NORTHEAST GEOSCIENCE INC

Water Supply and Environmental Consulting

May 4, 2015

Jeffrey Brem, PE
Meisner Brem Corporation
142 Littleton Road, Suite 16
Westford, MA 01886

Re: Groundwater Impact Analysis – Response #1
Brem Property
100 Long Ridge Road
Carlisle, MA

Dear Mr. Brem:

Northeast Geoscience, Inc. (NGI) has received the letter from GHC dated April 17, 2015 regarding the Groundwater Impact Analysis we conducted at the above address. We offer the following responses to the Comments and Recommendations raised by GHC:

1) Well logs, including schematics of the wells, were included in Appendix A of the report. The staff gauges were simply wood stakes driven into the stream bed. A one inch diameter PVC well screen (approximately three feet long) was pushed into the soft sediments by hand in the wetlands just north of the site but was not used in any of the analyses since it could not be located by the survey crew due to snow. Top of casing elevations and ground elevations for the wells are included on Table 1 and the locations of the wells are shown on the maps presented. Profiles could be developed by peer reviewers based on the information provided.

2) The water level data presented in the report for monitoring wells MW-1-15 and MW-1A-15 match the data recorded in the field. The water levels and relative top of casing elevations were verified in the field recently. The results confirmed a water level difference in the wells, with this most recent gauging event showing a difference of 0.91 feet. Possible explanations include: 1) smearing of the borehole in the well with the higher water table elevation (MW-1A-15) resulting in poor communication with the undisturbed deposits; or 2) it's possible that the well with the lower water table elevation (MW-1-15) could be installed in a much more permeable deposit or even within or adjacent to a previously excavated area. Observations made onsite and confirmed by the owner suggest monitoring well MW-1-15 is located adjacent to the buried power service for the existing barn, which may be acting as a preferred pathway for groundwater flow at that location. The hydraulic conductivity values obtained for these two monitoring wells, while not dramatically different, do not contradict the latter suggestion. There may be other explanations we have not considered but the difference is not considered significant.

3) The water table elevations (observed and ESHWT) included in the report were used to develop the watertable contour maps, as presented. At the contour interval used for the maps (5 feet) the water table elevation differences between the well pairs are not observable.

4) The seasonal high groundwater was based on soil mottling observed in test pits. In the vicinity of septic system #1 (near Long Ridge Road) the shallowest soil mottling observed was in test pit TP-305 at a depth of 29 inches. As presented on Table 1 this depth was subtracted from the ground

elevations near MW-1-15 and MW-1A-15. In the vicinity of septic system #2 and #3 no soil mottling was observed since the area has been excavated to create existing riding area. Considering that these leaching areas are located in a similar topographic position, we applied the same correction (subtracting 29 inches from the existing grade) applied to leaching area #1. For the wells located along the lower portion of the site (MW-4-15 and MW-5-15) we used soil mottling observed in test pit 401 which was excavated in that area. We believe that, since soil mottling is assumed to represent evidence of seasonal high groundwater and that the values typically vary across a site, the use of distributed soil mottling observations better represent changes in seasonal high groundwater across the site.

5) The saturated thickness at septic system #1 (12.49 feet) was calculated by subtracting the height of monitoring well MW-1-15 (1.86 feet) and the depth to soil mottling measured in the area (29 inches) from the depth to the bottom of the well (16.76 feet). The saturated thickness at septic system #2 and #3 (7.13 feet) was calculated by taking the average depth to refusal at the four monitoring well locations (9.54 feet) and subtracting 29 inches.

6) The observed saturated thickness at monitoring well MW-4-15 was 12.83 feet. The observed saturated thickness at monitoring well MW-5-15 was 12.13 feet. The original saturated thickness presented for monitoring well MW-5-15 was incorrect. Based on this correction the slug tests were updated and the results were considered insignificant. A discussion of the slug test results in included in item 7 below.

7) According to the U.S. Geological Survey (Morrissey, 1989), "*The alternate layering of coarse and fine materials within stratified-drift deposits creates a situation in which vertical hydraulic conductivity is less than horizontal hydraulic conductivity. The ratio of horizontal to vertical hydraulic conductivity in stratified drift is typically 10:1 but may be as high as 100:1 or 1,000:1".*

   The slug test data were reanalyzed using the Bouwer & Rice method and the results are included in Appendix B and included the adjusted saturated thickness for monitoring well MW-5-15. As can be seen from the results of the updated analysis the average hydraulic conductivity was calculated to be 9 ft /day (vs the previous value of 10.9 ft/day) and the geometric mean was calculated to by 7.4 ft/day (vs the previous 9 ft/day). We consider the difference in values to be de minimis when considering that: 1) we were conservative in choosing the best fit lines for the slug test data (specifically MW-3-15 and MW-3A-15); 2) the saturated thickness increases in the downgradient direction, and thus the transmissivity increases, which is not accounted for; and 3) the specific yield value of 0.07 used for the simulations (till/sandy clay) is conservative.

8) Separate groundwater mounding analyses were conducted for septic system #1 and septic systems #2 & #3 to account for the differences in saturated thickness at each location, and the independent groundwater mound maps (contour maps showing mound height) were presented to show the relative predicted groundwater mounds at each location. However, the models were based on the same model grid and the predicted mounds were combined (by superposition) to generate the post-development "seasonal high water plus mound map". For your reference, we have modified the simulation for septic system #1 to include the septic system for the existing home. The model includes a septic system 20 feet x 30 feet with a discharge of 440 gpd (0.098 ft/day). The model also includes an increase in the discharge to septic system #1 to reflect 100% of Title 5 flows, as described in response #9. The results for this new model run were combined using superposition to generate a new groundwater mound map for the site showing the combined mound for all four septic systems (at Title 5 flows). The combined mounds are shown on Figure 7. As can be seen from Figure 7, the combined mounds

are not significantly different from those presented previously. This is likely due to the fact that the proposed leaching areas are separated by almost 600 feet.

9) The groundwater mounding models [for (1) the existing house and proposed septic system #1; and (2) proposed septic systems #2 and #3] were reconfigured to simulate 100% of Title 5 flows. The models originally presented inadvertently simulated flows slightly below Title 5 flows. The mounds from each simulation were then combined using superposition to simulate the cumulative mounding effects across the site. The results of this analysis are presented on Figure 7 and show a maximum groundwater mound of 2.37 feet beneath proposed septic systems #2 and #3 and a maximum groundwater mound beneath proposed septic system #1 of 1.1 feet.

10) The groundwater mounding models were configured to simulate discharges of Title 5 flows for a period of 30 days. This assumes that the seasonal high water table persists for a period of 30 days, and that each bedroom in each unit contains two people, and that each person uses 55 gallons, each day. Clearly this condition that has a very low probably of occurrence. In addition, the MassDEP nitrogen loading model (based on census data) uses an occupancy of 3 people per unit, so the Title 5 flow estimates significantly overestimate actual wastewater flows.

    To further support this assumption NGI reviewed USGS groundwater data for monitoring wells in the vicinity of the proposed development with periods of record longer than 10 years. Data for two wells, Well-78 (11 years of data) located in Acton and Well-158 (28 years of data) located in Wilmington were reviewed and graphs of the water level vs time are included in Appendix C. As can be seen on the water level graphs the average seasonal high groundwater levels for the two wells occur in mid to late April and persist at the peaks for periods of less than 30 days.

11) There are currently no stormwater controls at the site in the existing condition. Under proposed conditions it has been assumed that normal stormwater flows will be retained on site. NGI estimated the amount of evapotranspiration based on the report by Randall (1996) which estimates evapotranspiration at the site is 21-22 inches/year or roughly 50% of the average precipitation. Therefore NGI estimated a 50% impervious runoff rate for existing conditions. If we assumed 100% recharge of current normal stormwater flows, the projected nitrogen concentrations under existing conditions would be reduced to 13.2 mg/l.

12) It is important to note that the mass-balance nitrogen loading model was developed to show the relative nitrogen load for the existing and proposed condition to groundwater in the vicinity of the site and should not be used to make assumptions regarding potential nitrogen concentrations at the site at specific locations. The assumptions used in the model are conservative and are simple straightforward way to compare the relative loads from existing and proposed site conditions. As the model shows, the proposed development results in a reduction of the nitrogen load under current land uses.

13) NGI modified the solute transport model by reducing the solute decay coefficient (half-life) to zero. Results for the points of interest are included in Appendix C and the results are discussed below.

14) NGI developed plume maps for the updated solute transport simulations noted in Item 13 above for Septic System #1 and Septic Systems #2 and #3, and the results are shown on Figure 8 and Figure 9. As can be seen from the plume maps, projected nitrate concentrations in the

overburden aquifer at the existing private well (90 Long Ridge Road), at the proposed wells downgradient of the proposed septic systems (Unit 1, Unit 11 and Unit 12), and at the wetlands areas are all below 10mg/L.

Please do not hesitate to call if you have any questions regarding this matter.

Sincerely,
NORTHEAST GEOSCIENCE, INC.

Joel Frisch, P.G.
Hydrogeologist

References:

Morrissey, Daniel J., 1989. Estimation of the recharge area to a pumped well in a glacial-drift, river-valley aquifer. USGS Water Supply Paper WSP-2338.

Randall, Allen D., 1996. Mean Annual Runoff, Precipitation, and Evapotranspiration in the Glaciated Northeastern United States 1951-1980. U.S. Geological Survey Open File Report 96-395

FIGURES

NGI
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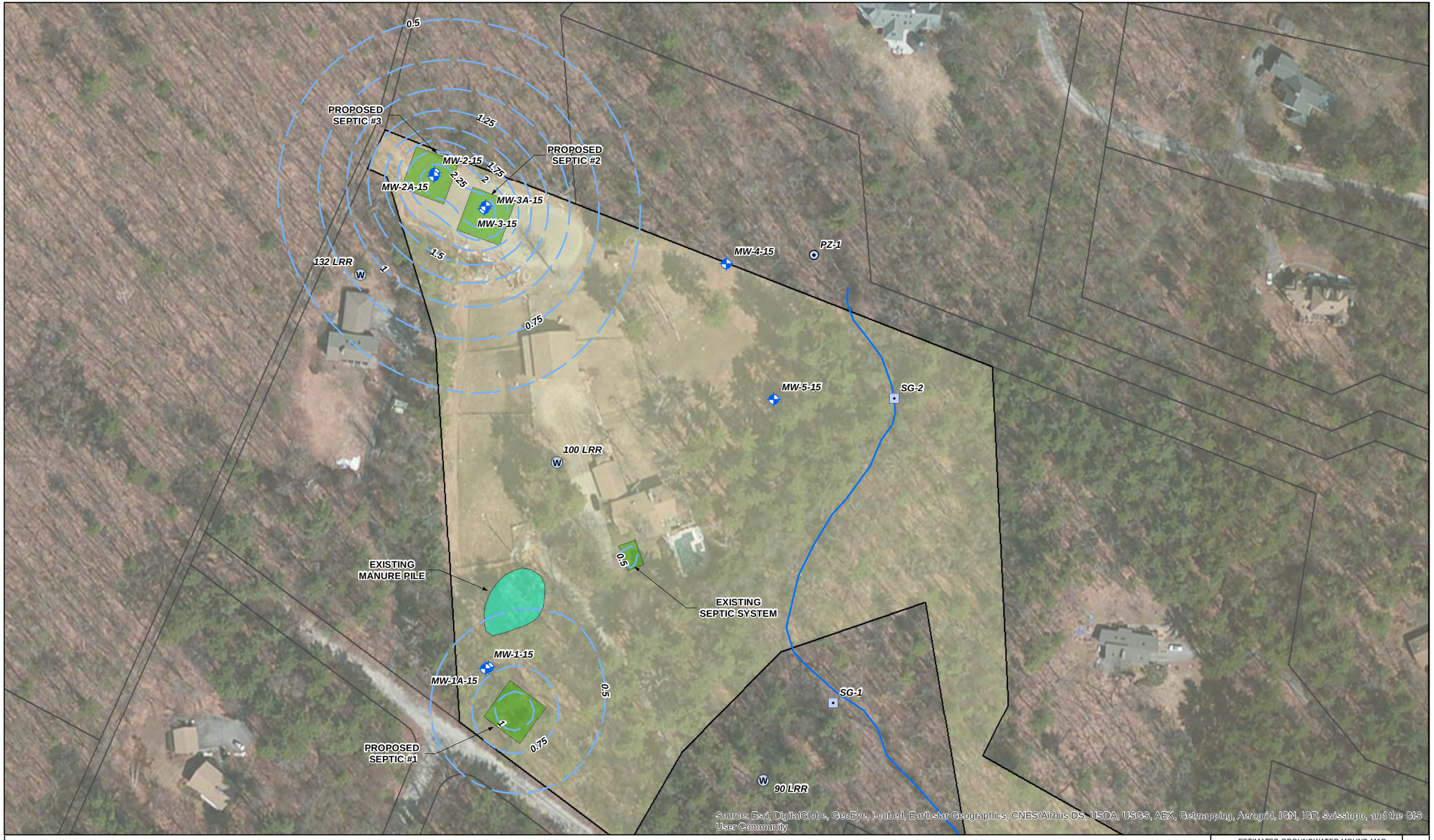

NGI
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www.northeastgeoscience.com

- Monitoring Well
- Private Domestic Well
- Staff Gauge
- Piezometer
- Parcel Of Interest
- Manure Pile
- Assessors Parcels
- Estimated Groundwater Mound Contour (ft)
- Approximate Stream Location

