Figure 7

Technetium-99 in Overburden Silty/Clay Wells (Third Quarter 2009)

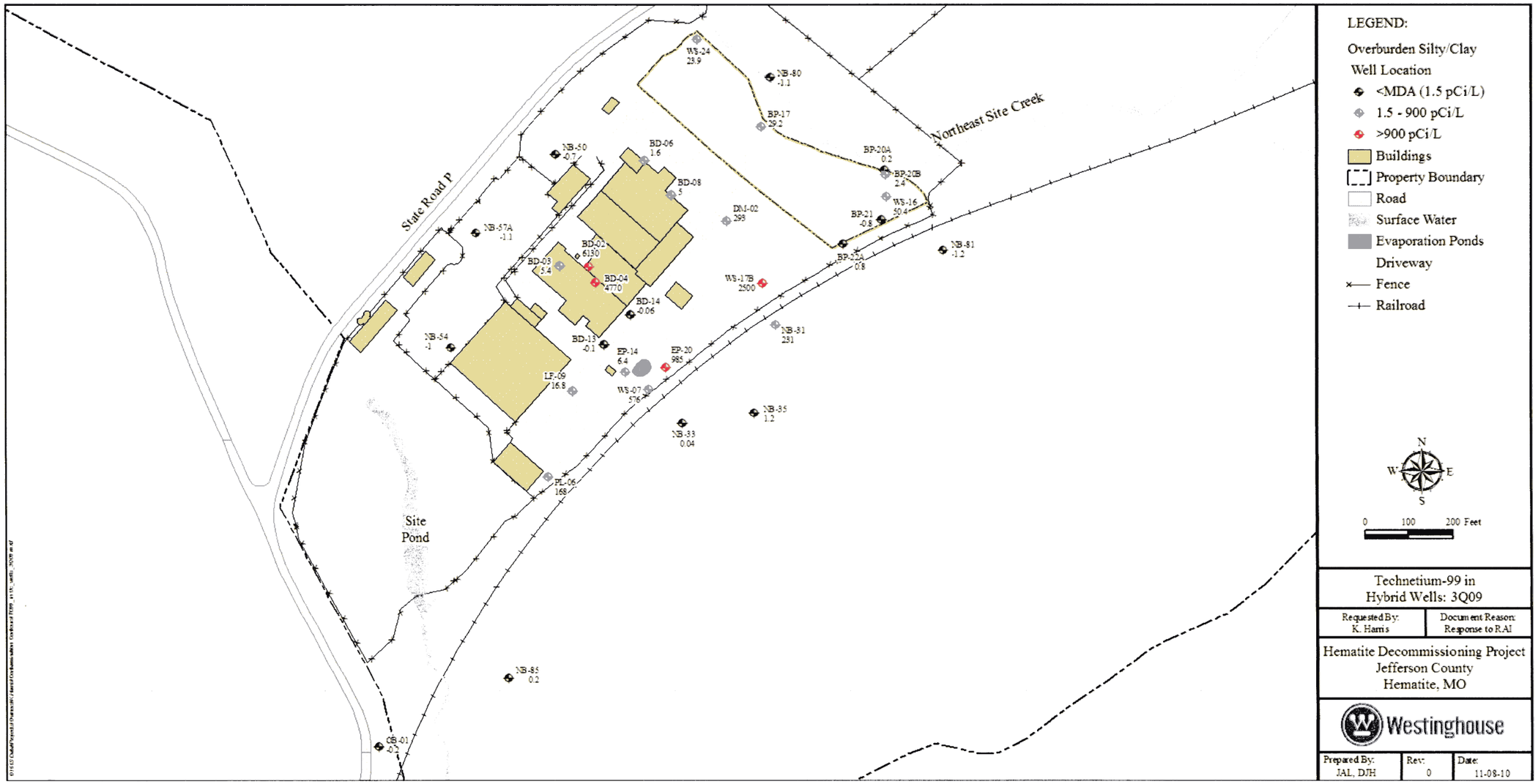


Figure 8

Technetium-99 in Overburden Sand/Gravel Wells (Third Quarter 2009)

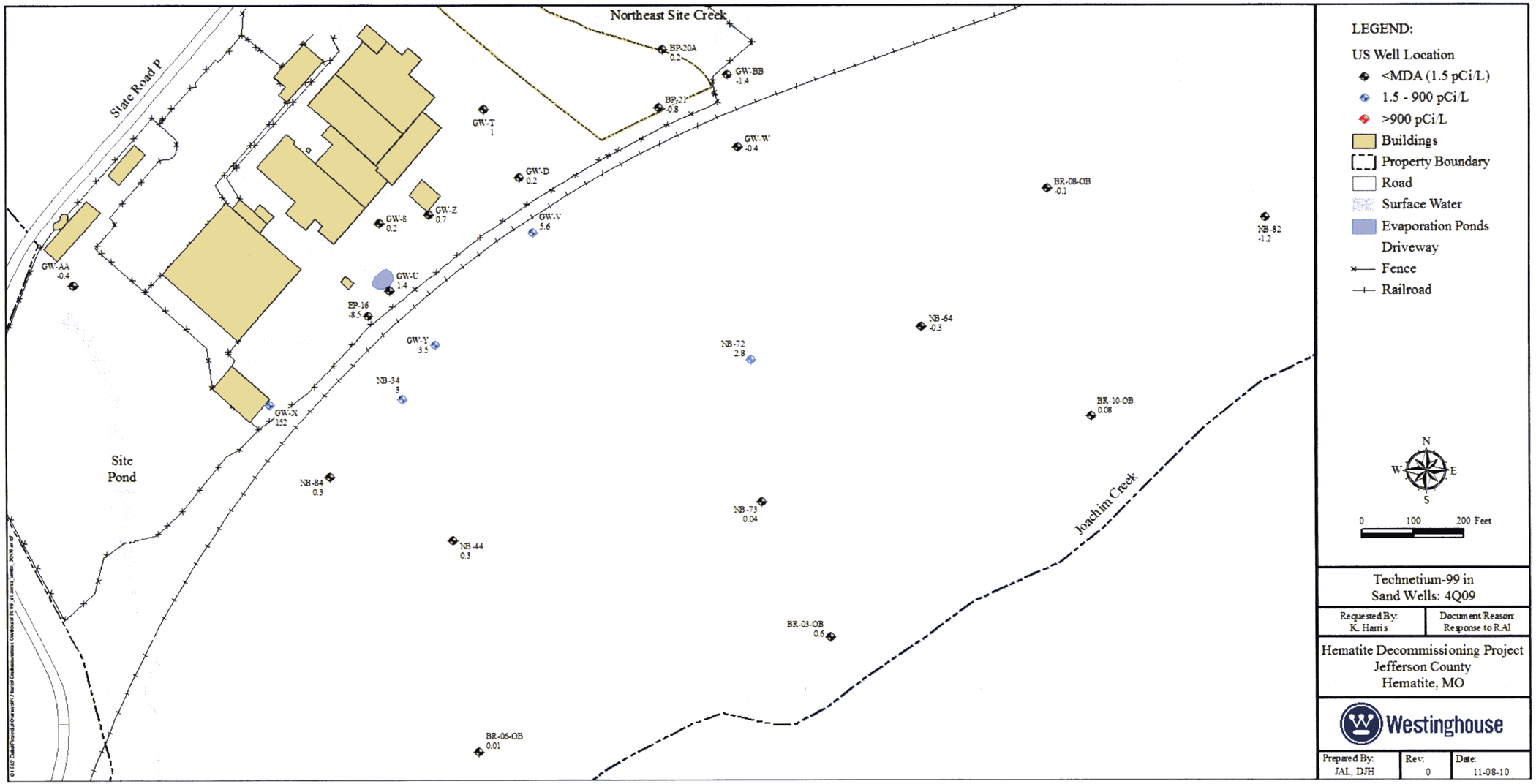


Figure 9

Technetium-99 in Overburden Silty/Clay Wells (Fourth Quarter 2009)

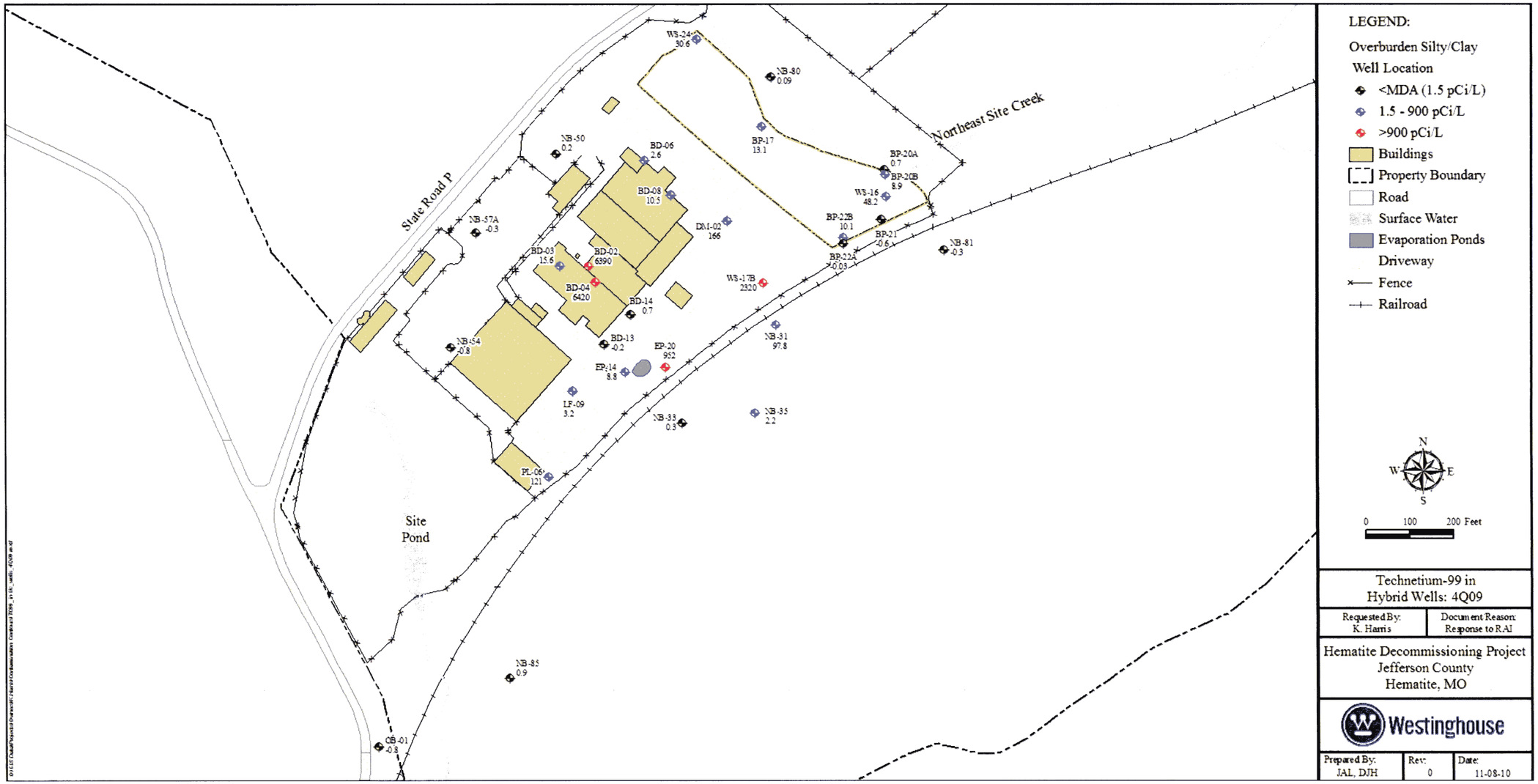


Figure 10

Technetium-99 in Overburden Sand/Gravel Wells (Fourth Quarter 2009)

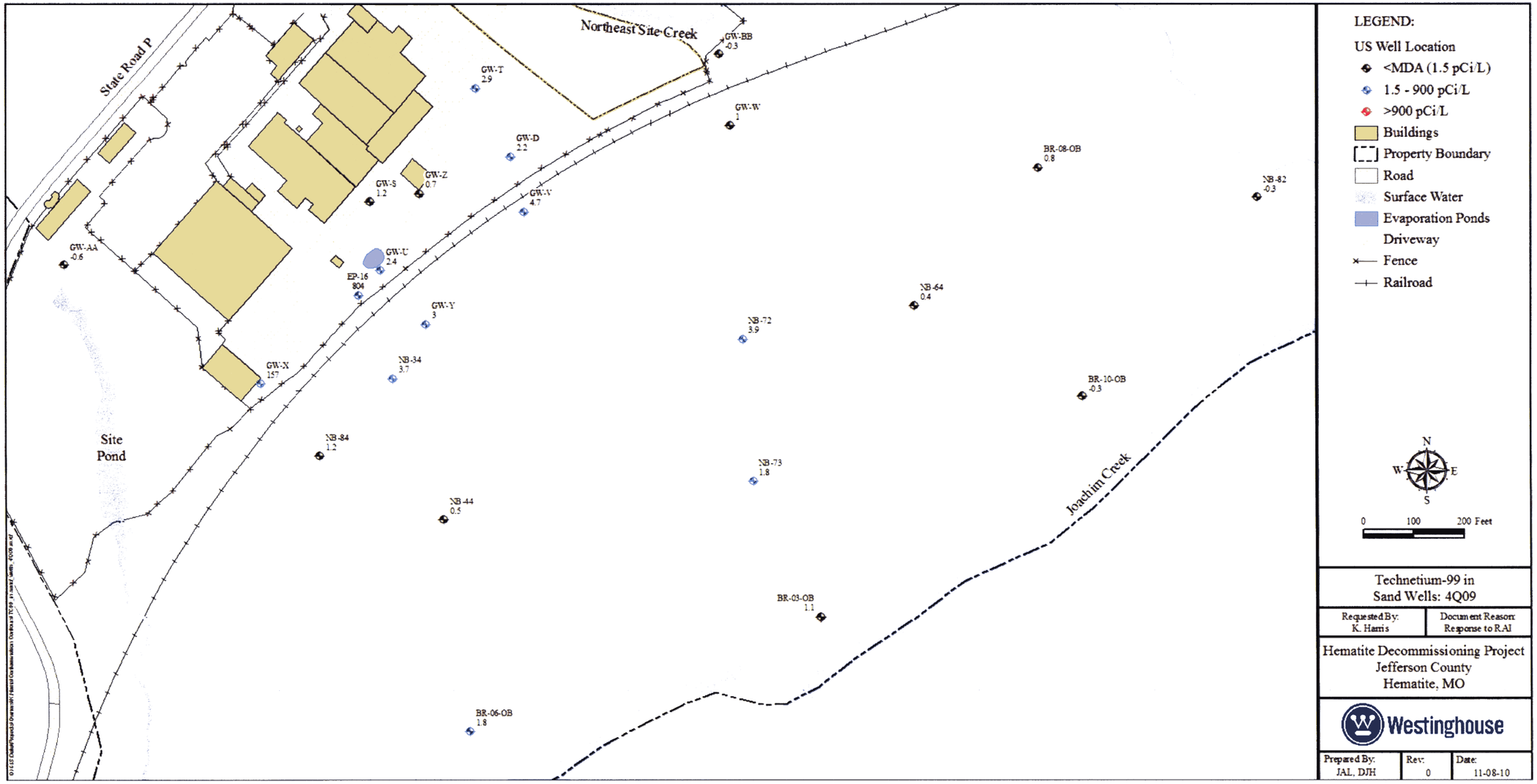


Figure 11

Technetium-99 in Overburden Silty/Clay Wells (First Quarter 2010)

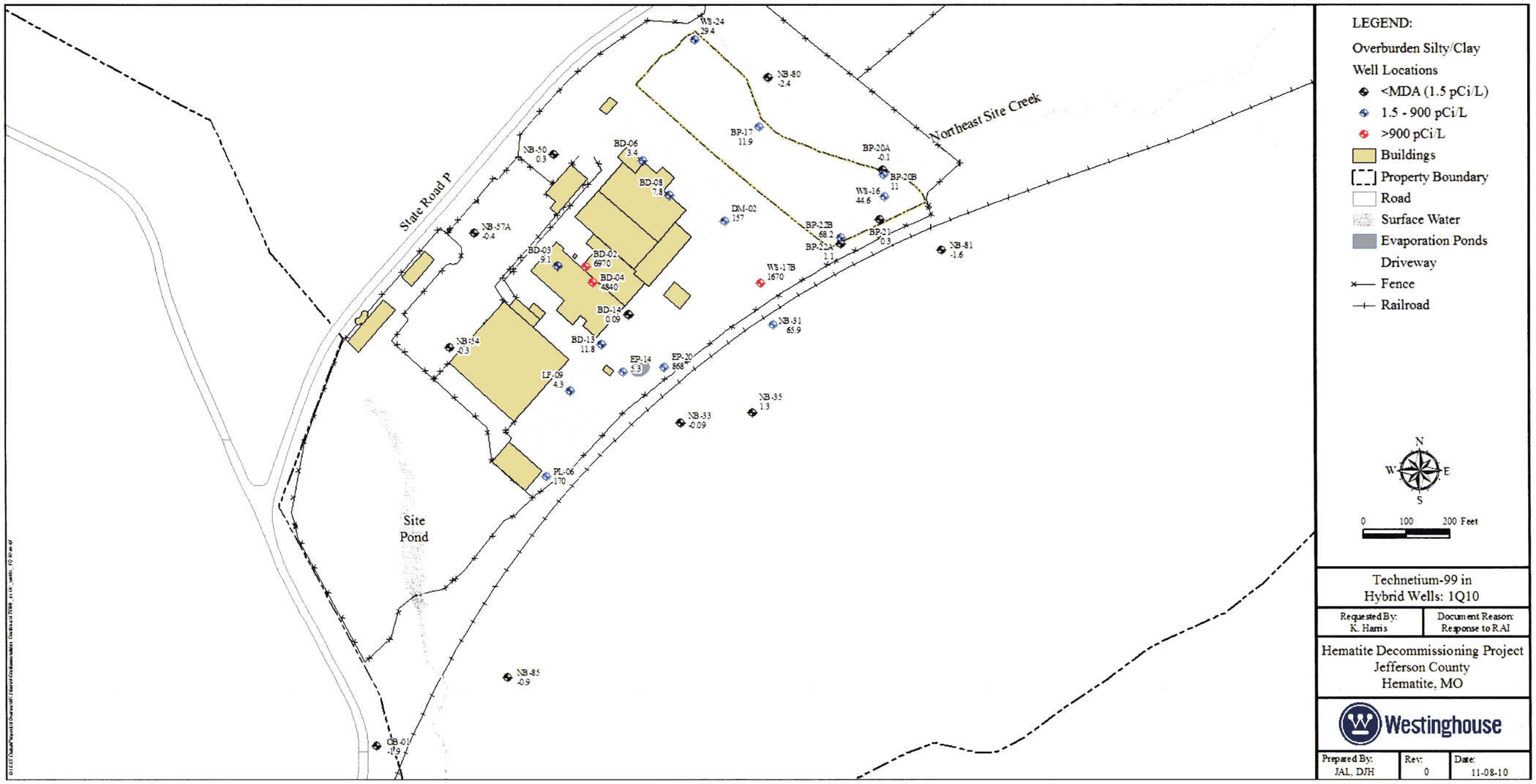


Figure 12

Technetium-99 in Overburden Sand/Gravel Wells (First Quarter 2010)

