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16 October 2003

Mr. Girish Desai, P.E.
Environmental Engineer 2
New York State Department of
Environmental Conservation, Region 1
Division of Environmental Remediation
Building 40, State University of New York
Stony Brook, New York 11790-2356

RE: Additional Predictive Scenarios for Peerless Photo Products Site, Shoreham, New York
Site ID No. 1-52-031
EA Project No. 13712.12

Dear Mr. Desai:

On behalf of Agfa Corporation, EA Engineering, Science, and Technology, Inc. is pleased to submit this letter report for the Peerless Photo Products site in Shoreham, New York. EA previously completed a groundwater flow and transport model for the Peerless Photo Products site in Shoreham, New York (EA 2003[1]) in support of evaluation of treatment options, and to assess the potential for future plume migration. This Groundwater Modeling Letter Report was completed to summarize the results and findings of additional predictive scenarios evaluated for the site.

The calibrated flow and transport model (EA 2003[1]) was used to evaluate two additional predictive scenarios for the site. The predictive scenarios were determined based on discussions with site stakeholders, including the New York State Department of Environmental Conservation and the Suffolk County Department of Health Services. The results of these model predictions were used to assess likely source area concentrations required to yield cadmium concentrations of 2.5 and 5.0 ppb (the Federal Maximum Contaminant Level for cadmium) at a hypothetical Briarcliff supply well.

To make the above assessment, two predictive scenarios were completed for this site, including:

- ***Scenario 1***—The source area cadmium concentration at the Tesla Tower Base was held at a constant concentration of 2,300 ppb for 100 years (2003-2103) to yield a concentration of 2.5 ppb at the hypothetical Briarcliff supply well. The hypothetical Briarcliff supply well was operated at a constant extraction rate of 0.52 million gal per day for 100 years from 2003 to 2103. This extraction rate is similar to actual extraction rates when the Briarcliff wells were in operation. Note that the Briarcliff wells are not currently installed, and these pumping wells may never actually be installed. These simulations were completed at the request of the Suffolk County Department of Health Services so the flow dynamics of the hypothetical Briarcliff wells could be more fully understood.

1. EA Engineering, Science, and Technology, Inc. 2003. Groundwater Modeling Summary Report, Peerless Photo Products Site, Shoreham, New York. October.

- ***Scenario 2***—The source area cadmium concentration was held at a constant concentration of 4,600 ppb for 100 years (2003-2103) to yield a concentration of 5 ppb (the Federal Maximum Contaminant Level for cadmium) at the hypothetical Briarcliff supply well. As above, the hypothetical Briarcliff supply well was operated at a constant extraction rate of 0.52 million gal per day for 100 years from 2003 to 2103.

PREDICTIVE SCENARIO RESULTS

A graphical comparison of the two scenarios is presented in Attachment A.1. Three wells were selected to present the results of the predictive scenarios. MW-2 was selected to present predicted concentration trends in the present day mid-plume area. MW-7S was selected to present predicted concentration trends at the present day toe of the plume. MW-2A was selected to present predicted concentration trends in the deeper aquifer. Graphical "snapshots" of the predicted plume for Scenarios 1 and 2 are presented for 2003, 2013, 2023, 2038, 2063, and 2103 (Attachments A.2 and A.3 respectively). The plume shape is shown for concentrations greater than 5 ppb (the Federal Maximum Contaminant Level for cadmium).

Scenario 1 – Source Area at 2,300 ppb, Briarcliff Wells at 2.5 ppb and in Operation

For this scenario, the source area cadmium concentration was held at 2,300 ppb from 2003 to 2103. This source area concentration was required to yield a concentration of 2.5 ppb at the hypothetical supply well. The supply well was operated at the location of the former Briarcliff well field at an extraction rate of 0.52 million gal per day from 2003 to 2103. The well was located in model Layer 3 to simulate groundwater extraction from the deeper aquifer.

Modeled concentrations decrease until 2012 at monitoring wells MW-2 and MW-2A. At this point, concentrations increase again, and eventually stabilize by 2022. At downgradient well MW-7S, concentrations decrease until 2052. Concentrations remain stable at approximately 60 ppb after 2022 for MW-2, and between 3 and 8 ppb at MW-2A. After 2052, concentrations stabilize at nominal concentrations (0.006 ppb) for MW-7S.

Modeled concentrations at the hypothetical supply well increase until approximately 2036 and stabilize thereafter between 1.5 and 2.5 ppb.

The plume shape stabilizes after 2023. Operation of the supply well shifts the plume to the west. Concentrations in the source area remain at 2,300 ppb.

Scenario 2 – Source Area at 4,600 ppb, Briarcliff Wells at 5.0 ppb and in Operation

For this scenario, the source area cadmium concentration was held at 4,600 ppb from 2003 to 2103. This source area concentration was required in order to yield a concentration of 5.0 ppb at the hypothetical supply well. As above, the supply well was operated at the location of the former Briarcliff well field at an extraction rate of 0.52 million gal per day from 2003 to 2103. The well was located in model Layer 3 to simulate groundwater extraction from the deeper aquifer.

Modeled concentrations decrease until 2012 at monitoring wells MW-2 and MW-2A. At this point, concentrations increase again, and eventually stabilize by 2022. At downgradient well MW-7S, concentrations decrease until 2052. Concentrations remain stable at approximately 120 ppb after 2022 for MW-2, and between 6 and 16 ppb at MW-2A. After 2052, concentrations stabilize at nominal concentrations (0.006 ppb) for MW-7S.

Modeled concentrations at the hypothetical supply well increase until approximately 2036 and stabilize thereafter between 3 and 5 ppb.

The plume shape stabilizes after 2023. Operation of the supply well shifts the plume to the west. Concentrations in the source area remain at 2,300 ppb.

PREDICTIVE SCENARIO CONCLUSIONS

Based on the results of the predictive scenarios, the following conclusions can be made:

- The source area cadmium concentrations required to yield 2.5 or 5.0 ppb at the hypothetical supply well are at least one order of magnitude higher than the highest cadmium concentration of 269 ppb measured at monitoring well MW-6, the source area well.

- For both scenarios, the plume stabilizes after 2023 after which concentrations at the Briarcliff well stabilize between 1.5 and 2.5 ppb for Scenario 1 and between 3 and 5 ppb for Scenario 2. There is a linear relationship between increases in source area concentration and increases in concentrations at the Braircliff well.

- Model results indicate the hypothetical operation of the Briarcliff well field will affect the shape of the cadmium plume, moving the plume to the west. Assuming operational flow rates of 0.52 million gal per day for these wells, the cadmium plume will be drawn toward the Briarcliff wells and will likely move into these wells. However, significant dilution is likely to occur prior to the plume reaching these wells.

If you have any questions regarding this letter report, please do not hesitate to contact me at (732) 404-9370, Extension 220, or Charlene Graff of Agfa at (201) 440-2500, Extension 4613.

Sincerely,

Christopher J. Kerlish
Project Manager

CJK/cl
Attachment

cc: S. Calabufo, Suffolk County Water Authority
C. Graff, Agfa Corporation
W. Parrish, NYSDEC
D. Ripstein, New York State Department of Health
S. Robbins, Suffolk County Department of Health Services

Attachment A

Additional Predictive Scenarios

A.1 Comparison of Scenarios
A.2 Scenario 1 Predicted Concentrations
A.3 Scenario 2 Predicted Concentrations

Attachment A.1

Comparison of Scenarios

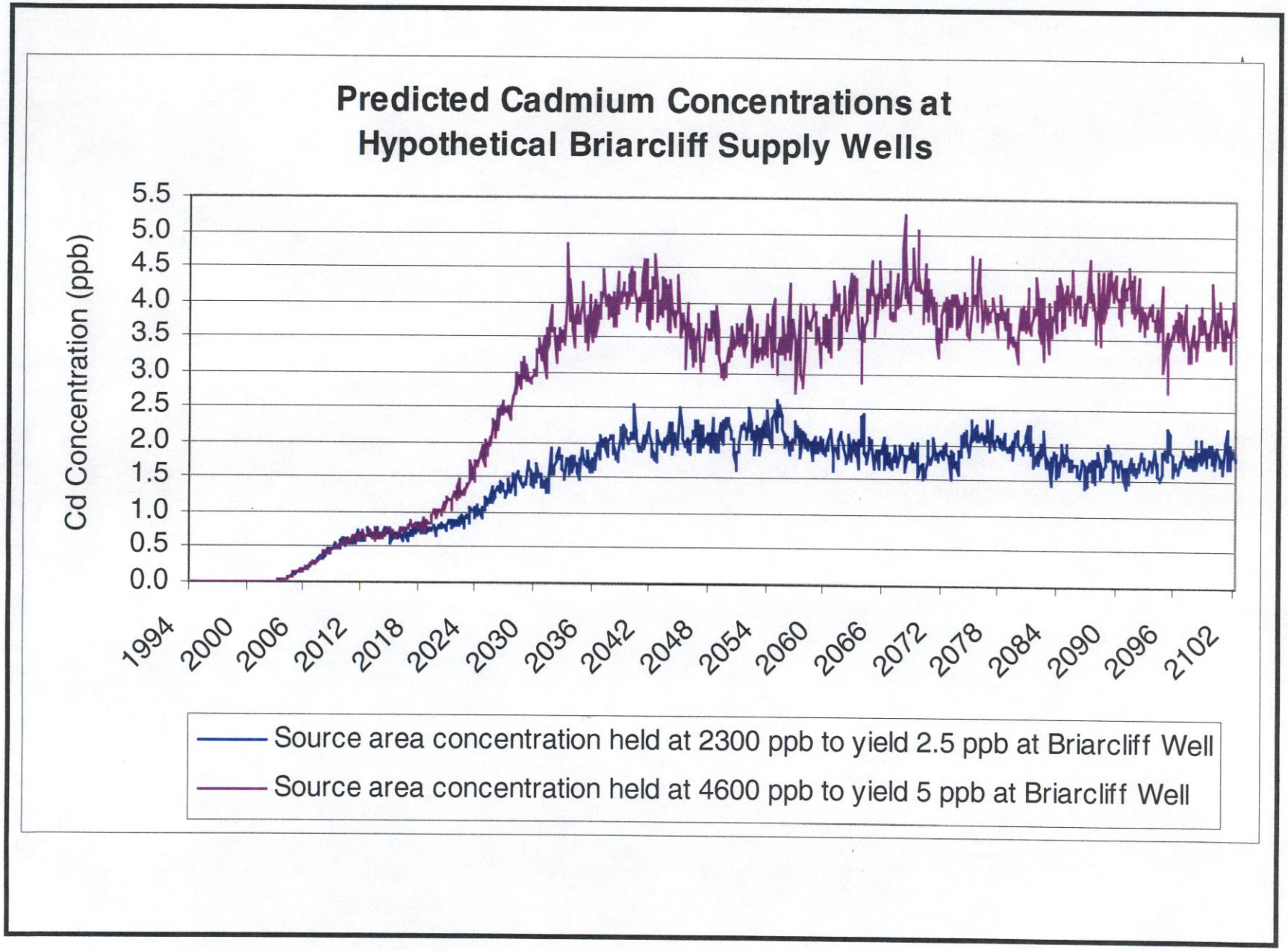

Figure A.1-1. Predicted cadmium concentrations at hypothetical Briarcliff supply wells, 1994-2102.

