Basin Management Objective
Butte County
Sub-Inventory Unit – PENTZ

Butte County Water Advisory Committee Member – Rick Ponciano

Contact Information
Phone Number: (530) 891-8455
Email Address: rcponciano@hotmail.com

Description of the Pentz Sub-Inventory Unit –
The Pentz Sub-Inventory Unit (SIU) covers an area of about 1,900 acres in the northern portion of the East Butte Inventory Unit. It is bordered by Butte Creek to the north, the North Fork of Dry Creek to the south, foothills to the east, and Highway 99 to the west. The land uses within this SUI are non-irrigated native vegetation, pasture, and low density residential. Current groundwater use in the Pentz SUI is minimal.

Management Objective –
It is the intent of this objective to maintain the groundwater surface elevation during the peak summer irrigation season (July and August) in all aquifer systems at a level that will assure an adequate and affordable irrigation groundwater supply, and to assure a sustainable agricultural supply of good quality water now and into the future. The management objective is also to assure an adequate groundwater supply of adequate quality from the alluvial aquifer system for all domestic users in the sub-inventory unit and to assure the water supply can be utilized without injuring groundwater quality or inducing land subsidence.

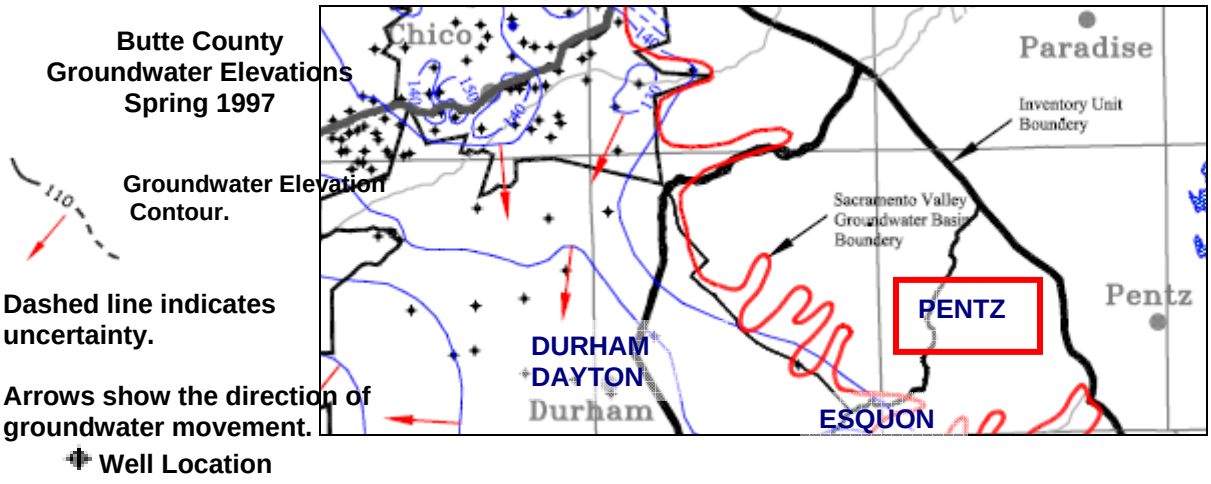
Geologic Formations Identified In Sub-Inventory Unit –
Geologic formations in the Esquon SIU, from youngest (shallowest) to oldest (deepest), include:

Modesto Formation
Tuscan Unit C (Upper Tuscan)
Tuscan Unit B (Lower Tuscan)

Fresh Water-bearing Units. In the Sacramento Valley Region of Butte County, fresh groundwater-bearing units include, from youngest (shallowest) to oldest (deepest), the Modesto, Riverbank, Laguna, Tehama and Tuscan Formations. Those included in the Esquon SIU are:

Modesto Formation
Tuscan Unit C (Upper Tuscan)
Tuscan Unit B (Lower Tuscan)

Groundwater Flow in the Pentz Sub-Inventory Unit –
The below figure is a cropped segment of a map prepared by DWR Northern District. It shows the groundwater elevation contours in your sub-inventory unit with arrows indicating the direction of groundwater movement. This graphic indicates that the regional pattern of spring groundwater movement in the Pentz SIU is in a west-to-southwesterly direction. Not enough groundwater level data exist to make an estimate of the local direction of groundwater movement in the sub-inventory unit.



BMO Key Wells Selected for Groundwater Level Monitoring –
Two monitoring wells currently in the DWR monitoring network have been selected to include in the Pentz BMO. One well has a significant history, however the period of record contains several questionable measurements. The DWR completed installation of a multi-completion monitoring well, SWN 21N02E26E003-6, a short distance away from the currently monitored well in September 2007. This well was constructed as a quadruple completion well, which means that the bore hole contains four casings isolated in separate geologic strata, allowing for monitoring of the groundwater levels contained in the respective aquifer systems. Dedicated monitoring wells are constructed specifically for measuring groundwater levels and groundwater will not be extracted from the newly installed monitoring well. There is currently only one measurement available for this new well, and therefore the Alert Stages cannot be established for this data set.

Additionally, five of the monitoring wells installed by Butte County Public Works at the Neal Road Landfill have been selected for inclusion in this BMO. These are identified as MW-4, 6, 8A, 8B, and 10. Monitoring of groundwater is a regulatory requirement for operation of the landfill. Groundwater is monitored quarterly at each of the landfill's monitoring wells, and both level and quality measurements are taken. The monitoring wells are located within the landfill

property. A function of the monitoring wells is to calculate ground water flow direction and velocity.

The operation and monitoring of the wells located at the landfill are under the direction of the Department of Public Works. Public Works staff will continue to provide groundwater elevation data, however, at this time, Alert Stages will not be established for these wells.

