Ford Motor Company

The Kingsford Products Company

This document has received approval from the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on January 27, 2020. This document was prepared a nd submitted pursuant to a Judicial Consent Judgment.

GROUNDWATER RESPONSE ACTIVITY PLAN, DISSOLVED-PHASE METHANE

Ford-Kingsford Products Facility
Court Case Number 04-1427-CE
Kingsford, Dickinson County, Michigan

January 2020

GROUNDWATER RESPONSE ACTIVITY PLAN, DISSOLVED-PHASE METHANE

Ford-Kingsford Products Facility Court Case Number 04-1427-CE Kingsford, Dickinson County, Michigan

Prepared for:

Ford Motor Company
The Kingsford Products Company

Prepared by:

Arcadis U.S., Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

Our Ref.:

WI001700.0001.0012

Date:

January 27, 2020

Richard L. Studebaker Jr.
Ford-Kingsford Products Facility Project Coordinator

Christopher Kubacki
Senior Engineer

Stacy Kinowski
Project Coordinator

CONTENTS

TABLES

FIGURES

APPENDICES

INTRODUCTION

Arcadis (on behalf of Ford Motor Company [Ford] and The Kingsford Products Company [KPC]) has prepared this dissolved-phase Groundwater Response Activity Plan (GW RAP) for the Ford-Kingsford Products Facility (Site) in Kingsford, Michigan. The First Modification to Consent Judgment, dated August 22, 2016, Court Case Number 04-1427-CE (CJ) outlines the response objectives and activities required for the Site, the boundaries of which are defined in the CJ as the Area of Concern (AOC).

Response actions to address the presence of dissolved-phase methane in groundwater within the AOC are currently being completed per the Interim Response Action Plan (IRAP) entitled "*Groundwater Interim Response Action Plan, Ford/Kingsford Site, Kingsford, Michigan*" (GW IRAP) dated January 29, 2009 and corresponding addendum entitled "*Addendum to the Groundwater Interim Response Action Plan, Ford-Kingsford Products Facility, Court Case Number 04-1427-CE, Kingsford, Michigan*" (GW IRAP Addendum) dated June 6, 2011. This GW RAP submittal is being made under Section 7.7A of the CJ, which allows for modifications of the response activity.

The purpose of this GW RAP is to propose/define a Study Area for the Site, which will encompass the area where the residential and commercial methane programs are implemented. This GW RAP presents a background summary of dissolved-phase methane in groundwater at the Site, summarizes the dissolved-phase methane screening criteria, describes the difference between gas-phase and dissolved-phase methane (as well as potential risks related to each), provides an update of the conceptual site model (CSM) and its impact on/relationship with dissolved-phase methane, and establishes a Study Area based on dissolved-phase (as well as the absence of gas-phase) methane analytical results and criteria to meet the objectives of the CJ. This GW RAP will replace the sections of the 2009 GW IRAP and 2011 GW IRAP Addendum regarding the dissolved-phase methane program. Note that this GW RAP is limited to the dissolved-phase methane component of groundwater for the Site. A separate response activity plan(s) will be developed for the full groundwater monitoring program and groundwater extraction and treatment program. This report contains the following sections:

- Background – Presents Site background information related to dissolved-phase methane within the AOC.
- Dissolved-Phase Methane Screening Levels – Presents an overview of methane and dissolved-phase methane screening criteria.
- CSM – Presents a summary of the updated CSM.
- Dissolved-Phase Methane Monitoring Program – Presents results of the groundwater monitoring program and standard sampling procedures for current dissolved-phase methane.
- Proposed Dissolved-Phase Methane Study Area and Monitoring Program - Presents recommendations for the dissolved-phase methane groundwater monitoring program and defines the Study Area, which represents the area of the Site where the residential and commercial methane programs will be implemented.

BACKGROUND

Investigation and ongoing remedial and monitoring activities have identified the areas within the AOC where dissolved-phase methane is present in groundwater at concentrations above the Michigan Department of Environment, Great Lakes, and Energy (EGLE) groundwater flammability and explosivity screening level (FESL) criteria of 28 milligrams per liter (mg/L) (Figure 1). Response activities to address dissolved-phase methane in groundwater, a potential source for gas-phase methane, have included methane extraction, control, and monitoring which have been implemented and are ongoing within the AOC in accordance with the following:

- "*Standard Contingent Work Plan - Pressure Control System, Ford-Kingsford Products Facility, Court Case No. 04-1427-CE*" (Attachment 1, Methane Response Activity Plan dated September 1, 2016).
- "*Emergency Response and Evacuation Procedure for Occupied Structures*" (Attachment 2, Methane Response Activity Plan, Residential and Commercial Programs dated September 1, 2016).
- "*Groundwater Interim Response Action Plan, Ford/Kingsford Site, Kingsford, Michigan*" (GW IRAP, January 29, 2009).
- "*Addendum to the Groundwater Interim Response Action Plan, Ford-Kingsford Produces Facility, Court Case Number 04-1427-CE, Kingsford, Michigan*" (GW IRAP Addendum, June 6, 2011).
- Groundwater Ordinances for the City of Kingsford and Breitung Township (Appendix A).
- Restrictive covenants allowing ongoing implementation of soil vapor extraction (SVE), passive venting programs, and associated monitoring at properties where methane is or may be present.
- Access agreements for properties where SVE, passive venting, and monitoring programs are or may be required.

The presence of dissolved-phase methane in groundwater related to the Site is the result of anaerobic biodegradation of organic compounds dissolved in groundwater. Degradation of organic constituents in groundwater will produce gas-phase methane in the deeper groundwater (where the majority of the dissolved organics are present); however, due to the higher pressures and subsequent increased solubility at these depths, gas-phase methane almost immediately transitions to dissolved-phase as it is generated. Most of the organic compounds dissolved in the groundwater system occur at approximately 100 feet below land surface (ft bls) and deeper, primarily in the central and western portions of the AOC (Figure 1).

The majority of organic compounds at depth in the groundwater system within the AOC are the result of historic discharge of manufacturing process wastewater to the former Northeast Pit (NE Pit). The liquid phase of these releases infiltrated the groundwater system, where organic compounds dissolved in groundwater move in the direction of groundwater flow. An IRAP has been implemented at the NE Pit, a portion of which included the installation of an engineered low-permeability cover system over remaining waste material, to minimize and/or eliminate any future contribution of organic materials to the groundwater system. Review of the investigative data collected from soil, waste, and groundwater indicates that the former Riverside Disposal Area, former Southwest Pit, and the former Plant Site (FPS) have very little to no potential to be a source of continuing release of organic constituents to groundwater (GW IRAP, 2009).

Dissolved-phase methane in groundwater has been monitored throughout the AOC since 1997. Data collected beginning in 2004 represents dissolved-phase methane concentrations collected during implementation of full gas-phase methane extraction and control programs in conjunction with the CJ. The current monitoring program for dissolved-phase methane in groundwater (referred to as the "*AOC perimeter monitoring program*") was established in the GW IRAP Addendum dated June 6, 2011. The dissolved-phase methane perimeter monitoring program is utilized in conjunction with additional remedial measures (e.g., groundwater extraction and treatment, Site-wide groundwater monitoring, SVE, passive venting, and residential and commercial programs) to maintain CJ compliance and to appropriately address impacted groundwater and methane within the AOC.

Additionally, existing City of Kingsford and Breitung Township water well prohibition ordinances (Appendix A) were enacted to ensure that no potential new openings or conduits into the deeper subsurface are allowed. This further supports and enhances the effectiveness of the remedial programs and maintains safety within the AOC.

DISSOLVED-PHASE METHANE SCREENING LEVELS

Methane is colorless, odorless and can exist as gas-phase (free vapor-phase methane; can be explosive or flammable) or dissolved-phase (methane dissolved into the groundwater and subject to solubility; is not explosive or flammable), or both, depending on temperature and pressure. Methane is non-toxic, but flammable in gas-phase concentrations (when mixed with air) between the lower explosive limit (LEL) of 5% by volume and the upper explosive limit (UEL) of 15% by volume. Gas-phase methane is only a fire/explosion hazard when it is present above the LEL and below the UEL in an enclosed unventilated space. Dissolved-phase methane is not flammable and presents a potential risk only when it can act as a source of gas-phase methane, and only when it could potentially release gas-phase methane at a concentration greater than the LEL.

The Arcadis Technical Memorandum "*Appropriate Dissolved-Phase Methane Screening Levels to Identify Risks Associated with Potential Gas-Phase Methane*" (attached as Appendix B) presents the background and scientific rationale for appropriate screening levels for dissolved-phase methane in groundwater. This technical memorandum focuses on appropriate dissolved-phase methane screening levels for groundwater in Michigan, including the existing EGLE groundwater FESL criteria of 28 mg/L. However, as discussed below, using regional, state, or site-specific groundwater temperatures and pressures will provide appropriate screening levels for dissolved-phase methane at any location.

It is important to note that dissolved-phase methane concentrations found in groundwater are only an indication of the potential for gas-phase methane release/production. Dissolved-phase methane should be used as a screening tool to evaluate the potential for gas-phase methane release (i.e., dissolved-phase methane concentrations above the established screening level would trigger gas-phase methane monitoring) rather than used as a regulatory criterion. Regardless of the screening level for dissolved-phase methane, it is critical to establish and maintain a gas-phase methane criterion to ensure that any potential safety risks are appropriately addressed, since gas-phase methane presents the actual risk in an enclosed unventilated space or at the receptor (if present at a high enough concentration). The current SVE and passive venting programs continue to provide the primary means of protection from potential methane intrusion into structures by intercepting and safely venting methane gas present in the subsurface. By controlling and/or eliminating gas-phase methane in primary travel routes and at potential locations of accumulation, the gas is removed prior to reaching shallow soils; thus, preventing gas-phase methane from reaching structures in the AOC. It is important to note that these venting/control programs will be continued as long as necessary to address gas-phase methane present above 1.25% by volume.

Based on the chemical and physical properties of methane (i.e., existing as either gas-phase or dissolved-phase in groundwater, dependent on temperature and pressure), the following screening levels will appropriately evaluate any potential risk due to dissolved-phase methane from the vapor intrusion pathway or from groundwater usage in the State of Michigan:

- 28 mg/L dissolved-phase methane for areas/locations where groundwater is not being extracted for use within unventilated enclosed structures (i.e., no residential water wells, commercial/industrial process water wells, or geothermal systems that are connected to the interior of the structure, etc.).
- 10 mg/L dissolved-phase methane for areas/locations where groundwater is extracted for use within, or is in contact with, unventilated enclosed structures (i.e., where potential mechanical agitation is present due to groundwater extraction or processing pumps, etc.).

To determine whether dissolved-phase methane present in groundwater could potentially be a source of gas-phase methane, the solubility limit must be determined and incorporated into any screening level. The solubility limit for methane (i.e., the amount of gas-phase methane that can dissolve into and be stored in water) is the critical controlling factor when discussing dissolved-phase methane. The solubility limit for dissolved-phase methane is dependent on groundwater temperature and hydrostatic pressure, and solubility increases as the pressure increases (i.e., as the depth below the groundwater table increases, so does the pressure, resulting in an increase in the solubility limit for dissolved-phase methane), and increases as the temperature decreases as demonstrated by a thermodynamic model that predicts methane solubility in aqueous fluids at temperatures ranging between 0 and 250 degrees Celsius (ºC) and pressures ranging between 1 and 1,970 atmospheres (atm) (Duan and Mao, 2006). The solubility for methane in water at standard temperature and standard pressure (1 atm) has been reported in literature ranging between 28 and 30 mg/L (Eltschlager, et. al. 2001). However, significant variability is noted in the values for “standard” temperature; 15, 20, and 25 ºC (59, 68, and 77 degrees Fahrenheit) have all been cited. Due to the inconsistent use of standard temperature, use of these published methane solubility values is not recommended for establishing site-specific screening levels.

Solubility should be determined based on actual conditions using site-specific temperature data and the American Society for Testing and Materials (ASTM [ASTM 2016]) E2993-16 Table X1.4 (Appendix B, Figure 1). Using actual temperature data to determine the solubility limit at 1 atm pressure (0 feet below the water table) is critical to accurately assess any potential for dissolved-phase methane to act as a source for gas-phase methane release/production.

Groundwater temperature data has been collected seasonally across the Site since 1997. Based on 1,653 measurements collected throughout the water column from 1997 through 2019, the average measured groundwater temperature at the Site is 10.7 ºC. This corresponds to a dissolved-phase methane solubility of 29.2 mg/L at the water table utilizing ASTM E2993-16 Table X1.4 (Appendix B, Figure 1). Note that groundwater temperatures presented in ASTM E2993-16 Table X1.4 are rounded to the nearest 1 ºC and thus the average measured groundwater temperature at the Site from 1997 through 2019 was rounded up to 11 ºC to determine the corresponding dissolved-phase methane solubility of 29.2 mg/L. Seasonal rounds of Site-wide groundwater temperature data were collected in November 2018 and May 2019 to compare to historical measured temperatures. The average measured groundwater temperatures during November 2018 (9.9 ºC, rounded to 10 ºC) and May 2019 (9.5 ºC, rounded to 10 ºC) correspond to a dissolved-phase methane solubility of 29.8 mg/L at the water table utilizing ASTM E2993-16 Table X1.4. The established EGLE FESL of 28 mg/L represents a conservative criterion compared to the calculated dissolved-methane solubility based on Site data. Summaries of Site-wide historical groundwater temperature data and the November 2018 and May 2019 temperature data are presented in attached Tables 1 and 2.

Due to solubility, the 28 and 10 mg/L dissolved-phase methane screening levels presented above are protective and applicable at the surface of the water table. These screening levels only become more conservative as the depth below the water table increases, thus increasing pressure and the solubility limit.

CONCEPTUAL SITE MODEL SUMMARY

The CSM for the Site was prepared using the comprehensive results documented in the "*Remedial Investigation Report*" (RI Report) (dated November 2010 and approved on May 4, 2011) and response activities completed within and surrounding the AOC. Since the initial CSM was submitted, additional data has been evaluated to add to and improve the understanding of the CSM. A summary of the CSM is presented herein.

The complex interaction between the geology and hydrogeology beneath the Site, the source locations and types of source materials (primarily historic liquid disposal from manufacturing operations), as well as ongoing chemical and biological degradation processes have all played a role in establishing and evolving the configuration of the groundwater plume, over time, beneath the Site. The plume is characterized by concentrations of certain dissolved organic constituents present in groundwater above the State of Michigan's Part 201 criteria (i.e., acetate, phenolic compounds, etc.) that serve as carbon substrates for the biologically driven generation of gas-phase methane. By evaluating the interaction of these components and incorporating additional data on an ongoing basis, the CSM becomes adaptive, aiding in understanding groundwater plume movement, distribution, and lifecycle. Additionally, understanding geological, hydrogeological, and biogeochemical source/plume characteristics provides an explanation as to why the groundwater plume exists as it does today and predicts its continued evolution over time. As additional data is generated over time, this information will be incorporated into this adaptive CSM on an ongoing basis to enhance and improve Site understanding. The following sections present a summary of the geology, hydrogeology, and groundwater plume distribution as presented in the attached CSM (Appendix C).

Geology

The geologic system beneath the Site is comprised of glacially derived, unconsolidated deposits, consisting of interbedded clay, silt, sand, and gravel that overlie bedrock. This geologic system is complex, with deposits having lateral and vertical spatial variability, consistent with the glacial depositional origin. Bedrock at the Site is overlain by up to 13 different unconsolidated lithologic units, ranging from clay to sand to gravel, that were deposited under glaciolacustrine (deposited lake sediments as a result of glacial activity) and glaciofluvial (deposited sediments as a result of flowing glacial meltwater) conditions. These varying units were further grouped into three composited lithologic units, representative of their depositional environments and hydrogeologic characteristics, designated as: Unit 1, Unit 2, and Unit 3. Unit 1 lithology represents the highest porosity and permeability at the Site and consist of gravels and fine to coarse grained sands and gravels. Unit 2 lithology exhibits a relatively low porosity and permeability and consists of very fine grain sands and silty sands. Unit 3 lithology characterizes the lowest porosity and permeability at the Site, consisting of silts and clays. Stratification indicates the lowest, or basal units, are composed of clays, silts, sands, and gravels overlying the bedrock. These basal units are interpreted to have been deposited in a glaciolacustrine environment overlain by a succession of fine to coarse grain sands and gravels representative of glaciofluvial deposition, with upper unit sands representative of an alluvial depositional environment (deposited sediments associated with rivers/streams) located throughout and adjacent to the Menominee River (Appendix C, Figure C-1).

The depth to bedrock (or thickness of unconsolidated deposits) ranges from 0 to over 360 feet below ground surface. Bedrock configuration is a controlling factor in the migration of the liquid source materials from the historic disposal area. Site bedrock consists of a metamorphosed gray, slightly fissile slate, with some metabasic igneous rock locally known as the Michigamme Slate of Middle Precambrian age. This bedrock, as observed exposed at the ground surface (bedrock outcrop) and recovered from boreholes, is massive, very dense, and transmits very little water. Additionally, Site bedrock forms an east-west trending elliptical basin, with a subsurface mound in roughly the western center of the deepest part of the basin and several subsurface mounds along the Menominee River. The north basin side is characterized by a steep upward slope to the north, with an average vertical rise of 200 feet over a horizontal distance of approximately 1,500 feet, while bedrock in the south/southeastern portion of the basin has an equally steep upward slope to the south/southeast. These steep, competent bedrock faces help control groundwater movement and contribute to both the historic and recent subsurface groundwater plume distribution to the north, south and east while providing preferential western migration towards the Menominee River. Geologic cross-sections west to east and north to south across the Site are presented in Appendix C, Figures C-2 and C-3.

Hydraulic testing performed spatially across the Site indicated that Unit 1 (fine to coarse grain sands and gravels) acts as a preferential pathway for Site groundwater flow; significantly less flow is contributed from the remaining lithologies, Unit 2 (very fine grain sands and silty sands) and Unit 3 (silts and clays). Thus, the porosity and permeability of the unconsolidated deposits are another controlling factor of groundwater flow and plume migration.

Hydrogeology

Data and information collected during Site investigations and response activities over time confirm, per the above discussion, that the groundwater system is complex due to both the Site's unconsolidated lithologic variability and bedrock topography. Groundwater levels collected from select monitoring wells were used to evaluate shallow- and deep-well groundwater potentiometric surfaces and flow directions. In general, the depth to groundwater in the shallow groundwater system ranges from approximately 10 feet near the Menominee River to over 50 feet inland. Shallow potentiometric surface data indicates generally southwest groundwater horizontal flow toward the Menominee River, under a hydraulic gradient that ranges from 0.004 to 0.03 feet per foot (ft/ft). Similarly, deep potentiometric surface data indicates horizontal, southwest flow toward the river, with a similar range in gradient from 0.003 to 0.04 ft/ft. Generally, lower hydraulic gradients are more characteristic across the Site within the bedrock basin, while larger values occur along bedrock highs within the northern portion of the Site.

Vertical components to groundwater flow are observed across the Site with a significant variance between the shallow and deep groundwater systems (i.e., nested monitoring wells screened in the shallow and deep groundwater system yield water level measurements that differ by several feet). Downward flow is observed across the majority of the Site, with the most significant vertical gradients observed in the vicinity of the deeper portions of the bedrock basin; upward flow is observed adjacent to the large discharge boundary of the Menominee River. As groundwater flow migrates towards the Menominee River, this reversal in the downward vertical component (hinge point) is observed, where both the vertical flow component and the bedrock basin topography are the primary mechanisms controlling the groundwater plume funneling from the source area to the Menominee River (Appendix C, Figure C-2). Within the hinge point, as noted, groundwater migrates from deeper bedrock areas towards the Menominee River, subject to preferential flow paths where deep groundwater vents to the shallow groundwater system. This change in vertical gradient causes a decrease in the hydrostatic pressure on the groundwater plume, which reduces methane solubility as the groundwater flows upwards towards the river.

Groundwater Plume Distribution and Movement

Evaluation of the FPS and Site disposal areas have determined that the former NE Pit was the primary source for the groundwater plume. Historically, process wastewater containing dissolved organic constituents was disposed at the NE Pit until manufacturing activities at the Site ceased by 1961 (RI Report, 2011). The present distribution of the groundwater plume is likely a combination of source material migration to the groundwater (and subsequent dissolution of organic constituents into the groundwater) while manufacturing operations were ongoing (i.e., active source area), followed by the redistribution of dissolved organic constituents over time from residual source materials (once manufacturing ceased). Migration of the plume during manufacturing operations, and redistribution post manufacturing was, and is controlled by bedrock topography, as described above. The interbedded fine- and coarse-grained overburden at the Site have overall low transmissivity but abundant storage, also controlling the groundwater plume, which is residing within a dual-porosity environment. The bedrock topography forces groundwater movement and contributes to both the historic and recent subsurface groundwater plume distribution to the north, south and east while providing preferential western migration towards the Menominee River as illustrated in the west-east geologic cross section on Appendix C, Figure C-2. In summary, the footprint and vertical extents of the historic and current groundwater plume at the Site are a function of:

- Location and type of the original source release (historical liquid disposal at the former NE Pit)
- Controlling geologic factors (bedrock, unconsolidated material porosity/permeability, preferential pathways)
- Controlling hydrogeologic factors (horizontal and vertical groundwater flow)
- Ongoing chemical and biological degradation

- Source removal/control remedy implementation at the former NE Pit (waste removal, consolidation, and engineered cover system installation).

The result of the controlling factors of geology and groundwater flow is that the bulk of the dissolved organic constituent mass is within deeper portions of the basin, except for a small section along the Menominee River as groundwater discharges to surface water (following gradient reversal at the hinge point).

Combining this knowledge and understanding of the Site CSM with the information discussed in the Background section above, and using the 22 years of dissolved- and gas-phase monitoring results to confirm, the following briefly summarizes methane generation and transport at the Site: gas-phase methane generated by ongoing biodegradation of organics constituents in deeper groundwater is dissolved into and contained within the groundwater as dissolved-phase methane due to solubility rules. Since the majority of Site groundwater gradients are downward, dissolved-phase methane will migrate west with the groundwater flow across the Site until the gradient shifts upward at the hinge point adjacent to the Menominee River. The subsequent decrease in pressure reduces the methane solubility, resulting in the release of gas-phase methane (Appendix C, Figure C-2).

CURRENT DISSOLVED-PHASE METHANE MONITORING PROGRAM

Dissolved-phase methane in groundwater has been monitored throughout the AOC since 1997. Data collected beginning in 2004 represents dissolved-phase methane concentrations collected during implementation of full gas-phase methane extraction and control programs in conjunction with the CJ. The current dissolved-phase perimeter groundwater monitoring program was approved as part of the GW IRAP Addendum in December 2011. In accordance with this approved plan, groundwater samples have been collected from five monitoring wells (GM-15, GM-59, GM-61, GM-68, and GM-85) and analyzed for dissolved-phase methane on an annual basis. A summary of the site-wide dissolved-phase methane analytical results is presented in Table 3 and shown on Figure 1, and a summary of the current dissolved-phase methane perimeter groundwater monitoring program is presented in Table 4.

The Arcadis standard operating procedure (SOP) for monitoring dissolved-phase methane in groundwater outlines the procedure for collection of groundwater samples for dissolved-phase methane analysis utilizing either the Isoflask or the volatile organics analysis (VOA) vial technique. This SOP is applied to all dissolved-phase methane groundwater sampling conducted at the Site and is provided in Appendix D.

Per the SOP, groundwater samples for dissolved-phase methane analysis are collected utilizing one of two techniques, described below:

- Isoflask Technique – This sampling technique utilizes a specialized Isoflask container designed for collection of groundwater samples for dissolved gas analyses by limiting potential gas losses during sample collection through a closed system by connecting the sampling device tubing directly to the Isoflask to collect the 750 milliliters (mL) of groundwater required for laboratory analysis. A pre-inserted bactericide capsule prevents bacterial degradation of the collected sample. This technique is applied at locations where dissolved-phase methane concentrations in groundwater are historically above 2.8 mg/L.

- VOA Vial Technique – This sampling technique includes the collection of groundwater in three, zero head space 40 mL VOA vials preserved with sodium triphosphate. This technique does not include a closed system, and therefore the groundwater sample is exposed to the atmosphere during the transfer from the sampling tubing to the VOA vial and some loss of gas-phase methane, released by the decrease in pressure due to extraction from depth and the resulting reduction in solubility, may occur. This technique is applied at locations where dissolved-phase methane concentrations in groundwater are historically below 2.8 mg/L.

A summary of the site-wide groundwater analytical results for dissolved-phase methane is presented in Table 3 and shown on Figure 1. The data for the AOC perimeter monitoring program is presented in Table 4 and compared to the FESL of 28 mg/L.

Eastern Perimeter: Monitoring Wells GM-68 and GM-85 have consistently shown results well below the FESL of 28 mg/L since the inception of the program in 2004. Dissolved-phase methane results at Monitoring Well GM-68 have ranged from 0.11 mg/L (2009) to less than 0.0002 mg/L (2011), with the most recent result of 0.028 mg/L detected in October 2018. Dissolved-phase methane results at Monitoring Well GM-85 have ranged from 0.59 mg/L (2015) to 0.00071 mg/L (2011), with the most recent result of 0.014 mg/L detected in September 2018. In addition, dissolved-phase methane results at Monitoring Well GM-17, which is also located along the eastern border of the current AOC, range from 1.23 mg/L (2004) to 0.0096 mg/L (2012), with the most recent result of 0.12 mg/L in 2014. Note that Monitoring Well GM-17 is damaged and no longer monitored.

Northern Perimeter: Monitoring wells GM-15, GM-59, and GM-61 have also shown results below the FESL of 28 mg/L since inception of the program in 2004. Dissolved-phase methane results at Monitoring Well GM-15 have ranged from 2.96 mg/L (2004) to 1.5 mg/L (2014), with the most recent result of 1.6 mg/L detected in September 2018. Dissolved-phase methane results at Monitoring Well GM-59 have ranged from 0.49 mg/L (2004) to 0.053 mg/L (2010), with the most recent result of 0.13 mg/L detected in October 2018. Dissolved-phase methane results at Monitoring Well GM-61 have ranged from 1.11 mg/L (2004) to 0.002 mg/L (2017), with the most recent result of 0.15 mg/L in September 2018.

As previously mentioned, the CSM (Appendix C) documents the east-west trending elliptical basin (dipping to the west and the Menominee River) which includes a bedrock rise located between Monitoring Wells GM-81B and BR-6 along the eastern edge of the Site. This steep, competent bedrock face helps control groundwater movement, contribute to the groundwater plume distribution, and provide preferential western migration towards the Menominee River (Appendix C, Figure C-2). Groundwater monitoring results at Monitoring Well GM-81B located at the FPS indicate that organic constituents are not present, indicating that the existing dissolved-phase methane concentrations are a result of biodegradation of source material in areas immediately to the west and subsequent diffusive flow of dissolved-phase methane within the lowest portion of the bedrock basin to this location as discussed in the CSM (Appendix C). Further, deeper portions of the basin are the main areas containing elevated dissolved-phase methane concentrations above the FESL and Monitoring Well GM-81B is screened within the interval of 295 to 300 ft bls. Due to high hydrostatic pressure (increasing solubility), gas-phase methane generated in deeper groundwater is dissolved into and contained within the groundwater as dissolved-phase methane. As discussed previously, any dissolved-phase methane present at this location below the solubility limit cannot be released until it reaches the hinge point along the Menominee River (at the far western edge of the Site and under the influence of the Extraction and Control programs).

PROPOSED STUDY AREA AND MONITORING PROGRAM

The AOC boundary is established in the CJ based on a historic dissolved-phase methane FESL of 0.5 mg/L. The current FESL established by EGLE is 28 mg/L. The current AOC boundary is not appropriate based on the FESL, evaluation of methane screening criteria, the Site CSM, and the dissolved-phase methane results in groundwater collected since the CJ was initially established in 2004. It is important to note, per ongoing discussions with EGLE, Arcadis is not intending to request an immediate revision of the AOC boundary, but rather a revision to the perimeter groundwater monitoring program for dissolved-phase methane and to the area where the residential and commercial methane programs apply per the "*Methane Response Activity Plan, Residential and Commercial Methane Programs, Ford-Kingsford Products Facility, Kingsford, Michigan*" dated September 1, 2016, and approved by EGLE on January 11, 2017. The current AOC boundary will be maintained, as well as the program components that apply to the overall Site such as the groundwater ordinances prohibiting the installation or usage of water wells (Appendix A); the "*Emergency Response and Evacuation Procedure for Occupied Structures*" (February 2, 2012), if ever needed, and availability of Arcadis for resident contact, information, etc. At this time, based on over 22 years of Site knowledge and monitoring results, and maintaining community safety as the highest priority, Arcadis is submitting for EGLE approval a recommended area (identified as the "Study Area" and shown on Figure 2) that outlines the area where the residential and commercial methane programs (related to/based on dissolved-phase and gas-phase methane) will be implemented to achieve CJ objectives.

Perimeter monitoring wells along the eastern edge of the AOC (GM-17, GM-68, and GM-85) have been below the current FESL of 28 mg/L since 2004; in addition, no gas-phase methane has ever been detected in this area, thus warranting a revised area where the methane programs apply (Study Area). To provide confirmation of the boundary and the groundwater concentrations compared to the FESL, new perimeter monitoring wells will be monitored along the eastern Study Area boundary. As shown in Table 1 and discussed above, the monitoring wells along the eastern edge of the AOC (GM-17, GM-68, and GM-85) have been sampled routinely for years, and clearly demonstrate that dissolved-phase methane is not present in groundwater above the FESL in this area.

Based on analytical data collected to date (gas-phase methane vapor monitoring and dissolved-phase methane groundwater monitoring) and our knowledge and understanding of the Site CSM, Arcadis proposes to adjust the eastern boundary of the current AOC to create the new Study Area. The proposed Study Area description is contained in Appendix E and is shown on Figure 2.

The area to be removed from implementation of the residential and commercial methane programs is described as follows (shown on Figure 1): *beginning at the corner of Roseland Street and East Boulevard, follow Roseland Street south until it intersects the Menominee River, continue northeast along the shore of the Menominee River to the point where an extension of Hooper Street intersects the Menominee River, continue north on Hooper Street to East Boulevard, and west on East Boulevard to the point of beginning*.

There are 11 commercial properties located within and adjacent to the area to be removed from implementation of the residential and commercial methane programs as defined above. Soil vapor probes have been installed adjacent to all commercial buildings except for the former Breen Avenue Service vacant building and lot (where installation has been denied by the property owner). No gas-phase methane has been detected at the 68 soil vapor probes surrounding these commercial properties since inception of the program in 2004 (Table 2). In addition, no gas-phase methane was detected during the installation and subsequent inspections of the 65 residential and 6 commercial property vapor control systems within the area to be removed.

A full review of well installation details in and adjacent to the area to be removed from implementation of the residential and commercial methane programs indicates that no elevated flame ionization detector (FID) readings were recorded above the screened intervals at Monitoring Wells BR-6, GM-7, GM-17, GM-67, GM-81A, GM-81B and GM-85. Three soil borings were also advanced within the area along the eastern edge of the Site: GMSB-7, GMSB-22 and GMSB-134; review of the boring information indicates no elevated FID readings were present in these borings. Soil boring and well construction logs are attached in Appendix F.

To further confirm that the new eastern boundary of the Study Area is appropriate, Monitoring Wells BR-6, GM-7, and GM-67 will be incorporated into the dissolved-phase methane perimeter groundwater monitoring program as compliance wells. These monitoring wells are located along the eastern edge of the Study Area as shown on Figure 2. Dissolved-phase methane analytical results for Monitoring Wells BR-6 and GM-67 are presented in Table 5, which show that these proposed eastern perimeter monitoring wells have also consistently shown results below the FESL of 28 mg/L since the inception of the program in 2004. Dissolved-phase methane results at Monitoring Well BR-6 have ranged from 0.029 mg/L (April 2016) to less than 0.00053 mg/L (October 2016), with the most recent result of 0.0057 mg/L detected in April 2019. Dissolved-phase methane results at Monitoring Well GM-67 have ranged from 23.1 mg/L (2004) to 2.36 mg/L (2009), with the most recent result of 3.4 mg/L in April 2019.

Following approval of this GW RAP, the new perimeter groundwater monitoring program will consist of collecting groundwater samples from Monitoring Wells BR-6, GM-15, GM-59, GM-61, GM-7, and GM-67 for dissolved-phase methane analysis. The monitoring wells will be sampled on an annual basis to ensure that the Study Area boundary is appropriate with respect to the FESL. All other monitoring will remain consistent with the GW IRAP Addendum.

CLOSING

This GW RAP will replace the sections of the Groundwater IRAP and the IRAP Addendum regarding the perimeter dissolved-phase methane groundwater monitoring program. The proposed modifications to the area where the residential and commercial methane programs are applicable (referred to as the “Study Area” going forward) will continue to successfully and safely achieve appropriate results and maintain compliance with the CJ. Ongoing monitoring will ensure the Study Area is appropriate, and existing support programs will be maintained in the overall AOC. Ford/KPC is requesting EGLE approval of this GW RAP.

REFERENCES

Arcadis, 2009. Groundwater Interim Response Action Plan (IRAP), Ford-Kingsford Products Facility, Court Case Number 04-1427-CE, Kingsford, Michigan, dated January 29, 2009

Arcadis, 2010. Remedial Investigation Report, Ford-Kingsford Products Facility, Court Case Number 04-1427-CE, Kingsford, Michigan, dated November 22, 2010

Arcadis, 2011. Addendum to the Groundwater Interim Response Action Plan, Ford-Kingsford Products Facility, Court Case Number 04-1427-CE, Kingsford, Michigan, dated June 6, 2011

Arcadis, 2012. Emergency Response & Evacuation Procedures for Occupied Structures, Ford-Kingsford Products Facility, Court Case Number 04-1427-CE, Kingsford, Michigan, dated February 2, 2012

Arcadis, 2016. Methane Response Activity Plan, Residential and Commercial Methane Programs, Ford-Kingsford Products Facility, Kingsford, Michigan, Court Case #04-1427-CE, dated September 1, 2016.

Duan, Zhenhao.; Mao, Shide; 2006. A thermodynamic model for calculating methane solubility, density and gas phase composition of methane-bearing aqueous fluids from 273 to 523 K and from 1 to 2000 bar. State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China. March 2006.

Eltschlager, Kenneth K.; Hawkins, Jay W.; Ehler, William C.; Baldassare, Fred; 2001. Technical Measures for the Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining. Office of Surface Mining Reclamation and Enforcement, Appalachian Regional Coordinating Center, Pittsburgh, Pennsylvania. September 2001.

ASTM; 2016. Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone; ASTM Designation: E2993-16. March 2016.

TABLES

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
BR-2	6/29/1997	75	14.93	58.87	--	--
	11/8/2018	75	--	--	10.25	50.45
	5/14/2019	75	--	--	10.61	51.10
BR-3	6/28/1997	122	22.78	73.00	--	--
	11/7/2018	122	--	--	9.04	48.27
	5/14/2019	122	--	--	9.44	48.99
BR-5A	7/1/1997	88	16.00	60.80	--	--
BR-5B	7/1/1997	188	19.40	66.92	--	--
BR-6	6/29/1997	149	12.01	53.62	--	--
	1/7/2016	149	6.33	43.39	--	--
	4/19/2016	149	17.94	64.30	--	--
	7/13/2016	149	16.75	62.15	--	--
	10/19/2016	149	13.58	56.45	--	--
	1/19/2017	149	7.48	45.47	--	--
	5/4/2017	149	13.42	56.16	--	--
	7/26/2017	149	19.50	67.10	--	--
	11/30/2017	149	10.45	50.81	--	--
	9/14/2018	149	19.51	67.11	--	--
	11/7/2018	149	9.93	49.87	10.08	50.14
	5/14/2019	149	9.70	49.46	9.74	49.53
CW-1	10/14/1997	130	8.86	47.95	--	--
	10/22/1998	130	11.11	52.00	--	--
	4/29/1999	130	14.05	57.29	--	--
GM-1	6/24/1997	220	18.16	64.69	--	--
	10/9/1997	220	13.42	56.16	--	--
	10/7/1998	220	12.40	54.32	--	--
	4/16/1999	220	13.45	56.21	--	--
	4/28/2004	220	17.39	63.30	--	--
	11/8/2018	220	--	--	9.20	48.56
	5/14/2019	220	--	--	9.58	49.24
GM-2A	7/2/1997	40	22.71	72.88	--	--
	10/12/1997	40	17.41	63.34	--	--
GM-2B	6/26/1997	271	13.96	57.13	--	--
	10/21/1997	271	5.10	41.18	--	--
	11/22/1998	271	10.49	50.88	--	--
	4/16/1999	271	10.66	51.19	--	--
	5/25/2004	271	9.15	48.47	--	--
	10/7/2011	271	21.38	70.49	--	--
	12/10/2013	271	4.56	40.21	--	--
	8/21/2015	271	13.69	56.64	--	--
	10/6/2015	271	12.57	54.62	--	--
	9/26/2017	271	12.76	54.97	--	--
	9/21/2018	271	14.46	58.02	--	--
	11/8/2018	271	9.03	48.25	9.52	49.14
	5/14/2019	271	9.07	48.33	10.89	51.60
GM-2C	11/6/1998	64	5.27	41.49	--	--
	4/13/1999	64	13.83	56.89	--	--
	5/4/2004	64	9.85	49.73	--	--
	9/20/2018	64	14.06	57.30	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-2C (continued)	11/8/2018	64	10.06	50.11	9.92	49.86
	5/14/2019	64	10.07	50.13	10.29	50.52
GM-3A	6/25/1997	74	21.46	70.63	--	--
	10/10/1997	74	10.33	50.59	--	--
	10/9/1998	74	11.60	52.88	--	--
	4/13/1999	74	12.16	53.89	--	--
	5/5/2004	74	10.00	50.00	--	--
	5/11/2004	74	11.76	53.17	--	--
	11/8/2018	74	--	--	9.48	49.06
	5/14/2019	74	--	--	9.95	49.91
GM-3B	6/26/1997	170	18.65	65.57	--	--
	10/14/1997	170	7.80	46.04	--	--
	10/8/1998	170	11.30	52.34	--	--
	4/17/1999	170	6.77	44.19	--	--
	5/11/2004	170	16.91	62.44	--	--
	4/13/2010	170	14.51	58.11	--	--
	11/8/2018	170	--	--	9.12	48.42
	5/14/2019	170	--	--	9.84	49.71
GM-4	6/26/1997	76	12.60	54.68	--	--
	10/14/1997	76	7.89	46.20	--	--
	10/20/1998	76	9.79	49.62	--	--
	4/21/1999	76	6.69	44.04	--	--
	5/2/2004	76	6.93	44.47	--	--
	5/22/2004	76	9.57	49.23	--	--
	1/8/2007	76	3.39	38.10	--	--
	6/3/2008	76	11.53	52.76	--	--
	8/26/2009	76	11.57	52.83	--	--
	9/7/2010	76	14.83	58.70	--	--
	5/4/2017	76	12.23	54.01	--	--
	11/7/2018	76	--	--	7.80	46.04
	5/14/2019	76	--	--	8.82	47.88
GM-5	7/2/1997	250	10.45	50.81	--	--
	10/15/1997	250	9.37	48.87	--	--
	4/18/1999	250	8.71	47.68	--	--
	11/30/1999	250	5.56	42.01	--	--
	12/2/1999	250	8.50	47.30	--	--
	8/15/2000	250	13.00	55.40	--	--
	8/17/2000	250	10.73	51.31	--	--
	9/20/2000	250	12.00	53.60	--	--
	7/14/2015	250	11.82	53.27	--	--
	10/9/2015	250	11.57	52.83	--	--
	11/7/2018	250	--	--	9.12	48.42
	5/14/2019	250	--	--	9.54	49.17
GM-6	6/28/1997	165	20.35	68.63	--	--
	10/22/1997	165	5.20	41.36	--	--
	10/10/1998	165	11.06	51.91	--	--
	4/19/1999	165	7.89	46.20	--	--
	2/29/2000	165	12.30	54.14	--	--
	3/2/2000	165	9.78	49.60	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-6	7/19/2000	165	9.20	48.56	--	--
	9/25/2000	165	8.75	47.75	--	--
	10/10/2012	165	8.11	46.59	--	--
	10/10/2014	165	9.98	49.96	--	--
	1/14/2016	165	2.61	36.69	--	--
	4/21/2016	165	12.01	53.62	--	--
	9/19/2016	165	12.38	54.28	--	--
	5/8/2017	165	10.38	50.69	--	--
	9/24/2018	165	15.72	60.30	--	--
	11/7/2018	165	8.96	48.13	9.20	48.56
	5/14/2019	165	8.93	48.07	9.82	49.68
GM-7	6/29/1997	145	21.53	70.75	--	--
	10/11/1997	145	10.09	50.16	--	--
	10/23/1998	145	12.64	54.75	--	--
	5/1/1999	145	29.13	84.43	--	--
	9/23/2003	145	16.55	61.79	--	--
	5/3/2004	145	14.06	57.31	--	--
	10/6/2011	145	21.24	70.23	--	--
	12/10/2013	145	6.08	42.94	--	--
	10/2/2015	145	11.96	53.52	--	--
	4/19/2016	145	14.72	58.49	--	--
	7/14/2016	145	15.64	60.16	--	--
	10/20/2016	145	9.93	49.88	--	--
	1/16/2017	145	6.74	44.13	--	--
	5/4/2017	145	13.39	56.10	--	--
	7/27/2017	145	15.23	59.42	--	--
	9/26/2017	145	16.35	61.43	--	--
	9/17/2018	145	17.92	64.26	--	--
	11/8/2018	145	9.47	49.05	9.11	48.40
	5/14/2019	145	9.56	49.21	10.48	50.86
GM-8	6/30/1997	79	11.06	51.91	--	--
	10/12/1997	79	9.62	49.32	--	--
	10/9/1998	79	8.36	47.05	--	--
	4/13/1999	79	8.87	47.97	--	--
	10/21/1999	79	9.34	48.81	--	--
	5/8/2017	79	9.27	48.68	--	--
	11/7/2018	79	8.67	47.61	10.16	50.29
	5/14/2019	79	8.52	47.34	6.40	43.52
GM-9	10/13/1997	164	10.44	50.79	--	--
	10/11/1998	164	8.92	48.06	--	--
	4/18/1999	164	8.70	47.66	--	--
	3/6/2000	164	9.47	49.05	--	--
	3/8/2000	164	10.01	50.02	--	--
	9/10/2003	164	10.56	51.00	--	--
	5/3/2004	164	9.07	48.33	--	--
	7/28/2005	164	9.90	49.82	--	--
	11/29/2018	164	8.91	48.04	9.73	49.51
	5/14/2019	164	8.23	46.81	8.73	47.71