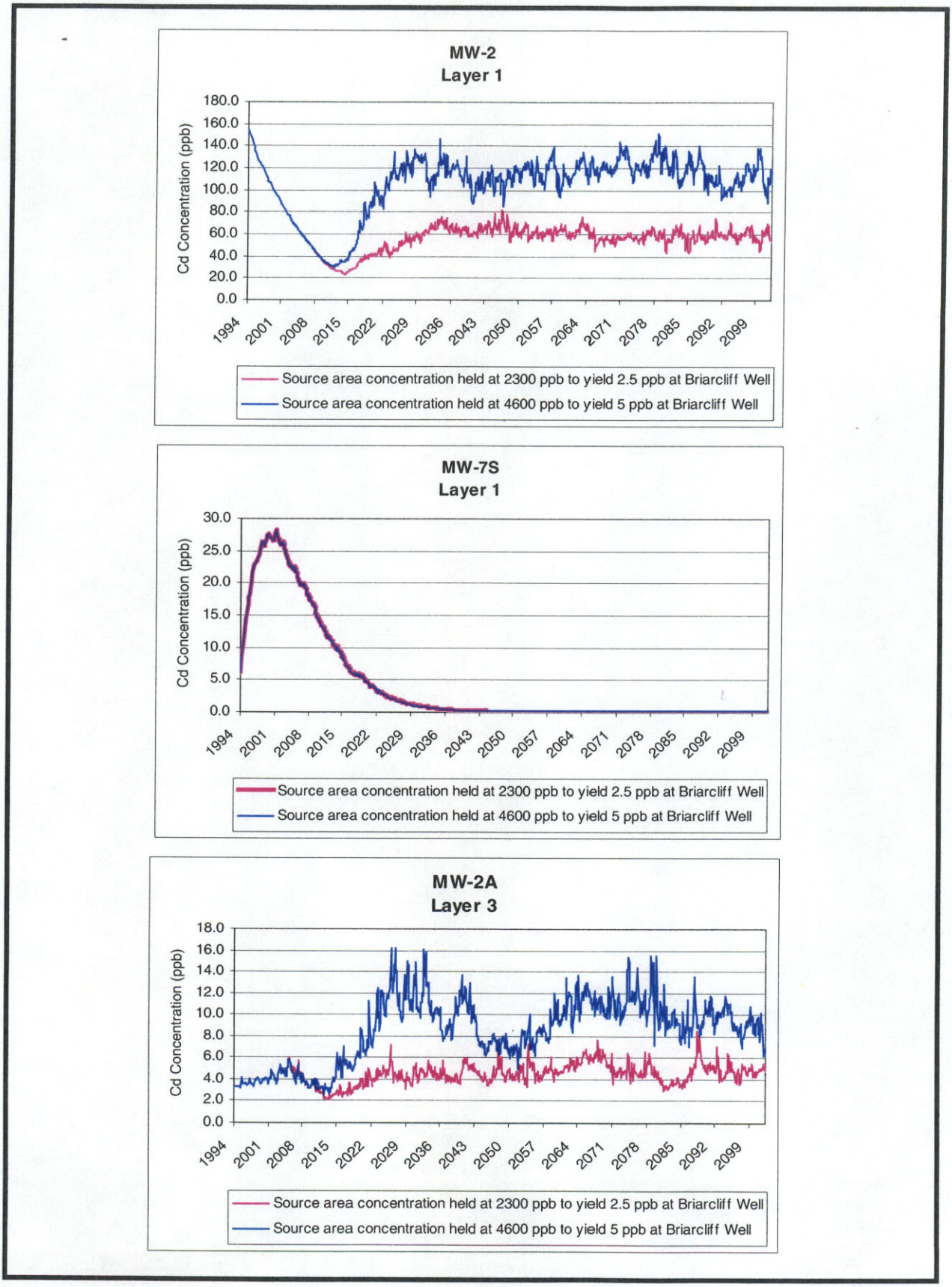

Figure A.1-2. Comparison of predictive scenarios at selected wells.

Attachment A.2

Scenario 1 Predicted Concentrations
Source Area at 2,300 ppb, Briarcliff Well at 2.5 ppb

Figure A.2-1. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2003).

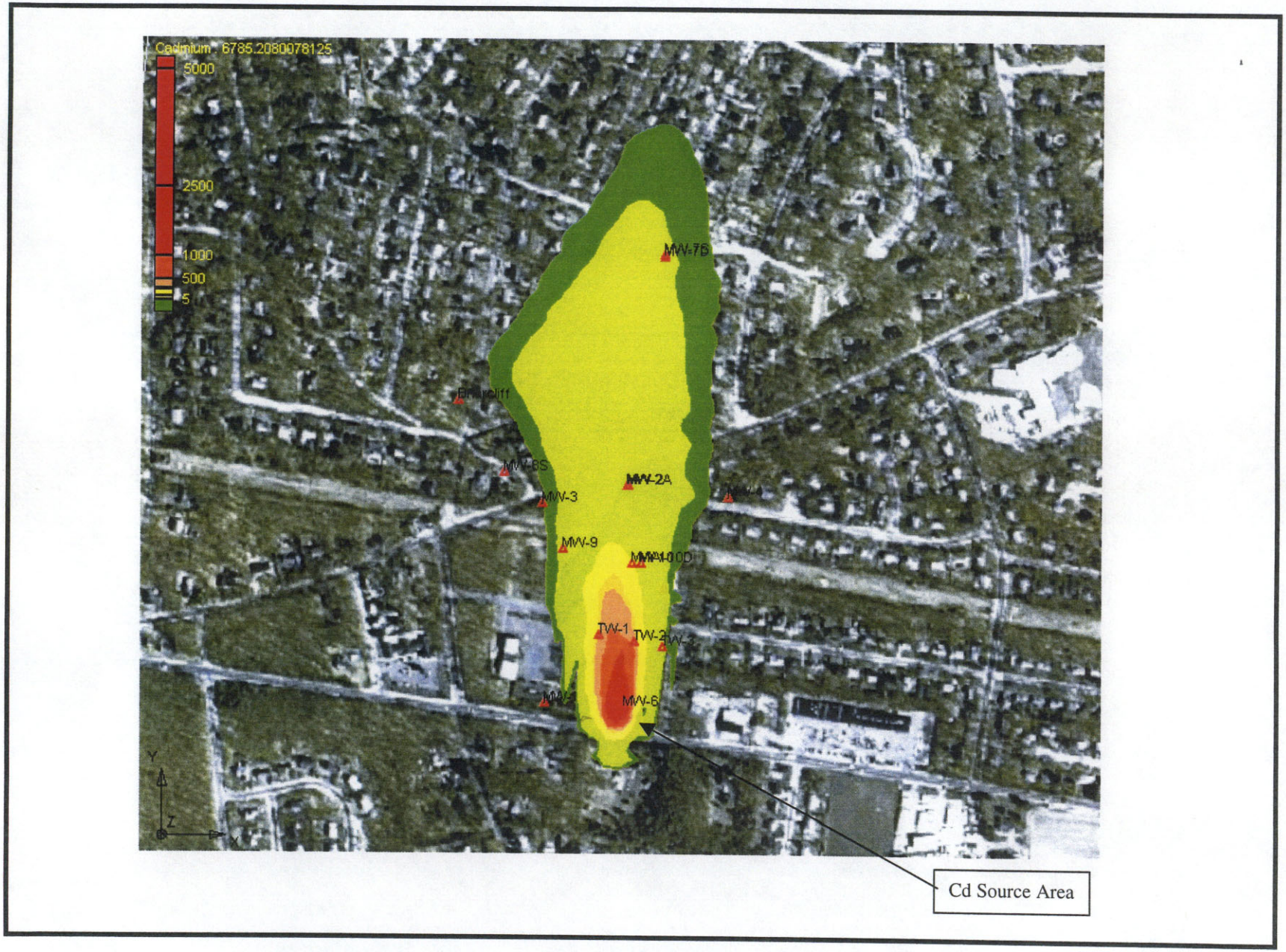

Figure A.2-2. Graphic representation of predicted cadmium concentrations for model Layer 1 (16 February 2013).

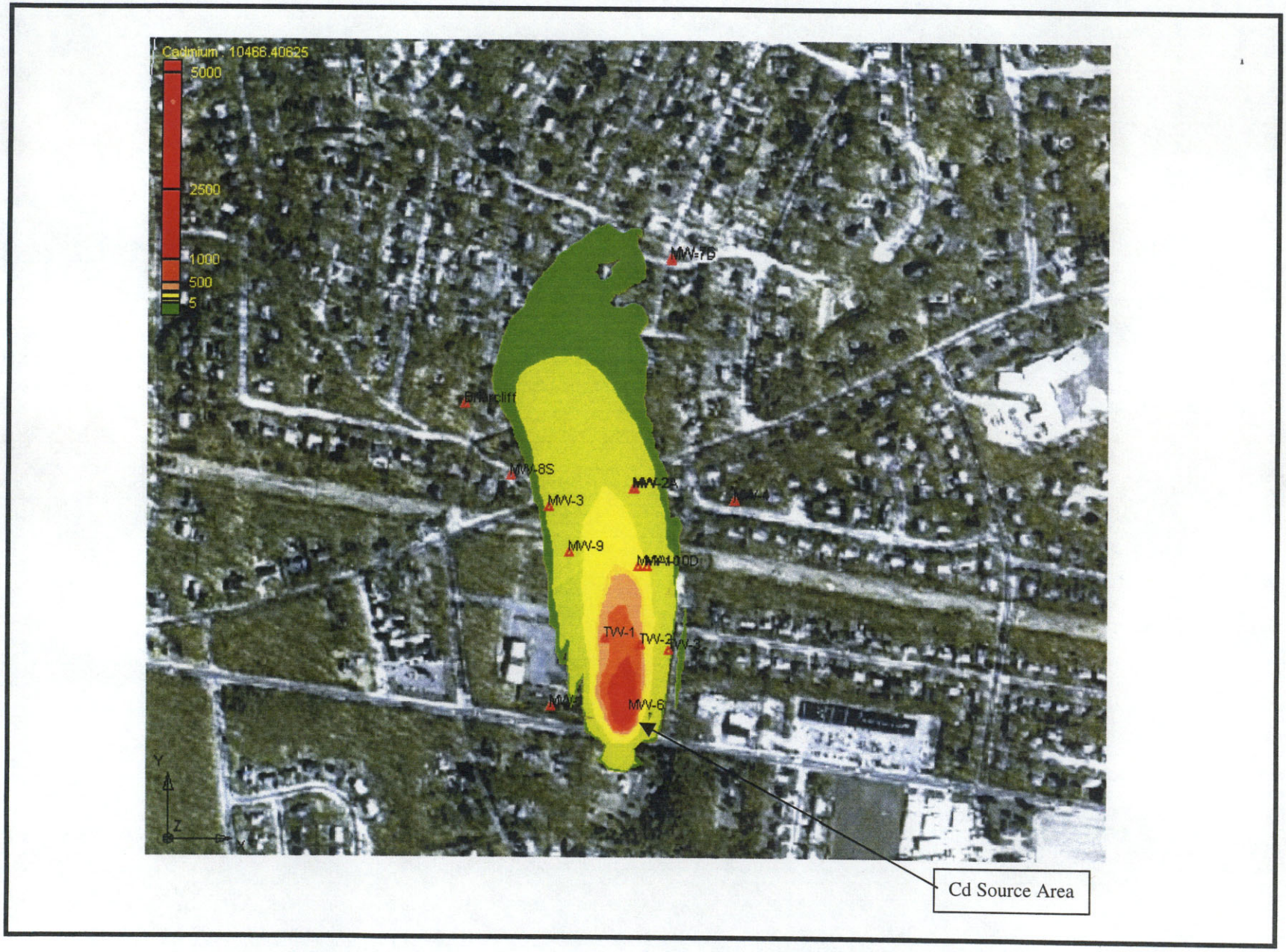

Figure A.2-3. Graphic representation of predicted cadmium concentrations for model Layer 1 (5 March 2023).