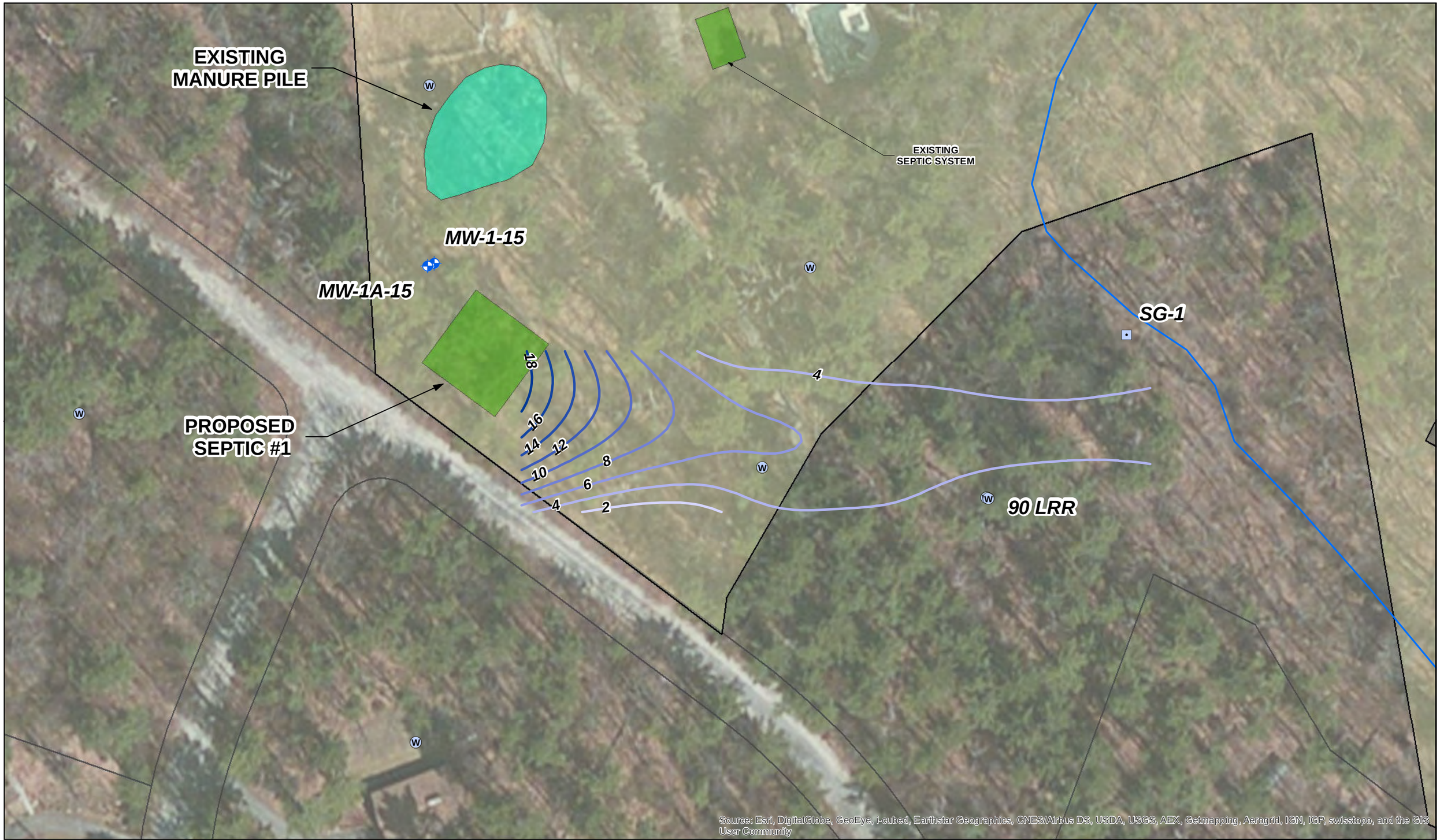
N W E S

0 25 50 100
Feet

ESTIMATED GROUNDWATER MOUND MAP
EXISTING AND PROPOSED SEPTIC SYSTEMS
LIFETIME GREEN HOMES
100 LONG RIDGE ROAD
CARLISLE, MASSACHUSETTS

NGI REF: Fig5GwMoundMap
Drafted By: JAF | Date: 05/02/2015
Source: Meisner Brem, MassGIS, ArcGIS.com

FIGURE 7



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- Monitoring Well
- Private Domestic Well
- Staff Gauge
- Piezometer
- Parcel Of Interest
- Manure Pile
- Assessors Parcels
- Estimated Nitrate Concentration (mg/L)
- Approximate Stream Location

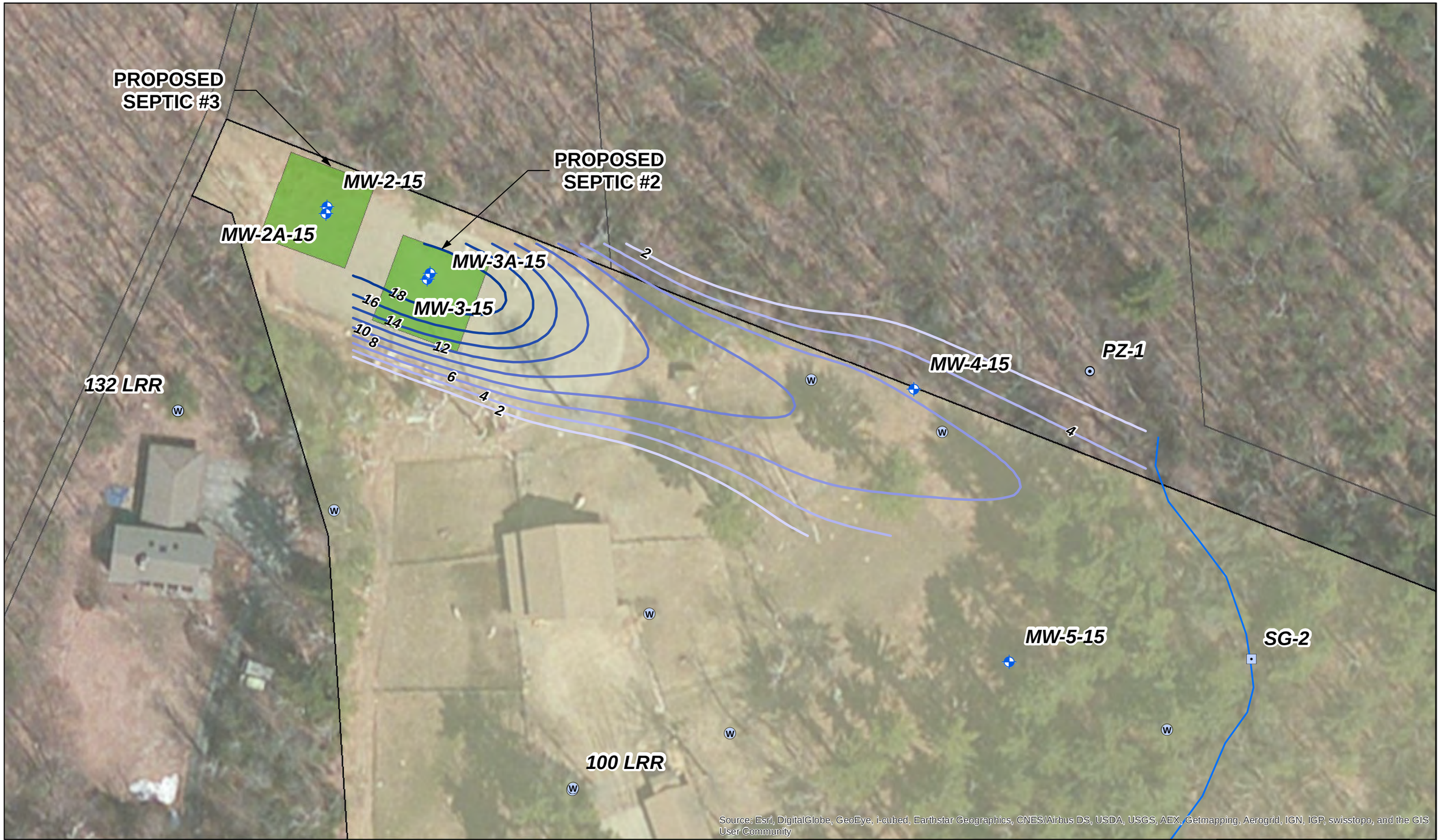
N W E S

0 12.5 25 50
Feet

APPROXIMATE NITRATE PLUME MAP
3 PEOPLE PER UNIT @ 55 GPD/PERSON & 19MG/L
LIFETIME GREEN HOMES
100 LONG RIDGE ROAD
CARLISLE, MASSACHUSETTS

NGI REF: Fig5GwMoundMap
Drafted By: JAF | Date: 05/02/2015
Source: Meisner Brem, MassGIS, ArcGIS.com

FIGURE 8



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

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- Monitoring Well
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- Estimated Nitrate Concentration (mg/L)
- Approximate Stream Location

N W E S

0 12.5 25 50
Feet

APPROXIMATE NITRATE PLUME MAP
3 PEOPLE PER UNIT, 55 GPD/PERSON, 19 mg/L
LIFETIME GREEN HOMES
100 LONG RIDGE ROAD
CARLISLE, MASSACHUSETTS

NGI REF: Fig5GwMoundMap

Drafted By: JAF | Date: 05/02/2015

Source: Meisner Brem, MassGIS, ArcGIS.com

FIGURE 9

APPENDIX A

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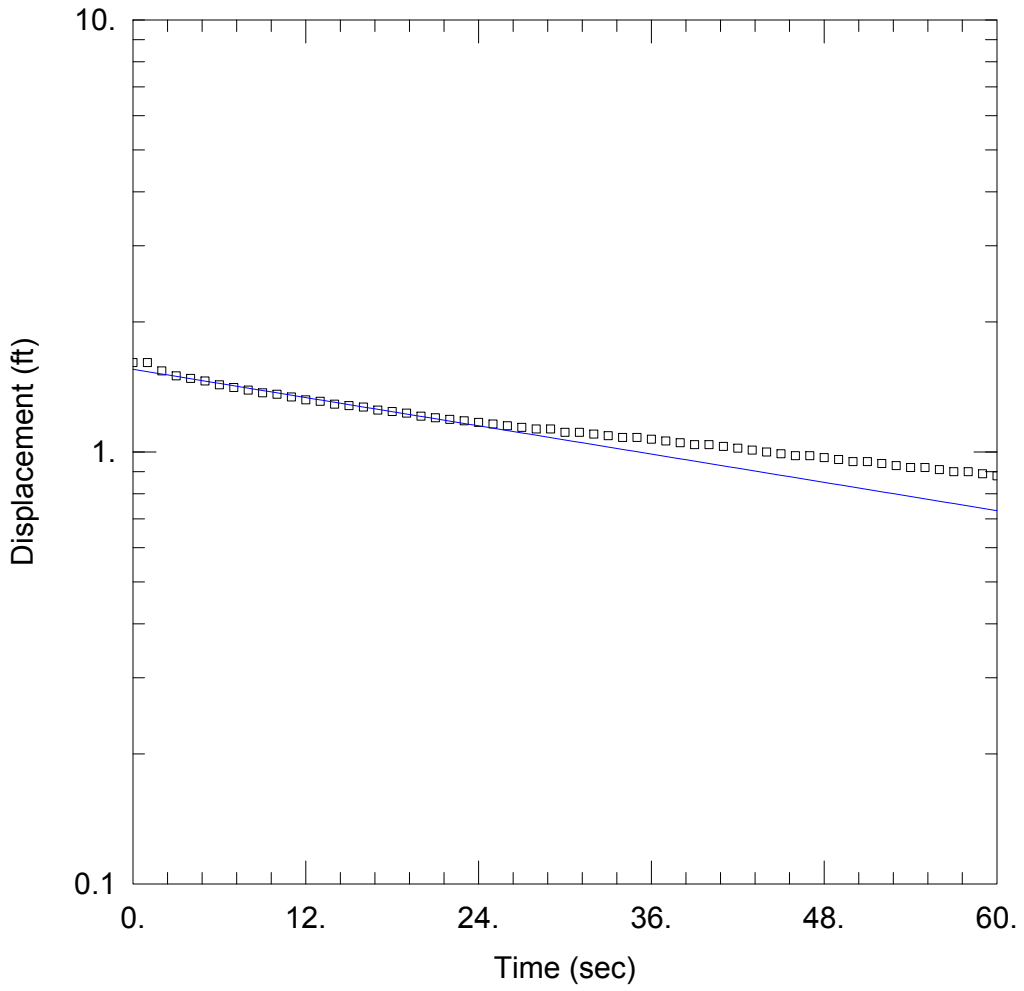


WELL TEST ANALYSIS

Data Set: W:\...\Mw_5_15Results.aqt
Date: 05/03/15 Time: 22:49:28

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-5-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 12.83 ft Anisotropy Ratio (Kz/Kr): 0.1

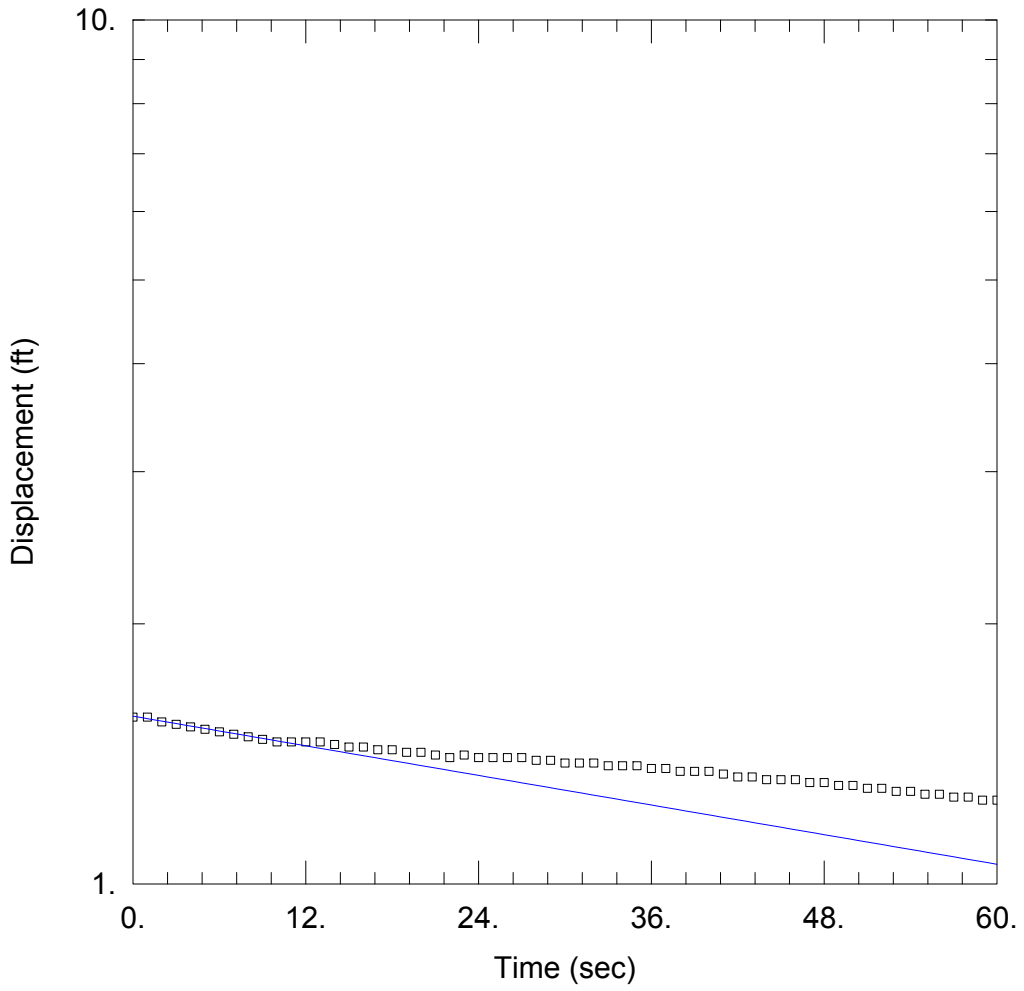
WELL DATA (MW-5-15)

