

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #50 - System Installation-Retrofit 2

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to a single control or treatment site that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge, back-up/solar power supply, communications device, and depth (stage) sensor to be added to existing system. It is actually to represent a cost for any system updates that has component costs greater than \$2,400 but less than or equal to \$7,300 as per the component costs in various scenarios.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$8,862.15

**Scenario Cost/Unit:** \$8,862.15

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	1	\$2,888.76
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	1	\$2,448.26
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.12	\$991.03
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	5	\$386.89
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CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	20	\$661.94
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**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #51 - System Installation-Retrofit 3

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to a single control or treatment site that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge, back-up/solar power supply, communications device, pre-calibrated flow control structure, and depth (stage) sensor to be added to existing system. It is actually to represent a cost for any system updates that has component costs greater than \$7,300 but less than or equal to \$10,500 as per the component costs in various scenarios. Anything above \$10,500 will be evaluated as a full system replacement as per scenarios for surface or tile (subsurface) drainage.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$12,667.64

**Scenario Cost/Unit:** \$12,667.64

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	1	\$2,888.76
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	1	\$2,448.26
Pre-calibrated flow control structure-surface	2610	Pre-calibrated flow control structure-surface. Used for A202 water quality monitoring	Each	\$3,408.32	1	\$3,408.32
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.12	\$991.03
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May	Hour	\$77.38	5	\$386.89
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		provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.				
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	32	\$1,059.11

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #52 - System Installation-Retrofit Above and Below 1

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing above and below monitoring designed system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to an above and below system that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge and two back-up/solar power supply be added to existing paired system. It is actually to represent a cost for any system updates that has component costs of \$3,300 or less as per the component costs in various scenarios.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$4,913.33

**Scenario Cost/Unit:** \$4,913.33

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.24	\$1,982.06
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	5	\$386.89
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	32	\$1,059.11

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #53 - System Installation-Retrofit Above 2

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing above and below monitoring designed system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to an above and below system that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge, two back-up/solar power supplies, two communications devices, and two depth (stage) sensors to be added to existing paired system. It is actually to represent a cost for any system updates that has component costs greater than \$3,300 but less than or equal to \$13,200 as per the component costs in various scenarios.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$15,664.75

**Scenario Cost/Unit:** \$15,664.75

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	2	\$5,777.52
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	2	\$4,896.53
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.24	\$1,982.06
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations	Hour	\$77.38	6	\$464.26
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		in a cost-effective and environmentally sound manner.				
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	32	\$1,059.11

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #54 - System Installation-Retrofit Above 3

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing above and below monitoring designed system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to an above and below system that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge, two back-up/solar power supplies, two communications devices, two pre-calibrated flumes, and two depth (stage) sensors to be added to existing paired system. It is actually to represent a cost for any system updates that has component costs greater than \$13,500 but less than or equal to \$20,500 as per the component costs in various scenarios. Anything above a \$20,500 will be evaluated as a full system replacement as per scenarios for surface or tile (subsurface) drainage.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$22,746.17

**Scenario Cost/Unit:** \$22,746.17

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	2	\$5,777.52
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	2	\$4,896.53
Pre-calibrated flow control structure-surface	2610	Pre-calibrated flow control structure-surface. Used for A202 water quality monitoring	Each	\$3,408.32	2	\$6,816.64
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.24	\$1,982.06
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate	Hour	\$77.38	6	\$464.26
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		effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.				
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	40	\$1,323.88

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #55 - System Installation-Surface Cold Climate

**Scenario Description:** This edge-of-field water quality monitoring system is applicable to a single control or treatment site that has a field defined with surface runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The component monitoring equipment are associated with a typical system for northern latitudes where winter time heating is required for sampling. It will allow for installation of automated sampling data collection system with protective housing to reduce potential for vandalism, battery backup for operation during periods when electricity is down or solar panels are not creating an electrical current, a calf hut or other structure with heat is required over the flume to allow sampling under northern latitude winter conditions, and a berm or other directional flow structure to guide the runoff to a sampling flume.

**Before Situation:** The agricultural operation prior to installing the monitoring equipment is guessing about the effects of the conservation system with regards to meeting practice intent of avoid, controlling, or trapping sediment and nutrients. Nothing is known about the volume or mass of sediment and nutrients leaving the edge of field through the tile or other subsurface drainage system.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$20,043.57

