

Practice: 533 - Pumping Plant

Scenario: #1 - Wastewater Pump < 1 Hp

Scenario Description:

Scenario is for the implementation of a electric chopper screw pump of less than 1 horsepower. Implementation examples include, but are not limited to, pumping wastewater from the source to a storage facility such as in a dairy milk parlor, or pumping supernatant from the sump of a settling basin to a level spreader device upstream of a Vegetated Treatment Area, in flat topography where gravity flow from the settling basin is not feasible. Payment includes the pump and controls, installation and concrete pad base for the pump. Dairy milk parlor wastewater.

Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; 633 Waste Utilization; 632 Solid/liquid Waste Separation Facility; 635 Vegetated Treatment Area

Before Situation:

Dairy milk parlor wastewater is not managed properly, or feedlot runoff enters a nearby stream, causing water quality concerns through excessive nutrients, organics, and pathogen. The resource concerns to be addressed are for water quality, air quality, and domestic animal health.

After Situation:

Practice typically installed for transfer of wastewater to a storage facility using 3/4 HP chopper/screw pump. Dairy milk parlor wastewater is directed to a waste storage facility, or feedlot runoff is directed to a solid/liquid settling basin, and supernatant is pumped from the sump of the settling basin to a Vegetated Treatment Area. Contaminated water no longer enters the stream. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

Scenario Feature Measure: Per Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$1,245.87

Scenario Cost/Unit: \$1,245.87

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
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	\$188.63	0.25	\$47.16
Materials						
Pump, Wastewater, Solids Handling < 1 HP	2514	Wastewater solid handling pump less than 1 horsepower. Pumping capacity of 20 gallons per minute at 30 feet of Total Dynamic Head. Includes materials and shipping only.	Each	\$1,198.71	1	\$1,198.71

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Scenario: #2 - Wastewater Pump 1-5 Hp

Scenario Description:

Scenario is for the implementation of a electric chopper screw pump of 1-5 horsepower. Implementation examples include, but are not limited to, pumping wastewater from the source to a storage facility such as in a dairy milk parlor, or pumping supernatant from the sump of a settling basin to a level spreader device upstream of a Vegetated Treatment Area, in flat topography where gravity flow from the settling basin is not feasible. Payment includes the pump and controls, installation and concrete pad base for the pump. Dairy milk parlor wastewater.

Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; 633 Waste Utilization; 632 Solid/Liquid Waste Separation Facility; 635 Vegetated Treatment Area

Before Situation:

Dairy milk parlor wastewater is not managed properly, or feedlot runoff enters a nearby stream, causing water quality concerns through excessive nutrients, organics, and pathogen. The resource concerns to be addressed are for water quality, air quality, and domestic animal health.

After Situation:

Practice typically installed for transfer of wastewater to a storage facility using 3 HP chopper/screw pump. Dairy milk parlor wastewater is directed to a waste storage facility, or feedlot runoff is directed to a solid/liquid settling basin, and supernatant is pumped from the sump of the settling basin to a Vegetated Treatment Area. Contaminated water no longer enters the stream. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

Scenario Feature Measure: Per Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$3,620.88

Scenario Cost/Unit: \$3,620.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Equipment/Installation</i>						
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	\$188.63	0.25	\$47.16
<i>Materials</i>						
Pump, Wastewater, Solids Handling, 1 to 5 HP	2515	Wastewater solid handling pump with 1 to 5 horsepower. Pumping capacity of 100 gallons per minute at 30 feet of Total Dynamic Head. Includes materials and shipping only.	Each	\$3,573.72	1	\$3,573.72

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Scenario: #3 - Manure Pump >5 Hp

Scenario Description:

Scenario is for the implementation of a electric chopper screw pump of >5 horsepower to pump manure from the source to a storage facility. Implementation examples include, but are not limited to, situations where a dairy or swine operation is pumping manure to an above ground storage facility. Payment includes the pump and controls, installation and concrete pad.

Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer; 633 Waste Utilization; 632 Solid/liquid Waste Separation Facility; 635 Vegetated Treatment Area

Before Situation:

Manure is not managed properly, or feedlot runoff enters a nearby stream, causing water quality concerns through excessive nutrients, organics, and pathogen. The resource concerns to be addressed are for water quality, air quality, and domestic animal health.

After Situation:

Practice typically installed for transfer of manure to a storage facility using 10 HP chopper/screw pump. Manure is directed to a waste storage facility, or feedlot runoff is directed to a solid/liquid settling basin, and supernatant is pumped from the sump of the settling basin to a Vegetated Treatment Area. Contaminated water no longer enters the stream. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

Scenario Feature Measure: Per Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$7,247.29

Scenario Cost/Unit: \$7,247.29

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
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	\$188.63	0.25	\$47.16
Materials						
Pump, Wastewater, Solids Handling, > 5 HP	2516	Wastewater solid handling pump greater than 5 horsepower. Pumping capacity of 400 gallons per minute at 40 feet of Total Dynamic Head. Includes materials and shipping only.	Each	\$7,200.13	1	\$7,200.13

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Scenario: #4 - Small Wastewater Fuel Driven Pump ≤ 50 Hp

Scenario Description:

Scenario is for the implementation of a fuel or PTO-driven pump of ≤ 50 horsepower for transferring manure or wastewater. Implementation examples include, but are not limited to, pumping wastewater from a storage facility to an end use such as a field, or transferring manure and wastewater from a shallow pit under a hog confinement building to a deep pit manure storage on the headquarters site. Payment includes all controls and appurtenances needed to mount the pump and connect the pump to the piping system. The piping system and any associated reception tank is specified under 634 - Waste Transfer.

Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters;

Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer

Before Situation:

Various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation:

For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Per Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$22,818.36

Scenario Cost/Unit: \$22,818.36

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
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	\$188.63	0.25	\$47.16
Materials						
Pump, < 50 HP, Pump & ICE power unit	1027	Materials, labor, controls: < 50 HP Pump & ICE power unit	Horsepower	\$569.28	40	\$22,771.20

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Scenario: #5 - Large Wastewater Fuel Driven Pump > 50 Hp

Scenario Description:

Scenario is for the implementation of a fuel or PTO-driven pump of >50 horsepower for transferring manure or wastewater. Implementation examples include, but are not limited to, moving wastewater from a waste holding pond to a dragline field application system, supplying wastewater to a sprinkler irrigation system, or any other transfer of wastewater from a storage facility to an end use. Includes all controls and appurtenances needed to mount the pump and connect the pump to the piping system. The piping system and any associated reception tank is specified under 634 - Waste Transfer.

Resource Concerns: Water Quality degradation - Excess nutrients in surface and ground waters

Associated Practices include: 374 - Farmstead Energy Improvement; 313 - Waste Storage Facility; 634 - Waste Transfer

Before Situation:

Various types of semi-solid or liquid waste at the headquarters is uncollected causing surface and ground water issues.

After Situation:

For semi-solid or liquid waste, wastes that have been collected through a waste transfer system are now efficiently transferred to appropriate treatment or storage facilities or crop application. Due to topography, gravity transfer is not possible and a properly sized pump is needed to transfer waste as part of a waste transfer system.

Scenario Feature Measure: Per Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$29,490.31

Scenario Cost/Unit: \$29,490.31

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Concrete, CIP, slab on grade, reinforced	37	Steel reinforced concrete formed and cast-in-place 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	\$188.63	0.25	\$47.16
Materials						
Pump, > 70 HP, Pump & ICE power unit	1029	Materials, labor, controls: > 70 HP Pump & ICE power unit	Horsepower	\$346.39	85	\$29,443.15

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Scenario: #6 - Solar Pump for Well

Scenario Description:

The scenario is for the installation of a solar panel array, pump, pressure tank, and appurtenances in a well for supplying water to livestock in situations where standard electric power is inaccessible. The installation includes the pump, wiring, drop pipe, solar panels, mounts, inverter, and all appurtenances. Payment does not include battery backup.

Associated Practices include: 516 - Livestock Pipeline; 642 Water Well, 528 Prescribed Grazing and, 614 - Watering Facility.

Before Situation:

Practice to be installed on grazing land. Current conditions include inadequate water supply, poor water quality, degraded site conditions leading to erosion concerns, poor grazing distribution, and poor livestock health. The resource concerns to be addressed are Inadequate supply of water, grazing distribution, and degraded site conditions leading to poor animal health.

After Situation:

The typical scenario assumes installation of a 200-watt photovoltaic (PV) panel. The installation includes the pump, wiring, pipeline in the well, solar panels, frame mounts, inverter, and all appurtenances. Water will be pumped to an existing storage tank at a higher elevation from which it will be used to pressurize the Livestock Pipeline (516) or Irrigation Pipeline (430). Grazing - Livestock exclusion from surface water will result in improved surface water quality and reduced erosion.

Scenario Feature Measure: Pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$2,393.42

Scenario Cost/Unit: \$2,393.42

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
Solar Panels, variable cost portion	1135	Variable cost portion of the Solar Panels. This portion IS dependent on the total Kilowatt for the Solar Panels. The total cost of any Solar Panels will include this variable cost plus the fixed cost portion. The completed Solar Panels will include all ma	Kilowatt	\$5,240.29	0.2	\$1,048.06
Solar Panels, fixed cost portion	1031	Fixed cost portion of the Solar Panels. This portion is a base cost for all Solar Panels and is not dependant on KiloWatt. The total cost of any Solar Panels will include this fixed cost plus a variable cost portion. The completed Solar Panels will incl	Each	\$308.91	1	\$308.91
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	\$382.80	0.25	\$95.70
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	\$508.62	1	\$508.62
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	\$432.13	1	\$432.13

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Scenario: #10 - Livestock Water, Shallow Well Pump (≤ 25 ft deep)

Scenario Description:

The scenario is for the installation of a pump and pressure tank in a shallow well (≤ 25 feet deep) or collection for supplying water to livestock. Associated practices: 528 Prescribed Grazing, 516 Pipeline, 614 Watering Facility, 642 Water Well; 574 Spring Development

Before Situation:

Practice to be installed on grazing land. Current conditions include inadequate water supply, poor water quality, degraded site conditions leading to erosion concerns, poor grazing distribution, and poor livestock health. The resource concerns to be addressed are Inadequate supply of water, grazing distribution, and degraded site conditions leading to poor animal health.