Initial Displacement: 1.61 ft
Total Well Penetration Depth: 15.8 ft
Casing Radius: 0.083 ft
Static Water Column Height: 12.83 ft
Screen Length: 10. ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 7.098 ft/day y0 = 1.553 ft



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-4-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 12.83 ft Anisotropy Ratio (Kz/Kr): 0.1

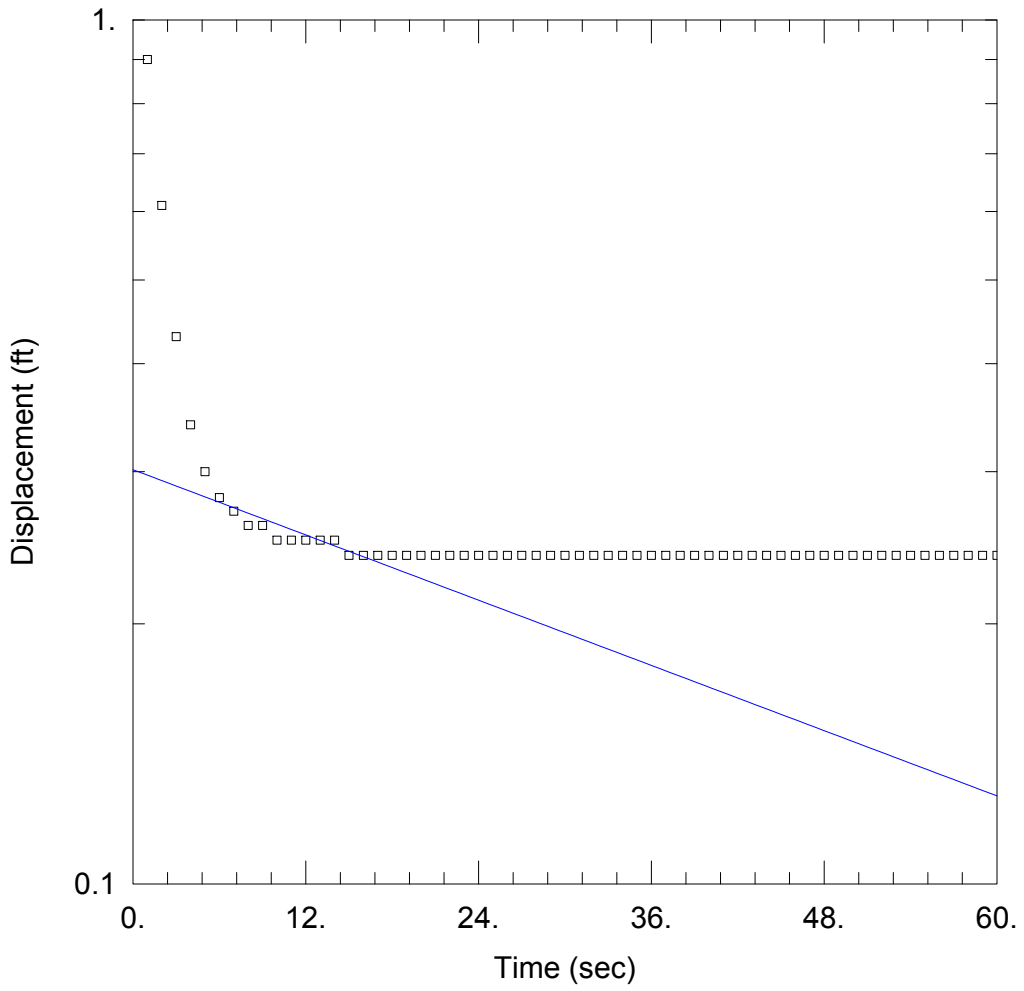
WELL DATA (MW-4-15)

Initial Displacement: 1.56 ft
Total Well Penetration Depth: 16.42 ft
Casing Radius: 0.083 ft
Static Water Column Height: 12.83 ft
Screen Length: 12.83 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 2.236 ft/day y0 = 1.564 ft



WELL TEST ANALYSIS

Data Set: W:\...\Mw_3A_15Results.aqt
Date: 05/03/15 Time: 22:48:31

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-3A-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 3.13 ft Anisotropy Ratio (Kz/Kr): 0.1

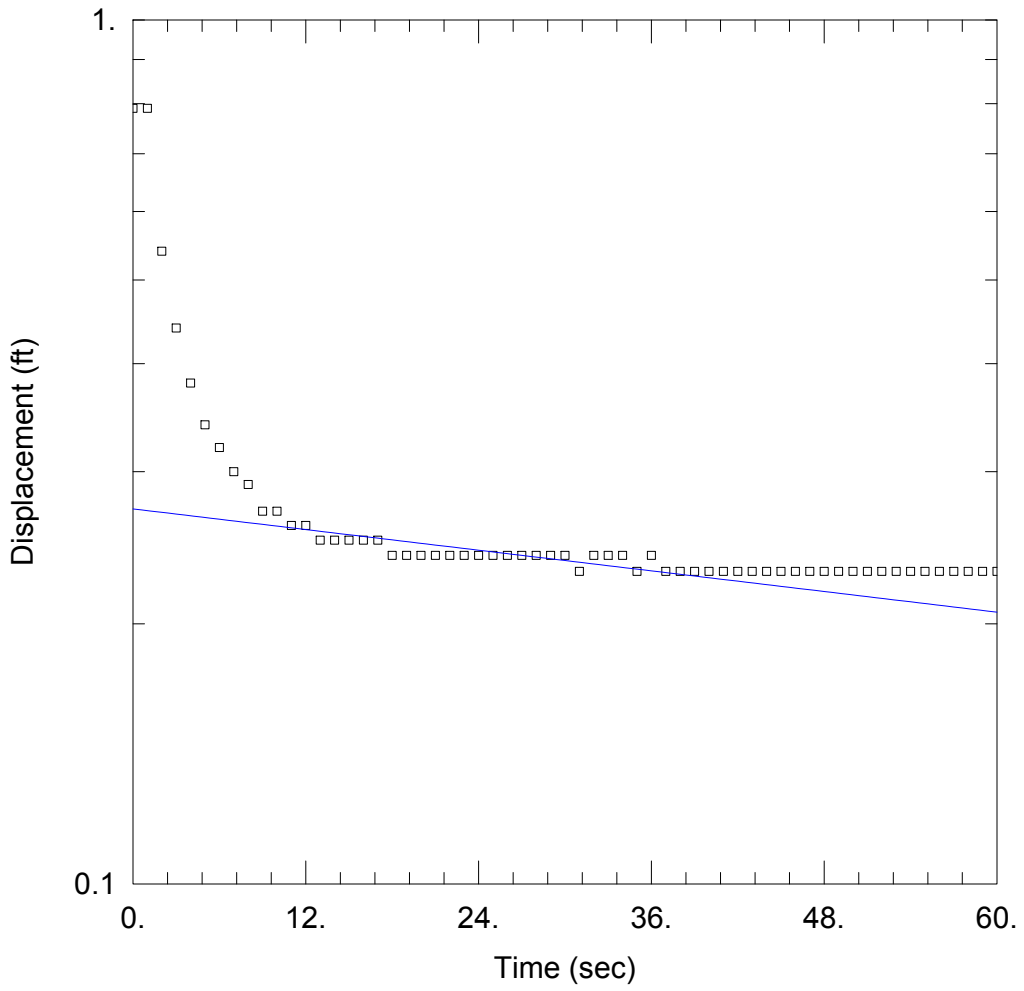
WELL DATA (MW-3A-15)

Initial Displacement: 1.56 ft
Total Well Penetration Depth: 6.72 ft
Casing Radius: 0.083 ft
Static Water Column Height: 3.13 ft
Screen Length: 3.13 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 13.74 ft/day y0 = 0.3016 ft



WELL TEST ANALYSIS

Data Set: W:\...\Mw_3_15Results.aqt
Date: 05/03/15 Time: 22:48:01

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-3-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 3.32 ft Anisotropy Ratio (Kz/Kr): 0.1

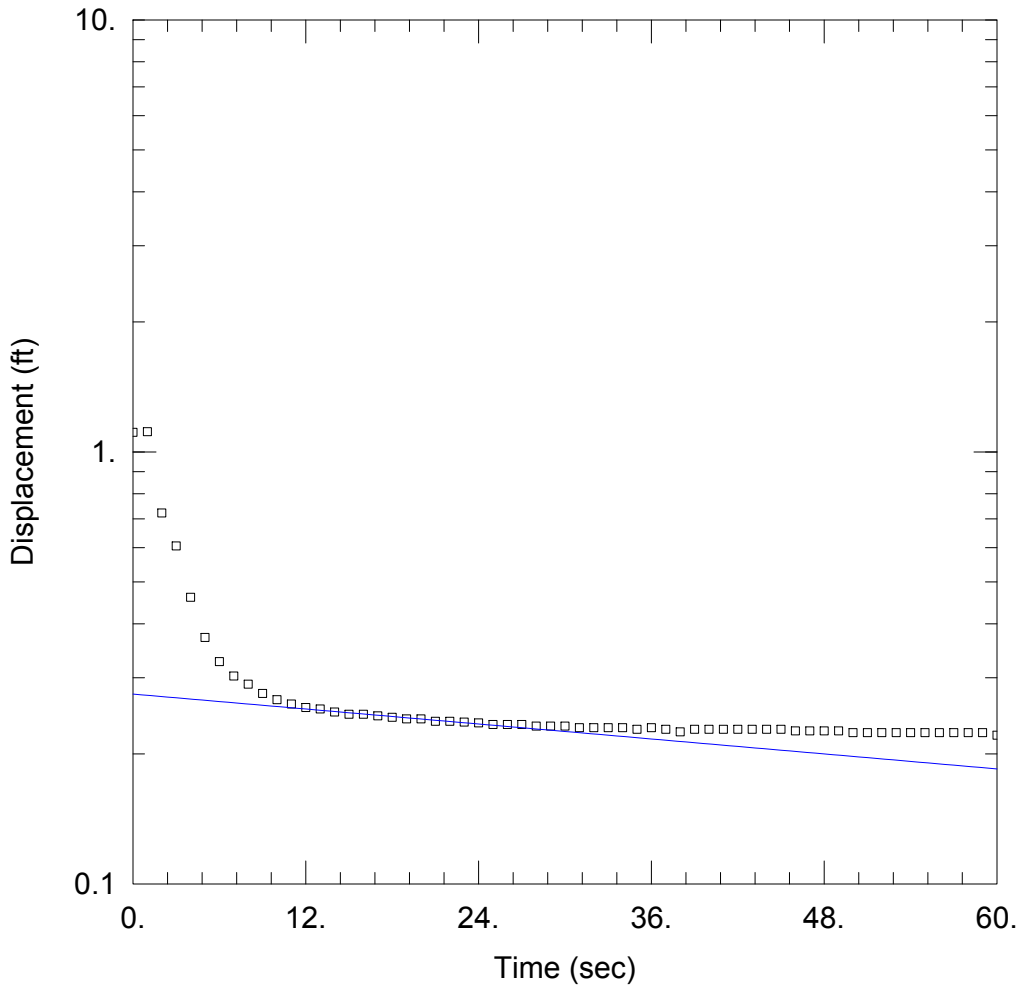
WELL DATA (MW-3-15)

Initial Displacement: 0.79 ft
Total Well Penetration Depth: 6.19 ft
Casing Radius: 0.083 ft
Static Water Column Height: 3.32 ft
Screen Length: 3.32 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 6.143 ft/day y0 = 0.2717 ft



WELL TEST ANALYSIS

Data Set: W:\...\Mw_2A_15Results.aqt
Date: 05/03/15 Time: 22:46:49

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-2A-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 6.79 ft Anisotropy Ratio (Kz/Kr): 0.1