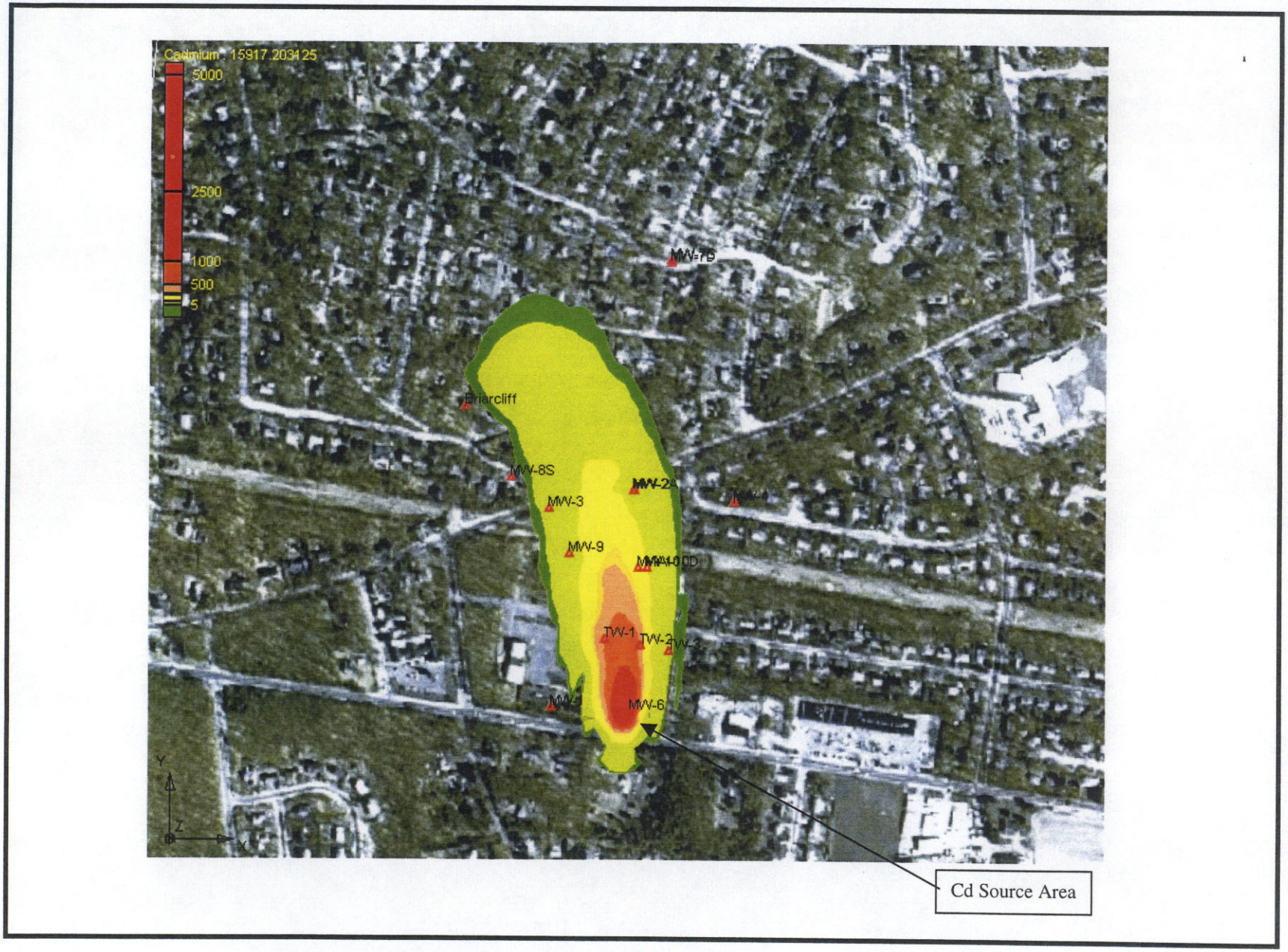

Figure A.2-4. Graphic representation of predicted cadmium concentrations for model Layer 1 (17 February 2038).

Figure A.2-5. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2063).

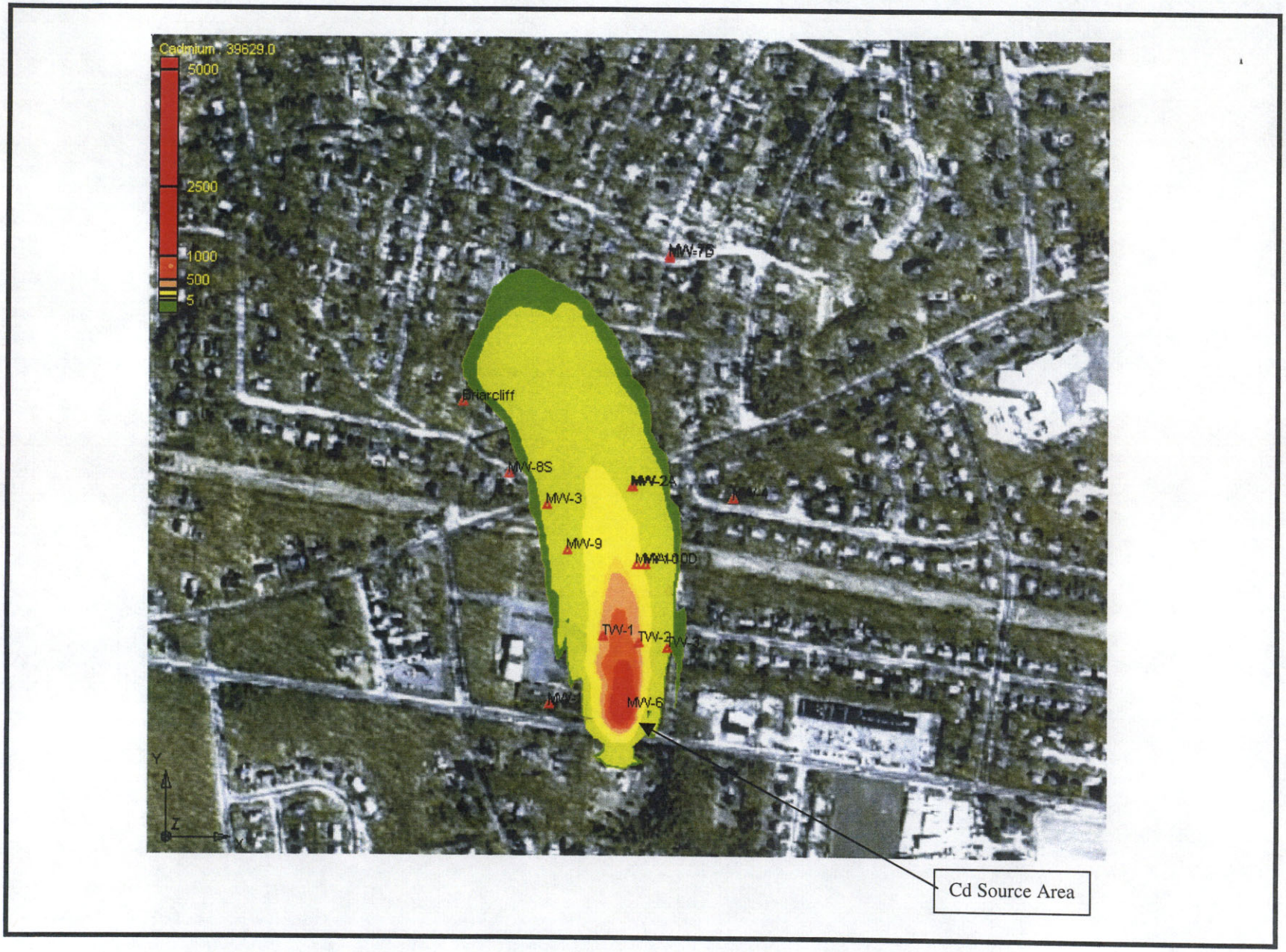

Figure A.2-6. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2103).

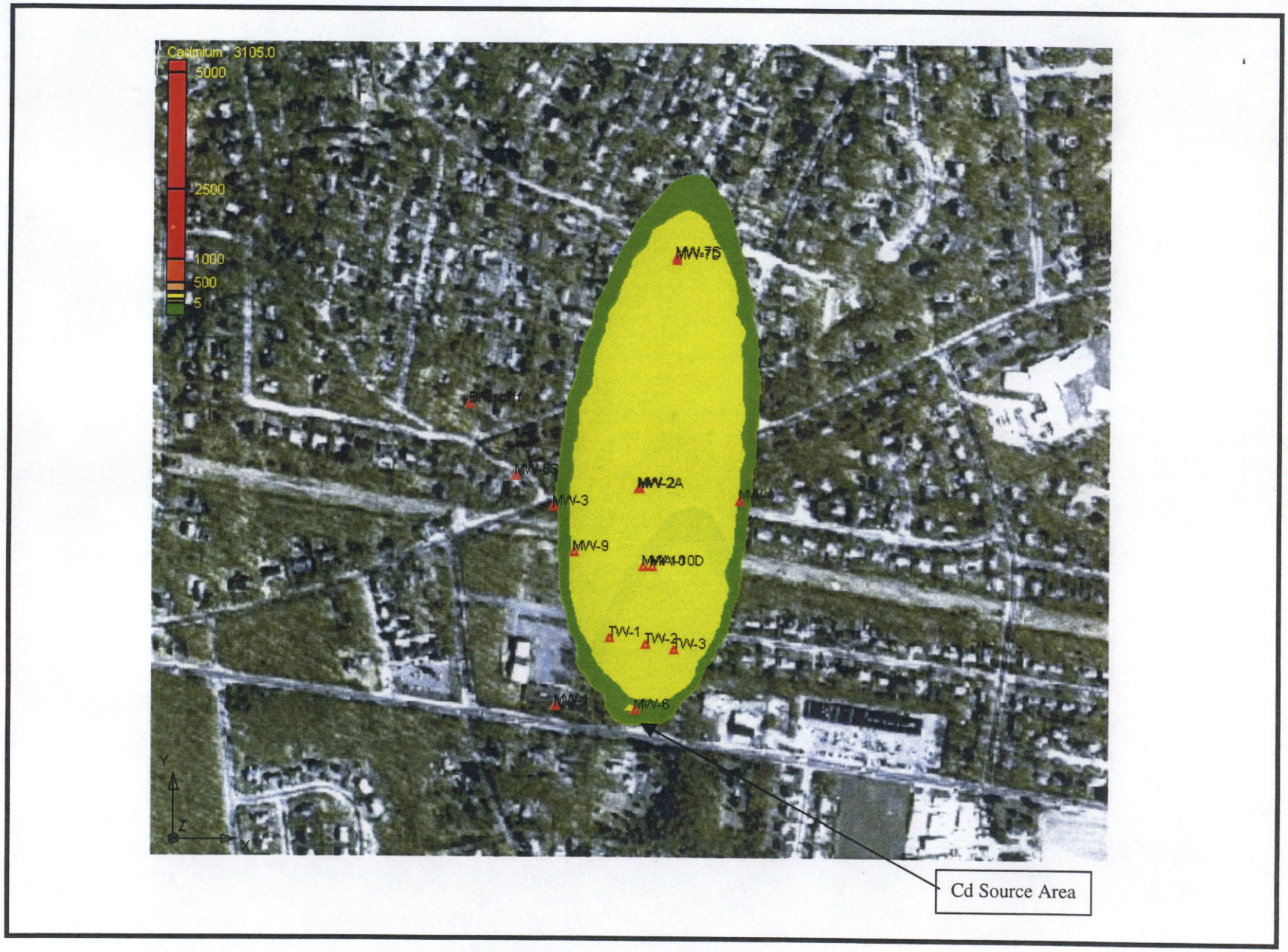

Figure A.2-7. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2003).

