

Practice: 635 - Vegetated Treatment Area

Scenario: #1 - Graded Area, Gravity Flow Surface Application

Scenario Description:

This is a permanent herbaceous vegetative area or channel installed down slope from a livestock production area. Wastewater (runoff or milking parlor wastewater) is properly collected and released with a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes a gravel trench for distribution flow (sheet flow) into the VTA. Typically requires grading and shaping, gravel spreader trenches and perforated pipe to maintain sheet flow throughout the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632). For milkhouse waste, Waste Treatment (629) could be contracted to provide pre-treatment prior to being released into the VTA. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Square Foot

Scenario Typical Size: 43,560

Scenario Cost: \$8,402.86

Scenario Cost/Unit: \$0.19

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--|------|--|-------------|-----------------|----------|------------|
| Equipment/Installation | | | | | | |
| Dozer, 80 HP | 929 | Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included. | Hour | \$65.73 | 16 | \$1,051.68 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic yard | \$2.30 | 70 | \$161.00 |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 400 | \$972.00 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 20 | \$459.20 |
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$38.68 | 16 | \$618.88 |
| Materials | | | | | | |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 70 | \$2,455.60 |
| Pipe, PVC, 2", SCH 40 | 976 | Materials: - 2" - PVC - SCH 40 - ASTM D1785 | Foot | \$1.39 | 45 | \$62.55 |
| Coupling, PVC, endcap, 2", SCH 20 | 1727 | 2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only. | Each | \$1.76 | 15 | \$26.40 |
| Pipe, PE, 6", DR 9, perforated | 1728 | Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9 | Foot | \$25.27 | 80 | \$2,021.60 |

Mobilization

Mobilization

| | | | | | | |
|------------------------------------|------|--|------|----------|---|----------|
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$69.63 | 1 | \$69.63 |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 2 | \$504.32 |

Practice: 635 - Vegetated Treatment Area

Scenario: #2 - Graded Area, Pumped Into A Basin, Gravity Flow Surface Application

Scenario Description:

This is a permanent herbaceous vegetative area or channel located upslope from the livestock production area. The topography of the site requires wastewater to be pumped uphill to the VTA designed system. Wastewater (runoff or milking parlor wastewater) is properly collected at the production area and pumped uphill to a shallow tank or basin where it has a controlled gravity outflow into the VTA. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629).

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes the installation site to be upslope from the production area with a shallow tank or basin that provides a controlled gravity outflow into the VTA. Typically requires grading and shaping, gravel spreader trenches and perforated pipe to maintain sheet flow throughout the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632) and Pumping Plant (533) to get the wastewater upslope to the VTA distribution point. For milkhouse waste, Waste Treatment (629) could be contracted to provide pretreatment prior to being released into the VTA. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Square Foot

Scenario Typical Size: 43,560

Scenario Cost: \$14,509.95

Scenario Cost/Unit: \$0.33

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--|------|---|-------------|-----------------|----------|------------|
| Equipment/Installation | | | | | | |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic yard | \$2.30 | 100 | \$230.00 |
| Concrete, CIP, slab on grade, reinforced | 37 | Steel reinforced concrete formed and cast-in-placed as a slab on grade by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$228.39 | 2 | \$456.78 |
| Concrete, CIP, formed reinforced | 38 | Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$491.28 | 12 | \$5,895.36 |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 400 | \$972.00 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 40 | \$918.40 |
| Materials | | | | | | |
| Coupling, PVC, endcap, 2", SCH 20 | 1727 | 2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only. | Each | \$1.76 | 15 | \$26.40 |
| Ball Valve, 4" | 1726 | 4" ball valve, metal body. Materials only. | Each | \$310.01 | 2 | \$620.02 |

Materials

| | | | | | | |
|---------------------------------|------|--|------------|---------|----|------------|
| Pipe, PVC, 2", SCH 40 | 976 | Materials: - 2" - PVC - SCH 40 - ASTM D1785 | Foot | \$1.39 | 45 | \$62.55 |
| Aggregate, Sand, Graded, Washed | 45 | Sand, typical ASTM C33 gradation, includes materials, equipment and labor to transport and place | Cubic yard | \$34.61 | 6 | \$207.66 |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 70 | \$2,455.60 |
| Pipe, PE, 6", DR 9, perforated | 1728 | Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9 | Foot | \$25.27 | 80 | \$2,021.60 |

Mobilization

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|------------------------------------|------|--|------|----------|---|----------|
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$69.63 | 2 | \$139.26 |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 2 | \$504.32 |

Practice: 635 - Vegetated Treatment Area

Scenario: #3 - Vegetated Treatment Area with Minor Grading

Scenario Description:

This is a proposed permanent herbaceous vegetative area located adjacent to a livestock production area needs to be regraded before use. Distribution is directly off the barnyard across the lower end. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich wastewater that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 0.5 ac in size, includes the sizing, grading and shaping of the VTA area. Requires grading and shaping to maintain sheet flow onto the VTA. A settling basin for wastewater collection is contracted using Solid/Liquid Waste Separation Facility (632) and Pumping Plant (533) to get the wastewater to the VTA mechanical distribution component that is contracted using Irrigation System, Sprinkler (442). For milkhouse waste, Waste Treatment (629) could be contracted to provide pretreatment prior to being pumped and distributed onto the VTA via a spreader pipe across top of VTA. An option for small barnyards can use slotted curbs to distribute across top side. The VTA practice will provide a controlled release of nutrient rich wastewater into a designed vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich wastewater and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA installed

Scenario Unit: Square Foot

Scenario Typical Size: 21,780

Scenario Cost: \$3,820.14

Scenario Cost/Unit: \$0.18

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--------------------------------|------|--|------------|-----------------|----------|------------|
| Equipment/Installation | | | | | | |
| Dozer, 80 HP | 929 | Track mounted Dozer with horsepower range of 60 to 90. Equipment and power unit costs. Labor not included. | Hour | \$65.73 | 8 | \$525.84 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 8 | \$183.68 |
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$38.68 | 8 | \$309.44 |
| Materials | | | | | | |
| Pipe, PVC, 4", SCH 40 | 978 | Materials: - 4" - PVC - SCH 40 - ASTM D1785 | Foot | \$4.09 | 150 | \$613.50 |
| Ball Valve, 4" | 1726 | 4" ball valve, metal body. Materials only. | Each | \$310.01 | 2 | \$620.02 |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 37.5 | \$1,315.50 |
| Mobilization | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 1 | \$252.16 |

Practice: 635 - Vegetated Treatment Area

Scenario: #4 - Existing Vegetative Area, Gravity Flow Surface Application

Scenario Description:

An existing permanent herbaceous vegetated area that meets the requirements for a VTA and is used as an overland flow area for nutrient rich runoff treatment. A flow distribution component is installed to achieve sheet flow at the start of the VTA. Clean runoff is diverted where possible. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich runoff that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment Area (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is 1.0 ac in size, includes a gravel trenches and perforated pipe to establish sheet flow into the VTA where and existing permanent herbaceous vegetated area meets the requirements for a VTA. Does not include any grading or seeding. The VTA practice will provide a controlled release of nutrient rich runoff into an existing vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich runoff and prevent contamination of surface and ground water resources.

Scenario Feature Measure: Amount of VTA treating wastewater

Scenario Unit: Square Foot

Scenario Typical Size: 43,560

Scenario Cost: \$10,700.39

Scenario Cost/Unit: \$0.25

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--|------|---|-------------|-----------------|----------|------------|
| Equipment/Installation | | | | | | |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 445 | \$1,081.35 |
| Concrete, CIP, formed reinforced | 38 | Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$491.28 | 7 | \$3,438.96 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic yard | \$2.30 | 75 | \$172.50 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 16 | \$367.36 |
| Materials | | | | | | |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 75 | \$2,631.00 |
| Pipe, PVC, 2", SCH 40 | 976 | Materials: - 2" - PVC - SCH 40 - ASTM D1785 | Foot | \$1.39 | 40 | \$55.60 |
| Pipe, PE, 6", DR 9, perforated | 1728 | Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9 | Foot | \$25.27 | 100 | \$2,527.00 |
| Coupling, PVC, endcap, 2", SCH 20 | 1727 | 2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only. | Each | \$1.76 | 20 | \$35.20 |
| Mobilization | | | | | | |
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$69.63 | 2 | \$139.26 |

Mobilization

| | | | | | | |
|--------------------------------|------|---|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 1 | \$252.16 |
|--------------------------------|------|---|------|----------|---|----------|

Practice: 635 - Vegetated Treatment Area

Scenario: #5 - VTA using an Existing Vegetative Area with Gated pipe or sprinkler system

Scenario Description:

An existing permanent herbaceous vegetated area that meets the requirements for a VTA and is used as an overland flow area for nutrient rich runoff treatment. A flow distribution component is installed to achieve sheet flow at the start of the VTA or a fixed sprinkler setup is installed. Clean runoff is diverted where possible. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich runoff that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment Area (629)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical VTA is .5 ac in size, includes perforated pipe to establish sheet flow into the VTA where and existing permanent herbaceous vegetated area meets the requirements for a VTA. Does not include any grading or seeding. The VTA practice will provide a controlled release of nutrient rich runoff into an existing vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich runoff and prevent contamination of surface and ground water resources.