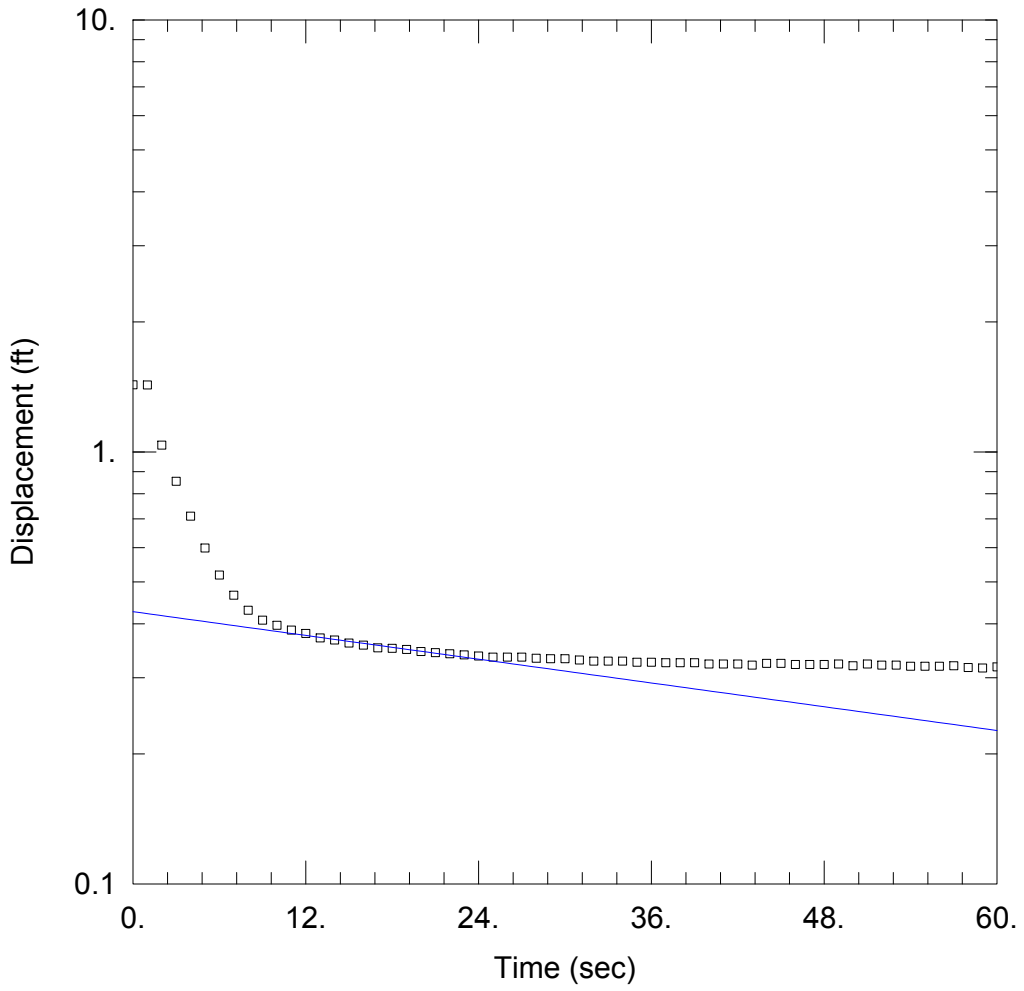
WELL DATA (MW-2A-15)

Initial Displacement: 1.11 ft
Total Well Penetration Depth: 9.15 ft
Casing Radius: 0.083 ft
Static Water Column Height: 6.79 ft
Screen Length: 6.79 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 3.505 ft/day y0 = 0.2751 ft



WELL TEST ANALYSIS

Data Set: W:\...\Mw_2_15Results.aqt
Date: 05/03/15 Time: 22:46:04

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-2-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 6.93 ft Anisotropy Ratio (Kz/Kr): 0.1

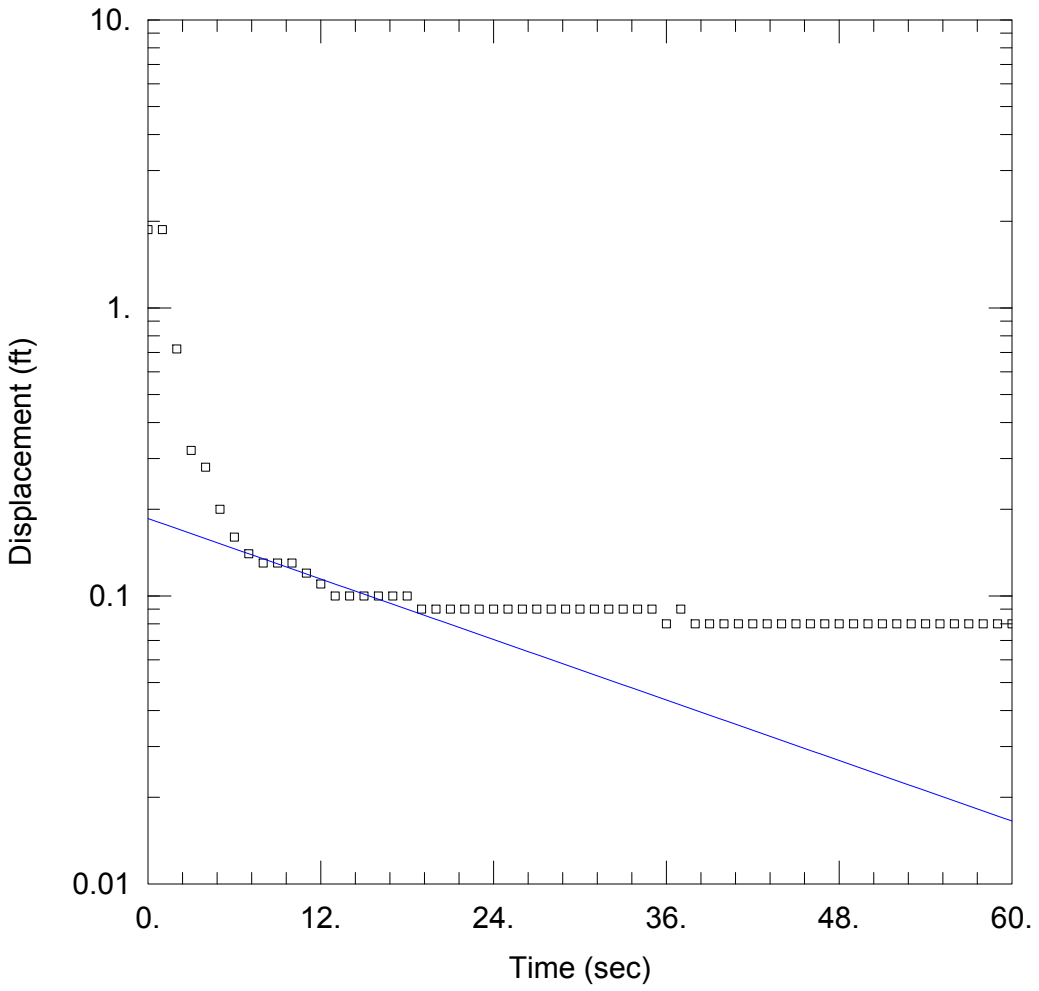
WELL DATA (MW-2-15)

Initial Displacement: 1.43 ft
Total Well Penetration Depth: 9.3 ft
Casing Radius: 0.083 ft
Static Water Column Height: 6.93 ft
Screen Length: 6.93 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 5.487 ft/day y0 = 0.4268 ft



WELL TEST ANALYSIS

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PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-1A-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 9.71 ft Anisotropy Ratio (Kz/Kr): 0.1

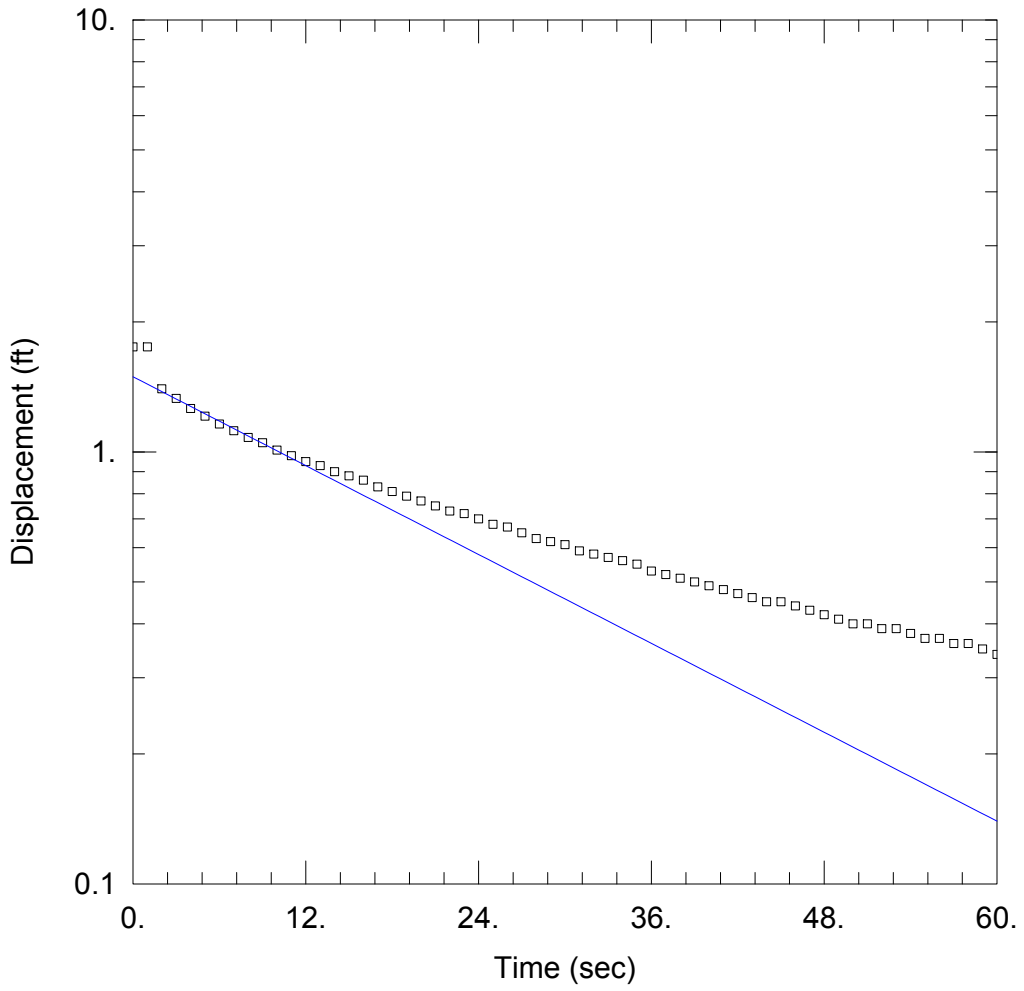
WELL DATA (MW-1A-15)

Initial Displacement: 1.87 ft
Total Well Penetration Depth: 13.92 ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.71 ft
Screen Length: 9.71 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 17.05 ft/day y0 = 0.1857 ft



WELL TEST ANALYSIS

Data Set: W:\...\Mw_1_15Results.aqt
Date: 05/03/15 Time: 22:44:51

PROJECT INFORMATION

Company: NGI
Client: Brem
Project: 150102
Location: Carlisle, MA
Test Well: MW-1-15
Test Date: 02/13/2015

AQUIFER DATA

Saturated Thickness: 9.58 ft Anisotropy Ratio (Kz/Kr): 0.1

WELL DATA (MW-1=15)

Initial Displacement: 1.75 ft
Total Well Penetration Depth: 14.91 ft
Casing Radius: 0.083 ft
Static Water Column Height: 9.58 ft
Screen Length: 9.58 ft
Well Radius: 0.3438 ft
Gravel Pack Porosity: 0.25

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 17.16 ft/day y0 = 1.493 ft

APPENDIX B

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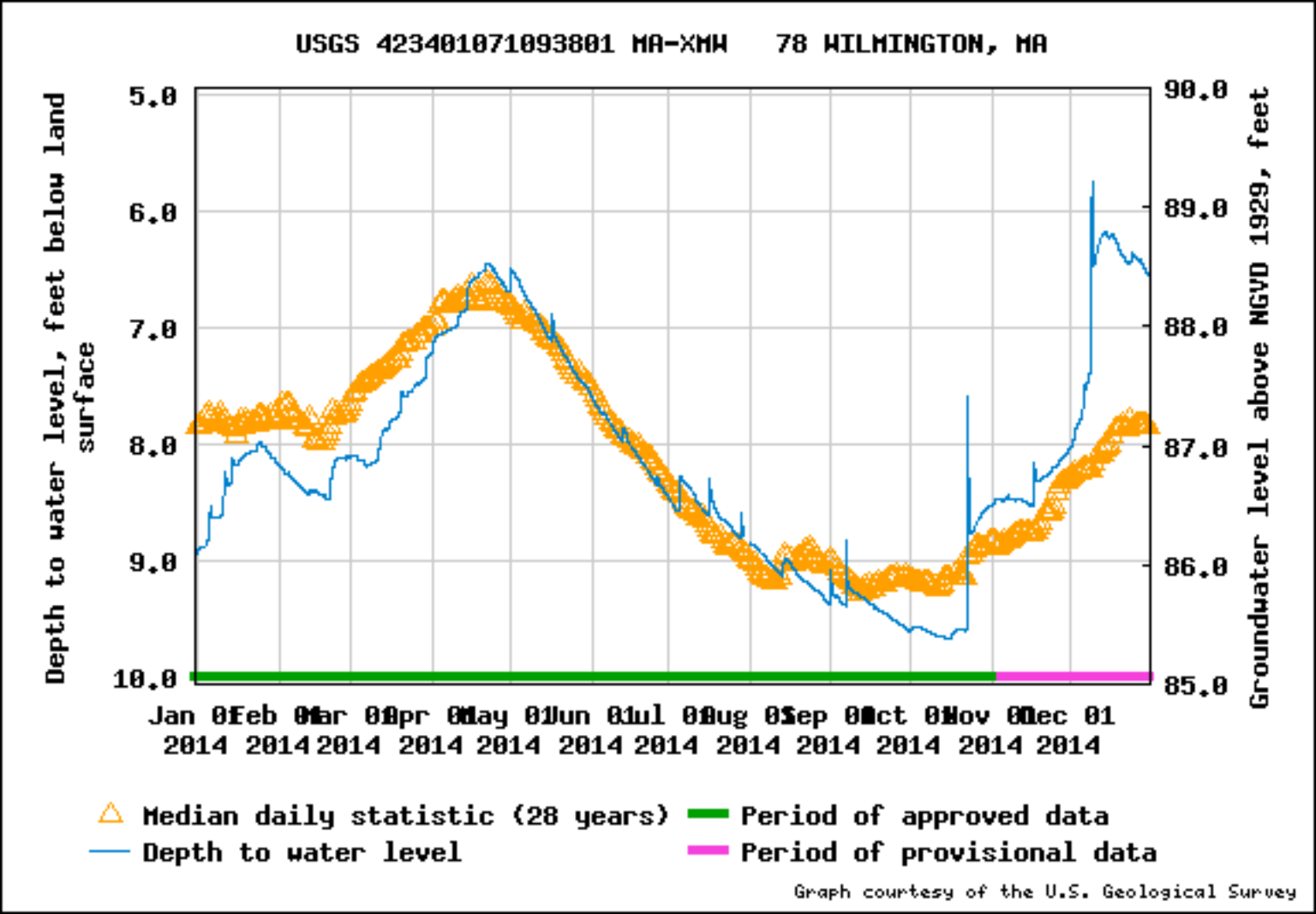
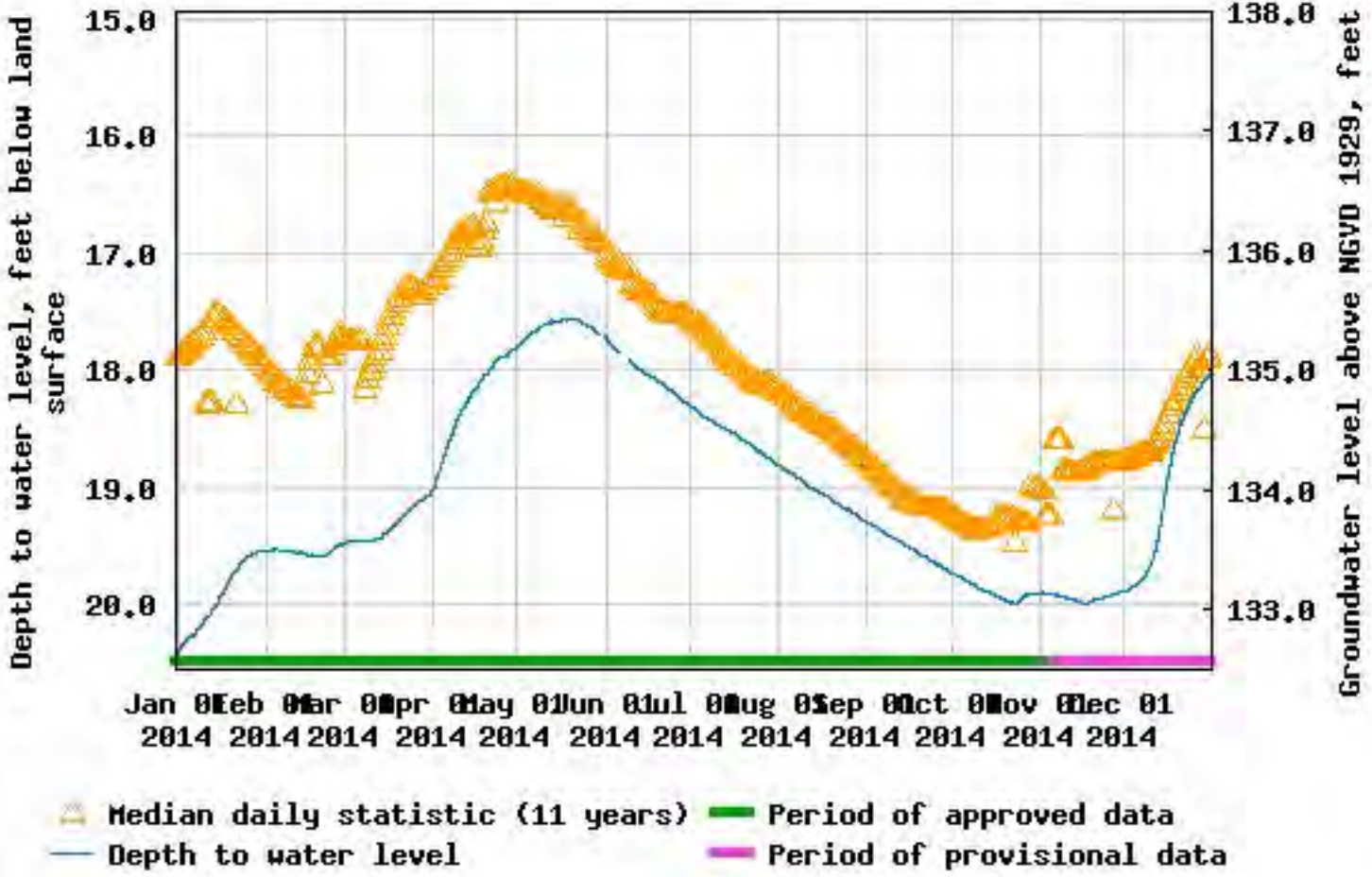