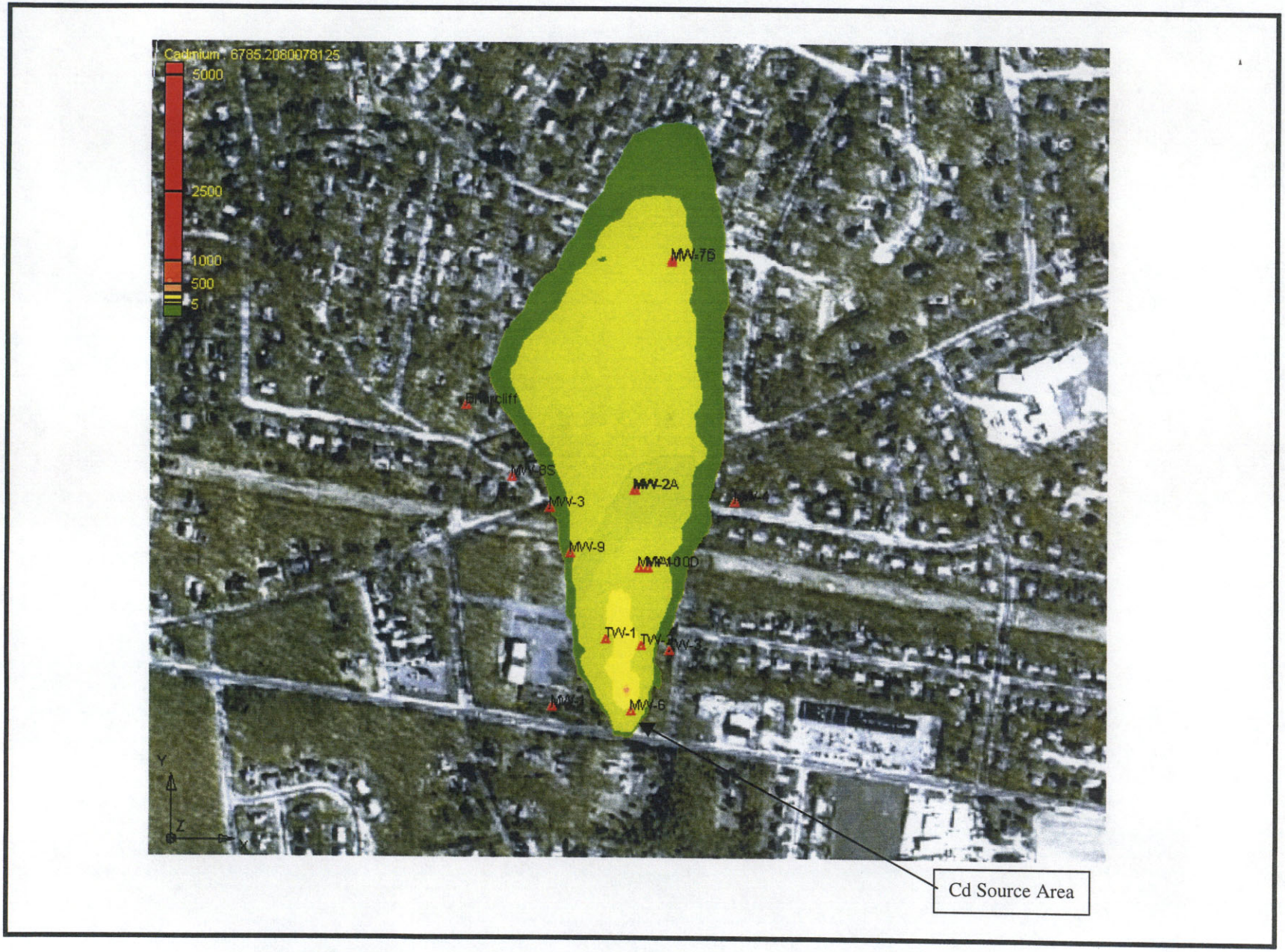

Figure A.2-8. Graphic representation of predicted cadmium concentrations for model Layer 2 (16 February 2013).

Figure A.2-9. Graphic representation of predicted cadmium concentrations for model Layer 2 (5 March 2023).

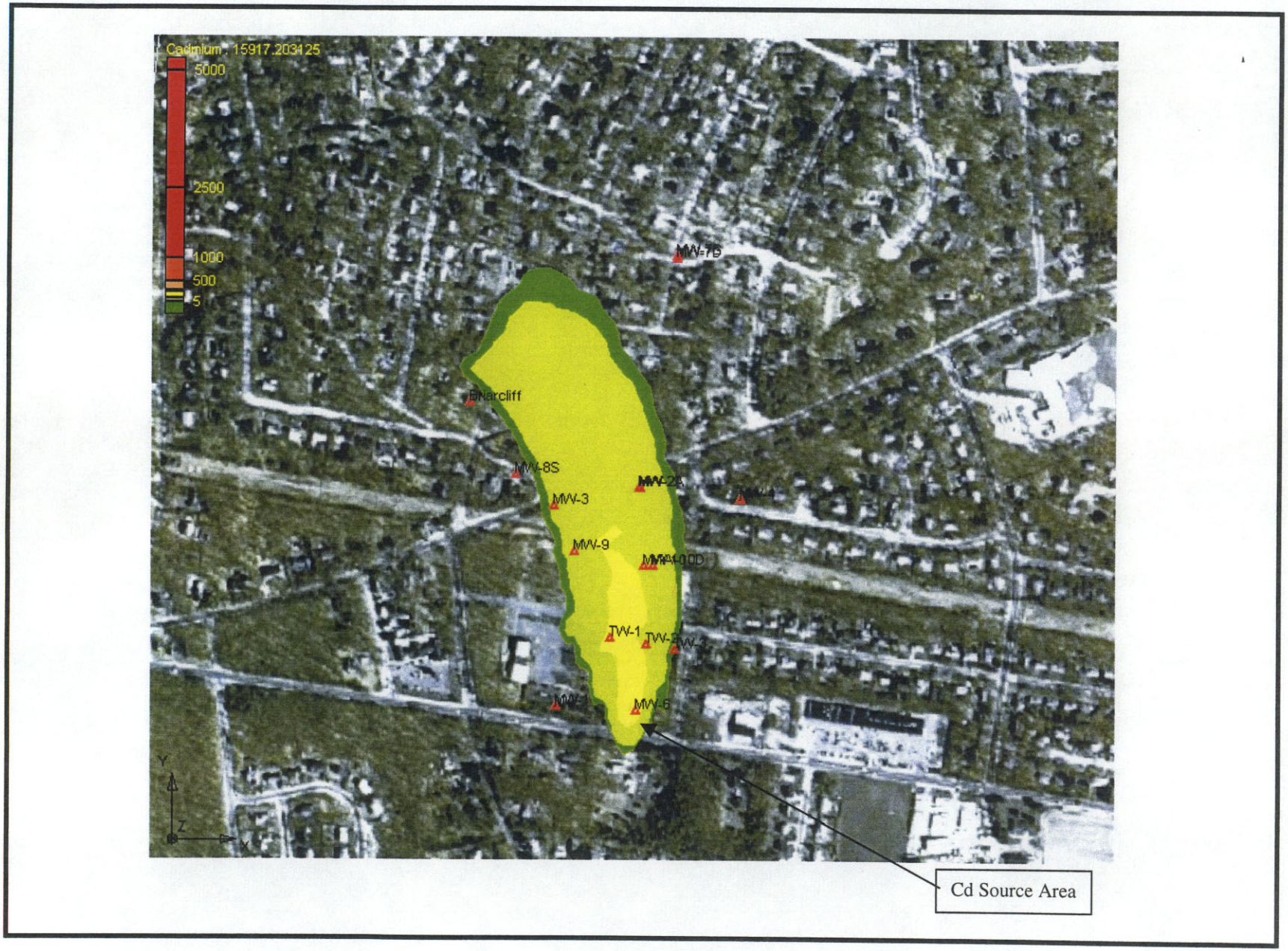

Figure A.2-10. Graphic representation of predicted cadmium concentrations for model Layer 2 (17 February 2038).

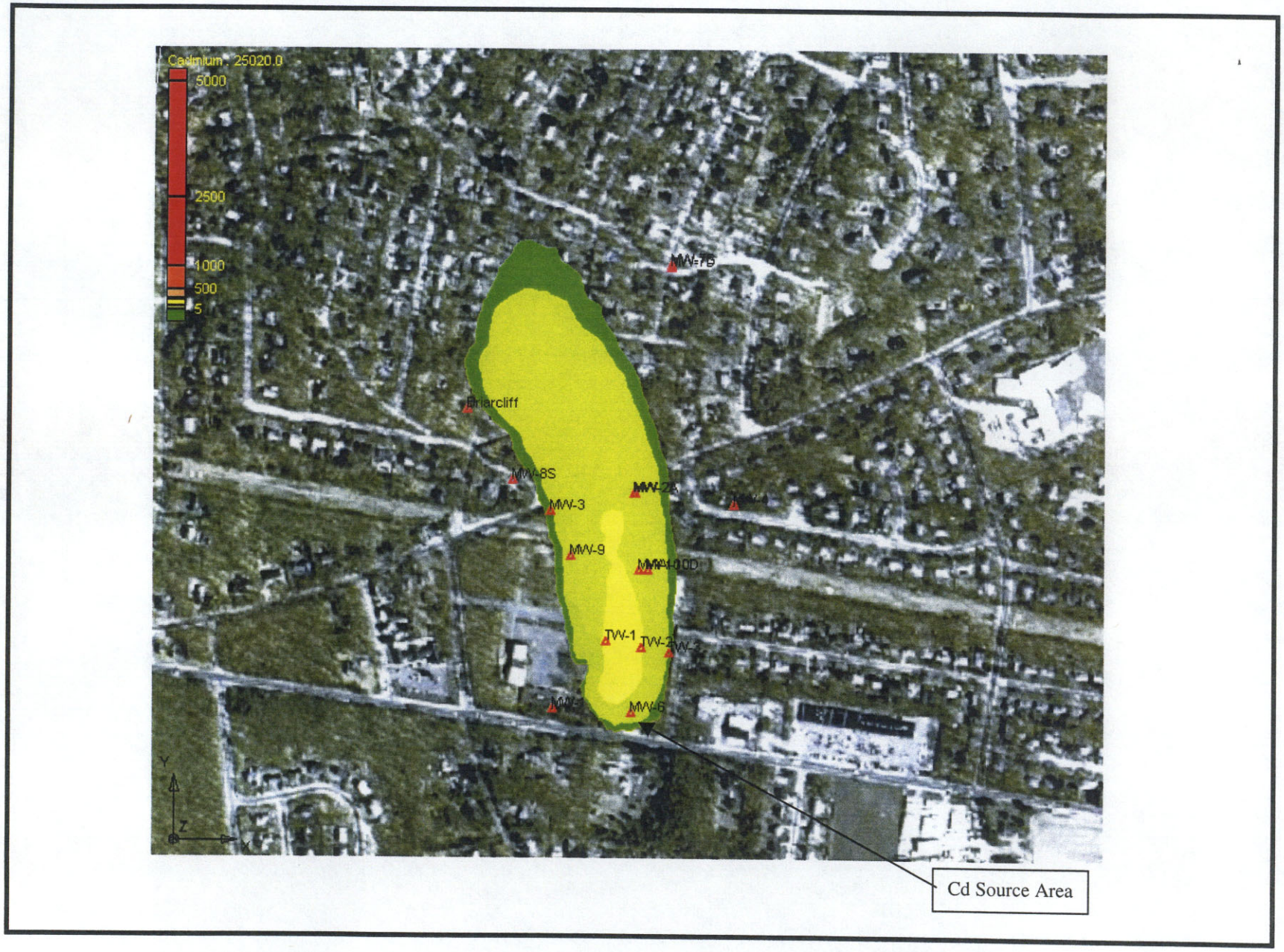

Figure A.2-11. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2063).