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-10	10/14/1997	170	7.48	45.46	--	--
	11/6/1998	170	8.38	47.08	--	--
	4/27/1999	170	8.16	46.69	--	--
	11/7/2018	170	--	--	11.55	52.79
	5/14/2019	170	--	--	7.42	45.36
GM-11	10/15/1997	174.7	10.95	51.71	--	--
	11/7/2018	174.7	--	--	10.50	50.90
	5/14/2019	174.7	--	--	6.93	44.47
GM-12	10/22/1997	290	7.80	46.04	--	--
	10/10/1998	290	13.93	57.07	--	--
	4/19/1999	290	9.58	49.24	--	--
	11/8/2018	290	--	--	9.73	49.51
	5/14/2019	290	--	--	10.11	50.20
GM-13	10/22/1997	325	9.56	49.21	--	--
	4/20/1999	325	12.01	53.62	--	--
	5/18/2004	325	14.73	58.51	--	--
	12/12/2013	325	8.08	46.55	--	--
	10/7/2015	325	10.93	51.67	--	--
	9/25/2017	325	20.39	68.70	--	--
	11/7/2018	325	9.60	49.28	9.38	48.88
	5/15/2019	325	9.46	49.03	10.36	50.65
GM-14	10/21/1997	135	9.91	49.84	--	--
	10/28/1998	135	11.08	51.94	--	--
	5/2/1999	135	18.49	65.28	--	--
	11/7/2018	135	--	--	9.93	49.87
	5/14/2019	135	--	--	10.12	50.22
GM-15	10/20/1997	165	5.25	41.45	--	--
	10/11/1998	165	14.44	57.99	--	--
	4/20/1999	165	10.61	51.10	--	--
	5/10/2004	165	22.67	72.81	--	--
	4/13/2010	165	14.47	58.05	--	--
	10/5/2011	165	15.07	59.12	--	--
	10/9/2012	165	10.68	51.22	--	--
	10/22/2013	165	10.80	51.44	--	--
	10/8/2014	165	10.78	51.40	--	--
	11/4/2015	165	11.57	52.83	--	--
	9/12/2016	165	16.32	61.37	--	--
	9/21/2017	165	17.47	63.45	--	--
	9/26/2018	165	8.81	47.86	--	--
	11/7/2018	165	9.81	49.66	9.70	49.46
	5/14/2019	165	9.82	49.68	10.21	50.38
GM-16	10/22/1997	108	8.44	47.19	--	--
	10/9/1998	108	12.30	54.14	--	--
	4/14/1999	108	12.12	53.82	--	--
	9/23/2003	108	15.03	59.05	--	--
	4/27/2004	108	11.97	53.55	--	--
GM-17	10/28/1997	224.3	9.66	49.39	--	--
	10/12/1998	224.3	13.24	55.83	--	--
	4/26/1999	224.3	20.27	68.49	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-17 (continued)	5/1/2004	224.3	12.65	54.77	--	--
	5/16/2004	224.3	20.97	69.75	--	--
	1/15/2007	224.3	9.18	48.52	--	--
	6/3/2008	224.3	14.24	57.64	--	--
	8/27/2009	224.3	20.76	69.37	--	--
	9/9/2010	224.3	16.93	62.48	--	--
	10/12/2012	224.3	10.63	51.14	--	--
	10/10/2014	224.3	10.81	51.46	--	--
	11/7/2018	224.3	9.83	49.69	9.87	49.77
	5/14/2019	224.3	9.63	49.33	10.83	51.49
GM-18	12/4/1997	50	7.05	44.69	--	--
	11/7/1998	50	9.10	48.38	--	--
GM-19	12/4/1997	46	8.91	48.04	--	--
GM-21	12/3/1997	5	8.65	47.57	--	--
	10/13/1998	5	10.09	50.16	--	--
	1/29/2001	5	5.27	41.49	--	--
	9/9/2005	5	11.72	53.10	--	--
GM-22	12/5/1997	6	9.10	48.38	--	--
	10/10/1998	6	15.10	59.18	--	--
	4/13/1999	6	5.06	41.11	--	--
	1/15/2001	6	4.00	39.20	--	--
	9/8/2005	6	10.50	50.90	--	--
GM-23	12/3/1997	3.5	8.73	47.71	--	--
	10/10/1998	3.5	12.00	53.60	--	--
	1/16/2001	3.5	2.10	35.78	--	--
	5/12/2004	3.5	10.41	50.74	--	--
	9/8/2005	3.5	11.00	51.80	--	--
GM-24A	11/9/1998	71	11.47	52.65	--	--
	5/4/1999	71	23.93	75.07	--	--
GM-24B	11/17/1998	104	5.54	41.97	--	--
	5/5/1999	104	16.78	62.20	--	--
	4/29/2004	104	14.61	58.30	--	--
	5/4/2004	104	14.50	58.10	--	--
GM-24C	11/20/1998	193	3.83	38.89	--	--
	5/13/1999	193	20.12	68.22	--	--
	9/24/2003	193	12.67	54.81	--	--
	4/29/2004	193	18.11	64.60	--	--
	10/11/2011	193	13.01	55.42	--	--
	12/9/2013	193	2.49	36.49	--	--
	10/1/2015	193	19.34	66.81	--	--
	9/22/2017	193	20.20	68.36	--	--
	11/8/2018	193	9.20	48.56	9.69	49.44
	5/14/2019	193	9.27	48.69	10.68	51.22
GM-25A	10/6/1998	19	8.52	47.34	--	--
	4/16/1999	19	8.44	47.19	--	--
	12/1/1999	19	8.18	46.72	--	--
	12/3/1999	19	8.40	47.12	--	--
	8/21/2000	19	10.07	50.13	--	--
	8/23/2000	19	9.78	49.60	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-25A (continued)	9/9/2003	19	11.30	52.34	--	--
	5/12/2004	19	11.18	52.12	--	--
	11/9/2018	19	9.20	48.56	10.43	50.77
	5/15/2019	19	7.82	46.08	7.84	46.11
GM-25B	10/6/1998	98	9.24	48.63	--	--
	4/27/1999	98	8.67	47.61	--	--
	10/20/1999	98	8.72	47.70	--	--
	4/17/2000	98	6.40	43.52	--	--
	9/9/2003	98	14.14	57.45	--	--
	5/18/2004	98	11.42	52.56	--	--
	11/5/2013	98	9.56	49.20	--	--
	11/5/2013	98	10.00	50.00	--	--
	11/7/2013	98	6.79	44.23	--	--
	10/7/2015	98	10.77	51.38	--	--
	10/9/2015	98	11.41	52.53	--	--
	1/19/2017	98	2.53	36.56	--	--
	11/9/2018	98	9.56	49.21	10.44	50.79
	5/15/2019	98	8.95	48.11	7.40	45.32
GM-25C	10/26/1998	206	9.53	49.15	--	--
	11/9/1998	206	9.49	49.08	--	--
	4/20/1999	206	8.89	48.00	--	--
	8/2/2000	206	13.30	55.94	--	--
	8/4/2000	206	10.43	50.77	--	--
	9/15/2003	206	10.46	50.83	--	--
	5/4/2004	206	9.51	49.12	--	--
	8/1/2005	206	12.10	53.78	--	--
	1/17/2017	206	7.17	44.90	--	--
	11/9/2018	206	--	--	9.89	49.80
	5/15/2019	206	--	--	7.87	46.17
GM-26A	10/7/1998	30	7.92	46.26	--	--
	4/14/1999	30	8.08	46.54	--	--
	11/29/1999	30	7.40	45.32	--	--
	12/1/1999	30	8.70	47.66	--	--
	8/16/2000	30	10.25	50.45	--	--
	8/18/2000	30	10.30	50.54	--	--
	9/9/2003	30	12.09	53.76	--	--
	5/13/2004	30	9.50	49.10	--	--
	11/9/2018	30	9.04	48.27	10.60	51.08
	5/16/2019	30	7.92	46.26	6.43	43.57
GM-26B	10/7/1998	101	8.55	47.39	--	--
	4/15/1999	101	8.33	46.99	--	--
	11/30/1999	101	6.90	44.42	--	--
	12/2/1999	101	8.40	47.12	--	--
	7/18/2000	101	9.71	49.48	--	--
	7/20/2000	101	10.55	50.99	--	--
	9/9/2003	101	10.30	50.54	--	--
	4/27/2004	101	8.55	47.39	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-26B (continued)	7/28/2005	101	10.74	51.33	--	--
	11/9/2018	101	8.64	47.55	10.36	50.65
	5/16/2019	101	8.08	46.54	6.49	43.68
GM-26C	10/25/1998	160	8.90	48.02	--	--
	4/17/1999	160	8.66	47.59	--	--
	11/30/1999	160	8.40	47.12	--	--
	12/2/1999	160	8.00	46.40	--	--
	8/16/2000	160	10.86	51.55	--	--
	8/18/2000	160	11.07	51.93	--	--
	9/16/2003	160	13.16	55.69	--	--
	5/18/2004	160	8.34	47.01	--	--
	1/20/2017	160	7.67	45.81	--	--
	11/9/2018	160	--	--	10.79	51.42
	5/16/2019	160	--	--	7.80	46.04
GM-27A	10/8/1998	30	8.01	46.42	--	--
	4/15/1999	30	8.20	46.76	--	--
	12/1/1999	30	7.69	45.84	--	--
	9/10/2003	30	11.25	52.25	--	--
	5/13/2004	30	9.58	49.24	--	--
	1/17/2017	30	8.29	46.93	--	--
	1/17/2017	30	8.00	46.40	--	--
	11/9/2018	30	8.85	47.93	10.91	51.64
	5/16/2019	30	8.46	47.23	7.24	45.03
GM-27B	10/26/1998	145	8.89	48.00	--	--
	4/14/1999	145	8.65	47.57	--	--
	7/18/2000	145	9.03	48.25	--	--
	7/20/2000	145	9.44	48.99	--	--
	9/10/2003	145	12.77	54.99	--	--
	4/30/2004	145	7.67	45.81	--	--
	8/5/2005	145	11.12	52.02	--	--
	2/22/2007	145	7.94	46.30	--	--
	5/11/2007	145	4.66	40.39	--	--
	8/8/2007	145	10.84	51.52	--	--
	11/8/2007	145	8.68	47.62	--	--
	5/28/2008	145	9.33	48.80	--	--
	8/21/2008	145	9.82	49.68	--	--
	8/18/2009	145	9.51	49.12	--	--
	8/23/2010	145	13.06	55.50	--	--
	9/13/2011	145	10.81	51.45	--	--
	9/25/2012	145	11.15	52.07	--	--
	12/16/2013	145	7.71	45.87	--	--
	9/25/2014	145	10.41	50.74	--	--
	10/3/2015	145	9.30	48.74	--	--
	8/25/2016	145	11.92	53.45	--	--
	9/13/2017	145	10.33	50.60	--	--
	10/2/2018	145	10.24	50.43	--	--
	11/9/2018	145	8.96	48.13	11.66	52.99
	5/16/2019	145	8.47	47.25	7.69	45.84

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-27C	11/9/1998	210	8.62	47.52	--	--
	12/2/1998	210	9.07	48.33	--	--
	4/26/1999	210	9.44	48.99	--	--
	8/7/2000	210	9.67	49.41	--	--
	8/9/2000	210	9.54	49.17	--	--
	9/11/2003	210	12.74	54.93	--	--
	4/30/2004	210	8.07	46.53	--	--
	8/5/2005	210	12.04	53.67	--	--
	11/9/2018	210	--	--	11.48	52.66
	5/16/2019	210	--	--	7.04	44.67
GM-28A	10/28/1998	40	8.01	46.42	--	--
	4/19/1999	40	7.91	46.24	--	--
	2/29/2000	40	7.78	46.00	--	--
	3/2/2000	40	7.48	45.46	--	--
	7/19/2000	40	9.65	49.37	--	--
	7/21/2000	40	8.96	48.13	--	--
	4/28/2004	40	11.40	52.52	--	--
	7/26/2005	40	9.74	49.53	--	--
	5/10/2007	40	9.37	48.87	--	--
	8/7/2007	40	9.84	49.72	--	--
	11/5/2007	40	8.27	46.88	--	--
	2/18/2008	40	7.01	44.62	--	--
	5/27/2008	40	8.43	47.18	--	--
	8/20/2008	40	8.72	47.69	--	--
	11/10/2008	40	7.34	45.21	--	--
	8/17/2009	40	9.82	49.67	--	--
	8/24/2010	40	10.89	51.60	--	--
	9/14/2011	40	8.84	47.91	--	--
	9/26/2012	40	8.79	47.82	--	--
	12/18/2013	40	6.74	44.13	--	--
	9/30/2014	40	8.44	47.19	--	--
	10/3/2015	40	9.05	48.29	--	--
	8/25/2016	40	14.98	58.97	--	--
	9/18/2017	40	10.06	50.11	--	--
	10/2/2018	40	9.99	49.98	--	--
	11/29/2018	40	8.28	46.90	8.14	46.65
	5/16/2019	40	8.27	46.89	8.38	47.08
GM-28B	11/8/1998	124.5	8.80	47.84	--	--
	4/19/1999	124.5	8.24	46.83	--	--
	3/1/2000	124.5	7.41	45.34	--	--
	3/3/2000	124.5	8.29	46.92	--	--
	3/6/2000	124.5	8.72	47.70	--	--
	3/8/2000	124.5	8.15	46.67	--	--
	4/28/2004	124.5	8.34	47.01	--	--
	7/26/2005	124.5	9.48	49.06	--	--
	2/21/2007	124.5	8.07	46.52	--	--
	5/10/2007	124.5	9.58	49.24	--	--
	8/7/2007	124.5	9.89	49.80	--	--
	11/5/2007	124.5	8.48	47.26	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-28B	5/27/2008	124.5	9.14	48.46	--	--
	8/20/2008	124.5	9.34	48.82	--	--
	11/10/2008	124.5	7.80	46.04	--	--
	8/17/2009	124.5	9.93	49.87	--	--
	8/24/2010	124.5	12.08	53.75	--	--
	9/14/2011	124.5	8.93	48.08	--	--
	9/26/2012	124.5	9.83	49.69	--	--
	12/20/2013	124.5	8.90	48.02	--	--
	9/30/2014	124.5	8.84	47.91	--	--
	10/3/2015	124.5	9.42	48.95	--	--
	8/26/2016	124.5	11.76	53.16	--	--
	9/18/2017	124.5	11.73	53.12	--	--
	10/2/2018	124.5	10.34	50.61	--	--
	11/29/2018	124.5	8.49	47.28	8.39	47.10
	5/16/2019	124.5	8.43	47.17	8.00	46.40
GM-29	10/9/1998	55	8.65	47.57	--	--
	4/16/1999	55	8.48	47.26	--	--
	2/29/2000	55	9.20	48.56	--	--
	3/2/2000	55	7.10	44.78	--	--
	9/10/2003	55	11.00	51.80	--	--
	5/3/2004	55	9.80	49.64	--	--
	7/28/2005	55	9.94	49.89	--	--
	2/20/2007	55	8.22	46.79	--	--
	8/7/2007	55	9.83	49.70	--	--
	11/6/2007	55	8.45	47.21	--	--
	2/22/2008	55	7.23	45.01	--	--
	8/20/2008	55	9.24	48.64	--	--
	11/10/2008	55	8.22	46.79	--	--
	8/17/2009	55	11.60	52.88	--	--
	8/24/2010	55	12.21	53.98	--	--
	9/14/2011	55	11.41	52.53	--	--
	9/27/2012	55	6.92	44.45	--	--
	12/20/2013	55	7.17	44.91	--	--
	9/29/2014	55	10.32	50.58	--	--
	10/7/2015	55	13.37	56.07	--	--
	8/26/2016	55	13.86	56.94	--	--
	9/18/2017	55	14.36	57.85	--	--
	10/2/2018	55	10.97	51.74	--	--
	11/29/2018	55	9.07	48.33	9.85	49.73
	5/14/2019	55	8.65	47.57	8.19	46.74
GM-30	10/27/1998	75	12.66	54.79	--	--
	5/12/1999	75	15.08	59.14	--	--
	5/16/2019	75	--	--	9.75	49.55
GM-31	10/24/1998	105	13.49	56.28	--	--
	5/3/1999	105	24.19	75.54	--	--
	10/9/2000	105	15.59	60.06	--	--
	10/9/2000	105	15.59	60.06	--	--
	10/11/2000	105	12.59	54.66	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-31 (continued)	11/7/2018	105	--	--	9.38	48.88
	5/14/2019	105	--	--	9.68	49.42
GM-32	4/27/1999	135	16.00	60.80	--	--
	9/25/2003	135	10.37	50.67	--	--
	5/26/2004	135	21.20	70.16	--	--
	10/6/2011	135	15.21	59.38	--	--
	12/11/2013	135	10.65	51.17	--	--
	8/24/2015	135	13.02	55.43	--	--
	10/8/2015	135	11.00	51.80	--	--
	9/25/2017	135	24.89	76.80	--	--
	11/7/2018	135	9.44	48.99	9.48	49.06
	5/15/2019	135	9.54	49.17	10.29	50.52
GM-33	5/10/1999	74	10.30	50.54	--	--
GM-34A	10/8/1998	30	9.33	48.79	--	--
	4/17/1999	30	9.84	49.71	--	--
	4/29/2004	30	10.05	50.09	--	--
	11/8/2018	30	--	--	9.80	49.64
	5/14/2019	30	--	--	8.85	47.93
GM-34B	10/12/1998	85	11.60	52.88	--	--
	4/14/1999	85	14.68	58.42	--	--
	9/24/2003	85	15.48	59.86	--	--
	4/28/2004	85	9.78	49.60	--	--
	10/5/2011	85	21.57	70.82	--	--
	12/9/2013	85	5.16	41.29	--	--
	10/1/2015	85	18.43	65.17	--	--
	1/8/2016	85	6.14	43.05	--	--
	4/19/2016	85	16.96	62.53	--	--
	9/22/2017	85	16.39	61.50	--	--
	11/8/2018	85	9.60	49.28	9.20	48.56
	5/14/2019	85	9.82	49.68	9.78	49.60
GM-35	11/4/1998	40	3.64	38.55	--	--
	5/4/1999	40	26.66	79.99	--	--
	11/8/2018	40	--	--	9.78	49.60
	5/14/2019	40	--	--	10.43	50.77
GM-36	11/3/1998	95	4.48	40.06	--	--
	5/5/1999	95	17.53	63.55	--	--
	5/4/2004	95	14.29	57.72	--	--
	10/10/2012	95	7.36	45.25	--	--
	10/10/2014	95	10.46	50.83	--	--
	9/13/2016	95	12.52	54.54	--	--
	9/26/2018	95	15.02	59.03	--	--
	11/7/2018	95	9.98	49.96	9.94	49.89
	5/14/2019	95	10.00	50.00	10.64	51.15
GM-37A	11/18/1998	144	7.48	45.46	--	--
	5/11/1999	144	10.20	50.36	--	--
	9/25/2003	144	12.81	55.06	--	--
	5/17/2004	144	21.13	70.03	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-37B	10/13/1998	328	10.67	51.21	--	--
	5/14/1999	328	14.79	58.62	--	--
	9/25/2003	328	11.06	51.91	--	--
	5/27/2004	328	12.61	54.70	--	--
GM-38A	10/13/1998	95	9.02	48.24	--	--
	4/15/1999	95	10.29	50.52	--	--
	11/8/2018	95	--	--	9.12	48.42
	5/14/2019	95	--	--	9.69	49.44
GM-38B	10/14/1998	160	7.76	45.97	--	--
	4/29/1999	160	15.72	60.30	--	--
	1/19/2017	160	6.87	44.36	--	--
	11/8/2018	160	9.36	48.85	9.47	49.05
	5/14/2019	160	9.33	48.79	9.72	49.50
GM-38C	10/20/1998	200	9.14	48.45	--	--
	4/30/1999	200	22.81	73.06	--	--
	1/8/2016	200	8.83	47.89	--	--
	4/19/2016	200	12.88	55.19	--	--
	10/20/2016	200	10.69	51.24	--	--
	1/17/2017	200	7.31	45.16	--	--
	5/8/2017	200	11.61	52.89	--	--
	7/27/2017	200	12.21	53.98	--	--
	11/1/2017	200	7.51	45.51	--	--
	11/8/2018	200	9.28	48.70	9.53	49.15
	5/14/2019	200	9.26	48.67	10.04	50.07
GM-39	10/12/1998	85	11.77	53.19	--	--
	4/15/1999	85	13.95	57.11	--	--
	1/8/2016	85	7.81	46.05	--	--
	10/19/2016	85	16.23	61.22	--	--
	7/26/2017	85	21.00	69.80	--	--
	7/26/2017	85	21.24	70.24	--	--
	4/20/2018	85	16.00	60.80	--	--
	9/14/2018	85	19.98	67.97	--	--
	11/8/2018	85	9.22	48.60	9.04	48.27
	5/14/2019	85	9.27	48.69	9.90	49.82
GM-40A	10/26/1998	75	12.27	54.09	--	--
	4/28/1999	75	16.50	61.70	--	--
	5/3/2004	75	11.35	52.43	--	--
	11/8/2018	75	11.28	52.30	11.28	52.30
	5/14/2019	75	11.28	52.30	11.89	53.40
GM-40B	10/26/1998	120	12.74	54.93	--	--
	4/27/1999	120	16.34	61.41	--	--
	5/19/2004	120	21.84	71.31	--	--
	11/5/2013	120	8.00	46.40	--	--
	11/5/2013	120	7.64	45.76	--	--
	11/7/2013	120	6.81	44.25	--	--
	7/14/2015	120	16.93	62.47	--	--
	8/24/2015	120	15.04	59.08	--	--
	10/8/2015	120	11.56	52.81	--	--
	5/5/2017	120	12.84	55.11	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-40B (continued)	9/26/2017	120	23.94	75.09	--	--
	11/8/2018	120	11.18	52.12	10.82	51.48
	5/14/2019	120	11.46	52.63	11.18	52.12
GM-41	10/19/1998	40	12.61	54.70	--	--
	4/16/1999	40	12.15	53.87	--	--
	5/14/2019	40	--	--	10.22	50.40
GM-42	10/20/1998	72	10.75	51.35	--	--
	4/16/1999	72	11.46	52.63	--	--
	11/8/2018	72	--	--	8.58	47.44
GM-44	11/7/2018	60	--	--	8.63	47.53
	5/16/2019	60	--	--	15.28	59.50
GM-45	11/7/2018	70	--	--	8.91	48.04
	5/16/2019	70	--	--	9.80	49.64
GM-46	11/7/2018	65	--	--	8.64	47.55
	5/16/2019	65	--	--	9.88	49.78
GM-48	11/7/2018	65	--	--	8.80	47.84
	5/16/2019	65	--	--	9.70	49.46
GM-49	4/17/1999	83.5	8.25	46.85	--	--
GM-50	10/14/1998	80.5	9.19	48.54	--	--
	4/17/1999	80.5	8.70	47.66	--	--
GM-51	4/18/1999	67	9.43	48.97	--	--
GM-52	4/19/1999	75	8.90	48.02	--	--
GM-53A	4/19/1999	79	9.50	49.10	--	--
	11/8/2018	79	--	--	9.18	48.52
	5/14/2019	79	--	--	9.07	48.33
GM-53B	11/5/1998	195	6.71	44.08	--	--
	5/1/1999	195	28.81	83.85	--	--
	11/8/2018	195	--	--	8.78	47.80
	5/14/2019	195	--	--	8.82	47.88
GM-54	10/24/1998	80	22.09	71.76	--	--
	5/1/1999	80	18.52	65.34	--	--
GM-55	10/24/1998	75	15.98	60.76	--	--
	5/1/1999	75	19.12	66.42	--	--
	7/13/2016	75	23.87	74.96	--	--
	11/8/2018	75	--	--	9.06	48.31
	5/14/2019	75	--	--	9.56	49.21
GM-56	10/21/1998	32	10.78	51.40	--	--
	4/20/1999	32	12.67	54.81	--	--
	11/8/2018	32	--	--	8.74	47.73
	5/14/2019	32	--	--	9.31	48.76
GM-57	4/20/1999	76	11.08	51.94	--	--
	11/7/2018	76	--	--	8.20	46.76
	5/14/2019	76	--	--	8.96	48.13
GM-58	4/26/1999	75	15.64	60.15	--	--
	5/22/2004	75	11.29	52.32	--	--
	7/14/2015	75	16.52	61.73	--	--
	11/7/2018	75	--	--	8.73	47.71
	5/14/2019	75	--	--	9.14	48.45

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-59	11/17/1998	114	8.13	46.63	--	--
	4/28/1999	114	12.44	54.39	--	--
	5/1/2004	114	10.54	50.97	--	--
	5/15/2004	114	15.50	59.90	--	--
	7/29/2005	114	13.52	56.34	--	--
	1/11/2007	114	7.99	46.38	--	--
	6/3/2008	114	11.06	51.90	--	--
	8/25/2009	114	15.02	59.03	--	--
	9/7/2010	114	12.68	54.83	--	--
	10/4/2011	114	17.31	63.15	--	--
	10/8/2012	114	11.04	51.87	--	--
	10/22/2013	114	9.13	48.43	--	--
	10/8/2014	114	12.41	54.34	--	--
	11/5/2015	114	13.76	56.77	--	--
	9/12/2016	114	13.51	56.31	--	--
	9/21/2017	114	15.44	59.79	--	--
	10/1/2018	114	12.64	54.76	--	--
	11/7/2018	114	8.67	47.61	8.29	46.92
	5/14/2019	114	8.47	47.25	9.12	48.42
GM-60	11/7/2018	102	--	--	9.03	48.25
	5/14/2019	102	--	--	9.46	49.03
GM-61	5/3/1999	138	14.79	58.62	--	--
	5/1/2004	138	17.04	62.67	--	--
	5/16/2004	138	16.54	61.77	--	--
	7/30/2005	138	14.00	57.20	--	--
	6/3/2008	138	17.56	63.60	--	--
	8/27/2009	138	11.93	53.48	--	--
	9/9/2010	138	11.78	53.21	--	--
	10/4/2011	138	15.64	60.15	--	--
	10/8/2012	138	12.47	54.45	--	--
	10/22/2013	138	11.44	52.60	--	--
	10/14/2014	138	10.94	51.70	--	--
	11/5/2015	138	14.34	57.81	--	--
	9/13/2016	138	12.40	54.32	--	--
	9/21/2017	138	20.38	68.68	--	--
	9/25/2018	138	15.66	60.18	--	--
	11/7/2018	138	8.54	47.37	8.70	47.66
	5/16/2019	138	9.07	48.33	9.75	49.55
GM-62A	8/23/1999	90	17.22	63.00	--	--
	5/11/2004	90	16.71	62.08	--	--
	10/10/2011	90	18.96	66.13	--	--
	12/12/2013	90	10.33	50.59	--	--
	10/5/2015	90	12.82	55.08	--	--
GM-62AR	9/27/2017	90	17.62	63.71	--	--
	11/7/2018	90	9.85	49.73	8.88	47.98
	5/16/2019	90	9.87	49.77	10.26	50.47
GM-62B	8/24/1999	195	22.04	71.67	--	--
	5/19/2004	195	18.92	66.06	--	--
	10/10/2011	195	18.09	64.57	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-62B (continued)	12/13/2013	195	10.26	50.47	--	--
	10/13/2015	195	11.71	53.07	--	--
GM-62BR	9/27/2017	195	12.19	53.94	--	--
	11/7/2018	195	10.17	50.31	9.71	49.48
	5/16/2019	195	10.02	50.04	9.98	49.96
GM-62C	8/24/1999	315	13.52	56.34	--	--
	5/18/2004	315	19.38	66.88	--	--
	10/11/2011	315	14.93	58.88	--	--
	12/13/2013	315	10.79	51.42	--	--
	10/8/2015	315	10.04	50.07	--	--
	10/14/2015	315	14.90	58.82	--	--
GM-62CR	9/8/2017	315	11.41	52.53	--	--
	11/7/2018	315	9.69	49.44	9.55	49.19
	5/16/2019	315	9.69	49.44	9.94	49.89
GM-63A	8/29/2000	45	10.70	51.26	--	--
	9/19/2000	45	11.55	52.79	--	--
	10/18/2000	45	15.61	60.10	--	--
	9/15/2003	45	10.17	50.31	--	--
	5/5/2004	45	7.75	45.95	--	--
	10/14/2014	45	9.40	48.92	--	--
	9/15/2016	45	11.94	53.50	--	--
	9/19/2018	45	10.67	51.21	--	--
	11/8/2018	45	8.86	47.95	10.33	50.59
	5/16/2019	45	8.37	47.07	8.47	47.25
GM-63B	2/7/2001	105	7.77	45.99	--	--
	9/11/2003	105	10.18	50.32	--	--
	4/27/2004	105	8.03	46.45	--	--
	10/9/2012	105	9.39	48.91	--	--
	10/14/2014	105	9.18	48.52	--	--
	9/15/2016	105	10.72	51.30	--	--
	9/19/2018	105	10.47	50.84	--	--
	11/8/2018	105	8.87	47.97	10.26	50.47
	5/16/2019	105	8.51	47.32	7.97	46.35
GM-64A	8/30/2000	33	10.60	51.08	--	--
	10/3/2000	33	9.71	49.48	--	--
	10/5/2000	33	8.36	47.05	--	--
	10/19/2000	33	15.41	59.74	--	--
	9/8/2003	33	10.33	50.60	--	--
	5/4/2004	33	8.56	47.41	--	--
GM-64B	7/24/2000	117	9.86	49.75	--	--
	7/26/2000	117	9.86	49.75	--	--
	10/4/2000	117	11.02	51.84	--	--
	9/8/2003	117	18.52	65.34	--	--
	5/11/2004	117	11.82	53.28	--	--
GM-65	10/28/2013	120	9.68	49.43	--	--
	10/28/2013	120	9.68	49.43	--	--
	10/30/2013	120	9.43	48.97	--	--
	10/7/2015	120	13.58	56.45	--	--
	10/9/2015	120	11.86	53.34	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-65 (continued)	11/8/2018	120	10.19	50.34	9.21	48.58
	5/16/2019	120	8.32	46.98	7.78	46.00
GM-66A	7/18/2000	27	9.21	48.58	--	--
	7/20/2000	27	9.54	49.17	--	--
	9/16/2003	27	9.88	49.78	--	--
	4/27/2004	27	6.12	43.02	--	--
	7/27/2005	27	9.57	49.23	--	--
	7/14/2015	27	12.51	54.52	--	--
	11/9/2018	27	--	--	8.40	47.12
	11/29/2018	27	--	--	6.04	42.87
	5/15/2019	27	--	--	6.46	43.63
GM-66B	7/19/2000	125	9.18	48.52	--	--
	7/20/2000	125	9.50	49.10	--	--
	8/3/2000	125	9.54	49.17	--	--
	9/11/2003	125	11.92	53.46	--	--
	5/10/2004	125	11.00	51.80	--	--
	7/27/2005	125	9.61	49.30	--	--
	3/1/2007	125	7.47	45.44	--	--
	5/14/2007	125	8.61	47.50	--	--
	8/14/2007	125	10.07	50.12	--	--
	11/9/2007	125	8.92	48.06	--	--
	2/21/2008	125	7.00	44.60	--	--
	5/30/2008	125	8.44	47.19	--	--
	8/26/2008	125	9.47	49.04	--	--
	11/12/2008	125	8.61	47.49	--	--
	8/20/2009	125	10.70	51.26	--	--
	8/27/2010	125	11.11	52.00	--	--
	9/16/2011	125	11.24	52.24	--	--
	9/26/2012	125	11.55	52.79	--	--
	12/20/2013	125	8.67	47.61	--	--
	9/28/2014	125	11.17	52.10	--	--
	10/4/2015	125	10.14	50.26	--	--
	8/24/2016	125	11.65	52.97	--	--
	9/14/2017	125	11.77	53.19	--	--
	10/3/2018	125	11.72	53.10	--	--
	11/9/2018	125	8.73	47.71	8.07	46.53
	5/15/2019	125	8.57	47.43	6.26	43.27
GM-67	8/7/2000	122	10.66	51.19	--	--
	5/1/2004	122	10.34	50.61	--	--
	5/17/2004	122	15.57	60.03	--	--
	6/2/2008	122	22.20	71.96	--	--
	8/24/2009	122	22.87	73.17	--	--
	4/13/2010	122	16.13	61.04	--	--
	9/9/2010	122	15.87	60.57	--	--
	1/8/2016	122	8.90	48.02	--	--
	4/20/2016	122	12.31	54.16	--	--
	7/14/2016	122	16.91	62.44	--	--
	10/20/2016	122	9.77	49.58	--	--
	5/5/2017	122	12.14	53.86	--	--

ARCADIS Design & Consultancy for natural and built assets

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-67 (continued)	7/27/2017	122	25.28	77.51	--	--
	11/1/2017	122	9.93	49.87	--	--
	4/20/2018	122	15.12	59.22	--	--
	9/17/2018	122	18.22	64.80	--	--
	11/8/2018	122	8.94	48.09	8.83	47.89
	5/14/2019	122	9.01	48.22	9.50	49.10
GM-68	8/31/2000	140	29.28	84.70	--	--
	9/26/2000	140	14.26	57.67	--	--
	10/17/2000	140	9.58	49.24	--	--
	5/24/2004	140	10.82	51.48	--	--
	7/31/2005	140	20.95	69.71	--	--
	6/2/2008	140	25.51	77.91	--	--
	8/24/2009	140	22.34	72.22	--	--
	9/8/2010	140	16.18	61.13	--	--
	10/4/2011	140	16.66	61.99	--	--
	10/8/2012	140	12.02	53.63	--	--
	10/22/2013	140	10.57	51.03	--	--
	10/8/2014	140	11.08	51.95	--	--
	11/4/2015	140	11.84	53.31	--	--
	9/12/2016	140	16.22	61.20	--	--
	9/21/2017	140	16.83	62.29	--	--
	10/1/2018	140	13.92	57.05	--	--
	11/8/2018	140	9.97	49.95	10.08	50.14
	5/14/2019	140	10.17	50.31	10.89	51.60
GM-70	8/17/2000	42	14.96	58.93	--	--
GM-71	8/21/2000	39	21.61	70.90	--	--
GM-72	8/22/2000	43	25.70	78.26	--	--
	9/24/2003	43	11.17	52.11	--	--
GM-72A	7/25/2005	46	13.99	57.18	--	--
	8/21/2009	46	9.95	49.91	--	--
	12/30/2013	46	10.93	51.68	--	--
	9/30/2015	46	19.33	66.80	--	--
	9/21/2016	46	16.74	62.13	--	--
	10/3/2017	46	17.56	63.61	--	--
	9/27/2018	46	15.81	60.46	--	--
	11/8/2018	46	11.50	52.70	11.26	52.27
	5/14/2019	46	11.66	52.99	11.84	53.31
GM-73	9/6/2000	42	20.07	68.13	--	--
	11/7/2018	42	--	--	9.28	48.70
	5/14/2019	42	--	--	9.55	49.19
GM-74	9/7/2000	34	15.41	59.74	--	--
	11/7/2018	34	--	--	7.29	45.12
	5/14/2019	34	--	--	8.57	47.43
GM-75	9/8/2000	24	15.80	60.44	--	--
	11/7/2018	24	--	--	8.79	47.82
	5/14/2019	24	7.74	45.93	8.23	46.81
GM-76	1/29/2001	3	2.50	36.50	--	--
	9/9/2005	3	14.18	57.52	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-77	9/22/2003	105	11.52	52.74	--	--
	5/11/2004	105	9.12	48.42	--	--
	7/28/2005	105	11.52	52.74	--	--
	11/29/2018	105	8.85	47.93	8.60	47.48
	5/15/2019	105	8.23	46.81	6.57	43.83
GM-78	9/18/2003	20	10.85	51.53	--	--
	4/29/2004	20	9.30	48.74	--	--
	7/29/2005	20	9.75	49.55	--	--
	2/28/2007	20	7.93	46.27	--	--
	5/11/2007	20	9.05	48.29	--	--
	8/14/2007	20	11.31	52.36	--	--
	2/21/2008	20	5.87	42.57	--	--
	5/28/2008	20	9.46	49.03	--	--
	8/25/2008	20	8.98	48.17	--	--
	11/12/2008	20	8.40	47.12	--	--
	8/19/2009	20	10.24	50.44	--	--
	8/26/2010	20	10.02	50.04	--	--
	9/15/2011	20	10.46	50.82	--	--
	9/26/2012	20	11.42	52.55	--	--
	12/18/2013	20	9.05	48.29	--	--
	9/25/2014	20	10.53	50.95	--	--
	10/6/2015	20	10.31	50.56	--	--
	8/24/2016	20	12.14	53.85	--	--
	9/14/2017	20	11.03	51.85	--	--
	10/4/2018	20	11.00	51.80	--	--
	11/9/2018	20	9.28	48.70	10.77	51.39
	5/15/2019	20	7.29	45.12	6.92	44.46
GM-79	9/18/2003	25	9.65	49.37	--	--
	4/26/2004	25	7.48	45.46	--	--
	7/29/2005	25	9.54	49.17	--	--
	8/7/2007	25	11.52	52.73	--	--
	11/6/2007	25	10.79	51.42	--	--
	2/22/2008	25	8.82	47.87	--	--
	5/28/2008	25	9.04	48.28	--	--
	8/20/2008	25	12.58	54.64	--	--
	11/11/2008	25	9.52	49.13	--	--
	8/17/2009	25	10.96	51.72	--	--
	8/23/2010	25	13.31	55.95	--	--
	9/13/2011	25	10.60	51.08	--	--
	9/25/2012	25	14.69	58.45	--	--
	12/16/2013	25	10.77	51.39	--	--
	9/24/2014	25	10.41	50.74	--	--
	7/14/2015	25	11.96	53.52	--	--
	10/6/2015	25	10.22	50.39	--	--
	8/25/2016	25	12.68	54.83	--	--
	9/12/2017	25	11.36	52.44	--	--
	10/3/2018	25	12.86	55.15	--	--
	11/30/2018	25	10.39	50.70	11.07	51.93
	5/16/2019	25	8.98	48.16	8.07	46.53

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-81A	11/7/2018	140	10.17	50.31	9.31	48.76
GM-81B	10/13/2015	295	11.36	52.45	--	--
	4/20/2016	295	24.88	76.79	--	--
	7/15/2016	295	14.51	58.12	--	--
	10/20/2016	295	10.13	50.23	--	--
	1/18/2017	295	6.55	43.79	--	--
	5/9/2017	295	9.86	49.74	--	--
	11/1/2017	295	11.04	51.87	--	--
	4/20/2018	295	12.66	54.78	--	--
	9/25/2018	295	11.99	53.59	--	--
	11/7/2018	295	9.91	49.84	9.86	49.75
	5/14/2019	295	9.83	49.69	9.79	49.62
GM-84	8/1/2005	77	11.70	53.06	--	--
	3/2/2007	77	8.01	46.41	--	--
	5/14/2007	77	9.81	49.65	--	--
	8/14/2007	77	10.29	50.53	--	--
	11/9/2007	77	8.88	47.99	--	--
	2/21/2008	77	6.42	43.55	--	--
	8/25/2008	77	9.48	49.06	--	--
	11/13/2008	77	8.49	47.28	--	--
	8/20/2009	77	10.12	50.22	--	--
	8/27/2010	77	11.03	51.86	--	--
	9/16/2011	77	9.85	49.73	--	--
	9/27/2012	77	11.38	52.49	--	--
	10/9/2012	77	9.66	49.39	--	--
	12/19/2013	77	8.98	48.17	--	--
	12/27/2013	77	8.08	46.54	--	--
	9/26/2014	77	10.19	50.35	--	--
	10/9/2014	77	10.73	51.32	--	--
	10/4/2015	77	9.46	49.02	--	--
	8/24/2016	77	10.92	51.66	--	--
	9/14/2016	77	9.78	49.60	--	--
	9/15/2017	77	11.18	52.13	--	--
	10/4/2018	77	9.08	48.34	--	--
	11/8/2018	77	8.99	48.18	9.72	49.50
	5/15/2019	77	8.68	47.62	8.36	47.05
GM-85	7/31/2005	75	21.89	71.40	--	--
	6/2/2008	75	20.95	69.71	--	--
	8/25/2009	75	13.26	55.87	--	--
	4/13/2010	75	18.59	65.47	--	--
	9/8/2010	75	12.58	54.64	--	--
	10/4/2011	75	13.18	55.72	--	--
	10/22/2013	75	6.64	43.95	--	--
	10/8/2014	75	8.02	46.44	--	--
	11/4/2015	75	10.54	50.98	--	--
	9/12/2016	75	11.02	51.83	--	--
	9/20/2017	75	14.74	58.54	--	--
	9/25/2018	75	12.19	53.95	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-85 (continued)	11/7/2018	75	9.03	48.25	9.28	48.70
	5/14/2019	75	8.82	47.88	8.79	47.82
GM-86A	10/7/2011	143	16.47	61.64	--	--
	12/11/2013	143	11.18	52.13	--	--
	10/2/2015	143	8.09	46.57	--	--
	5/5/2017	143	14.37	57.87	--	--
	9/28/2017	143	22.36	72.25	--	--
	9/19/2018	143	14.28	57.71	--	--
	11/8/2018	143	10.56	51.01	9.95	49.91
	5/16/2019	143	10.42	50.76	10.45	50.81
GM-86B	10/12/2012	335	12.72	54.90	--	--
	10/30/2013	335	10.00	50.00	--	--
	10/30/2013	335	9.52	49.13	--	--
	10/30/2013	335	9.52	49.13	--	--
	11/1/2013	335	9.76	49.57	--	--
	10/10/2014	335	10.82	51.47	--	--
	8/20/2015	335	13.44	56.19	--	--
	10/12/2015	335	15.29	59.52	--	--
	10/14/2015	335	12.62	54.71	--	--
	9/20/2016	335	12.31	54.15	--	--
	5/9/2017	335	11.29	52.33	--	--
	9/28/2017	335	16.10	60.98	--	--
	9/27/2018	335	10.29	50.52	--	--
	11/8/2018	335	10.97	51.75	9.87	49.77
	5/16/2019	335	9.31	48.76	10.46	50.83
GM-87A	2/19/2007	32	7.20	44.96	--	--
	5/8/2007	32	9.81	49.65	--	--
	8/6/2007	32	11.22	52.19	--	--
	11/7/2007	32	9.39	48.91	--	--
	5/29/2008	32	10.23	50.42	--	--
	8/21/2008	32	10.38	50.69	--	--
	8/21/2009	32	9.95	49.91	--	--
	8/23/2010	32	11.43	52.58	--	--
	9/15/2011	32	10.18	50.33	--	--
	9/25/2012	32	12.84	55.11	--	--
	10/10/2012	32	6.78	44.20	--	--
	12/15/2013	32	9.64	49.36	--	--
	9/24/2014	32	11.51	52.72	--	--
	10/13/2014	32	10.61	51.10	--	--
	10/4/2015	32	10.92	51.65	--	--
	8/25/2016	32	14.40	57.92	--	--
	9/14/2016	32	13.65	56.57	--	--
	9/12/2017	32	10.91	51.64	--	--
	9/18/2018	32	12.90	55.22	--	--
	11/8/2018	32	9.22	48.60	12.30	54.14
	5/15/2019	32	8.87	47.97	6.97	44.55
GM-87B	2/20/2007	117	7.80	46.04	--	--
	5/8/2007	117	4.57	40.22	--	--
	8/6/2007	117	10.68	51.23	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-87B	11/7/2007	117	9.18	48.53	--	--
	2/18/2008	117	7.61	45.70	--	--
	5/29/2008	117	10.23	50.42	--	--
	8/21/2008	117	10.63	51.14	--	--
	11/13/2008	117	9.02	48.24	--	--
	8/21/2009	117	10.11	50.20	--	--
	8/23/2010	117	11.74	53.13	--	--
	9/15/2011	117	11.32	52.38	--	--
	9/25/2012	117	11.30	52.34	--	--
	10/10/2012	117	7.58	45.64	--	--
	12/15/2013	117	9.23	48.61	--	--
	9/24/2014	117	11.28	52.30	--	--
	10/13/2014	117	10.13	50.23	--	--
	10/4/2015	117	10.51	50.91	--	--
	8/25/2016	117	16.50	61.70	--	--
	9/14/2016	117	11.99	53.59	--	--
	9/12/2017	117	11.52	52.74	--	--
	9/18/2018	117	11.82	53.27	--	--
	11/8/2018	117	8.87	47.97	12.57	54.63
	5/15/2019	117	8.11	46.60	7.34	45.21
GM-88	8/18/2017	130	13.84	56.92	--	--
	9/25/2017	130	21.45	70.61	--	--
	9/17/2018	130	19.67	67.41	--	--
	11/7/2018	130	9.12	48.42	9.45	49.01
	5/14/2019	130	9.03	48.25	10.16	50.29
GM-118D	10/21/1998	54	11.45	52.61	--	--
	4/29/1999	54	9.10	48.38	--	--
	11/7/2018	54	--	--	9.45	49.01
	5/16/2019	54	--	--	10.46	50.83
GM-81A	5/14/2019	140	--	--	9.19	48.54
GMEW-1	7/11/2011	20	10.72	51.30	--	--
	11/9/2018	20	8.82	47.88	8.23	46.81
	5/15/2019	20	8.01	46.42	8.62	47.52
GMEW-2	10/28/2013	23	10.17	50.30	--	--
	10/28/2013	23	10.17	50.30	--	--
	10/28/2013	23	10.00	50.00	--	--
	10/30/2013	23	8.17	46.71	--	--
	10/9/2015	23	8.86	47.95	--	--
	11/9/2018	23	9.69	49.44	10.09	50.16
	5/16/2019	23	7.57	45.63	6.92	44.46
GMEW-3	7/24/2000	135	11.52	52.74	--	--
GMEW-4R	5/16/2019	107	--	--	7.43	45.37
GMEW-5	11/8/2018	40	--	--	8.56	47.41
	5/16/2019	40	--	--	9.96	49.93
GMEW-6	11/8/2018	39	--	--	8.91	48.04
	5/16/2019	39	--	--	8.37	47.07
GMEW-7	11/8/2018	183	--	--	9.53	49.15
	5/16/2019	183	--	--	7.86	46.15

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMEW-8	10/15/2015	125	12.11	53.80	--	--
	11/8/2018	125	--	--	10.21	50.38
	5/16/2019	125	--	--	7.22	45.00
GMEWA-1	5/16/2019	26	--	--	7.24	45.03
GMEWA-2	5/16/2019	26	--	--	8.02	46.44
GMEWA-3	5/16/2019	25	--	--	7.84	46.11
GMEWA-4	8/2/2005	20	10.24	50.43	--	--
	11/7/2013	20	9.85	49.73	--	--
	11/11/2013	20	9.99	49.99	--	--
	11/13/2013	20	9.88	49.79	--	--
	10/6/2015	20	11.98	53.56	--	--
GMEWA-5	10/31/2013	16	10.54	50.98	--	--
	10/31/2013	16	10.54	50.98	--	--
	11/4/2013	16	10.43	50.78	--	--
	11/6/2013	16	11.00	51.80	--	--
	9/3/2014	16	10.37	50.67	--	--
	4/20/2015	16	9.49	49.08	--	--
	10/15/2015	16	11.98	53.57	--	--
	4/26/2016	16	9.87	49.76	--	--
	9/8/2016	16	12.20	53.96	--	--
	10/5/2017	16	11.29	52.33	--	--
	4/18/2018	16	9.83	49.70	--	--
	10/17/2018	16	13.70	56.66	--	--
GMEWA-6	11/14/2013	22	10.57	51.02	--	--
	11/19/2013	22	10.84	51.52	--	--
	11/21/2013	22	11.12	52.02	--	--
GMEWA-15	11/14/2013	20	10.08	50.15	--	--
	11/19/2013	20	9.63	49.33	--	--
	11/21/2013	20	9.76	49.57	--	--
GMEWA-16	11/11/2013	20	9.61	49.29	--	--
	11/13/2013	20	9.56	49.21	--	--
	9/3/2014	20	9.96	49.92	--	--
	4/20/2015	20	8.58	47.45	--	--
	10/16/2015	20	9.81	49.65	--	--
	4/26/2016	20	9.02	48.23	--	--
	9/8/2016	20	10.33	50.59	--	--
	10/5/2017	20	10.47	50.84	--	--
	4/18/2018	20	9.46	49.03	--	--
	10/17/2018	20	12.26	54.07	--	--
GMEWA-17	10/31/2013	20	10.95	51.71	--	--
	10/31/2013	20	10.95	51.71	--	--
	11/4/2013	20	10.50	50.90	--	--
	11/6/2013	20	10.43	50.77	--	--
	9/3/2014	20	10.91	51.64	--	--
	4/20/2015	20	8.91	48.04	--	--
	10/5/2015	20	10.23	50.41	--	--
	10/7/2015	20	10.35	50.63	--	--
	4/26/2016	20	9.76	49.57	--	--
	9/8/2016	20	11.21	52.18	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMEWA-17 (continued)	10/5/2017	20	10.74	51.34	--	--
	4/18/2018	20	11.02	51.84	--	--
	10/17/2018	20	11.73	53.11	--	--
GMEWA-18	11/11/2013	18	10.41	50.74	--	--
	11/19/2013	18	10.36	50.65	--	--
	11/21/2013	18	10.38	50.68	--	--
	10/15/2015	18	11.11	52.00	--	--
GMEWA-19	11/12/2013	19	10.67	51.21	--	--
	11/18/2013	19	10.67	51.21	--	--
	11/20/2013	19	11.62	52.91	--	--
	10/15/2015	19	10.45	50.81	--	--
GMEWA-20	10/31/2013	19	10.46	50.83	--	--
	10/31/2013	19	10.46	50.83	--	--
	11/4/2013	19	10.59	51.06	--	--
	11/6/2013	19	10.58	51.04	--	--
	9/3/2014	19	10.37	50.67	--	--
	4/20/2015	19	9.24	48.64	--	--
	10/5/2015	19	11.72	53.09	--	--
	10/7/2015	19	10.89	51.61	--	--
	4/26/2016	19	9.87	49.76	--	--
	9/8/2016	19	10.53	50.96	--	--
	10/5/2017	19	10.39	50.71	--	--
	4/18/2018	19	10.33	50.59	--	--
	10/17/2018	19	11.05	51.89	--	--
GMEWA-22	11/12/2013	24	10.75	51.35	--	--
	11/14/2013	24	10.68	51.22	--	--
	10/15/2015	24	10.97	51.74	--	--
GMEWA-23	11/18/2013	25	11.24	52.24	--	--
	11/20/2013	25	10.75	51.35	--	--
	9/3/2014	25	9.91	49.84	--	--
	4/20/2015	25	9.49	49.08	--	--
	10/16/2015	25	10.53	50.96	--	--
	4/26/2016	25	9.81	49.65	--	--
	9/8/2016	25	10.34	50.61	--	--
	10/5/2017	25	10.59	51.07	--	--
	4/18/2018	25	10.54	50.98	--	--
	10/17/2018	25	10.88	51.58	--	--
GMEWA-24	11/4/2013	22	10.05	50.09	--	--
	11/4/2013	22	10.05	50.09	--	--
	11/6/2013	22	9.88	49.78	--	--
	11/8/2013	22	10.13	50.23	--	--
	10/16/2015	22	10.17	50.30	--	--
GMEWA-25	11/14/2013	23	9.91	49.84	--	--
	11/19/2013	23	10.13	50.24	--	--
	11/21/2013	23	10.11	50.19	--	--
GMEWA-26	7/27/2005	22	11.08	51.94	--	--
	5/16/2019	22	--	--	7.40	45.32
GMEWA-27	5/20/2019	21	--	--	8.10	46.58
GMEWA-28	5/20/2019	25	--	--	7.93	46.27