SPRING

Well ID	Aquifer System	Well Type	Stage 1 & 2Alerts Mid point of Average & Historic Low Elev. (ft)	Stage 3Alerts Lowest Recorded Elev. (ft)
21N02E26F01M	Tuscan B	Irrigation	119.85	106.70

FALL

Well ID	Aquifer System	Well Type	Stage 1 & 2Alerts Mid point of Average & Historic Low Elev. (ft)	Stage 3Alerts Lowest Recorded Elev. (ft)
21N02E26F01M	Tuscan B	Irrigation	119.60	111.5

BMO Key Wells Selected for Groundwater Quality Monitoring–
When the Butte County Groundwater Trend Monitoring Program began, a well was sampled close to the border of the Pentz and Cherokee sub-inventory units. Data was monitored at that well from 2002 through 2005. This year, a new well was located and sampled approximately 2.4 miles from the Pentz-Butte Valley well. Tabular data and established Alert Stages for this well will be presented in the Pentz and Cherokee documents in the 2009 BMO.

Groundwater Temperature - 2002 through 2007

State Well Number	2002 Temp ^{o}C	2003 Temp ^{o}C	2004 Temp ^{o}C	2005 Temp ^{o}C	2006 Temp ^{o}C	2007 Temp ^{o}C
21N03E29J003M						22.2
21N03E26EO1M	27	26.4	26.7	23.2		

Groundwater pH - 2002 through 2007

State Well Number	2002 pH	2003 pH	2004 pH	2005 pH	2006 pH	2007 pH
21N03E29J003M						7.6
21N03E26EO1M	7.1	6.9	7.29	6.24		

Groundwater EC - 2002 through 2007

State Well Number	2002 EC	2003 EC	2004 EC	2005 EC	2006 EC	2007 EC
21N03E29J003M						218
21N03E26EO1M	195	186	211	240		

BMO Key Well(s) Selected for Land Subsidence Monitoring–
State Well Number 20N01E18L03M located in the Western Canal Water District. Maximum annual inelastic land subsidence shall not exceed 0.01 feet per year.

BMO Alert Stage Definitions and Compliance Methodologies–
The Pentz Sub-Inventory Unit will use the following guidelines in the management of the groundwater resources. The groundwater level and land subsidence management objectives are intended to trigger predetermined voluntary Ground Water Management Actions, as defined in the staff report, to remedy declining ground water levels that are not recovering to compliance levels for each index well.

Groundwater Levels – Specific Depth and Lowest Record
Stage 1: The first year that spring groundwater levels reach or fall below the alert level established for the well. *This alert level represents the mid point between the average spring measurement and the historic low.*

Stage 2: Stage 2 is reached if spring groundwater levels, for a second consecutive year, remain at or below the Stage 1 alert level established for the well while still above the lowest record spring level for the well.

Stage 3: Stage 3 is reached if the spring groundwater levels reach or fall below the lowest historic water level on record for each respective well.

Groundwater Quality –
Data from the newly installed dedicated monitoring well should be available for inclusion in the 2009 BMO packet. Stakeholders in the Pentz SIU will work with staff to locate additional wells in the DWR monitoring network, either irrigation or domestic, with sufficient historical construction information to include in the water quality monitoring network, and initiate data collection in August 2008.

Land Subsidence –
Land Subsidence will be monitored at the closest extensometers located in the M&T and Western Canal sub inventory units. Maximum annual inelastic land subsidence shall not exceed 0.01 feet per year.

Stage 1: is reached when the annual elastic subsidence exceeds the average annual elastic subsidence measured over the period of record of the extensometer.

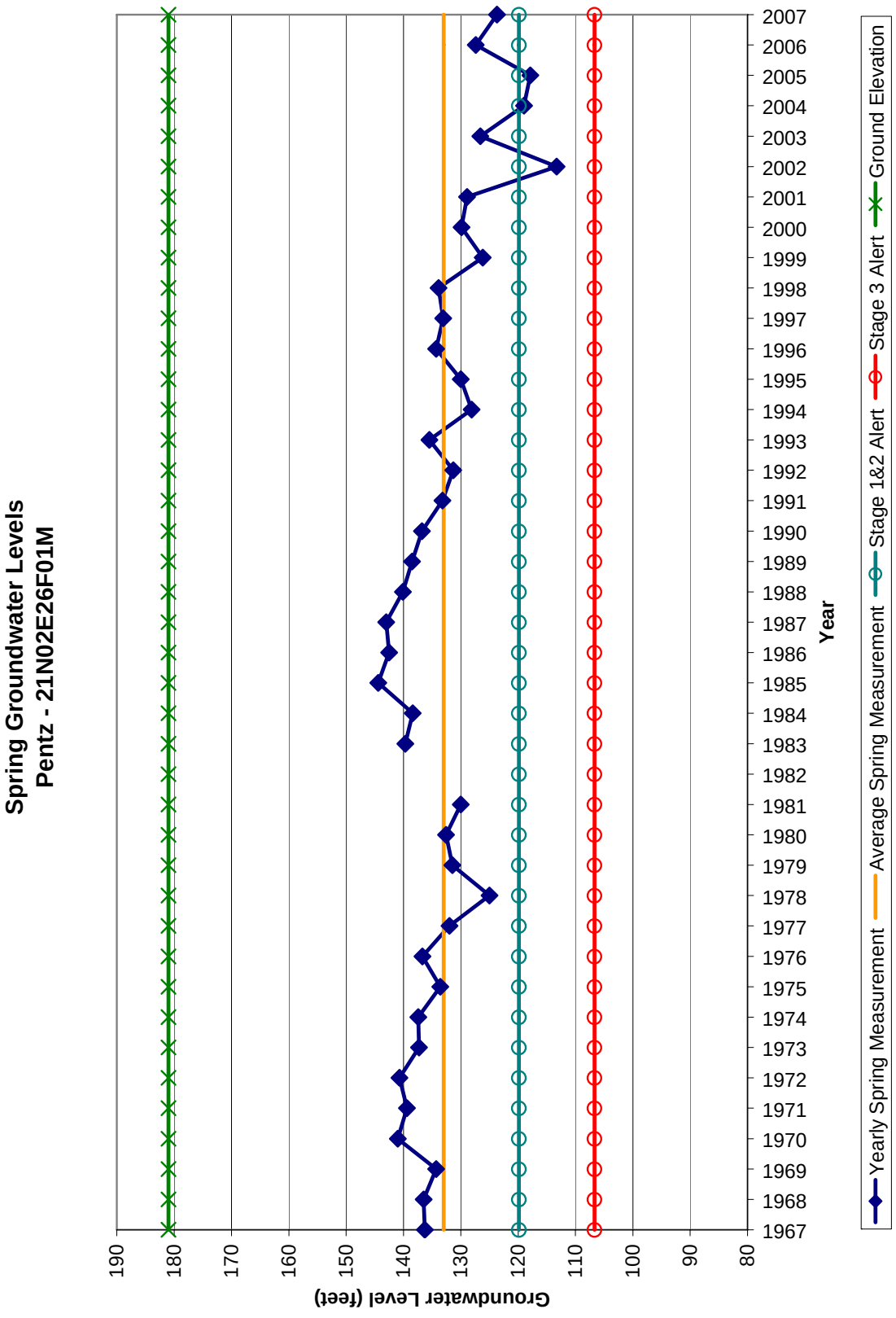
Stage 2: is reached when the annual elastic subsidence exceeds the maximum recorded elastic subsidence over the period of record for the extensometer.