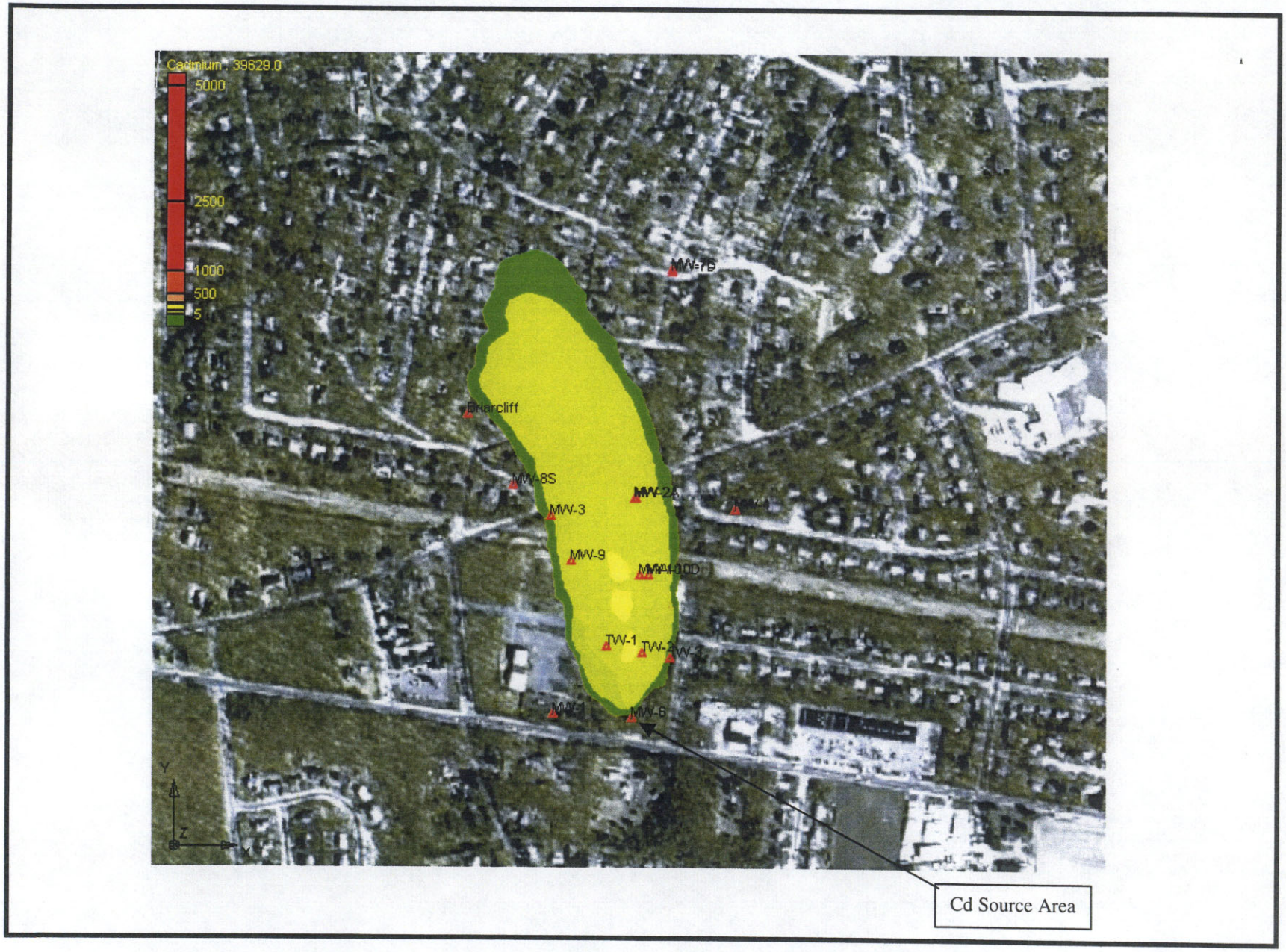

Figure A.2-12. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2103).

Figure A.2-13. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2003).

Figure A.2-14. Graphic representation of predicted cadmium concentrations for model Layer 3 (16 February 2013).

Figure A.2-15. Graphic representation of predicted cadmium concentrations for model Layer 3 (5 March 2023).

Figure A.2-16. Graphic representation of predicted cadmium concentrations for model Layer 3 (17 February 2038).

Figure A.2-17. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2063).

Figure A.2-18. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2103).

Attachment A.3

Scenario 2 Predicted Concentrations
Source Area at 4,600 ppb, Briarcliff Well at 5 ppb

Figure A.3-1. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2003).

Figure A.3-2. Graphic representation of predicted cadmium concentrations for model Layer 1 (16 February 2013).

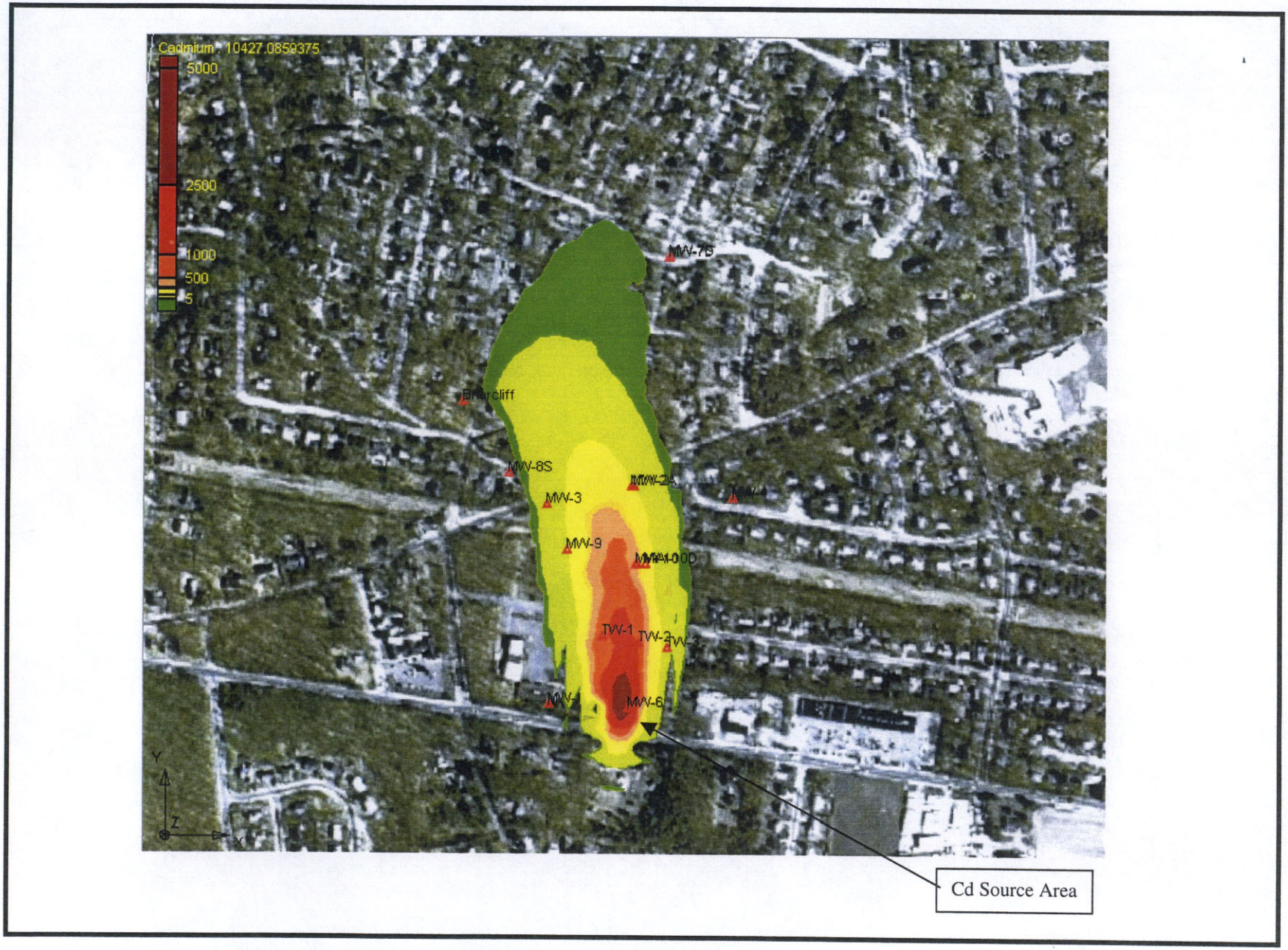

Figure A.3-3. Graphic representation of predicted cadmium concentrations for model Layer 1 (5 March 2023).