After Situation:

Practice typically installed for 30 animal units and consists of installing a centrifugal pump, pressure tank, and appurtenances for a shallow draw watering system. Conservation benefits of the installation is proper grazing distribution, which will allow a degraded site to be restored. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

Scenario Feature Measure: per pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$1,323.55

Scenario Cost/Unit: \$1,323.55

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	\$508.62	1	\$508.62
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	\$382.80	1	\$382.80
Pressure Tank, 40 gallon	1038	Pressure Tank, 40 gallon. Includes materials and shipping only.	Each	\$432.13	1	\$432.13

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Scenario: #13 - Livestock Water, Deep Well Pump (>25 ft deep)

Scenario Description:

The scenario is for the installation of a pump and pressure tank in a deep well (> 25 feet) for supplying water to livestock. Associated practices: 528 Prescribed Grazing, 516 Pipeline, 614 Watering Facility, 642 Water Well

Before Situation:

Practice to be installed on grazing land. Current conditions include inadequate water supply, poor water quality, degraded site conditions leading to erosion concerns, poor grazing distribution, and poor livestock health. The resource concerns to be addressed are Inadequate supply of water, grazing distribution, and degraded site conditions leading to poor animal health.

After Situation:

Practice typically installed for 30 animal units and consists of installing a jet or submersible pump, pressure tank, and appurtenances for a watering system. When utilizing a pond or stream a sump will be installed and used rather than a well. Conservation benefits of the installation is proper grazing distribution, which will allow a degraded site to be restored. Cost represents typical situations for conventional, organic, and transitioning to organic producers.

Scenario Feature Measure: per pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$1,694.21

Scenario Cost/Unit: \$1,694.21

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
Pressure Tank, 80 gallon	1039	Pressure Tank, 80 gallon. Includes materials and shipping only.	Each	\$611.39	1	\$611.39
Pump, ≤ 5 HP, pump and motor, variable cost portion	1010	Variable cost portion of a pump less than or equal to 5 HP pump and motor. This portion IS dependent on the total horsepower for the pump. The total cost of any pump will include this variable cost plus the fixed cost portion. The completed pump and moto	Horsepower	\$382.80	1.5	\$574.20
Pump, ≤ 5 HP, pump and motor, fixed cost portion	1009	Fixed cost portion of a pump less than or equal to 5 HP pump and motor. This portion is a base cost and is not dependant on horsepower. The total cost of any pump will include this fixed cost plus a variable cost portion. The completed pump and motor will	Each	\$508.62	1	\$508.62

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Scenario: #17 - Milk Transfer Pump

Scenario Description:

The typical scenario is for the installation of a 1 HP motor and transfer pump with appurtances, used in a dairy milking system to transfer milk from the milk receiver to the bulk tank. The motor will be used in conjunction with a VSD. This practice is to be used exclusively for implementing recommendations from on-farm energy audits.

Before Situation:

The system is inefficient when a motor operates at constant speed to satisfy a load which varies as to flow rate and/or pressure requirements.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a more efficient motor and pump combination. A VSD will be used with the motor/pump combination so that the motor speed can be adjusted to reduce power requirements and better match varied flow or pressure requirements. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: per pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$547.26

Scenario Cost/Unit: \$547.26

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
Pump, Transfer, 1 HP, Pump and Motor	2472	Transfer pump with a 1 horsepower, 3 phase motor. Includes materials, labor, and controls.	Each	\$547.26	1	\$547.26

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Scenario: #18 - Vacuum Pump

Scenario Description:

The typical scenario is for the installation of a 10 HP motor and vacuum pump with appurtances, used in a dairy milking system to transfer the milk from the animal to the milk receiver. The motor will be used in conjunction with a VSD. This practice is to be used exclusively for implementing recommendations from on-farm energy audits.

Before Situation:

The system is inefficient when a motor operates at constant speed to satisfy a load which varies as to flow rate and/or pressure requirements.

After Situation:

An on-farm energy audit has determined that energy use can be reduced through use of a more efficient motor and pump combination. A VSD will be used with the motor/pump combination so that the motor speed can be adjusted to reduce power requirements and better match varied flow or pressure requirements. Associated practices/activities: may include 122-AgEMP - HQ, and other activities within 374-Farmstead Energy Improvement. The resource concern is inefficient use of energy in the farm operation which increases dependence on non-renewable energy sources and can be addressed through improved energy efficiency. Any improvements are based on a Type 2 energy audit meeting the requirements of ASABE S612.

Scenario Feature Measure: per pump

Scenario Unit: Each

Scenario Typical Size: 1

Scenario Cost: \$5,010.22

Scenario Cost/Unit: \$5,010.22

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
<i>Materials</i>						
Pump, Vacuum, 10 HP, Pump and Motor	2473	Vacuum pump including a 10 horsepower, 3 phase motor. Includes materials, labor, and controls.	Each	\$5,010.22	1	\$5,010.22