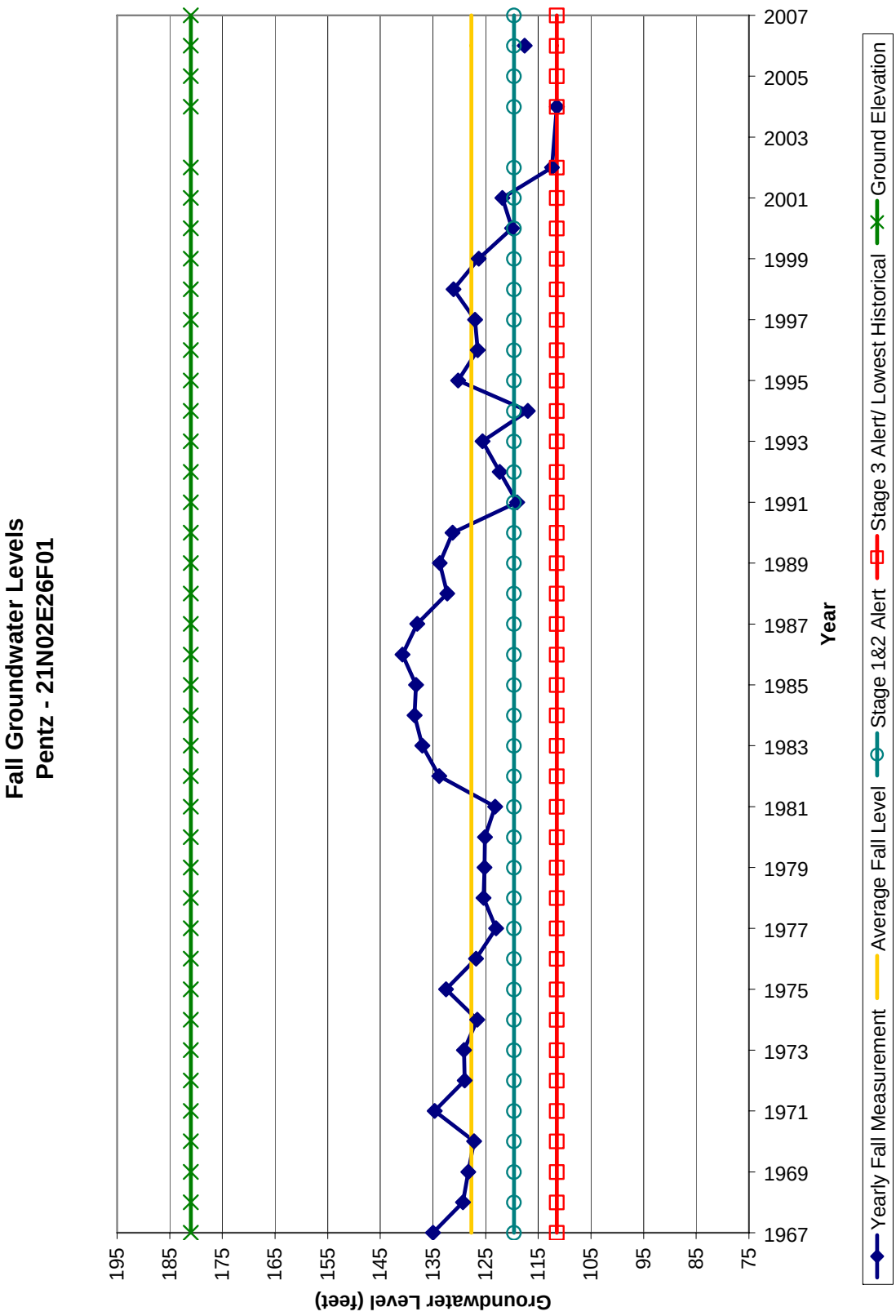
Stage 3: is when inelastic subsidence is detected. Inelastic subsidence shall be detected by comparing reading from the extensometer taken on March 1 of each year against previous March 1 measurements.