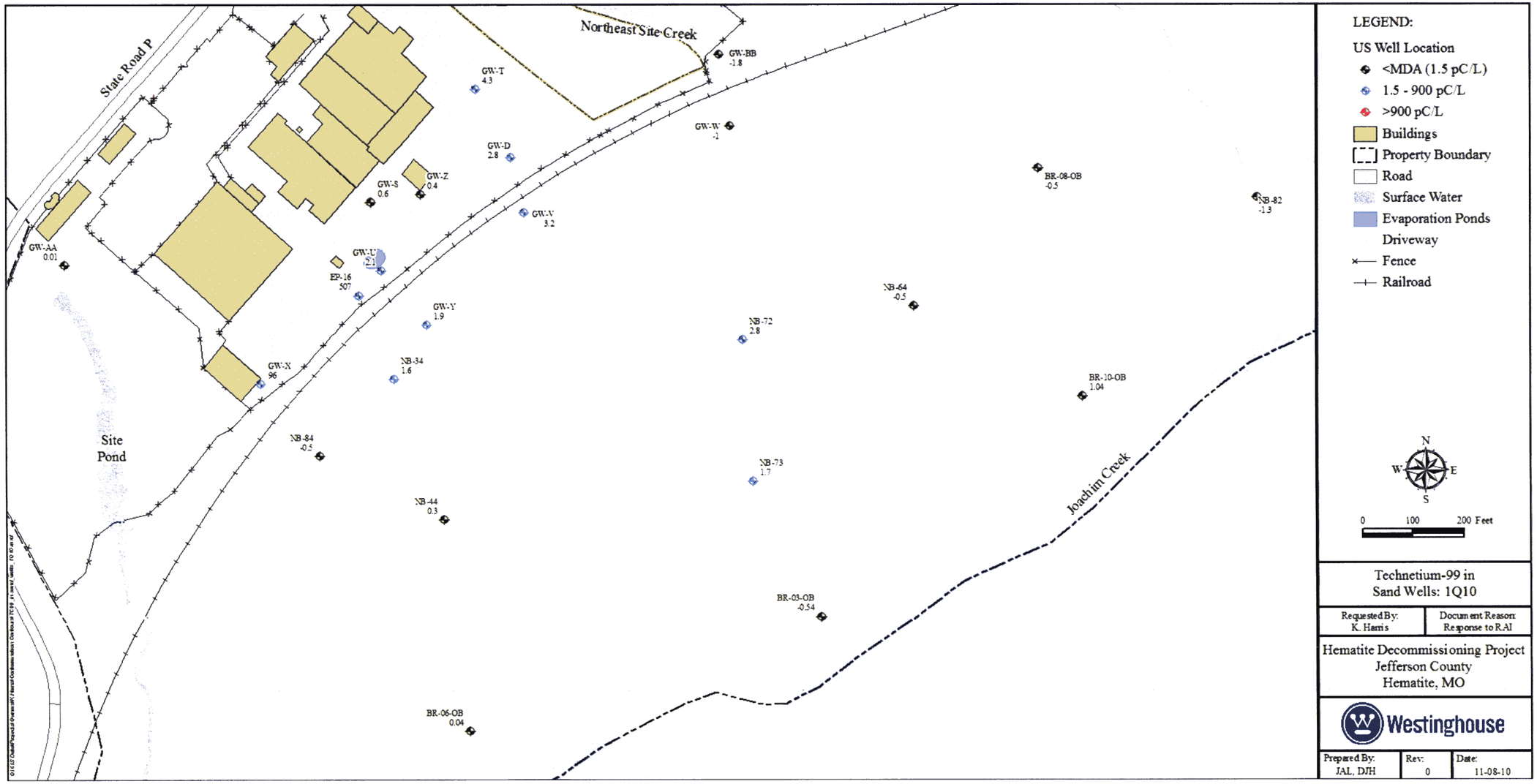


Figure 13

Technetium-99 in Overburden Silty/Clay Wells (Second Quarter 2010)

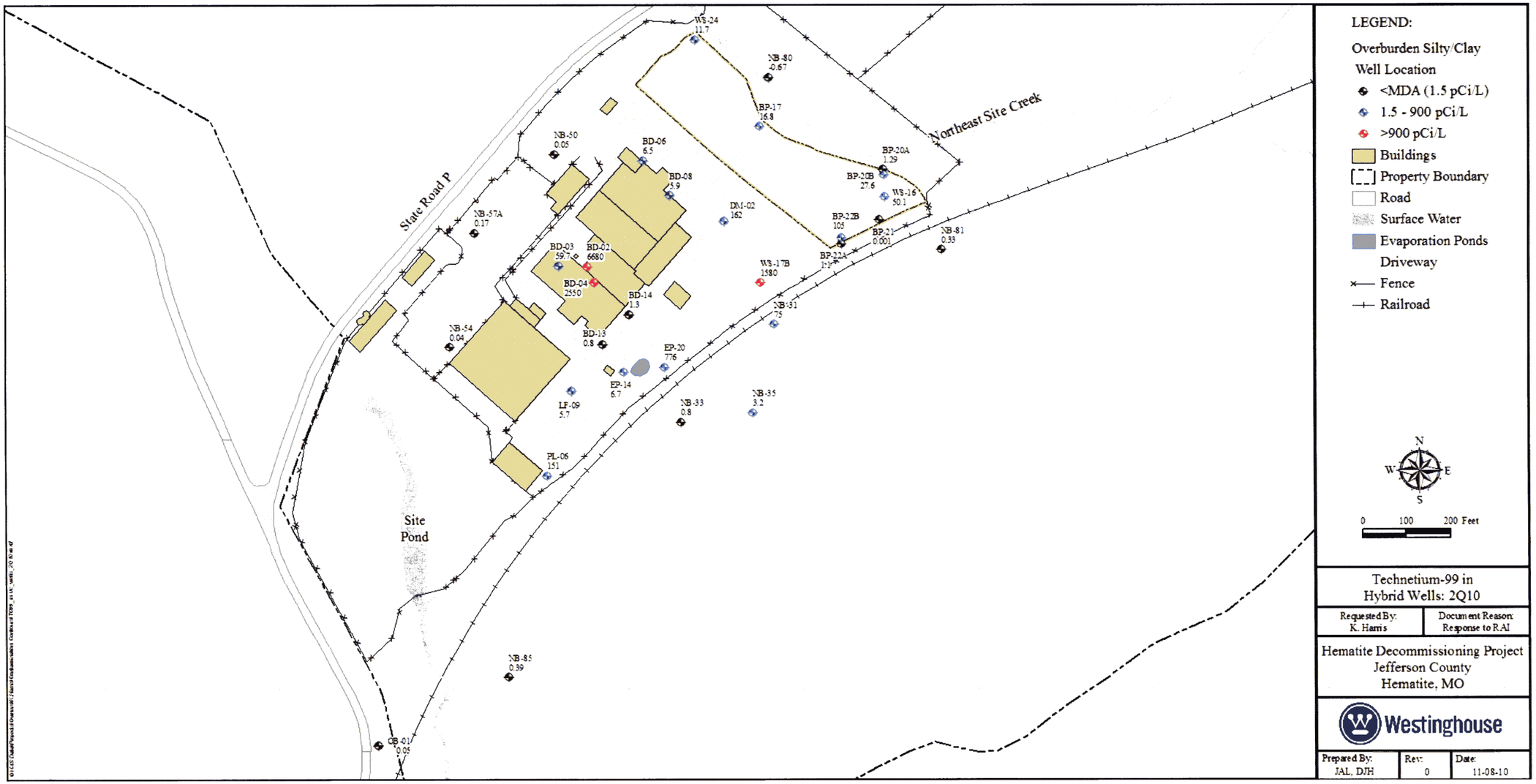


Figure 14

Technetium-99 in Overburden Sand/Gravel Wells (Second Quarter 2010)

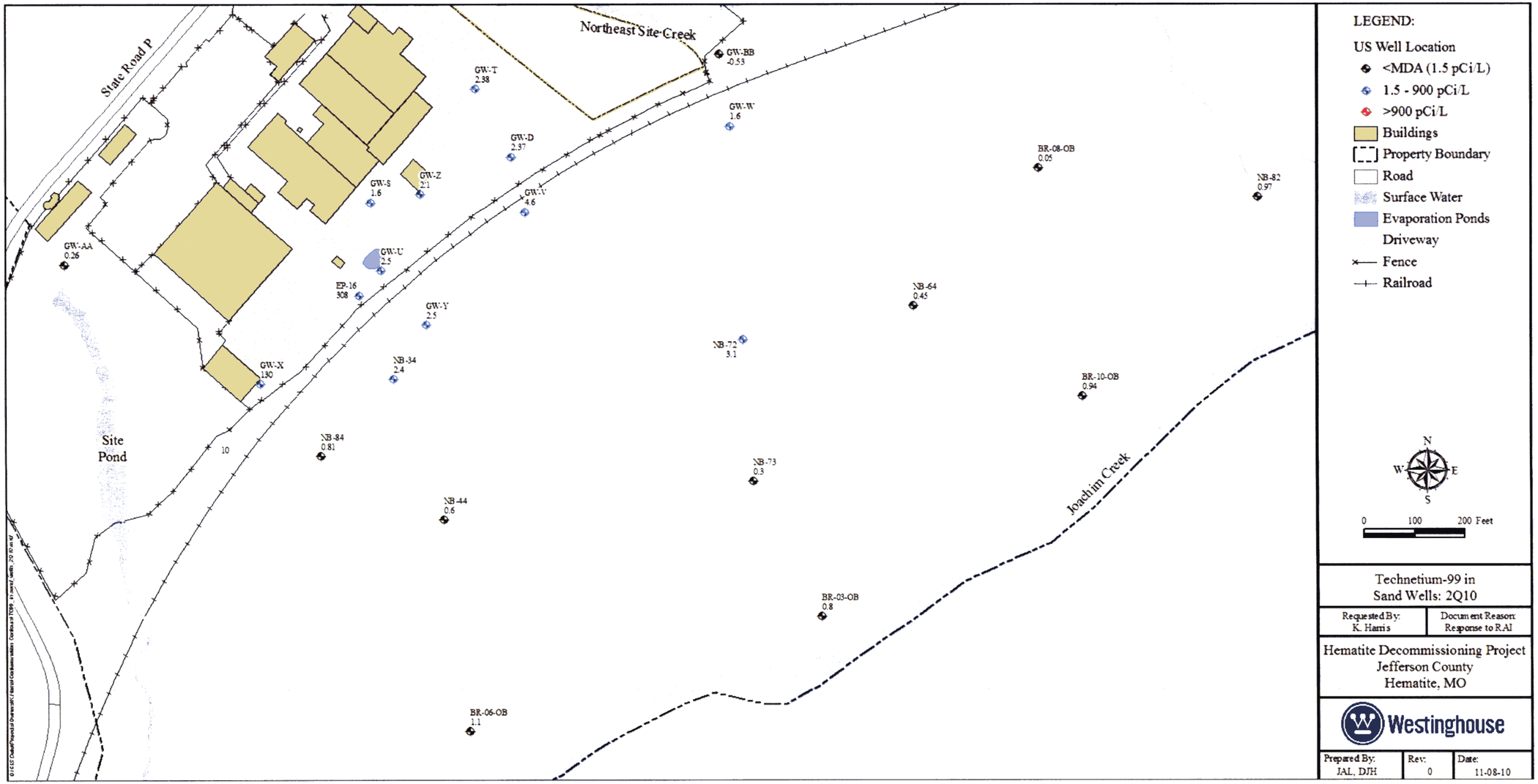


Figure 15

Technetium-99 in Overburden Silty/Clay Wells (Third Quarter 2010)

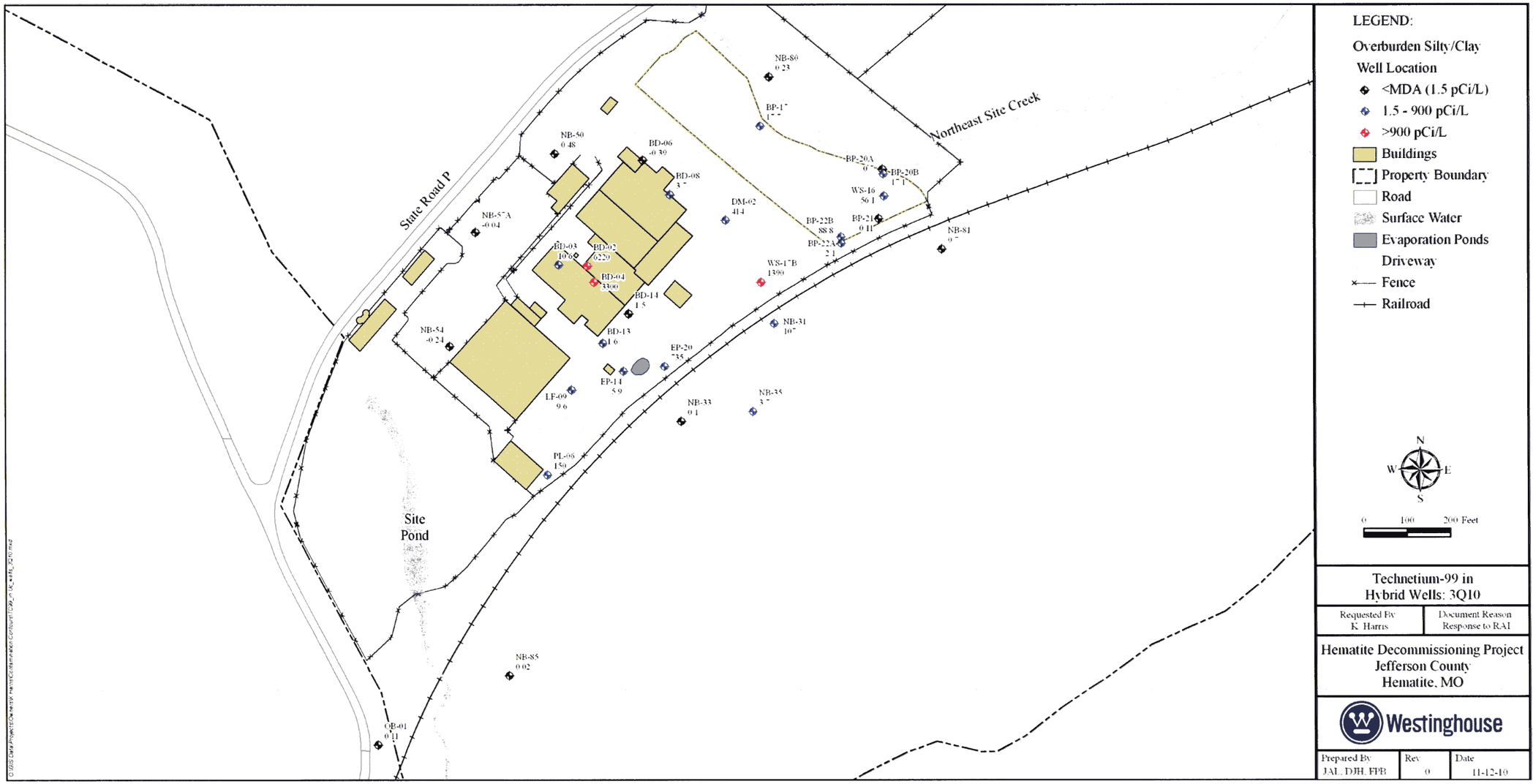


Figure 16

Technetium-99 in Overburden Sand/Gravel Wells (Third Quarter 2010)

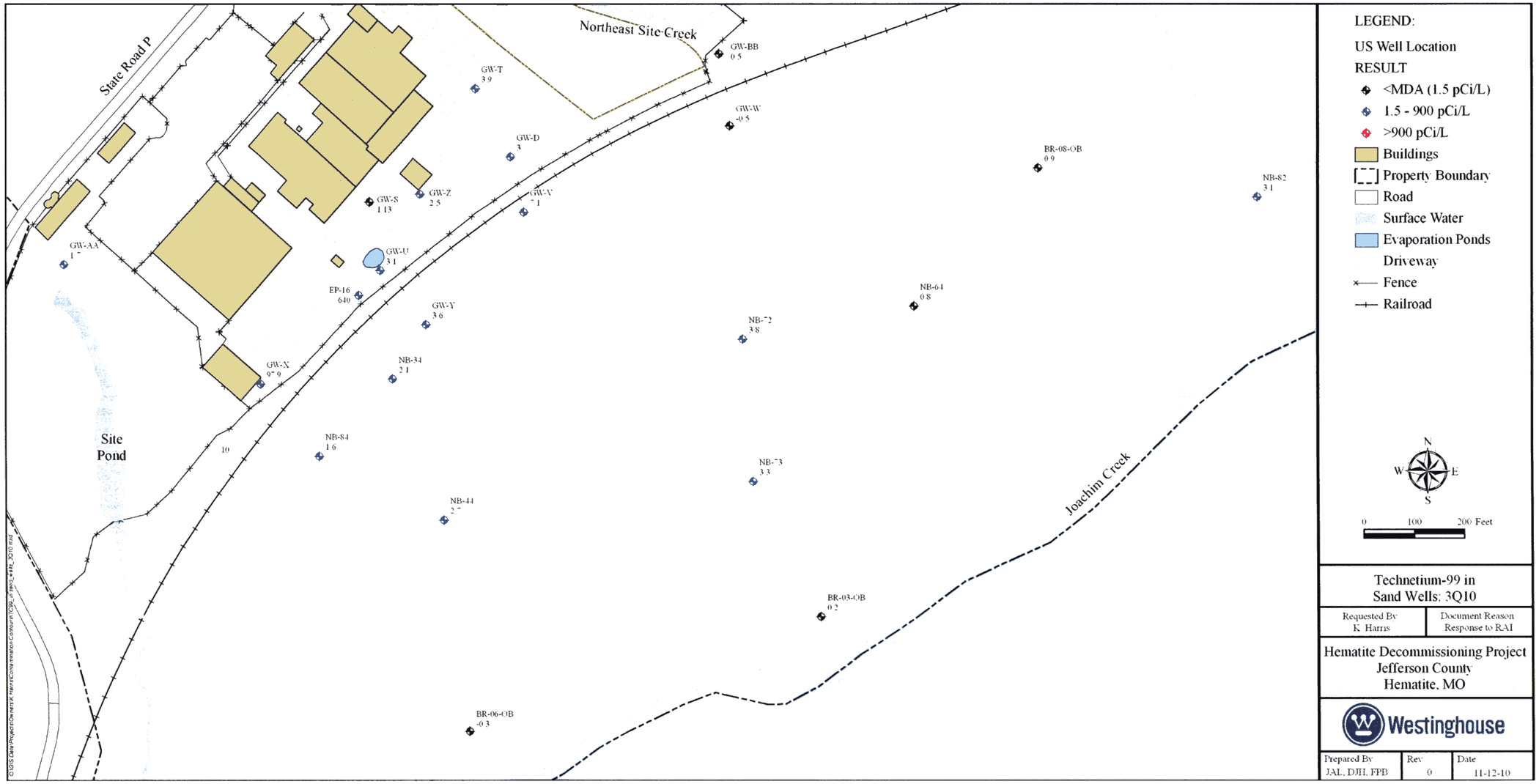


Figure 17

Uranium in Overburden Silty/Clay Wells (Third Quarter 2009)

