

Practice: 353 - Monitoring Well

Scenario: #1 - Borehole, 200 Ft. Depth or Less

Scenario Description:

A vertical borehole designed and installed 200 feet or less in depth to obtain representative groundwater quality samples and hydrogeologic information. The well provides controlled access for sampling groundwater near an agricultural waste storage or treatment facility to detect seepage and monitor groundwater quality. Installation methods must be in conformance with ASTM D5092. The resource concerns addressed include groundwater contamination and groundwater quality.

Before Situation:

This practice applies to the design, installation, and development of monitoring wells where contamination of groundwater from an agricultural waste storage or treatment facility is a concern, detection of seepage and monitoring of groundwater quality is needed, and the facility is a component of an agricultural waste management system.

After Situation:

Typical installation of a vertical borehole for a monitoring well 100 feet deep that provides controlled access to obtain water samples for detecting seepage and monitoring of groundwater quality from an agricultural waste storage or treatment facility as a component of an agricultural waste management system. The monitoring well is installed by drilling an 8 inch borehole, installing a protective casing, a 2 inch riser pipe, a well screen, and filter pack. The installation method was in conformance with ASTM D5092. Vegetation of disturbed areas will be completed under critical area planting (342). Erosion control during construction activities will use Stormwater Runoff Control (570). Other associated practices include Access Control (472), Water Well Decommissioning (351), Waste Storage Facility (313), Waste Treatment Lagoon (359), and Pumping Plant (533).

Scenario Feature Measure: Depth of Well

Scenario Unit: Foot

Scenario Typical Size: 100

Scenario Cost: \$7,788.12

Scenario Cost/Unit: \$77.88

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	\$170.68	24	\$4,096.32
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	\$30.51	3	\$91.53
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite gout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	\$739.80	3	\$2,219.40
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	\$32.49	1	\$32.49
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	\$13.67	20	\$273.40
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	\$3.84	25	\$96.00
Bentonite	41	Bentonite, includes materials (50# bag)	Each	\$9.74	6	\$58.44
End Cap, PVC, 2"	2301	PVC End cap used in groundwater monitoring and other well installations. Materials only.	Each	\$2.54	1	\$2.54
Centralizer, stainless steel, 2"	2298	Stainless steel centralizer to stabilize and center pipe in groundwater monitoring and other well installations. Materials only.	Each	\$21.99	10	\$219.90
Pipe, PVC, Flush Thread, 2" SCH 40	2295	Flush thread PVC riser pipe, 2" diameter, schedule 40. Materials only.	Foot	\$2.32	110	\$255.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.68	6	\$166.08
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$276.82	1	\$276.82

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Scenario: #2 - Borehole, Greater Than 200 Ft. Depth

Scenario Description:

A vertical borehole designed and installed greater than 200 feet deep to obtain representative groundwater quality samples and hydrogeologic information. The well provides controlled access for sampling groundwater near an agricultural waste storage or treatment facility to detect seepage and monitor groundwater quality. Installation methods must be in conformance with ASTM D5092. The resource concerns addressed include groundwater contamination and groundwater quality.

Before Situation:

This practice applies to the design, installation, and development of monitoring wells where contamination of groundwater from an agricultural waste storage or treatment facility is a concern, detection of seepage and monitoring of groundwater quality is needed, and the facility is a component of an agricultural waste management system.

After Situation:

Typical installation of a vertical borehole for a monitoring well 300 feet deep that provides controlled access to obtain water samples for detecting seepage and monitoring of groundwater quality from an agricultural waste storage or treatment facility as a component of an agricultural waste management system. The monitoring well is installed by drilling an 8 inch borehole, installing a protective casing, a 2 inch monitoring-riser pipe, a well screen, and filter pack. The installation method was in conformance with ASTM D5092. Vegetation of disturbed areas will be completed under critical area planting (342). Erosion control during construction activities will use Stormwater Runoff Control (570). Other associated practices include Access Control (472), Water Well Decommissioning (351), Waste Storage Facility (313), Waste Treatment Lagoon (359), and Pumping Plant (533).

Scenario Feature Measure: Depth of Well

Scenario Unit: Foot

Scenario Typical Size: 300

Scenario Cost: \$22,368.35

Scenario Cost/Unit: \$74.56

Cost Details (by category):

Component Name	ID	Component Description	Unit	Price (\$/unit)	Quantity	Cost
Equipment/Installation						
Rotary Drill Rig with Operator	1595	Rotary drill rig including equipment and power unit costs and labor.	Hour	\$170.68	90	\$15,361.20
Materials						
Aggregate, gravel, washed, pea gravel	1331	Washed and graded pea gravel river stone. Includes materials and local delivery within 20 miles of quarry.	Cubic Yard	\$30.51	6	\$183.06
Grout, cement	1333	Cement grout meeting ASTM specifications for well sealing. Includes both neat-cement grout and bentonite grout mixtures. Includes materials, equipment and labor to place.	Cubic Yard	\$739.80	6	\$4,438.80
Well Cap, 6"	1786	Well cap, 6". Materials only.	Each	\$32.49	1	\$32.49
Well Casing, Metal, 6"	1810	Steel well casing, 6". Materials only.	Foot	\$13.67	20	\$273.40
Well Screen, plastic, 2"	1997	2" PVC well screen. Materials only.	Foot	\$3.84	50	\$192.00
Bentonite	41	Bentonite, includes materials (50# bag)	Each	\$9.74	12	\$116.88
End Cap, PVC, 2"	2301	PVC End cap used in groundwater monitoring and other well installations. Materials only.	Each	\$2.54	1	\$2.54
Centralizer, stainless steel, 2"	2298	Stainless steel centralizer to stabilize and center pipe in groundwater monitoring and other well installations. Materials only.	Each	\$21.99	20	\$439.80
Pipe, PVC, Flush Thread, 2" SCH 40	2295	Flush thread PVC riser pipe, 2" diameter, schedule 40. Materials only.	Foot	\$2.32	310	\$719.20
Aggregate, Gravel, Graded	46	Gravel, includes materials, equipment and labor to transport and place. Includes washed and unwashed gravel.	Cubic yard	\$27.68	12	\$332.16
Mobilization						
Mobilization, medium equipment	1139	Equipment with 70-150 HP or typical weights between 14,000 and 30,000 pounds.	Each	\$276.82	1	\$276.82