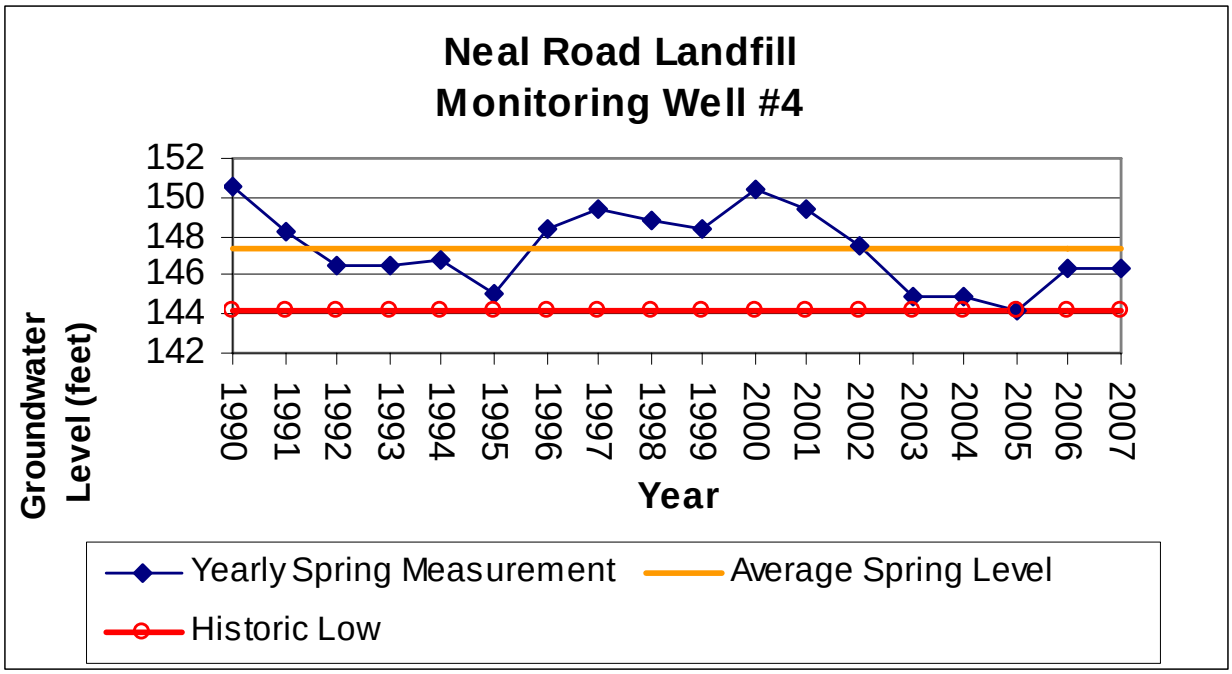
Future Monitoring Recommendations –
Possibly secure funding for the installation of an extensometer to monitor land subsidence in the Esquon SIU.

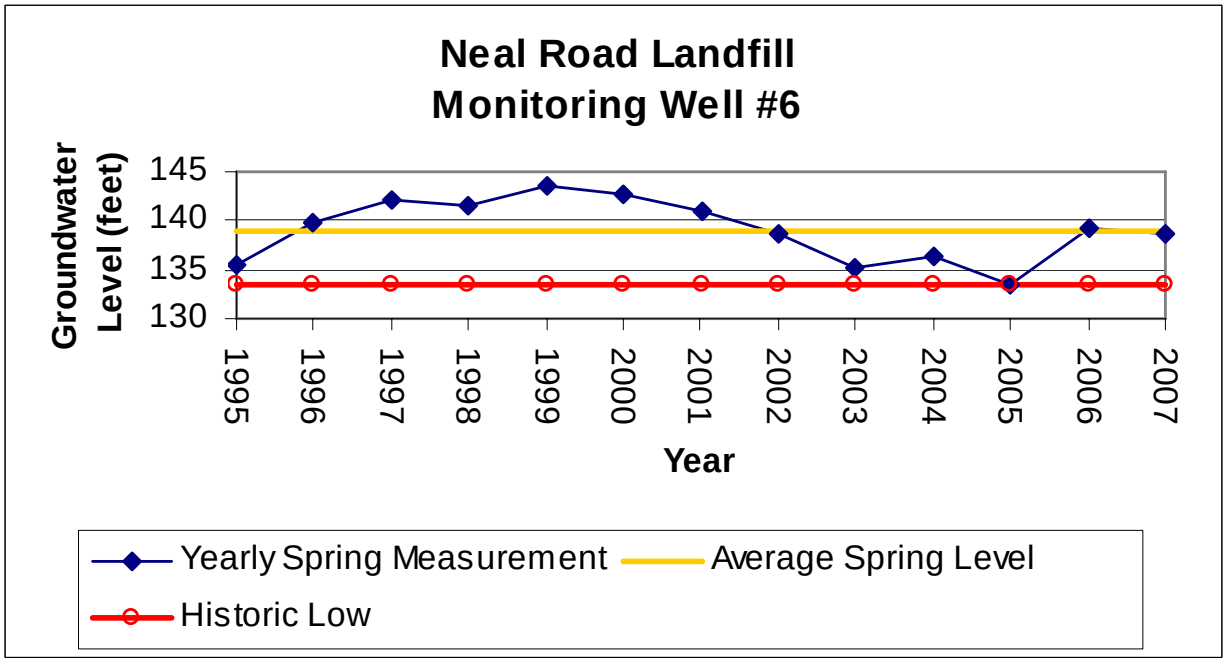
Supporting Data –
Hydrographs depicting yearly spring level measurements, including 2007 data, with established alert levels.