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMEWA-28A	5/16/2019	23	--	--	8.14	46.65
GMEWA-29	11/14/2013	22	10.60	51.08	--	--
	11/18/2013	22	10.59	51.07	--	--
	11/20/2013	22	10.49	50.89	--	--
	10/19/2015	22	12.01	53.61	--	--
	10/21/2015	22	13.04	55.47	--	--
GMEWA-30	11/14/2013	24	11.16	52.08	--	--
	11/18/2013	24	10.75	51.35	--	--
	11/20/2013	24	10.93	51.68	--	--
	9/3/2014	24	9.83	49.69	--	--
	4/20/2015	24	9.59	49.27	--	--
	10/20/2015	24	10.67	51.20	--	--
	4/26/2016	24	9.79	49.62	--	--
	9/8/2016	24	10.37	50.67	--	--
	10/5/2017	24	10.43	50.78	--	--
	4/18/2018	24	10.61	51.09	--	--
	10/17/2018	24	10.94	51.69	--	--
GMEWA-31	11/12/2013	21	10.76	51.36	--	--
	11/14/2013	21	10.96	51.72	--	--
	10/16/2015	21	10.67	51.21	--	--
GMEWB-1	5/16/2019	99	--	--	7.59	45.66
GMEWC-1	7/26/2005	123	11.30	52.34	--	--
	5/16/2019	123	--	--	7.36	45.25
GMEWC-1A	5/16/2019	117.5	--	--	7.49	45.48
GMEWC-2	5/16/2019	165	--	--	9.83	49.69
GMEWC-4 (GMEW-9)	11/6/2013	125	10.05	50.09	--	--
	11/6/2013	125	10.05	50.09	--	--
	11/8/2013	125	9.86	49.74	--	--
GMEWC-5	11/13/2013	122	10.14	50.26	--	--
	11/15/2013	122	10.24	50.43	--	--
	9/3/2014	122	10.52	50.94	--	--
	4/20/2015	122	9.71	49.47	--	--
	10/20/2015	122	10.58	51.05	--	--
	4/26/2016	122	9.83	49.70	--	--
	9/8/2016	122	10.44	50.79	--	--
	10/5/2017	122	10.33	50.59	--	--
	4/18/2018	122	10.06	50.10	--	--
	10/17/2018	122	10.62	51.12	--	--
GMEWC-7	11/11/2013	108	10.66	51.19	--	--
	11/11/2013	108	10.66	51.19	--	--
	11/13/2013	108	10.33	50.59	--	--
	9/3/2014	108	10.74	51.33	--	--
	4/20/2015	108	10.27	50.48	--	--
	10/19/2015	108	11.31	52.35	--	--
	10/21/2015	108	12.17	53.90	--	--
	4/26/2016	108	10.27	50.48	--	--
	9/8/2016	108	10.78	51.41	--	--
	10/5/2017	108	10.59	51.07	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMEWC-7 (continued)	4/18/2018	108	10.47	50.85	--	--
	10/17/2018	108	10.86	51.54	--	--
GMEWC-8	9/3/2014	127	10.11	50.19	--	--
	4/26/2016	127	9.31	48.75	--	--
	9/8/2016	127	10.82	51.48	--	--
	10/5/2017	127	10.38	50.68	--	--
GMEWC-8A	11/6/2013	122	9.96	49.92	--	--
	11/6/2013	122	9.96	49.92	--	--
	11/8/2013	122	10.38	50.69	--	--
	4/20/2015	122	8.83	47.90	--	--
	10/16/2015	122	10.43	50.77	--	--
	4/18/2018	122	9.34	48.82	--	--
	10/17/2018	122	11.27	52.29	--	--
GMEWC-10	5/16/2019	134	--	--	8.63	47.53
GMEWC-11	11/13/2013	125	10.60	51.08	--	--
	11/15/2013	125	10.42	50.76	--	--
	9/3/2014	125	11.47	52.65	--	--
	4/20/2015	125	9.74	49.53	--	--
	10/20/2015	125	11.16	52.08	--	--
	4/26/2016	125	9.99	49.99	--	--
	9/8/2016	125	10.79	51.43	--	--
	10/5/2017	125	10.28	50.50	--	--
	4/18/2018	125	10.23	50.41	--	--
	10/17/2018	125	11.37	52.46	--	--
GMEWC-12	11/4/2013	103	10.44	50.79	--	--
	11/4/2013	103	10.44	50.79	--	--
	11/6/2013	103	10.32	50.57	--	--
	11/8/2013	103	10.32	50.57	--	--
	10/12/2015	103	12.73	54.91	--	--
GMEWC-13	11/13/2013	115	10.47	50.85	--	--
	11/15/2013	115	11.22	52.20	--	--
	9/3/2014	115	10.95	51.71	--	--
	4/20/2015	115	10.48	50.86	--	--
	10/19/2015	115	11.66	52.98	--	--
	10/21/2015	115	12.17	53.91	--	--
	4/26/2016	115	10.41	50.74	--	--
	9/8/2016	20	11.07	51.92	--	--
	10/5/2017	115	10.71	51.27	--	--
	4/18/2018	115	10.37	50.67	--	--
	10/17/2018	115	11.07	51.93	--	--
GMEWC-6	5/16/2019	104	--	--	6.80	44.24
GMEWC-9	5/20/2019	114.7	--	--	7.98	46.36
GMIM-1	11/8/2018	12	--	--	8.31	46.96
	5/16/2019	12	--	--	9.98	49.96
GMIM-2	11/8/2018	12	--	--	8.05	46.49
	5/16/2019	12	--	--	10.01	50.02
GMPZ-1	11/8/2018	22	--	--	11.03	51.85
	5/16/2019	22	--	--	7.21	44.98

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZ-2	11/8/2018	24	--	--	10.90	51.62
	5/16/2019	24	--	--	7.83	46.09
GMPZ-3	11/8/2018	12	--	--	7.75	45.95
	5/16/2019	12	--	--	9.85	49.73
GMPZ-5	11/8/2018	40	--	--	8.43	47.17
	5/16/2019	40	--	--	9.42	48.96
GMPZ-6	11/8/2018	32.5	--	--	8.80	47.84
	5/16/2019	32.5	--	--	7.92	46.26
GMPZ-7	11/8/2018	183	--	--	9.34	48.81
	5/16/2019	183	--	--	7.93	46.27
GMPZ-8	11/8/2018	125	--	--	10.08	50.14
	5/16/2019	125	--	--	6.53	43.75
GMPZA-1	11/9/2018	22	--	--	11.32	52.38
	5/15/2019	22	--	--	6.20	43.16
GMPZA-2	11/9/2018	23	--	--	11.82	53.28
	5/15/2019	23	--	--	6.74	44.13
GMPZA-3	11/9/2018	25	--	--	10.72	51.30
GMPZA-4	11/9/2018	24	--	--	11.27	52.29
	5/15/2019	24	--	--	7.39	45.30
GMPZA-5	11/9/2018	23	--	--	11.31	52.36
	5/15/2019	23	--	--	7.66	45.79
GMPZA-6	11/9/2018	20	--	--	11.23	52.21
	5/15/2019	20	--	--	7.30	45.14
GMPZA-7	11/9/2018	20	--	--	11.32	52.38
	5/15/2019	20	--	--	6.73	44.11
GMPZA-8	11/9/2018	14	--	--	11.49	52.68
	5/15/2019	14	--	--	7.24	45.03
GMPZA-9	11/9/2018	18	--	--	10.91	51.64
	5/15/2019	18	--	--	7.06	44.71
GMPZA-10	11/9/2018	25	--	--	11.27	52.29
	5/15/2019	25	--	--	6.58	43.84
GMPZA-11	11/9/2018	24	--	--	10.15	50.27
	5/15/2019	24	--	--	6.39	43.50
GMPZA-12	11/9/2018	24	--	--	10.25	50.45
	5/15/2019	24	--	--	6.84	44.31
GMPZA-13	11/9/2018	30	--	--	10.09	50.16
	5/16/2019	30	--	--	6.28	43.30
GMPZA-14	7/11/2011	20	12.63	54.73	--	--
	11/9/2018	20	--	--	10.36	50.65
	5/16/2019	20	--	--	6.43	43.57
GMPZA-15	11/9/2018	26	--	--	10.74	51.33
	5/16/2019	26	--	--	7.25	45.05
GMPZA-16	11/9/2018	25	--	--	11.14	52.05
	5/16/2019	25	--	--	6.51	43.72
GMPZA-17	11/8/2018	25	--	--	9.38	48.88
	5/16/2019	25	--	--	8.06	46.51
GMPZA-18	11/8/2018	20	--	--	8.22	46.80
	5/16/2019	20	--	--	7.77	45.99

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZA-19	11/8/2018	20	--	--	9.20	48.56
	5/16/2019	20	--	--	7.48	45.46
GMPZA-20	11/8/2018	15	--	--	9.89	49.80
	5/16/2019	15	--	--	6.91	44.44
GMPZA-21	11/8/2018	17	--	--	9.89	49.80
	5/16/2019	17	--	--	7.02	44.64
GMPZA-22	11/8/2018	15	--	--	9.82	49.68
	5/16/2019	15	--	--	7.08	44.74
GMPZA-23	11/9/2018	22	9.84	49.71	12.20	53.96
	5/15/2019	22	7.06	44.71	5.99	42.78
GMPZA-24	11/9/2018	23	9.69	49.44	12.60	54.68
	5/15/2019	23	7.28	45.10	5.12	41.22
GMPZA-25	11/9/2018	25	10.81	51.46	11.92	53.46
	5/15/2019	25	7.37	45.27	5.86	42.55
GMPZA-26	8/13/2007	20	10.29	50.53	--	--
	2/20/2008	20	5.46	41.83	--	--
	8/22/2008	20	10.47	50.85	--	--
	8/26/2008	20	10.25	50.45	--	--
	8/20/2009	20	10.61	51.09	--	--
	8/25/2010	20	12.65	54.77	--	--
	9/15/2011	20	10.58	51.05	--	--
	10/1/2012	20	13.03	55.46	--	--
	12/18/2013	20	9.09	48.36	--	--
	9/28/2014	20	10.08	50.15	--	--
	10/5/2015	20	10.37	50.67	--	--
	8/23/2016	20	14.00	57.20	--	--
	9/14/2017	20	11.69	53.04	--	--
	10/4/2018	20	11.15	52.07	--	--
	11/9/2018	20	10.25	50.45	11.15	52.07
	5/15/2019	20	6.84	44.31	5.21	41.38
GMPZA-27	11/9/2018	20	11.18	52.12	11.50	52.70
	5/15/2019	20	6.18	43.12	5.68	42.22
GMPZA-28	11/9/2018	18	12.21	53.98	12.18	53.92
	5/15/2019	18	6.77	44.19	6.91	44.44
GMPZA-29	2/26/2007	18	7.37	45.27	--	--
	8/10/2007	18	11.46	52.63	--	--
	2/20/2008	18	4.07	39.32	--	--
	8/22/2008	18	11.71	53.08	--	--
	8/26/2008	18	11.47	52.64	--	--
	8/19/2009	18	11.87	53.37	--	--
	8/25/2010	18	13.78	56.81	--	--
	9/12/2011	18	12.09	53.76	--	--
	10/1/2012	18	11.50	52.70	--	--
	12/17/2013	18	10.79	51.43	--	--
	9/27/2014	18	10.91	51.64	--	--
	10/5/2015	18	10.31	50.55	--	--
	8/23/2016	18	13.56	56.40	--	--
	9/14/2017	18	11.67	53.00	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZA-29 (continued)	11/9/2018	18	11.41	52.54	11.67	53.01
	5/15/2019	18	6.67	44.01	5.85	42.53
GMPZA-3	5/15/2019	25	--	--	7.20	44.96
GMPZA-30	11/9/2018	19	10.15	50.27	10.47	50.85
	5/15/2019	19	7.24	45.03	4.81	40.66
GMPZA-31	11/9/2018	19	10.25	50.45	11.28	52.30
	5/15/2019	19	6.24	43.23	5.60	42.08
GMPZA-32	11/9/2018	26	10.09	50.16	10.69	51.24
	5/15/2019	26	6.85	44.33	4.47	40.05
GMPZA-33	11/9/2018	25	10.40	50.72	10.68	51.22
	5/15/2019	25	6.62	43.92	4.70	40.46
GMPZA-34	2/26/2007	25	8.19	46.75	--	--
	8/9/2007	25	10.94	51.70	--	--
	2/20/2008	25	5.11	41.19	--	--
	8/22/2008	25	10.92	51.65	--	--
	8/26/2008	25	9.74	49.53	--	--
	8/19/2009	25	9.41	48.94	--	--
	8/25/2010	25	10.45	50.81	--	--
	9/15/2011	25	9.67	49.41	--	--
	9/27/2012	25	13.16	55.69	--	--
	9/27/2014	25	9.74	49.53	--	--
	10/5/2015	25	9.86	49.74	--	--
	8/23/2016	25	12.07	53.72	--	--
	9/13/2017	25	11.51	52.71	--	--
	10/5/2018	25	10.02	50.04	--	--
	10/9/2018	25	10.19	50.34	--	--
	11/9/2018	25	10.24	50.43	10.73	51.31
	5/15/2019	25	6.86	44.35	5.29	41.52
GMPZA-35	11/9/2018	30	9.64	49.35	10.67	51.21
	5/15/2019	30	7.74	45.93	5.88	42.58
GMPZA-36	11/9/2018	21	9.61	49.30	10.82	51.48
	5/15/2019	21	7.78	46.00	6.05	42.89
GMPZA-37	11/9/2018	27	9.19	48.54	10.41	50.74
	5/15/2019	27	8.07	46.53	7.52	45.54
GMPZA-38	2/23/2007	25	7.80	46.04	--	--
	8/9/2007	25	10.57	51.03	--	--
	2/19/2008	25	7.34	45.22	--	--
	8/22/2008	25	10.29	50.52	--	--
	8/26/2008	25	10.09	50.17	--	--
	8/18/2009	25	10.03	50.06	--	--
	8/25/2010	25	10.51	50.92	--	--
	9/13/2011	25	10.89	51.60	--	--
	9/27/2012	25	10.99	51.78	--	--
	12/17/2013	25	8.88	47.99	--	--
	9/26/2014	25	10.41	50.73	--	--
	10/6/2015	25	17.71	63.88	--	--
	8/23/2016	25	10.61	51.09	--	--
	9/13/2017	25	10.94	51.69	--	--
	10/5/2018	25	9.80	49.64	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZA-38 (continued)	10/9/2018	25	10.48	50.87	--	--
	11/9/2018	25	8.96	48.13	10.88	51.58
	5/15/2019	25	7.81	46.06	6.57	43.83
GMPZA-39	11/9/2018	26	8.81	47.86	10.19	50.34
	5/15/2019	26	7.75	45.95	5.79	42.42
GMPZA-40	11/9/2018	20	9.19	48.54	9.79	49.62
	5/15/2019	20	7.58	45.64	7.55	45.59
GMPZA-41	2/23/2007	20	7.60	45.68	--	--
	8/8/2007	20	10.23	50.42	--	--
	2/19/2008	20	6.28	43.31	--	--
	8/21/2008	20	10.11	50.19	--	--
	8/18/2009	20	9.96	49.93	--	--
	8/24/2010	20	10.77	51.39	--	--
	9/13/2011	20	10.23	50.41	--	--
	9/28/2012	20	12.23	54.02	--	--
	12/17/2013	20	8.48	47.27	--	--
	10/1/2014	20	9.57	49.22	--	--
	10/6/2015	20	11.42	52.56	--	--
	8/24/2016	20	10.77	51.39	--	--
	9/13/2017	20	10.72	51.29	--	--
	10/10/2018	20	9.65	49.37	--	--
	11/9/2018	20	9.10	48.38	8.88	47.98
	5/15/2019	20	8.60	47.48	10.64	51.15
GMPZA-42	11/9/2018	15	10.08	50.14	9.44	48.99
	5/15/2019	15	6.72	44.10	7.10	44.78
GMPZA-43	11/9/2018	--	10.53	50.95	11.27	52.29
	5/15/2019	--	--	--	7.62	45.72
GMPZC-1	11/29/2018	115	--	--	6.40	43.52
	5/15/2019	115	--	--	7.67	45.81
GMPZC-2	11/29/2018	134	--	--	5.45	41.81
	5/15/2019	134	--	--	7.79	46.02
GMPZC-3	11/29/2018	120	--	--	8.47	47.25
	5/15/2019	120	--	--	7.41	45.34
GMPZC-5	11/9/2018	145	--	--	9.96	49.93
	5/15/2019	145	--	--	8.12	46.62
GMPZC-6	11/9/2018	115	--	--	10.95	51.71
	5/15/2019	115	--	--	6.08	42.94
GMPZC-7	11/9/2018	135	--	--	11.32	52.38
	5/15/2019	135	--	--	7.78	46.00
GMPZC-8	11/9/2018	135	--	--	10.44	50.79
	5/15/2019	135	--	--	6.69	44.04
GMPZC-9	11/29/2018	115	--	--	9.66	49.39
	5/15/2019	115	--	--	7.23	45.01
GMPZC-10	11/9/2018	156	--	--	10.83	51.49
	5/15/2019	156	--	--	7.07	44.73
GMPZC-11	11/29/2018	115	8.76	47.77	8.07	46.53
	5/15/2019	115	8.24	46.83	5.54	41.97
GMPZC-12	3/1/2007	137	8.05	46.49	--	--
	2/21/2008	137	5.84	42.51	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZC-12 (continued)	8/25/2008	137	10.69	51.24	--	--
	8/20/2009	137	10.06	50.10	--	--
	8/27/2010	137	10.87	51.57	--	--
	9/14/2011	137	10.70	51.26	--	--
	9/28/2012	137	12.36	54.25	--	--
	12/19/2013	137	9.17	48.50	--	--
	12/27/2013	137	8.26	46.87	--	--
	9/28/2014	137	11.23	52.21	--	--
	10/6/2015	137	12.17	53.90	--	--
	8/24/2016	137	11.49	52.69	--	--
	9/15/2017	137	12.12	53.81	--	--
	10/11/2018	137	10.12	50.22	--	--
	11/29/2018	137	8.77	47.79	7.43	45.37
	5/15/2019	137	8.66	47.59	7.33	45.19
GMPZC-13	11/29/2018	105	8.78	47.80	8.63	47.53
	5/15/2019	105	8.63	47.53	6.32	43.38
GMPZC-14	2/28/2007	111	7.89	46.20	--	--
	8/10/2007	111	10.50	50.90	--	--
	2/20/2008	111	9.16	48.48	--	--
	8/26/2008	111	9.16	48.48	--	--
	8/19/2009	111	11.60	52.88	--	--
	8/27/2010	111	9.94	49.90	--	--
	9/16/2011	111	13.34	56.02	--	--
	10/1/2012	111	15.08	59.14	--	--
	12/19/2013	111	9.32	48.77	--	--
	12/27/2013	111	8.62	47.51	--	--
	10/1/2014	111	9.52	49.14	--	--
	10/7/2015	111	10.02	50.03	--	--
	8/24/2016	111	11.01	51.81	--	--
	9/15/2017	111	16.92	62.46	--	--
	10/11/2018	111	9.33	48.79	--	--
	11/9/2018	111	9.12	48.42	11.34	52.41
	5/15/2019	111	8.69	47.64	6.97	44.55
GMPZC-15	11/9/2018	130	9.27	48.69	12.59	54.66
	5/15/2019	130	8.70	47.66	5.50	41.90
GMPZC-16	11/9/2018	118	9.33	48.79	11.61	52.90
	5/15/2019	118	8.79	47.82	5.62	42.12
GMPZC-17	2/27/2007	125	8.16	46.69	--	--
	8/13/2007	125	10.26	50.47	--	--
	2/19/2008	125	6.94	44.49	--	--
	8/25/2008	125	8.99	48.19	--	--
	8/18/2009	125	9.65	49.37	--	--
	8/26/2010	125	11.68	53.03	--	--
	9/13/2011	125	10.70	51.26	--	--
	12/17/2013	125	9.03	48.26	--	--
	9/27/2014	125	10.32	50.57	--	--
	10/7/2015	125	10.48	50.86	--	--
	8/24/2016	125	11.83	53.30	--	--
	9/13/2017	125	10.41	50.73	--	--

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZC-17 (continued)	10/10/2018	125	9.96	49.93	--	--
	11/9/2018	125	8.49	47.28	10.80	51.44
	5/15/2019	125	8.22	46.80	5.45	41.81
GMPZC-18	11/9/2018	160	--	--	10.48	50.86
	5/15/2019	160	--	--	7.27	45.09
GMPZC-19	11/9/2018	--	--	--	10.96	51.73
	5/15/2019	--	--	--	7.42	45.36
MP-1S	11/7/2018	--	--	--	10.51	50.92
	5/14/2019	--	--	--	5.96	42.73
MP-2D	11/7/2018	--	--	--	10.09	50.16
	5/14/2019	--	--	--	3.92	39.06
MP-2S	11/7/2018	--	--	--	9.83	49.69
	5/14/2019	--	--	--	3.95	39.11
MP-3D	11/7/2018	--	--	--	9.99	49.98
	5/14/2019	--	--	--	6.26	43.27
MP-3S	11/7/2018	--	--	--	9.75	49.55
	5/14/2019	--	--	--	5.80	42.44
MPMW-4	2/26/2002	--	2.35	36.23	--	--
MW-1B	6/27/1997	86	14.60	58.28	--	--
MW-2B	6/28/1997	102	14.67	58.41	--	--
MW-4	11/7/2018	80	--	--	9.54	49.17
	5/14/2019	80	--	--	9.94	49.89
MW-5	10/22/1998	83	9.94	49.89	--	--
	4/30/1999	83	17.20	62.96	--	--
	11/8/2018	83	--	--	10.32	50.58
	5/14/2019	83	--	--	10.97	51.75
MW-8	6/29/1997	133	27.57	81.63	--	--
	10/24/1998	133	13.06	55.51	--	--
	5/3/1999	133	17.45	63.41	--	--
	5/12/2004	133	22.76	72.97	--	--
	10/7/2011	133	16.14	61.06	--	--
	12/11/2013	133	9.72	49.50	--	--
	8/24/2015	133	12.66	54.79	--	--
	10/2/2015	133	21.08	69.94	--	--
	4/20/2016	133	18.50	65.30	--	--
	7/14/2016	133	18.48	65.26	--	--
	5/5/2017	133	16.47	61.64	--	--
MW-9A	7/2/1997	57	14.95	58.91	--	--
MW-10	6/30/1997	95	12.29	54.12	--	--
	7/13/2016	95	20.04	68.08	--	--
	11/7/2018	95	--	--	8.76	47.77
	5/14/2019	95	--	--	9.36	48.85
MW-96-1	11/8/2018	65	--	--	10.00	50.00
	5/14/2019	65	--	--	11.31	52.36
MW-96-2	11/8/2018	60	--	--	9.92	49.86
MW-96-4	11/8/2018	60	--	--	9.78	49.60
	5/14/2019	60	--	--	10.90	51.62
P-2	11/7/2018	28	--	--	11.19	52.14
	5/14/2019	28	--	--	10.35	50.63

Table 1
Historic Site-Wide Temperature Data
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample Date	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
UG-1	5/21/2004	81	11.90	53.42	--	--
	7/31/2005	81	19.22	66.60	--	--
	1/9/2007	81	4.80	40.64	--	--
	6/3/2008	81	15.47	59.84	--	--
	8/25/2009	81	16.63	61.94	--	--
	9/7/2010	81	12.32	54.17	--	--
UG-2	7/1/1997	48	16.67	62.01	--	--
	10/27/1998	48	11.44	52.59	--	--
	5/3/1999	48	25.24	77.43	--	--
	11/7/2018	48	--	--	9.78	49.60
	5/14/2019	48	--	--	10.29	50.52
UG-3	5/10/2004	44	22.64	72.75	--	--
	8/2/2005	44	27.30	81.14	--	--
	1/11/2007	44	8.94	48.09	--	--
	6/3/2008	44	13.98	57.17	--	--
	8/25/2009	44	17.30	63.14	--	--
	9/7/2010	44	12.37	54.26	--	--
UG-4	10/13/1997	103	11.48	52.66	--	--
	10/23/1998	103	17.89	64.20	--	--
	5/2/1999	103	20.39	68.70	--	--
	11/8/2018	103	--	--	11.34	52.41
	5/14/2019	103	--	--	12.65	54.77
UG-5	5/22/2004	139	11.15	52.07	--	--
	8/3/2005	139	28.79	83.82	--	--
	1/11/2007	139	10.26	50.47	--	--
	6/3/2008	139	14.56	58.21	--	--
	8/26/2009	139	14.33	57.80	--	--
	9/8/2010	139	14.77	58.59	--	--
	11/7/2018	139	--	--	10.61	51.10
	5/14/2019	139	--	--	11.40	52.52
UG-6	10/21/1997	236	7.05	44.69	--	--
	11/7/2018	236	--	--	10.70	51.26
	5/14/2019	236	--	--	11.54	52.77
GMEW-3	7/26/2000	135	11.16	52.09	--	--

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
BR-2	11/8/18	75	--	--	10.25	50.45
	5/14/19	75	--	--	10.61	51.10
BR-3	11/7/18	122	--	--	9.04	48.27
	5/14/19	122	--	--	9.44	48.99
BR-6	11/7/18	149	9.93	49.87	10.08	50.14
	5/14/19	149	9.70	49.46	9.74	49.53
GM-1	11/8/18	220	--	--	9.20	48.56
	5/14/19	220	--	--	9.58	49.24
GM-2B	11/8/18	271	9.03	48.25	9.52	49.14
	5/14/19	271	9.07	48.33	10.89	51.60
GM-2C	11/8/18	64	10.06	50.11	9.92	49.86
	5/14/19	64	10.07	50.13	10.29	50.52
GM-3A	11/8/18	74	--	--	9.48	49.06
	5/14/19	74	--	--	9.95	49.91
GM-3B	11/8/18	170	--	--	9.12	48.42
	5/14/19	170	--	--	9.84	49.71
GM-4	11/7/18	76	--	--	7.80	46.04
	5/14/19	76	--	--	8.82	47.88
GM-5	11/7/18	250	--	--	9.12	48.42
	5/14/19	250	--	--	9.54	49.17
GM-6	11/7/18	165	8.96	48.13	9.20	48.56
	5/14/19	165	8.93	48.07	9.82	49.68
GM-7	11/8/18	145	9.47	49.05	9.11	48.40
	5/14/19	145	9.56	49.21	10.48	50.86
GM-8	11/7/18	79	8.67	47.61	10.16	50.29
	5/14/19	79	8.52	47.34	6.40	43.52
GM-9	5/14/19	164	8.23	46.81	8.73	47.71
GM-10	11/7/18	170	--	--	11.55	52.79
	5/14/19	170	--	--	7.42	45.36
GM-11	11/7/18	174.7	--	--	10.50	50.90
	5/14/19	174.7	--	--	6.93	44.47
GM-12	11/8/18	290	--	--	9.73	49.51
	5/14/19	290	--	--	10.11	50.20
GM-13	11/7/18	325	9.60	49.28	9.38	48.88
	5/15/19	325	9.46	49.03	10.36	50.65
GM-14	11/7/18	135	--	--	9.93	49.87
	5/14/19	135	--	--	10.12	50.22
GM-15	11/7/18	165	9.81	49.66	9.70	49.46
	5/14/19	165	9.82	49.68	10.21	50.38
GM-17	11/7/18	224.3	9.83	49.69	9.87	49.77
	5/14/19	224.3	9.63	49.33	10.83	51.49
GM-24C	11/8/18	193	9.20	48.56	9.69	49.44
	5/14/19	193	9.27	48.69	10.68	51.22
GM-25A	11/9/18	19	9.20	48.56	10.43	50.77
	5/15/19	19	7.82	46.08	7.84	46.11
GM-25B	11/9/18	98	9.56	49.21	10.44	50.79
	5/15/19	98	8.95	48.11	7.40	45.32

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-25C	11/9/18	206	--	--	9.89	49.80
	5/15/19	206	--	--	7.87	46.17
GM-26A	11/9/18	30	9.04	48.27	10.60	51.08
	5/16/19	30	7.92	46.26	6.43	43.57
GM-26B	11/9/18	101	8.64	47.55	10.36	50.65
	5/16/19	101	8.08	46.54	6.49	43.68
GM-26C	11/9/18	160	--	--	10.79	51.42
	5/16/19	160	--	--	7.80	46.04
GM-27A	11/9/18	30	8.85	47.93	10.91	51.64
	5/16/19	30	8.46	47.23	7.24	45.03
GM-27B	11/9/18	145	8.96	48.13	11.66	52.99
	5/16/19	145	8.47	47.25	7.69	45.84
GM-27C	11/9/18	210	--	--	11.48	52.66
	5/16/19	210	--	--	7.04	44.67
GM-28A	5/16/19	40	8.27	46.89	8.38	47.08
GM-28B	5/16/19	124.5	8.43	47.17	8.00	46.40
GM-29	5/14/19	55	8.65	47.57	8.19	46.74
GM-30	5/16/19	75	--	--	9.75	49.55
GM-31	11/7/18	105	--	--	9.38	48.88
	5/14/19	105	--	--	9.68	49.42
GM-32	11/7/18	135	9.44	48.99	9.48	49.06
	5/15/19	135	9.54	49.17	10.29	50.52
GM-34A	11/8/18	30	--	--	9.80	49.64
	5/14/19	30	--	--	8.85	47.93
GM-34B	11/8/18	85	9.60	49.28	9.20	48.56
	5/14/19	85	9.82	49.68	9.78	49.60
GM-35	11/8/18	40	--	--	9.78	49.60
	5/14/19	40	--	--	10.43	50.77
GM-36	11/7/18	95	9.98	49.96	9.94	49.89
	5/14/19	95	10.00	50.00	10.64	51.15
GM-38A	11/8/18	95	--	--	9.12	48.42
	5/14/19	95	--	--	9.69	49.44
GM-38B	11/8/18	160	9.36	48.85	9.47	49.05
	5/14/19	160	9.33	48.79	9.72	49.50
GM-38C	11/8/18	200	9.28	48.70	9.53	49.15
	5/14/19	200	9.26	48.67	10.04	50.07
GM-39	11/8/18	85	9.22	48.60	9.04	48.27
	5/14/19	85	9.27	48.69	9.90	49.82
GM-40A	11/8/18	75	11.28	52.30	11.28	52.30
	5/14/19	75	11.28	52.30	11.89	53.40
GM-40B	11/8/18	120	11.18	52.12	10.82	51.48
	5/14/19	120	11.46	52.63	11.18	52.12
GM-41	5/14/19	40	--	--	10.22	50.40
GM-42	11/8/18	72	--	--	8.58	47.44
GM-44	11/7/18	60	--	--	8.63	47.53
	5/16/19	60	--	--	15.28	59.50
GM-45	11/7/18	70	--	--	8.91	48.04
	5/16/19	70	--	--	9.80	49.64

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-46	11/7/18	65	--	--	8.64	47.55
	5/16/19	65	--	--	9.88	49.78
GM-48	11/7/18	65	--	--	8.80	47.84
	5/16/19	65	--	--	9.70	49.46
GM-53A	11/8/18	79	--	--	9.18	48.52
	5/14/19	79	--	--	9.07	48.33
GM-53B	11/8/18	195	--	--	8.78	47.80
	5/14/19	195	--	--	8.82	47.88
GM-55	11/8/18	75	--	--	9.06	48.31
	5/14/19	75	--	--	9.56	49.21
GM-56	11/8/18	32	--	--	8.74	47.73
	5/14/19	32	--	--	9.31	48.76
GM-57	11/7/18	76	--	--	8.20	46.76
	5/14/19	76	--	--	8.96	48.13
GM-58	11/7/18	75	--	--	8.73	47.71
	5/14/19	75	--	--	9.14	48.45
GM-59	11/7/18	114	8.67	47.61	8.29	46.92
	5/14/19	114	8.47	47.25	9.12	48.42
GM-60	11/7/18	102	--	--	9.03	48.25
	5/14/19	102	--	--	9.46	49.03
GM-61	11/7/18	138	8.54	47.37	8.70	47.66
	5/16/19	138	9.07	48.33	9.75	49.55
GM-62AR	11/7/18	90	9.85	49.73	8.88	47.98
	5/16/19	90	9.87	49.77	10.26	50.47
GM-62BR	11/7/18	195	10.17	50.31	9.71	49.48
	5/16/19	195	10.02	50.04	9.98	49.96
GM-62CR	11/7/18	315	9.69	49.44	9.55	49.19
	5/16/19	315	9.69	49.44	9.94	49.89
GM-63A	11/8/18	45	8.86	47.95	10.33	50.59
	5/16/19	45	8.37	47.07	8.47	47.25
GM-63B	11/8/18	105	8.87	47.97	10.26	50.47
	5/16/19	105	8.51	47.32	7.97	46.35
GM-65	11/8/18	120	10.19	50.34	9.21	48.58
	5/16/19	120	8.32	46.98	7.78	46.00
GM-66A	11/9/18	27	--	--	8.40	47.12
	11/29/18	27	--	--	6.04	42.87
	5/15/19	27	--	--	6.46	43.63
GM-66B	11/9/18	125	8.73	47.71	8.07	46.53
	5/15/19	125	8.57	47.43	6.26	43.27
GM-67	11/8/18	122	8.94	48.09	8.83	47.89
	5/14/19	122	9.01	48.22	9.50	49.10
GM-68	11/8/18	140	9.97	49.95	10.08	50.14
	5/14/19	140	10.17	50.31	10.89	51.60
GM-72A	11/8/18	46	11.50	52.70	11.26	52.27
	5/14/19	46	11.66	52.99	11.84	53.31
GM-73	11/7/18	42	--	--	9.28	48.70
	5/14/19	42	--	--	9.55	49.19

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GM-74	11/7/18	34	--	--	7.29	45.12
	5/14/19	34	--	--	8.57	47.43
GM-75	11/7/18	24	--	--	8.79	47.82
	5/14/19	24	7.74	45.93	8.23	46.81
GM-77	5/15/19	105	8.23	46.81	6.57	43.83
GM-78	11/9/18	20	9.28	48.70	10.77	51.39
	5/15/19	20	7.29	45.12	6.92	44.46
GM-79	5/16/19	25	8.98	48.16	8.07	46.53
GM-81A	11/7/18	140	10.17	50.31	9.31	48.76
GM-81B	11/7/18	295	9.91	49.84	9.86	49.75
	5/14/19	295	9.83	49.69	9.79	49.62
GM-84	11/8/18	77	8.99	48.18	9.72	49.50
	5/15/19	77	8.68	47.62	8.36	47.05
GM-85	11/7/18	75	9.03	48.25	9.28	48.70
	5/14/19	75	8.82	47.88	8.79	47.82
GM-86A	11/8/18	143	10.56	51.01	9.95	49.91
	5/16/19	143	10.42	50.76	10.45	50.81
GM-86B	11/8/18	335	10.97	51.75	9.87	49.77
	5/16/19	335	9.31	48.76	10.46	50.83
GM-87A	11/8/18	32	9.22	48.60	12.30	54.14
	5/15/19	32	8.87	47.97	6.97	44.55
GM-87B	11/8/18	117	8.87	47.97	12.57	54.63
	5/15/19	117	8.11	46.60	7.34	45.21
GM-88	11/7/18	130	9.12	48.42	9.45	49.01
	5/14/19	130	9.03	48.25	10.16	50.29
GM-118D	11/7/18	54	--	--	9.45	49.01
	5/16/19	54	--	--	10.46	50.83
GM-81A	5/14/19	140	--	--	9.19	48.54
GMEW-1	11/9/18	20	8.82	47.88	8.23	46.81
	5/15/19	20	8.01	46.42	8.62	47.52
GMEW-2	11/9/18	23	9.69	49.44	10.09	50.16
	5/16/19	23	7.57	45.63	6.92	44.46
GMEW-4R	5/16/19	107	--	--	7.43	45.37
GMEW-5	11/8/18	40	--	--	8.56	47.41
	5/16/19	40	--	--	9.96	49.93
GMEW-6	11/8/18	39	--	--	8.91	48.04
	5/16/19	39	--	--	8.37	47.07
GMEW-7	11/8/18	183	--	--	9.53	49.15
	5/16/19	183	--	--	7.86	46.15
GMEW-8	11/8/18	125	--	--	10.21	50.38
	5/16/19	125	--	--	7.22	45.00
GMEWA-1	5/16/19	26	--	--	7.24	45.03
GMEWA-2	5/16/19	26	--	--	8.02	46.44
GMEWA-3	5/16/19	25	--	--	7.84	46.11
GMEWA-26	5/16/19	22	--	--	7.40	45.32
GMEWA-27	5/20/19	21	--	--	8.10	46.58
GMEWA-28	5/20/19	25	--	--	7.93	46.27
GMEWA-28A	5/16/19	23	--	--	8.14	46.65

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMEWB-1	5/16/19	99	--	--	7.59	45.66
GMEWC-1	5/16/19	123	--	--	7.36	45.25
GMEWC-1A	5/16/19	117.5	--	--	7.49	45.48
GMEWC-2	5/16/19	165	--	--	9.83	49.69
GMEWC-10	5/16/19	134	--	--	8.63	47.53
GMEWC-6	5/16/19	104	--	--	6.80	44.24
GMEWC-9	5/20/19	114.7	--	--	7.98	46.36
GMIM-1	11/8/18	12	--	--	8.31	46.96
	5/16/19	12	--	--	9.98	49.96
GMIM-2	11/8/18	12	--	--	8.05	46.49
	5/16/19	12	--	--	10.01	50.02
GMPZ-1	11/8/18	22	--	--	11.03	51.85
	5/16/19	22	--	--	7.21	44.98
GMPZ-2	11/8/18	24	--	--	10.90	51.62
	5/16/19	24	--	--	7.83	46.09
GMPZ-3	11/8/18	12	--	--	7.75	45.95
	5/16/19	12	--	--	9.85	49.73
GMPZ-5	11/8/18	40	--	--	8.43	47.17
	5/16/19	40	--	--	9.42	48.96
GMPZ-6	11/8/18	32.5	--	--	8.80	47.84
	5/16/19	32.5	--	--	7.92	46.26
GMPZ-7	11/8/18	183	--	--	9.34	48.81
	5/16/19	183	--	--	7.93	46.27
GMPZ-8	11/8/18	125	--	--	10.08	50.14
	5/16/19	125	--	--	6.53	43.75
GMPZA-1	11/9/18	22	--	--	11.32	52.38
	5/15/19	22	--	--	6.20	43.16
GMPZA-2	11/9/18	23	--	--	11.82	53.28
	5/15/19	23	--	--	6.74	44.13
GMPZA-3	11/9/18	25	--	--	10.72	51.30
GMPZA-4	11/9/18	24	--	--	11.27	52.29
	5/15/19	24	--	--	7.39	45.30
GMPZA-5	11/9/18	23	--	--	11.31	52.36
	5/15/19	23	--	--	7.66	45.79
GMPZA-6	11/9/18	20	--	--	11.23	52.21
	5/15/19	20	--	--	7.30	45.14
GMPZA-7	11/9/18	20	--	--	11.32	52.38
	5/15/19	20	--	--	6.73	44.11
GMPZA-8	11/9/18	14	--	--	11.49	52.68
	5/15/19	14	--	--	7.24	45.03
GMPZA-9	11/9/18	18	--	--	10.91	51.64
	5/15/19	18	--	--	7.06	44.71
GMPZA-10	11/9/18	25	--	--	11.27	52.29
	5/15/19	25	--	--	6.58	43.84
GMPZA-11	11/9/18	24	--	--	10.15	50.27
	5/15/19	24	--	--	6.39	43.50
GMPZA-12	11/9/18	24	--	--	10.25	50.45
	5/15/19	24	--	--	6.84	44.31

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZA-13	11/9/18	30	--	--	10.09	50.16
	5/16/19	30	--	--	6.28	43.30
GMPZA-14	11/9/18	20	--	--	10.36	50.65
	5/16/19	20	--	--	6.43	43.57
GMPZA-15	11/9/18	26	--	--	10.74	51.33
	5/16/19	26	--	--	7.25	45.05
GMPZA-16	11/9/18	25	--	--	11.14	52.05
	5/16/19	25	--	--	6.51	43.72
GMPZA-17	11/8/18	25	--	--	9.38	48.88
	5/16/19	25	--	--	8.06	46.51
GMPZA-18	11/8/18	20	--	--	8.22	46.80
	5/16/19	20	--	--	7.77	45.99
GMPZA-19	11/8/18	20	--	--	9.20	48.56
	5/16/19	20	--	--	7.48	45.46
GMPZA-20	11/8/18	15	--	--	9.89	49.80
	5/16/19	15	--	--	6.91	44.44
GMPZA-21	11/8/18	17	--	--	9.89	49.80
	5/16/19	17	--	--	7.02	44.64
GMPZA-22	11/8/18	15	--	--	9.82	49.68
	5/16/19	15	--	--	7.08	44.74
GMPZA-23	11/9/18	22	9.84	49.71	12.20	53.96
	5/15/19	22	7.06	44.71	5.99	42.78
GMPZA-24	11/9/18	23	9.69	49.44	12.60	54.68
	5/15/19	23	7.28	45.10	5.12	41.22
GMPZA-25	11/9/18	25	10.81	51.46	11.92	53.46
	5/15/19	25	7.37	45.27	5.86	42.55
GMPZA-26	11/9/18	20	10.25	50.45	11.15	52.07
	5/15/19	20	6.84	44.31	5.21	41.38
GMPZA-27	11/9/18	20	11.18	52.12	11.50	52.70
	5/15/19	20	6.18	43.12	5.68	42.22
GMPZA-28	11/9/18	18	12.21	53.98	12.18	53.92
	5/15/19	18	6.77	44.19	6.91	44.44
GMPZA-29	11/9/18	18	11.41	52.54	11.67	53.01
	5/15/19	18	6.67	44.01	5.85	42.53
GMPZA-3	5/15/19	25	--	--	7.20	44.96
GMPZA-30	11/9/18	19	10.15	50.27	10.47	50.85
	5/15/19	19	7.24	45.03	4.81	40.66
GMPZA-31	11/9/18	19	10.25	50.45	11.28	52.30
	5/15/19	19	6.24	43.23	5.60	42.08
GMPZA-32	11/9/18	26	10.09	50.16	10.69	51.24
	5/15/19	26	6.85	44.33	4.47	40.05
GMPZA-33	11/9/18	25	10.40	50.72	10.68	51.22
	5/15/19	25	6.62	43.92	4.70	40.46
GMPZA-34	11/9/18	25	10.24	50.43	10.73	51.31
	5/15/19	25	6.86	44.35	5.29	41.52
GMPZA-35	11/9/18	30	9.64	49.35	10.67	51.21
	5/15/19	30	7.74	45.93	5.88	42.58