USGS 423401071093801 MA-XMW 78 WILMINGTON, MA
Depth to water level, feet below land surface
5.0
6.0
7.0
8.0
9.0
10.0
90.0
89.0
88.0
87.0
86.0
85.0
Groundwater level above NGVD 1929, feet
Jan 01 2014
Feb 01 2014
Mar 01 2014
Apr 01 2014
May 01 2014
Jun 01 2014
Jul 01 2014
Aug 01 2014
Sep 01 2014
Oct 01 2014
Nov 01 2014
Dec 01 2014
Median daily statistic (28 years)
Depth to water level
Period of approved data
Period of provisional data
Graph courtesy of the U.S. Geological Survey

USGS

USGS 422812071244401 MA-ACW 158 ACTON, MA



APPENDIX C

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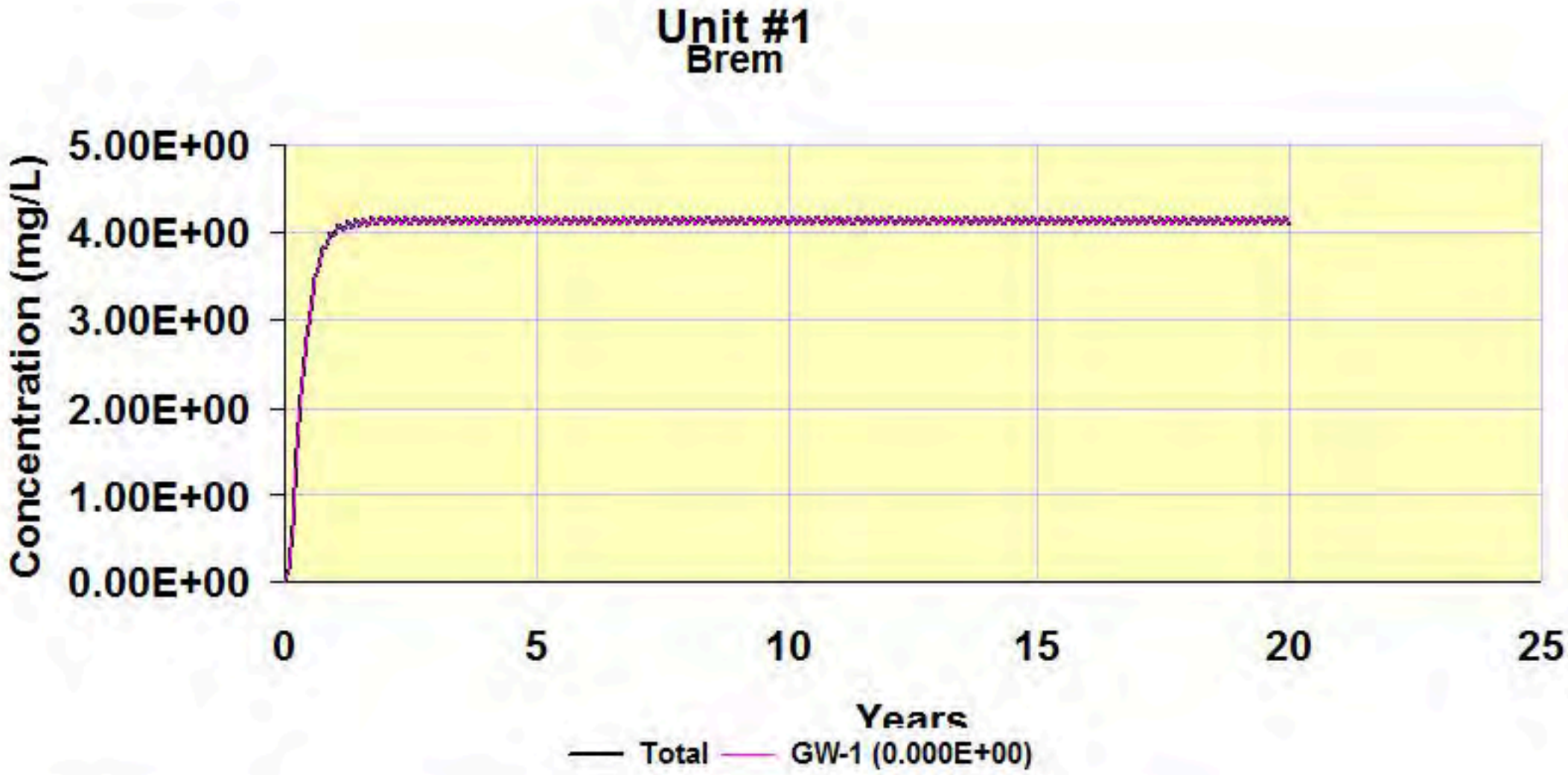
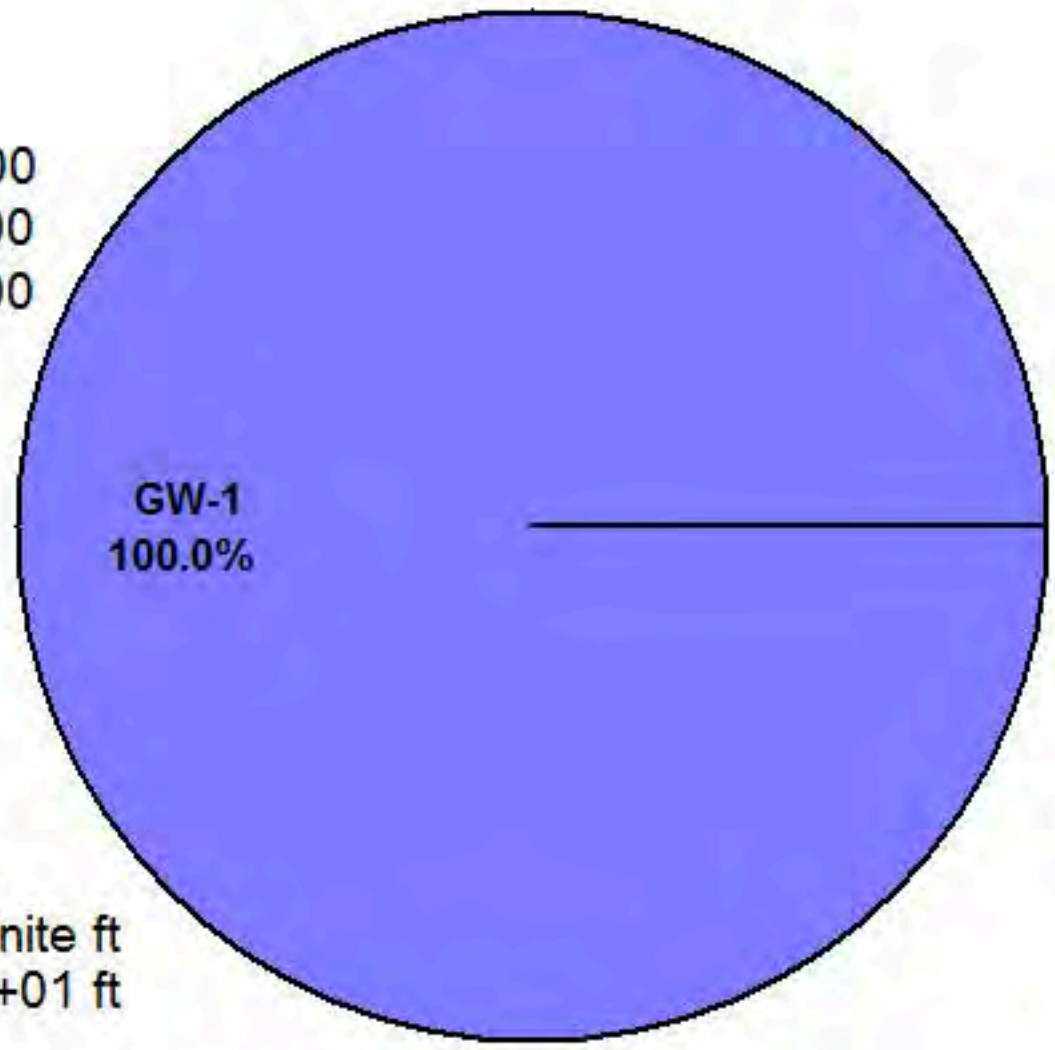


Maximum Concentration: 4.180E+00 mg/L
Year of Maximum Concentration: 3.25

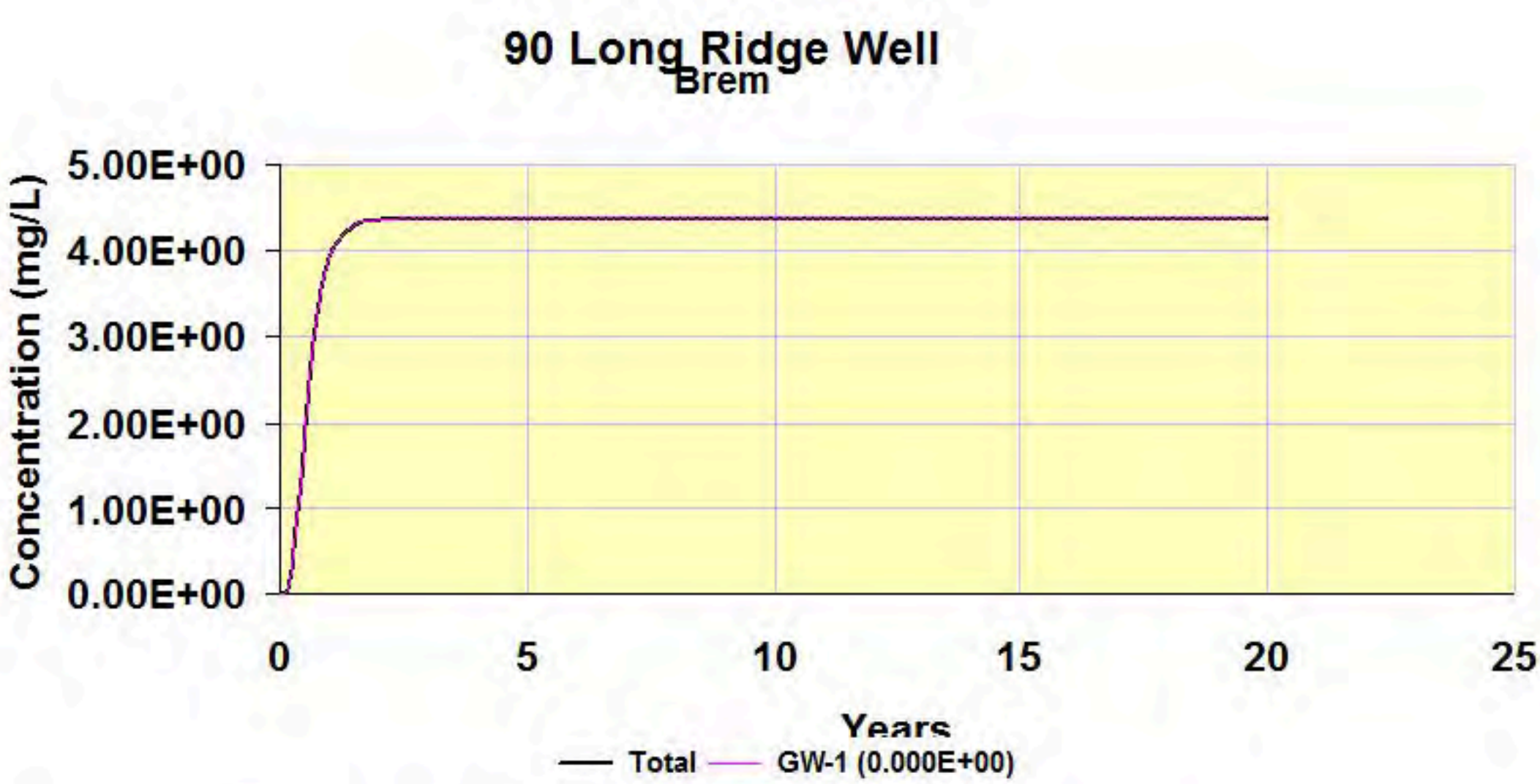
INPUT PARAMETERS

Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.05700

Dispersivities	**Meters**	**Feet**
Longitudinal:	1.400E+01	4.593E+01
Lateral:	1.400E+00	4.593E+00
Vertical:	1.400E-02	4.593E-02