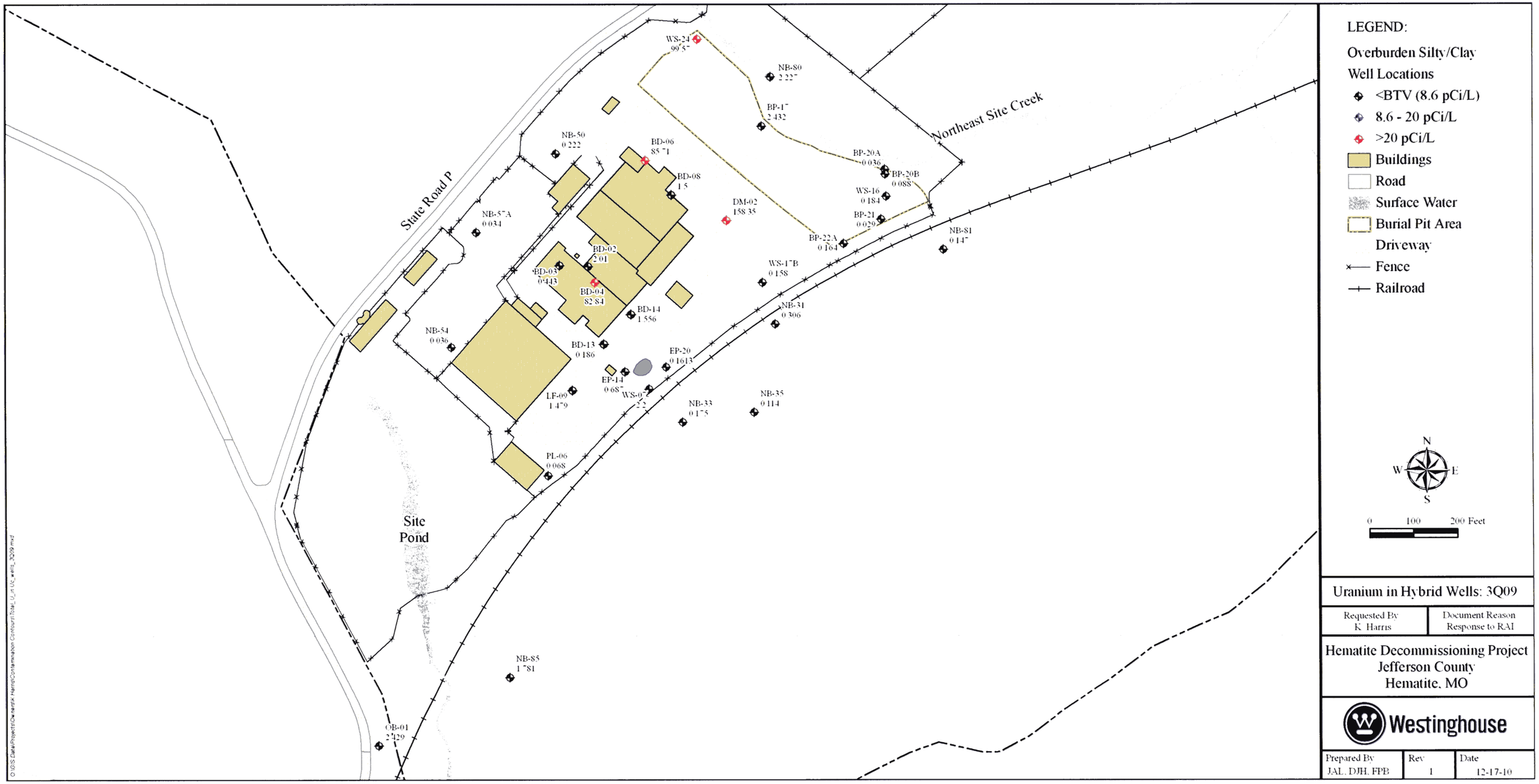


Figure 18

Uranium Overburden Sand/Gravel Wells (Third Quarter 2009)

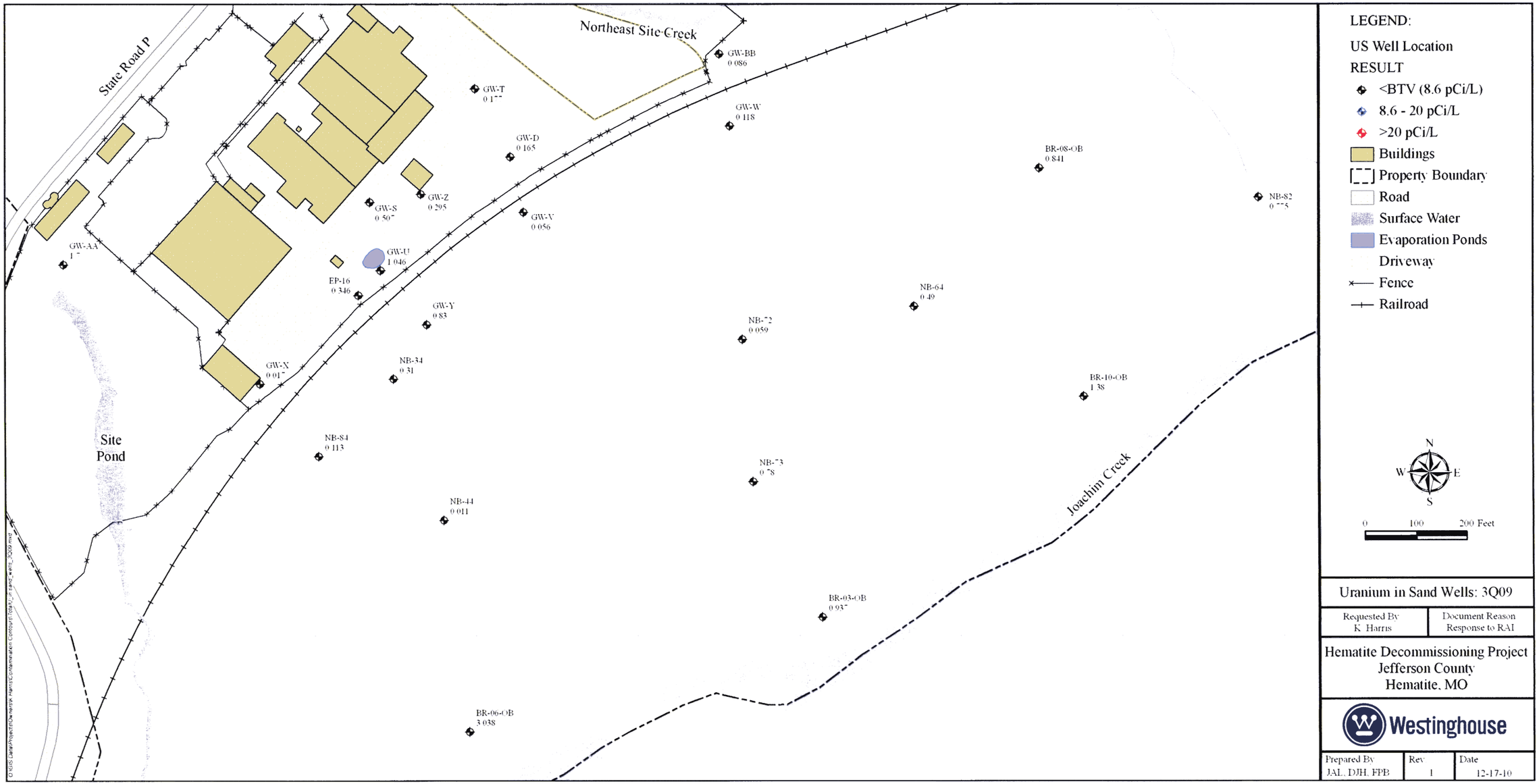


Figure 19

Uranium in Overburden Silty/Clay Wells (Fourth Quarter 2009)

Figure 20

Uranium Overburden Sand/Gravel Wells (Fourth Quarter 2009)

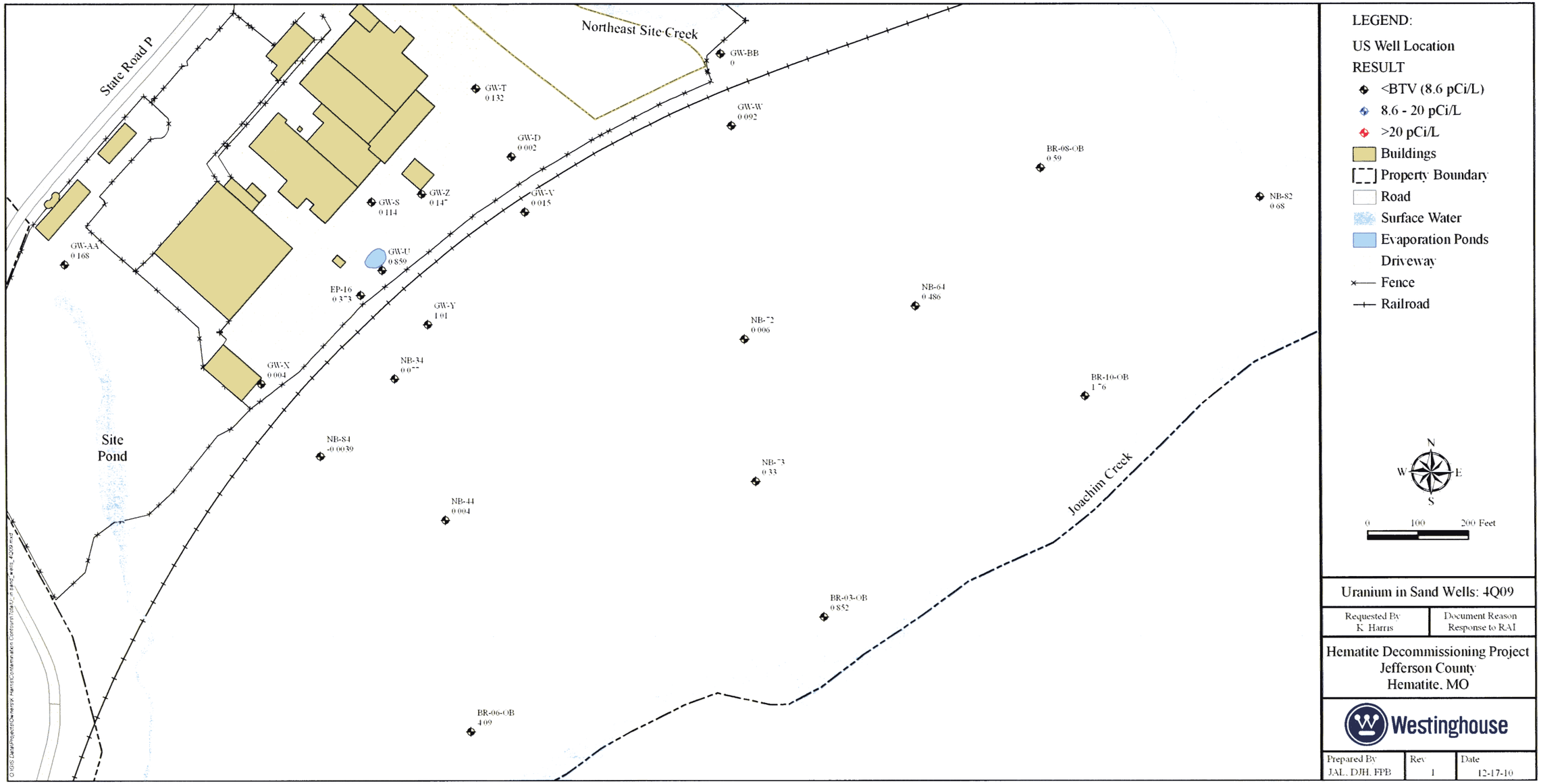


Figure 21

Uranium in Overburden Silty/Clay Wells (First Quarter 2010)

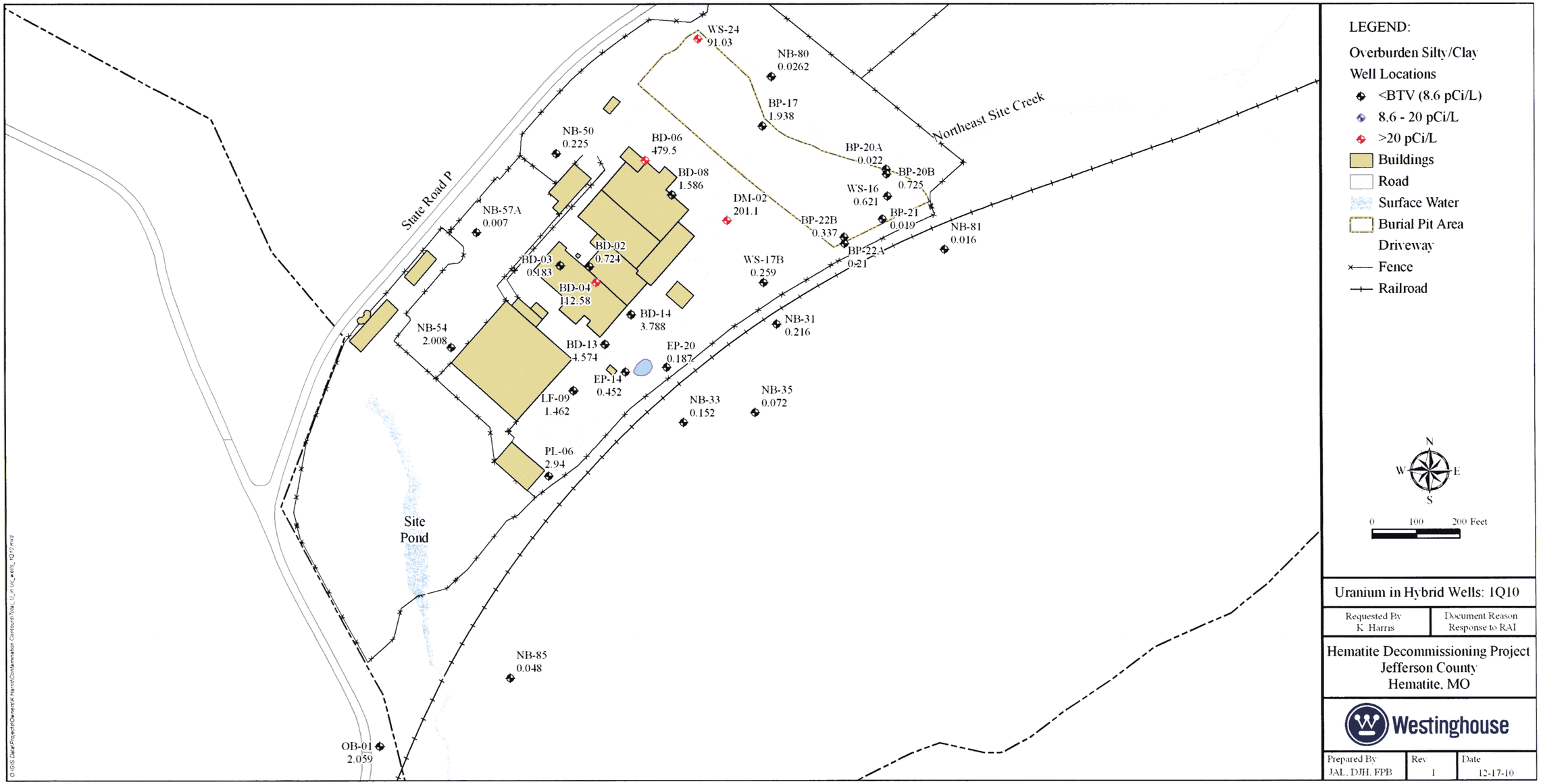


Figure 22

Uranium Overburden Sand/Gravel Wells (First Quarter 2010)

