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SS Coordinator: Add section 76-4 with:

76-4 MONITORING WELLS

## 76-4.01 GENERAL

### 76-4.01A Summary

Section 76-4 includes specifications for installing monitoring wells to monitor groundwater table elevation, groundwater quality, or concentration of contaminants in groundwater.

### 76-4.01B Definitions

**monitoring well:** Borehole that provides access to sampling for groundwater quality, or concentration of contaminants in groundwater, or with installed instrument for monitoring groundwater table elevation.

### 76-4.01C Submittals

#### 76-4.01C(1) General

Reserved

#### 76-4.01C(2) Product Data

Submit product data for:

1. Protective casing and cover

2. Well cap

3. Blank well casing

4. Well screen

5. Filter pack material

6. Annular space seal

#### 76-4.01C(3) Calculation of Filter Pack Volume

Submit calculations for volume of filter pack material.

#### 76-4.01C(4) Well Completion Report

Submit Well Completion Report under Department of Water Resources requirements.

Submit a copy of the Department of Water Resources Well Completion Report within 20 days after the completion of each monitoring well, as informational submittal.

### 76-4.01D Quality Assurance

Reserved

## 76-4.02 MATERIALS

### 76-4.02A General

Concrete must be minor concrete.

### 76-4.02B Well Casing and Fittings

Well casing and fittings must be schedule 40 PVC plastic pipe and comply with NSF/ANSI 14 and ASTM F480.

If not shown, use pipe with a nominal pipe size of 2 inches.

Pipe joints must be flush threaded. Where lubrication is required, use manufacturer’s lubricant. Do not use solvent weld.

### 76-4.02C Centralizer

Centralizer must provide at least 2 inches annulus between outside diameter of casing and the borehole wall throughout the entire length of casing.

### 76-4.02D Well Screen

Well screen must have slots equally spaced along the pipe circumference and comply with the requirements shown in the following table:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Well Screen Slots** | | | | |
| Pipe Size, nominal inside diameter (inches) | Number of slot rows | Slot width  (inches) | Slot length (inches) | Slot spacing  (inches) |
| 2.0 | 3 | 0.01 | 0.6–0.8 | 0.25 |
| 2.5 | 3 | 0.01 | 0.6–0.8 | 0.25 |
| 3.0 | 3 | 0.01 | 1.0–1.2 | 0.25 |
| 4.0 | 4 | 0.01 | 1.0–1.2 | 0.25 |

The slot length is measured on the inner surface of the pipe.

### 76-4.02E Well Cap

For monitoring well extended above ground, use schedule 40 PVC cap.

For monitoring well with flush mount protective cover, use J-type cap with wing nut and expandable gasket that provides watertight seal. Include an attachment eye at the bottom of cap. The cap must be lockable by a padlock.

### 76-4.02F Protective Cover

Protective cover must comply with *Water Well Standards* section of Bulletin 74-90.

Protective cover must include permanent monitor well identification.

Above-ground protective cover must be steel and extend at least 2 feet above ground with a lockable hinged cover.

Flush-mounted protective cover must be 12-inch-long steel casing by 4-inch in diameter with a cast-iron cover. The cover must be AASHTO H-20 load rated and affixed to the casing with threaded stainless-steel bolts with lubricant and waterproof gasket.

### 76-4.02G Annular Seal

Comply with section 76-6.02.

### 76-4.02H Filter Pack Seal

Filter pack seal material must be sodium bentonite and comply with NSF/ANSI 60. Filter pack seal material may be pellets or chips with bulk density of 70–80 pcf, or slurry.

### 76-4.02I Filter Pack

Filter pack material must consist of clean, rounded to well-rounded, hard, insoluble particles of siliceous composition.

Filter pack material must comply with the following gradation requirements or as directed.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Filter Pack Gradation Requirements** | | | | | |
| Sand pack mesh name | 1% Passing size | 10% Passing size | 30% Passing size | 60% Passing size | Uniformity Coefficient |
| (mm (US Sieve)) | | | |
| 20-40 | 0.250 (60)–0.425 (40) | 0.425 (40)–0.500 (35) | 0.500 (35)–0.600 (30) | 0.600 (30)–0.850 (20) | 1.1–1.6 |

Protect filter pack material from contacting with pollutants, contaminants, and foreign substances, such as clay or vegetative matter.

## 76-4.03 CONSTRUCTION

### 76-4.03A General

Install monitoring well under ASTM D5092, D5521, D5787, D6452, and *Monitoring Well Standards* section of Bulletin 74-90.

### 76-4.03B Drill Borehole

Drill borehole under section 76-3.

Borehole diameter must be at least 4 inches larger than the outside diameter of monitoring well casing.

### 76-4.03C Install Well Casing

Clean the borehole before installing well casing and screen.

Casing, couplings, centralizers, and other components of well casing must be clean and free of contaminants at time of installation.

Space centralizers at 8-foot maximum intervals for the full length of the casing. Place the uppermost centralizer less than 2 feet from the top of casing and the lowermost centralizer at 2 feet from the bottom of casing.

Attach bottom cap to the first section of monitoring well casing and insert the casing into the borehole.

Add and join the remaining screen and casing sections.

Casing joint must be watertight.

Do not drive or force the casing string into place. Protect casing from impact that may damage or weaken the casing.

Do not rest casing assembly on the bottom of borehole.

Suspend casing assembly until completion of annular seal placement.

### 76-4.03D Place Filter Pack

Use tremie pipe to place filter pack material at filter pack section of borehole as shown. Measure the top of filter pack and volume of filter pack placed to verify filter pack has not bridged.

### 76-4.03E Place Filter Pack Seal

Place filter pack seal material at borehole section shown or as directed.

For filter pack seal material with sodium bentonite pellets or chips, add water after placement of filter pack seal. Do not displace filter pack seal material. Wait at least 1 hour after placement of water for filter pack seal material to properly hydrate before placing annular seal.

Sound the top of the filter pack seal to verify that no bridging occurred during placement.

### 76-4.03F Place Annular Seal

Place annular seal at borehole section shown or as directed.

Comply with *Water Well Standards* section of Bulletin 74-90.

### 76-4.03G Install Protective Cover

Install protective cover under *Water Well Standards* section of Bulletin 74-90.

## 76-4.04 PAYMENT

Not Used