Scenario Feature Measure: SF

Scenario Unit: Square Foot

Scenario Typical Size: 22,500

Scenario Cost: \$2,984.86

Scenario Cost/Unit: \$0.13

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--------------------------------|------|--|------------|-----------------|----------|------------|
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 8 | \$183.68 |
| Materials | | | | | | |
| Pipe, PVC, 4", SCH 40 | 978 | Materials: - 4" - PVC - SCH 40 - ASTM D1785 | Foot | \$4.09 | 150 | \$613.50 |
| Ball Valve, 4" | 1726 | 4" ball valve, metal body. Materials only. | Each | \$310.01 | 2 | \$620.02 |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 37.5 | \$1,315.50 |
| Mobilization | | | | | | |
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 1 | \$252.16 |

Practice: 635 - Vegetated Treatment Area

Scenario: #6 - VTA with 1 ft of new soil and complex distribution

Scenario Description:

An existing site for the permanent herbaceous vegetated area does not meet the requirements for a VTA due to high phosphorous levels in existing top 12". No other options. Remove and replace upper 12" with low phosphorous soil. Then install distribution system for nutrient rich runoff treatment. A flow distribution component is installed to achieve sheet flow at the start of the VTA. Clean runoff is diverted where possible. The VTA vegetation is harvested to remove nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich runoff that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment Area (629) Critical area seeding(342)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical application is a VTA that is 1.0 ac in size, includes removing upper 12" of soil and replacing with new 12" topsoil then installing a gravel trenches and perforated pipe to establish sheet flow into the VTA. New vegetation established under Critical area planting. The VTA practice will provide a controlled release of nutrient rich runoff into an existing vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich runoff and prevent contamination of surface and ground water resources.

Scenario Feature Measure: SF of VTA

Scenario Unit: Square Foot

Scenario Typical Size: 43,560

Scenario Cost: \$19,165.73

Scenario Cost/Unit: \$0.44

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--|------|---|-------------|-----------------|----------|------------|
| Equipment/Installation | | | | | | |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 445 | \$1,081.35 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic yard | \$2.30 | 75 | \$172.50 |
| Concrete, CIP, formed reinforced | 38 | Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$491.28 | 7 | \$3,438.96 |
| Stripping and stockpiling, topsoil | 1199 | Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor. | Cubic Yard | \$0.85 | 1613 | \$1,371.05 |
| Earthfill, Dumped and Spread | 51 | Earthfill, dumped and spread without compaction effort, includes equipment and labor | Cubic yard | \$3.50 | 1935 | \$6,772.50 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 16 | \$367.36 |
| Materials | | | | | | |
| Coupling, PVC, endcap, 2", SCH 20 | 1727 | 2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only. | Each | \$1.76 | 20 | \$35.20 |
| Pipe, PVC, 2", SCH 40 | 976 | Materials: - 2" - PVC - SCH 40 - ASTM D1785 | Foot | \$1.39 | 40 | \$55.60 |
| Pipe, PE, 6", DR 9, perforated | 1728 | Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9 | Foot | \$25.27 | 100 | \$2,527.00 |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 75 | \$2,631.00 |

Mobilization

| | | | | | | |
|------------------------------------|------|--|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 2 | \$504.32 |
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$69.63 | 3 | \$208.89 |

Practice: 635 - Vegetated Treatment Area

Scenario: #7 - VTA with 3 ft of new soil and complex distribution

Scenario Description:

An existing site for the permanent herbaceous vegetated area does not meet the requirements for a VTA due to insufficient soil depth to limiting material. No other options. Strip topsoil and add 3' of new subbase. Then install distribution system for nutrient rich runoff treatment. A flow distribution component is installed to achieve sheet flow at the start of the VTA. Clean runoff is diverted where possible. The VTA vegetation is harvested to removed nutrients on a regular basis. This practice addresses water quality degradation due to uncontrolled nutrient rich runoff that can flow into surface waters or leach into ground water.

Associated practices: Waste Storage Facility (313), Fence (382), Solid/Liquid Waste Separation Facility (632), Manure Transfer (634), Irrigation System, Sprinkler (442), Roof runoff Management (558), Pumping Plant (533), Subsurface Drain (606), Critical Area Planting (342), Terrace (600), Nutrient Management (590), Diversion (362), Pipeline (516), Land Smoothing (466), Precision Land Forming (462), Waste Treatment Area (629) Critical area seeding(342)

Before Situation:

Nutrient rich wastewater is running off from an animal operation that has the potential to pollute surface waters or ponding and leaching into groundwater.