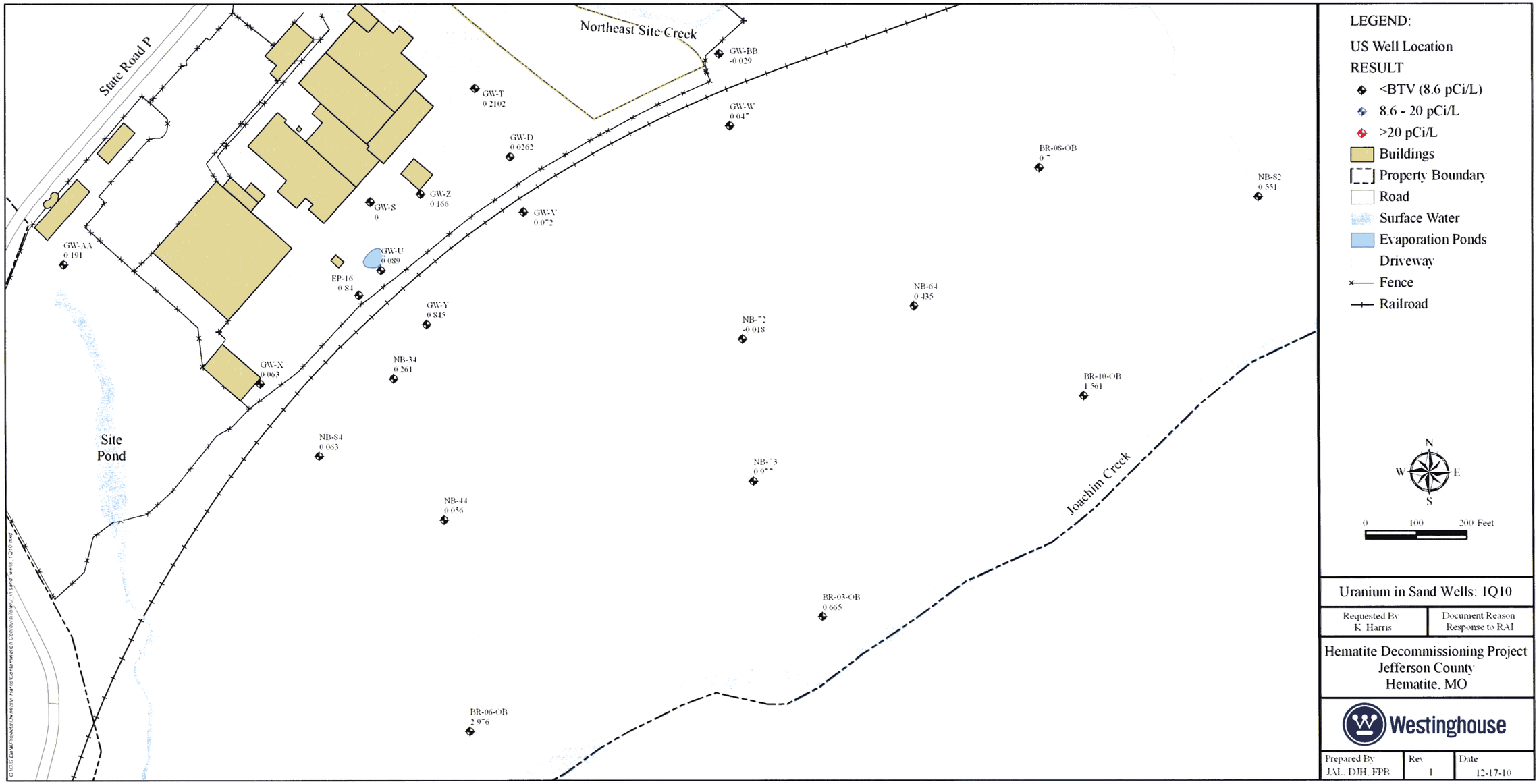


Figure 23

Uranium in Overburden Silty/Clay Wells (Second Quarter 2010)

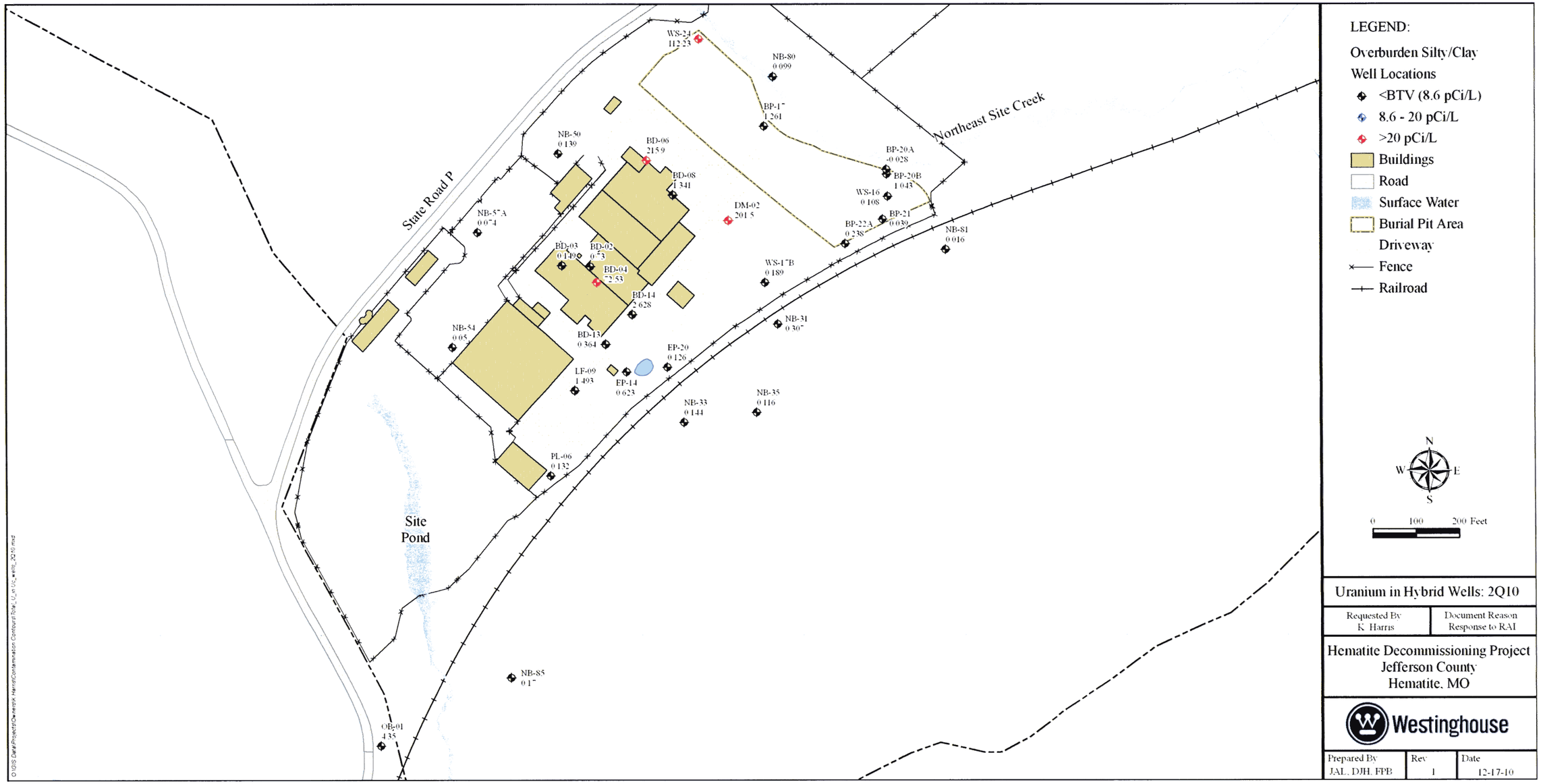
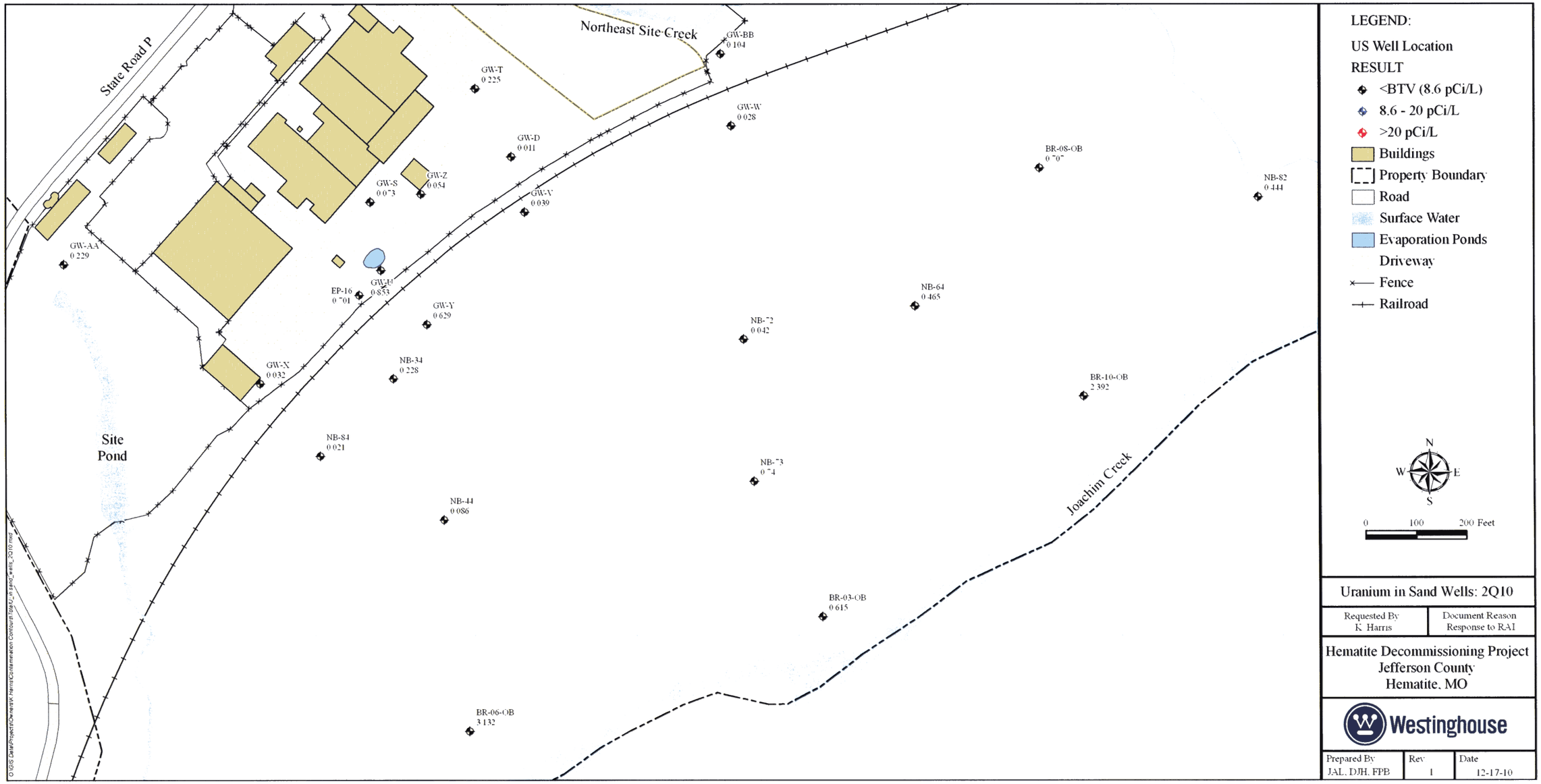


Figure 24

Uranium Overburden Sand/Gravel Wells (Second Quarter 2010)



Uranium in Sand Wells: 2Q10

Requested By	Document Reason
K. Harris	Response to RAI

Hematite Decommissioning Project
Jefferson County
Hematite, MO

Westinghouse

Prepared By	Rev	Date
JAL, DJH, FPB	1	12-17-10

Figure 25

Uranium in Overburden Silty/Clay Wells (Third Quarter 2010)

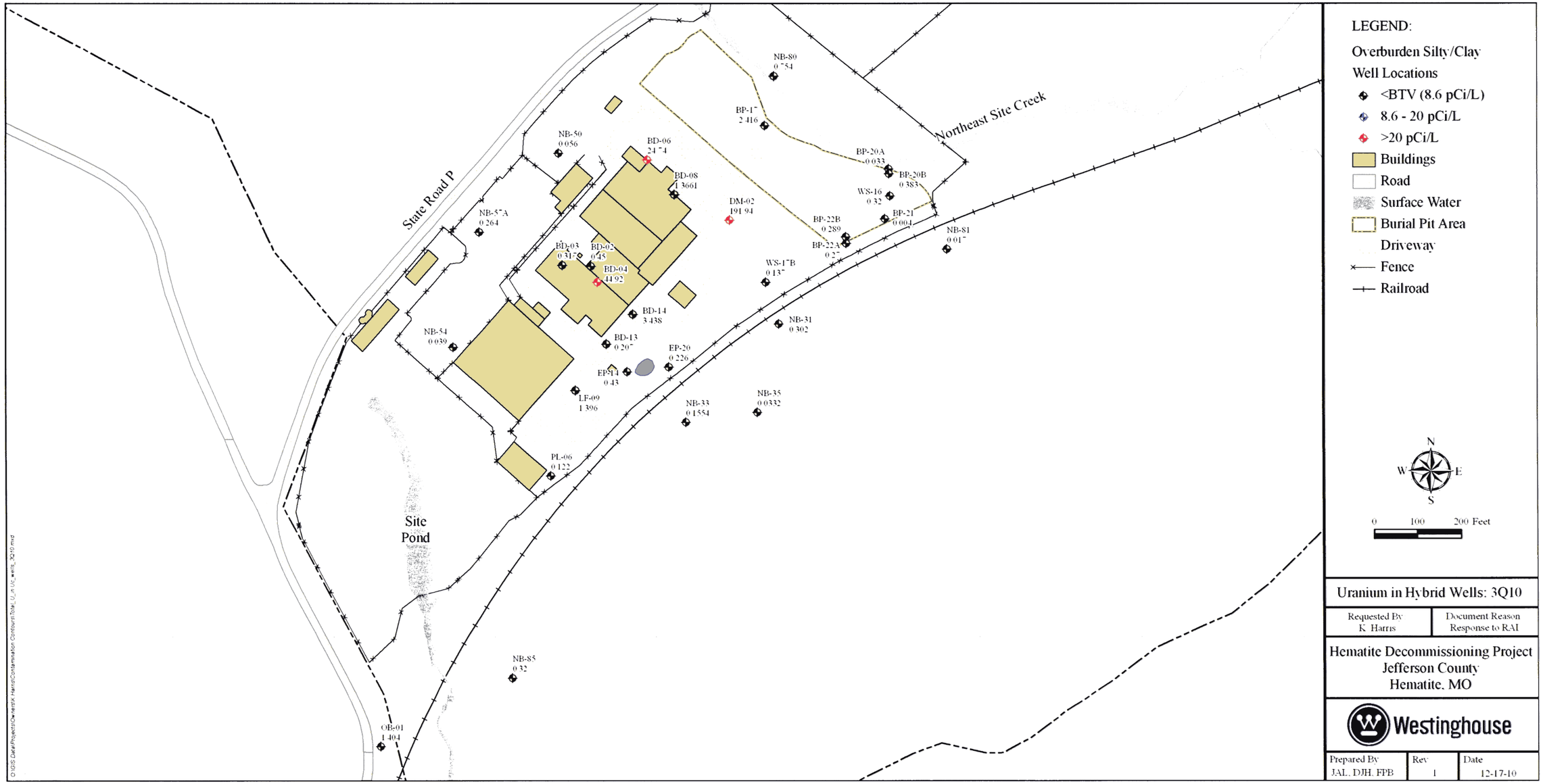


Figure 26

Uranium Overburden Sand/Gravel Wells (Third Quarter 2010)

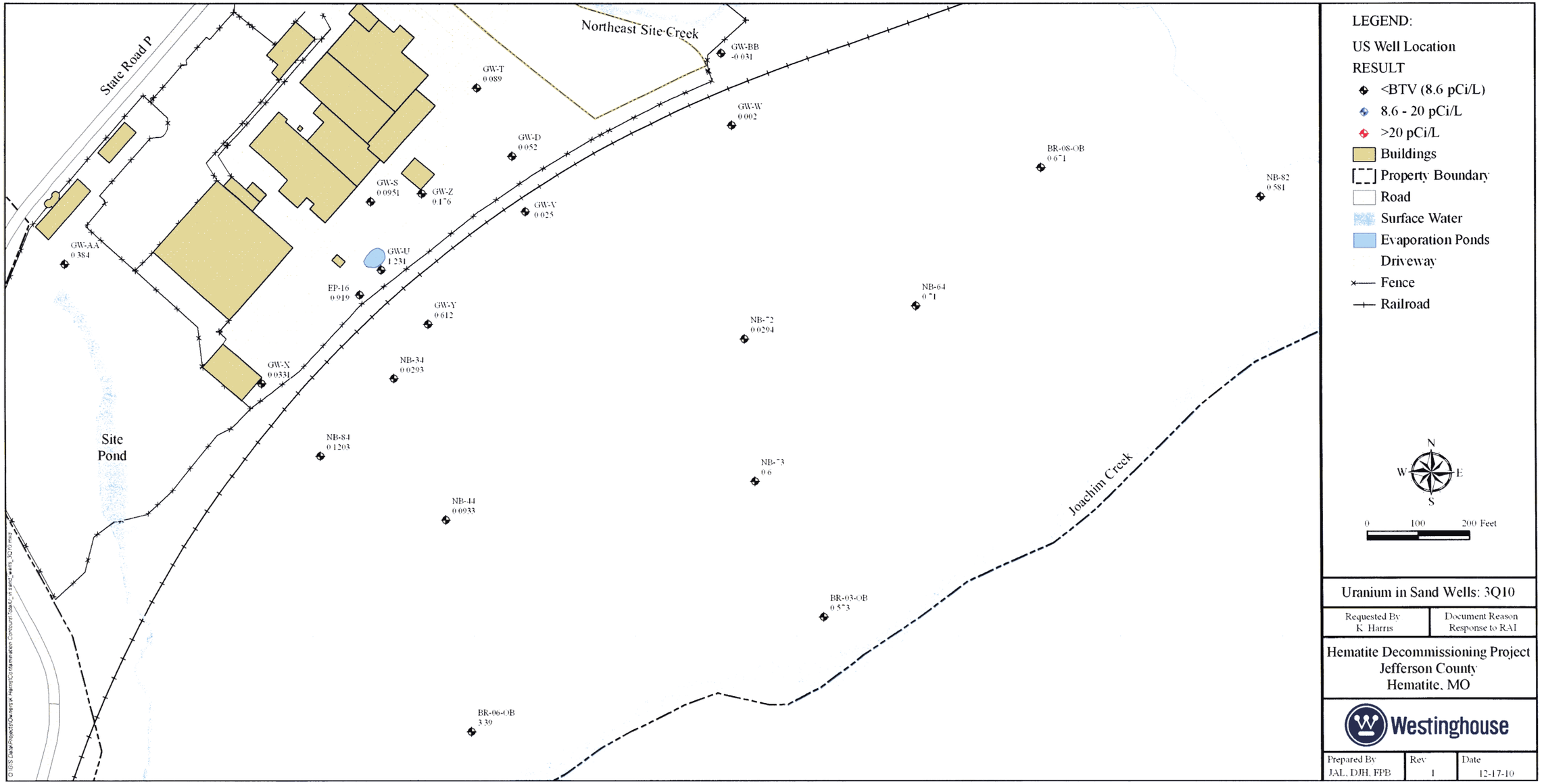
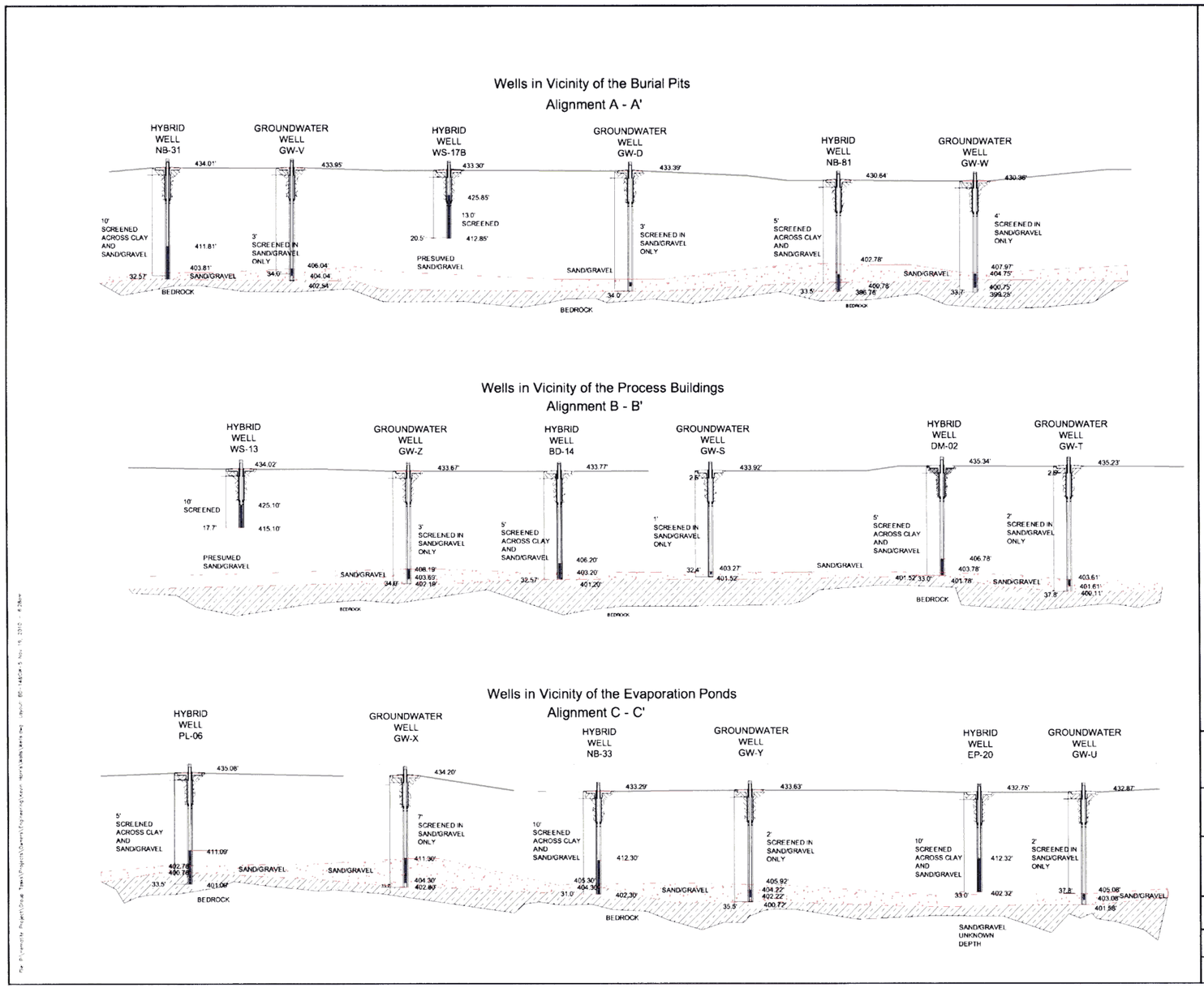