Aquifer Width:	Infinite	m	Infinite	ft
Aquifer Depth:	3.830E+00	m	1.256E+01	ft
Retardation Factor:	1.608E+00			
Soil Bulk Density:	1.700E+03	kg/m3	1.700E+00	g/cm3
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day
Hydraulic Conductivity:			1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption				0.1430E+02 (ug/g)/(ug/ml)
Kd:			7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:			2.026E-02 m/hr	5.627E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			2.837E-01 m2/hr	7.880E-01 cm/sec
Retarded Lateral Dispersion Coefficient:			2.837E-02 m2/hr	7.880E-02 cm/sec
Retarded Vertical Dispersion Coefficient:			2.837E-04 m2/hr	7.880E-04 cm/sec

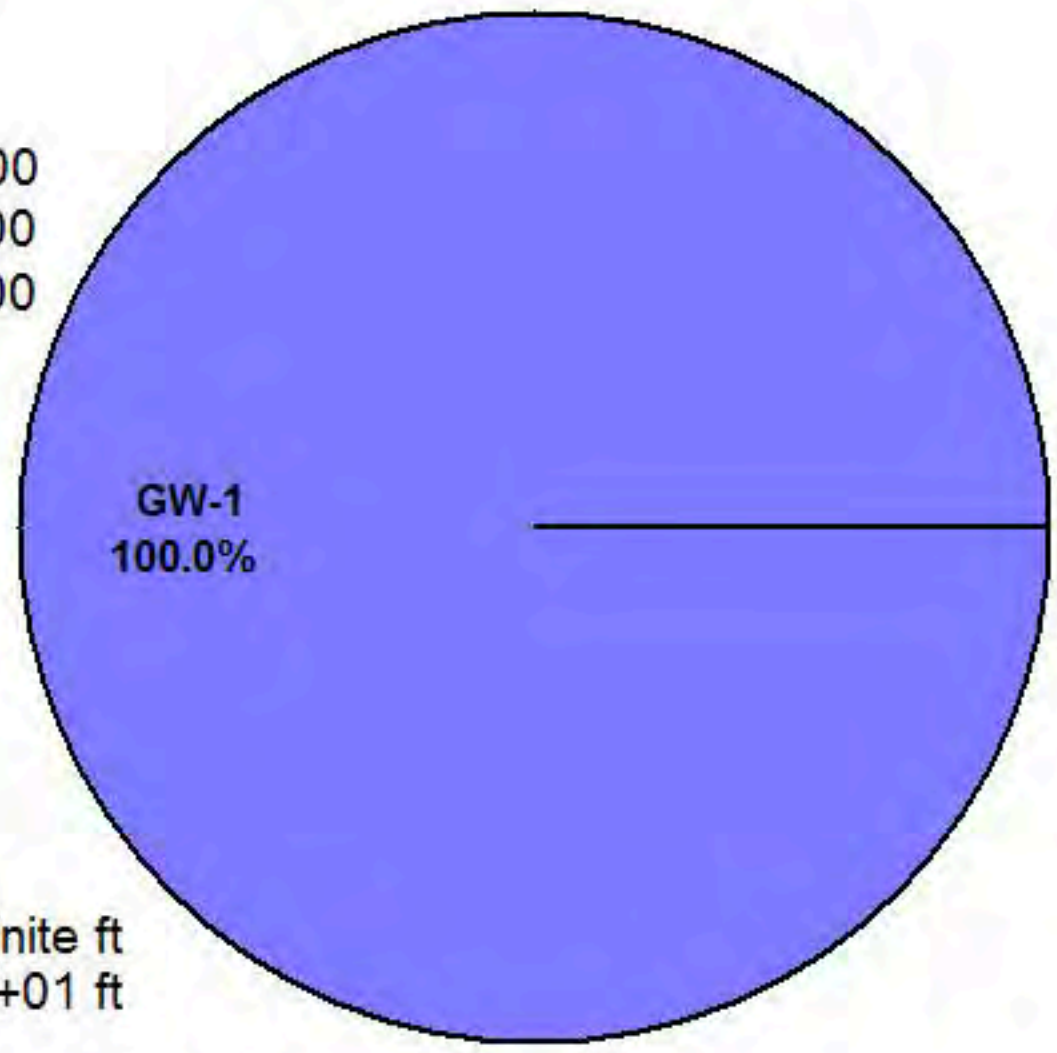


Maximum Concentration: 4.380E+00 mg/L
Year of Maximum Concentration: 2.50

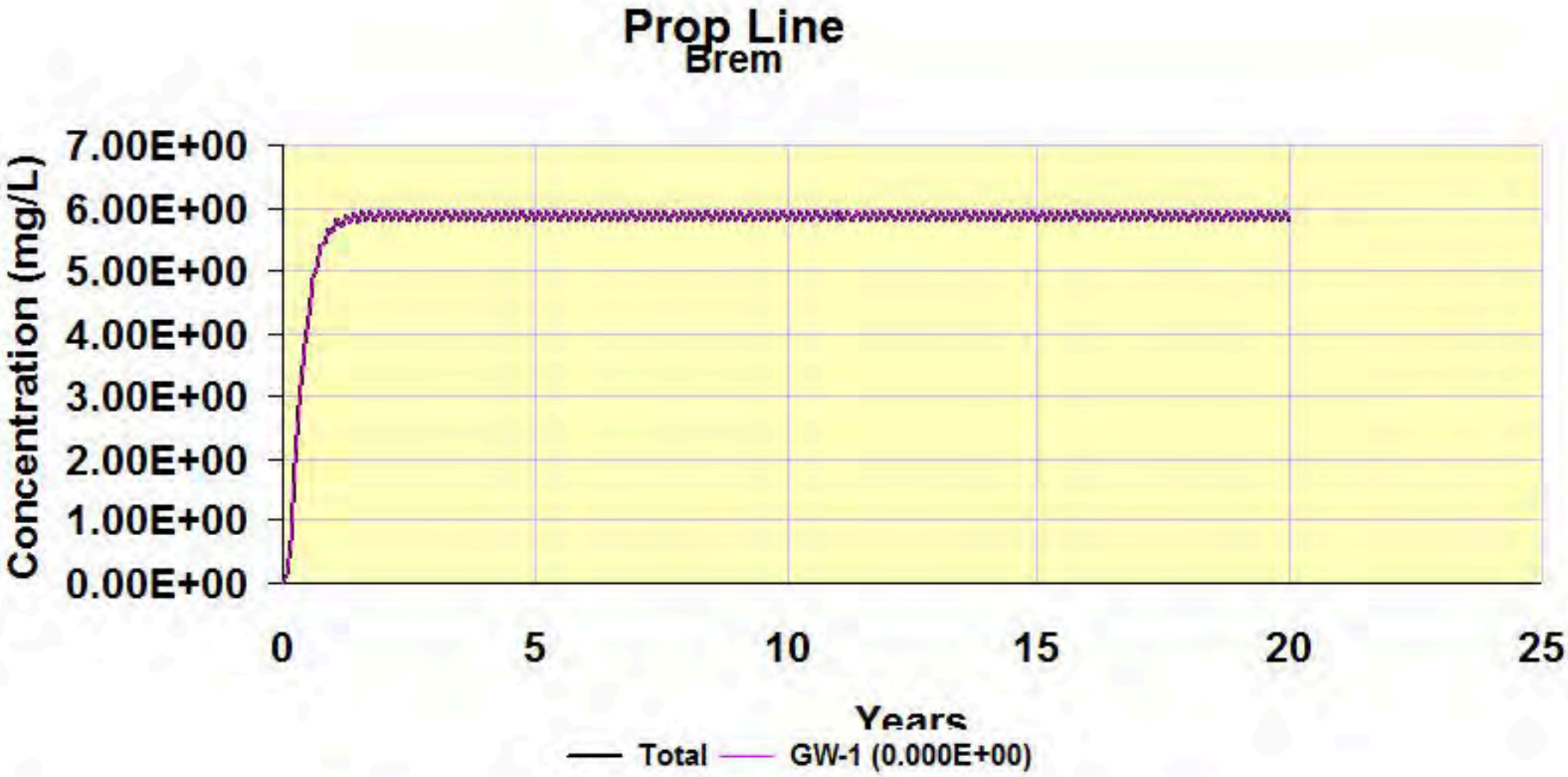
INPUT PARAMETERS

Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.05700

Dispersivities	**Meters**	**Feet**
Longitudinal:	1.400E+01	4.593E+01
Lateral:	1.400E+00	4.593E+00
Vertical:	1.400E-02	4.593E-02



Aquifer Width:	Infinite	m	Infinite	ft
Aquifer Depth:	3.830E+00	m	1.256E+01	ft
Retardation Factor:	1.608E+00			
Soil Bulk Density:	1.700E+03	kg/m3	1.700E+00	g/cm3
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day
Hydraulic Conductivity:			1.143E-01	m/hr 3.175E-03 cm/sec
Carbon Adsorption				0.1430E+02 (ug/g)/(ug/ml)
Kd:			7.000E-05	m3/kg 7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:			2.026E-02	m/hr 5.627E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			2.837E-01	m2/hr 7.880E-01 cm/sec
Retarded Lateral Dispersion Coefficient:			2.837E-02	m2/hr 7.880E-02 cm/sec
Retarded Vertical Dispersion Coefficient:			2.837E-04	m2/hr 7.880E-04 cm/sec