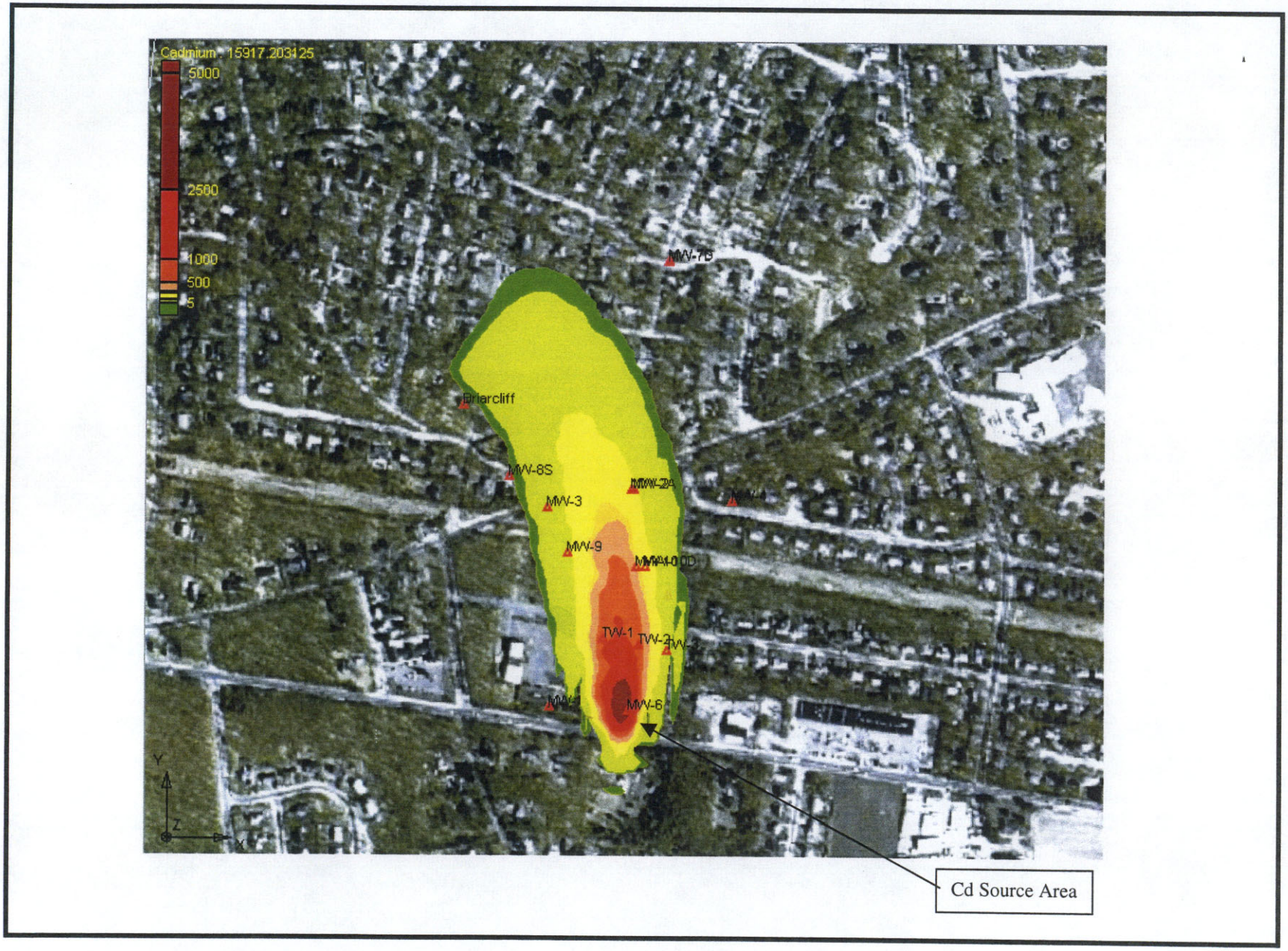

Figure A.3-4. Graphic representation of predicted cadmium concentrations for model Layer 1 (17 February 2038).

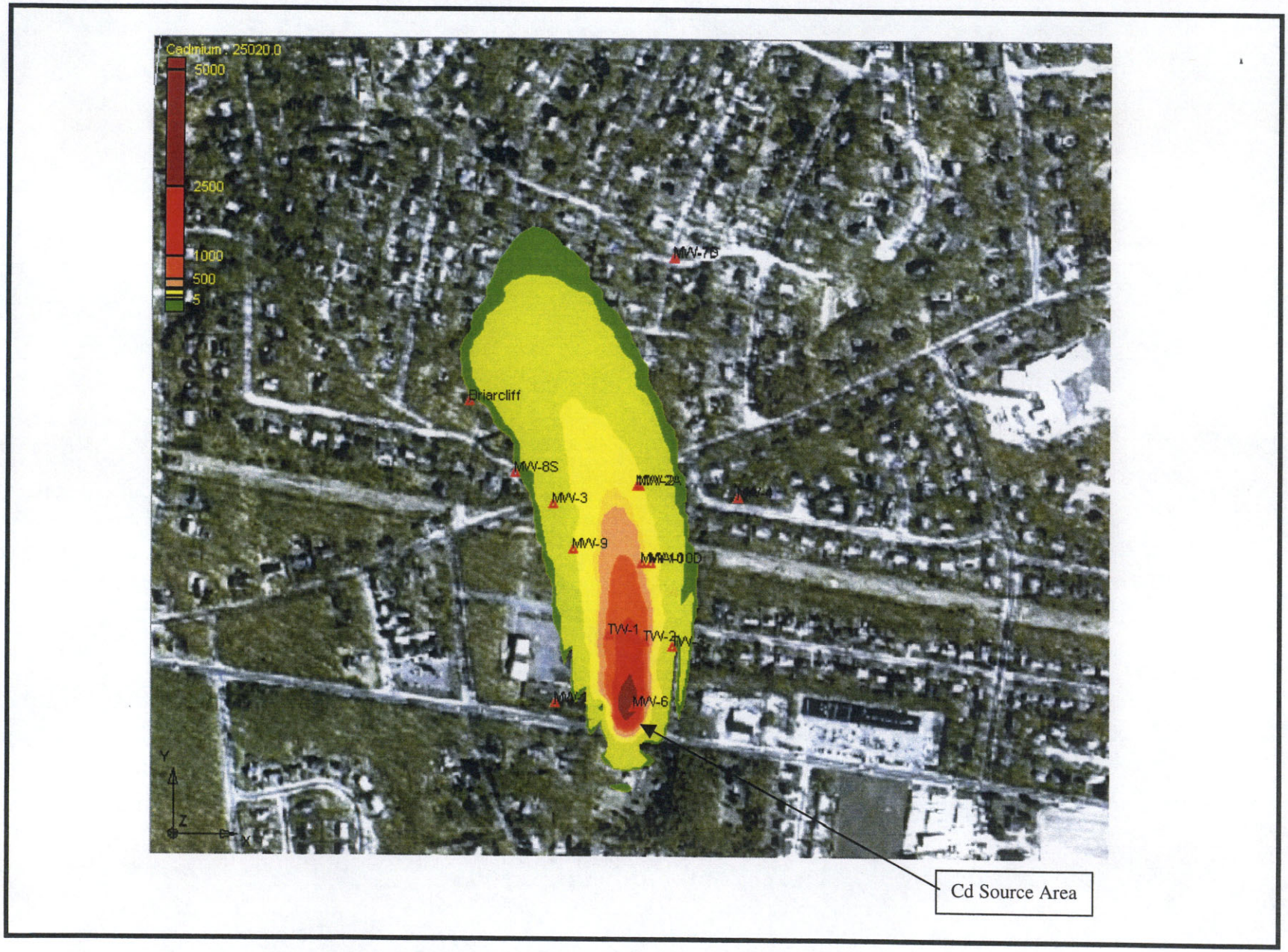

Figure A.3-5. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2063).

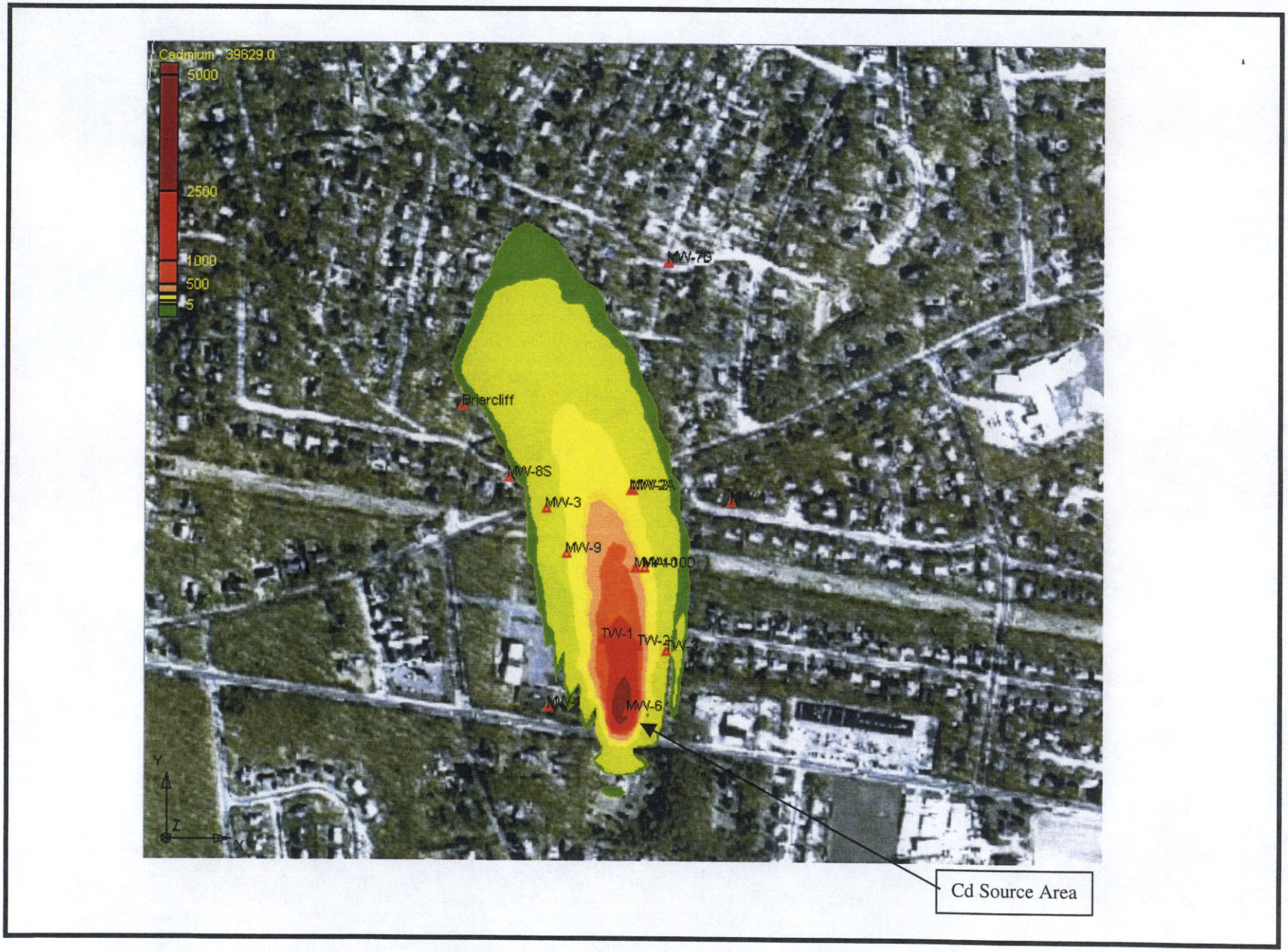

Figure A.3-6. Graphic representation of predicted cadmium concentrations for model Layer 1 (31 January 2103).

Figure A.3-7. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2003).