Figure 27

Plate 1: Cross-sections of Paired Wells



LEGEND:

NOT TO SCALE

- Surface Grade
- Confined Sand/ Gravel Layer
- Native Sediment
- Bedrock
- Screen

Plate 1: Cross-sections of Paired Wells

Requested by: Kevin Harris	Document/Reason: RAI: HDP-4-Q12

Hematite Decommissioning Project
Jefferson County
Hematite, MO

Westinghouse

Hematite Decommissioning Project
Well Pair Profile

DRAWING NO:	SHEET NO:	SIZE:
N/A	1 OF 1	ANSI B
PREPARED BY:	REVISION:	DATE
C. Crawford	0	11/10/10

13. (HDP-4-Q13) Comment: The information provided does not allow the staff to determine whether the background bedrock monitoring wells are located in appropriate sampling locations.

    Basis: Figure 3-32 in the HDP indicates that well BR12RB may be down gradient of the site, but the figure lacks sufficient detail to provide a clear understanding of the groundwater flow regime. This ambiguity is significant because bedrock well BR12RB appears to have the highest level of 234U when compared to all other bedrock well data provided in the Radiological Characterization Report.

    Path Forward: Provide figures for all bedrock well locations. The figures should include detailed potentiometric elevation maps for each bedrock unit pre and post Festus municipal well shut down.

Westinghouse Response:

DP Chapter 3 contains figures depicting all bedrock well locations (DP Figures 3-10 and 3-11). On these figures, the locations of the wells screened in the Jefferson City formation are shown with a blue dot, the locations of the wells screened in the Jefferson City-Roubidoux contract zone are shown with a purple dot, and the locations of the wells screened in the Roubidoux formation are shown with a gray dot. Since the time of DP submittal, additional sampling events have occurred and additional groundwater maps have been generated for both aquifers. These additional figures are provided in response to this comment. Groundwater flow maps for the Jefferson City formation are provided herein as Figures 28 through 43, and groundwater flow maps for the Roubidoux formation are provided herein as Figures 44 through 59.

Please note that the Festus municipal wells were put on standby in the summer of 2003 when a "collector" well located in the floodplain of the Mississippi River was brought online. The Festus municipal wells are now used intermittently to supplement the "collector" well, and pumping rates are much lower than prior to the "collector" well being brought online. Since the Festus municipal wells were put on standby, the groundwater levels in the Roubidoux wells at the site have risen and the groundwater flow direction in the Roubidoux formation has changed from east to northeast.

The inferred direction of groundwater flow for the two bedrock units prior to the Festus municipal wells being shutdown was assessed in the Interim Hydrogeologic Investigation to Support the Engineering Evaluation and Cost Analysis for Response Actions for Off-Site Ground-Water Quality Impacts dated November 15, 2002. The groundwater flow maps for the Jefferson City and Roubidoux bedrock zones for August 2002 are depicted in Figures 28 and 44 of this response, respectively. The inferred direction of groundwater flow shown on these maps is to the east-southeast.

The inferred direction of groundwater flow for the bedrock units post Festus municipal wells shutdown was assessed during the Remedial Investigation activities performed in 2004. The groundwater flow maps for the Jefferson City and Roubidoux bedrock zones were regenerated from the groundwater elevations measured during the Remedial Investigation.

The updated groundwater flow maps generated from the 2004 Remedial Investigation data are provided as Figures 29 and 45 to this response. The inferred direction of groundwater flow for the Jefferson City formation in the site area (Attachment 2) varies from the northeast to the southeast. The inferred direction of groundwater flow for the Roubidoux formation in the site area (Figure 45) is to the northeast.

Water levels measured during the quarterly Interim Groundwater Monitoring Program (IGMP) events from the second quarter of 2007 to the third quarter of 2010 (also post Festus municipal wells shutdown) were used to develop groundwater flow maps for the Jefferson City and Roubidoux bedrock formations. Please note that the groundwater flow maps for the Jefferson City bedrock formation were recently updated to include data from stream gradient locations along Joachim Creek (excluding the 4Q09 and 1Q10 events when the stream staff gauges were destroyed due to flooding of Joachim Creek). The surface water elevation data was used to supplement the groundwater elevation data and to evaluate the relationship between the Jefferson City aquifer and Joachim Creek. The groundwater flow maps for the IGMP are provided as Figures 30 through 43 for the Jefferson City formation and Figures 46 through 59 for the Roubidoux formation. In the site area, the groundwater flow maps depict a general groundwater flow direction for the Jefferson City formation to the east-southeast, and for the Roubidoux formation to the northeast.