**Scenario Cost/Unit:** \$20,043.57

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Automated sampler with bottles and tubing	2606	Equipment used to collect the water samples on a flow weighted interval of 1.27 mm of runoff (volumetric depth) during a storm event.	Each	\$2,272.44	1	\$2,272.44
Connectors, cables, platform materials	2607	Miscellaneous (connectors, cables, berm, platform materials); Includes materials only.	Each	\$2,073.39	1	\$2,073.39
Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	1	\$2,888.76
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	1	\$2,448.26
Equipment Shed	2617	Equipment Shed (10' x 10') made of steel applied over the sampling flume to allow collection of water samples during the winter in colder climates.	Each	\$1,331.51	1	\$1,331.51
Equipment shelter	2609	Building designed to house and reduce the risk of equipment damage from weather, animals, and vandalism.	Each	\$760.15	1	\$760.15
Heater, high efficiency	1165	Natural gas, propane, or fuel oil unit heater or boiler and venting materials. Based on input kBTU/hour. Includes materials and shipping only.	1,000 BTU/Hour	\$11.72	1	\$11.72
Pre-calibrated flow control structure-surface	2610	Pre-calibrated flow control structure-surface. Used for A202 water quality monitoring	Each	\$3,408.32	1	\$3,408.32
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material,	Kilowatt	\$8,258.60	0.12	\$991.03

		labor and equipment.				
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	5	\$386.89
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	60	\$1,985.82

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #56 - System Installation-Tile Cold Climate

**Scenario Description:** This edge-of-field water quality monitoring system is applicable to a single control or treatment site that has a field defined with tile or other subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The component monitoring equipment are associated with a typical system for northern latitudes where winter time heating is required for sampling. It will allow for installation of automated sampling data collection system for a subsurface collection and separate surface automated sample collection system with protective housing to reduce potential for vandalism, battery backup for operation during periods when electricity is down or solar panels are not creating an electrical current, an area velocity sensor for pipe flow and estimation of submerged flow, a calf hut or other structure with heat is required over the flume to allow sampling under northern latitude winter conditions and a berm or other directional flow structure to guide the runoff to a sampling flume.

**Before Situation:** The agricultural operation prior to installing the monitoring equipment is guessing about the effects of the conservation system with regards to meeting practice intent of avoid, controlling, or trapping sediment and nutrients. Nothing is known about the volume or mass of sediment and nutrients leaving the edge of field through the tile or other subsurface drainage system.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$28,921.22

**Scenario Cost/Unit:** \$28,921.22

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Automated sampler with bottles and tubing	2606	Equipment used to collect the water samples on a flow weighted interval of 1.27 mm of runoff (volumetric depth) during a storm event.	Each	\$2,272.44	2	\$4,544.87
Connectors, cables, platform materials	2607	Miscellaneous (connectors, cables, berm, platform materials); Includes materials only.	Each	\$2,073.39	1	\$2,073.39
Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	2	\$5,777.52
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	1	\$2,448.26
Equipment Shed	2617	Equipment Shed (10' x 10') made of steel applied over the sampling flume to allow collection of water samples during the winter in colder climates.	Each	\$1,331.51	1	\$1,331.51
Equipment shelter	2609	Building designed to house and reduce the risk of equipment damage from weather, animals, and vandalism.	Each	\$760.15	2	\$1,520.29
Heater, high efficiency	1165	Natural gas, propane, or fuel oil unit heater or boiler and venting materials. Based on input kBTU/hour. Includes materials and shipping only.	1,000 BTU/Hour	\$11.72	1	\$11.72
Pre-calibrated flow control structure-subsurface (pipe flow)	2615	Equipment used to collect runoff for ease in measure of flow, sample collection and to reduce time in constructing and calibrating of a flow structure.	Each	\$1,555.05	1	\$1,555.05
Pre-calibrated flow control structure-surface	2610	Pre-calibrated flow control structure-surface. Used for A202 water quality monitoring	Each	\$3,408.32	1	\$3,408.32
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
Solar Panels, variable cost	1135	Variable cost portion of the Solar Panels. This portion IS dependent	Kilowatt	\$8,258.60	0.12	\$991.03

portion		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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.				
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	6	\$464.26
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	100	\$3,309.71

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #58 - System Installation-Above&Belowcold climate

**Scenario Description:** This edge-of-field water quality monitoring system is applicable where a conservation practice has a pre- and post treatment area in the same field drainage with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The component monitoring equipment are associated with a typical system for northern latitudes where winter time heating is required for sampling. It will allow for installation of automated sampling data collection system with protective housing to reduce potential for vandalism, battery backup for operation during periods when electricity is down or solar panels are not creating an electrical current, a calf hut or other structure with heat is required over the flume to allow sampling under northern latitude winter conditions, and a berm or other directional flow structure to guide the runoff to a sampling flume. The actual installation will differ on the subsurface flow by allowing a smaller pre-calibrated flume with the addition of a velocity sensor meter as in the tile alternative.