After Situation:

Typical application is a VTA that is 1.0 ac in size, includes removing topsoil and bringing in 3' of soil and resspreading topsoil. Then installing a gravel trenches and perforacted pipe to establish sheet flow into the VTA. Width of 100' by 436' long. New vegetation established under Critical area planting. The VTA practice will provide a controlled release of nutrient rich runoff into an existing vegetative area for nutrient uptake. This system will improve water quality by treating nutrient rich runoff and prevent contamination of surface and ground water resources.

Scenario Feature Measure: SF of VTA

Scenario Unit: Square Foot

Scenario Typical Size: 43,560

Scenario Cost: \$44,504.03

Scenario Cost/Unit: \$1.02

Cost Details (by category):

| Component Name | ID | Component Description | Unit | Price (\$/unit) | Quantity | Cost |
|--|------|---|-------------|-----------------|----------|-------------|
| Equipment/Installation | | | | | | |
| Stripping and stockpiling, topsoil | 1199 | Stripping and stockpiling of topsoil adjacent to stripping area. Includes equipment and labor. | Cubic Yard | \$0.85 | 1080 | \$918.00 |
| Earthfill, Dumped and Spread | 51 | Earthfill, dumped and spread without compaction effort, includes equipment and labor | Cubic yard | \$3.50 | 5808 | \$20,328.00 |
| Excavation, Common Earth, side cast, small equipment | 48 | Bulk excavation and side casting of common earth with hydraulic excavator with less than 1 CY capacity. Includes equipment and labor. | Cubic yard | \$2.30 | 75 | \$172.50 |
| Concrete, CIP, formed reinforced | 38 | Steel reinforced concrete formed and cast-in-placed in formed structures such as walls or suspended slabs by chute placement. Typical strength is 3000 to 4000 psi. Includes materials, labor and equipment to transport, place and finish. | Cubic yard | \$491.28 | 7 | \$3,438.96 |
| Geotextile, woven | 42 | Woven Geotextile Fabric. Includes materials, equipment and labor | Square Yard | \$2.43 | 445 | \$1,081.35 |
| Excavation, common earth, small equipment, 50 ft | 1220 | Bulk excavation of common earth with dozer <100 HP with average push distance of 50 feet. Includes equipment and labor. | Cubic Yard | \$2.41 | 4840 | \$11,664.40 |
| Dozer, 140 HP | 927 | Track mounted Dozer with horsepower range of 125 to 160. Equipment and power unit costs. Labor not included. | Hour | \$121.59 | 4 | \$486.36 |
| Labor | | | | | | |
| General Labor | 231 | Labor performed using basic tools such as power tool, shovels, and other tools that do not require extensive training. Ex. pipe layer, herder, concrete placement, materials spreader, flagger, etc. | Hour | \$22.96 | 16 | \$367.36 |

Labor

| | | | | | | |
|----------------------------|-----|---|------|---------|---|----------|
| Equipment Operators, Heavy | 233 | Includes: Cranes, Hydraulic Excavators >=50 HP, Dozers, Paving Machines, Rock Trenchers, Trenchers >=12", Dump Trucks, Ag Equipment >=150 HP, Scrapers, Water Wagons. | Hour | \$38.68 | 4 | \$154.72 |
|----------------------------|-----|---|------|---------|---|----------|

Materials

| | | | | | | |
|-----------------------------------|------|--|------------|---------|-----|------------|
| Pipe, PE, 6", DR 9, perforated | 1728 | Materials: -6" - Perforated PE- 160 psi - ASTM D3035 DR 9 | Foot | \$25.27 | 100 | \$2,527.00 |
| Pipe, PVC, 2", SCH 40 | 976 | Materials: - 2" - PVC - SCH 40 - ASTM D1785 | Foot | \$1.39 | 40 | \$55.60 |
| Coupling, PVC, endcap, 2", SCH 20 | 1727 | 2" - PVC- SCH 40- ASTM D1785 pipe endcaps. Materials only. | Each | \$1.76 | 20 | \$35.20 |
| Aggregate, Gravel, Graded | 46 | Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel. | Cubic yard | \$35.08 | 75 | \$2,631.00 |

Mobilization

| | | | | | | |
|------------------------------------|------|--|------|----------|---|----------|
| Mobilization, medium equipment | 1139 | Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds. | Each | \$252.16 | 2 | \$504.32 |
| Mobilization, very small equipment | 1137 | Equipment that is small enough to be transported by a pick-up truck with typical weights less than 3,500 pounds. Can be multiple pieces of equipment if all hauled simultaneously. | Each | \$69.63 | 2 | \$139.26 |