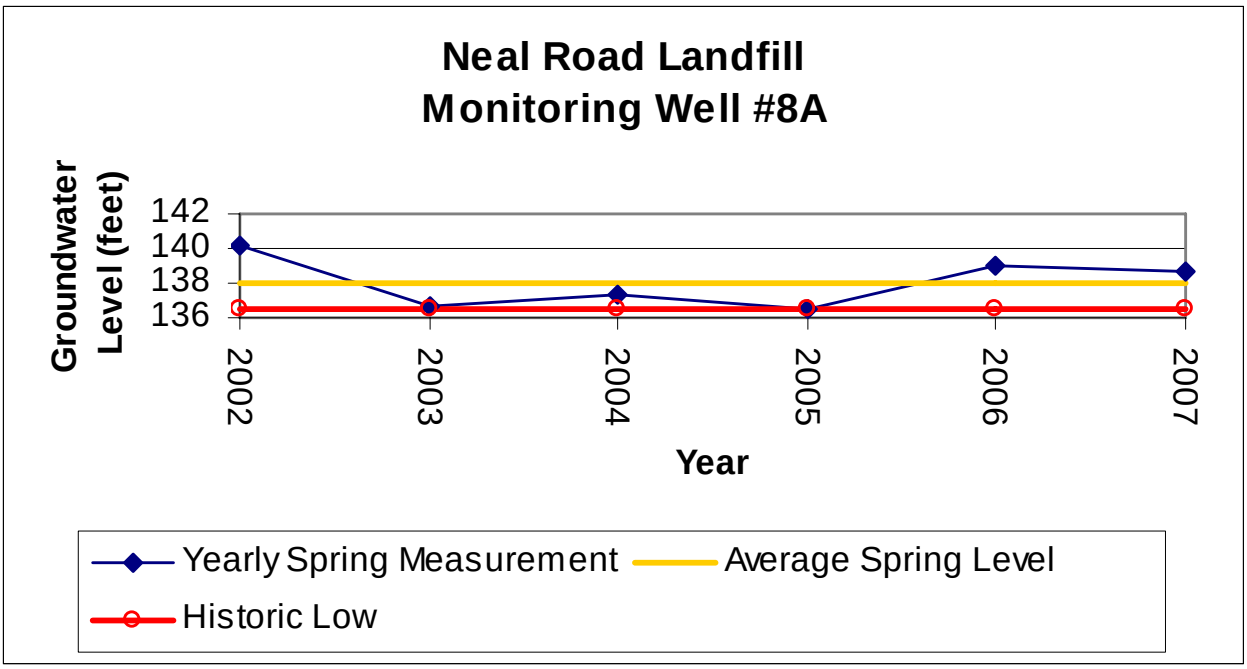
Summary charts of water quality monitoring.

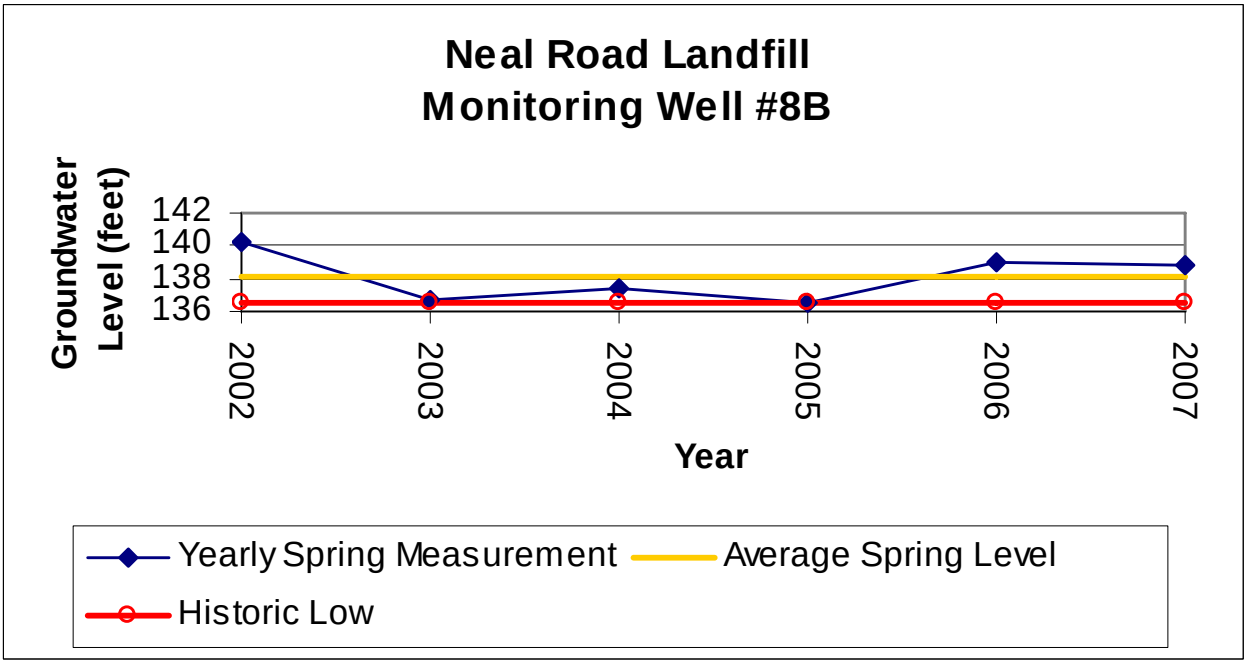

Spring Groundwater Levels
Pentz - 21N02E26F01M
Groundwater Level (feet)
190
180
170
160
150
140
130
120
110
100
90
80
Year
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991
1990
1989
1988
1987
1986
1985
1984
1983
1982
1981
1980
1979
1978
1977
1976
1975
1974
1973
1972
1971
1970
1969
1968
1967
Yearly Spring Measurement
Average Spring Measurement
Stage 1&2 Alert
Stage 3 Alert
Ground Elevation