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZA-36	11/9/18	21	9.61	49.30	10.82	51.48
	5/15/19	21	7.78	46.00	6.05	42.89
GMPZA-37	11/9/18	27	9.19	48.54	10.41	50.74
	5/15/19	27	8.07	46.53	7.52	45.54
GMPZA-38	11/9/18	25	8.96	48.13	10.88	51.58
	5/15/19	25	7.81	46.06	6.57	43.83
GMPZA-39	11/9/18	26	8.81	47.86	10.19	50.34
	5/15/19	26	7.75	45.95	5.79	42.42
GMPZA-40	11/9/18	20	9.19	48.54	9.79	49.62
	5/15/19	20	7.58	45.64	7.55	45.59
GMPZA-41	11/9/18	20	9.10	48.38	8.88	47.98
	5/15/19	20	8.60	47.48	10.64	51.15
GMPZA-42	11/9/18	15	10.08	50.14	9.44	48.99
	5/15/19	15	6.72	44.10	7.10	44.78
GMPZA-43	11/9/18	--	10.53	50.95	11.27	52.29
	5/15/19	--	--	--	7.62	45.72
GMPZC-1	11/29/18	115	--	--	6.40	43.52
	5/15/19	115	--	--	7.67	45.81
GMPZC-2	11/29/18	134	--	--	5.45	41.81
	5/15/19	134	--	--	7.79	46.02
GMPZC-3	11/29/18	120	--	--	8.47	47.25
	5/15/19	120	--	--	7.41	45.34
GMPZC-5	11/9/18	145	--	--	9.96	49.93
	5/15/19	145	--	--	8.12	46.62
GMPZC-6	11/9/18	115	--	--	10.95	51.71
	5/15/19	115	--	--	6.08	42.94
GMPZC-7	11/9/18	135	--	--	11.32	52.38
	5/15/19	135	--	--	7.78	46.00
GMPZC-8	11/9/18	135	--	--	10.44	50.79
	5/15/19	135	--	--	6.69	44.04
GMPZC-9	11/29/18	115	--	--	9.66	49.39
	5/15/19	115	--	--	7.23	45.01
GMPZC-10	11/9/18	156	--	--	10.83	51.49
	5/15/19	156	--	--	7.07	44.73
GMPZC-11	5/15/19	115	8.24	46.83	5.54	41.97
GMPZC-12	5/15/19	137	8.66	47.59	7.33	45.19
GMPZC-13	5/15/19	105	8.63	47.53	6.32	43.38
GMPZC-14	11/9/18	111	9.12	48.42	11.34	52.41
	5/15/19	111	8.69	47.64	6.97	44.55
GMPZC-15	11/9/18	130	9.27	48.69	12.59	54.66
	5/15/19	130	8.70	47.66	5.50	41.90
GMPZC-16	11/9/18	118	9.33	48.79	11.61	52.90
	5/15/19	118	8.79	47.82	5.62	42.12
GMPZC-17	11/9/18	125	8.49	47.28	10.80	51.44
	5/15/19	125	8.22	46.80	5.45	41.81
GMPZC-18	11/9/18	160	--	--	10.48	50.86
	5/15/19	160	--	--	7.27	45.09

Table 2
Site-Wide Temperature Data, November 2018 and May 2019
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Well/Boring	Top of Screen Depth	Midpoint Temp Deg C	Midpoint Temp Deg F	Surface Temp Deg C	Surface Temp Deg F
GMPZC-19	11/9/18	--	--	--	10.96	51.73
	5/15/19	--	--	--	7.42	45.36
MP-1S	11/7/18	--	--	--	10.51	50.92
	5/14/19	--	--	--	5.96	42.73
MP-2D	11/7/18	--	--	--	10.09	50.16
	5/14/19	--	--	--	3.92	39.06
MP-2S	11/7/18	--	--	--	9.83	49.69
	5/14/19	--	--	--	3.95	39.11
MP-3D	11/7/18	--	--	--	9.99	49.98
	5/14/19	--	--	--	6.26	43.27
MP-3S	11/7/18	--	--	--	9.75	49.55
	5/14/19	--	--	--	5.80	42.44
MW-4	11/7/18	80	--	--	9.54	49.17
	5/14/19	80	--	--	9.94	49.89
MW-5	11/8/18	83	--	--	10.32	50.58
	5/14/19	83	--	--	10.97	51.75
MW-10	11/7/18	95	--	--	8.76	47.77
	5/14/19	95	--	--	9.36	48.85
MW-96-1	11/8/18	65	--	--	10.00	50.00
	5/14/19	65	--	--	11.31	52.36
MW-96-2	11/8/18	60	--	--	9.92	49.86
MW-96-4	11/8/18	60	--	--	9.78	49.60
	5/14/19	60	--	--	10.90	51.62
P-2	11/7/18	28	--	--	11.19	52.14
	5/14/19	28	--	--	10.35	50.63
UG-2	11/7/18	48	--	--	9.78	49.60
	5/14/19	48	--	--	10.29	50.52
UG-4	11/8/18	103	--	--	11.34	52.41
	5/14/19	103	--	--	12.65	54.77
UG-5	11/7/18	139	--	--	10.61	51.10
	5/14/19	139	--	--	11.40	52.52
UG-6	11/7/18	236	--	--	10.70	51.26
	5/14/19	236	--	--	11.54	52.77

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
BR-2	GWBR-2 (6/29/97)	6/29/1997	75	0.023
BR-3	GWBR-3 (6/28/97)	6/28/1997	122	2.9
BR-5A	GWBR-5A (7/1/97)	7/1/1997	88	0.82
BR-5B	GWBR-5B (7/1/97)	7/1/1997	188	15.8
	GWGM-98 (GWBR-5B) (7/1/97)	7/1/1997	188	17.1
BR-6	GWBR-6 (6/29/97)	6/29/1997	149	0.013
	GWBR-6 (V) (1/7/16)	1/7/2016	149	0.013
	GWBR-6 (I) (1/7/16)	1/7/2016	149	0.02
	GWBR-6 (4/19/16)	4/19/2016	149	0.029
	DUP-998 (BR-6) (7/13/16)	7/13/2016	149	0.012
	GWBR-6 (7/13/16)	7/13/2016	149	0.011
	GWBR-6 (10/19/16)	10/19/2016	149	0.00053
	GWBR-6 (1/19/17)	1/19/2017	149	0.0041
	GWBR-6 (5/4/2017)	5/4/2017	149	0.00081
	GWBR-6 (7/26/17)	7/26/2017	149	0.0067
	GWBR-6 (11/30/17)	11/30/2017	149	0.0014
	GWBR-6 (9/14/18)	9/14/2018	149	0.0087
	GWBR-6 (4/16/19)	4/16/2019	149	0.0057
CW-1	GWCW-1 (10/14/97)	10/14/1997	130	19.13
	GWCW-1 (10/22/98)	10/22/1998	130	17.2
	GWCW-1 (4/29/99)	4/29/1999	130	14.6
GM-1	GWGM-1 (6/24/97)	6/24/1997	220	98.4
	GWGM-1 (10/9/97)	10/9/1997	220	91.7
	GWGM-1 (10/7/98)	10/7/1998	220	73.8
	GWGM-1 (4/16/99)	4/16/1999	220	165
	GWGM-1 (4/28/04)	4/28/2004	220	28.3
GM-2A	GWGM-2A (7/2/97)	7/2/1997	40	11.7
	GWGM-2A (10/12/97)	10/12/1997	40	19.2
	GMGW-2A (10/3/18)	10/3/2018	40	0.032
GM-2B	GWGM-2B (6/26/97)	6/26/1997	271	70.7
	GWGM-2B (10/21/97)	10/21/1997	271	460
	GWGM-2B (11/22/98)	11/22/1998	271	218
	GWGM-2B (4/16/99)	4/16/1999	271	165
	GWGM-2B (5/25/04)	5/25/2004	271	77.5
	GWGM-2B (10/7/11)	10/7/2011	271	16
	GWGM-2B (12/10/13)	12/10/2013	271	34
	GWGM-2B (V) (8/21/15)	8/21/2015	271	23
	GWGM-2B (I) (8/21/15)	8/21/2015	271	120
	GM-2B (MDEQ) (10/6/15)	10/6/2015	271	290
	GWGM-2B (10/6/15)	10/6/2015	271	420
	GWGM-2B (9/26/17)	9/26/2017	271	450
	GWGM-2B (9/21/18)	9/21/2018	271	32

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-2C	GWGM-2C (11/6/98)	11/6/1998	64	5.6
	GWGM-2C (4/14/99)	4/14/1999	64	5.18
	GWGM-2C (5/4/04)	5/4/2004	64	0.57
	GWGM-2C (9/20/18)	9/20/2018	64	0.36
GM-3A	GWGM-3A (10/10/97)	10/10/1997	74	0.006
	GWGM-3A (10/9/98)	10/9/1998	74	0.14
	GWGM-3A (4/13/99)	4/13/1999	74	0.0014
	GWGM-3A (5/11/04)	5/11/2004	74	0.53
GM-3B	GWGM-3B (6/26/97)	6/26/1997	170	127
	GWGM-3B (10/14/97)	10/14/1997	170	84.31
	GWGM-3B (10/8/98)	10/8/1998	170	61.7
	GWGM-3B (4/17/99)	4/17/1999	170	95.6
	GWGM-88 (GM-3B) (4/17/99)	4/17/1999	170	102
	GWGM-3B (5/11/04)	5/11/2004	170	28.4
	GWGM-3B (4/13/10)	4/13/2010	170	97.3
GM-4	GWGM-4 (6/26/97)	6/26/1997	76	0.02
	GWGM-4 (10/14/97)	10/14/1997	76	0.0043
	GWGM-4 (10/20/98)	10/20/1998	76	0.02
	GWGM-4 (4/21/99)	4/21/1999	76	0.057
	GWGM-4 (5/22/04)	5/22/2004	76	0.065
	GWGM-4 (1/8/07)	1/8/2007	76	<0.004
	GWGM-4 (6/3/08)	6/3/2008	76	0.01
	GWGM-4 (8/26/09)	8/26/2009	76	0.003
	GWGM-4 (9/7/10)	9/7/2010	76	0.00029
	GWGM-4 (5/4/17)	5/4/2017	76	0.0025
GM-5	GWGM-5 (7/2/97)	7/2/1997	250	74.4
	GWGM-5 (10/15/97)	10/15/1997	250	36.4
	GWGM-5 (4/18/99)	4/18/1999	250	92.2
	GWGM-5 (V) (7/14/15)	7/14/2015	250	17
	GWGM-5 (I) (7/14/15)	7/14/2015	250	97
	GM-5 (MDEQ) (10/9/15)	10/9/2015	250	120
GM-6	GWGM-6 (6/28/97)	6/28/1997	165	62.5
	GWGM-6 (10/22/97)	10/22/1997	165	64.8
	GWGM-6 (10/10/98)	10/10/1998	165	57.1
	GWGM-6 (4/19/99)	4/19/1999	165	25.2
	GWGM-6 (7/19/00)	7/19/2000	165	59.3
	GWGM-6 (10/10/12)	10/10/2012	165	17
	GWGM-6 (10/10/14)	10/10/2014	165	1.2
	GWGM-6 (V) (1/14/16)	1/14/2016	165	26
	GWGM-6 (I) (1/14/16)	1/14/2016	165	35

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-6 (continued)	GWGM-6 (4/21/16)	4/21/2016	165	43
	DUP-999 (GM-6) (4/21/16)	4/21/2016	165	38
	GWGM-6 (9/19/16)	9/19/2016	165	36
	GWGM-6 (5/8/17)	5/8/2017	165	35
	GWGM-6 (9/24/18)	9/24/2018	165	27
GM-7	GWGM-7 (6/29/97)	6/29/1997	145	16.3
	GWGM-7 (10/11/97)	10/11/1997	145	31.7
	GWGM-7 (10/23/98)	10/23/1998	145	25.3
	GWGM-7 (5/1/99)	5/1/1999	145	31.6
	GWGM-7 (9/23/03)	9/23/2003	145	16.6
	GWGM-7 (5/3/04)	5/3/2004	145	20.1
	GWGM-7 (10/6/11)	10/6/2011	145	6
	GWGM-7 (12/10/13)	12/10/2013	145	6.1
	GWGM-7 (10/2/15)	10/2/2015	145	9.3
	GWGM-7 (4/19/16)	4/19/2016	145	7.4
	GWGM-7 (7/14/16)	7/14/2016	145	7.2
	GWGM-7 (10/20/16)	10/20/2016	145	5
	GWGM-7 (1/16/17)	1/16/2017	145	4.9
	GWGM-7 (5/4/17)	5/4/2017	145	5.1
	GWGM-7 (7/27/17)	7/27/2017	145	5.5
	GWGM-7 (9/26/17)	9/26/2017	145	5.7
	GWGM-7 (9/17/18)	9/17/2018	145	3.6
GM-8	GWGM-8 (6/30/97)	6/30/1997	79	0.02
	GWGM-8 (10/12/97)	10/12/1997	79	<0.0011
	GWGM-8 (10/9/98)	10/9/1998	79	0.02
	GWGM-8 (4/13/99)	4/13/1999	79	<0.0009
	GWGM-8 (10/21/99)	10/21/1999	79	0.051
	GWGM-8 (5/8/17)	5/8/2017	79	0.0012
GM-9	GWGM-9 (10/13/97)	10/13/1997	164	0.17
	GWGM-9 (10/11/98)	10/11/1998	164	0.24
	GWGM-9 (4/18/99)	4/18/1999	164	0.32
	GWGM-9 (9/10/03)	9/10/2003	164	0.037
	GWGM-9 (5/3/04)	5/3/2004	164	0.48
	GWGM-9 (7/28/05)	7/28/2005	164	0.37
GM-10	GWGM-10 (10/14/97)	10/14/1997	170	0.028
	GWGM-10 (11/6/98)	11/6/1998	170	0.024
	GWGM-10 (4/27/99)	4/27/1999	170	1.06
GM-11	GWGM-11 (10/15/97)	10/15/1997	174.7	0.12
GM-12	GWGM-12 (10/22/97)	10/22/1997	290	0.47
	GWGM-12 (10/10/98)	10/10/1998	290	0.22
	GWGM-12 (4/19/99)	4/19/1999	290	0.27

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-13	GWGM-13 (10/21/97)	10/22/1997	325	24.8
	GWGM-13 (4/20/99)	4/20/1999	325	38.8
	GWGM-13 (5/18/04)	5/18/2004	325	16
	GWGM-13 (10/6/11)	10/6/2011	325	20
	GWGM-13 (12/12/13)	12/12/2013	325	8.9
	GWGM-13 (10/7/15)	10/7/2015	325	44
	GWGM-13 (9/25/17)	9/25/2017	325	5
GM-14	GWGM-14 (10/21/97)	10/21/1997	135	7.33
	GWGM-14 (10/23/98)	10/23/1998	135	8.96
	GWGM-14 (10/28/98)	10/28/1998	135	7.29
	GWGM-14 (5/2/99)	5/2/1999	135	8.46
GM-15	GWGM-15 (10/20/97)	10/20/1997	165	2.06
	GWGM-15 (10/11/98)	10/11/1998	165	2.14
	GWGM-15 (4/20/99)	4/20/1999	165	2.8
	GWGM-15 (5/10/04)	5/10/2004	165	2.96
	GWGM-996 (5/10/04)	5/10/2004	165	2.57
	GWGM-15 (4/13/10)	4/13/2010	165	2.72
	GWGM-15 (10/5/11)	10/5/2011	165	2.2
	DUP-999 (GM-15) (10/5/11)	10/5/2011	165	2.2
	GWGM-15 (10/9/12)	10/9/2012	165	2.6
	GWGM-15 (10/22/13)	10/22/2013	165	2.9
	GWGM-15 (10/8/14)	10/8/2014	165	1.5
	GWGM-15 (11/4/15)	11/4/2015	165	1.9
	GWGM-15 (9/12/16)	9/12/2016	165	2.6
	DUP-999 (GM-15) (9/12/16)	9/12/2016	165	2.6
	GWGM-15 (9/21/17)	9/21/2017	165	2.2
	DUP-997 (GM-15) (9/21/17)	9/21/2017	165	2.2
	GWGM-15 (9/26/18)	9/26/2018	165	1.6
	DUP-999 (GM-15) (9/26/18)	9/26/2018	165	1.6
GM-16	GWGM-16 (10/22/97)	10/22/1997	108	0.0055
	GWGM-78 (GM-16) (10/22/97)	10/22/1997	108	0.012
	GWGM-16 (10/9/98)	10/9/1998	108	<0.0009
	GWGM-16 (4/14/99)	4/14/1999	108	0.0065
	GWGM-16 (9/23/03)	9/23/2003	108	0.09
	GWGM-16 (4/27/04)	4/27/2004	108	<0.01
GM-17	GWGM-17 (10/28/97)	10/28/1997	224.3	12.4
	GWGM-17 (10/12/98)	10/12/1998	224.3	11.9
	GWGM-17 (4/26/99)	4/26/1999	224.3	5.88
	GWGM-17 (5/16/04)	5/16/2004	224.3	1.23
	GWGM-17 (1/15/07)	1/15/2007	224.3	0.19
	GWGM-17 (6/3/08)	6/3/2008	224.3	0.33

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-17 (continued)	GWGM-17 (8/27/09)	8/27/2009	224.3	0.31
	GWGM-17 (9/9/10)	9/9/2010	224.3	0.2
	GWGM-17 (10/12/12)	10/12/2012	224.3	0.096
	GWGM-17 (10/10/14)	10/10/2014	224.3	0.12
GM-18	GWGM-18 (12/4/97)	12/4/1997	50	<0.0009
	GWGM-18 (11/7/98)	11/7/1998	50	<0.001
GM-19	GWGM-19 (12/4/97)	12/4/1997	46	<0.0009
GM-21	GWGM-21 (12/3/97)	12/3/1997	5	0.019
	GWGM-95 (12/3/97)	12/3/1997	5	0.019
	GWGM-21 (10/13/98)	10/13/1998	5	0.03
GM-22	GWGM-22 (12/5/97)	12/5/1997	6	0.022
	GWGM-22 (10/10/98)	10/10/1998	6	0.03
	GWGM-22 (4/13/99)	4/13/1999	6	0.16
GM-23	GWGM-23 (12/3/97)	12/3/1997	3.5	0.123
	GWGM-23 (10/10/98)	10/10/1998	3.5	0.01
	GWGM-23 (5/12/04)	5/12/2004	3.5	<0.007
	GWGM-995 (5/12/04)	5/12/2004	3.5	<0.005
GM-24A	GWGM-24A (11/9/98)	11/9/1998	71	32.7
	GWGM-24A (5/4/99)	5/4/1999	71	34.7
GM-24B	GWGM-24B (11/17/98)	11/17/1998	104	9.44
	GWGM-94 (GM-24B) (11/17/98)	11/17/1998	104	9.85
	GWGM-24B (5/5/99)	5/5/1999	104	5.01
	GWGM-24B (5/4/04)	5/4/2004	104	8.55
GM-24C	GWGM-24C (11/20/98)	11/20/1998	193	0.02
	GWGM-93 (GM-24C) (11/20/98)	11/20/1998	193	0.04
	GWGM-24C (5/13/99)	5/13/1999	193	0.18
	GWGM-24C (9/24/03)	9/24/2003	193	0.19
	GWGM-24C (4/29/04)	4/29/2004	193	0.35
	GWGM-24C (10/11/11)	10/11/2011	193	0.26
	GWGM-24C (12/9/13)	12/9/2013	193	0.41
	GWGM-24C (10/1/15)	10/1/2015	193	0.43
	GWGM-24C (9/22/17)	9/22/2017	193	0.49
GM-25A	GWGM-25A (10/6/98)	10/6/1998	19	38.9
	GWGM-25A (4/16/99)	4/16/1999	19	28.4
	GWGM-25A (9/9/03)	9/9/2003	19	40.2
	GWGM-25A (5/12/04)	5/12/2004	19	38.2
GM-25B	GWGM-25B (10/6/98)	10/6/1998	98	107
	GWGM-25B (4/27/99)	4/27/1999	98	112.3
	GWGM-25B (10/20/99)	10/20/1999	98	108.7
	GWGM-25B (9/9/03)	9/9/2003	98	23.9
	GWGM-25B (5/18/04)	5/18/2004	98	137

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-25B (continued)	GWGM-25B (11/5/13)	11/5/2013	98	20
	GWGM-25B (1/19/17)	1/19/2017	98	64
GM-25C	GWGM-25C (11/9/98)	11/9/1998	206	9.05
	GWGM-95 (GM-25C) (11/9/98)	11/9/1998	206	11.6
	GWGM-25C (4/20/99)	4/20/1999	206	26.5
	GWGM-25C (8/2/00)	8/2/2000	206	30.3
	GWGM-25C (9/15/03)	9/15/2003	206	8.47
	GWGM-25C (5/4/04)	5/4/2004	206	35.3
	GWGM-25C (8/1/05)	8/1/2005	206	32.7
	GWGM-25C (1/17/17)	1/17/2017	206	40
GM-26A	GWGM-26A (10/7/98)	10/7/1998	30	59
	GWGM-26A (4/14/99)	4/14/1999	30	53.5
	GWGM-26A (5/13/04)	5/13/2004	30	37.3
GM-26B	GWGM-26B (10/7/98)	10/7/1998	101	0.32
	GWGM-26B (4/15/99)	4/15/1999	101	0.072
	GWGM-26B (7/18/00)	7/18/2000	101	6.34
	GWGM-26B (9/9/03)	9/9/2003	101	13.1
	GWGM-26B (4/27/04)	4/27/2004	101	16.4
	GWGM-26B (7/28/05)	7/28/2005	101	12
GM-26C	GWGM-26C (10/25/98)	10/25/1998	160	128
	GWGM-26C (4/17/99)	4/17/1999	160	134
	GWGM-26C (9/16/03)	9/16/2003	160	63.5
	GWGM-26C (5/18/04)	5/18/2004	160	199
	GWGM-994 (5/18/04)	5/18/2004	160	347
	GWGM-26C (1/20/17)	1/20/2017	160	0.29
	Dup-999 (GM-26C) (1/20/17)	1/20/2017	160	0.32
GM-27A	GWGM-27A (10/8/98)	10/8/1998	30	48.2
	GWGM-27A (4/15/99)	4/15/1999	30	27.4
	GWGM-27A (9/10/03)	9/10/2003	30	40.4
	GWGM-27A (5/13/04)	5/13/2004	30	25.4
	GWGM-27A (1/17/17)	1/17/2017	30	42
GM-27B	GWGM-27B (10/26/98)	10/26/1998	145	0.05
	GWGM-27B (4/14/99)	4/14/1999	145	0.18
	GWGM-27B (7/18/00)	7/18/2000	145	0.049
	GWGM-27B (9/10/03)	9/10/2003	145	0.011
	GWGM-27B (4/30/04)	4/30/2004	145	0.01
	GWGM-998 (4/30/04)	4/30/2004	145	0.01
	GWGM-27B (8/5/05)	8/5/2005	145	0.011
	GWGM-27B (12/7/06)	12/7/2006	145	0.005
	GWGM-27B (2/22/07)	2/22/2007	145	0.07
	GWGM-27B (5/11/07)	5/11/2007	145	0.01

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-27B (continued)	GWGM-27B (8/8/07)	8/8/2007	145	0.05
	GWGM-27B (11/8/07)	11/8/2007	145	0.01
	GWGM-27B (2/19/08)	2/19/2008	145	0.01
	GWGM-27B (5/28/08)	5/28/2008	145	0.09
	GWGM-27B (8/21/08)	8/21/2008	145	0.005
	GWGM-27B (11/11/08)	11/11/2008	145	0.01
	GWGM-27B (9/25/14)	9/25/2014	145	0.0092
GM-27C	GWGM-27C (11/9/98)	11/9/1998	210	0.08
	GWGM-27C (4/26/99)	4/26/1999	210	13.5
	GWGM-86 (GM-27C) (4/26/99)	4/26/1999	210	0.067
	GWGMGW-27C (8/7/00)	8/7/2000	210	1.1
	GWGM-27C (9/11/03)	9/11/2003	210	0.088
	GWGM-27C (4/30/04)	4/30/2004	210	0.12
	GWGM-27C (8/5/05)	8/5/2005	210	0.09
GM-28A	GWGM-28A (10/28/98)	10/28/1998	40	37.6
	GWGM-28A (4/19/99)	4/19/1999	40	30.3
	GWGM-28A (7/19/00)	7/19/2000	40	23.6
	GWGM-28A (4/28/04)	4/28/2004	40	33.5
	GWGM-28A (7/26/05)	7/26/2005	40	30.7
	GWGM-999 (7/26/05)	7/26/2005	40	31.6
	GWGM-28A (12/5/06)	12/5/2006	40	20.8
	GWGM-28A (2/21/07)	2/21/2007	40	20.7
	GWGM-28A (5/10/07)	5/10/2007	40	23.7
	GWGM-28A (8/7/07)	8/7/2007	40	25.9
	GWGM-28A (11/5/07)	11/5/2007	40	20
	GWGM-28A (2/18/08)	2/18/2008	40	13.7
	GWGM-28A (5/27/08)	5/27/2008	40	7.13
	GWGM-28A (8/20/08)	8/20/2008	40	5.07
	GWGM-28A (11/10/08)	11/10/2008	40	7.65
	GWGM-28A (9/30/14)	9/30/2014	40	7.8
GM-28B	GWGM-96 (GM-28B) (10/24/98)	10/24/1998	124.5	0.3
	GWGM-28B (11/8/98)	11/8/1998	124.5	0.1
	GWGM-96 (GM-28B) (11/8/98)	11/8/1998	124.5	0.005
	GWGM-28B (4/19/99)	4/19/1999	124.5	0.41
	GWGM-87 (GM-28B) (4/19/99)	4/19/1999	124.5	0.064
	GWGM-28B (4/28/04)	4/28/2004	124.5	0.01
	GWGM-999 (4/28/04)	4/28/2004	124.5	0.01
	GWGM-28B (7/26/05)	7/26/2005	124.5	0.01
	GWGM-28B (12/5/06)	12/5/2006	124.5	0.063
	GWGM-28B (2/21/07)	2/21/2007	124.5	0.02
	GWGM-28B (5/10/07)	5/10/2007	124.5	0.01

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-28B (continued)	GWGM-28B (8/7/07)	8/7/2007	124.5	0.02
	GWGM-28B (11/5/07)	11/5/2007	124.5	0.1
	GWGM-28B (2/18/08)	2/18/2008	124.5	0.03
	GWGM-28B (5/27/08)	5/27/2008	124.5	0.05
	GWGM-28B (8/20/08)	8/20/2008	124.5	0.03
	GWGM-28B (11/10/08)	11/10/2008	124.5	0.04
	GWGM-28B (9/30/14)	9/30/2014	124.5	17
GM-29	GWGM-29 (10/9/98)	10/9/1998	55	29.2
	GWGM-99 (GM-29) (10/9/98)	10/9/1998	55	28.5
	GWGM-29 (4/16/99)	4/16/1999	55	22.4
	GWGM-29 (9/10/03)	9/10/2003	55	8.75
	GWGM-29 (5/3/04)	5/3/2004	55	6.27
	GWGM-29 (7/28/05)	7/28/2005	55	6.12
	GWGM-29 (12/8/06)	12/8/2006	55	7.7
	GWGM-29 (2/20/07)	2/20/2007	55	18
	GWGM-29 (5/9/07)	5/9/2007	55	21.1
	GWGM-29 (8/7/07)	8/7/2007	55	11.9
	GWGM-29 (11/6/07)	11/6/2007	55	7.93
	DUP-999 (GM-29) (11/6/07)	11/6/2007	55	8.04
	GWGM-29 (2/22/08)	2/22/2008	55	5.57
	GWGM-29 (5/27/08)	5/27/2008	55	3.58
	GWGM-29 (8/20/08)	8/20/2008	55	12.4
	GWGM-29 (11/10/08)	11/10/2008	55	6.77
	GWGM-29 (9/29/14)	9/29/2014	55	14
	DUP-998 (GM-29) (9/29/14)	9/29/2014	55	14
GM-30	GWGM-30 (10/27/98)	10/27/1998	75	27.4
	GWGM-30 (5/12/99)	5/12/1999	75	8.46
	GWGM-83 (GM-30) (5/12/99)	5/12/1999	75	8.45
GM-31	GWGM-31 (10/24/98)	10/24/1998	105	6.98
	GWGM-31 (5/3/99)	5/3/1999	105	5.03
GM-32	GWGM-32 (10/25/98)	10/25/1998	135	11
	GWGM-32 (4/27/99)	4/27/1999	135	33.2
	GWGM-32 (9/25/03)	9/25/2003	135	14.4
	GWGM-32 (5/26/04)	5/26/2004	135	8.24
	GWGM-32 (10/6/11)	10/6/2011	135	12
	GWGM-32 (12/11/13)	12/11/2013	135	19
	GWGM-32 (V) (8/24/15)	8/24/2015	135	23
	GWGM-32 (I) (8/24/15)	8/24/2015	135	41
	GM-32 (MDEQ) (10/8/15)	10/8/2015	135	78
	GWGM-32 (10/8/15)	10/8/2015	135	74
	GWGM-32 (9/25/17)	9/25/2017	135	21

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-34A	GWGM-34A (10/8/98)	10/8/1998	30	0.11
	GWGM-34A (4/17/99)	4/17/1999	30	0.22
	GWGM-34A (4/29/04)	4/29/2004	30	<0.01
GM-34B	GWGM-34B (10/12/98)	10/12/1998	85	0.11
	GWGM-34B (4/14/99)	4/14/1999	85	0.014
	GWGM-34B (9/24/03)	9/24/2003	85	0.004
	GWGM-34B (4/28/04)	4/28/2004	85	0.05
	GWGM-34B (10/5/11)	10/5/2011	85	0.8
	GWGM-34B (12/9/13)	12/9/2013	85	2.1
	GWGM-34B (10/1/15)	10/1/2015	85	1.8
	GWGM-34B (V) (1/8/16)	1/8/2016	85	1
	GWGM-34B (I) (1/8/16)	1/8/2016	85	1.2
	GWGM-34B (4/19/16)	4/19/2016	85	0.55
	GWGM-34B (9/22/17)	9/22/2017	85	0.58
GM-35	GWGM-35 (11/4/98)	11/4/1998	40	0.57
	GWGM-35 (5/4/99)	5/4/1999	40	4.21
GM-36	GWGM-36 (11/3/98)	11/3/1998	95	0.02
	GWGM-36 (5/5/99)	5/5/1999	95	0.026
	GWGM-36 (5/4/04)	5/4/2004	95	0.02
	GWGM-36 (10/10/12)	10/10/2012	95	0.16
	GWGM-36 (10/10/14)	10/10/2014	95	0.0043
	GWGM-36 (9/13/16)	9/13/2016	95	0.011
	GWGM-36 (9/26/18)	9/26/2018	95	0.013
GM-37A	GWGM-37A (11/18/98)	11/18/1998	144	66.1
	GWGM-37A (9/25/03)	9/25/2003	144	28.5
	GWGM-37A (5/17/04)	5/17/2004	144	31.7
GM-37B	GWGM-37B (5/14/99)	5/14/1999	328	121
	GWGM-37B (9/25/03)	9/25/2003	328	161
	GWGM-37B (5/27/04)	5/27/2004	328	20.8
GM-38A	GWGM-38A (10/13/98)	10/13/1998	95	0.04
	GWGM-98 (GM-38A) (10/13/98)	10/13/1998	95	0.01
	GWGM-38A (4/15/99)	4/15/1999	95	0.0083
GM-38B	GWGM-38B (10/14/98)	10/14/1998	160	0.88
	GWGM-38B (4/29/99)	4/29/1999	160	0.91
	GWGM-38B (1/19/17)	1/19/2017	160	0.56
GM-38C	GWGM-38C (10/20/98)	10/20/1998	200	0.37
	GWGM-97 (GM-38C) (10/20/98)	10/20/1998	200	0.36
	GWGM-38C (4/30/99)	4/30/1999	200	0.64
	GWGM-38C (V) (1/8/16)	1/8/2016	200	2
	DUP-999 (GM-38C) (V) (1/8/16)	1/8/2016	200	2.1

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-38C (continued)	GWGM-38C (I) (1/8/16)	1/8/2016	200	1.7
	DUP-999 (GM-38C) (I) (1/8/16)	1/8/2016	200	1.9
	GWGM-38C (4/19/16)	4/19/2016	200	5.2
	GWGM-38C (10/20/16)	10/20/2016	200	4.2
	DUP-999 (GM-38C) (10/20/16)	10/20/2016	200	4.1
	GWGM-38C (1/17/17)	1/17/2017	200	4.2
	GWGM-38C (5/8/17)	5/8/2017	200	5.1
	GWGM-38C (7/27/17)	7/27/2017	200	5.1
	DUP-999 (GM-38C) (7/27/17)	7/27/2017	200	5.1
	GWGM-38C (11/1/17)	11/1/2017	200	4.4
	GWGM-38C (4/17/19)	4/17/2019	200	1.4
GM-39	GWGM-39 (10/12/98)	10/12/1998	85	9.12
	GWGM-39 (4/15/99)	4/15/1999	85	5.88
	GWGM-89 (GM-39) (4/15/99)	4/15/1999	85	5.7
	GWGM-39 (V) (1/8/16)	1/8/2016	85	0.038
	GWGM-39 (I) (1/8/16)	1/8/2016	85	0.047
	GWGM-39 (10/19/16)	10/19/2016	85	0.18
	GWGM-39 (7/26/17)	7/26/2017	85	0.16
	GWGM-39 (4/20/18)	4/20/2018	85	3.1 d, D1
	GWGM-39 (9/14/18)	9/14/2018	85	3.1
	GWGM-39 (4/17/19)	4/17/2019	85	2.4
	DUP-999 (GM-39) (4/17/19)	4/17/2019	85	2.2
GM-40A	GWGM-40A (10/26/98)	10/26/1998	75	1.46
	GWGM-40A (4/28/99)	4/28/1999	75	0.23
	GWGM-40A (5/3/04)	5/3/2004	75	0.5
GM-40B	GWGM-40B (10/26/98)	10/26/1998	120	54
	GWGM-40B (4/27/99)	4/27/1999	120	63.1
	GWGM-40B (5/19/04)	5/19/2004	120	23.8
	GWGM-40B (11/5/13)	11/5/2013	120	22
	GWGM-40B (V) (7/14/15)	7/14/2015	120	16
	GWGM-40B (I) (7/14/15)	7/14/2015	120	99
	GWGM-40B (V) (8/24/15)	8/24/2015	120	25
	GWGM-40B (I) (8/24/15)	8/24/2015	120	27
	GM-40B (MDEQ) (10/8/15)	10/8/2015	120	43
	GWGM-40B (5/5/2017)	5/5/2017	120	47
	GWGM-40B (9/26/17)	9/26/2017	120	18
GM-41	GWGM-41 (10/19/98)	10/19/1998	40	8.32
	GWGM-41 (4/16/99)	4/16/1999	40	3.62
GM-42	GWGM-42 (10/20/98)	10/20/1998	72	0.47
	GWGM-42 (4/16/99)	4/16/1999	72	0.82
GM-49	GWGM-49 (4/17/99)	4/17/1999	83.5	9.2

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-50	GWGM-50 (10/14/98)	10/14/1998	80.5	33
	GWGM-50 (4/17/99)	4/17/1999	80.5	30.4
GM-51	GWGM-51 (10/20/98)	10/20/1998	67	1.86
	GWGM-51 (4/18/99)	4/18/1999	67	5.4
GM-52	GWGM-52 (4/19/99)	4/19/1999	75	30.4
GM-53A	GWGM-53A (4/19/99)	4/19/1999	79	31.7
GM-53B	GWGM-53B (11/5/98)	11/5/1998	195	131
	GWGM-53B (5/1/99)	5/1/1999	195	147
GM-54	GWGM-54 (10/24/98)	10/24/1998	80	0.08
	GWGM-54 (5/1/99)	5/1/1999	80	0.091
GM-55	GWGM-55 (10/24/98)	10/24/1998	75	19.1
	GWGM-55 (5/1/99)	5/1/1999	75	22.8
	GWGM-85 (GM-55) (5/1/99)	5/1/1999	75	24.6
	GWGM-55 (7/13/16)	7/13/2016	75	0.02
GM-56	GWGM-56 (10/21/98)	10/21/1998	32	0.03
	GWGM-56 (4/20/99)	4/20/1999	32	0.3
GM-57	GWGM-57 (4/20/99)	4/20/1999	76	14.3
GM-58	GWGM-58 (4/26/99)	4/26/1999	75	7.69
	GWGM-58 (5/22/04)	5/22/2004	75	0.056
	GWGM-58 (V) (7/14/15)	7/14/2015	75	0.0042
	GWGM-58 (I) (7/14/15)	7/14/2015	75	0.0052
GM-59	GWGM-59 (11/17/98)	11/17/1998	114	0.16
	GWGM-59 (4/28/99)	4/28/1999	114	0.17
	GWGM-59 (5/15/04)	5/15/2004	114	0.49
	GWGM-997 (5/22/04)	5/22/2004	114	0.062
	GWGM-59 (7/29/05)	7/29/2005	114	0.09
	GWGM-59 (1/11/07)	1/11/2007	114	0.089
	GWGM-999 (1/11/07)	1/11/2007	114	0.077
	GWGM-59 (6/3/08)	6/3/2008	114	0.012
	GWGM-59 (8/25/09)	8/25/2009	114	0.19
	GWGM-59 (9/7/10)	9/7/2010	114	0.053
	GWGM-59 (10/4/11)	10/4/2011	114	0.16
	GWGM-59 (10/8/12)	10/8/2012	114	0.21
	GWGM-59 (10/22/13)	10/22/2013	114	0.071
	DUP-999 (GM-59) (10/22/13)	10/22/2013	114	0.058
	GWGM-59 (10/8/14)	10/8/2014	114	0.088
	GWGM-59 (11/5/15)	11/5/2015	114	0.09
	GWGM-59 (9/12/16)	9/12/2016	114	0.068
	GWGM-59 (9/21/17)	9/21/2017	114	0.067
	GWGM-59 (10/1/18)	10/1/2018	114	0.13

Notes on Page 22.

Table 3

Summary of Analytical Results for Dissolved-Phase Methane

Groundwater Response Activity Plan, Dissolved-Phase Methane

Ford-Kingsford Products Facility

Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-61	GWGM-61 (5/3/99)	5/3/1999	138	5.71
	GWGM-61 (5/16/04)	5/16/2004	138	1.11
	GWGM-61 (7/30/05)	7/30/2005	138	0.76
	GWGM-61 (1/9/07)	1/9/2007	138	0.007
	GWGM-61 (6/3/08)	6/3/2008	138	1.09
	GWGM-61 (8/27/09)	8/27/2009	138	0.8
	DUP-999 (GM-61) (8/27/09)	8/27/2009	138	0.92
	GWGM-61 (9/9/10)	9/9/2010	138	1.1
	GWGM-61 (10/4/11)	10/4/2011	138	0.47
	DUP-999 (GM-61) (10/08/12)	10/8/2012	138	0.38
	GWGM-61 (10/8/12)	10/8/2012	138	0.71
	GWGM-61 (10/22/13)	10/22/2013	138	0.76
	GWGM-61 (10/14/14)	10/14/2014	138	0.022
	DUP-998 (GM-61) (10/14/14)	10/14/2014	138	0.02
	GWGM-61 (11/5/15)	11/5/2015	138	0.092
	GWGM-61 (9/13/16)	9/13/2016	138	0.14
	GWGM-61 (9/21/17)	9/21/2017	138	0.002
	GWGM-61 (9/25/18)	9/25/2018	138	0.15
GM-62A	GWGM-62A (8/23/99)	8/23/1999	90	8.47
	GWGM-62A (5/11/04)	5/11/2004	90	12.8
	GWGM-62A (10/10/11)	10/10/2011	90	5.5
	GWGM-62A (12/12/13)	12/12/2013	90	3
	GWGM-62A (10/5/15)	10/5/2015	90	2.4
	DUP-998 (GM-62A) (10/5/15)	10/5/2015	90	2.4
GM-62AR	GWGM-62AR (9/27/17)	9/27/2017	90	15
GM-62B	GWGM-62B (8/24/99)	8/24/1999	195	66.2
	GWGM-82 (GM-62) (8/24/99)	8/24/1999	195	134
	GWGM-62B (5/19/04)	5/19/2004	195	64.1
	GWGM-62B (10/10/11)	10/10/2011	195	9.6
	DUP-998 (GM-62B) (10/10/11)	10/10/2011	195	16
	GWGM-62B (12/13/13)	12/13/2013	195	14
	GM-62B (MDEQ) (10/13/15)	10/13/2015	195	83
	GWGM-62B (10/13/15)	10/13/2015	195	49
GM-62BR	GWGM-62BR (9/27/17)	9/27/2017	195	260
GM-62C	GWGM-62C (8/24/99)	8/24/1999	315	298
	GWGM-62C (5/18/04)	5/18/2004	315	52.6
	GWGM-62C (10/11/11)	10/11/2011	315	11
	GWGM-62C (12/13/13)	12/13/2013	315	29
	GWGM-62C (10/14/15)	10/14/2015	315	160
GM-62CR	GWGM-62CR (9/8/17)	9/8/2017	315	34
	GWGM-62CR (9/27/17)	9/27/2017	315	25

Notes on Page 22.

ARCADIS Design & Consultancy for natural and built assets

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-63A	GWGM-63A (10/18/00)	10/18/2000	45	52.5
	GWGM-63A (9/15/03)	9/15/2003	45	36.8
	GWGM-63A (5/5/04)	5/5/2004	45	48.3
	GWGM-63A (10/9/12)	10/9/2012	45	1.5
	GWGM-63A (10/14/14)	10/14/2014	45	16
	DUP-999 (GM-63A) (10/14/14)	10/14/2014	45	17
	GWGM-63A (9/15/16)	9/15/2016	45	28
	DUP-998 (GM-63A) (9/15/16)	9/15/2016	45	45
	GWGM-63A (9/19/18)	9/19/2018	45	35
	Dup-998 (GM-63A) (9/19/18)	9/19/2018	45	34
GM-63B	GWGM-63B (2/7/01)	2/7/2001	105	0.023
	GWGM-63B (9/11/03)	9/11/2003	105	0.023
	GWGM-63B (4/27/04)	4/27/2004	105	0.03
	GWGM-63B (10/9/12)	10/9/2012	105	0.019
	GWGM-63B (10/14/14)	10/14/2014	105	0.035
	GWGM-63B (9/15/16)	9/15/2016	105	0.027
	GWGM-63B (9/19/18)	9/19/2018	105	0.4
GM-64A	GWGM-64A (8/30/00)	8/30/2000	33	35.6
	GWGM-64A (10/19/00)	10/19/2000	33	44.1
	GWGM-64A (9/8/03)	9/8/2003	33	37.4
	GWGM-64A (5/4/04)	5/4/2004	33	36.9
GM-64B	GWGM-64B (9/8/03)	9/8/2003	117	32.9
	GWGM-64B (5/11/04)	5/11/2004	117	91.8
GM-65	GWGM-65 (10/28/13)	10/28/2013	120	14
GM-66A	GWGM-66A (7/18/00)	7/18/2000	27	26.9
	GWGM-66A (9/16/03)	9/16/2003	27	38.7
	GWGM-66A (4/27/04)	4/27/2004	27	37.9
	GWGM-66A (7/27/05)	7/27/2005	27	30.8
	GWGM-66A (V) (7/14/15)	7/14/2015	27	0.089
	GWGM-66A (I) (7/14/15)	7/14/2015	27	0.057
GM-66B	GWGM-66B (7/19/00)	7/19/2000	125	82.6
	GWGM-66B (8/3/00)	8/3/2000	125	93.2
	GWGM-66B (9/11/03)	9/11/2003	125	73.2
	GWGM-66B (5/10/04)	5/10/2004	125	83.3
	GWGM-66B (7/27/05)	7/27/2005	125	71.1
	GWGM-66B (12/8/06)	12/8/2006	125	22.7
	GWGM-66B (3/1/07)	3/1/2007	125	19.3
	GWGM-66B (5/14/07)	5/14/2007	125	30.2
	GWGM-999 (GM-66B) (5/14/07)	5/14/2007	125	29.6
	GWGM-66B (8/14/07)	8/14/2007	125	30.4
	GWGM-66B (11/9/07)	11/9/2007	125	30.2

Notes on Page 22.

Table 3

Summary of Analytical Results for Dissolved-Phase Methane

Groundwater Response Activity Plan, Dissolved-Phase Methane

Ford-Kingsford Products Facility

Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-66B (continued)	GWGM-66B (2/21/08)	2/21/2008	125	29.6
	DUP-998 (GM-66B) (2/21/08)	2/21/2008	125	29.8
	GWGM-66B (5/30/08)	5/30/2008	125	25.1
	GWGM-66B (8/26/08)	8/26/2008	125	19.6
	GWGM-66B (11/12/08)	11/12/2008	125	8.58
	GWGM-66B (9/28/14)	9/28/2014	125	18
GM-67	GWGM-67 (8/7/00)	8/7/2000	122	12.9
	GWGM-67 (5/17/04)	5/17/2004	122	23.1
	GWGM-67 (1/12/07)	1/12/2007	122	9.98
	GWGM-67 (6/2/08)	6/2/2008	122	11.8
	GWGM-67 (8/24/09)	8/24/2009	122	2.36
	GWGM-67 (11/14/09)	11/14/2009	122	16
	GWGM-67 (4/13/10)	4/13/2010	122	13.7
	GWGM-67 (9/9/10)	9/9/2010	122	15
	DUP-999 (GM-67) (9/9/10)	9/9/2010	122	16
	GWGM-67 (V) (1/8/16)	1/8/2016	122	16
	GWGM-67 (I) (1/8/16)	1/8/2016	122	18
	GWGM-67 (4/20/16)	4/20/2016	122	13
	GWGM-67 (7/14/16)	7/14/2016	122	1.6
	GWGM-67 (10/20/16)	10/20/2016	122	14
	GWGM-67 (5/5/17)	5/5/2017	122	11
	GWGM-67 (7/27/17)	7/27/2017	122	8.9
	GWGM-67 (11/1/17)	11/1/2017	122	10
	DUP-999 (GM-67) (11/1/17)	11/1/2017	122	9.7
	GWGM-67 (4/20/18)	4/20/2018	122	7.4
	GWGM-67 (9/17/18)	9/17/2018	122	6.6
	GWGM-67 (4/16/19)	4/16/2019	122	3.4
GM-68	GWGM-68 (10/17/00)	10/17/2000	140	0.02
	GWGM-68 (5/24/04)	5/24/2004	140	0.077
	GWGM-68 (7/31/05)	7/31/2005	140	0.02
	GWGM-68 (1/12/07)	1/12/2007	140	<0.002
	GWGM-68 (6/2/08)	6/2/2008	140	0.01
	GWGM-68 (8/24/09)	8/24/2009	140	0.11
	GWGM-68 (9/8/10)	9/8/2010	140	0.0006
	GWGM-68 (10/4/11)	10/4/2011	140	<0.0002
	GWGM-68 (10/8/12)	10/8/2012	140	0.028
	GWGM-68 (10/22/13)	10/22/2013	140	0.0039
	GWGM-68 (10/8/14)	10/8/2014	140	0.0054
	GWGM-68 (11/4/15)	11/4/2015	140	0.01
	DUP-999 (GM-68) (11/4/15)	11/4/2015	140	0.014

Notes on Page 22.