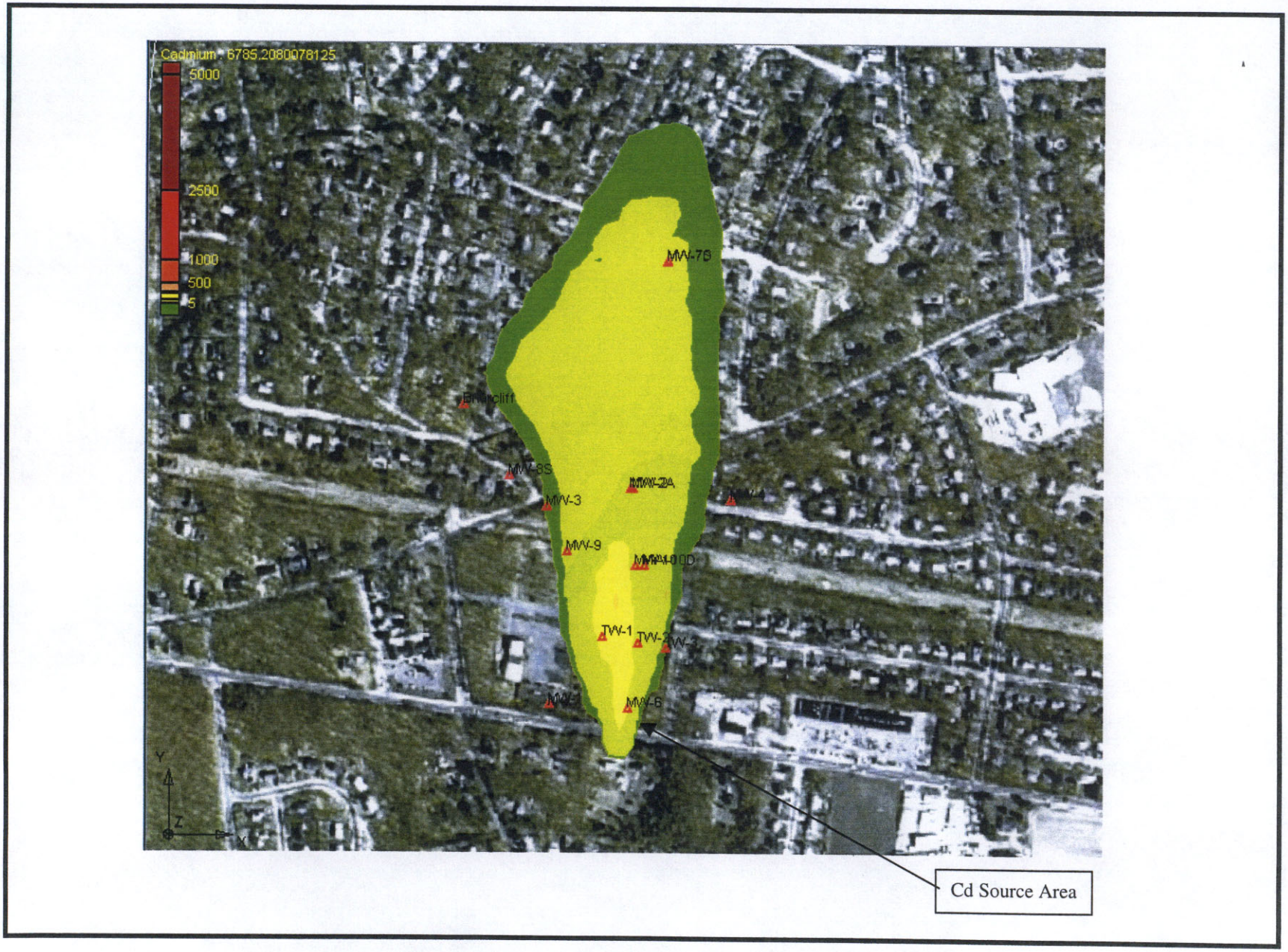

Figure A.3-8. Graphic representation of predicted cadmium concentrations for model Layer 2 (16 February 2013).

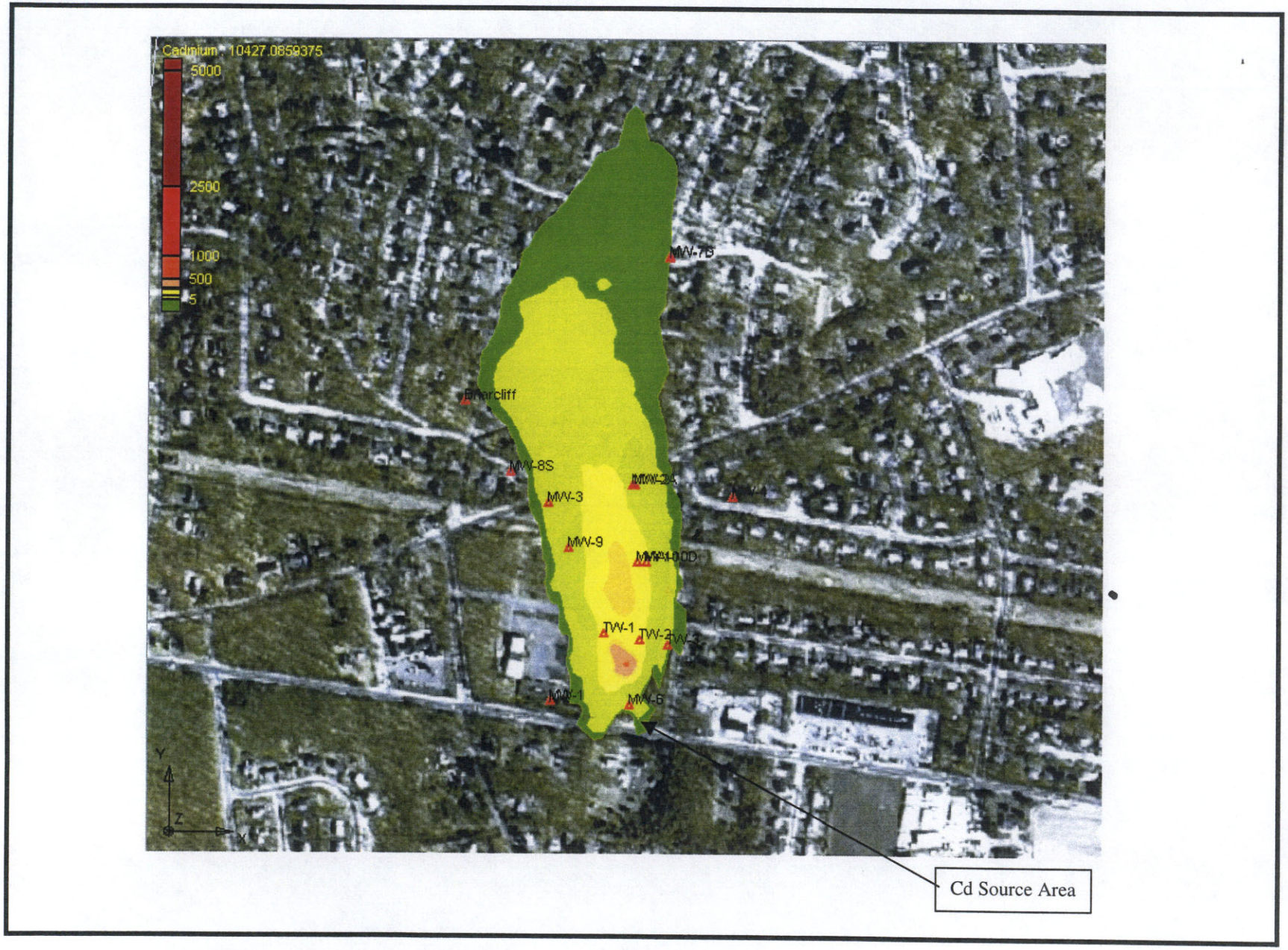

Figure A.3-9. Graphic representation of predicted cadmium concentrations for model Layer 2 (5 March 2023).

Figure A.3-10. Graphic representation of predicted cadmium concentrations for model Layer 2 (17 February 2038).

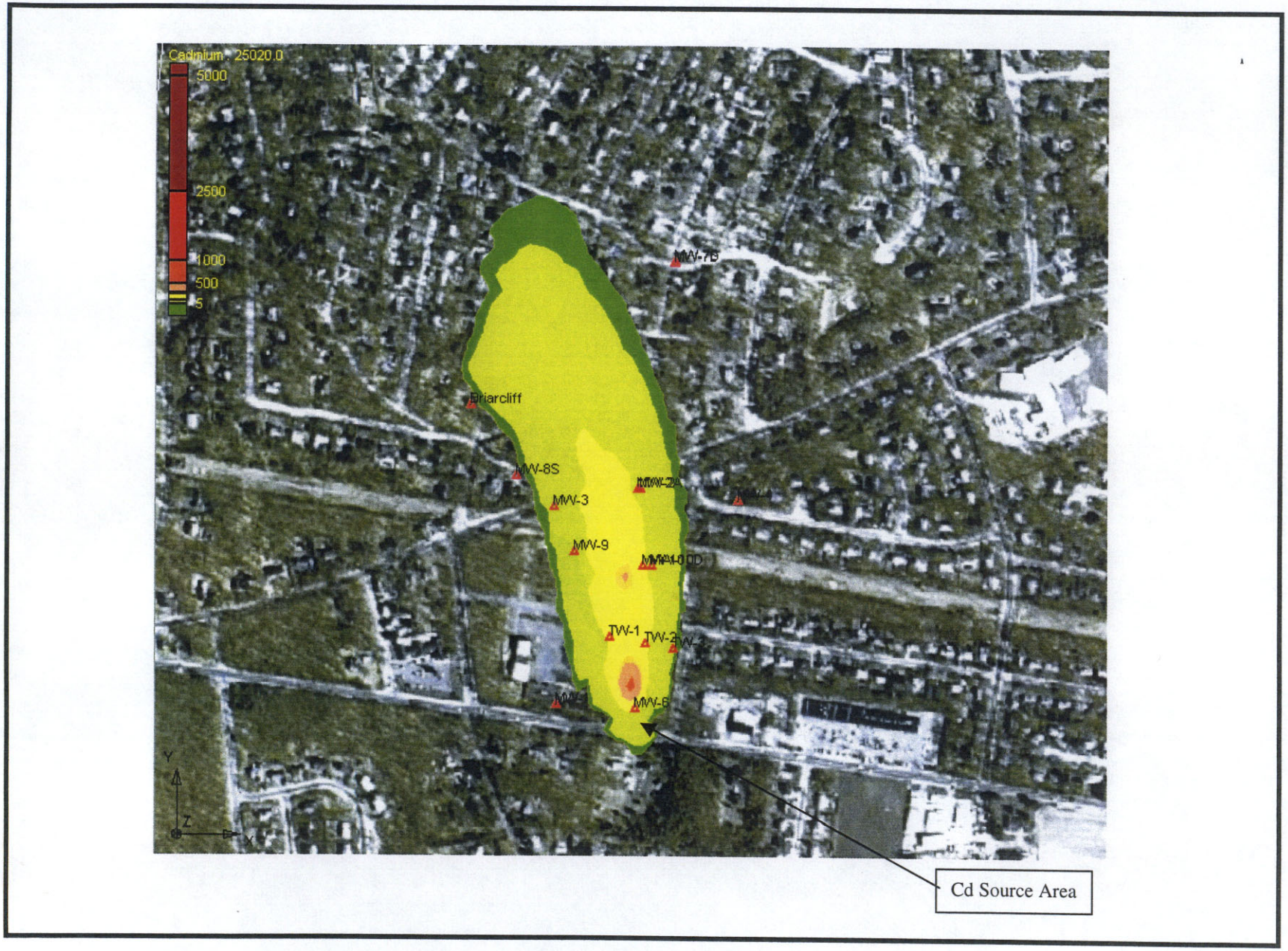

Figure A.3-11. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2063).