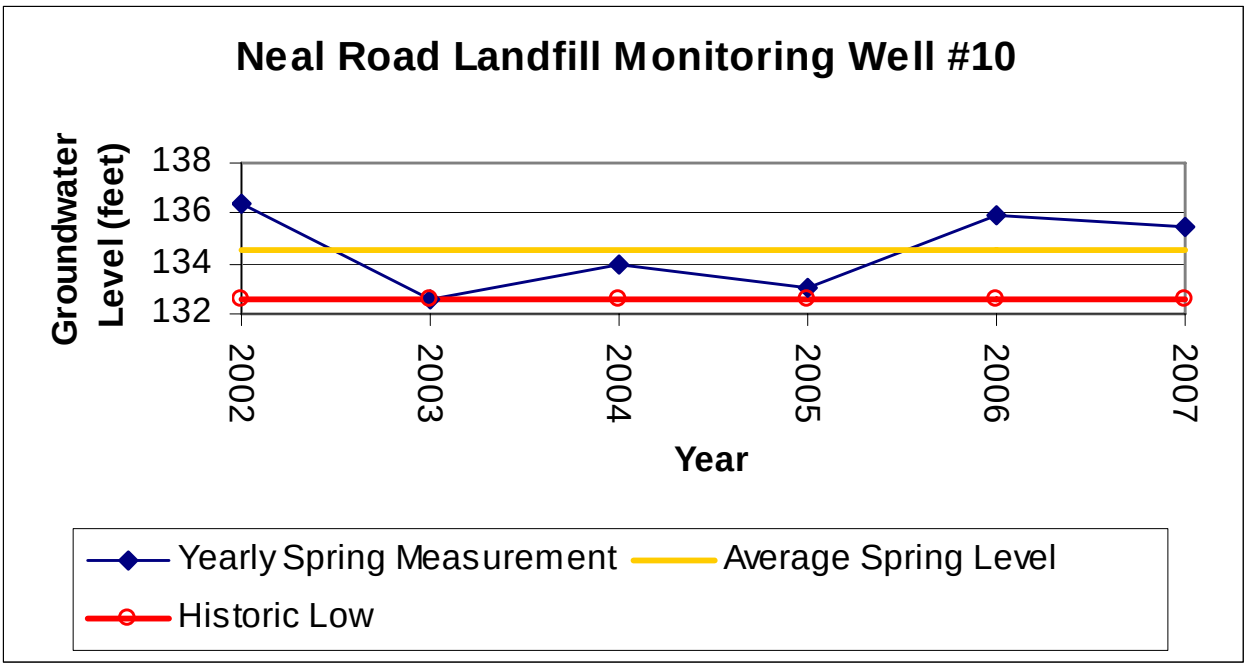

Fall Groundwater Levels
Pentz - 21N02E26F01
Groundwater Level (feet)
195
185
175
165
155
145
135
125
115
105
95
85
75
Year
2007
2005
2003
2001
1999
1997
1995
1993
1991
1989
1987
1985
1983
1981
1979
1977
1975
1973
1971
1969
1967
Yearly Fall Measurement
Average Fall Level
Stage 1&2 Alert
Stage 3 Alert/ Lowest Historical
Ground Elevation

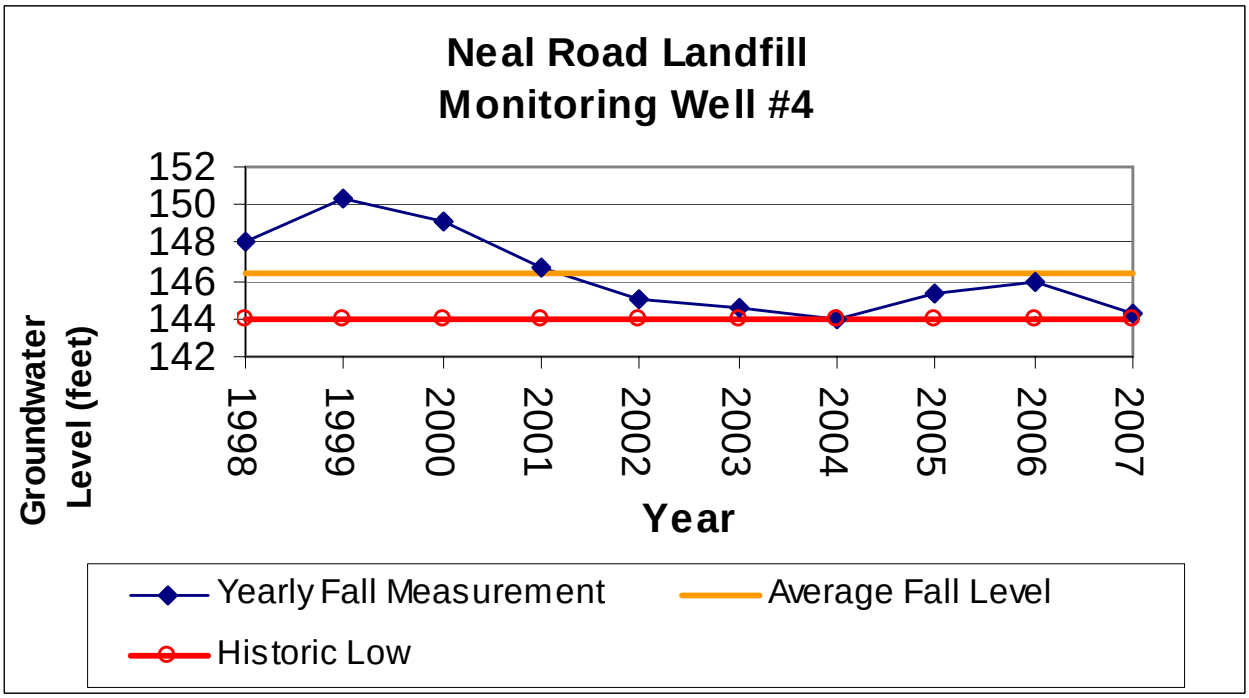

Neal Road Landfill
Monitoring Well #4
Groundwater Level (feet)
152
150
148
146
144
142
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Spring Measurement
Average Spring Level
Historic Low