ARCADIS Design & Consultancy for natural and built assets

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-68 (continued)	GWGM-68 (9/12/16)	9/12/2016	140	0.031
	GWGM-68 (9/21/17)	9/21/2017	140	0.0069
	GWGM-68 (10/1/18)	10/1/2018	140	0.028
GM-70	GWGM-70 (8/17/00)	8/17/2000	42	16.3
GM-71	GWGM-71 (8/21/00)	8/21/2000	39	2.63
GM-72	GWGM-72 (8/22/00)	8/22/2000	43	13.6
	GWGM-72 (9/24/03)	9/24/2003	43	11.8
	GWGM-72 (1/5/04)	1/5/2004	43	12.7
	GWGM-72 (4/16/04)	4/16/2004	43	10.4
GM-72A	GWGM-72A (7/25/05)	7/25/2005	46	19.9
	GWGM-72A (12/12/06)	12/12/2006	46	14.9
	GWGM-72A (11/8/07)	11/8/2007	46	13
	GWGM-72A (5/30/08)	5/30/2008	46	14.6
	GWGM-72A (8/21/09)	8/21/2009	46	14.4
	GWGM-72A (8/26/10)	8/26/2010	46	12
	GWGM-72A (9/19/11)	9/19/2011	46	14
	GWGM-72A (10/1/12)	10/1/2012	46	8.9
	GWGM-72A (12/30/13)	12/30/2013	46	16
	GWGM-72A (8/28/14)	8/28/2014	46	12
	GWGM-72A (V) (9/30/15)	9/30/2015	46	12
	GWGM-72A (I) 9/30/15)	9/30/2015	46	9.8
	GWGM-72A (9/21/16)	9/21/2016	46	14
	GWGM-72A (10/3/17)	10/3/2017	46	9.9
	GWGM-72A (9/27/18)	9/27/2018	46	13
GM-73	GWGM-73 (9/6/00)	9/6/2000	42	<0.0011
GM-74	GWGM-74 (9/7/00)	9/7/2000	34	<0.001
GM-75	GWGMGW-75 (9/8/00)	9/8/2000	24	0.024
GM-77	GWGM-77 (9/22/03)	9/22/2003	105	34.3
	GWGM-77 (5/11/04)	5/11/2004	105	84.6
	GWGM-77 (7/28/05)	7/28/2005	105	60.4
GM-78	GWGM-78 (9/18/03)	9/18/2003	20	31.9
	GWGM-78 (4/29/04)	4/29/2004	20	37.1
	GWGM-78 (7/29/05)	7/29/2005	20	28.5
	GWGM-998 (GM-78) (7/29/05)	7/29/2005	20	34.7
	GWGM-78 (12/8/06)	12/8/2006	20	12.2
	GWGM-78 (2/28/07)	2/28/2007	20	7.04
	GWGM-998 (2/28/07)	2/28/2007	20	6.58
	GWGM-78 (5/11/07)	5/11/2007	20	5.65
	GWGM-78 (8/14/07)	8/14/2007	20	5.62
	GWGM-78 (11/8/07)	11/8/2007	20	4.78
	GWGM-78 (2/21/08)	2/21/2008	20	2.27

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-78 (continued)	GWGM-78 (5/28/08)	5/28/2008	20	2.82
	Dup-999 (GM-78) (5/28/08)	5/28/2008	20	3
	GWGM-78 (8/25/08)	8/25/2008	20	5.11
	Dup-998 (GM-78) (8/25/08)	8/25/2008	20	4.92
	GWGM-78 (11/12/08)	11/12/2008	20	4.72
	Dup-999 (GM-78) (11/12/08)	11/12/2008	20	4.93
	GWGM-78 (9/25/14)	9/25/2014	20	6.5
GM-79	GWGM-79 (9/18/03)	9/18/2003	25	1.76
	GWGM-79 (4/26/04)	4/26/2004	25	28.7
	GWGM-79 (7/29/05)	7/29/2005	25	29.3
	GWGM-79 (12/4/06)	12/4/2006	25	30.9
	GWGM-79 (2/22/07)	2/22/2007	25	25.2
	GWGM-999 (GM-79) (2/22/07)	2/22/2007	25	27.4
	GWGM-79 (5/9/07)	5/9/2007	25	24.4
	GWGM-79 (8/7/07)	8/7/2007	25	29.8
	GWGM-79 (11/6/07)	11/6/2007	25	28.5
	GWGM-79 (2/22/08)	2/22/2008	25	36.6
	GWGM-79 (5/28/08)	5/28/2008	25	29.6
	GWGM-79 (8/20/08)	8/20/2008	25	23.4
	GWGM-79 (11/11/08)	11/11/2008	25	29
	GWGM-79 (9/24/14)	9/24/2014	25	29
	GWGM-79 (V) (7/14/15)	7/14/2015	25	22
	GWGM-79 (I) (7/14/15)	7/14/2015	25	42
GM-80	GWGM-80 (5/3/04)	5/3/2004	113	0.73
GM-81B	GM-81B (MDEQ) (10/13/15)	10/13/2015	295	55
	GWGM-81B (4/20/16)	4/20/2016	295	1.2
	GWGM-81B (7/15/16)	7/15/2016	295	64
	GWGM-81B (10/20/16)	10/20/2016	295	58
	GWGM-81B (1/18/17)	1/18/2017	295	3.1
	GWGM-81B (5/9/17)	5/9/2017	295	75
	GWGM-81B (11/1/17)	11/1/2017	295	66
	GWGM-81B (4/20/18)	4/20/2018	295	63
	GWGM-81B (9/25/18)	9/25/2018	295	44
GM-84	GWGM-84 (8/26/04)	8/26/2004	77	0.0048
	GWGM-84 (8/1/05)	8/1/2005	77	0.02
	GWGM-84 (12/12/06)	12/12/2006	77	0.01
	GWGM-84 (3/2/07)	3/2/2007	77	<0.004
	GWGM-84 (5/14/07)	5/14/2007	77	4.04
	GWGM-84 (8/14/07)	8/14/2007	77	0.04
	GWGM-84 (11/9/07)	11/9/2007	77	0.02
	GWGM-84 (2/21/08)	2/21/2008	77	0.004

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-84 (continued)	GWGM-84 (5/29/08)	5/29/2008	77	0.005
	GWGM-84 (8/25/08)	8/25/2008	77	0.01
	GWGM-84 (11/13/08)	11/13/2008	77	0.03
	GWGM-84 (10/9/12)	10/9/2012	77	0.031
	GWGM-84 (9/26/14)	9/26/2014	77	0.00026
	GWGM-84 (9/14/16)	9/14/2016	77	0.0035
	GWGM-84 (10/4/18)	10/4/2018	77	0.00052
GM-85	GWGM-85 (9/1/04)	9/1/2004	75	0.01
	GWGM-85 (7/31/05)	7/31/2005	75	0.01
	GWGM-85 (1/12/07)	1/12/2007	75	0.005
	GWGM-85 (6/2/08)	6/2/2008	75	0.25
	GWGM-85 (8/25/09)	8/25/2009	75	0.015
	GWGM-85 (4/13/10)	4/13/2010	75	0.06
	GWGM-85 (9/8/10)	9/8/2010	75	0.0024
	GWGM-85 (10/4/11)	10/4/2011	75	0.00071
	GWGM-85 (10/8/12)	10/8/2012	75	0.087
	GWGM-85 (10/22/13)	10/22/2013	75	0.085
	GWGM-85 (10/8/14)	10/8/2014	75	0.18
	GWGM-85 (11/4/15)	11/4/2015	75	0.59
	GWGM-85 (9/12/16)	9/12/2016	75	0.2
	GWGM-85 (9/20/17)	9/20/2017	75	0.047
	GWGM-85 (9/25/18)	9/25/2018	75	0.014
GM-86A	GWGM-86A (10/7/11)	10/7/2011	143	15
	GWGM-86A (12/11/13)	12/11/2013	143	31
	GWGM-86A (10/2/15)	10/2/2015	143	38
	GWGM-86A (5/5/2017)	5/5/2017	143	30
	DUP-999 (GM-86A) (5/5/2017)	5/5/2017	143	34
	GWGM-86A (9/28/17)	9/28/2017	143	20
	GWGM-86A (9/19/18)	9/19/2018	143	55
GM-86B	GWGM-86B (10/12/12)	10/12/2012	335	27
	GWGM-86B (10/30/13)	10/30/2013	335	19
	GWGM-86B (10/10/14)	10/10/2014	335	19
	GWGM-86B (V) (8/20/15)	8/20/2015	335	11
	GWGM-86B (I) (8/20/15)	8/20/2015	335	250
	GM-86B (MDEQ) (10/12/15)	10/12/2015	335	290
	GWGM-86B (10/12/15)	10/12/2015	335	170
	GWGM-86B (9/20/16)	9/20/2016	335	62
	GWGM-86B (5/9/17)	5/9/2017	335	110
	GWGM-86B (9/28/17)	9/28/2017	335	99
	DUP-996 (GM-86B) (9/28/17)	9/28/2017	335	100
	GWGM-86B (9/27/18)	9/27/2018	335	72

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-87A	GWGM-87A (12/5/06)	12/5/2006	32	31.4
	GWGM-999 (GM-87A) (12/5/06)	12/5/2006	32	33
	GWGM-87A (2/19/07)	2/19/2007	32	25.2
	GWGM-87A (5/8/07)	5/8/2007	32	24
	GWGM-87A (8/6/07)	8/6/2007	32	12.3
	GWGM-87A (11/7/07)	11/7/2007	32	31.3
	GWGM-87A (2/18/08)	2/18/2008	32	29.8
	GWGM-87A (5/29/08)	5/29/2008	32	29.9
	GWGM-87A (8/21/08)	8/21/2008	32	23.4
	GWGM-87A (11/13/08)	11/13/2008	32	30.8
	GWGM-87A (10/10/12)	10/10/2012	32	16
	GWGM-87A (9/24/14)	9/24/2014	32	22
	GWGM-87A (9/14/16)	9/14/2016	32	30
	GWGM-87A (9/18/18)	9/18/2018	32	39
GM-87B	GWGM-87B (12/5/06)	12/5/2006	117	0.22
	GWGM-87B (2/20/07)	2/20/2007	117	0.27
	GWGM-87B (5/8/07)	5/8/2007	117	0.29
	GWGM-87B (8/6/07)	8/6/2007	117	0.1
	GWGM-87B (11/7/07)	11/7/2007	117	0.65
	GWGM-87B (2/18/08)	2/18/2008	117	0.69
	GWGM-87B (5/29/08)	5/29/2008	117	0.16
	GWGM-87B (8/21/08)	8/21/2008	117	0.18
	Dup-999 (GM-87B) (8/21/08)	8/21/2008	117	0.14
	GWGM-87B (11/13/08)	11/13/2008	117	0.39
	GWGM-87B (10/10/12)	10/10/2012	117	0.088
	GWGM-87B (9/24/14)	9/24/2014	117	0.04
	GWGM-87B (9/14/16)	9/14/2016	117	0.052
	GWGM-87B (9/18/18)	9/18/2018	117	0.12
GM-88	GWGM-88 (8/18/17)	8/18/2017	130	21
	GWGM-88 (9/25/17)	9/25/2017	130	20
	GWGM-88 (9/17/18)	9/17/2018	130	28
GM-118D	GWGM-118D (10/21/98)	10/21/1998	54	0.006
	GWGM-118D (4/29/99)	4/29/1999	54	0.0087
GMEW-1	GWGMEW-1 (7/11/11)	7/11/2011	20	15
GMEW-2	GWGMEW-2 (10/28/13)	10/28/2013	23	31
GMEW-3	GWGMEW-3 (7/24/00)	7/24/2000	135	86.8
GMEWA-4	GWGMEWA-4 (8/2/05)	8/2/2005	20	38.6
GMEWA-5	GWGMEWA-5 (10/31/13)	10/31/2013	16	29
GMEWA-7	GWGMEWA-7 (6/12/2012)	6/12/2012	17	2.1
GMEWA-8	GWGMEWA-8 (6/12/2012)	6/12/2012	20	0.52
GMEWA-9	GWGMEWA-9 (10/18/2011)	10/18/2011	20	0.038

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GMEWA-10	GWGMEWA-10 (10/18/2011)	10/18/2011	25	0.0021
GMEWA-11	GWGMEWA-11 (6/12/2012)	6/12/2012	24	0.06
GMEWA-12	GWGMEWA-12 (6/14/2012)	6/14/2012	23	5
GMEWA-13	GWGMEWA-13 (6/14/2012)	6/14/2012	20	6.4
GMEWA-14	GWGMEWA-14 (9/11/2012)	9/11/2012	25	3.2
GMEWA-17	GWGMEWA-17 (10/31/13)	10/31/2013	20	24
GMEWA-20	GWGMEWA-20 (10/31/13)	10/31/2013	19	28
GMEWA-24	GWGMEWA-24 (11/4/13)	11/4/2013	22	30
	DUP-999 (GMEWA-24) (11/4/13)	11/4/2013	22	26
GMEWA-26	GWGMEWA-26 (7/27/05)	7/27/2005	22	32.3
GMEWC-1	GWGMEWC-1 (7/26/05)	7/26/2005	123	89.9
GMEWC-2A	GWGMEWC-2A (6/14/2012)	6/14/2012	133	6.1
GMEWC-3	GWGMEWC-3 (9/11/2012)	9/11/2012	107	15
GMEWC-4 (GMEW-9)	GWGMEWC-4 (11/6/13)	11/6/2013	125	22
GMEWC-7	GWGMEWC-7 (11/11/13)	11/11/2013	108	17
	DUP-998 (GMEWC-7) (11/11/13)	11/11/2013	108	13
GMEWC-8A	GWGMEWC-8A (11/6/13)	11/6/2013	122	22
GMEWC-12	GWGMEWC-12 (11/4/13)	11/4/2013	103	16
GMPZA-14	GWGMPZA-14 (7/11/11)	7/11/2011	20	1.6
GMPZA-26	GWGMPZA-26 (12/6/06)	12/6/2006	20	8.87
	GWGMPZA-26 (2/27/07)	2/27/2007	20	27
	GWGMPZA-26 (8/13/07)	8/13/2007	20	26.4
	GWGMPZA-26 (2/20/08)	2/20/2008	20	35.2
	GWGMPZA-26 (8/22/08)	8/22/2008	20	23.8
	GWGMPZA-26 (9/28/14)	9/28/2014	20	22
GMPZA-29	GWGMPZA-29 (12/6/06)	12/6/2006	18	27.4
	GWGMPZA-29 (2/26/07)	2/26/2007	18	22.5
	GWGMPZA-29 (8/10/07)	8/10/2007	18	20.1
	GWGMPZA-29 (2/20/08)	2/20/2008	18	24.9
	GWGMPZA-29 (8/22/08)	8/22/2008	18	19.4
	GWGMPZA-29 (9/27/14)	9/27/2014	18	24
GMPZA-34	GWGMPZA-34 (12/8/06)	12/8/2006	25	0.09
	GWGMPZA-34 (2/26/07)	2/26/2007	25	0.01
	GWGMPZA-34 (8/9/07)	8/9/2007	25	0.02
	GWGMPZA-34 (2/20/08)	2/20/2008	25	0.004
	GWGMPZA-34 (8/22/08)	8/22/2008	25	0.004
	GWGMPZA-34 (9/27/14)	9/27/2014	25	0.0087
	DUP-999 (GMPZA-34) (9/27/2014)	9/27/2014	25	0.0099
GMPZA-38	GWGM-998 (12/7/2006)	12/7/2006	25	0.005
	GWGMPZA-38 (12/7/06)	12/7/2006	25	0.006
	GWGMPZA-38 (2/23/07)	2/23/2007	25	0.01

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GMPZA-38 (continued)	GWGMPZA-38 (8/9/07)	8/9/2007	25	0.02
	GWGMPZA-38 (2/19/08)	2/19/2008	25	0.01
	GWGMPZA-38 (8/22/08)	8/22/2008	25	0.01
	GWGMPZA-38 (9/26/14)	9/26/2014	25	4.8
GMPZA-41	GWGMPZA-41 (12/7/06)	12/7/2006	20	0.002
	GWGMPZA-41 (2/23/07)	2/23/2007	20	0.01
	GWGMPZA-41 (8/8/07)	8/8/2007	20	0.08
	DUP-999 (GMPZA-41) (8/8/07)	8/8/2007	20	2.44
	GWGMPZA-41 (2/19/08)	2/19/2008	20	0.002
	GWGMPZA-41 (8/21/08)	8/21/2008	20	<0.001
	GWGMPZA-41 (10/1/14)	10/1/2014	20	1.8
GMPZC-12	GWGMPZC-12 (12/6/06)	12/6/2006	137	13.3
	GWGMPZC-12 (3/1/07)	3/1/2007	137	6.91
	GWGMPZC-12 (8/14/07)	8/14/2007	137	5.58
	GWGMPZC-12 (2/21/08)	2/21/2008	137	5.18
	GWGMPZC-12 (8/25/08)	8/25/2008	137	2.88
	GWGMPZC-12 (9/28/14)	9/28/2014	137	14
GMPZC-14	GWGMPZC-14 (12/6/06)	12/6/2006	111	77.2
	GWGMPZC-14 (2/28/07)	2/28/2007	111	121
	GWGMPZC-14 (8/10/07)	8/10/2007	111	102
	GWGMPZC-14 (2/20/08)	2/20/2008	111	93.8
	GWGMPZC-14 (8/26/08)	8/26/2008	111	106
	GWGMPZC-14 (10/1/14)	10/1/2014	111	28
GMPZC-17	GWGMPZC-17 (12/7/06)	12/7/2006	125	0.035
	GWGMPZC-17 (2/27/07)	2/27/2007	125	0.02
	GWGMPZC-17 (8/13/07)	8/13/2007	125	0.01
	DUP-998 (GMPZC-17) (8/13/07)	8/13/2007	125	0.02
	GWGMPZC-17 (2/19/08)	2/19/2008	125	0.03
	DUP-999 (GMPZC-17) (2/19/08)	2/19/2008	125	0.02
	GWGMPZC-17 (8/25/08)	8/25/2008	125	0.03
	GWGMPZC-17 (9/27/14)	9/27/2014	125	0.022
Grailer	GWGBGW-53C (5/12/99)	5/12/1999		0.0087
	GWGBGW-53 C (8/07/03)	8/7/2003		<0.001
Hambel	GWGBGW-101C (8/06/03)	8/6/2003		0.002
Krans	GWGBGW-101F (8/06/03)	8/6/2003		<0.001
Michaud	GWGBGW-101G (8/06/03)	8/6/2003		<0.0009
Schnieder	GWGBGW-113 (5/3/99)	5/3/1999		0.022
	GWGBGW-113 (8/07/03)	8/7/2003		<0.0009
MPMW-4	GWMPMW-4 (2/26/02)	2/26/2002		ND
MW-1B	GWMW-1B (6/27/97)	6/27/1997	86	18.2
MW-2B	GWMW-2B (6/28/97)	6/28/1997	102	34.8

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
MW-5	GWMW-5 (10/22/98)	10/22/1998	83	0.02
	GWMW-5 (4/18/99)	4/18/1999	83	0.11
MW-8	GWMW-8 (6/29/97)	6/29/1997	133	86
	GWGM-99 (MW-8) (6/29/97)	6/29/1997	133	83
	GWMW-8 (10/24/98)	10/24/1998	133	57.3
	GWMW-8 (5/3/99)	5/3/1999	133	68.7
	GWMW-8 (5/12/04)	5/12/2004	133	21.1
	GWMW-8 (10/7/11)	10/7/2011	133	18
	GWMW-8 (12/11/13)	12/11/2013	133	26
	DUP-999 (MW-8) (12/11/13)	12/11/2013	133	32
	GWMW-8 (V) (8/24/15)	8/24/2015	133	18
	GWMW-8 (I) (8/24/15)	8/24/2015	133	30
	GWMW-8 (10/2/15)	10/2/2015	133	16
	DUP-999 (MW-8) (10/2/15)	10/2/2015	133	16
	GWMW-8 (4/20/16)	4/20/2016	133	22
	GWMW-8 (7/14/16)	7/14/2016	133	38
	GWMW-8 (5/5/2017)	5/5/2017	133	22
MW-9B	GWMW-9B (7/2/97)	7/2/1997	107	0.014
MW-10	GWMW-10 (6/30/97)	6/30/1997	95	0.011
	GWMW-10 (7/13/16)	7/13/2016	95	0.38
UG-1	GWUG-1 (5/21/04)	5/21/2004	81	0.36
	GWUG-1 (7/31/05)	7/31/2005	81	0.003
	GWGM-997 (UG-1) (7/31/05)	7/31/2005	81	0.002
	GWUG-1 (1/9/2007)	1/9/2007	81	<0.001
	GWUG-1 (6/3/08)	6/3/2008	81	0.003
	GWUG-1 (8/25/09)	8/25/2009	81	0.012
	UG-1 (9/7/10)	9/7/2010	81	0.00047
UG-2	GWUG-2 (7/1/97)	7/1/1997	48	0.02
	GWUG-2 (10/27/98)	10/27/1998	48	0.22
	GWUG-2 (5/3/99)	5/3/1999	48	0.1
UG-3	GWUG-3 (5/10/04)	5/10/2004	44	0.06
	GWUG-3 (8/2/05)	8/2/2005	44	0.004
	GWUG-3 (1/11/07)	1/11/2007	44	<0.003
	GWUG-3 (6/3/08)	6/3/2008	44	0.01
	GWUG-3 (8/25/09)	8/25/2009	44	0.034
	UG-3 (9/7/10)	9/7/2010	44	0.00033
UG-4	UG-4 (10/13/97)	10/13/1997	103	0.13
	GWGM-79 (UG-4) (10/13/97)	10/13/1997	103	0.013
	GWUG-4 (10/23/98)	10/23/1998	103	0.22
	GWUG-4 (5/2/99)	5/2/1999	103	0.22

Notes on Page 22.

Table 3
Summary of Analytical Results for Dissolved-Phase Methane
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
UG-5	GWUG-5 (5/22/04)	5/22/2004	139	0.077
	GWUG-5 (8/3/05)	8/3/2005	139	0.06
	GWUG-5 (1/11/07)	1/11/2007	139	0.027
	GWUG-5 (6/3/08)	6/3/2008	139	0.09
	GWUG-5 (8/26/09)	8/26/2009	139	0.034
	UG-5 (9/8/10)	9/8/2010	139	0.024
UG-6	UG-6 (10/21/97)	10/21/1997	236	0.15

Notes:
< = Less than detection limit.
mg/L = milligrams per liter

Table 4
Summary of Analytical Results for Dissolved-Phase Methane Perimeter Monitoring
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Top of Screen Depth	Methane (mg/L)
GM-15	GWGM-15 (10/20/97)	10/20/1997	165	2.06
	GWGM-15 (10/11/98)	10/11/1998	165	2.14
	GWGM-15 (4/20/99)	4/20/1999	165	2.8
	GWGM-15 (5/10/04)	5/10/2004	165	2.96
	GWGM-996 (5/10/04)	5/10/2004	165	2.57
	GWGM-15 (4/13/10)	4/13/2010	165	2.72
	GWGM-15 (10/5/11)	10/5/2011	165	2.2
	DUP-999 (GM-15) (10/5/11)	10/5/2011	165	2.2
	GWGM-15 (10/9/12)	10/9/2012	165	2.6
	GWGM-15 (10/22/13)	10/22/2013	165	2.9
	GWGM-15 (10/8/14)	10/8/2014	165	1.5
	GWGM-15 (11/4/15)	11/4/2015	165	1.9
	GWGM-15 (9/12/16)	9/12/2016	165	2.6
	DUP-999 (GM-15) (9/12/16)	9/12/2016	165	2.6
	GWGM-15 (9/21/17)	9/21/2017	165	2.2
	DUP-997 (GM-15) (9/21/17)	9/21/2017	165	2.2
	GWGM-15 (9/26/18)	9/26/2018	165	1.6
	DUP-999 (GM-15) (9/26/18)	9/26/2018	165	1.6
GM-59	GWGM-59 (11/17/98)	11/17/1998	114	0.16
	GWGM-59 (4/28/99)	4/28/1999	114	0.17
	GWGM-59 (5/15/04)	5/15/2004	114	0.49
	GWGM-997 (5/22/04)	5/22/2004	114	0.062
	GWGM-59 (7/29/05)	7/29/2005	114	0.09
	GWGM-59 (1/11/07)	1/11/2007	114	0.089
	GWGM-999 (1/11/07)	1/11/2007	114	0.077
	GWGM-59 (6/3/08)	6/3/2008	114	0.012
	GWGM-59 (8/25/09)	8/25/2009	114	0.19
	GWGM-59 (9/7/10)	9/7/2010	114	0.053
	GWGM-59 (10/4/11)	10/4/2011	114	0.16
	GWGM-59 (10/8/12)	10/8/2012	114	0.21
	GWGM-59 (10/22/13)	10/22/2013	114	0.071
	DUP-999 (GM-59) (10/22/13)	10/22/2013	114	0.058
	GWGM-59 (10/8/14)	10/8/2014	114	0.088
	GWGM-59 (11/5/15)	11/5/2015	114	0.09
	GWGM-59 (9/12/16)	9/12/2016	114	0.068
	GWGM-59 (9/21/17)	9/21/2017	114	0.067
	GWGM-59 (10/1/18)	10/1/2018	114	0.13
GM-61	GWGM-61 (5/3/99)	5/3/1999	138	5.71
	GWGM-61 (5/16/04)	5/16/2004	138	1.11
	GWGM-61 (7/30/05)	7/30/2005	138	0.76
	GWGM-61 (1/9/07)	1/9/2007	138	0.007
	GWGM-61 (6/3/08)	6/3/2008	138	1.09
	GWGM-61 (8/27/09)	8/27/2009	138	0.8
	DUP-999 (GM-61) (8/27/09)	8/27/2009	138	0.92
	GWGM-61 (9/9/10)	9/9/2010	138	1.1
	GWGM-61 (10/4/11)	10/4/2011	138	0.47

Table 4
Summary of Analytical Results for Dissolved-Phase Methane Perimeter Monitoring
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Top of Screen Depth	Methane (mg/L)
GM-61 (continued)	DUP-999 (GM-61) (10/08/12)	10/8/2012	138	0.38
	GWGM-61 (10/8/12)	10/8/2012	138	0.71
	GWGM-61 (10/22/13)	10/22/2013	138	0.76
	GWGM-61 (10/14/14)	10/14/2014	138	0.022
	DUP-998 (GM-61) (10/14/14)	10/14/2014	138	0.02
	GWGM-61 (11/5/15)	11/5/2015	138	0.092
	GWGM-61 (9/13/16)	9/13/2016	138	0.14
	GWGM-61 (9/21/17)	9/21/2017	138	0.002
	GWGM-61 (9/25/18)	9/25/2018	138	0.15
GM-68	GWGM-68 (10/17/00)	10/17/2000	140	0.02
	GWGM-68 (5/24/04)	5/24/2004	140	0.077
	GWGM-68 (7/31/05)	7/31/2005	140	0.02
	GWGM-68 (1/12/07)	1/12/2007	140	<0.002
	GWGM-68 (6/2/08)	6/2/2008	140	0.01
	GWGM-68 (8/24/09)	8/24/2009	140	0.11
	GWGM-68 (9/8/10)	9/8/2010	140	0.0006
	GWGM-68 (10/4/11)	10/4/2011	140	<0.0002
	GWGM-68 (10/8/12)	10/8/2012	140	0.028
	GWGM-68 (10/22/13)	10/22/2013	140	0.0039
	GWGM-68 (10/8/14)	10/8/2014	140	0.0054
	GWGM-68 (11/4/15)	11/4/2015	140	0.01
	DUP-999 (GM-68) (11/4/15)	11/4/2015	140	0.014
	GWGM-68 (9/12/16)	9/12/2016	140	0.031
	GWGM-68 (9/21/17)	9/21/2017	140	0.0069
	GWGM-68 (10/1/18)	10/1/2018	140	0.028
GM-85	GWGM-85 (9/1/04)	9/1/2004	75	0.01
	GWGM-85 (7/31/05)	7/31/2005	75	0.01
	GWGM-85 (1/12/07)	1/12/2007	75	0.005
	GWGM-85 (6/2/08)	6/2/2008	75	0.25
	GWGM-85 (8/25/09)	8/25/2009	75	0.015
	GWGM-85 (4/13/10)	4/13/2010	75	0.06
	GWGM-85 (9/8/10)	9/8/2010	75	0.0024
	GWGM-85 (10/4/11)	10/4/2011	75	0.00071
	GWGM-85 (10/8/12)	10/8/2012	75	0.087
	GWGM-85 (10/22/13)	10/22/2013	75	0.085
	GWGM-85 (10/8/14)	10/8/2014	75	0.18
	GWGM-85 (11/4/15)	11/4/2015	75	0.59
	GWGM-85 (9/12/16)	9/12/2016	75	0.2
	GWGM-85 (9/20/17)	9/20/2017	75	0.047
	GWGM-85 (9/25/18)	9/25/2018	75	0.014

Table 5
Summary of Analytical Results for Dissolved-Phase Methane Proposed Perimeter
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
BR-6	GWBR-6 (6/29/97)	6/29/1997	149	0.013
	GWBR-6 (V) (1/7/16)	1/7/2016	149	0.013
	GWBR-6 (I) (1/7/16)	1/7/2016	149	0.02
	GWBR-6 (4/19/16)	4/19/2016	149	0.029
	DUP-998 (BR-6) (7/13/16)	7/13/2016	149	0.012
	GWBR-6 (7/13/16)	7/13/2016	149	0.011
	GWBR-6 (10/19/16)	10/19/2016	149	0.00053
	GWBR-6 (1/19/17)	1/19/2017	149	0.0041
	GWBR-6 (5/4/2017)	5/4/2017	149	0.00081
	GWBR-6 (7/26/17)	7/26/2017	149	0.0067
	GWBR-6 (11/30/17)	11/30/2017	149	0.0014
	GWBR-6 (9/14/18)	9/14/2018	149	0.0087
	GWBR-6 (4/16/19)	4/16/2019	149	0.0057
GM-7	GWGM-7 (6/29/97)	6/29/1997	145	16.3
	GWGM-7 (10/11/97)	10/11/1997	145	31.7
	GWGM-7 (10/23/98)	10/23/1998	145	25.3
	GWGM-7 (5/1/99)	5/1/1999	145	31.6
	GWGM-7 (9/23/03)	9/23/2003	145	16.6
	GWGM-7 (5/3/04)	5/3/2004	145	20.1
	GWGM-7 (10/6/11)	10/6/2011	145	6
	GWGM-7 (12/10/13)	12/10/2013	145	6.1
	GWGM-7 (10/2/15)	10/2/2015	145	9.3
	GWGM-7 (4/19/16)	4/19/2016	145	7.4
	GWGM-7 (7/14/16)	7/14/2016	145	7.2
	GWGM-7 (10/20/16)	10/20/2016	145	5
	GWGM-7 (1/16/17)	1/16/2017	145	4.9
	GWGM-7 (5/4/17)	5/4/2017	145	5.1
	GWGM-7 (7/27/17)	7/27/2017	145	5.5
	GWGM-7 (9/26/17)	9/26/2017	145	5.7
	GWGM-7 (9/17/18)	9/17/2018	145	3.6
GM-15	GWGM-15 (10/20/97)	10/20/1997	165	2.06
	GWGM-15 (10/11/98)	10/11/1998	165	2.14
	GWGM-15 (4/20/99)	4/20/1999	165	2.8
	GWGM-15 (5/10/04)	5/10/2004	165	2.96
	GWGM-996 (5/10/04)	5/10/2004	165	2.57
	GWGM-15 (4/13/10)	4/13/2010	165	2.72
	GWGM-15 (10/5/11)	10/5/2011	165	2.2
	DUP-999 (GM-15) (10/5/11)	10/5/2011	165	2.2
	GWGM-15 (10/9/12)	10/9/2012	165	2.6
	GWGM-15 (10/22/13)	10/22/2013	165	2.9

Table 5
Summary of Analytical Results for Dissolved-Phase Methane Proposed Perimeter
Groundwater Response Activity Plan, Dissolved-Phase Methane
Ford-Kingsford Products Facility
Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-15 (continued)	GWGM-15 (10/8/14)	10/8/2014	165	1.5
	GWGM-15 (11/4/15)	11/4/2015	165	1.9
	GWGM-15 (9/12/16)	9/12/2016	165	2.6
	DUP-999 (GM-15) (9/12/16)	9/12/2016	165	2.6
	GWGM-15 (9/21/17)	9/21/2017	165	2.2
	DUP-997 (GM-15) (9/21/17)	9/21/2017	165	2.2
	GWGM-15 (9/26/18)	9/26/2018	165	1.6
	DUP-999 (GM-15) (9/26/18)	9/26/2018	165	1.6
GM-59	GWGM-59 (11/17/98)	11/17/1998	114	0.16
	GWGM-59 (4/28/99)	4/28/1999	114	0.17
	GWGM-59 (5/15/04)	5/15/2004	114	0.49
	GWGM-997 (5/22/04)	5/22/2004	114	0.062
	GWGM-59 (7/29/05)	7/29/2005	114	0.09
	GWGM-59 (1/11/07)	1/11/2007	114	0.089
	GWGM-999 (1/11/07)	1/11/2007	114	0.077
	GWGM-59 (6/3/08)	6/3/2008	114	0.012
	GWGM-59 (8/25/09)	8/25/2009	114	0.19
	GWGM-59 (9/7/10)	9/7/2010	114	0.053
	GWGM-59 (10/4/11)	10/4/2011	114	0.16
	GWGM-59 (10/8/12)	10/8/2012	114	0.21
	GWGM-59 (10/22/13)	10/22/2013	114	0.071
	DUP-999 (GM-59) (10/22/13)	10/22/2013	114	0.058
	GWGM-59 (10/8/14)	10/8/2014	114	0.088
	GWGM-59 (11/5/15)	11/5/2015	114	0.09
	GWGM-59 (9/12/16)	9/12/2016	114	0.068
	GWGM-59 (9/21/17)	9/21/2017	114	0.067
	GWGM-59 (10/1/18)	10/1/2018	114	0.13
GM-61	GWGM-61 (5/3/99)	5/3/1999	138	5.71
	GWGM-61 (5/16/04)	5/16/2004	138	1.11
	GWGM-61 (7/30/05)	7/30/2005	138	0.76
	GWGM-61 (1/9/07)	1/9/2007	138	0.007
	GWGM-61 (6/3/08)	6/3/2008	138	1.09
	GWGM-61 (8/27/09)	8/27/2009	138	0.8
	DUP-999 (GM-61) (8/27/09)	8/27/2009	138	0.92
	GWGM-61 (9/9/10)	9/9/2010	138	1.1
	GWGM-61 (10/4/11)	10/4/2011	138	0.47
	DUP-999 (GM-61) (10/08/12)	10/8/2012	138	0.38
	GWGM-61 (10/8/12)	10/8/2012	138	0.71
	GWGM-61 (10/22/13)	10/22/2013	138	0.76
	GWGM-61 (10/14/14)	10/14/2014	138	0.022

Table 5

Summary of Analytical Results for Dissolved-Phase Methane Proposed Perimeter

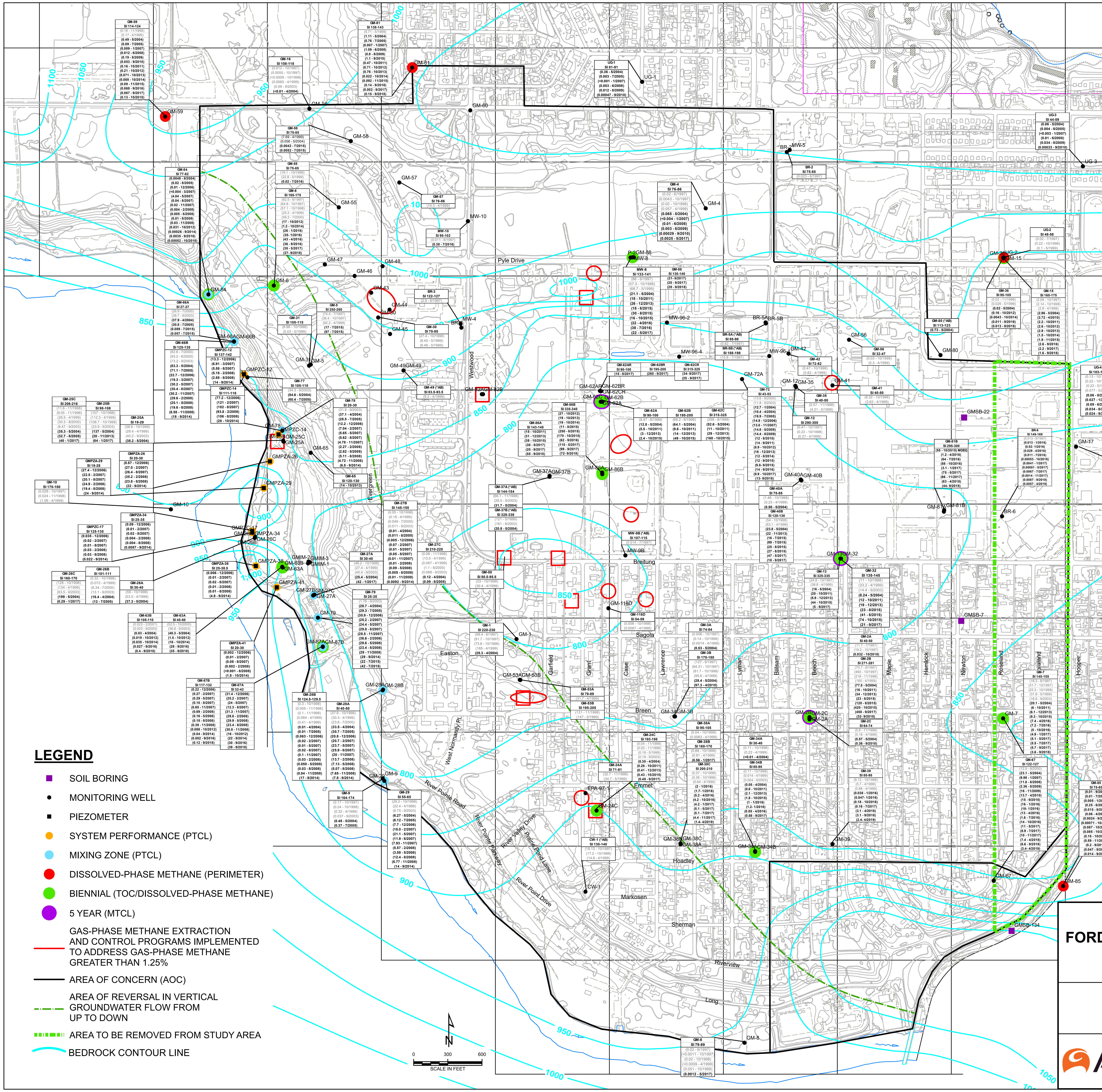
Groundwater Response Activity Plan, Dissolved-Phase Methane

Ford-Kingsford Products Facility

Kingsford, Michigan

Well/Boring	Sample ID	Sample Date	Screen	Methane (mg/L)
GM-61	DUP-998 (GM-61) (10/14/14)	10/14/2014	138	0.02
	GWGM-61 (11/5/15)	11/5/2015	138	0.092
	GWGM-61 (9/13/16)	9/13/2016	138	0.14
	GWGM-61 (9/21/17)	9/21/2017	138	0.002
	GWGM-61 (9/25/18)	9/25/2018	138	0.15
GM-67	GWGM-67 (8/7/00)	8/7/2000	122	12.9
	GWGM-67 (5/17/04)	5/17/2004	122	23.1
	GWGM-67 (1/12/07)	1/12/2007	122	9.98
	GWGM-67 (6/2/08)	6/2/2008	122	11.8
	GWGM-67 (8/24/09)	8/24/2009	122	2.36
	GWGM-67 (11/14/09)	11/14/2009	122	16
	GWGM-67 (4/13/10)	4/13/2010	122	13.7
	GWGM-67 (9/9/10)	9/9/2010	122	15
	DUP-999 (GM-67) (9/9/10)	9/9/2010	122	16
	GWGM-67 (V) (1/8/16)	1/8/2016	122	16
	GWGM-67 (I) (1/8/16)	1/8/2016	122	18
	GWGM-67 (4/20/16)	4/20/2016	122	13
	GWGM-67 (7/14/16)	7/14/2016	122	1.6
	GWGM-67 (10/20/16)	10/20/2016	122	14
	GWGM-67 (5/5/17)	5/5/2017	122	11
	GWGM-67 (7/27/17)	7/27/2017	122	8.9
	GWGM-67 (11/1/17)	11/1/2017	122	10
	DUP-999 (GM-67) (11/1/17)	11/1/2017	122	9.7
	GWGM-67 (4/20/18)	4/20/2018	122	7.4
	GWGM-67 (9/17/18)	9/17/2018	122	6.6
	GWGM-67 (4/16/19)	4/16/2019	122	3.4

FIGURES



NOTES:

1. "SI" INDICATES SCREENED INTERVAL.

2. "(*AB)" INDICATES THE MONITORING WELL HAS BEEN ABANDONED.

3. 20.1 (5/2004) INDICATES DISSOLVED-PHASE METHANE CONCENTRATION IN MILLIGRAMS PER LITER (mg/L), COLLECTED IN MAY 2004.

4. BOLD: DATA REPRESENTS DISSOLVED-PHASE METHANE CONCENTRATIONS RECORDED DURING IMPLEMENTATION OF FULL EXTRACTION AND CONTROL PROGRAMS (BEGINNING IN 2004 TIMEFRAME) TO ADDRESS 1.25 PERCENT BY VOLUME GAS-PHASE METHANE (I.E., IN COMPLIANCE WITH CONSENT JUDGEMENT OBJECTIVES).

5. NON-BOLD: DATA REPRESENTS DISSOLVED-PHASE METHANE CONCENTRATIONS RECORDED PRIOR TO IMPLEMENTATION OF FULL EXTRACTION AND CONTROL PROGRAMS (I.E., PRE-2004).

LEGEND

- SOIL BORING
- MONITORING WELL
- PIEZOMETER
- SYSTEM PERFORMANCE (PTCL)
- MIXING ZONE (PTCL)
- DISSOLVED-PHASE METHANE (PERIMETER)
- BIENNIAL (TOC/DISSOLVED-PHASE METHANE)
- 5 YEAR (MTCL)
- GAS-PHASE METHANE EXTRACTION AND CONTROL PROGRAMS IMPLEMENTED TO ADDRESS GAS-PHASE METHANE GREATER THAN 1.25%
- AREA OF CONCERN (AOC)
- AREA OF REVERSAL IN VERTICAL GROUNDWATER FLOW FROM UP TO DOWN
- AREA TO BE REMOVED FROM STUDY AREA
- BEDROCK CONTOUR LINE

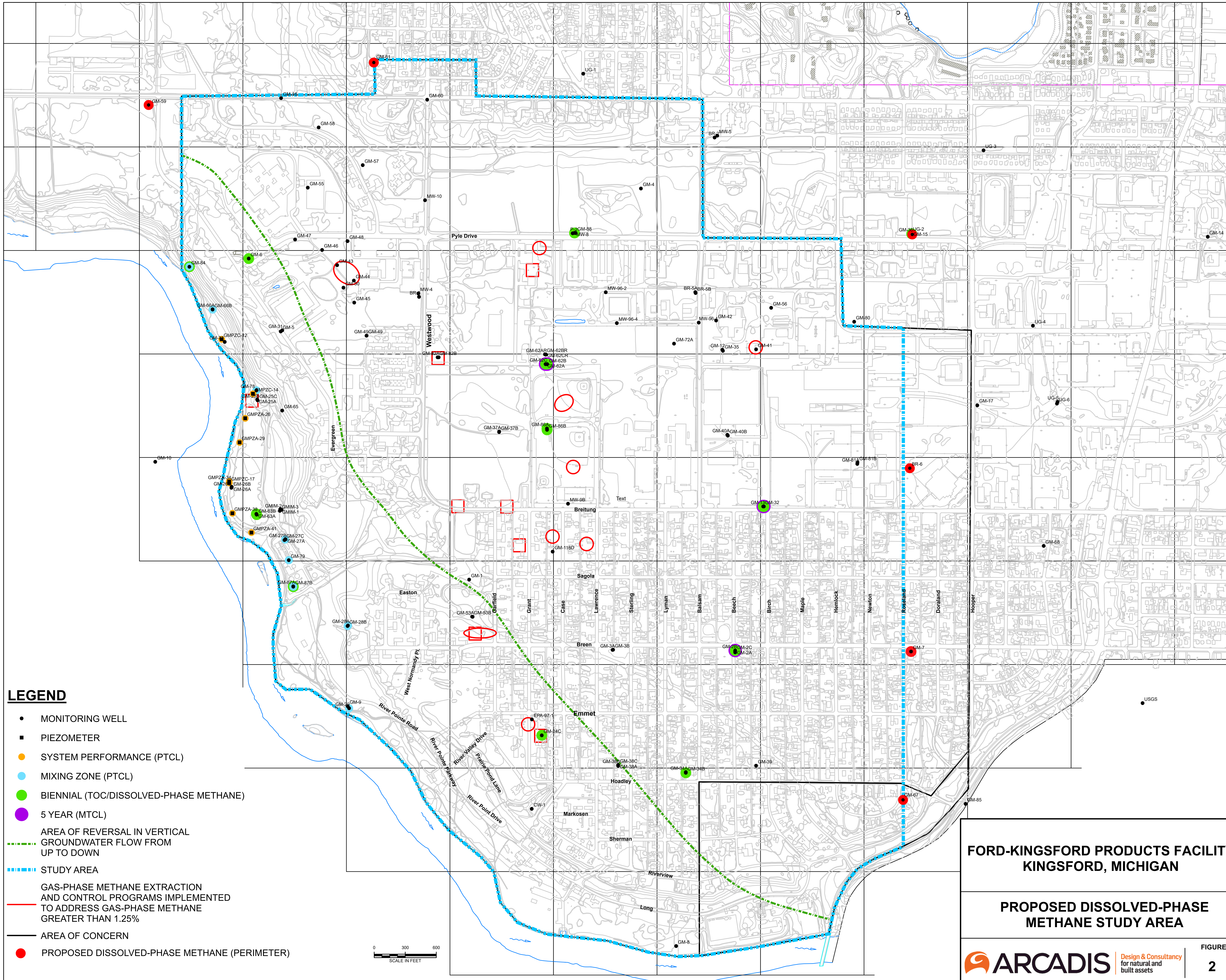
0 300 600
SCALE IN FEET

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

DISSOLVED-PHASE METHANE RESULTS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

PROPOSED DISSOLVED-PHASE METHANE STUDY AREA

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

APPENDIX A

Groundwater Ordinances

ORDINANCE NO. 272

AN ORDINANCE PROVIDING FOR THE REGULATION AND RESTRICTION OF WELLS IN CERTAIN AREAS OF THE CITY, BY ADDING ARTICLE V, REGULATION AND RESTRICTIONS OF WELLS TO CHAPTER 16 OF THE KINGSFORD CITY CODE.