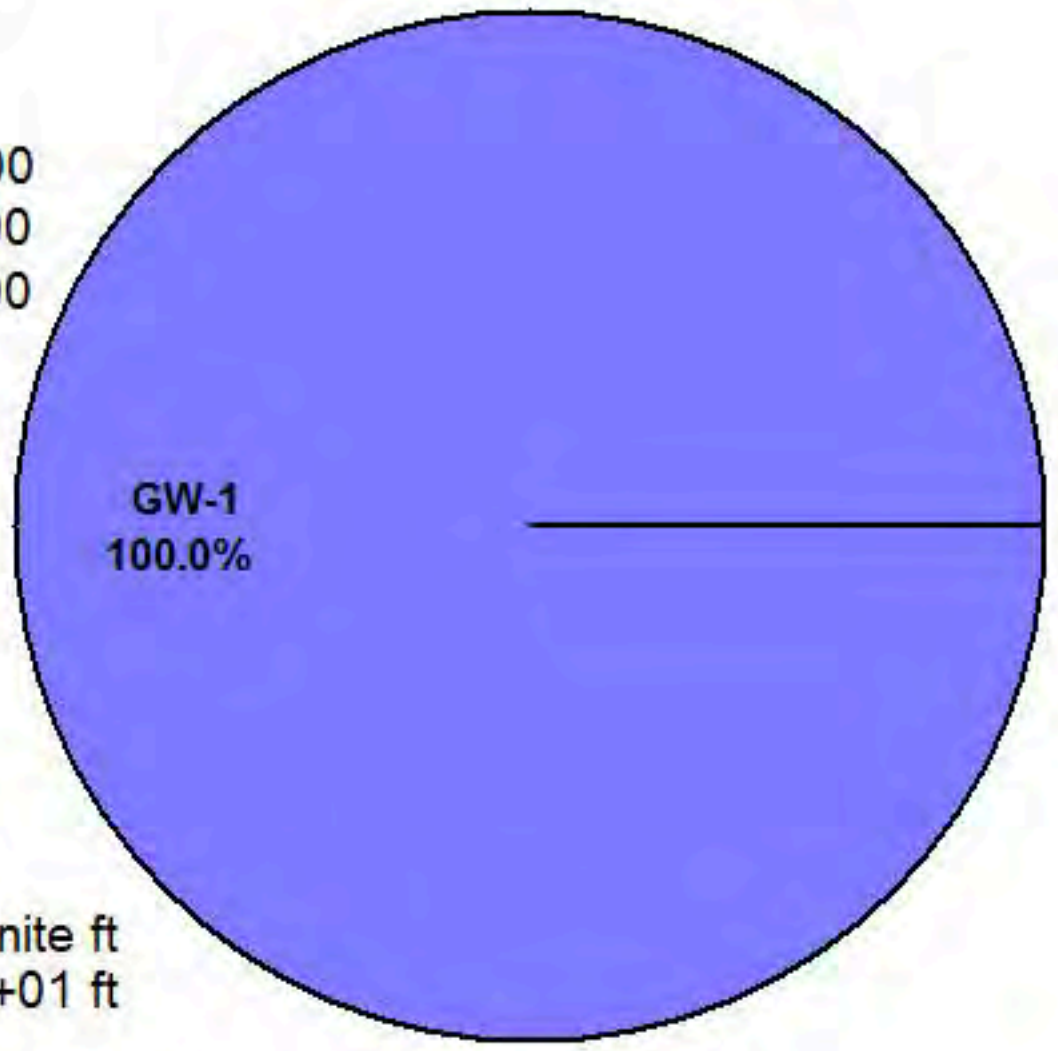


Maximum Concentration: 5.965E+00 mg/L
Year of Maximum Concentration: 2.08

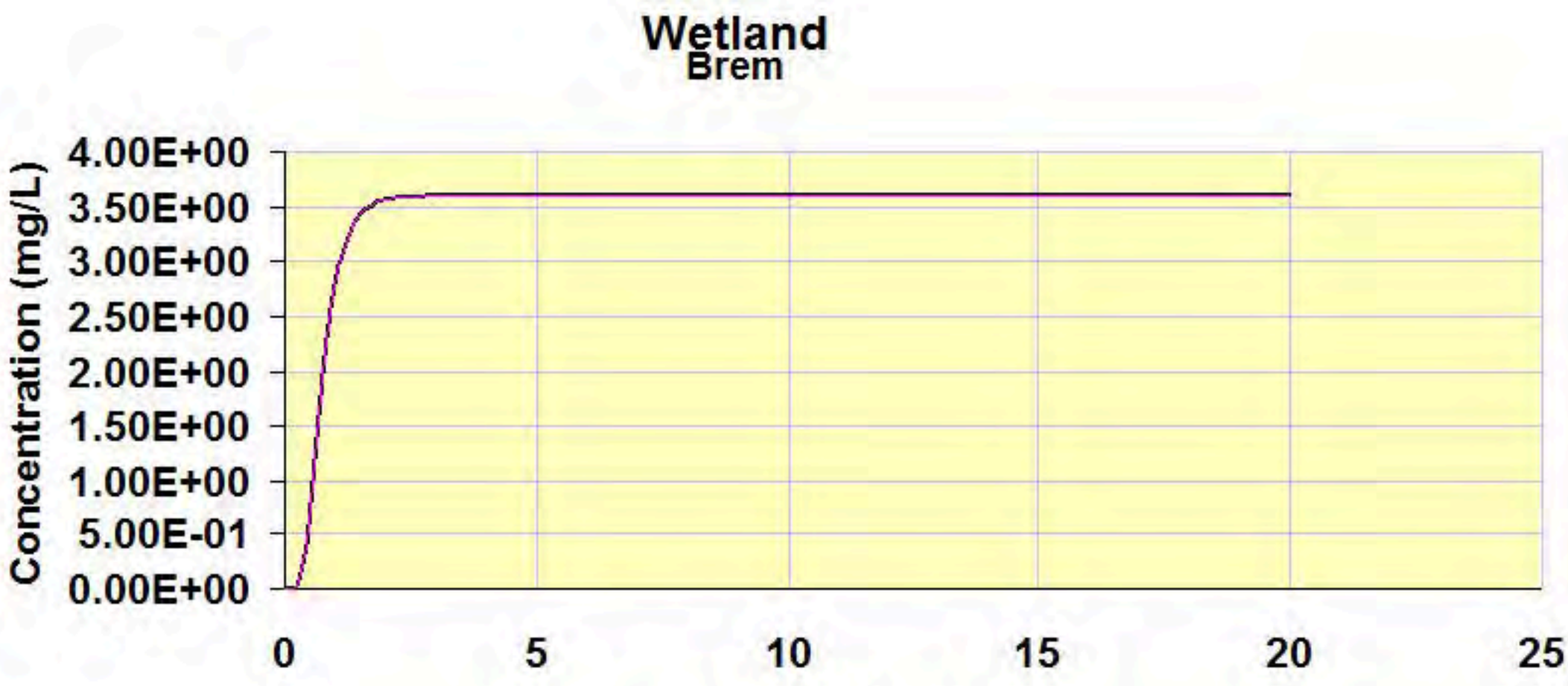
INPUT PARAMETERS

Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.05700

Dispersivities	Meters	Feet
Longitudinal:	1.400E+01	4.593E+01
Lateral:	1.400E+00	4.593E+00
Vertical:	1.400E-02	4.593E-02



Aquifer Width:	Infinite	m	Infinite	ft
Aquifer Depth:	3.830E+00	m	1.256E+01	ft
Retardation Factor:	1.608E+00			
Soil Bulk Density:	1.700E+03	kg/m3	1.700E+00	g/cm3
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day
Hydraulic Conductivity:			1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption				0.1430E+02 (ug/g)/(ug/ml)
Kd:			7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:			2.026E-02 m/hr	5.627E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			2.837E-01 m2/hr	7.880E-01 cm/sec
Retarded Lateral Dispersion Coefficient:			2.837E-02 m2/hr	7.880E-02 cm/sec
Retarded Vertical Dispersion Coefficient:			2.837E-04 m2/hr	7.880E-04 cm/sec

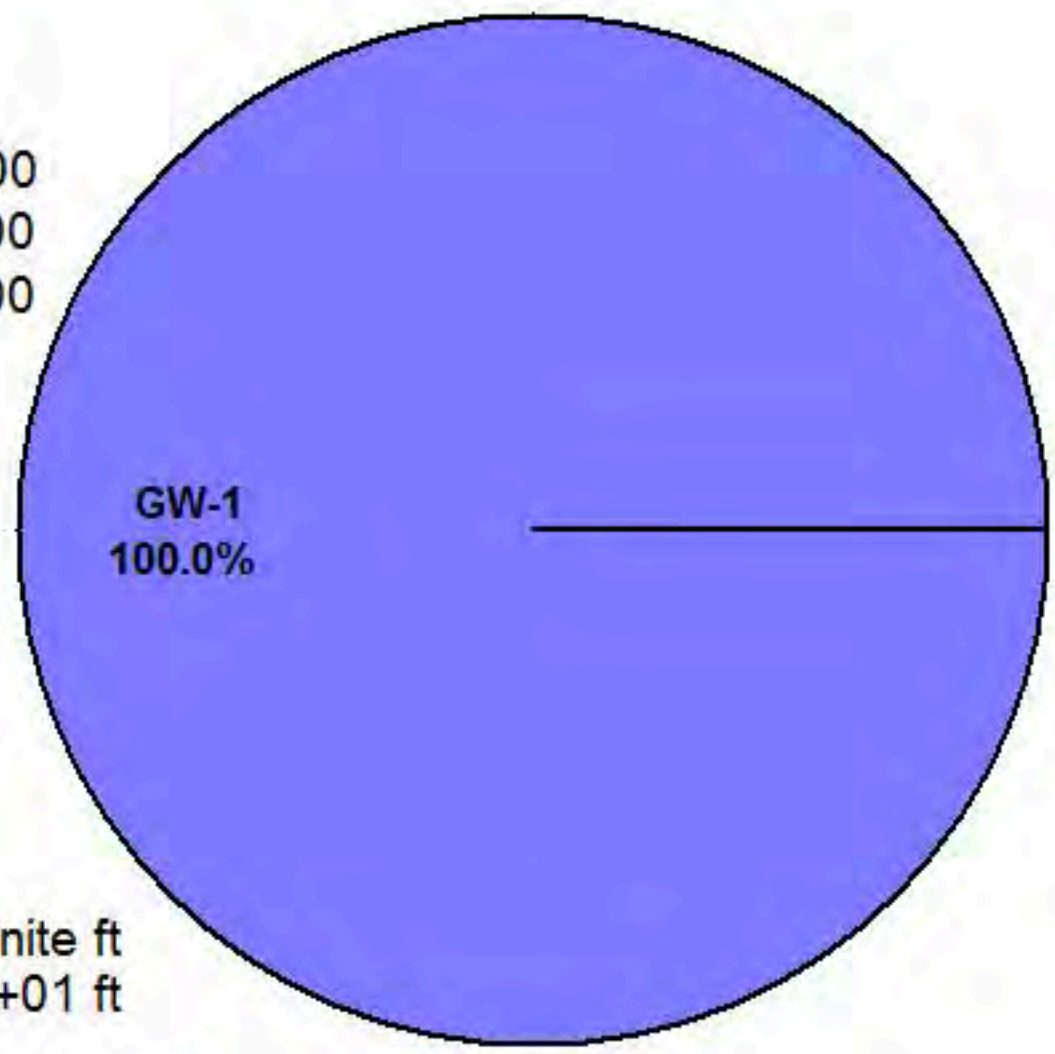


Maximum Concentration: 3.600E+00 mg/L
Year of Maximum Concentration: 2.92

INPUT PARAMETERS

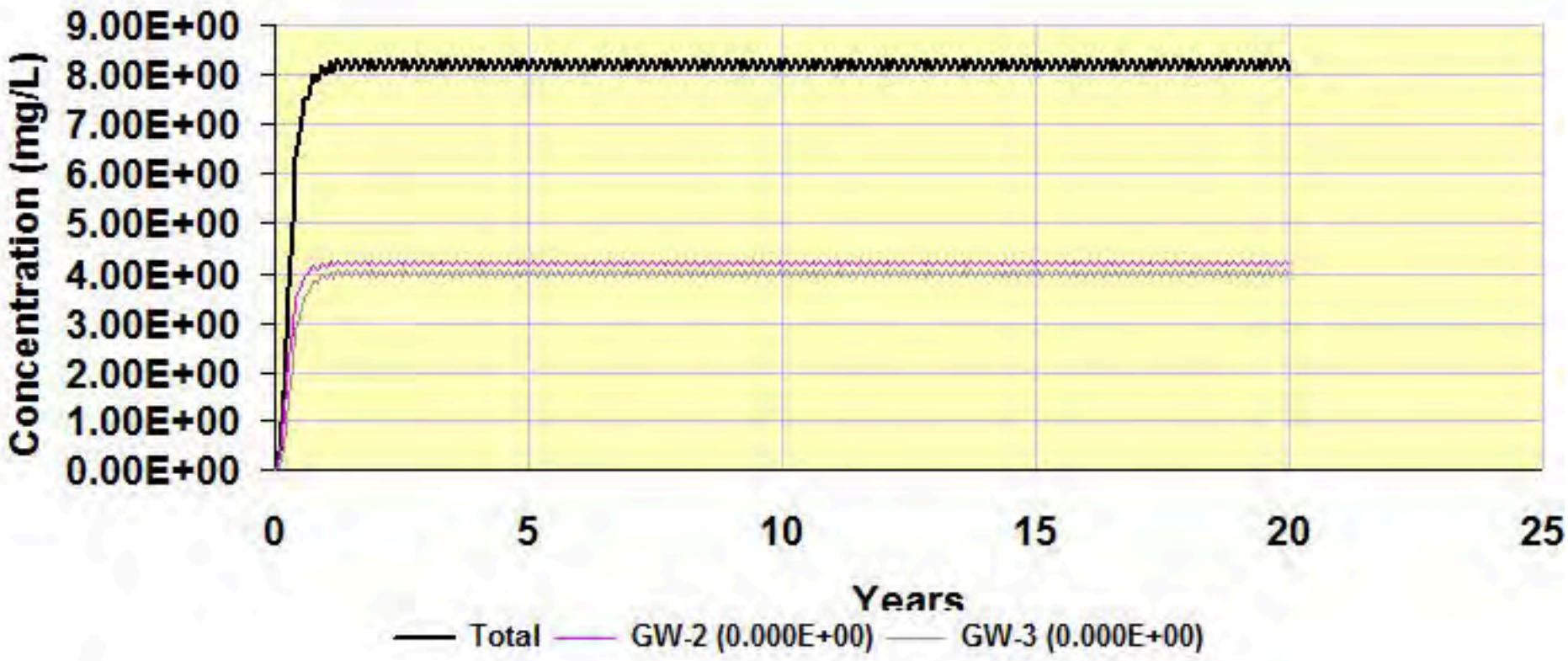
Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.05700

Dispersivities	Meters	Feet
Longitudinal:	1.400E+01	4.593E+01
Lateral:	1.400E+00	4.593E+00
Vertical:	1.400E-02	4.593E-02



Aquifer Width:	Infinite	m	Infinite	ft
Aquifer Depth:	3.830E+00	m	1.256E+01	ft
Retardation Factor:	1.608E+00			
Soil Bulk Density:	1.700E+03	kg/m3	1.700E+00	g/cm3
Molecular Diffusion:	0.000E+00	m2/hr	0.000E+00	cm2/sec
Decay Coefficient:	0.000E+00	1/hr	0.000E+00	1/day
Hydraulic Conductivity:			1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption				0.1430E+02 (ug/g)/(ug/ml)
Kd:			7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:			2.026E-02 m/hr	5.627E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:			2.837E-01 m2/hr	7.880E-01 cm/sec
Retarded Lateral Dispersion Coefficient:			2.837E-02 m2/hr	7.880E-02 cm/sec
Retarded Vertical Dispersion Coefficient:			2.837E-04 m2/hr	7.880E-04 cm/sec