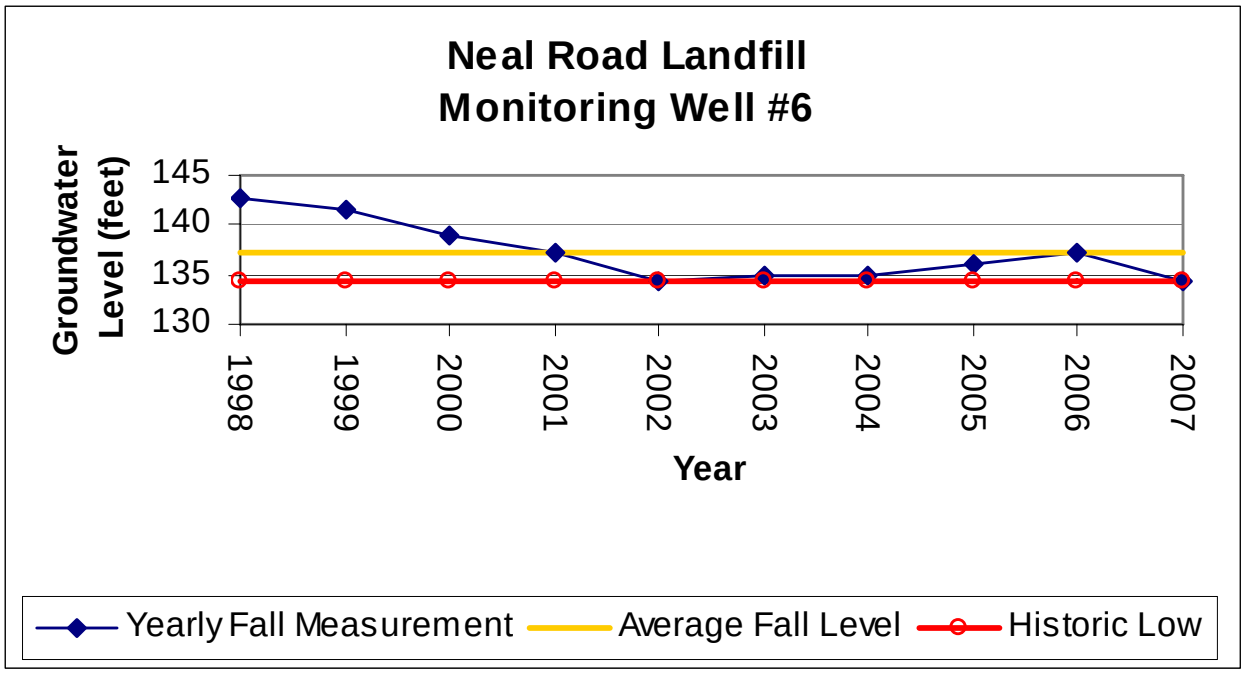

Neal Road Landfill
Monitoring Well #6
Groundwater Level (feet)
145
140
135
130
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Spring Measurement
Average Spring Level
Historic Low

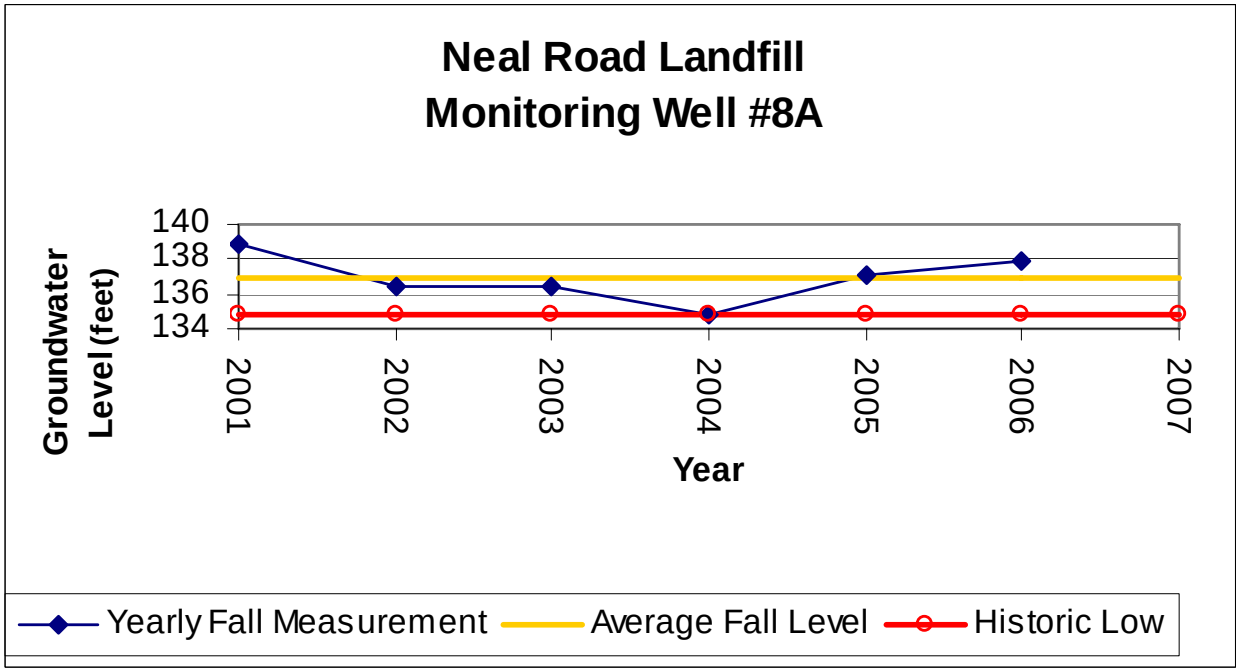

Neal Road Landfill
Monitoring Well #8A
Groundwater Level (feet)
142
140
138
136
2002
2003
2004
2005
2006
2007
Year
Yearly Spring Measurement
Average Spring Level
Historic Low