The City of Kingsford Ordains:

Section 16-131: PURPOSES. The purposes of this Ordinance are i) to provide for the protection of the public health, safety, and welfare in connection with the use of groundwater within the Restricted Zone in the City of Kingsford, ii) to prevent exposure of Persons to groundwater Contamination in the Restricted Zone which exceeds applicable state or federal criteria; iii) to prevent exposure of Persons to methane or methane accumulations in the Restricted Zone above applicable state or federal criteria, and iv) to prevent the capture, exacerbation, spreading or migration of hazardous substances (which exceed applicable state or federal criteria) in groundwater in the Restricted Zone by the installation and use of Wells, as defined below.

Section 16-132: DEFINITIONS. When used in this Ordinance, the following terms shall have the meanings set forth below:

(a) "Contaminated" or "Contamination" means hazardous substances in concentrations in groundwater within the Restricted Zone that exceed any residential drinking water criteria established by the Michigan Department of Environment Quality (MDEQ) in rules pursuant to Part 201, Environmental Remediation, or Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

(b) "MDEQ" means the Michigan Department of Environment Quality or its successor agency.

(c) "Included Premises" shall mean a parcel of property any part of which is located within the Restricted Zone.

(d) "Person" means any individual, partnership, corporation, association, club, joint venture, estate, trust, and any other group or combination acting as a unit.

(e) "Restricted Zone" shall mean an area described as follows:

All that area lying in Sections One (1), Two (2), Eleven (11) and Twelve (12), Town 39 North, Range 31 West, City of Kingsford, County of Dickinson, Michigan, described as the following:
Beginning at a point approximately 353 feet west of the centerline intersection of North Pyle Drive with Woodward Avenue; thence south to the intersection with the Menominee River; thence southeasterly, south, southeasterly, and east meandering along the northerly shoreline of the Menominee

River until an intersection of the north bank of the Menominee River with the east side of Balsam Street projected to the Menominee River; thence north along the east of Balsam Street to the southeast corner of the intersection of Balsam Street with Hoadley Avenue; thence east along the southern side of Hoadley Avenue to the southeast corner of the intersection of Hoadley Avenue with Fox Drive; thence northeast along the east side of Fox Drive to the intersection of Fox Drive with Hooper Street; thence north along the centerline of Hooper Street to the intersection of Hooper Street with East Boulevard; thence west along the centerline of East Boulevard to the intersection of East Boulevard with North Boulevard; thence north along the centerline of North Boulevard to the intersection of North Boulevard with Pyle Drive; thence west along the centerline of Pyle Drive to the intersection of Pyle Drive with Balsam Street; thence north along the centerline of Balsam Street to the intersection of Balsam Street with Woodward Avenue, thence west along the centerline of Woodward Avenue to a point approximately 500 feet east from the intersection of the centerline of Westwood Avenue with Woodward Avenue; thence north approximately 350 feet; thence west approximately 1,000 feet along a line parallel with Woodward Avenue; thence south approximately 350 feet to the centerline of Woodward Avenue; thence west along the centerline of Woodward Avenue to the beginning point.

A map of the "Restricted Zone" is attached as Figure 1.

(f) "Well" means an opening in the surface of the earth for the purpose of removing water from the ground through non-mechanical or mechanical means for any purpose other than i) obtaining groundwater as part of a response action consistent with the Michigan Natural Resources and Environmental Protection Act of 1994, as amended, ("NREPA"), or ii) removal of wastewater from a septic tank.

Section 16-133: PROHIBITION OF INSTALLATION AND USE OF WELLS WITHIN RESTRICTED ZONE. Unless an exception is issued to a Person under Section 16-134 of this Ordinance, no Person shall allow, permit, maintain, install, use, or have available for use a Well on any Included Premises.

Section 16-134: EXCEPTIONS. The City Manager may, upon written application to the City Manager by a Person, issue a written exception which authorizes a Person to allow, permit, maintain, install or use a well in the Restricted Zone which would otherwise qualify as a Well but for the exception issued by the City Manager. No exception shall be issued unless the exception is consistent with:

(a) the protection of the public health, safety and welfare in connection with the use of groundwater within the Restricted Zone,

(b) the prevention of exposure of Persons to Contamination in the Restricted Zone or to hazardous substances in groundwater which exceed criteria established, specified or provided for in or pursuant to any final order, judgment or consent decree to which the MDEQ is a party, whichever applies in the Restricted Zone.

(c) the prevention of exposure of Persons to methane or methane accumulations in the Restricted Zone above statewide criteria, or criteria established, specified or provided for in or pursuant to any final order, judgment or consent decree to which the MDEQ is a party, whichever applies in the Restricted Zone.

(d) the prevention of exacerbation of Contamination, spreading Contamination, and cross Contamination between saturated zones.

(e) the prevention of any interference with any environmental response action with respect to Contamination.

The Person applying for an exception shall submit a written due care analysis consistent with due care requirements in Part 201 of NREPA to the City Manager as part of that Person's application. The City Manager shall include compliance with due care conditions in any exception issued.

Prior to making a decision on a Person's application for an exception, the City Manager shall consult with the MDEQ and with any Persons performing environmental response actions with respect to the Contamination. The City Manager may request that any Person performing environmental response actions with respect to Contamination provide technical and other assistance to the City Manager in connection with the City Manager's review of and determinations made regarding the application for an exception. If the City Manager issues an exception, such exception may be issued subject to conditions imposed by the City Manager to assure that such exception is consistent with this Ordinance. If a Person is aggrieved by any decision by the City Manager regarding an application for an exception or any conditions in an issued exception, then such Person may submit a written request to the City Council for review of such decision. The aggrieved Person may submit written or oral information and statements to the City Council and the City Council shall affirm, modify or overturn such decision by the City Manager.

Section 16-135: VIOLATION OF EXCEPTION CONDITIONS. No Person shall violate any condition specified in a written exception issued by the City Manager to such Person under Section 16-134 of this Ordinance.

Section 16-136: WELL ABANDONMENT. A survey of existing wells within the Restricted Zone has been conducted prior to the effective date of this ordinance by Ford Motor Company and The Kingsford Products Company. All Wells within the Restricted Zone have been properly abandoned as of the effective date of this Ordinance in accordance with either the American Standards for Testing and Materials (ASTM) Standard #D5299-99 (non-drinking water wells) or the Groundwater Quality Control Act Part 127, 1978 PA 368 (drinking water wells).

Section 16-137: CITY INSPECTIONS; ENFORCEMENT. When the City determines that a violation of this Ordinance exists, the City Manager shall notify by appropriate means the Persons who are the owners or occupants of the Included Premises where such violation has been so determined to exist of the existence of the violation and that the Person or Persons must terminate such violation. A copy of the notice of violation shall also be provided to the County Health Department.

Section 16-138: NOTICE TO COUNTY HEALTH DEPARTMENT. Within seven (7) days after the effective date of this Ordinance, the City shall provide to the County Health Department a copy of this Ordinance.

Section 16-139: MODIFICATION OR REPEAL OF THIS ORDINANCE; NOTICE TO MDEQ. In the event this Ordinance is considered for modification or repeal by the City, where said modification or repeal will allow the installation or use of Wells in the Restricted Zone, this Ordinance shall not be modified or repealed except upon 30 days' prior written notice to MDEQ.

Section 16-140: PENALTY, REMEDIES.

Section 16-140.1: CIVIL INFRACTION. Any Person violating this Ordinance shall be liable for a civil infraction and each day that the violation continues to occur shall be a separate offense.

Section 16-140.2: INJUNCTIVE RELIEF. The City may further enforce this Ordinance by action seeking injunctive relief in a court of competent jurisdiction against a Person in violation of this Ordinance. In such an action the City shall be awarded its costs, damages, and actual attorney fees if the City establishes that such Person was in violation of this Ordinance.

Section 16-140.3: PUBLIC NUISANCE. A violation of this Ordinance is hereby declared to be a public nuisance and shall be abated by immediately taking the Well out of service and properly abandoning and closing it. The City may seek abatement of such public nuisance in a court of competent jurisdiction and, in such action, recover its costs, damages, and actual attorney fees.

Section 16-141: REPEAL; SEVERABILITY. All provisions/sections of any City of Kingsford Ordinances heretofore adopted, inconsistent with the provisions of this Ordinance are hereby repealed. In the event any part of this Ordinance is finally determined to be invalid or unenforceable by a court of competent jurisdiction, then said determination shall not affect the validity of the remaining provisions. The City shall promptly notify MDEQ upon the occurrence of any event described in the preceding sentence.

Section 16-142: EFFECTIVE DATE. This Ordinance shall become effective twenty-one (21) days after its adoption.

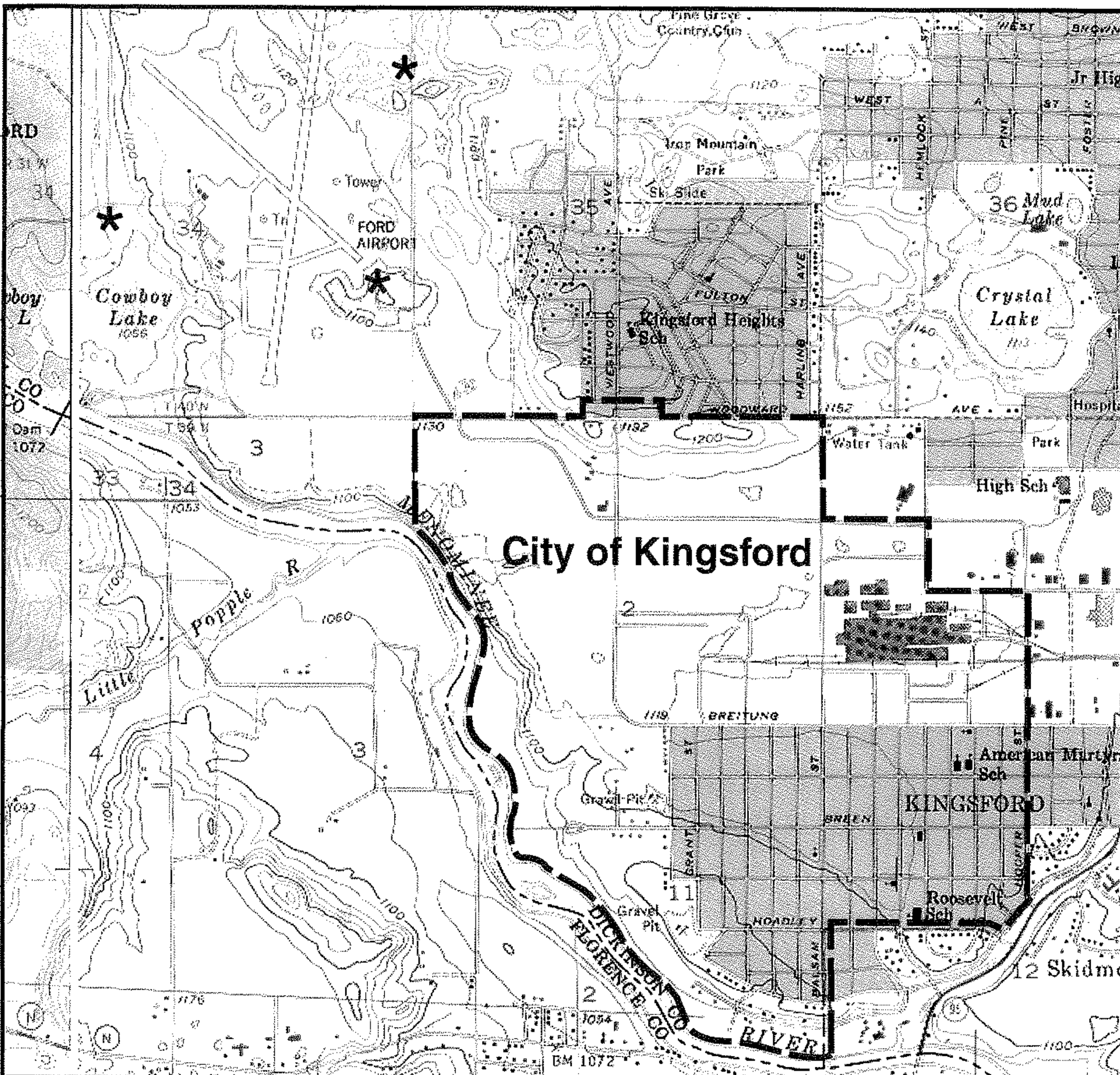
ADOPTED: 8/15/11

Paul Novara
Mayor

EFFECTIVE: 9/5/11

Darryl K. Wickman
City Clerk/Manager

070511h.pso



SOURCE: USGS 7.5 Minute Topographic Map, IRON MOUNTAIN, MICHIGAN Quadrangle, 1955 Photorevised 1982

N

0 1000 2000 4000

SCALE IN FEET

Restricted Zone

* Kingsford City Supply Well

ARCADIS

RESTRICTED ZONE

FORD-KINGSFORD PRODUCTS
KINGSFORD, MICHIGAN

FIGURE 1

DRAFTER: LMB | APPROVED: | CHECKED: RLS | DRAWING: SITELOC CITY OF KINGSFORD.AI | FILE NO.: GRAPHICS | PN: FORD\WI0637\CJ2011 | DWG DATE: 11JULY11

ORDINANCE NO. 1 of 2011
AN ORDINANCE OF BREITUNG TOWNSHIP
RESTRICTING WELLS

AN ORDINANCE PROVIDING FOR THE REGULATION AND RESTRICTION OF WELLS IN CERTAIN AREAS OF THE TOWNSHIP, BY ADDING REGULATION AND RESTRICTIONS OF WELLS TO SECTION 52 OF THE CHARTER TOWNSHIP OF BREITUNG CODE OF ORDINANCES.

Breitung Township Ordains:

Section 1: APPLICABILITY. This Ordinance applies only to the "Restricted Zone," the area depicted in Figure 1 and described as follows:

> All that area lying in Section Twelve (12), Town 39 North, Range 31 West, Breitung Township, County of Dickinson, Michigan, described as the following:
>
> Beginning at a point at the southwest corner of the intersection of Hooper Street and Fox Drive; thence approximately 600 feet southwest along the east side of Fox Drive until it intersects with the southeast corner of the intersection of Fox Drive and Hoadley Avenue, thence approximately 2,200 feet northwest and west along the south side of Hoadley Avenue until it intersects with the southeast corner of the intersection of Hoadley Avenue and Balsam Street; thence approximately 1,660 feet south on the east side of Balsam Street to the end of Balsam Street, and continuing on a similar azimuth until the intersection with the Menominee River; thence approximately 1,200 feet east along the north shoreline of the Menominee River to the intersection with Highway M-95 (Carpenter Road); thence approximately 2,200 feet northeast along the west side of Highway M-95 to a point directly south of the beginning point; thence approximately 230 feet north to the beginning point at the southwest corner of the intersection of Hooper Street and Fox Drive.

The Restricted Zone was the subject of environmental response activities by Arcadis U.S., Inc., on behalf of Ford Motor Company and The Kingsford Products Company.

Section 2: PURPOSES. The purposes of this Ordinance are: i) to provide for the protection of the public health, safety, and welfare in connection with the use of groundwater within the Restricted Zone in Breitung Township, ii) to prevent exposure of Persons to groundwater Contamination in the Restricted Zone which exceeds applicable state or federal criteria, iii) to prevent exposure of Persons to methane or methane accumulations in the Restricted Zone above applicable state or federal criteria, and iv) to prevent the capture, exacerbation, spreading or migration of hazardous substances (which exceed applicable state or federal criteria) in groundwater in the Restricted Zone by the installation and use of Wells, as defined below.

Section 3: DEFINITIONS. When used in this Ordinance, the following terms shall have the meanings set forth below:

(a) "Contaminated" or "Contamination" means hazardous substances in concentrations in groundwater within the Restricted Zone that exceed any residential drinking water criteria established by the Michigan Department of Environment Quality (MDEQ) in rules pursuant to Part 201, Environmental Remediation, or Part 213, Leaking Underground Storage Tanks, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended.

(b) "MDEQ" means the Michigan Department of Environment Quality or its successor agency.

(c) "Included Premises" shall mean a parcel of property any part of which is located within the Restricted Zone.

(d) "Person" means any individual, partnership, corporation, association, club, joint venture, estate, trust, and any other group or combination acting as a unit.

(e) "Saturated Zone" means soil or rock below the ground surface which is below the water table and which has water filling the pore spaces.

(f) "Well" means an opening in the surface of the earth for the purpose of removing water from the ground through non-mechanical or mechanical means for any purpose other than i) obtaining groundwater as part of a response action consistent with the Michigan Natural Resources and Environmental Protection Act of 1994, as amended, ("NREPA"), or ii) removal of wastewater from a septic tank.

Section 4: PROHIBITION OF INSTALLATION AND USE OF WELLS WITHIN RESTRICTED ZONE. In addition to the prohibition of private wells pursuant to Breitung Township Ordinance 52.004, no person in the Restricted Zone, whether in a platted or unplatted area, shall allow, permit, maintain, install, use, or have available for use a Well on any Included Premises.

Section 5: WELL ABANDONMENT. A survey of existing wells within the Restricted Zone has been conducted prior to the effective date of this ordinance by Ford Motor Company and The Kingsford Products Company. According to the best knowledge of Arcadis U.S., Inc., on behalf of Ford Motor Company and The Kingsford Products Company, all Wells within the Restricted Zone have been properly abandoned as of the effective date of this Ordinance in accordance with the American Standards for Testing and Materials (ASTM) Standard #D5299-99 (non-drinking water wells) or the Groundwater Quality Control Act Part 127, 1978 PA 368 (drinking water wells).

Section 6: TOWNSHIP INSPECTIONS; ENFORCEMENT. When the Township determines that a violation of this Ordinance exists, the Township Superintendent shall notify by appropriate means the Persons who are the owners or occupants of the Included Premises where such violation has been so determined to exist of the existence of the violation and that the Person or Persons must terminate such violation.

Section 7: NOTICE TO COUNTY HEALTH DEPARTMENT. Within seven (7) days after the effective date of this Ordinance, the Township shall provide to the County Health Department a copy of this Ordinance.

Section 8: MODIFICATION OR REPEAL OF THIS ORDINANCE; NOTICE TO THE MDEQ. In the event this Ordinance is considered for modification or repeal by the Township, where said modification or repeal will allow the installation or use of Wells in the Restricted Zone, this Ordinance shall not be modified or repealed except upon 30 days' prior written notice to the MDEQ.

Section 9: PENALTY. Any person violating this Ordinance shall be liable for a civil infraction and each day that the violation continues to occur shall be a separate offense. The Township may enforce this Ordinance by any means available pursuant to Section 32.01(E)(2) of the Code of Ordinances, including through an action seeking injunctive relief in a court of competent jurisdiction against a Person in violation of this Ordinance. In such an action the Township shall be awarded its costs, damages, and actual attorney fees if the Township establishes that such a Person was in violation of this Ordinance. A violation of this Ordinance is hereby declared to be a public nuisance and shall be abated by immediately taking the Well out of service and properly abandoning and closing it. The Township may seek abatement of such public nuisance in a court of competent jurisdiction and, in such action, recover its costs, damages, and actual attorney fees.

Section 10: SEVERABILITY. In the event any part of this Ordinance is finally determined to be invalid or unenforceable by a court of competent jurisdiction, then said determination shall not affect the validity of the remaining provisions. The Township shall promptly notify the MDEQ upon the occurrence of any event described in the preceding sentence.

Section 11: EFFECTIVE DATE. This Ordinance shall become effective twenty-one (21) days after its adoption.

I, Samantha Coron, hereby certify that the above Ordinance NO. 1 0f 2011 is an ordinance providing for the regulation and restriction of wells in certain areas of the township, by adding regulation and restrictions of wells to Section 52 of The Charter Township of Breitung code of ordinances. THIS ORDINANCE SHALL BE CALLED ORDINANCE OF BREITUNG TOWNSHIP RESTRICTING WELLS for the Charter Township of Breitung, Dickinson County, Michigan, and is a true and complete copy of the Ordinance adopted by the Charter Township of Breitung Board on December 28, 2011 at a meeting held in the Breitung Township Hall at 7:00 p.m.

Samantha Coron

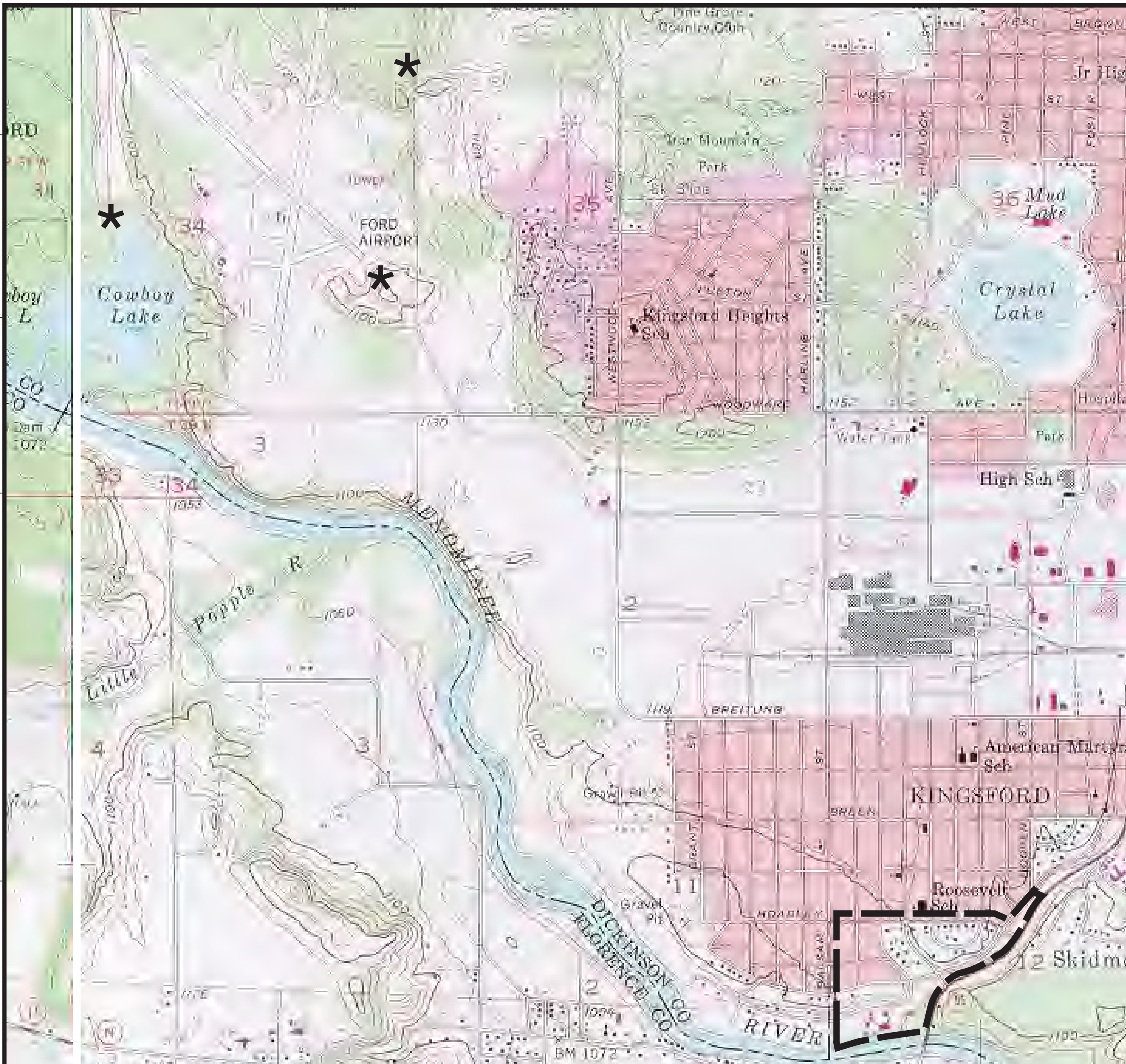
Samantha Coron
Township Clerk

Denny Olson

Denny Olson
Breitung Township Supervisor

Date of Publication before adoption: October 7, 2011
Name of Newspaper: The Daily News
Date of Passage: December 28, 2011
Date of Publication after adoption: January 2, 2012
Name of Newspaper: The Daily News

Trustee Garrett:	Aye
Trustee Erickson:	Absent
Trustee Gaudette:	Aye
Trustee Dixon:	Aye
Treasurer Cahee:	Aye
Clerk Coron:	Aye
Supervisor Olson:	Aye



SOURCE: USGS 7.5 Minute Topographic Map, IRON MOUNTAIN, MICHIGAN Quadrangle, 1955 Photorevised 1982

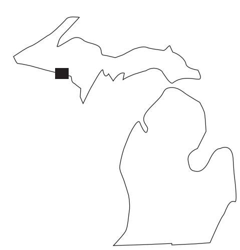
N

0 1000 2000 4000

SCALE IN FEET

— — Breitung Township Restricted Zone

*** Kingsford City Supply Well**



ARCADIS

RESTRICTED ZONE

FORD-KINGSFORD PRODUCTS
KINGSFORD, MICHIGAN

FIGURE

1

DRAFTER: LMB
APPROVED:
CHECKED: RLS
DRAWING: SITELOC BREITUNG TOWNSHIP.AI
FILE NO.: GRAPHICS
PN: FORD\WI0637\CJ2011
DWG DATE: 19AUG11

APPENDIX B

Technical Memorandum

Appropriate Dissolved-Phase Methane Screening Levels to Identity Risks Associated with Gas-Phase Methane

APPROPRIATE DISSOLVED-PHASE METHANE SCREENING LEVELS TO IDENTIFY RISKS ASSOCIATED WITH POTENTIAL GAS-PHASE METHANE

Introduction

Methane is colorless, odorless and can exist as gas-phase (free vapor-phase methane above the water table) or dissolved-phase (below the water table), or both, depending on temperature and pressure. Methane is non-toxic, but flammable in gas-phase concentrations (when mixed with air) between the lower explosive limit (LEL) of 5 percent by volume and the upper explosive limit (UEL) of 15 percent by volume. Gas-phase methane is only a fire/explosion hazard when it is present above the LEL and below the UEL in an enclosed unventilated structure. Dissolved-phase methane is not flammable and presents a potential risk only when it can potentially act as a source of gas-phase methane, and only when it could potentially release gas-phase methane at a concentration greater than the LEL.

Purpose

This technical memorandum presents the background and scientific rationale for appropriate screening levels for dissolved-phase methane in groundwater. Specifically, this paper will focus on appropriate dissolved-phase methane screening levels for groundwater in Michigan. However, as discussed below, using regional, state, or site-specific groundwater temperatures and pressures will provide appropriate screening levels for dissolved-phase methane at any location.

It is important to note that dissolved-phase methane concentrations found in groundwater are an indication of the potential for gas-phase methane release/production. Dissolved-phase methane should be used as a screening tool to evaluate the potential for gas-phase methane release (i.e., dissolved-phase methane concentrations above the established screening level would trigger gas-phase methane monitoring) rather than used as a regulatory criteria or limit. Regardless of the screening level for dissolved-phase methane, it is critical to establish and maintain a gas-phase methane criterion to ensure that any potential safety risks are appropriately addressed, since gas-phase methane presents the actual risk in an enclosed unventilated structure or at the receptor (if present at a high enough concentration).

Based on the scientific properties of methane (i.e., existing as either dissolved-phase or gas-phase in groundwater, dependent on temperature and pressure), the following screening levels will appropriately evaluate any potential risk due to dissolved-phase methane from the vapor intrusion pathway or from groundwater usage:

- 28 milligrams per liter (mg/L) dissolved-phase methane for areas/locations where groundwater is not being extracted for use within unventilated enclosed structures (i.e., no residential water wells, commercial/industrial process water wells, geothermal systems that are connected to the interior of the structure, etc.).

- 10 mg/L dissolved-phase methane for areas/locations where groundwater is extracted for use within, or is in contact with, unventilated enclosed structures (i.e., where potential mechanical agitation is present due to groundwater extraction or processing pumps, etc.).

Rationale

To determine whether dissolved-phase methane present in groundwater could potentially be a source of gas-phase methane, the solubility limit must be determined and incorporated into any screening level. The solubility limit for methane (i.e., the amount of gas-phase methane that can dissolve into and be stored in water) is the critical controlling factor when discussing dissolved-phase methane. The solubility limit for dissolved-phase methane is dependent on groundwater temperature and pressure, and increases as the pressure increases (i.e., as the depth below the groundwater table increases, so does the pressure, resulting in an increase in the solubility limit for dissolved-phase methane), and increases as the temperature decreases as demonstrated by *a recent thermodynamic model that predicts methane solubility in aqueous fluids at temperatures ranging between 0 to 250 degrees Celsius (*°C) and *pressures ranging between 1 to 1,970 atmospheres (atm)* (Duan and Mao, 2006). The solubility for methane in water at standard temperature and standard pressure (1 atm) has been reported in the literature ranging between 28 and 30 mg/L (Eltschlager, et. al. 2001). However, significant variability is noted in the values for "standard" temperature; 15, 20, and 25 °C (59, 68, and 77 degrees Fahrenheit [°F]) have all been cited. Due to the inconsistent use of standard temperature, use of these published methane solubility values is not recommended for establishing site-specific screening levels.

Solubility should be determined based on actual conditions using site-specific temperature data and the American Society for Testing and Materials (ASTM) E2993-16 Table X1.4 below (ASTM 2016). Using actual temperature data to determine the solubility limit at 1 atmosphere pressure (0 feet below the water table) is critical to accurately assess any potential for dissolved-phase methane to act as a source for gas-phase methane release/production.

Figure 1. ASTM E2993-16 Table X1.4

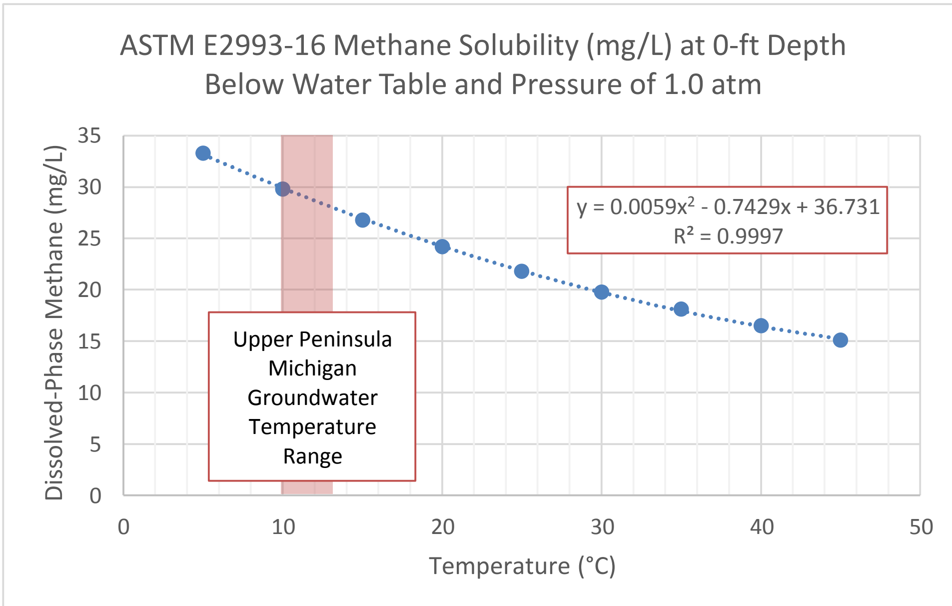
TABLE X1.4 Aqueous Solubility for Methane at Pressure of 1 atm

	Depth below Water Table (Unconfined Aquifer)								
Depth, ft	0	3.3	6.6	9.8	16.4	32.8	65.6	98.4	164.0
Depth, m	0	1	2	3	5	10	20	30	50
Temperature, °C	Water-Saturated Methane Concentration (mg/L-water)								
5	33.3	36.6	39.8	43.0	49.5	65.6	97.9	130.1	194.7
10	29.8	32.7	35.6	38.5	44.3	58.7	87.6	116.5	174.2
15	26.8	29.4	32.0	34.6	39.8	52.7	78.7	104.6	156.5
20	24.2	26.5	28.8	31.2	35.8	47.5	70.9	94.3	141.0
25	21.8	24.0	26.1	28.2	32.4	43.0	64.1	85.3	127.6
30	19.8	21.7	23.7	25.6	29.4	39.0	58.2	77.4	115.8
35	18.1	19.8	21.5	23.3	26.8	35.5	53.0	70.5	105.4
40	16.5	18.1	19.7	21.3	24.5	32.4	48.4	64.3	96.2
45	15.1	16.6	18.0	19.5	22.4	29.7	44.3	58.9	88.1

Partial pressure of methane = total pressure

Figure 1 presents a graphical depiction of the Table X1.4 dissolved-phase methane concentration at 0 ft of depth below the water table and a pressure of 1.0 atmosphere.

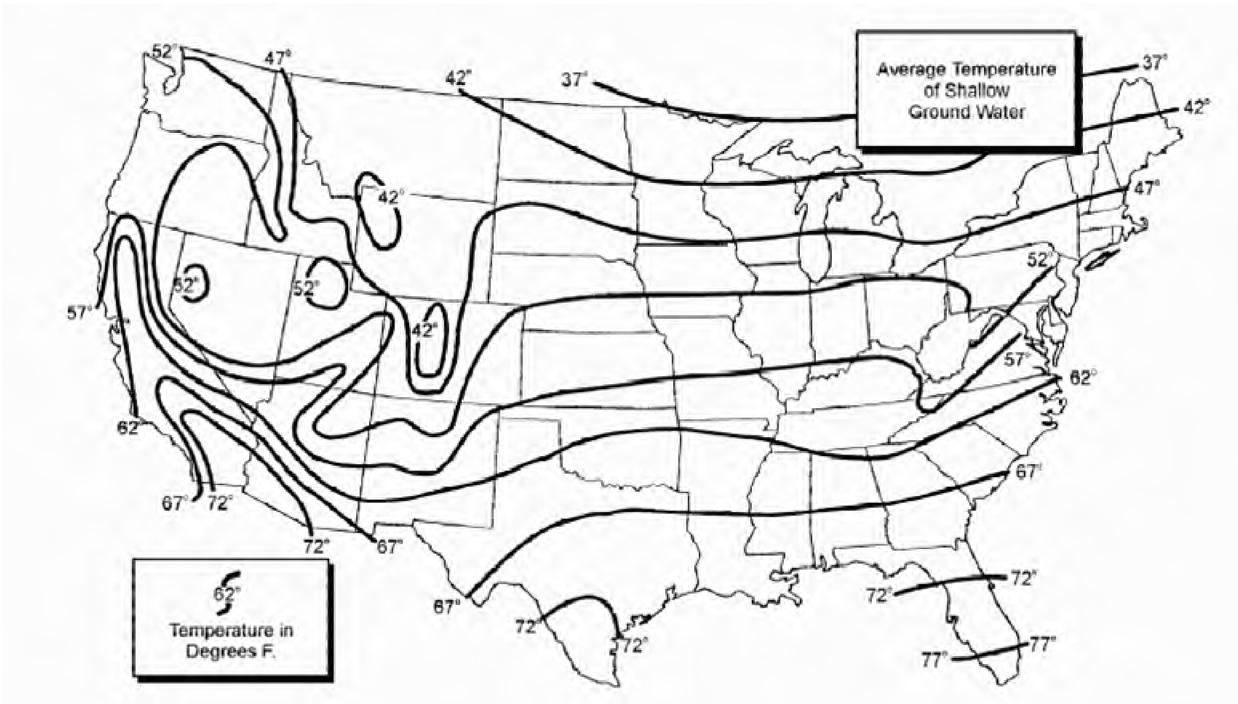
Figure 2. Dissolved-Phase Methane Solubility Curve at Pressure of 1.0 Atmosphere.



Notes:
Assume partial pressure equals total pressure, unconfined aquifer to calculate solubility over typical temperature range for groundwater.

According to the United States Environmental Protection Agency (U.S. EPA) Ecosystems Research division (U.S. EPA, 2016), the average temperature in shallow groundwater for the state of Michigan ranges from 37 to 52 °F (3 to 11 °C), in accordance with Figure 2. County-specific soil temperatures for the state of Michigan are presented in the Michigan Department of Environmental Quality's R 299.7(7), Table 3 and range from 8 to 13 °C (46 to 55 °F). Groundwater cannot be warmer than soil except for frozen shallow soil in winter conditions or if a geothermal uprising is present. Thus, the upper limit (i.e., conservatively high temperature) for shallow groundwater temperature in Michigan is 13 °C (55 °F).

Figure 3. Average Shallow Groundwater Temperature.



To calculate the dissolved-phase methane solubility at temperatures between 5 and 45 °C, the following equation is used (refer to Figure 1 above):

$$\text{Methane Solubility (mg/L)} = 0.0059 \times (\text{Temp. }^{o}\text{C})^2 - 0.7429 \times (\text{Temp. }^{o}\text{C}) + 36.731$$

If site-specific groundwater temperature data is not available, 13 °C (55 °F) is recommended to represent the conservative upper end of average Michigan shallow groundwater temperatures, yielding a solubility limit for dissolved-phase methane of 28 mg/L at the surface of the water table. This ambient (at the groundwater water surface or atmospheric pressure) solubility of 28 mg/L will only increase as the depth below water table increases, due to the resulting increase in pressure and decrease in temperature. Therefore 28 mg/L is an appropriate screening level to indicate if a potential source of gas-phase methane release is present.

Any concentrations of dissolved-phase methane present above the ambient solubility limit (at the surface of the groundwater table) could be released as gas-phase methane. However, at levels below the solubility limit, release of any significant methane would not be possible without some type of mechanical agitation or physical disturbance. Where dissolved-phase methane is present in groundwater at or above 28 mg/L at the water surface, monitoring for gas-phase methane must be completed to appropriately identify and address/control risk.

Regulatory Comparison

The U.S. EPA does not list cleanup criteria for dissolved-phase methane in groundwater. Some state and federal agencies, however, have instituted recommended guidelines for dissolved-phase methane in groundwater that is being extracted for use within enclosed structures (e.g., water wells) in areas of naturally occurring (e.g., deep anaerobic aquifers) or anthropogenic methane sources (e.g., coal mining areas).

The United States Department of the Interior, Office of Surface Mining (Eltschlager et. al., 2001) recommends immediately ventilating a water well if dissolved-phase methane is greater than 28 mg/L and recommends further investigation if dissolved-phase methane is greater than 10 mg/L but less than 28 mg/L in a water well. The Groundwater Protection Council (GWPC) recommended the same screening criteria in a white paper published in 2012 (GWPC, 2012). The Indiana State Department of Health (ISDH) also uses these screening criteria (ISDH Factsheet), as does the West Virginia Department of Health and Human Resources (DHRR, 2006), recommending that the well owner immediately contact their local/county health department at 28 mg/L, and consider contacting the local/county health department at 10 mg/L.

A summary of available regulatory guidelines applicable to groundwater usage within structures is provided in Table 1. These guidelines are conservative when applied to the vapor intrusion pathway, since gas-phase methane concentrations are attenuated in the presence of oxygen within the vadose zone. Therefore, the recommended guidelines discussed above and presented in Table 1 support the screening levels as being both conservative and protective for screening of potential risks associated with gas-phase methane being produced from dissolved phase methane in groundwater.

CONCLUSION

The screening levels of 28 mg/L dissolved-phase methane (where there are no water wells or usage) and 10 mg/L (where there are water wells and usage within enclosed unventilated structures) are appropriate for evaluating if the dissolved-phase methane can be a source of gas-phase methane.

Due to solubility, the 28 and 10 mg/L dissolved-phase methane screening levels, as qualified above for water usage, are protective and applicable at the surface of the water table. These screening levels only become more conservative as the depth below the water table increases, thus increasing pressure and the solubility limit.

REFERENCES

ASTM; 2016. Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone; ASTM Designation: E2993-16. March 2016.

Duan, Zhenhao.; Mao, Shide; 2006. A thermodynamic model for calculating methane solubility, density and gas phase composition of methane-bearing aqueous fluids from 273 to 523 K and from 1 to 2000 bar. State Key Laboratory of Lithospheric Evolution, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China. March 2006.

Eltschlager, Kenneth K.; Hawkins, Jay W.; Ehler, William C.; Baldassare, Fred; 2001. Technical Measures for the Investigation and Mitigation of Fugitive Methane Hazards in Areas of Coal Mining. Office of Surface Mining Reclamation and Enforcement, Appalachian Regional Coordinating Center, Pittsburgh, Pennsylvania. September 2001.

GWPC (2012). A White Paper Summarizing the Stray Gas Incidence & Response Forum. Groundwater Protection Council (GWPC). October 2012.

ISDH Factsheet. Methane Gas & Your Water Well, A Fact Sheet for Indiana Water Well Owners. Indiana State Department of Health (ISDH). http://www.in.gov/isdh/26421.htm

USGS (2006). Methane in West Virginia Ground Water; USGS Fact Sheet 2006-3011; available online at: http://pubs.usgs.gov/fs/2006/3011/pdf/Factsheet2006_3011.pdf

U.S. EPA; 2016. Average Temperature of Shallow Ground Water; available online at: https://www3.epa.gov/ceampubl/learn2model/part-two/onsite/ex/jne_henrys_map.html

APPENDIX C

Conceptual Site Model Summary

Ford Motor Company

The Kingsford Products Company

CONCEPTUAL SITE MODEL SUMMARY

Ford-Kingsford Products Facility

Kingsford, Michigan

September 2018

CONCEPTUAL SITE MODEL SUMMARY

Ford-Kingsford Products Facility
Kingsford Michigan

Michael LeFrancois
Senior Geologist

Jon Forbort
Senior Expert

Richard L. Studebaker Jr.
Ford-Kingsford Products Facility Project Coordinator

Prepared for:

Ford Motor Company

The Kingsford Products Company

Prepared by:
Arcadis U.S., Inc.
126 North Jefferson Street
Suite 400
Milwaukee
Wisconsin 53202
Tel 414 276 7742
Fax 414 276 7603

Our Ref.:
WI001600.0010

Date:
September 28, 2018

CONTENTS

TABLES

FIGURES

APPENDIX

INTRODUCTION

This Conceptual Site Model (CSM) has been prepared on behalf of Ford Motor Company (Ford) and The Kingsford Products Company for the Ford-Kingsford Products Facility (Site) in Kingsford, Michigan.

The CSM was prepared for the Site using the comprehensive results of the remedial investigation (documented in the *Remedial Investigation Report* dated November 2010 and approved by the Michigan Department of Environmental Quality in a letter dated May 4, 2011) and response activities completed within and surrounding the Area of Concern. The complex interaction between the geology and hydrogeology beneath the Site, the source locations and types of source materials (primarily historic liquid disposal from manufacturing operations), as well as ongoing chemical and biological degradation processes have all played a role in establishing and evolving the configuration of the groundwater plume, over time, beneath the Site. The plume is characterized by concentrations of certain dissolved organic constituents present in groundwater above the State of Michigan's Part 201 criteria (i.e., acetate, phenolic compounds, etc.), and these organic constituents serve as carbon substrates for the biologically driven generation of dissolved- and gas-phase methane. By evaluating the interaction of these components and incorporating additional data on an ongoing basis, the CSM becomes adaptive, aiding in understanding groundwater plume movement, distribution, and lifecycle. Additionally, understanding geological, hydrogeological, and biogeochemical source/plume characteristics provides an explanation as to why the groundwater plume exists as it does today and predicts its continued evolution over time. This document serves as an executive summary of the Site CSM (as presented in the *Remedial Investigation Report*) and will be used going forward to assist with evaluating monitoring data and progress of the remedial activities. As additional data is generated over time, this information will be incorporated into this adaptive CSM on an ongoing basis to enhance and improve Site understanding.

GEOLOGY

The geologic system beneath the Site is comprised of glacially-derived, unconsolidated deposits, consisting of interbedded clay, silt, sand, and gravel that overlie bedrock. This geologic system is complex, with deposits having lateral and vertical spatial variability, consistent with the glacial depositional origin. Bedrock at the Site is overlain by up to 13 different unconsolidated lithologic units, ranging from clay to sand to gravel, that were deposited under glaciolacustrine (deposited lake sediments as a result of glacial activity) and glaciofluvial (deposited sediments as a result of flowing glacial meltwater) conditions. These varying units were further grouped into three composited lithologic units, representative of their depositional environments and hydrogeologic characteristics, designated as: Unit 1, Unit 2, and Unit 3. Unit 1 lithology represents the highest porosity and permeability at the Site and consist of gravels and fine to coarse grained sands and gravels. Unit 2 lithology exhibits a relatively low porosity and permeability and consists of very fine grain sands and silty sands. Unit 3 lithology characterizes the lowest porosity and permeability at the Site, consisting of silts and clays. Stratification indicates the lowest, or basal units, are composed of clays, silts, sands, and gravels overlying the bedrock. These basal units are interpreted to have been deposited in a glaciolacustrine environment overlain by a succession of fine to coarse grain sands and gravels representative of glaciofluvial deposition, with upper unit sands representative of an alluvial depositional environment (deposited sediments associated with rivers/streams) located throughout and adjacent to the Menominee River (Figure 1).

