities

Legend	
▲	Abner's Nurseries, Inc.
▲	Agrios Commodore's Partners
▲	Baywood Gardens
▲	Castle Village Golf
▲	Charles West Farms, Inc.
▲	Flag Hill
▲	Harwood Foods Corp.
▲	Hy-Ford Dairy Farms, Inc.
▲	James Thompson & Co.
▲	Kenny Industries Produce
▲	Mountain Farms of DE
▲	New Castle County WRF # 1
▲	Pinckney - Inglewilde
▲	Pinckney Foods Corp.
▲	Plantations
▲	SC Island Bays WWTFF
▲	SC Pine Neck WWTFF
▲	SC Wills Neck WWTFF
▲	Seward Farms
▲	Town of Georgetown
▲	Town of Middletown
▲	Wages of Coal Branch



Beneficial Reuse of Reclaimed Water by Spray Irrigation

Reclaimed Water ...

- Is water that is used, recovered, then treated for reuse
- May contain nutrients, solids, microbes, salts and metals
- Is disinfected prior to reuse if water is reclaimed from domestic sources
- Is not required to meet drinking water standards

Beneficial uses of Reclaimed Water include the Irrigation of:

- Agricultural lands
- Wooded tracks
- Residential lawns
- Golf courses
- Parks
- Highway median strips, etc.

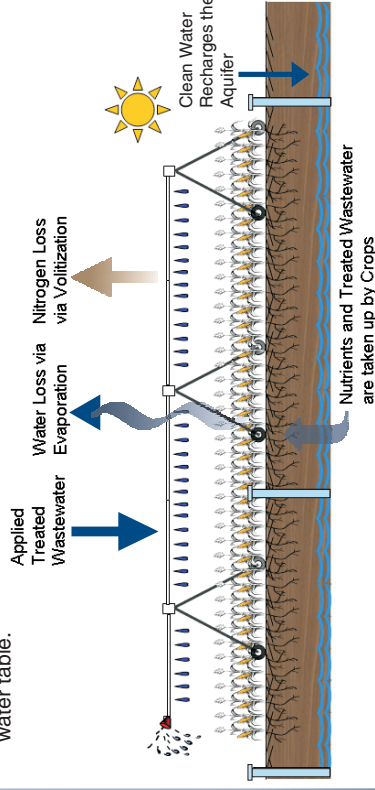
Advantages of Beneficial Reuse Include:

- Aquifer recharge
- Reduces demand on the aquifer
- Preserves agricultural land
- Keeps water in watershed
- Reduces nutrient loading to ground water
- Helps protect surface water quality
- Maintains open space



Nutrient Uptake

- Most of the nutrients in the reclaimed water that aid plant growth, 80% of the nitrogen and 95% of the phosphorus, are taken up and utilized by the crops.
- Organic material is broken down by sunlight and microbial action. Metals and the remaining phosphorus are chemically bound in the upper foot of the soil.
- The land application system is designed, managed and monitored so that the reclaimed water meets drinking water standards before it reaches the ground water table.



Typical Waste Water Characteristics

Parameter	Prior to Treatment	Treated WW/ Prior to Spray Irrigation	3 feet Below the Soil Surface
Nitrogen	45 mg/L	20 mg/L	<5 mg/L
Phosphorus	12 mg/L	8 mg/L	0 mg/L
Fecal Coliforms	>1,000,000 col/100mL	10 - 200* col/100mL	0 col/100mL
BOD	250 mg/L	10 - 50* mg/L	0 mg/L
TSS	220 mg/L	10 - 50* mg/L	0 mg/L
Chlorides	30 mg/L	30 mg/L	30 mg/L

* The lower concentrations must be met if the public may come into contact with the reclaimed water, such as in Golf Course Irrigation