Figure 28

Groundwater Flow Map: Jefferson City Formation, August 2002

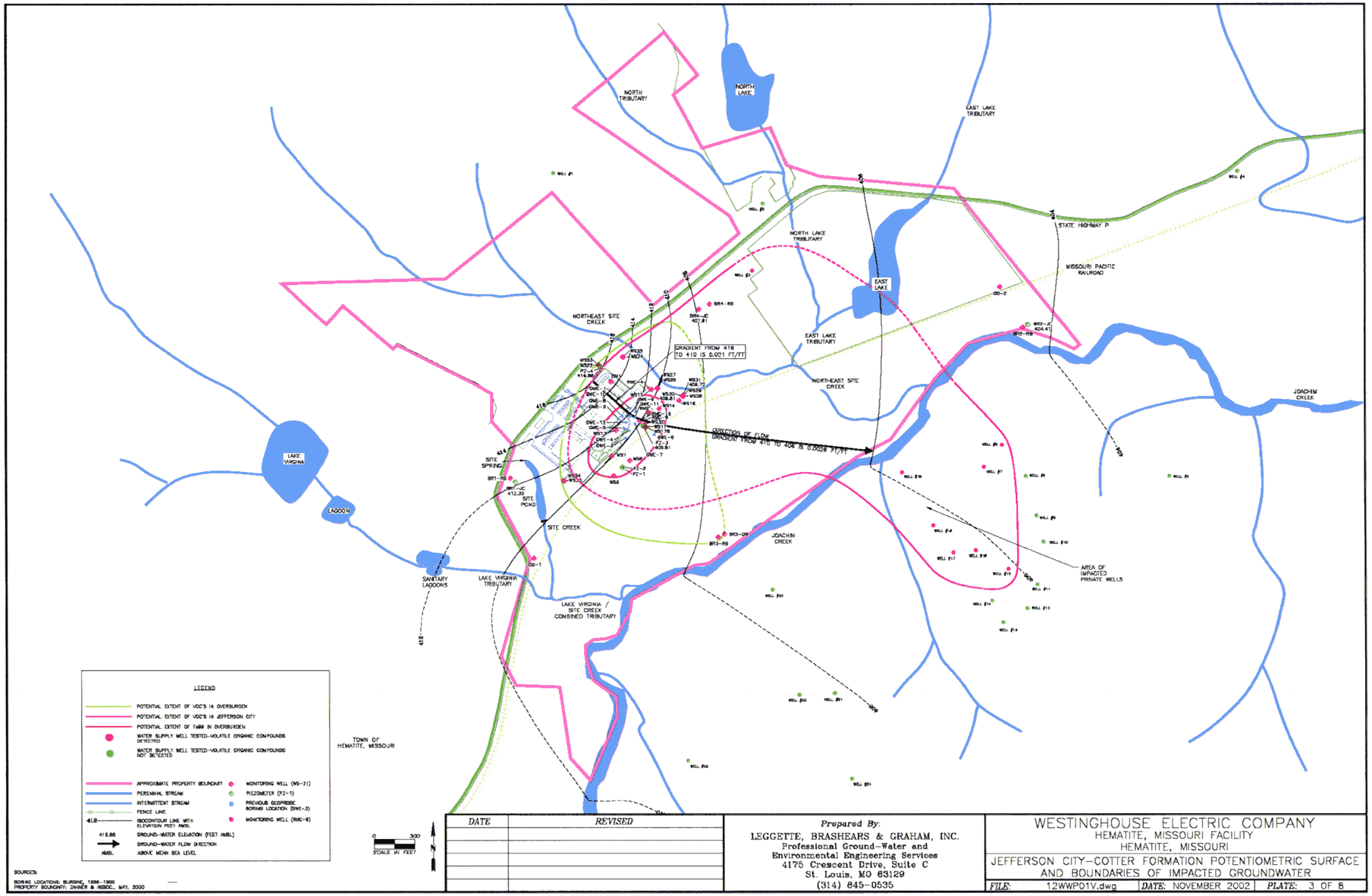


Figure 29

Groundwater Flow Map: Jefferson City Formation, December 2004

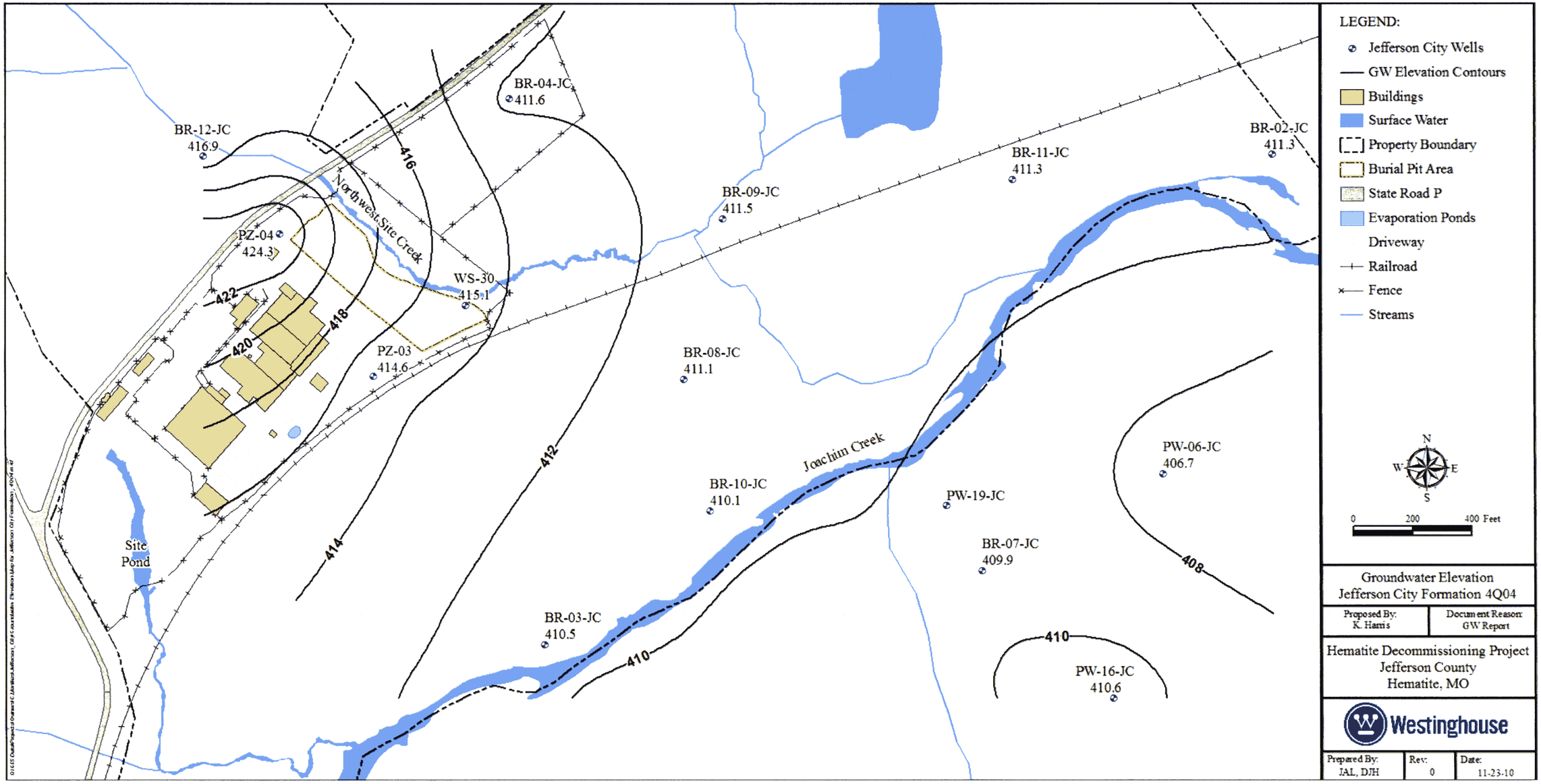


Figure 30

Groundwater Flow Map: Jefferson City Formation, June 2007

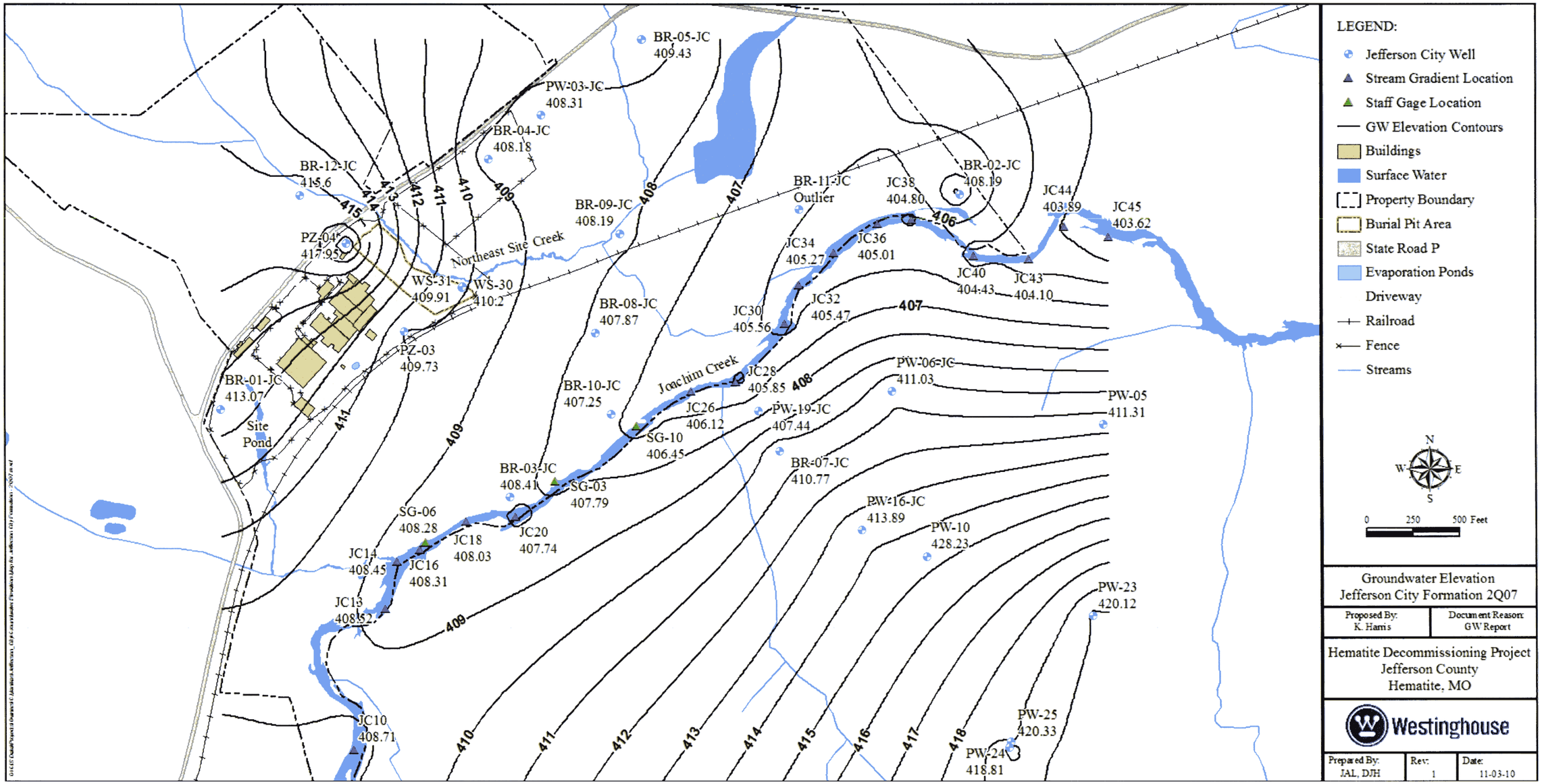


Figure 31

Groundwater Flow Map: Jefferson City Formation, September 2007

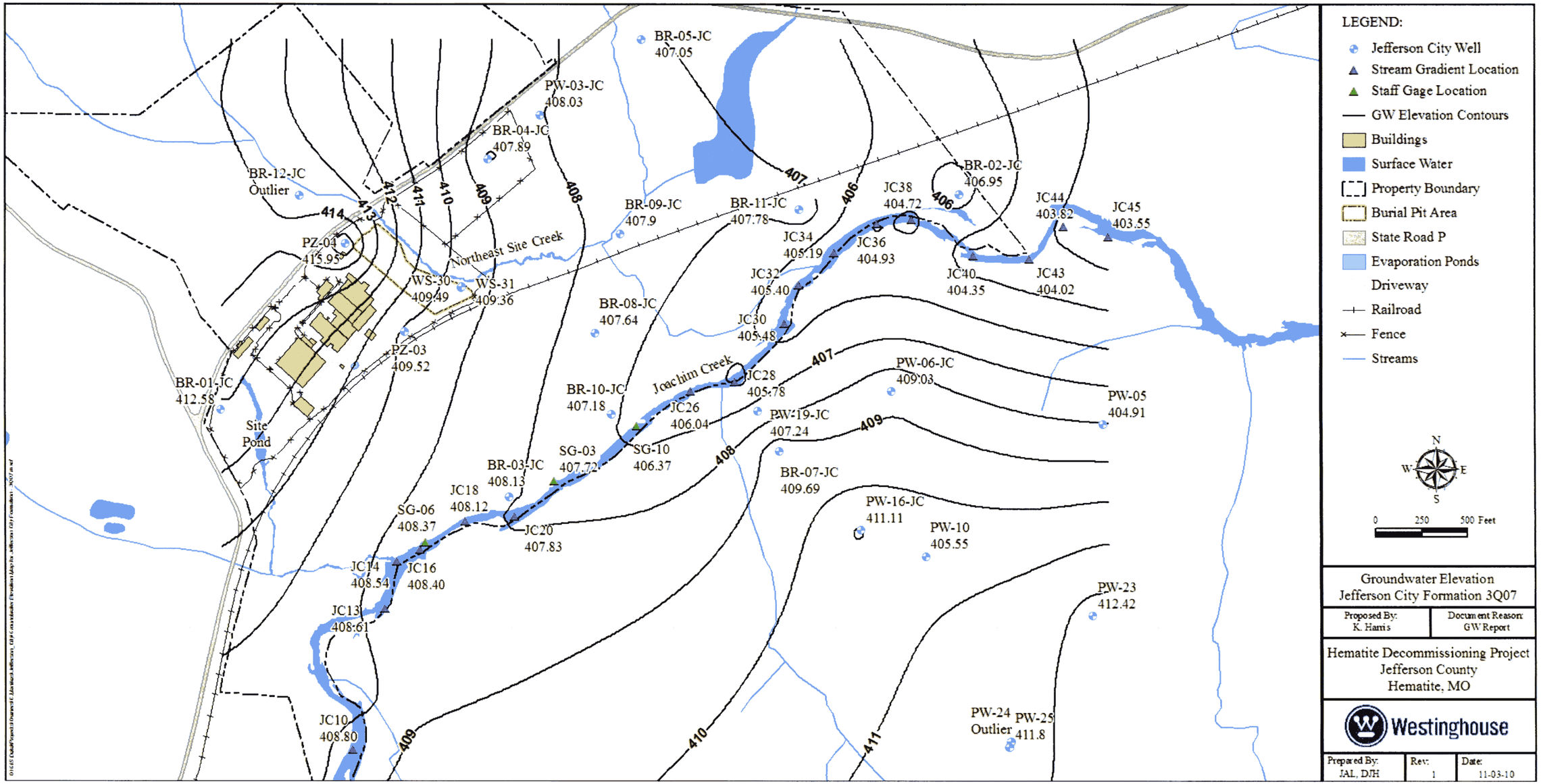


Figure 32

Groundwater Flow Map: Jefferson City Formation, December 2007

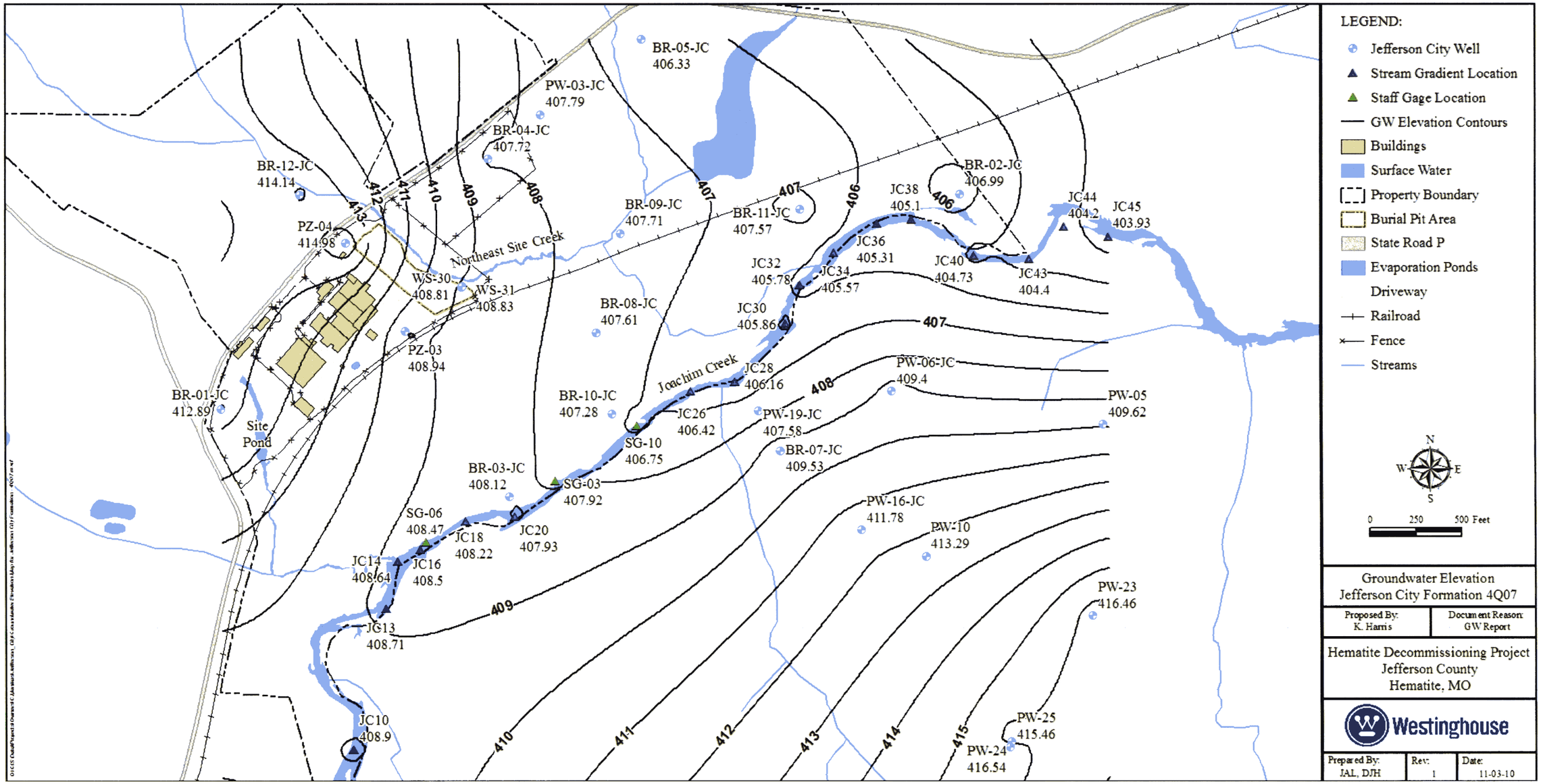


Figure 33

Groundwater Flow Map: Jefferson City Formation, March 2008

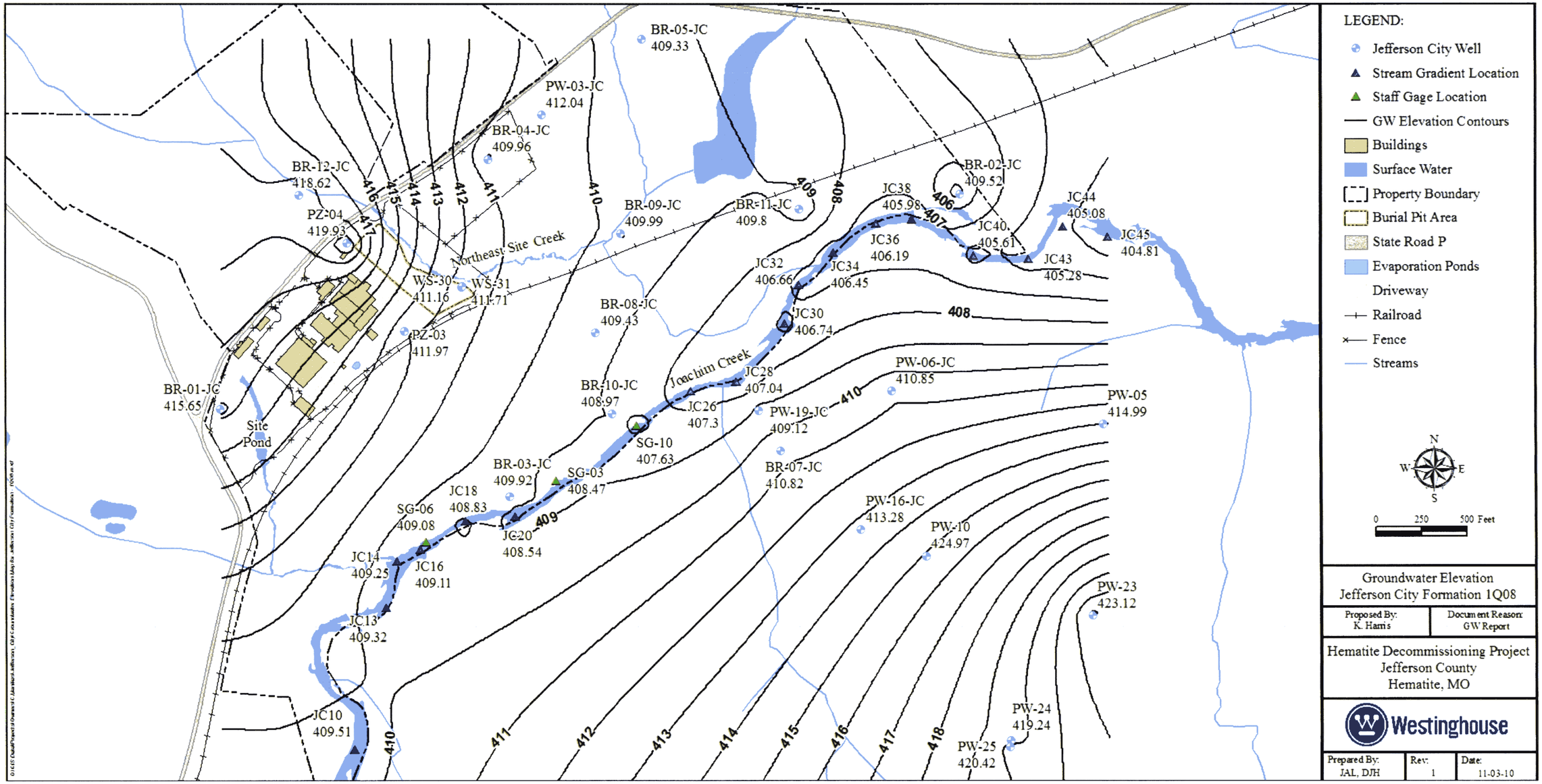