**Before Situation:** The agricultural operation prior to installing the monitoring equipment is guessing about the effects of the conservation system with regards to meeting practice intent of avoid, controlling, or trapping sediment and nutrients. Nothing is known about the volume or mass of sediment and nutrients leaving the edge of field through the tile or other subsurface drainage system.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$33,242.12

**Scenario Cost/Unit:** \$33,242.12

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

Automated sampler with bottles and tubing	2606	Equipment used to collect the water samples on a flow weighted interval of 1.27 mm of runoff (volumetric depth) during a storm event.	Each	\$2,272.44	2	\$4,544.87
Connectors, cables, platform materials	2607	Miscellaneous (connectors, cables, berm, platform materials); Includes materials only.	Each	\$2,073.39	1	\$2,073.39
Depth (stage) sensor	2608	Device used to relay information to the Data logger about incremental increases in runoff. ISCO 730 Module with 1/8-in x 25-ft vinyl bubble line. Includes equipment only. Used for A202 water quality monitoring	Each	\$2,888.76	2	\$5,777.52
Device, communications	2616	Piece of equipment or hardware designed to transmit real time data or information collected prior to site visits. Includes equipment only.	Each	\$2,448.26	2	\$4,896.53
Equipment Shed	2617	Equipment Shed (10' x 10') made of steel applied over the sampling flume to allow collection of water samples during the winter in colder climates.	Each	\$1,331.51	2	\$2,663.03
Equipment shelter	2609	Building designed to house and reduce the risk of equipment damage from weather, animals, and vandalism.	Each	\$760.15	2	\$1,520.29
Heater, high efficiency	1165	Natural gas, propane, or fuel oil unit heater or boiler and venting materials. Based on input kBTU/hour. Includes materials and shipping only.	1,000 BTU/Hour	\$11.72	2	\$23.45
Pre-calibrated flow control structure-surface	2610	Pre-calibrated flow control structure-surface. Used for A202 water quality monitoring	Each	\$3,408.32	2	\$6,816.64
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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical,	Kilowatt	\$8,258.60	0.12	\$991.03

		controllers, and service drop, etc). This cost will include material, labor and equipment.				
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	6	\$464.26
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	60	\$1,985.82

**Practice:** 202 - Edge-of-Field Water Quality Monitoring– System Installation

**Scenario:** #59 - System Installation-Retrofit 1

**Scenario Description:** This edge-of-field water quality monitoring system is to retrofit an existing system that is being used in associated with the 799 interim practice or comparable system. The retrofit is applicable to a single control or treatment site that has a field defined with surface or subsurface drainage runoff that can be captured and sampled at the edge of a field before entering a ditch or receiving water body or water course. The data represents the installation of an automated and manual backup rain gauge and back-up/solar power supply be added to existing system. It is actually to represent a cost for any system updates that has component costs of \$2,400 or less as per the component costs in various scenarios.

**Before Situation:** The agricultural operation prior to retrofit has an edge-of-field data collection system but it does not meet the present standards for accuracy or reliability as detailed in either or both of Activity 201 and Activity 202.

**After Situation:** The agricultural operation after installing the monitoring equipment will be receiving feedback in the form of edge-of-field runoff water quality samples. The samples will allow the operator to understand the relationship between rain/irrigation, practice choice, and nutrient inputs effecting nutrient and sediment loss for the field. Thus, providing an opportunity to make adaptive management changes to the agricultural operation to reduce sediment and nutrient loss and/or profitability.

**Scenario Feature Measure:** System installed

**Scenario Unit:** Each

**Scenario Typical Size:** 1

**Total Scenario Cost:** \$3,392.74

**Scenario Cost/Unit:** \$3,392.74

**Cost Details**

Component Name	Id	Description	Unit	Cost	Qty	Total
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**Materials**

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 include all materials (electrical, controllers, service drops and etc). This cost will include material, labor and equipment.	Each	\$460.51	1	\$460.51
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 materials (electrical, controllers, and service drop, etc). This cost will include material, labor and equipment.	Kilowatt	\$8,258.60	0.12	\$991.03
Weather Station, Advanced	2550	Advance Weather Station which collects and records recording rainfall, humidity, barometric pressure, wind speed, temperature, and solar radiation from a solar powered self-standing tripod to an advance weather recording console. Used for both 449 advance irrigation water management and for Activity 202 water quality monitoring .	Each	\$1,024.76	1	\$1,024.76

**Labor**

CAP Labor, agronomist	1295	Conservation Activity Plan labor to conduct research in breeding, physiology, production, yield, and management of crops and agricultural plants or trees, shrubs, and nursery stock, their growth in soils, and control of pests; or study the chemical, physical, biological, and mineralogical composition of soils as they relate to plant or crop growth. May classify and map soils and investigate effects of alternative practices on soil and crop productivity. May provide on-site consulting services to help growers troubleshoot nutrient and pest problems, establish appropriate agronomic sampling programs and implement management recommendations in a cost-effective and environmentally sound manner.	Hour	\$77.38	5	\$386.89
CAP Labor, Skilled	1604	Conservation Activity Plan labor requiring a high level skill set: Includes carpenters, welders, electricians, conservation professionals involved with data collection, monitoring, and or record keeping, etc.	Hour	\$33.10	16	\$529.55