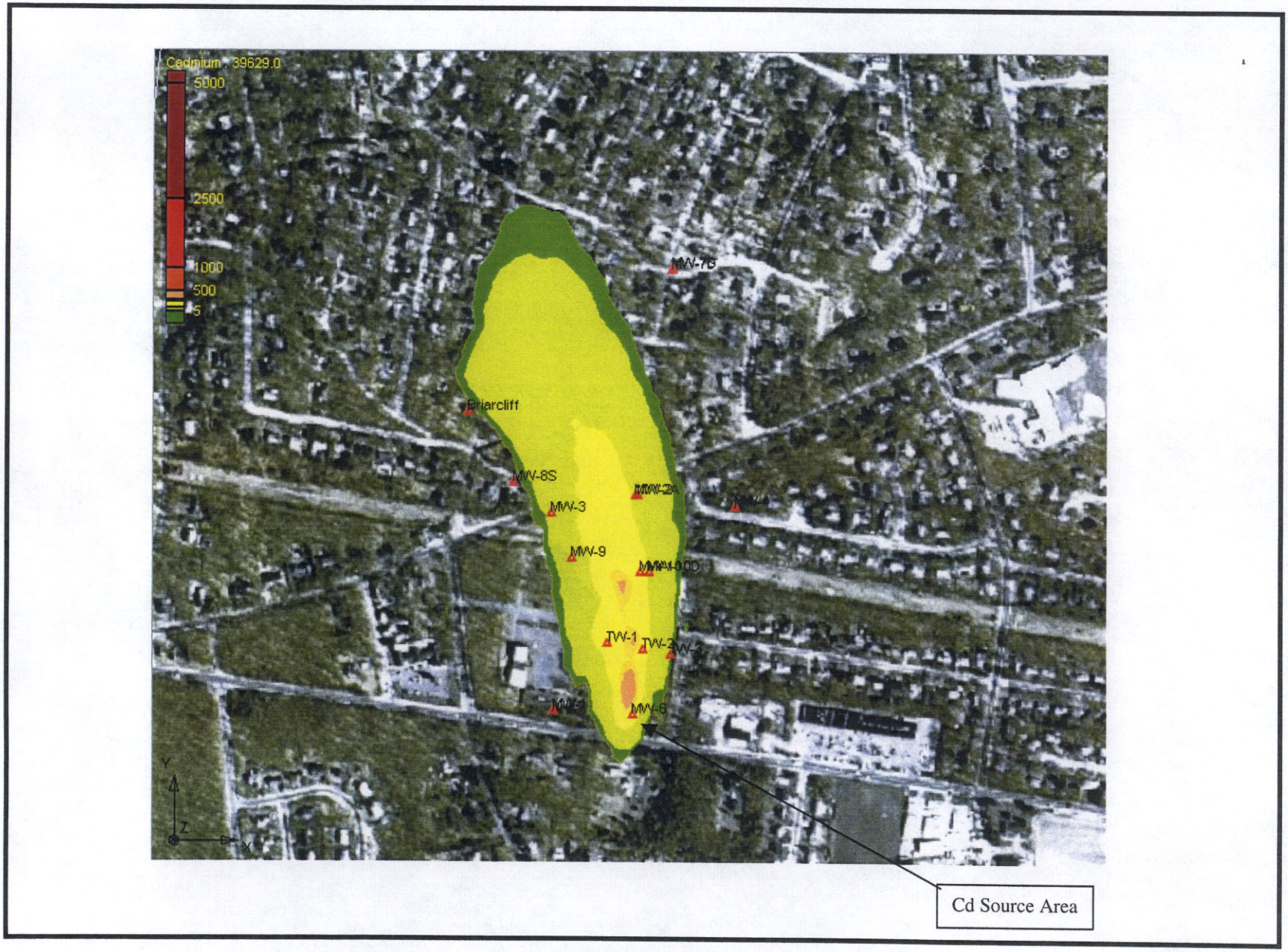

Figure A.3-12. Graphic representation of predicted cadmium concentrations for model Layer 2 (31 January 2103).

Figure A.3-13. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2003).

Figure A.3-14. Graphic representation of predicted cadmium concentrations for model Layer 3 (16 February 2013).

Figure A.3-15. Graphic representation of predicted cadmium concentrations for model Layer 3 (5 March 2023).

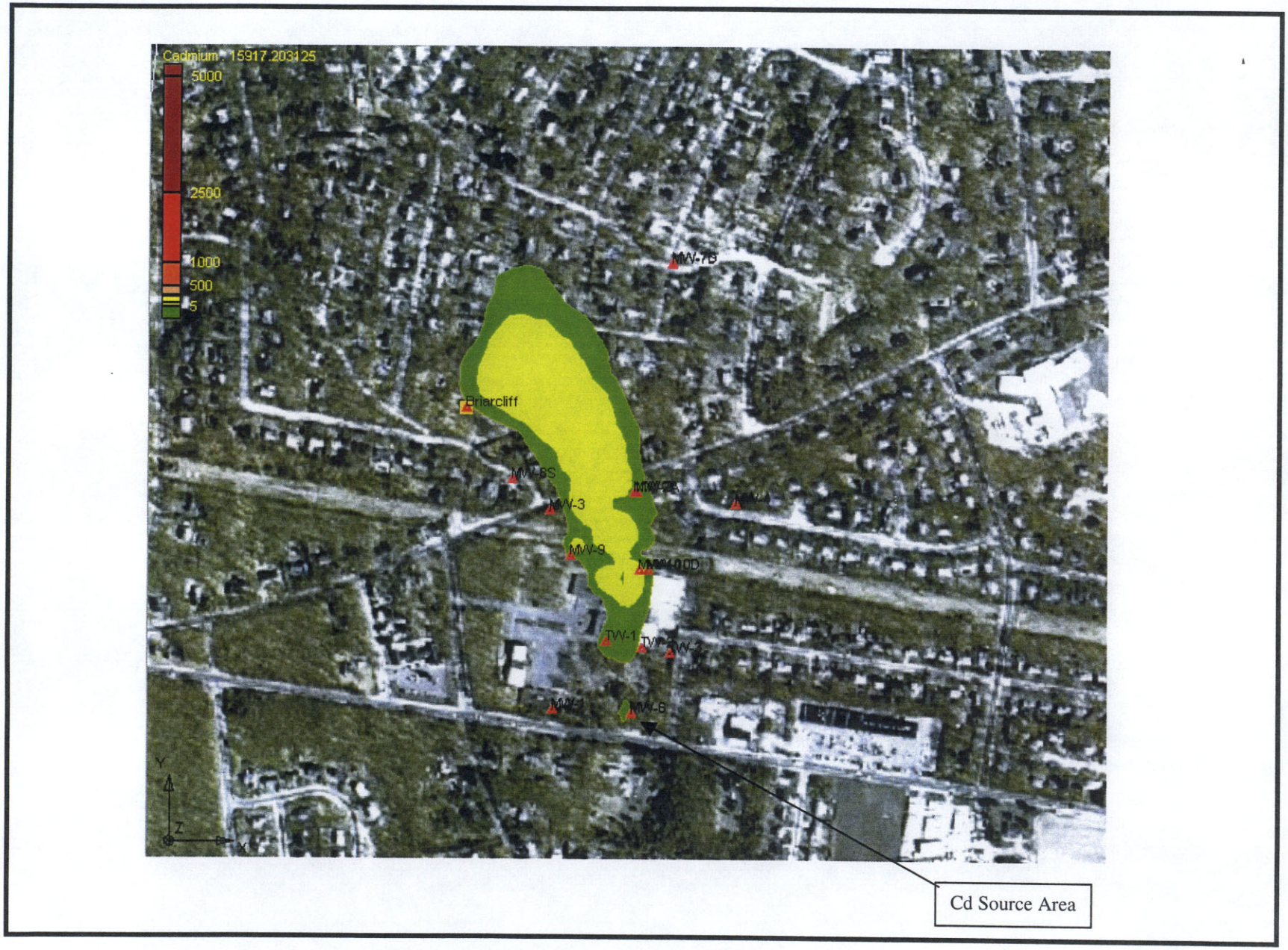

Figure A.3-16. Graphic representation of predicted cadmium concentrations for model Layer 3 (17 February 2038).

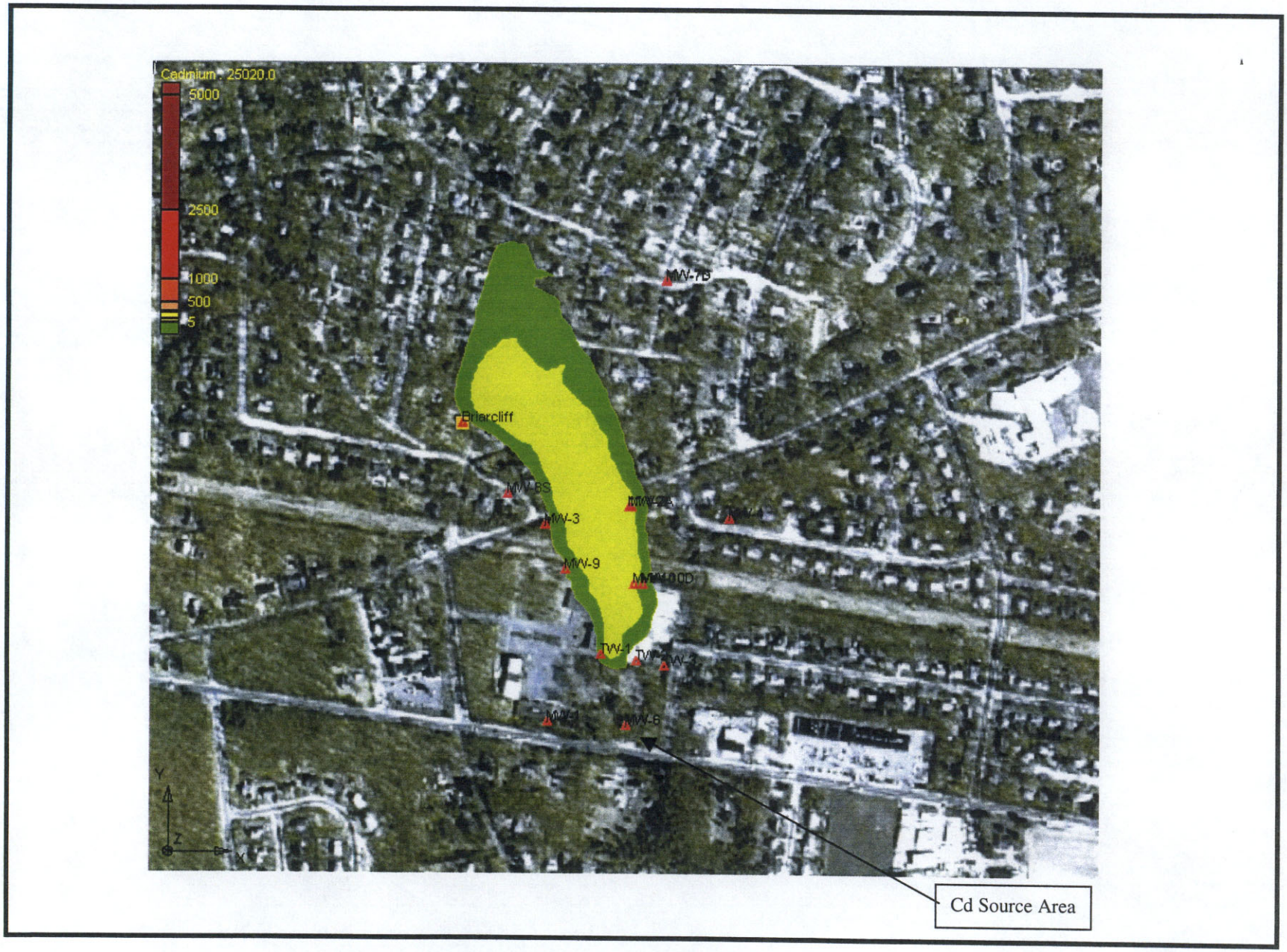

Figure A.3-17. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2063).

Figure A.3-18. Graphic representation of predicted cadmium concentrations for model Layer 3 (31 January 2103).