Figure 34

Groundwater Flow Map: Jefferson City Formation, June 2008

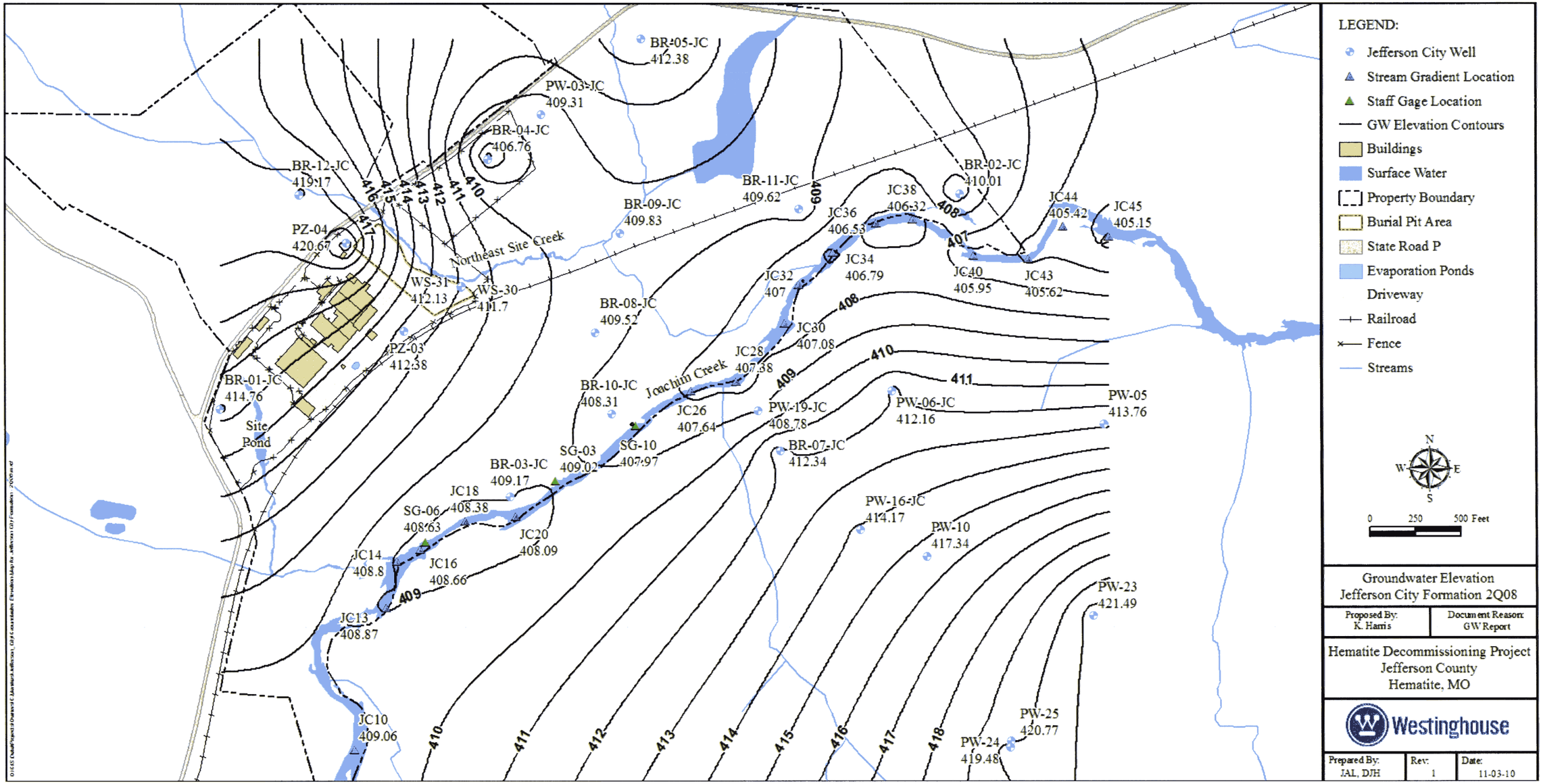


Figure 35

Groundwater Flow Map: Jefferson City Formation, September 2008

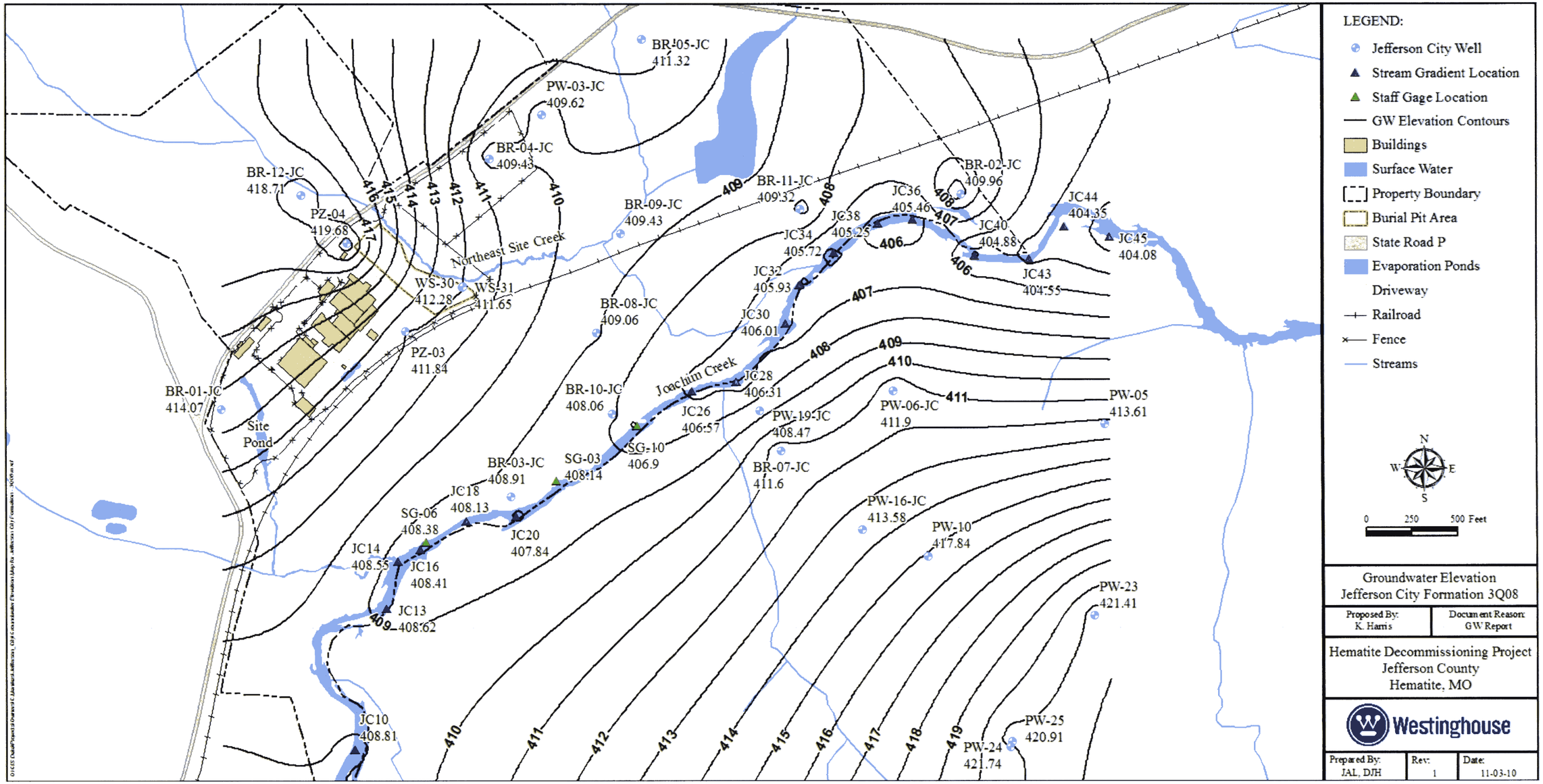


Figure 36

Groundwater Flow Map: Jefferson City Formation, December 2008

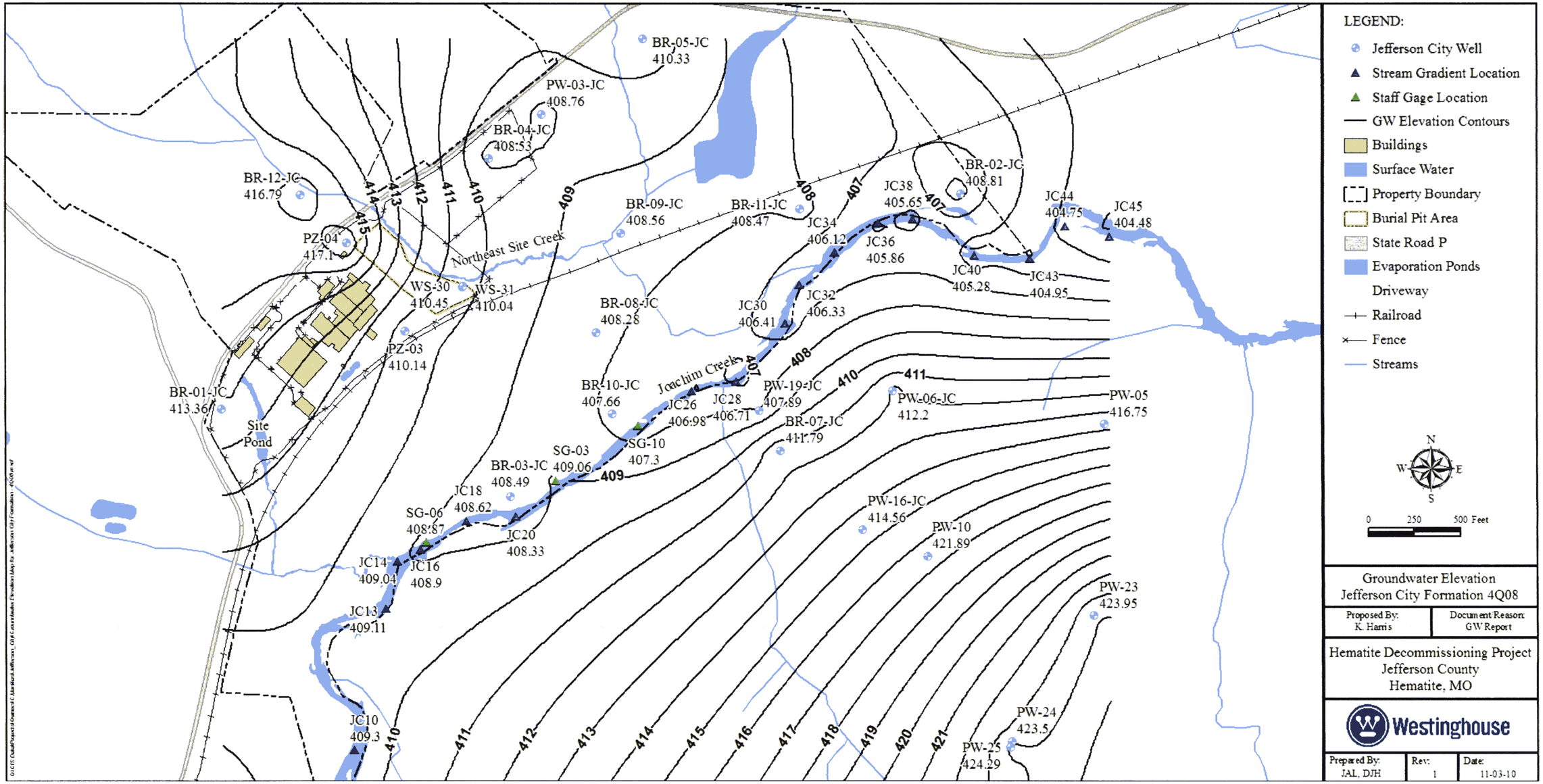


Figure 37

Groundwater Flow Map: Jefferson City Formation, March 2009

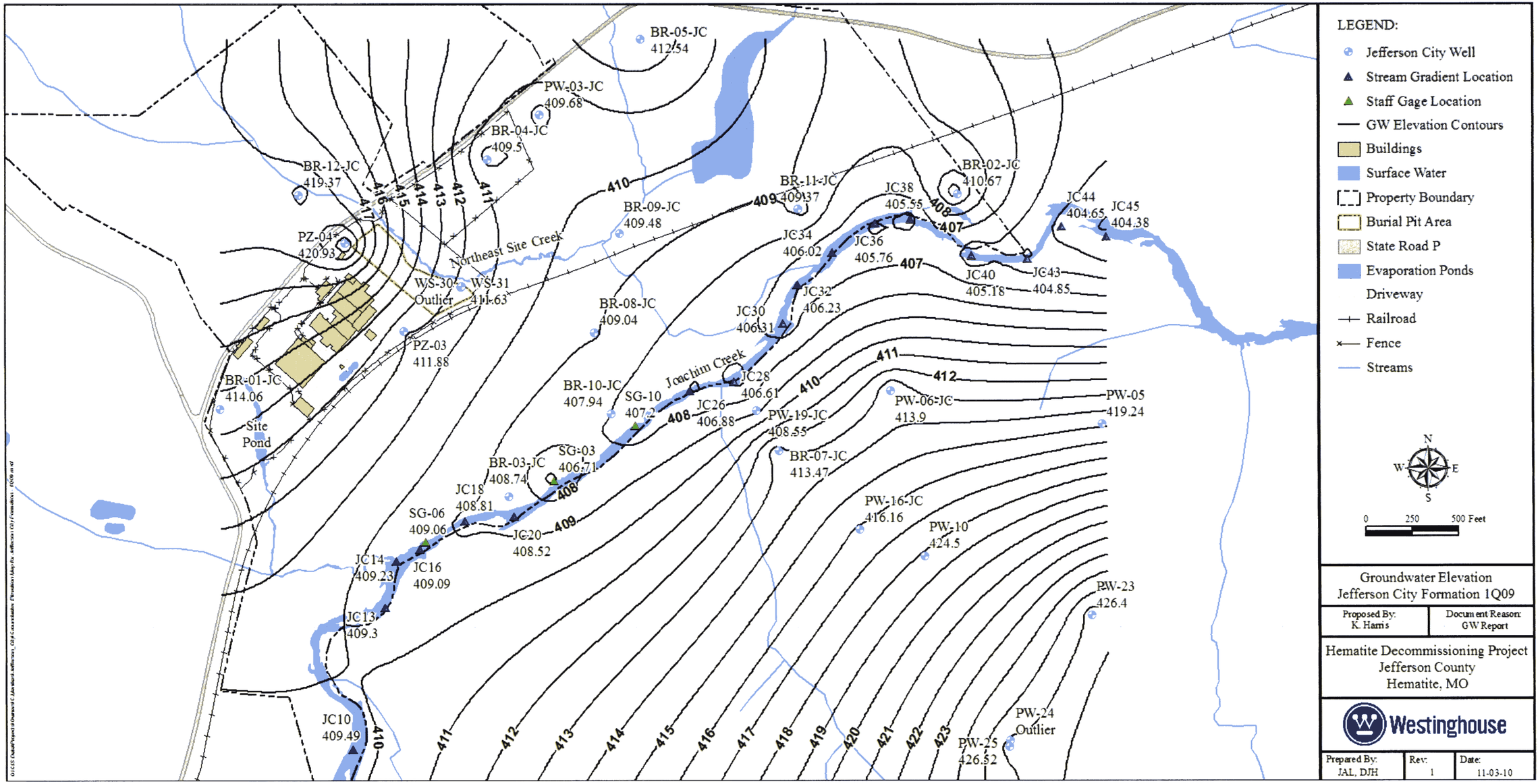


Figure 38

Groundwater Flow Map: Jefferson City Formation, June 2009

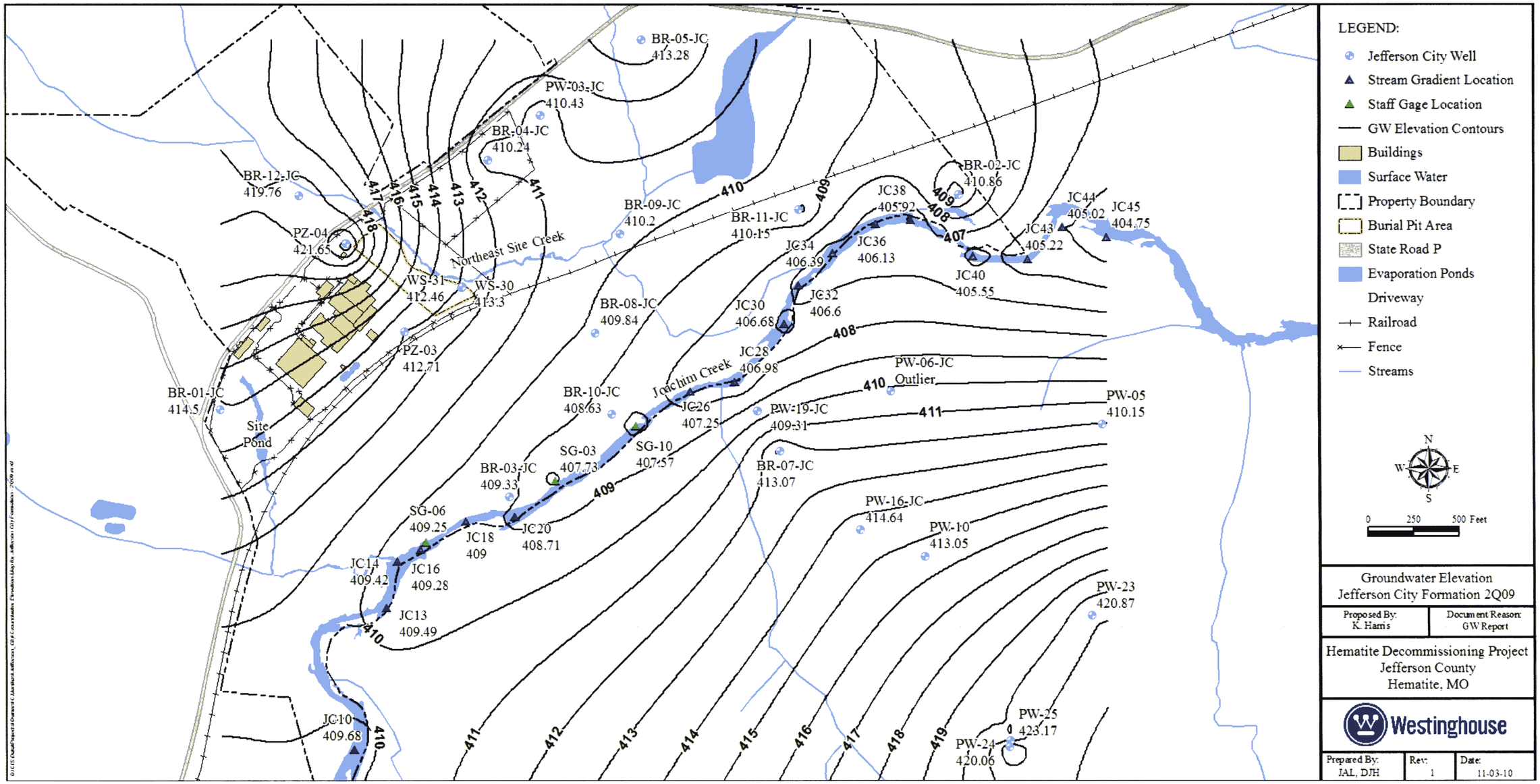


Figure 39

Groundwater Flow Map: Jefferson City Formation, September 2009