The depth to bedrock (or thickness of unconsolidated deposits) ranges from 0 to over 360 feet below ground surface. Bedrock configuration is a controlling factor in the migration of the liquid source materials from the historic disposal area. Site bedrock consists of a metamorphosed gray, slightly fissile slate, with some metabasic igneous rock locally known as the Michigamme Slate of Middle Precambrian age. This bedrock, as observed exposed at the ground surface (bedrock outcrop) and recovered from boreholes, is massive, very dense, and transmits very little water. Additionally, Site bedrock forms an east-west trending elliptical basin, with a subsurface mound in roughly the western center of the deepest part of the basin and several subsurface mounds along the Menominee River. The north basin side is characterized by a steep upward slope to the north, with an average vertical rise of 200 feet over a horizontal distance of approximately 1,500 feet, while bedrock in the south/southeastern portion of the basin has an equally steep upward slope to the south/southeast. These steep, competent bedrock faces help control groundwater movement and contribute to both the historic and recent subsurface groundwater plume distribution to the north, south and east while providing preferential western migration towards the Menominee River. Geologic cross-sections west to east and north to south across the Site are shown on Figures 2 and 3.

Hydraulic testing performed spatially across the Site indicated that Unit 1 (fine to coarse grain sands and gravels) acts as a preferential pathway for Site groundwater flow; significantly less flow is contributed from the remaining lithologies, Unit 2 (very fine grain sands and silty sands) and Unit 3 (silts and clays). Thus, the porosity and permeability of the unconsolidated deposits are another controlling factor of groundwater flow and plume migration.

HYDROGEOLOGY

Data and information collected during Site investigations and response activities over time confirm, per the above discussion, that the groundwater system is complex due to both the Site's unconsolidated lithologic variability and bedrock topography. Groundwater levels collected from select monitoring wells were used to evaluate shallow- and deep-well groundwater potentiometric surfaces and flow directions. In general, the depth to groundwater in the shallow groundwater system ranges from approximately 10 feet near the Menominee River to over 50 feet in upland areas. Shallow potentiometric surface data indicates generally southwest groundwater horizontal flow toward the Menominee River, under a hydraulic gradient that ranges from 0.004 to 0.03 feet per foot (ft/ft). Similarly, deep potentiometric surface data indicates horizontal, southwest flow toward the river, with a similar range in gradient from 0.003 to 0.04 ft/ft. Generally, lower hydraulic gradients are more characteristic across the Site within the bedrock basin, while larger values occur along bedrock highs within the northern portion of the Site.

Vertical components to groundwater flow are observed across the Site with a significant variance between the shallow and deep groundwater systems (i.e., nested monitoring wells screened in the shallow and deep groundwater system yield water level measurements that differ by several feet). Downward flow is observed across the majority of the Site, with the most significant vertical gradients observed in the vicinity of the deeper portions of the bedrock basin; upward flow is observed adjacent to the large discharge boundary of the Menominee River. As groundwater migrates towards the Menominee River, this reversal in the downward vertical component (hinge point) is observed, where both the vertical flow component and the bedrock basin topography are the primary mechanisms controlling the groundwater plume funneling from the source area to the Menominee River (Figure 2). Within the hinge point, as noted, groundwater migrates from deeper bedrock areas towards the Menominee River, subject to preferential flow paths where deep groundwater vents to the shallow groundwater system. This change in vertical gradient causes a decrease in the hydrostatic pressure on the groundwater plume, which impacts (reduces) methane solubility as the groundwater flows upwards towards the river.

GROUNDWATER PLUME

Distribution and Movement

Evaluation of the FPS and Site disposal areas have determined that the former Northeast Pit (NE Pit) was the primary source for the groundwater plume. Historically, process wastewater containing dissolved organic constituents was disposed at the NE Pit until manufacturing activities at the Site ceased by 1960 (*Remedial Investigation Report*). The present distribution of the groundwater plume is likely a combination of source material migration to the groundwater (and subsequent dissolution of organic constituents into the groundwater) while manufacturing operations were ongoing (i.e., active source area), followed by the redistribution of dissolved organic constituents over time from residual source materials (once manufacturing ceased). Migration of the plume during manufacturing operations, and redistribution post manufacturing was, and is controlled by bedrock topography, as described above. The interbedded fine- and coarse-grained overburden at the Site have overall low transmissivity but abundant storage, also controlling the groundwater plume, which is residing within a dual-porosity environment. The bedrock topography forces groundwater movement and contributes to both the historic and recent subsurface groundwater plume distribution to the north, south and east while providing preferential western migration towards the Menominee River as illustrated in the west-east geologic cross section on Figure 2. In summary, the footprint and vertical extents of the historic and current groundwater plume at the Site are a function of:

- Location and type of the original source release (historical liquid disposal at the NE Pit)
- Controlling geologic factors (bedrock, unconsolidated material porosity/permeability, preferential pathways)
- Controlling hydrogeologic factors (horizontal and vertical groundwater flow)
- Ongoing chemical and biological degradation
- Source removal/control remedy implementation at the NE Pit (waste removal, consolidation, and engineered cover system installation).

The result of the controlling factors of geology and groundwater flow is that the bulk of the dissolved organic constituent mass is within deeper portions of the basin, except for a small section along the Menominee River as groundwater discharges to surface water (following gradient reversal at the hinge point).

Biological Degradation

The biological degradation (biodegradation) of the dissolved organic groundwater plume at the Site is a complex process. To understand the origin, fate, and transport of organic and inorganic constituents found within the Site, the location of the groundwater plume and the biogeochemical reactions that are occurring in the groundwater plume must be understood.

Biodegradation can occur under aerobic, anoxic, and anaerobic conditions when various naturally-occurring microorganisms use organic material as an energy source. When in situ biodegradation takes place, aqueous organic materials (i.e., carbon substrates) are converted to simpler organic constituents and ultimately to new bacteria (i.e., cell mass, or biomass), carbon dioxide (CO_2) or gas-phase methane, and water. The microbes derive energy from reactions when the electrons from the energy source (the carbon substrate, referred to as the electron donor) are transferred to elements (such as oxygen, nitrate, iron, manganese, and sulfate), which are electron acceptors. Biodegradation of dissolved organic constituents in groundwater results in a decrease in organic concentration and mass, consuming dissolved oxygen (DO) in the process. Once the DO has been depleted (less than 0.5 milligrams per liter [mg/L]), electron acceptors such as nitrate, iron, and manganese are consumed (i.e., anoxic conditions are established, and the aquifer reduction-oxidation [redox] potential is advanced to reducing conditions). The biodegradation pathway for the dissolved organic material under anaerobic conditions (mostly present within the source area of the groundwater plume) is dependent on redox potential and the availability and distribution of sulfate and CO_2 as electron acceptors (i.e., oxygen, nitrate, iron, and manganese are no longer present) and residual dissolved organic material (electron donor) within the groundwater plume. The biodegradation pathways are summarized below, in order of the redox potential (i.e., an excess of carbon/electron donor is needed to reach the next pathway; once nitrate/nitrite is consumed, anoxic manganese reduction takes place; once manganese is consumed, anoxic iron reduction takes place, and so on):

- Anoxic Denitrification
- Anoxic Manganese (Mn) Reduction
- Anoxic Iron Reduction
- Anaerobic Sulfate (SO_4^{2+}) Reduction
- Anaerobic Fermentation
- Anaerobic Methanogenesis.

The critical biodegradation pathway at the Site has been identified as methanogenesis. However, before methanogenesis can take place, anaerobic fermentation must be established. Fermentation reactions break down organics into volatile fatty acids (VFAs) such as acetic acid/acetate. Since the fermentation reactions produce acids, the pH will lower in the absence of alkalinity (note that Site groundwater has sufficient alkalinity to buffer pH by neutralizing acidity). Further, the acids help to solubilize the non-soluble components of organics (including the phenolic compounds). These fermentative reactions provide the raw materials needed for methanogenesis – acetate, hydrogen, and CO_2. Methanogenic bacteria are highly susceptible to stress, and reactions can be easily mitigated or shut down completely if the pH drops below approximately 6.0, or the rate of VFAs produced by the fermenters exceeds the capacity of the methanogens to utilize them. Further, certain compounds at sufficiently high concentrations can be toxic or inhibitory to methanogens. Site constituents that have the potential to be toxic inputs to methanogens are summarized in the table below (Gerardi 2006):

Parameter	Description
Alkali/Alkaline metals	Calcium (Ca^{2+}), Potassium (K^{+})
Ammonia/Ammonium	Ammonia (NH_3), Ammonium (NH_4^{+})
Substrate Inhibition	Hydrogen (H_2), VFAs (including acetate)
Long-chain fatty acids	Carprylic acid, lauric acid
Sulfate/nitrate (alternate electron acceptors)	Sulfate (SO_4^{2-}), Nitrate (NO_3^{-})
Tannins	Phenolic compounds

As indicated above, there are a number of common analytes found at the Site that can inhibit methanogenesis at sufficiently high concentrations (note that acetate is a necessary raw material for methanogenesis but can also be inhibitory at higher concentrations). Historically, there was little evidence of methanogenesis occurring in the areas of the plume with high concentrations of organics near the source area, attributed to being at inhibitory concentrations (Godsy and Warren 1999). Methanogenesis was occurring downstream of the source area where plume characteristics were more favorable due to dilution. However, since implementing source removal and cover system installation, concentrations of organics in groundwater have declined and methanogenesis of the dissolved organics is now observed in these areas. As protective measures continue to successfully eliminate and/or appropriately control gas-phase methane at the Site, indication and verification of ongoing methanogenesis in the source area is a positive sign that residual source mass is now undergoing biodegradation.

Methane Production

As mentioned above, conditions are suitable for the methanogenic degradation of dissolved organic material present in the groundwater plume at the Site; this degradation, which occurs at varying degrees throughout the groundwater plume, depending on the concentration of dissolved organic material and the specific biochemical conditions present at different areas, is the primary source of gas-phase methane generation at the Site.

Groundwater total organic carbon (TOC) concentrations provide a good overall indicator of the total mass of dissolved organic material in the groundwater plume. TOC can also be used to monitor the distribution of the groundwater plume and organic mass available for biodegradation in different portions of the Site. The approximate footprint of TOC at concentrations of 50 mg/L (consistent with representations provided in the *Remedial Investigation Report*) in the groundwater is shown on Figures 4 and 5. Note that the areal extent of TOC varies at different depths within the groundwater system, and Figures 4 and 5 represent point data respective of different lithologies, depths, and concentrations. The distribution of TOC in the groundwater plume demonstrates the influence of the geologic and hydrogeologic controls at the Site.

Methane Solubility

The solubility limit for methane (i.e., the amount of gas-phase methane that can dissolved into and be contained in water) is an important controlling factor when discussing gas-phase methane generation at the Site. The solubility limit of dissolved-phase methane increases as the pressure increases, and also increases as the temperature decreases. Groundwater temperatures collected from monitoring wells at the Site average approximately 10 degrees Celsius (ºC) and 50 degrees Fahrenheit (ºF); however, a conservative range for groundwater temperatures in Michigan is 10 to 13ºC/50 to 55 ºF, which creates an associated range of solubility limits in accordance with Table 1 (Arcadis 2017). Assuming: 1) a standard groundwater surface temperature of 13ºC/55ºF, which is representative of the upper end of the groundwater temperature range in Michigan and provides a very conservatively high temperature; and 2) standard atmospheric pressure (1 atm/14.7 pounds per square inch per the International Union of Pure and Applied Chemistry and the National Institute of Standards and Technology), groundwater present at the intersection of the water table and the vadose zone/unsaturated soils can contain up to 28 mg/L of dissolved-phase methane (solubility limit).

Since the highest concentrations of TOC are present in the deeper portion of the groundwater system, most of the gas-phase methane is produced at depths that yield a higher than atmospheric pressure (as noted previously, the deepest portion of the aquifer is 360 feet below ground surface with a water saturated thickness of approximately 300 feet, a depth that imparts an approximate an 8- to 10-fold increase in pressure); subsequently, the deep groundwater system has a much higher capacity for dissolved-phase methane than the shallow system. For example, in accordance with Table 2 (American Society for Testing and Materials [ASTM] Table X1.4 to ASTM Standard Guide E2992-16 [ASTM 2016]), groundwater at a depth of approximately 100 feet below ground surface has an increased solubility limit of approximately 110 mg/L, assuming a consistent groundwater temperature of 13ºC/55ºF. However, if the temperature of groundwater at this depth decreased to 10ºC/50ºF, the dissolved-phase methane solubility limit would increase to approximately 117 mg/L.

Due to solubility rules, gas-phase methane generated in the deeper groundwater system is dissolved into the groundwater and is contained in the groundwater as dissolved-phase methane. As the vertical groundwater gradients are downward across most of the Site, this dissolved-phase methane travels with the groundwater and is influenced by the geologic and hydrogeologic controlling factors. As the vertical gradient changes to upward flow adjacent to the Menominee River at the hinge point, the decrease in pressure reduces the dissolved-phase methane solubility resulting in the release of gas-phase methane. This production, movement/storage, and eventual release of dissolved and gas-phase methane is conceptually illustrated on Figure 6.

Dissolved-Phase Methane Distribution and Movement

As mentioned above, the main areas of dissolved-phase methane production occur in the deep groundwater system and correspond to the areas of high TOC concentrations. Currently, there is no evidence of dissolved-phase methane concentrations above 28 mg/L in the shallow groundwater system upgradient of the hinge point adjacent to the Menominee River. Due to the increased dissolved-phase methane solubility of the deep groundwater system, the migration (and generation) of dissolved-phase methane follows the groundwater plume migration detailed above, until the hinge point is reached. In stagnant areas of the deep groundwater system, diffusion mechanisms can drive dissolved-phase methane from high concentration zones to lower concentrations zones, but there has been no evidence that diffusion plays a significant role in Site methane distribution.

As discussed previously and shown on Figures 2 and 6, a hinge point is present along the Menominee River; groundwater vertical gradients reverse at this hinge point and the vertical component of groundwater flow is upward, with the groundwater ultimately venting to the Menominee River. Since the pressure decreases as the groundwater travels from the deep groundwater system to the shallow groundwater system (and ultimately to atmospheric pressure), gas-phase methane is released if the concentration is above the solubility limit. The gas-phase methane that is released by the decreasing pressure on the groundwater system can either continue to move as free-phase in the direction of groundwater flow, or move independently from groundwater flow, based on the nature of the geologic deposits. At locations where bubbles were historically present in the Menominee River, these bubbles were due to the gas-phase methane moving along with the groundwater and venting into the river. At locations where the geologic deposits along the groundwater pathway change from a higher to lower permeability material, the gas-phase methane can migrate up-dip away from the river, counter to groundwater flow direction (Figure 6).

This independent gas-phase methane movement is observed in areas where gas-phase methane rises upward through the groundwater system within preferential pathways (Unit 1 material) and then encounters a silt/clay layer (Unit 3 material), which causes the gas-phase methane to migrate within the more permeable sand towards structurally higher elevations along the base of the silt/clay layer (away from the groundwater flow direction). Unit 2 material can retard and redirect gas-phase methane when compared to Unit 1 material; however, Unit 2 material also offers a secondary pathway when compared to Unit 3 material.

As the gas-phase methane moves along the base of the silt/clay layer, if it encounters a structural high of more permeable sand protruding into the base of the silt/clay layer, gas-phase methane can accumulate within these structures and displace the groundwater, causing a structural trap for gas-phase methane. As gas-phase methane accumulates, a point can be reached where gas-phase methane can no longer be contained within the dome structure and will continue to migrate upward along the dip of the base of the silt/clay, until another structure or dome is encountered that allows gas-phase methane to accumulate again. Ultimately, gas-phase methane can migrate upward to where permeable materials disappear into impermeable materials, which can trap the gas-phase methane and prevent further movement. If permeable pathways are encountered within the silt/clay layers, then the gas-phase methane can move upward into the vadose zone. The result of the historical dissolved- and gas-phase methane movement was the formation of gas-phase methane accumulations that formed primarily in areas along and upgradient of the hinge point, where gas-phase methane is released from groundwater due to the change in solubility caused by the decrease in pressure related to the vertical component of groundwater flow reversing from downwards to upwards.

CLOSING

This document serves as the updated Site CSM. Response activities have been completed in areas of the Site and are being maintained and monitored in accordance with their respective operation and maintenance plans to ensure long-term effectiveness. The Site CSM will be used going forward to assist with evaluating monitoring data and progress of the response activities. A numerical groundwater flow model (Appendix A) was also prepared to analyze potential groundwater plume movement, and as additional data is generated over time, this information will be incorporated into this adaptive CSM on an ongoing basis to enhance and improve Site understanding.

REFERENCES

Gerardi, Michael H., Wastewater Bacteria, Wiley-Interscience, 2006.

Godsy, E.M., and E. Warren. 1999. Origins of Dissolved Methane In Ground Water at Kingsford, Michigan, U.S.G.S. draft report, 16p.

ASTM E2993-16; Standard Guide for Evaluating Potential Hazard as a Result of Methane in the Vadose Zone; 2016.

Arcadis 2010; Remedial Investigation Report, November 2010.

TABLES

Table 1
Aqueous Solubility for Methane at Pressure of 1 Atmospere (surface of the water table).
Conceptual Site Model Summary
Kingsford, Michigan

Temperature		Water-Saturated Methane Concentration (mg/L-water)
°C	°F	
5	41	33.3
6	42.8	32.6
7	44.6	31.9
8	46.4	31.2
9	48.2	30.5
10	50	29.8
11	51.8	29.2
12	53.6	28.6
13	55.4	28.0
14	57.2	27.4
15	59	26.8
16	60.8	26.3
17	62.6	25.8
18	64.4	25.2
19	66.2	24.7
20	68	24.2
21	69.8	23.7
22	71.6	23.2
23	73.4	22.8
24	75.2	22.3
25	77	21.8

Note:

Assume partial pressure equals total pressure, unconfied aquifer to calculate solubility over typical temperature range for groundwater.

[grey shading] = Representative temperatures for Michigan groundwater range from approximately 10 to 13 °C.

C° = degrees Celsius

F° = degrees Fahrenheit

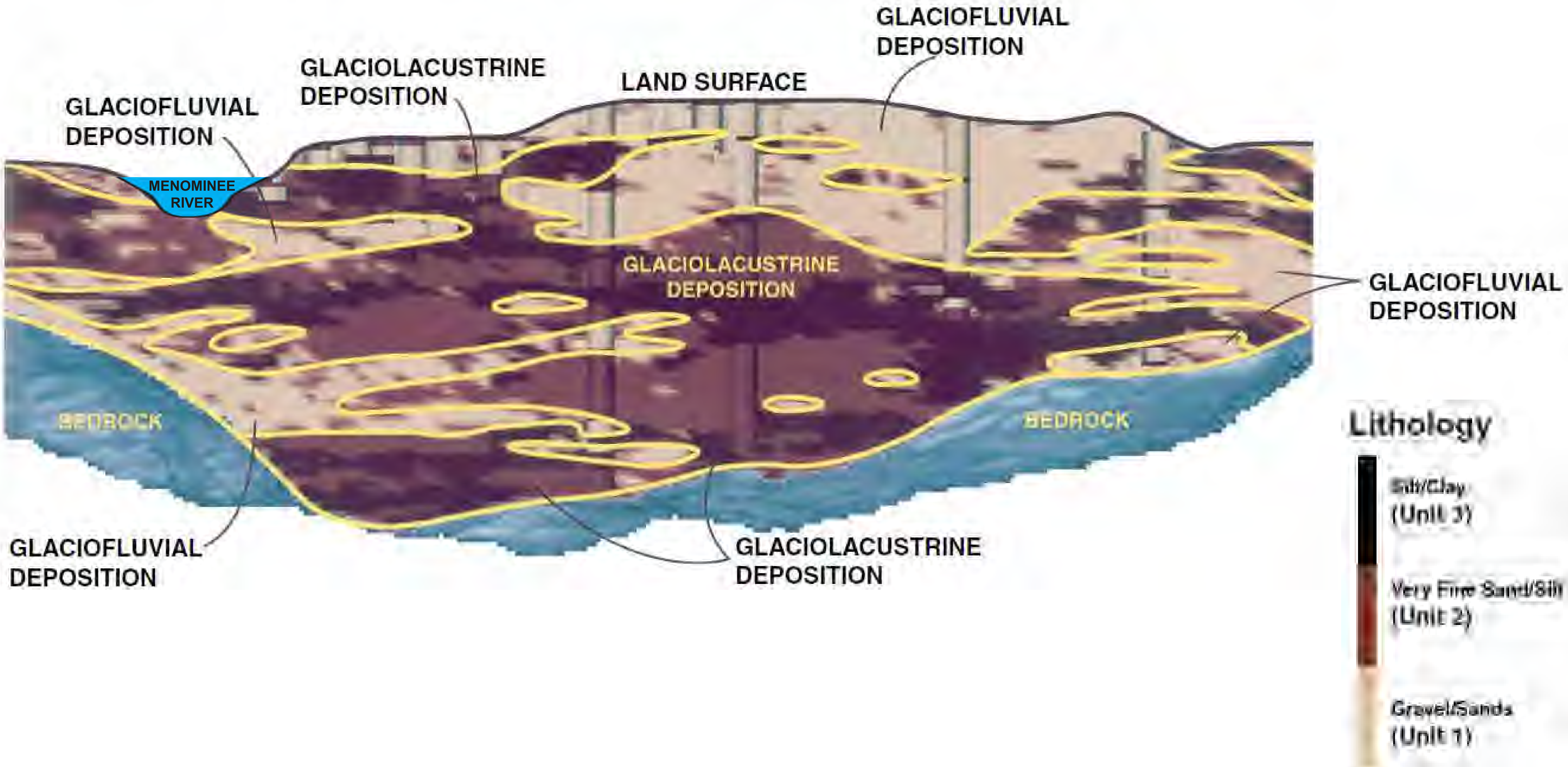
mg/L = milligrams per liter

Table 2
ASTM x1.4 Aqueous Solubility for Methane at Pressure of 1 atm
Conceptual Site Model Summary
Kingsford, Michigan

Depth below Water Table (Unconfined Aquifer)									
Depth, ft	0	3.3	6.6	9.8	16.4	32.8	65.6	98.4	164.0
Depth, m	0	1	2	3	5	10	20	30	50
Temperature,°C	**Water-Saturated Methane Concentration (mg/L-water)**								
5	33.3	36.6	39.8	43.0	49.5	65.6	97.9	130.1	194.7
6	32.6	35.8	39.0	42.1	48.5	64.2	95.8	127.4	190.6
7	31.9	35.0	38.1	41.2	47.4	62.8	93.8	124.7	186.5
8	31.2	34.3	37.3	40.3	46.4	61.5	91.7	121.9	182.4
9	30.5	33.5	36.4	39.4	45.3	60.1	89.7	119.2	178.3
10	29.8	32.7	35.6	38.5	44.3	58.7	87.6	116.5	174.2
11	29.2	32.0	34.9	37.7	43.4	57.5	85.8	114.1	170.7
12	28.6	31.4	34.2	36.9	42.5	56.3	84.0	111.7	167.1
13	28.0	30.7	33.4	36.2	41.6	55.1	82.3	109.4	163.6
14	27.4	30.1	32.7	35.4	40.7	53.9	80.5	107.0	160.0
15	26.8	29.4	32.0	34.6	39.8	52.7	78.7	104.6	156.5
16	26.3	28.8	31.4	33.9	39.0	51.7	77.1	102.5	153.4
17	25.8	28.2	30.7	33.2	38.2	50.6	75.6	100.5	150.3
18	25.2	27.7	30.1	32.6	37.4	49.6	74.0	98.4	147.2
19	24.7	27.1	29.4	31.9	36.6	48.5	72.5	96.4	144.1
20	24.2	26.5	28.8	31.2	35.8	47.5	70.9	94.3	141.0
21	23.7	26.0	28.3	30.6	35.1	46.6	69.5	92.5	138.3
22	23.2	25.5	27.7	30.0	34.4	45.7	68.2	90.7	135.6
23	22.8	25.0	27.2	29.4	33.8	44.8	66.8	88.9	133.0
24	22.3	24.5	26.6	28.8	33.1	43.9	65.5	87.1	130.3
25	21.8	24.0	26.1	28.2	32.4	43.0	64.1	85.3	127.6

Partial pressure of methane = total pressure

FIGURES



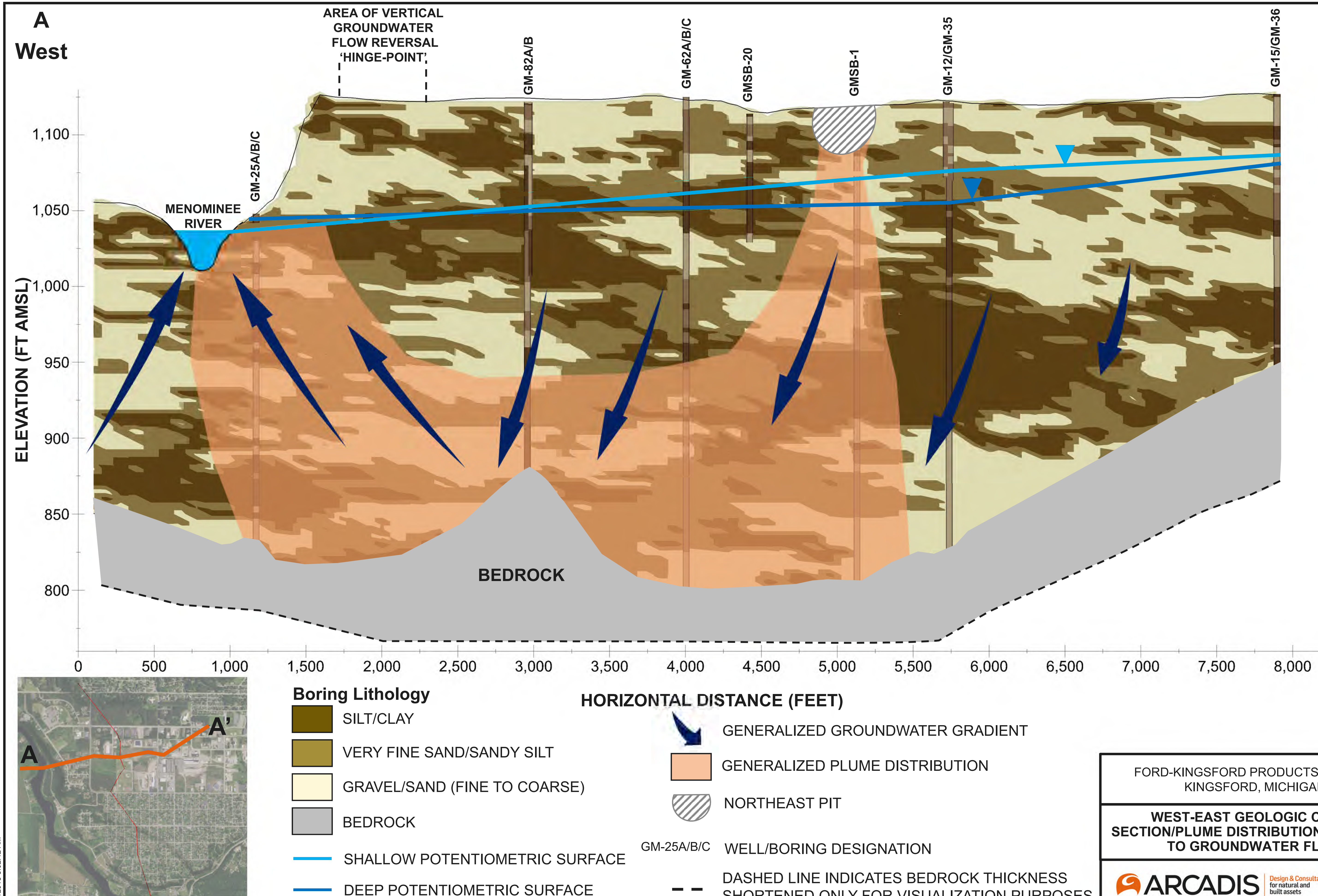
Drawing not to scale. Lithologic cross-section west to east in Kingsford area.

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

DEPOSITIONAL ENVIRONMENTS / GEOLOGICAL UNIT DESCRIPTIONS

FIGURE
1

7/27/2018 8:02:40 AM



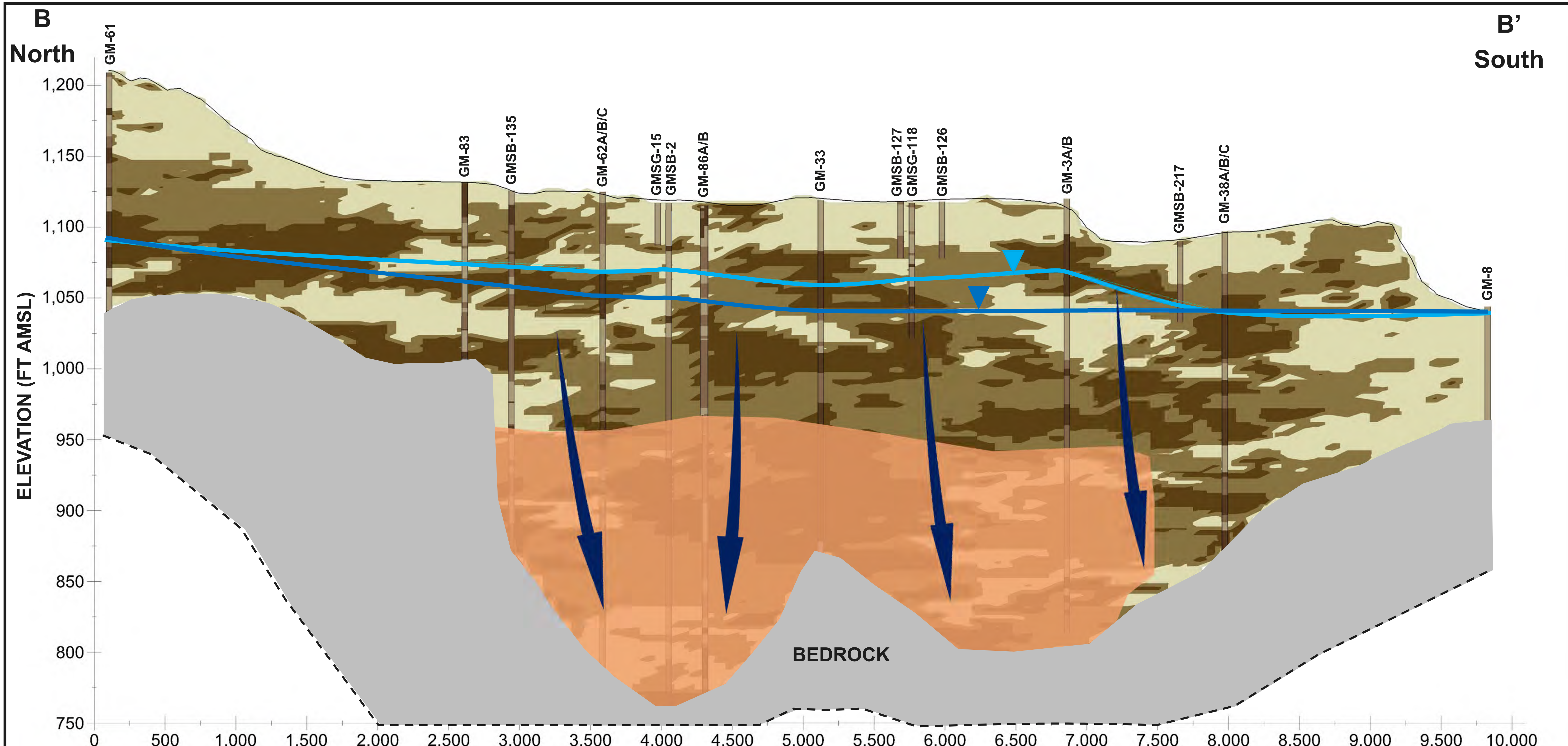
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

WEST-EAST GEOLOGIC CROSS SECTION/PLUME DISTRIBUTION PARALLEL TO GROUNDWATER FLOW

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2

7/27/2018 8:02:42 AM



Boring Lithology

- SILT/CLAY
- VERY FINE SAND/SANDY SILT
- GRAVEL/SAND (FINE TO COARSE)
- BEDROCK
- SHALLOW POTENTIOMETRIC SURFACE
- DEEP POTENTIOMETRIC SURFACE

- GENERALIZED GROUNDWATER GRADIENT
- GENERALIZED PLUME DISTRIBUTION
- GM-25A/B/C WELL/BORING DESIGNATION
- DASHED LINE INDICATES BEDROCK THICKNESS SHORTENED ONLY FOR VISUALIZATION PURPOSES

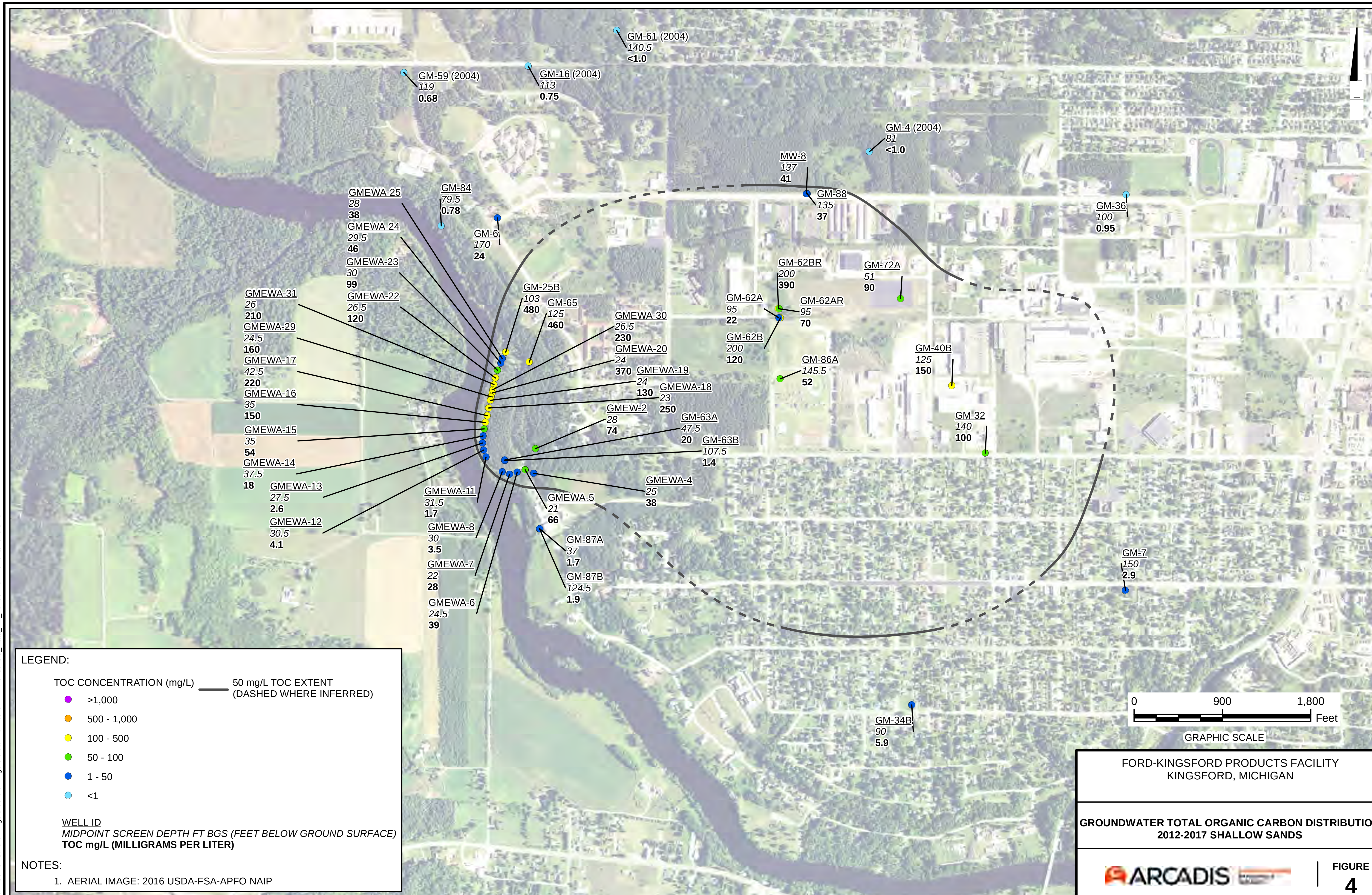
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

NORTH-SOUTH GEOLOGIC CROSS SECTION/PLUME DISTRIBUTION ORTHOGONAL TO GROUNDWATER FLOW

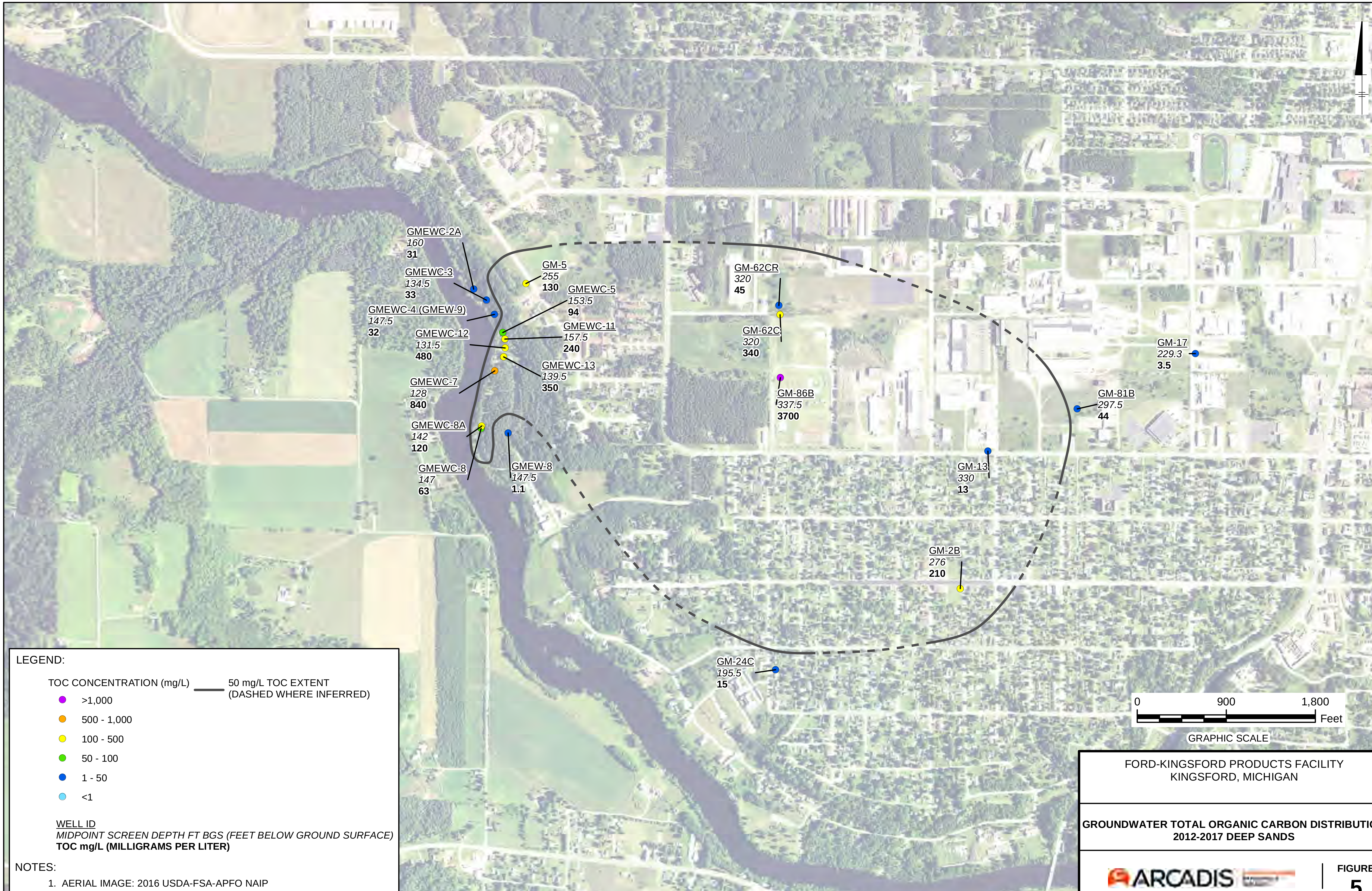
ARCADIS Design & Consultancy for natural and built assets

FIGURE 3

7/27/2018 8:02:42 AM



City: Minneapolis Div/Group: IMDV Created By: MG Last Saved By: mgress
Ford Kingsford
G:\PROJECTS\Ford Kingsford\Ford Kingsford Jan.2017\GIS\MXD\2018\TOC_Data_AB_20180125.mxd 1/25/2018 8:49:12 AM



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER TOTAL ORGANIC CARBON DISTRIBUTION 2012-2017 DEEP SANDS

ARCADIS

FIGURE **5**

City: Minneapolis Div/Group: IMDV Created By: MG Last Saved By: mgress
Ford Kingsford
G:\PROJECTS\Ford Kingsford\Ford Kingsford Jan.2017\GIS\MXD\2018\TOC_Data_CD_20180125.mxd 1/25/2018 8:48:25 AM

1. Source Area

Historic waste disposal at the former Northeast Pit, primarily manufacturing process wastewaters, caused liquid organic constituents to migrate into the groundwater system. Response actions in the source area, including waste material removal and/or consolidation and installation of an engineered cover system have eliminated any continuing impact to groundwater. In addition, an ordinance was established that prohibits the installation of water wells and/or use of groundwater within the impacted plume.

2. Groundwater Plume

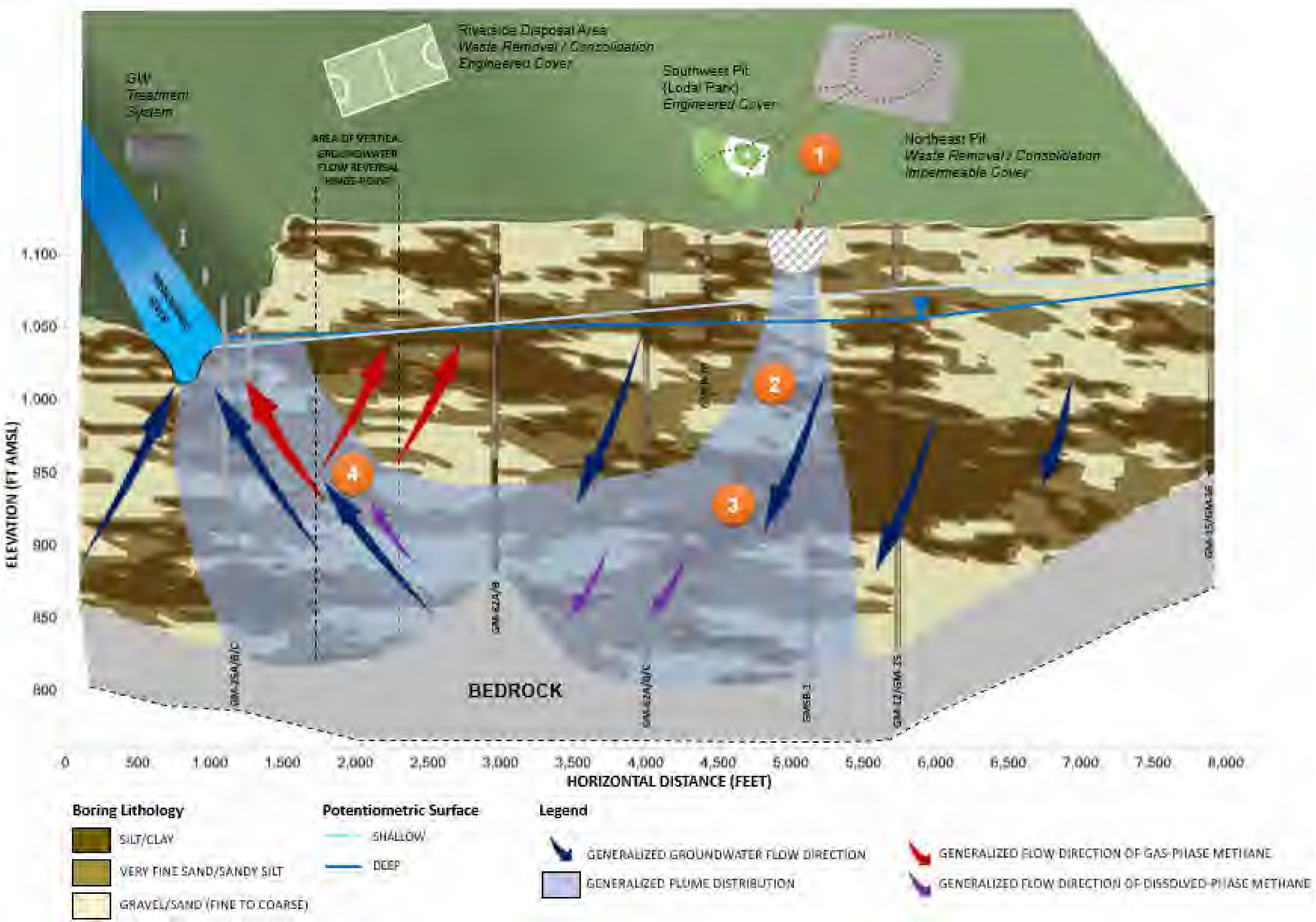
Liquid organic constituents dissolved into the groundwater and then migrated downwards through the geologic formation, with preferential pathways (i.e., the more permeable coarse gravels/sands) dominating plume migration, with regional groundwater flow moving the plume horizontally to the southwest towards the Menominee River. Impermeable bedrock impedes vertical movement of the groundwater plume beneath the Site, as well as horizontally along the northern and southern/southeastern boundaries. The downward vertical component of groundwater flow (present across the majority of the Site) reverses along a hinge point located adjacent to the Menominee River, and groundwater flows upward to discharge into the river.