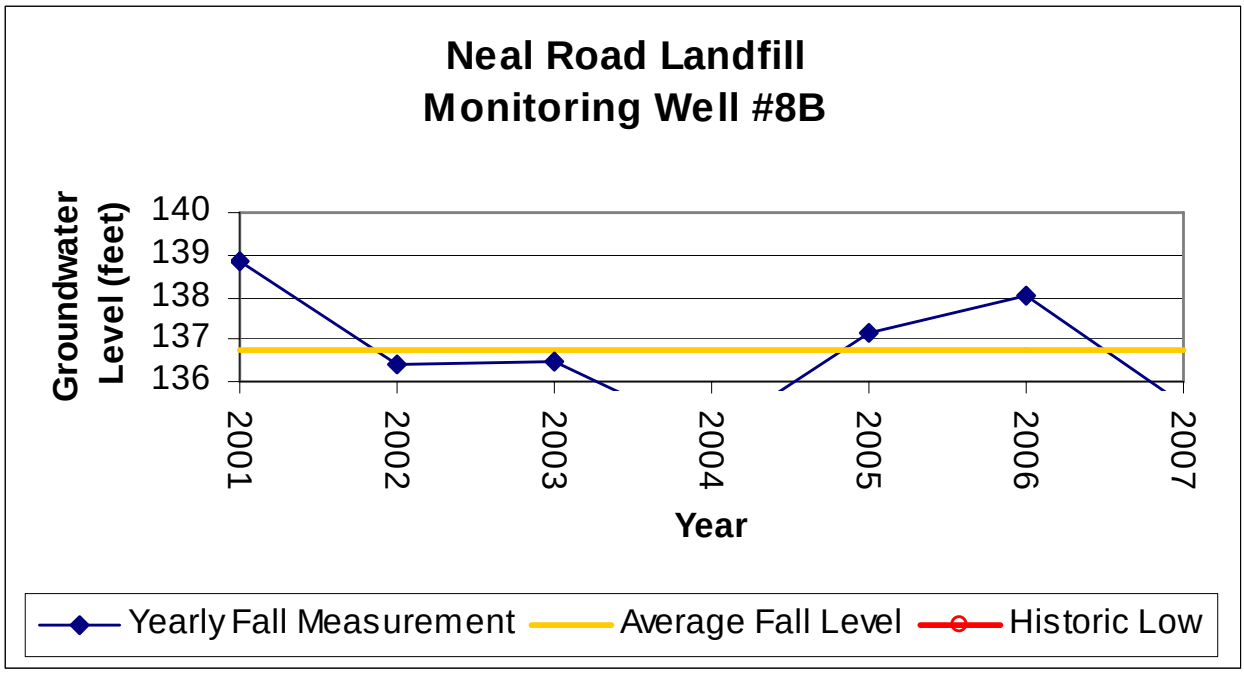

Neal Road Landfill
Monitoring Well #8B
Groundwater Level (feet)
142
140
138
136
2002
2003
2004
2005
2006
2007
Year
Yearly Spring Measurement
Average Spring Level
Historic Low

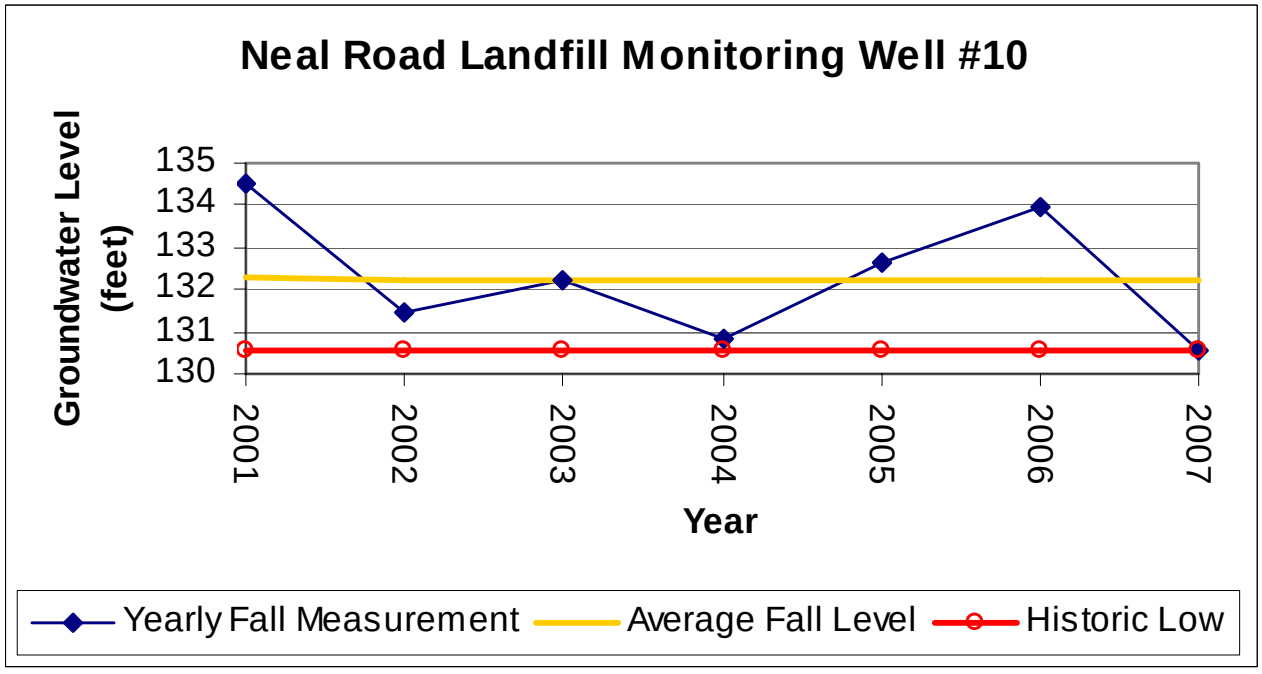

Neal Road Landfill Monitoring Well #10
Groundwater Level (feet)
138
136
134
132
2002
2003
2004
2005
2006
2007
Year
Yearly Spring Measurement
Average Spring Level
Historic Low


Neal Road Landfill
Monitoring Well #4
Groundwater Level (feet)
152
150
148
146
144
142
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Fall Measurement
Average Fall Level
Historic Low


Neal Road Landfill
Monitoring Well #6
Groundwater Level (feet)
145
140
135
130
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Fall Measurement
Average Fall Level
Historic Low


Neal Road Landfill
Monitoring Well #8A
Groundwater Level (feet)
140
138
136
134
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Fall Measurement
Average Fall Level
Historic Low


Neal Road Landfill
Monitoring Well #8B
Groundwater Level (feet)
140
139
138
137
136
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Fall Measurement
Average Fall Level
Historic Low


Neal Road Landfill Monitoring Well #10
Groundwater Level (feet)
135
134
133
132
131
130
2001
2002
2003
2004
2005
2006
2007
Year
Yearly Fall Measurement
Average Fall Level
Historic Low