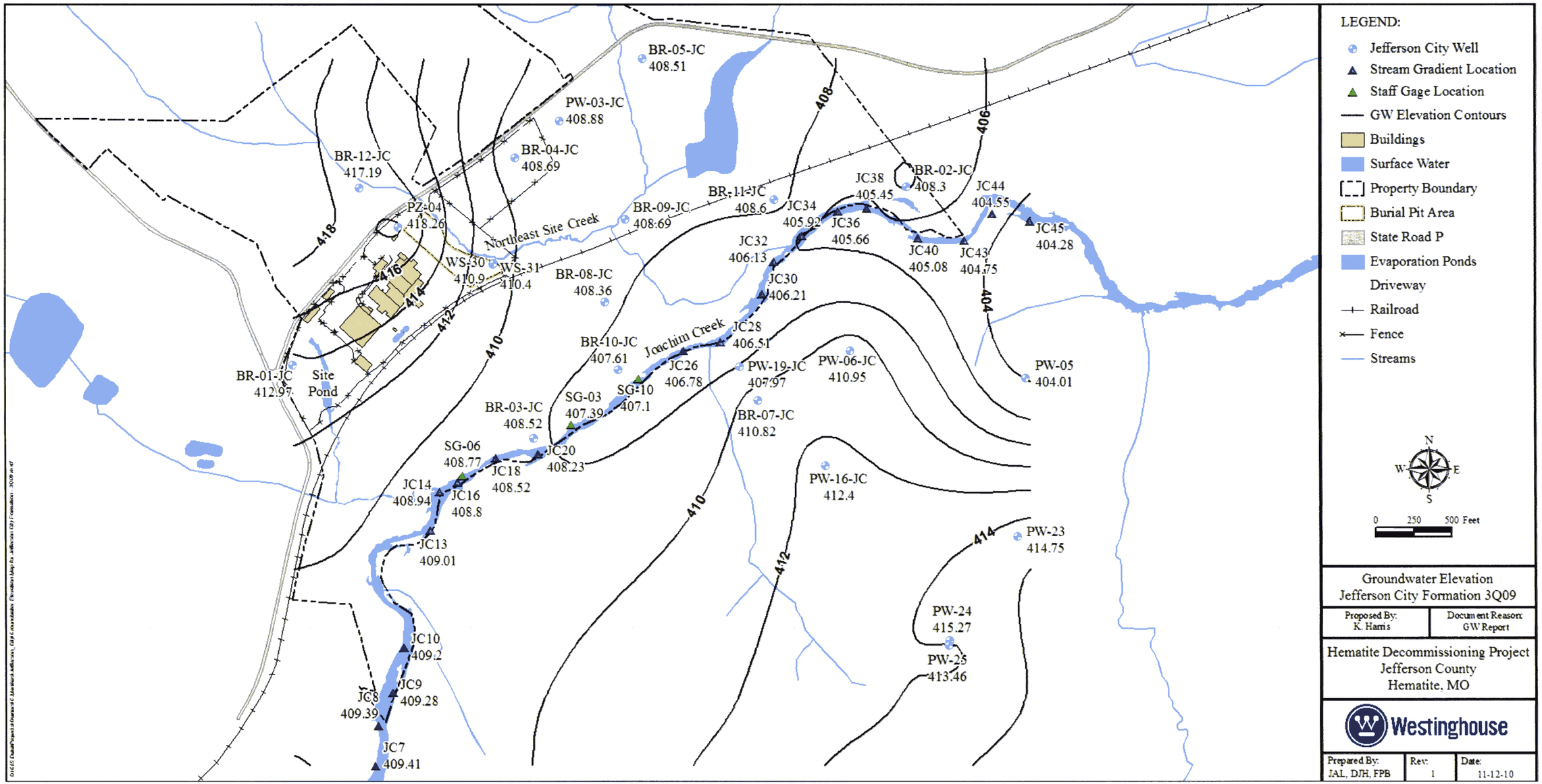


Figure 40

Groundwater Flow Map: Jefferson City Formation, December 2009

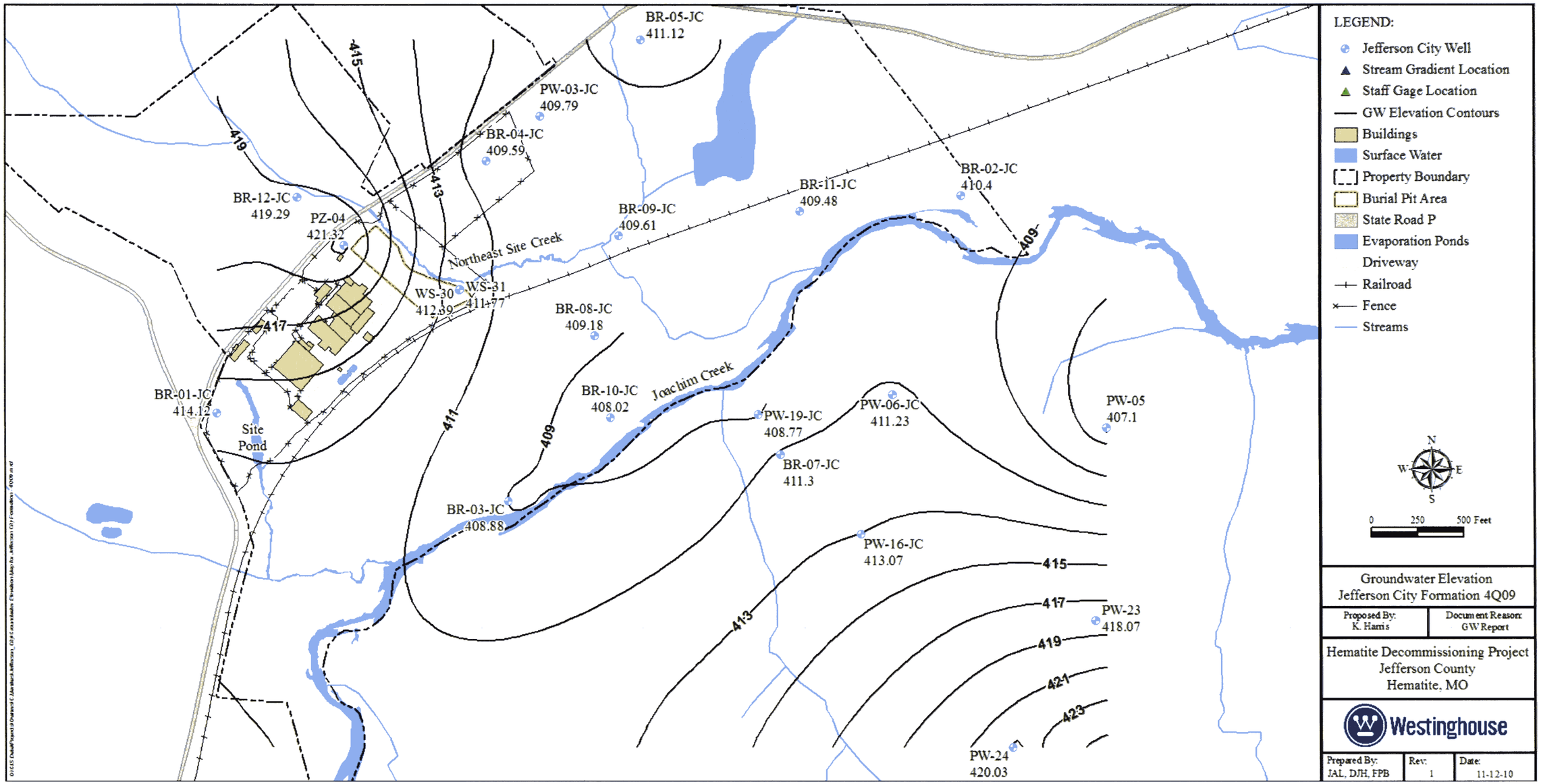


Figure 41

Groundwater Flow Map: Jefferson City Formation, March 2010

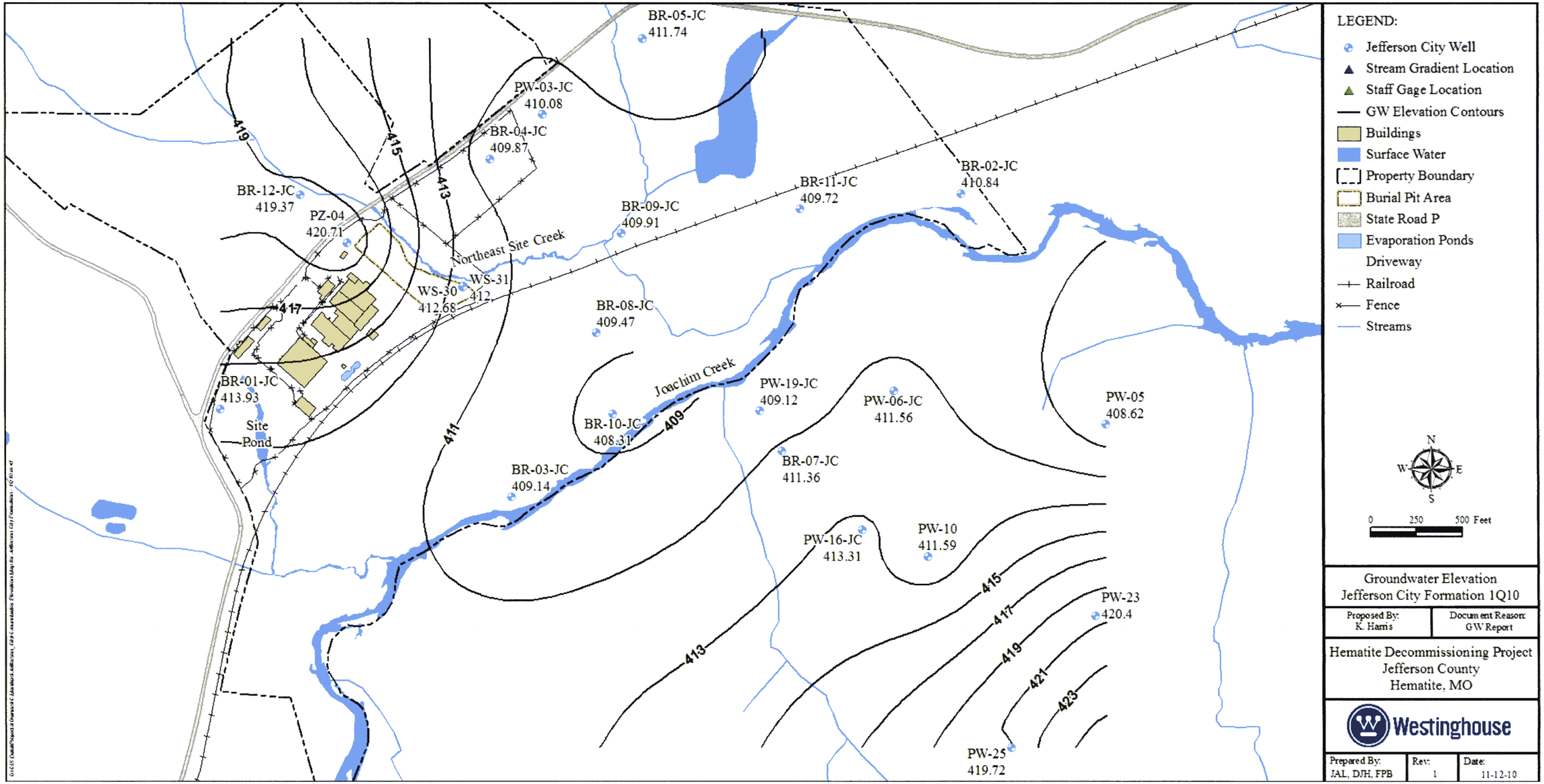


Figure 42

Groundwater Flow Map: Jefferson City Formation, June 2010

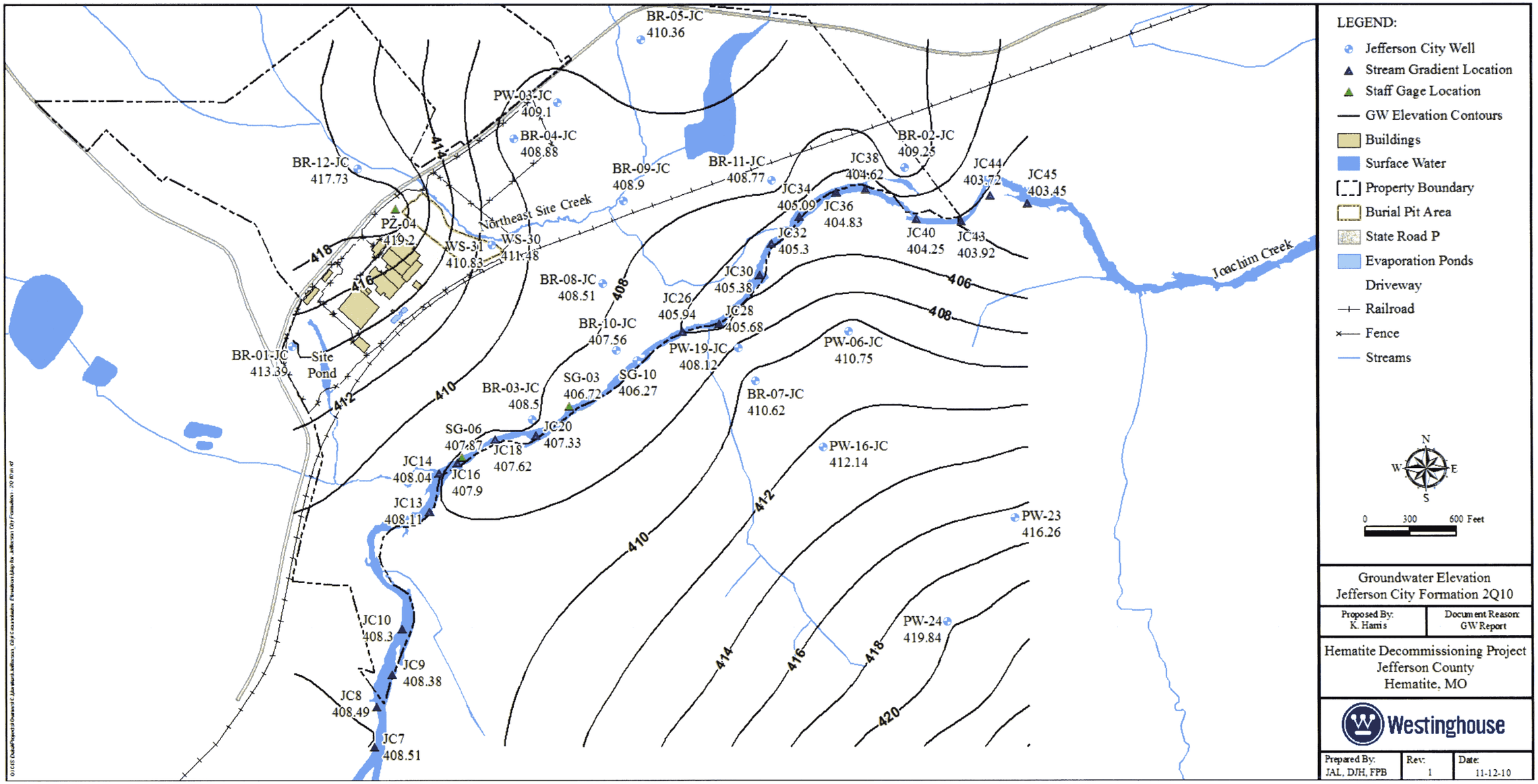


Figure 43

Groundwater Flow Map: Jefferson City Formation, September 2010

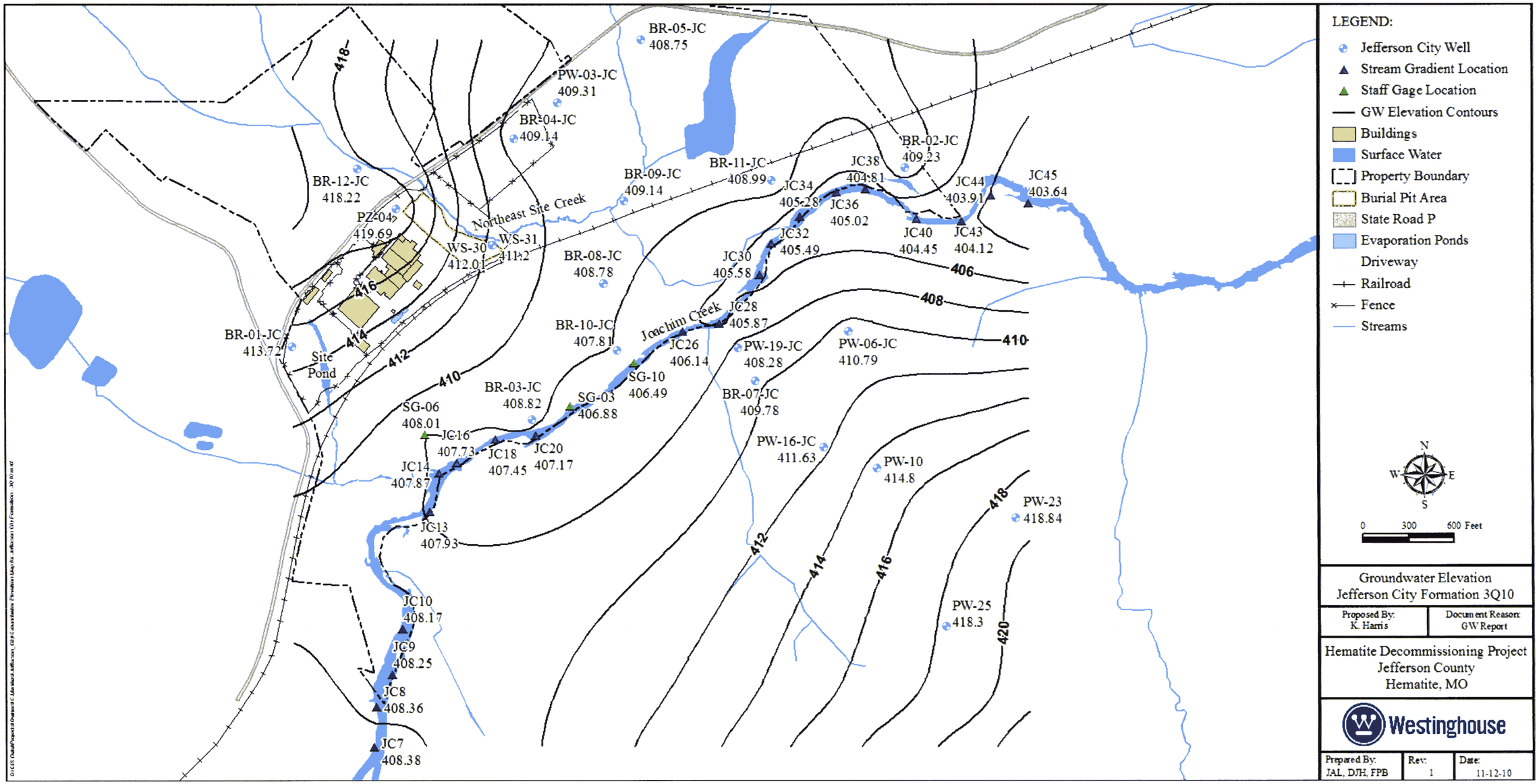


Figure 44

Groundwater Flow Map: Roubidoux Formation, August 2002

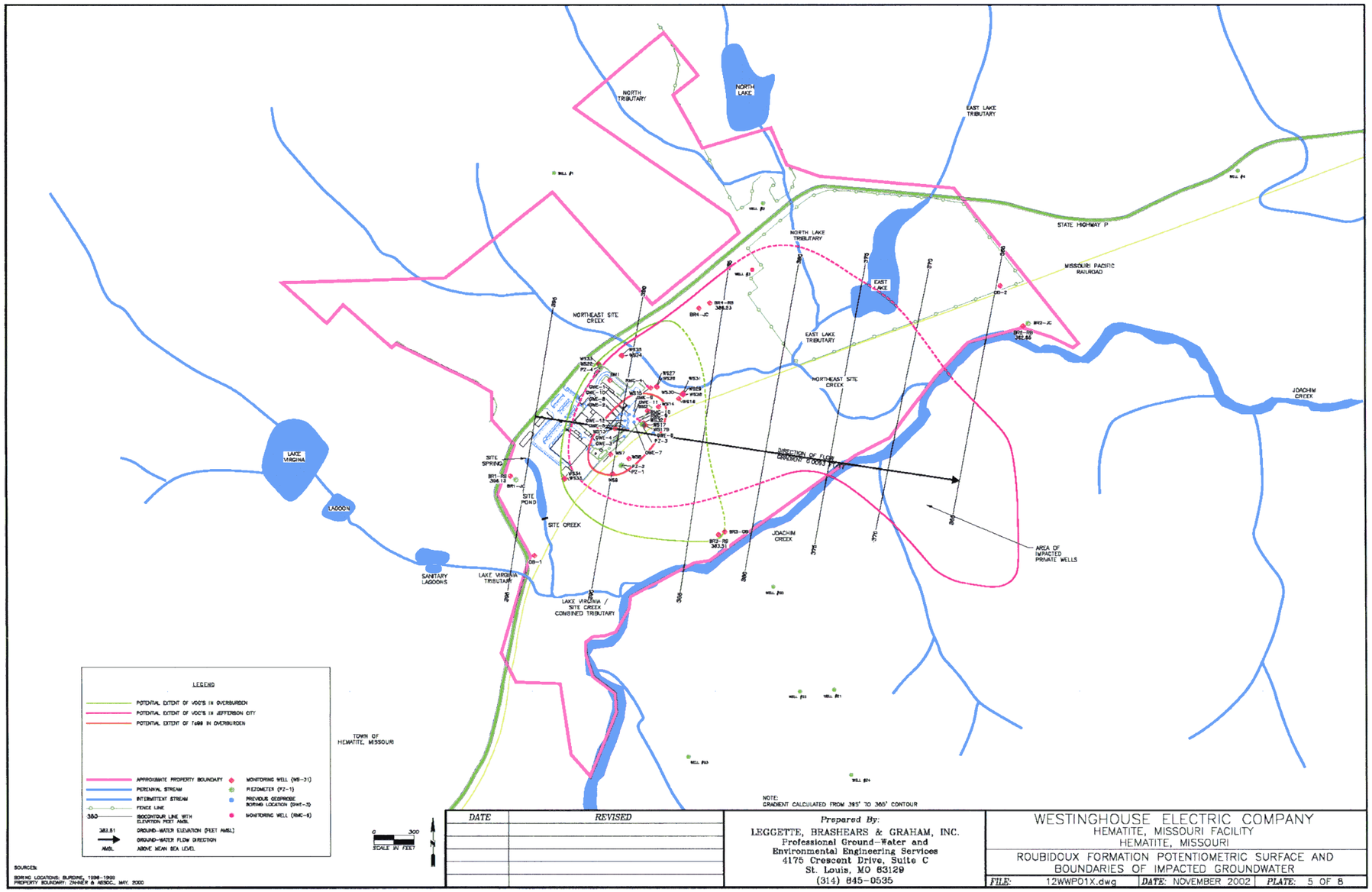


Figure 45

Groundwater Flow Map: Roubidoux Formation, December 2004