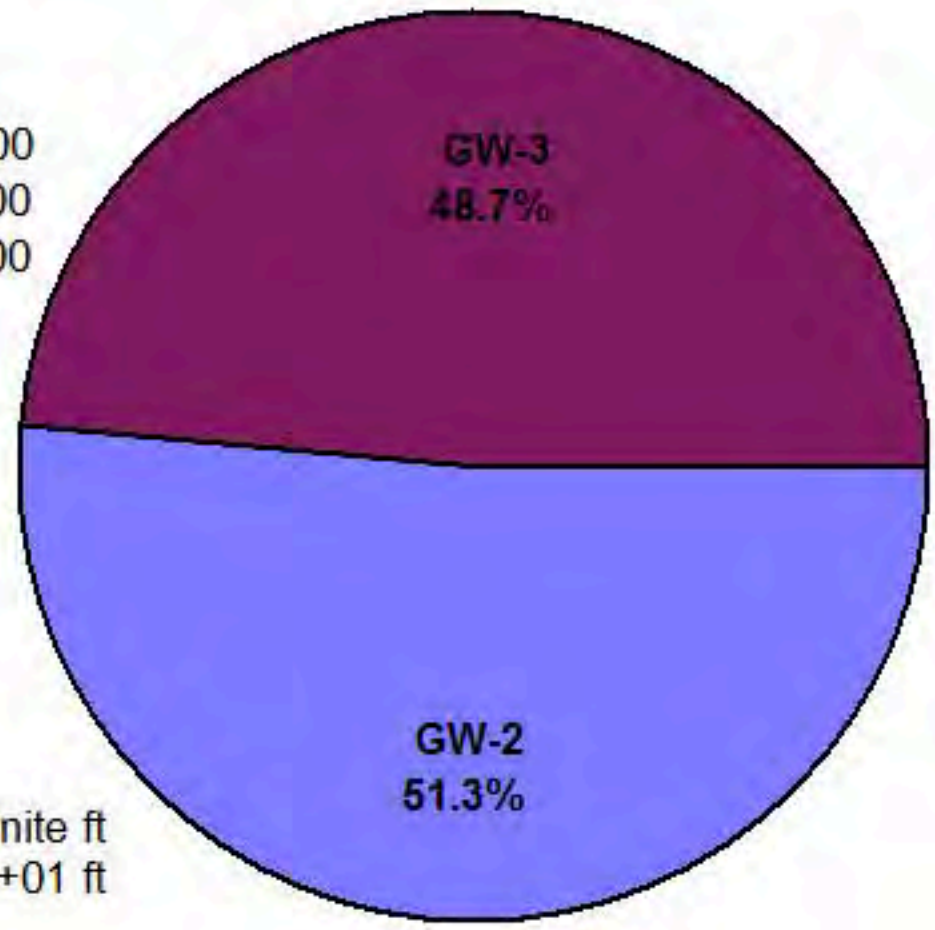
Prop. Well #11
Brem



Maximum Concentration: 8.330E+00 mg/L
Year of Maximum Concentration: 1.42

INPUT PARAMETERS

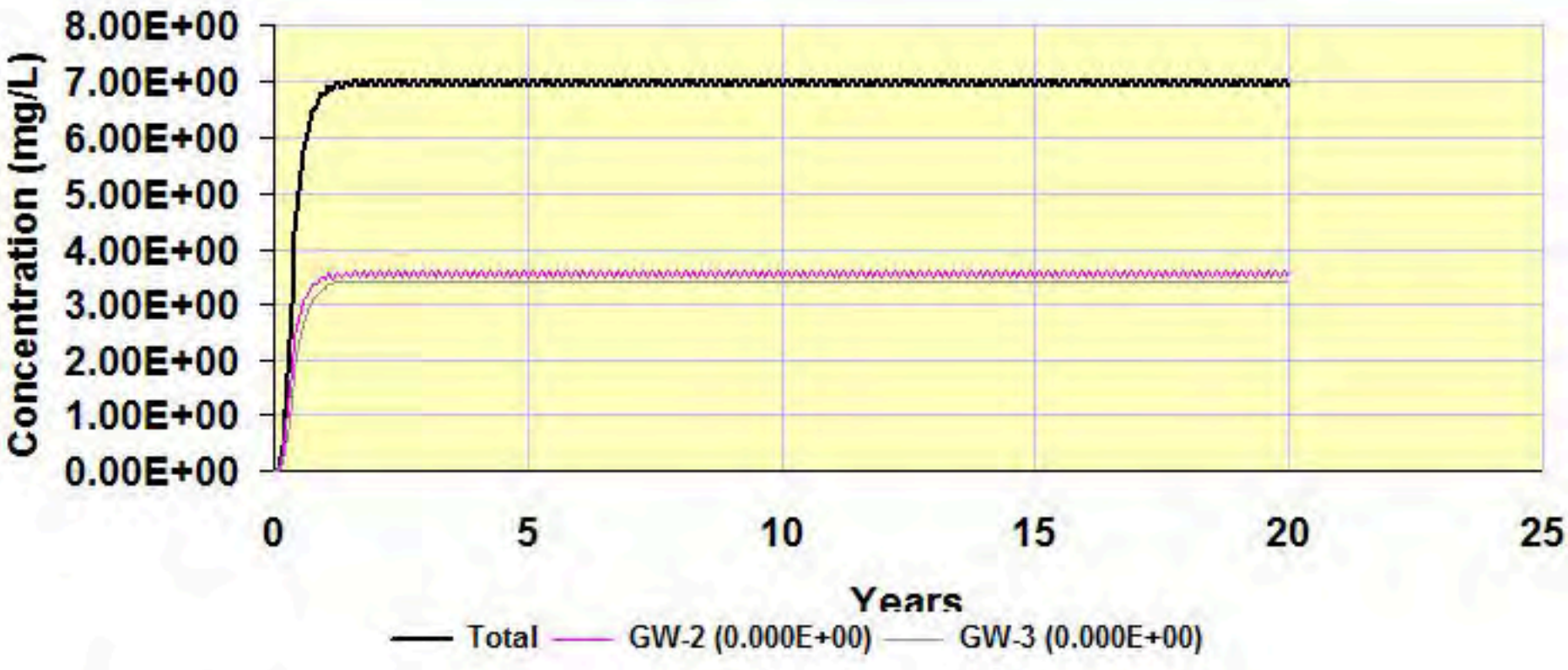
Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.07800



Dispersivities	Meters	Feet
Longitudinal:	1.370E+01	4.494E+01
Lateral:	1.370E+00	4.494E+00
Vertical:	1.370E-02	4.494E-02

Aquifer Width:	Infinite m	Infinite ft
Aquifer Depth:	3.250E+00 m	1.066E+01 ft
Retardation Factor:	1.608E+00	
Soil Bulk Density:	1.700E+03 kg/m3	1.700E+00 g/cm3
Molecular Diffusion:	0.000E+00 m2/hr	0.000E+00 cm2/sec
Decay Coefficient:	0.000E+00 1/hr	0.000E+00 1/day
Hydraulic Conductivity:	1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption		0.1430E+02 (ug/g)/(ug/ml)
Kd:	7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:	2.773E-02 m/hr	7.702E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:	3.799E-01 m2/hr	1.055E+00 cm/sec
Retarded Lateral Dispersion Coefficient:	3.799E-02 m2/hr	1.055E-01 cm/sec
Retarded Vertical Dispersion Coefficient:	3.799E-04 m2/hr	1.055E-03 cm/sec

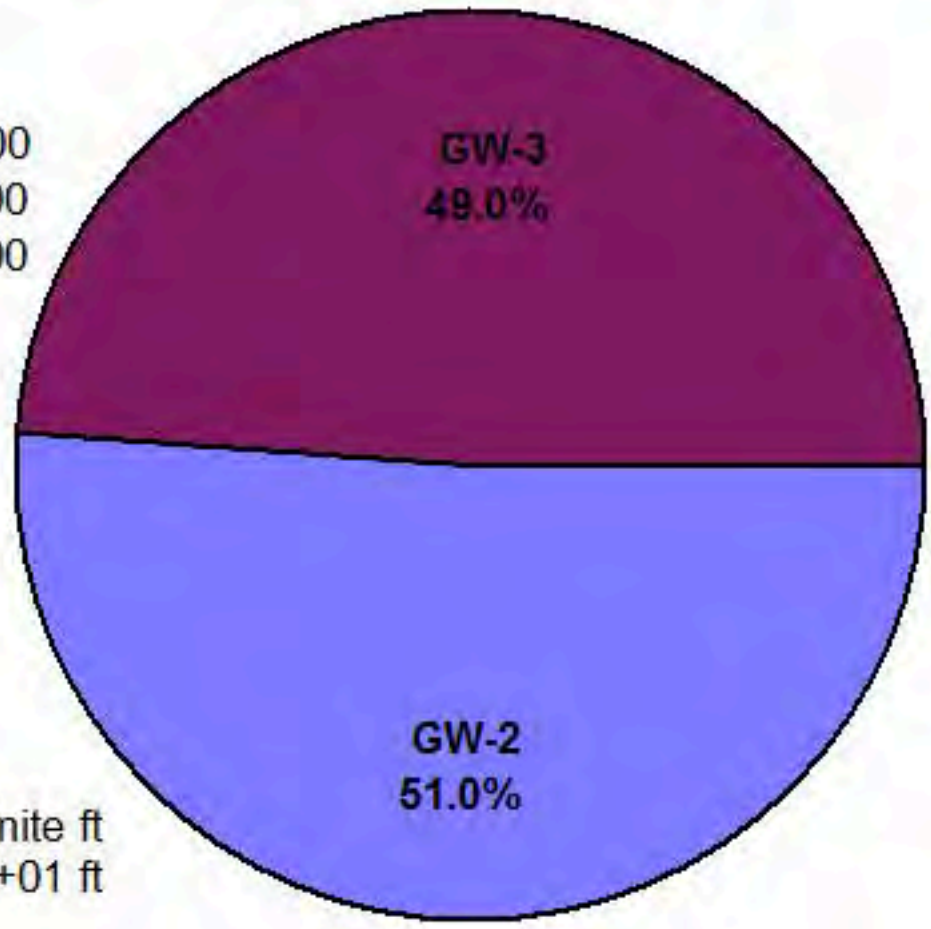
Prop Well #12
Brem



Maximum Concentration: 7.030E+00 mg/L
Year of Maximum Concentration: 1.58

INPUT PARAMETERS

Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.07800

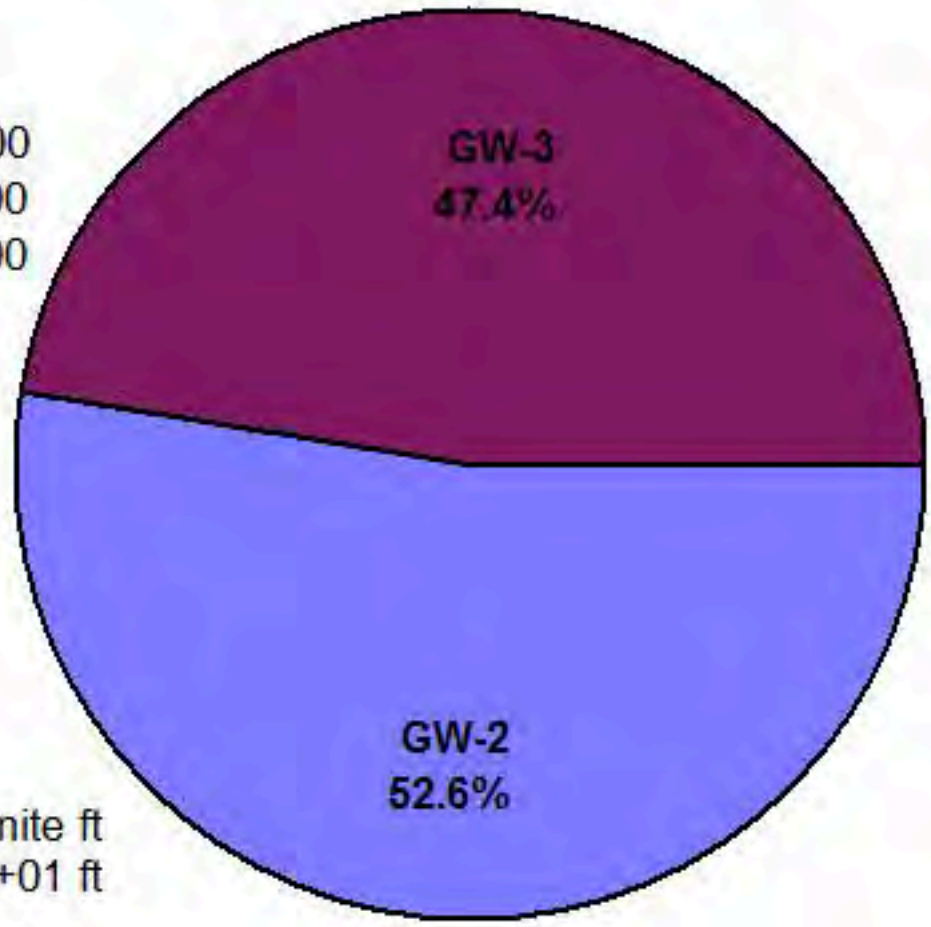


Dispersivities	Meters	Feet
Longitudinal:	1.370E+01	4.494E+01
Lateral:	1.370E+00	4.494E+00
Vertical:	1.370E-02	4.494E-02

Aquifer Width:	Infinite m	Infinite ft
Aquifer Depth:	3.250E+00 m	1.066E+01 ft
Retardation Factor:	1.608E+00	
Soil Bulk Density:	1.700E+03 kg/m3	1.700E+00 g/cm3
Molecular Diffusion:	0.000E+00 m2/hr	0.000E+00 cm2/sec
Decay Coefficient:	0.000E+00 1/hr	0.000E+00 1/day
Hydraulic Conductivity:	1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption		0.1430E+02 (ug/g)/(ug/ml)
Kd:	7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:	2.773E-02 m/hr	7.702E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:	3.799E-01 m2/hr	1.055E+00 cm/sec
Retarded Lateral Dispersion Coefficient:	3.799E-02 m2/hr	1.055E-01 cm/sec
Retarded Vertical Dispersion Coefficient:	3.799E-04 m2/hr	1.055E-03 cm/sec

Wetlands
Brem

Maximum Concentration: 5.365E+00 mg/L
Year of Maximum Concentration: 2.33



INPUT PARAMETERS

Organic Carbon (percent):	0.50000
Effective Porosity:	0.20000
Hydraulic Gradient (m/m):	0.07800

Dispersivities	Meters	Feet
Longitudinal:	1.370E+01	4.494E+01
Lateral:	1.370E+00	4.494E+00
Vertical:	1.370E-02	4.494E-02

Aquifer Width:	Infinite m	Infinite ft
Aquifer Depth:	3.250E+00 m	1.066E+01 ft
Retardation Factor:	1.608E+00	
Soil Bulk Density:	1.700E+03 kg/m3	1.700E+00 g/cm3
Molecular Diffusion:	0.000E+00 m2/hr	0.000E+00 cm2/sec
Decay Coefficient:	0.000E+00 1/hr	0.000E+00 1/day
Hydraulic Conductivity:	1.143E-01 m/hr	3.175E-03 cm/sec
Carbon Adsorption		0.1430E+02 (ug/g)/(ug/ml)
Kd:	7.000E-05 m3/kg	7.000E-02 (ug/g)/(ug/ml)
Retarded Darcy Velocity:	2.773E-02 m/hr	7.702E-02 cm/sec
Retarded Longitudinal Disp. Coefficient:	3.799E-01 m2/hr	1.055E+00 cm/sec
Retarded Lateral Dispersion Coefficient:	3.799E-02 m2/hr	1.055E-01 cm/sec
Retarded Vertical Dispersion Coefficient:	3.799E-04 m2/hr	1.055E-03 cm/sec