3. Biological Degradation

Natural biological degradation processes have been ongoing and reducing dissolved organic constituent concentrations for many decades; until recent years, this primarily occurred in areas of the Site farther downgradient from the source. Since implementation of project activities, plume concentrations in the source area have continued to decrease, and conditions are now favorable for anaerobic biodegradation. The anaerobic conditions present within the groundwater plume promote completion of the biodegradation pathway through Methanogenesis, and this biodegradation is now occurring in all areas of the Site. Anaerobic methanogenesis produces gas-phase methane; due to the depths within the groundwater system that this gas-phase methane is produced, it almost immediately transitions to dissolved-phase due to solubility.

4. Methane Migration

Dissolved-phase methane generally moves with groundwater flow, but can move by diffusion in areas with very low or stagnant groundwater flow. Dissolved-phase methane can transition to gas-phase if significant enough fluctuations in pressure or temperature change the solubility, and gas-phase methane is released from the groundwater when dissolved-phase methane concentrations are above the methane solubility limit. As dissolved-phase methane migrates with upward groundwater flow at the hinge point, the solubility limit decreases and gas-phase methane is released; this gas-phase methane can continue to move either in the direction of groundwater flow to the Menominee River or independently from groundwater flow through preferential lithologic pathways.



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

CONCEPTUAL METHANE MOVEMENT

FIGURE
6

1/29/2018 10:28:54 AM

APPENDIX A

Groundwater Flow and Solute Transport Model Update

Ford Motor Company

The Kingsford Products Company

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

Ford-Kingsford Products Facility

Kingsford, Michigan

September 2018

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

Ford-Kingsford Products Facility
Kingsford Michigan

Jennifer Wahlberg
Staff Environmental Specialist

Michael LeFrancois, PG
Senior Geologist

Richard L. Studebaker, Jr., PE
Project Manager

Prepared for:

Ford Motor Company

The Kingsford Products Company

Prepared by:

Arcadis U.S., Inc.

126 North Jefferson Street

Suite 400

Milwaukee

Wisconsin 53202

Tel 414 276 7742

Fax 414 276 7603

Our Ref.:

WI001600.0035.00001

Date:

September 28, 2018

CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

On behalf of Ford Motor Company and The Kingsford Products Company, Arcadis U.S., Inc. (Arcadis) has prepared this Groundwater Flow and Solute Transport Model Update (report) to present a calibrated steady-state and transient groundwater flow and solute transport model for the Ford-Kingsford Products Facility (Site) in Kingsford, Michigan. The groundwater flow and solute transport model (the model) described in this report updates and refines a prior version developed by the United States Geological Survey (Luukkonen and Westjohn 2001), while transiently verifying model construction (Arcadis 2005). The model described in this report was developed such that effects of current and future groundwater conditions within the model extent could be assessed. This included evaluating groundwater plume fate and transport under groundwater remedial extraction. Updates to the original model included:

- Refining the model grid and extent;
- Adjusting model boundary conditions to account for the revised model extent and groundwater extraction adjacent to the Menominee River;
- Refining the distribution of recharge and hydraulic conductivity to account for the revised model extent and data collected at the Site;
- Verifying model calibration (the comparison between model simulated and field hydraulic conditions) under steady-state conditions using 130 groundwater level measurements collected in 2000;
- Verifying the model under transient conditions using 9,413 groundwater level measurements collected from 2000 through 2017;
- Constructing and calibrating the solute transport model under transient flow conditions using 739 2-methyphenol concentration measurements collected from 2000 through 2017; and
- Predicting future 3-methylphenol/4-methylphenol (m,p-cresol) transport.

Calibration showed a reasonable agreement between simulated and observed groundwater levels and concentration, allowing for a predictive assessment of future m,p-cresol transport. The constituent 2-methyphenol was used during transient solute transport verification because it is the last of the phenolic compounds to degrade (i.e., most recalcitrant); however, m,p-cresol was used for predictive analysis because it is the second to last of the phenolic compounds to degrade, is the most comprehensive analyte in the database in terms of sample locations across the Site, and has the lowest groundwater/surface water interface criteria of Site constituents. Predictive fate and transport was conducted over a 30-year period using remedial system extraction rates from 2017. Predictive results indicate there is a significant reduction in m,p-cresol concentration over the 30-year simulation, especially adjacent to the Menominee River, where impacted groundwater is captured by the remedial system. The analysis also indicates the plume extent is greatly reduced over the 30-year simulation time, especially in upgradient portions of the Site.

1 INTRODUCTION

Arcadis U.S., Inc. (Arcadis), on behalf of the Ford Motor Company (Ford) and The Kingsford Products Company (KPC), has updated a numerical model (model) of the localized groundwater flow system in the Kingsford, Michigan area, known as the Ford-Kingsford Products Facility (Site; Figure 1-1). The model updates a previous modeling effort completed by the United State Geological Survey (USGS; Luukkonen and Westjohn 2001) and verifies existing model calibration under steady-state conditions and with the addition of temporal remedial groundwater extraction, transient conditions (Arcadis 2005). The numerical verification effort described in this Groundwater Flow and Solute Transport Model Update (report) was developed such that the model could be used to assess current and future groundwater conditions resulting from remedial actions at the Site. This included assessing fate and transport of the m,p-cresol groundwater plume.

1.1 Model Objectives

The primary objective of the modeling study was to verify the updated numerical model constructed using the USGS version as a basis. A secondary objective was to transiently verify the updated model through the inclusion of remedial system groundwater extraction to assess both potentiometric levels and fate and transport of dissolved phase groundwater constituents. Specific tasks completed included:

- Verifying model calibration under steady-state conditions (the comparison between model simulated and field hydraulic conditions) using 130 groundwater level measurements collected in 2000.
- Verifying the model under transient conditions using 9,413 groundwater level measurements collected from 2000 through 2017.
- Constructing and calibrating the solute transport model under transient flow conditions using 739 2-methylphenol concentration measurements collected from 2000 through 2017.
- Predicting future 3-methylphenol/4-methylphenol (m,p-cresol) transport.

2 CONCEPTUAL SITE MODEL (CSM)

The CSM, as discussed in more detail within the CSM summary report, is a written and/or illustrative representation of the physical, chemical, and biological processes that control the transport, migration, and actual/potential impacts of contamination to human and/or ecological receptors. This effort was prepared within and surrounding the Area of Concern (Figure 1-1). The complex interaction between the geology and hydrogeology beneath the Site, the source locations and types of source materials (primarily historical liquid disposal from manufacturing operations), as well as ongoing chemical and biological degradation processes have all played a role in establishing and evolving the configuration of the groundwater plume, over time, beneath the Site. Groundwater impacts are characterized by certain present dissolved organic constituents at concentrations greater than the State of Michigan's Part 201 criteria (acetate, phenolic compounds), which serve as carbon substrates for the biologically driven generation of dissolved- and gas-phase methane at the Site. By evaluating the interaction of these components and incorporating additional data on an ongoing basis, the CSM becomes adaptive, aiding in understanding groundwater plume movement, distribution, and lifecycle. Moreover, this establishes a framework of conditions in a specified area to construct a mathematical model (a representation of the actual flow and contaminant transport system, which is also referred to as a numerical groundwater flow and solute transport model in this report). Additionally, understanding geological, hydrogeological, and biogeochemical source/plume characteristics provides an explanation as to why the groundwater plume exists as it does and predicts its continued evolution.

3 GROUNDWATER FLOW MODEL UPDATE

Two groundwater models have been developed to assess Site groundwater conditions:

- The earliest was developed in 2001 by the USGS (Luukkonen and Westjohn 2001). The USGS model focused on Kingsford and Iron Mountain public supply wells with a 64 square mile extent representing unconsolidated geology above the bedrock. The USGS model was constructed using 3 layers, 213 columns, and 204 rows (130,356 nodes), with 100 by 100 feet as the finest grid spacing.
- During the RI, Arcadis updated the USGS model, with the objective of supporting a groundwater extraction and treatment system designed to hydraulically capture groundwater adjacent to the Menominee River (Arcadis 2004). The USGS model was refined using Site-specific geologic and hydrogeologic data collected during the RI process. The model extents were similar as the USGS model, but the resolution was increased to 8 layers, 343 columns, and 704 rows (1,931,776 nodes). Updated grid spacing resulted in 20 by 20 feet as the finest.
- Following review by the Michigan Department of Environmental Quality (MDEQ), the model was again revised to address MDEQ comments (Arcadis 2005), resulting in a significantly smaller model domain than previous (7.3 square miles versus 64 square miles). Both the model domain and grid were refined to permit increased Site grid discretization and still allow for computational efficiency (relatively short flow model run times). The model domain consists, as before, of 8 layers, but increased to 428 columns and 880 rows (3,013,120 nodes). Updated grid spacing also resulted in increased resolution in the remedial system area adjacent to the Menominee River, where grid cell size is as fine as 4 by 4 feet, coarsening to 450 feet at the model extents. The model grid axes align with the primary groundwater flow direction (west towards the Menominee River).

Original and updated modeling initially focused on groundwater flow. Neither effort considered solute transport, which was completed during this effort and will be discussed in detail below.

3.1 Model Code Selection

The groundwater flow component of the modeling task was performed using MODFLOW, a Modular Three-Dimensional Finite-Difference Groundwater Flow Model, developed by the USGS (McDonald and Harbaugh 1988). MODFLOW is thoroughly documented, widely used by consultants, government agencies, and researchers, and is consistently accepted in regulatory and litigation proceedings. MODFLOW-2005 was used in this modeling task (Harbaugh 2005).

3.2 Model Domain and Grid

As discussed above, the most recent numerical model was refined as shown in Figure 3.2-1, which presents the model domain and grid. This version of the model is also discussed in the performance monitoring plan (Arcadis 2005) and the RI report (Arcadis 2010) and will be addressed as the 2010 model throughout this report.

3.3 Stratigraphy and Model Layering

Model layering rationale is based on sedimentary unit stratigraphy being reasonably flat. Model layer geometry was developed by contouring the bottom of the Zone A sands and using uniform thickness for the underlying water-bearing units and confining beds. The stratigraphy is shown on Figures 1 through 3 within the main body of the report and visually shown in Figure 1 of the performance monitoring plan (Arcadis 2005). Model vertical discretization is summarized below:

- Layer one (model top) was used to simulate Zone A sands and overlying sediments. The top of layer one was derived from a digital elevation model for the Kingsford and Iron Mountain area.
- Layers two and three were used to simulate the regional confining bed and thicker portions of the Zone A sands.
- Layer four was used to simulate Zone B sands and the thicker portions of the regional confining bed.
- Layer five was used to simulate the thin confining bed that separates Zone B and Zone C sands.
- Layers six and seven were used to simulate Zone C sands to account for the variability of the unit and underlying bedrock topography.
- Layer eight was used to simulate Zone D sands and lodgement till.

Material property zonation was used within each of the layers as necessary to account for bedrock surface expressions, which extend above the groundwater table at some locations in the groundwater system.

3.4 Boundary Conditions

Boundary conditions must be imposed to define spatial boundaries on all sides of the model domain. In addition to these boundary conditions, sources and sinks of groundwater, such as wells, drains, and rivers, can be included within the model's external boundaries. A boundary condition can represent different types of physical boundaries depending on the rules that govern groundwater flow across the boundary. This model includes the following boundary conditions: no-flow, general head boundary, rivers, extraction wells, and recharge (Figure 3.4-1).

3.4.1 No-Flow Boundaries

No-flow boundaries were used to define inactive areas of the model domain and to represent the effects of regional groundwater flow patterns. No-flow boundaries are shown on Figure 3.4-1.

3.4.2 General Head Boundaries

A general head boundary is a head-dependent flow boundary assigned a reference head based on surrounding hydrogeologic conditions. General head boundaries were included along the northern, eastern, and western model extents to represent regional groundwater flow directions within the model domain. Values of the general head boundaries were assigned based on the regional groundwater models (Luukkonen and Westjohn 2001; Arcadis 2010).

General head boundaries (Figure 3.4-1) also require a conductance term that regulates groundwater flux into, or from, the boundary. Conductance terms were initially based on model cell areas normal to groundwater flow, hydraulic conductivity values representative of the model layers, and the distance from the boundary to the chosen potentiometric water level. During model calibration, conductance was adjusted within a reasonable range to aid in finding a statistically acceptable calibration.

3.4.3 River Boundary Conditions

The Menominee River, Little Popple Creek, Crystal Lake, and Cowboy Lake were simulated using river boundaries (Figure 3.4-1). The interaction between the surface water bodies and the groundwater system is simulated as a function of the head difference between the water table and the surface water, as well as the degree of hydraulic communication. River boundaries simulate the interaction with the uppermost hydrostratigraphic unit through the specification of a surface-water stage, bed elevation, and a conductance term. River boundaries allow groundwater to flow to, or from, the aquifer, based on the difference between the stage and simulated water level (head) in the groundwater system. If the simulated water level in the groundwater system is below the stage elevation, the river cell recharges the groundwater system based on the bed conductance. If the stage in the surface water body is lower than the groundwater system, groundwater flows to the surface water body (river cell).

Surface water body stage and bed elevation were developed via USGS topographic maps, dam elevations, and staff gauge measurements during calibration. River conductance terms were calculated from individual grid cell dimensions and calibrated hydraulic conductivities.

3.4.4 Groundwater Extraction

Groundwater extraction wells located along the Menominee River (Figure 3.4-1) were simulated using the well boundary, which requires specification of well screen interval and pumping rate during the period of interest. Extraction well pumping rates for each year from 2000 through 2017 and model screen interval are shown in Table 3.4-1.

3.4.5 Recharge

Recharge (percolation of infiltrating precipitation) was applied to the uppermost active model layer. Estimates of recharge were obtained from previous modeling efforts and published climatic data. The USGS model assumed rates of zero for outcropping bedrock and till, and 9 inches per year (in/yr) throughout the remaining model domain. Recharge zones used in the 2010 model are the same, albeit, with refined zones accounting for a smaller model domain and grid cells. Recharge zonation for the 2010 model (Figure 3.4-2) was established at 0.02 in/yr at bedrock and till locations, with 8 to 9.8 in/yr across remaining areas.

3.5 Hydraulic Parameters

A key parameter for groundwater modeling is hydraulic conductivity. Initial hydraulic conductivities based on Site geology were derived from USGS and early model values. During the modeling process, hydraulic conductivities were adjusted based on Site-specific pumping tests to ensure field testing consistency.

2010 model hydraulic conductivity values and model layer zones are presented on Figures 3.5-1 and 3.5-2.

Throughout model layers, bedrock was consistently assigned a single value for horizontal hydraulic conductivity of 0.001 feet/day (ft/day) and vertical hydraulic conductivity of 5×10^{-5} ft/day to represent vertical anisotropy (ratio of horizontal to vertical hydraulic conductivity). Confining bed horizontal hydraulic conductivity ranges from 0.1 ft/day for interbedded silt and clay to approximately 5 ft/day for silt or sandy silt, with vertical anisotropy between approximately 120 to 1,200. Water-bearing lithologies range from approximately 20 to 120 ft/day for sand and gravels. In general, vertical anisotropy within the sand units varied between approximately 10 to 15 for less stratified morphologies and 120 to 390 for interbedded morphologies.

4 GROUNDWATER FLOW MODEL CALIBRATION

Calibration of a groundwater flow model refers to the process of adjusting model parameters to obtain a reasonable match between observed and simulated water levels. Model calibration is an iterative procedure that involves adjusting hydraulic parameters and/or boundary conditions to achieve a statistically acceptable match between observed and simulated water levels. During model calibration, parameters are varied over a narrow range set by Site-specific data using the CSM as a guide. During calibration of a groundwater flow model, use of point data (targets) eliminates the potential for interpretive bias that may result from attempting to match a contoured potentiometric surface (Konikow 1978; Anderson and Woessner 1992). This groundwater flow model was calibrated under steady-state conditions. For this effort, the originally constructed steady-state calibration was verified. Additionally, a transient build was included, which added a more robust model verification, as discussed in the following sections.

4.1 Steady-State Groundwater Flow Model Calibration

The 2010 model construction and calibration were verified to steady-state flow conditions in 2000, before the remediation system was in place (Table 4.1-1). One-hundred thirty groundwater elevation targets from Site monitoring wells were used for verification distributed throughout the model domain spatially and vertically (Figure 4.1-1).

Model calibration quality can be determined through residual statistical analysis, as shown in Table 4.1-1. Residuals are defined as the difference between model-simulated heads and observed field values. Positive residuals indicate model-simulated values are lower than the field measured values, where negative residuals denote model-simulated values higher than field measured observations. Residuals indicate an acceptable agreement between simulated and measured steady-state groundwater elevations (Table 4.1-1). The residual mean, residual standard deviation, and sum of squared residuals are shown to be 0.046, 6.43, and 5,745 square feet, with a normalized root mean square error (RMS Error[1]) less than 10 percent. Statistical results indicate a good agreement between observed and simulated water levels, which are also plotted on a calibration scatter plot (Figure 4.1-2). As shown on Figure 4.1-2, data points cluster near the best-fit ideal calibration line, indicating simulated values closely match field-measured water levels, with some outliers on both ends of the data set.

The steady-state simulated water table elevation is presented on Figure 4.1-3. Regionally, groundwater flows towards the Menominee River. Due to the permeability contrast between the sand and gravel units and the till/bedrock, the gradient steepens in the central portion of the Site.

A water budget describes inflows and outflows within an active model domain, the sum of which ideally equals zero. Water budget information can be used to identify the main sources of surface water and groundwater discharge areas in the model. For this model, the water budget is shown in Table 4.1-2 and indicates the main groundwater sources are general head boundaries simulating regional groundwater

[1] The normalized root mean square error (residual standard deviation divided by the range of observed heads) is used to assess overall model fit adjusted for scaling effects (Anderson and Woessner 1992). For this parameter, a result less than 10 percent is considered acceptable.

flow to the model domain along with recharge, representing inflows of 1,195 and 1,157 gallons per minute (gpm). Additional water budget contributors include:

- The Menominee River with a discharge of 2,275 gpm and an input contribution of 205 gpm.
- General head boundary cells with a discharge of 261 gpm.

For the steady-state simulation, model construction represents conditions before remedial activities, meaning extraction wells within the active model domain are not yet operating.

The calibrated steady-state groundwater flow model achieves a reasonable small mass balance error with a net difference inflow of 20 gpm, which equates to a mass balance percent discrepancy of 0.8 percent and is considered acceptable (Anderson and Woessner 1992).

4.2 Transient Groundwater Flow Model Calibration

The transient model verification was conducted using 9,413 water level targets at 228 monitoring locations from 2000 to 2017 (Figure 4.2-1). Average variations in Menominee River stage and groundwater pumping were computed on a yearly basis and used as model inputs. As the transient model is time dependent, aquifer storage needed to be incorporated. Storage was varied per model layer with resulting values shown in Table 4.2-1.

Residual statistics (Table 4.2-2) for the transient flow model indicate an acceptable agreement between simulated and measured groundwater elevations. The residual mean, residual standard deviation, and sum of squared residuals were calculated to be 0.88 feet, 5.23 feet, and 264,532 square feet. The RMS Error is less than 8 percent, as noted previously, a model below 10 percent is considered acceptable. Statistical results indicate good agreement between observed and simulated water levels, with a scatter plot for the 9,413 calibration targets indicating clustering near the best-fit ideal calibration line (Figure 4.2-2). As with the steady-state verification, outliers on both ends of the data set are shown.

Simulated hydrographs were generated at each transient monitoring observation location and presented in Appendix A. A brief example is shown on Figure 4.2-3 for purposes of spatially showing transient results. The majority of hydrographs depict representative fits between simulated and observed conditions as the river stage and groundwater pumping rates varied over time. As with the calibration scatter plot, some locations depict simulated water levels above or below field observations.

A transient simulated water table at the end of the simulation (2017) is presented on Figure 4.2-4. Groundwater flow is depicted similar to steady-state (Figure 4.1-3); however, active remedial wells show an area of lower groundwater elevation adjacent to the Menominee River, which is to be expected.

5 SOLUTE TRANSPORT MODEL CONSTRUCTION AND CALIBRATION

The transiently verified groundwater flow model was used as a framework for development of a solute transport model to evaluate the migration and fate of 2-methylphenol. 2-methylphenol was selected for this evaluation over other constituents because 2-methylphenol has the most comprehensive data density to support a robust solute transport model calibration.

5.1 Code Selection and Description

The numerical fate and transport model MT3DMS (Zheng and Wang 1999) was selected to simulate 2-methylphenol. MT3DMS has comprehensive capabilities for simulating advection, dispersion/diffusion, and chemical reactions of contaminants in groundwater flow systems. The MT3DMS code was selected over previous versions of MT3D because it more readily incorporates the dual-domain formulation. Additionally, MT3DMS is publicly available and features extensive code documentation and verification.

As an alternative to the classical single-domain advection-dispersion equation, dual-domain mass transfer was utilized for the transport evaluation. In a dual-domain approach, two porosity terms are entered: mobile and immobile porosity. Mobile porosity represents the more mobile portion of the formation (through which the majority of advective groundwater flow occurs), while immobile porosity represents lesser mobile portions of the formation where diffusion is dominant. Mobile and immobile porosities were set based on hydraulic conductivity values (Table 5.2-1). Areas with lower hydraulic conductivity were assumed to have a smaller mobile porosity compared to high hydraulic conductivity areas. Movement between both zones is controlled by diffusion and based on a mass transfer coefficient, which was set to 0.001 per-day (d^{-1}), to represent the diffusion-based relationships that drive transfer into and out of immobile porosity areas. Diffusion based movement is well-documented (Gillham et al. 1984; Molz et al. 2006; Flach et al. 2004; Harvey and Gorelick 2000; Feehley et al. 2000; Julian et al. 2001; Zheng and Bennett 2002). The selected mass transfer coefficient for this model is within the range of published literature values.

5.2 Transport Model Parameters

Fate and transport simulation of 2-methylphenol requires specification of various transport parameters that control the rate, movement, mixing, absorption, and degradation of 2-methylphenol in the subsurface. Transport model parameters are summarized in Table 5.2-1.

Parameters for model sorption include the following:

- A partition coefficient between the contaminant and natural organic matter (K_{oc}) set at 306.5 liters per kilogram (United States Environmental Protection Agency 2016).
- The fraction of organic carbon (f_{oc}) set to 0.009 percent, which represent the average f_{oc} from samples collected during the RI (Arcadis 2010).
- Previously discussed porosity values and an average bulk density of 2.07 kilograms per liter also based on reported RI results all equating to a retardation factor of approximately 1.2.

Within source areas, a conservative approach was taken mirroring current understanding of soil impacts, where elevated concentrations of 2-methylphenol are believed to reside (Figure 5.2-1). Each area presented on Figure 5.2-1 is represented by a higher retardation factor of 10 times the surrounding aquifer material to represent residual higher concentration material.

For degradation, which refers to the decay of contaminant concentrations due to physical, chemical, and biological activity, historical data trends at multiple monitoring wells and groundwater plume geometry were evaluated to assess Site degradation rates. Based on the overview of available Site information, appropriate half-lives were assigned per model layer ranging from approximately 5 to 10 years (Table 5.2-1).

5.3 Initial 2-methylphenol Concentration Distribution (1997 – 2000)

As noted above, solute transport is conceptualized within a dual-domain approach. For modeling, both the mobile and immobile domains were initialized with equivalent values of 2-methylphenol concentrations (e.g., mass [Figures 5.3-1 and 5.3-2] assuming sufficient residence time has occurred for the domains to equilibrate). The initial 2-methylphenol concentration represents data collected at boring/wells and groundwater grab samples from 1997 through 2000. The footprint and vertical extents of the historic and current 2-methylphenol groundwater plume are a function of:

- Location and type of the original source release (historical liquid disposal at the former Northeast Pit).
- Controlling geologic factors (bedrock, unconsolidated material porosity/permeability, preferential pathways, as shown on Figure 5.3-2).
- Controlling hydrogeologic factors (horizontal and vertical groundwater flow).
- Ongoing chemical and biological degradation.
- Source removal/control remedy implementation at the former Northeast Pit (waste removal, consolidation, and engineered cover system installation).

5.4 Calibration

Transport model calibration was conducted with 739 2-methylphenol concentration targets at more than 123 monitoring locations from 2000 to 2017 (Figure 5.4-1). Transport calibration used the transient groundwater flow model (described in Section 4.2) as the basis.

Residual statistics (Figure 5.4-2) for the solute transport model indicate an acceptable agreement between simulated and observed 2-methylphenol concentrations. The residual mean, residual standard deviation, and sum of squared residuals were calculated to be 70.5 micrograms per liter (µg/L), 705.5, and 214,224,327 µg/L. The RMS Error is less than 8 percent, representing a statistically acceptable calibration. Statistical results indicate a good agreement between simulated versus observed concentrations, with a scatter plot of 739 simulated versus observed 2-methylphenol calibration targets (Figure 5.4-2). As with steady-state and transient verification, outliers on both ends of the data set are shown.

Simulated concentration plots were generated at each monitoring observation location and presented in Appendix B. A brief example is shown on Figure 5.4-1 for purposes of spatially showing results.

Concentration plots depict representative fits between simulated and observed conditions over time. As with the calibration scatter plot, some locations depict simulated concentrations above, or below, field observations.

6 SOLUTE TRANSPORT MODEL PREDICTIVE SIMULATION

Predictive flow modeling was conducted under steady-state conditions using remedial groundwater extraction as reported during 2017 as the basis. M,p-cresol was used for predictive analysis because it is the next to last of the phenolic compounds to degrade, is the most comprehensive analyte in the database in terms of sample locations across the Site and has the lowest generic Part 201 GSI criteria of Site constituents. Similar transport parameters (sorption and degradation) were used for m,p-cresol as for 2-methylphenol (Section 5.2) because they have similar chemical properties.

6.1 Initial m,p-cresol Concentration Distribution

As noted above, dual-domain transport is conceptualized. Similar to solute transport calibration, both the mobile and immobile domains were initialized with equivalent values of m,p-cresol concentrations (Figures 6.1-1 and 6.1-2), assuming sufficient residence time has occurred for the domains to equilibrate. Additionally, the initialized m,p-cresol concentration distribution represents boring/wells and groundwater grab sample data from 2000 through 2017, with the footprint and vertical extents controlled as discussed in Section 5.3.

6.2 Simulation Results

Predictive fate and transport were conducted over a 30-year period using remedial system extraction rates from 2017 as a basis to aid in understanding the fate of m,p-cresol. Results indicate there is a significant reduction in both extent and concentration of m,p-cresol, especially adjacent to the Menominee River, where impacted groundwater is captured by the remedial system (Figure 6.2-1). Simulated plumes presented on Figure 6.2-1 represent the maximum simulated concentrations throughout all the model layers. Upgradient portions of the Site were identified to show the bulk of the extent reduction, albeit with some concentrations remaining respective of Site GSI criteria.

7 SUMMARY AND CONCLUSIONS

An originally constructed, the regional numerical groundwater flow model developed by the USGS was developed for the area encompassed by the Site. To best support Site remedial system design, the USGS model was updated by Arcadis which included:

- Refining the model grid and domain.
- Adjusting model boundary conditions to account for the revised model domain and recent groundwater extraction adjacent to the Menominee River.
- Refining the distribution of recharge and hydraulic conductivity to account for the revised model domain and data collected at the Site.

The updated model was verified under both steady-state and transient conditions using:

- Steady-state using 130 observation locations collected in 2000.
- Transiently using 9,413 groundwater level measurements collected from 2000 through 2017.

In addition to groundwater flow, a solute transport model was constructed and calibrated using 739 2-methylphenol concentrations collected from 2000 through 2017 to support predictive 30-year m,p-cresol fate and transport analysis as it is the most recalcitrant and has the lowest GSI criteria of Site constituents. The analysis, using 2017 remedial extraction rates as a basis, indicated significant m,p-cresol concentration reduction throughout the domain, but especially adjacent to the Menominee River due to remedial system operation. Additionally, the predicted lateral plume extent is greatly reduced over the 30-year simulation, especially in upgradient areas.

Lastly, as m,p-cresol was investigated, the calibrated numerical flow and solute transport model can also be used to evaluate other Site constituents, as well as in various capacities such as: evaluating groundwater extraction system hydraulic capture, mass flux to the Menominee River, source life, predicted concentrations in monitoring and extraction wells over time, and plume travel time analysis. The model can also be refined for added confidence in predictions, adaptable to relevant Site information, and/or prediction support reflective of remedial path forward alternatives.

8 UNCERTAINTIES AND LIMITATIONS

All models are based on available information and are by their very nature representations of actual systems. As with any modeling exercise, a level of uncertainty is prevalent in the construction of a complex, multilayer numerical flow model to predict groundwater responses. The purpose of the groundwater model in this case is to use available data and information to predict behavior of natural systems as these systems would respond to additional stresses. Where the available data and information are lacking or infeasible to collect, assumptions are made regarding the various inputs into the model. These assumptions are typically based on literature values and/or the experience of the project team.

9 REFERENCES

Anderson, M. P., and W. H. Woessner. 1992. Applied Groundwater Modeling. Academic Press, Inc., San Diego, California

Arcadis. 2004. Numerical Groundwater Flow Model, Kingsford, Michigan, May 24, 2004.

Arcadis. 2005. Performance Monitoring Plan – Groundwater Extraction System, Ford-Kingsford Products Facility, Kingsford Michigan, Court Case No. 04-1427-CE, April 22, 2005.

Arcadis. 2010. Remedial Investigation Report, November 2010.

Feehley, C.E., C. Zheng, and F.J. Molz. 2000. A dual-domain mass transfer approach for modeling solute transport in heterogeneous aquifers: Application to the macrodispersion experiment (MADE) site. Water Resources Research 36, no. 9: 2501–2515.

Flach, G.P., S.A. Crisman, and F.J Molz III. 2004. Comparison of Single-Domain and Dual-Domain Subsurface Transport Models. Ground Water 42, no. 6: 815-828.

Gillham, R.W., E.A. Sudicky, J.A. Cherry, and E.O. Frind. 1984. An advection-diffusion concept for solute transport in heterogeneous unconsolidated geological deposits. Water Resources Research 20, no.3: 369-378.

Harbaugh, A.W., 2005. MODFLOW-2005, The U.S. Geological Survey Modular Ground-Water Model-the Ground-Water Flow Process: U.S. Geological Survey Techniques and Methods 6-A16.

Harvey, C.F., and S.M. Gorelick. 2000. Rate-limited mass transfer or macrodispersion: Which dominates plume evolution at the macrodispersion experiment (MADE) site? Water Resources Research 36, no. 3: 637–650.

Julian, H.E., M.J. Boggs, C. Zheng, and C.E. Feehley. 2001. Numerical simulation of a natural gradient tracer experiment for the natural attenuation study: Flow and physical transport. Ground Water 39, no. 4: 534–545.

Konikow, L. 1978. Calibration of Groundwater Models, in Proceedings of the Specialty Conferences on Verification of Mathematical and Physical Models in Hydraulic Engineering, College Park, Maryland, August 9-11, 1978.

Luukkonen, C.L., and D.B. Westjohn. 2001. Ground-Water Flow and Contributing Areas to Public-Supply Wells in Kingsford and Iron Mountain, Michigan. U.S. Geological Survey Water-Resources Investigation 00-4226, Lansing, Michigan.

McDonald, M. G., and A. W. Harbaugh. 1988. A Modular Three-Dimensional Finite-Difference Ground-Water Flow Model, Techniques of Water-Resources Investigations, Book 6, Chapter A1. U. S. Geological Survey. Reston, Virginia.

Molz, F.J., C. Zheng, S.M. Gorelick, and C.F. Harvey. 2006. Comment on “Investigating the Macrodispersion Experiment (MADE) site in Columbus, Mississippi, Using a Three-Dimensional Inverse Flow and Transport Model” by Heidi Christiansen Barlebo, Mary C. Hill, and Dan Rosbjerg. Water Resources Research. 42 no. 6 W06603.

USEPA. 2016. *Regional Screening Levels*. Available online at https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016. Retrieved March 27, 2017.

Zheng, C., and G. D. Bennett. 2002. Applied Contaminant Transport Modeling Second Edition, John Wiley & Sons, New York, 621 pp.

Zheng, C., and P. Wang. 1999. MT3DMS: A Modular Three-Dimensional Multispecies Transport Model for Simulation of Advection, Dispersion, and Chemical Reactions of Contaminants in Groundwater Systems. Prepared for the U.S. Army Corps of Engineers, Washington, DC. University of Alabama, Tuscaloosa. 2000.

TABLES

Table 3.4-1
Extraction Well Pumping
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Extraction Well ID	Easting	Northing	Top Layer	Bottom Layer	Pumping Rate (gallons per minute)																	
					2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
GMEWA-4	25965373	371313	1	1	0	0	0	0	0	0	7	7	7	7	7	7	7	7	7	7	7	7
GMEWA-5	25965286	371349	1	1	0	0	0	0	0	0	10	10	10	10	10	11	13.67	10	10	10	10	10
GMEWA-7	25965128	371307	1	1	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0
GMEWA-14	25964858	371694	1	1	0	0	0	0	0	0	10	10	10	10	10	6.67	0	0	0	0	7.5	10
GMEWA-15	25964869	371765	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	6.67	7.50	10	10
GMEWA-16	25964881	371833	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	11.25	11.25	10	10
GMEWA-17	25964899	371901	1	1	0	0	0	0	0	0	15	15	15	15	15	15	15	15	15	15	15	15
GMEWA-18	25964914	371980	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWA-19	25964931	372056	1	1	0	0	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6
GMEWA-20	25964950	372133	1	1	0	0	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6
GMEWA-22	25964984	372285	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWA-23	25965003	372362	1	1	0	0	0	0	0	0	15	15	15	15	15	15	15	15	15	15	15	15
GMEWA-24	25965038	372435	1	1	0	0	0	0	0	0	15	15	15	15	15	13.33	10	10	10	10	11.17	12
GMEWA-25	25965053	372482	1	1	0	0	0	0	0	0	15	15	15	15	15	13.33	10	10	10	10	11.17	12
GMEWA-29	25964940	372095	1	1	0	0	0	0	0	0	5	5	5	5	5	5	5	5	5	5	5	5
GMEWA-30	25964957	372164	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWA-31	25964967	372220	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWC-4	25964997	372901	6	7	0	0	0	0	0	0	20	20	20	20	20	20	15.83	15	15	15	15	15
GMEWA-9	25964978	371352	1	1	0	0	0	0	0	0	10	10	10	10	5	0	0	0	0	0	0	0
GMEWC-5	25965079	372718	6	7	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20
GMEWC-7	25964997	372331	6	7	0	0	0	0	0	0	20	20	20	20	20	20	20	20	20	20	20	20
GMEWC-8	25964862	371747	6	7	0	0	0	0	0	0	20	20	20	20	20	20	10	10	10	10	10	10
GMEWC-11	25965102	372653	6	7	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWC-12	25965103	372560	6	7	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWC-13	25965088	372471	6	7	0	0	0	0	0	0	10	10	10	10	10	10	10	10	10	10	10	10
GMEWA-10	25964923	371412	1	1	0	0	0	0	0	0	10	10	10	10	0	0	0	0	0	0	0	0
GMEWA-11	25964888	371477	1	1	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0
GMEWA-12	25964863	371547	1	1	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0
GMEWA-13	25964853	371622	1	1	0	0	0	0	0	0	10	10	10	10	10	4.17	0	0	0	0	0	0
GMEWA-21	25964968	372207	1	1	0	0	0	0	0	0	10	10	10	10	10	10	10	10	0	0	0	0
GMEWA-6	25965208	371327	1	1	0	0	0	0	0	0	10	10	10	10	10	0	8	8	8	0	0	0
GMEWA-8	25965053	371327	1	1	0	0	0	0	0	0	10	10	10	10	10	0	0	0	0	0	0	0
GMEWC-10	25965083	372617	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEWC-2A	25964788	373152	6	8	0	0	0	0	0	0	20	20	20	20	20	10	0	0	0	0	0	0
GMEWC-3	25964913	373042	6	7	0	0	0	0	0	0	20	20	20	20	20	15	0	0	0	0	0	0
GMEWC-6	25965078	372512	6	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-1	25965135	371261	1	1	0	22.44	36.82	15.72	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-2	25965390	371566	1	1	0	19.70	14.10	9.97	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-3	25965328	372457	5	6	0	1.61	0.30	4.53	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-4	25965084	372565	4	5	0	0	1.76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-4R	25965091	372522	4	6	0	0	0.91	0.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-5	25965487	371265	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GMEW-6	25965211	372623	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4.1-1
Steady-State Calibration Statistics
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Well ID	Easting	Northing	Model Layer	Observed Groundwater Elevation (ft amsl)	Simulated Groundwater Elevation (ft amsl)	Residual (ft)
BR-02	25969505	375086	1	1,083.75	1,089.92	-6.17
BR-05S	25969318	373591	1	1,076.36	1,079.61	-3.25
GM-002A	25969704	370111	1	1,071.38	1,075.75	-4.37
GM-002C	25969704	370121	1	1,070.21	1,075.76	-5.55
GM-003A	25968519	370136	1	1,070.46	1,073.45	-2.99
GM-004	25968793	374593	1	1,084.40	1,079.58	4.82
GM-016	25965317	375466	1	1,053.03	1,050.53	2.50
GM-019	25967424	372263	1	1,065.00	1,059.98	5.01
GM-020	25967692	372380	1	1,070.91	1,072.22	-1.31
GM-021	25965892	370149	1	1,052.65	1,036.94	15.71
GM-023	25965842	370288	1	1,051.14	1,037.16	13.97
GM-024A	25967825	369311	1	1,040.02	1,037.88	2.14
GM-025A	25965087	372556	1	1,038.01	1,036.63	1.37
GM-026A	25964840	371712	1	1,037.68	1,035.55	2.13
GM-027A	25965361	371205	1	1,038.26	1,037.08	1.18
GM-028A	25965963	370372	1	1,038.49	1,037.53	0.96
GM-031	25965329	373223	1	1,040.19	1,041.02	-0.83
GM-034A	25969226	368950	1	1,069.62	1,049.37	20.25
GM-035	25969585	373025	1	1,074.31	1,079.29	-4.98
GM-036	25971409	374156	1	1,087.21	1,089.64	-2.43
GM-040A	25969628	372214	1	1,071.67	1,078.21	-6.55
GM-041	25969906	373039	1	1,076.64	1,080.40	-3.76
GM-042	25969520	373318	1	1,077.63	1,079.76	-2.13
GM-043	25965859	373853	1	1,049.25	1,044.80	4.45
GM-044	25966020	373703	1	1,046.05	1,044.95	1.10
GM-045	25966024	373491	1	1,043.01	1,044.53	-1.52
GM-046	25965713	374000	1	1,054.11	1,044.79	9.32
GM-047	25965453	374101	1	1,047.24	1,044.50	2.74
GM-048	25965959	374085	1	1,057.01	1,045.54	11.47
GM-049	25966142	373171	1	1,041.58	1,044.22	-2.65
GM-051	25965416	373706	1	1,041.45	1,043.08	-1.62
GM-052	25967202	371156	1	1,041.54	1,041.22	0.32
GM-053A	25967168	370456	1	1,039.68	1,039.54	0.14
GM-055	25965575	374601	1	1,051.27	1,046.49	4.78
GM-056	25970051	373440	1	1,078.76	1,082.39	-3.62
GM-057	25966106	374819	1	1,052.08	1,047.39	4.69
GM-058	25965680	375183	1	1,052.39	1,048.73	3.65
GM-059	25964051	375399	1	1,050.50	1,050.39	0.10
GM-060	25966728	375452	1	1,086.85	1,073.55	13.29
GM-061	25966219	375828	1	1,090.25	1,068.16	22.09
GM-062A	25967872	372897	1	1,071.11	1,072.41	-1.30

Notes on Page 4.

Table 4.1-1
Steady-State Calibration Statistics
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Well ID	Easting	Northing	Model Layer	Observed Groundwater Elevation (ft amsl)	Simulated Groundwater Elevation (ft amsl)	Residual (ft)
GM-064A	25965496	370717	1	1,038.07	1,037.18	0.88
GM-066A	25964655	373426	1	1,038.49	1,038.21	0.28
GM-069	25966330	371085	1	1,039.40	1,039.66	-0.26
GM-070	25968797	373110	1	1,072.87	1,076.04	-3.17
GM-071	25968894	372981	1	1,082.04	1,076.41	5.63
GM-072	25969108	373101	1	1,079.55	1,077.43	2.12
GM-073	25961545	376569	1	1,066.50	1,059.62	6.88
GM-074	25961264	376375	1	1,065.76	1,059.55	6.21
GM-075	25961117	376664	1	1,066.15	1,061.09	5.06
GM-100	25967155	370457	1	1,038.65	1,039.53	-0.88
GM-118D	25967940	371085	1	1,066.12	1,072.96	-6.83
GMEW-01	25965135	371261	1	1,038.48	1,036.25	2.23
GMEW-02	25965390	371566	1	1,039.21	1,037.58	1.63
MP-1S	25960848	375431	1	1,057.60	1,055.80	1.80
MP-2D	25960996	376005	1	1,063.89	1,058.57	5.32
MP-2S	25960989	375998	1	1,064.57	1,058.55	6.02
MP-3D	25960141	376197	1	1,064.35	1,061.78	2.57
MP-3S	25960142	376211	1	1,066.11	1,061.84	4.27
MW-01B	25969473	371578	1	1,071.25	1,076.96	-5.71
MW-02D	25966840	371715	1	1,039.45	1,042.16	-2.71
MW-03	25969323	373623	1	1,079.11	1,079.74	-0.63
MW-04	25966643	373579	1	1,058.35	1,046.90	11.45
MW-05	25969531	375104	1	1,082.99	1,090.14	-7.15
MW-06	25965667	375115	1	1,052.01	1,048.45	3.55
MW-09A	25968084	371547	1	1,071.93	1,073.47	-1.54
MW-10	25966707	374480	1	1,053.27	1,050.93	2.34
MW96-01	25969351	373297	1	1,078.24	1,078.80	-0.56
MW96-02	25968453	373590	1	1,071.96	1,074.18	-2.22
MW96-03	25968886	373285	1	1,073.21	1,076.53	-3.32
MW96-04	25968560	373292	1	1,071.37	1,074.89	-3.52
P-01	25967522	371546	1	1,082.54	1,063.11	19.43
SG-01	25965999	369508	1	1,035.40	1,035.21	0.19
SG-02	25965009	372658	1	1,035.61	1,036.00	-0.39
SG-04	25969050	367173	1	1,035.32	1,033.41	1.91
UG-01	25968236	375702	1	1,101.14	1,100.16	0.97
UG-02	25971404	374163	1	1,086.86	1,089.66	-2.80
UG-03	25972103	374961	1	1,096.81	1,095.66	1.15
BR-03	25966649	373546	2	1,045.24	1,046.93	-1.69
GM-029	25965974	369572	2	1,037.12	1,035.50	1.62
GM-034B	25969227	368953	2	1,042.14	1,046.49	-4.35
GM-038A	25968573	369015	2	1,041.17	1,038.33	2.84

Notes on Page 4.

Table 4.1-1
Steady-State Calibration Statistics
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Well ID	Easting	Northing	Model Layer	Observed Groundwater Elevation (ft amsl)	Simulated Groundwater Elevation (ft amsl)	Residual (ft)
GM-039	25969906	369013	2	1,043.84	1,058.44	-14.60
GM-040B	25969633	372207	2	1,071.44	1,078.14	-6.70
GM-063A	25965078	371449	2	1,037.61	1,037.26	0.35
GM-067	25971321	368697	2	1,046.40	1,057.16	-10.76
MW-08	25968151	374164	2	1,058.34	1,072.23	-13.89
MW-09B	25968089	371548	2	1,065.11	1,069.54	-4.43
UG-04	25972580	373267	2	1,067.64	1,087.27	-19.64
CW-01	25967738	368600	3	1,040.31	1,036.00	4.31
GM-007	25971403	370120	3	1,061.53	1,070.29	-8.76
GM-008	25969133	367275	3	1,035.19	1,033.72	1.46
GM-014	25974269	374127	3	1,081.34	1,087.02	-5.68
GM-032	25969974	371521	3	1,070.89	1,071.58	-0.69
GM-037A	25967424	372245	3	1,047.07	1,053.37	-6.31
GM-068	25972684	371141	3	1,070.26	1,072.57	-2.32
UG-05	25972818	372532	3	1,053.21	1,074.22	-21.00
BR-06	25971393	371892	4	1,075.32	1,060.71	14.61
GM-003B	25968524	370137	4	1,044.00	1,046.19	-2.19
GM-006	25965004	373916	4	1,042.01	1,042.65	-0.64
GM-015	25971409	374162	4	1,084.81	1,062.08	22.72
GM-025B	25965088	372549	4	1,039.11	1,042.45	-3.34
GM-026B	25964838	371707	4	1,038.02	1,038.20	-0.17
GM-028B	25965959	370366	4	1,038.28	1,038.39	-0.11
GM-038B	25968573	369020	4	1,042.65	1,040.81	1.84
GM-063B	25965081	371443	4	1,038.28	1,038.34	-0.06
GM-064B	25965499	370711	4	1,038.14	1,038.29	-0.15
GM-065	25965328	372448	4	1,042.25	1,042.38	-0.14
BR-05D	25969321	373584	5	1,055.50	1,057.33	-1.83
GM-062B	25967888	372897	5	1,051.52	1,052.43	-0.92
GM-001	25967134	370815	6	1,040.44	1,045.94	-5.50
GM-024C	25967835	369311	6	1,041.27	1,042.91	-1.64
GM-027B	25965357	371202	6	1,038.70	1,038.82	-0.12
GM-038C	25968573	369023	6	1,042.57	1,045.62	-3.04
GM-053B	25967163	370457	6	1,040.18	1,045.18	-5.00
GM-066B	25964656	373424	6	1,039.81	1,042.73	-2.92
GMEW-03	25965328	372457	6	1,040.38	1,042.87	-2.49
BR-01	25967231	370573	7	1,040.43	1,046.06	-5.63
GM-005	25965314	373213	7	1,039.94	1,043.38	-3.43
GM-009	25965960	369592	7	1,037.99	1,039.00	-1.00
GM-010	25964101	371953	7	1,039.00	1,040.03	-1.04
GM-011	25960860	375429	7	1,054.16	1,052.50	1.66
GM-017	25972078	372503	7	1,054.80	1,060.01	-5.21

Notes on Page 4.

Table 4.1-1
Steady-State Calibration Statistics
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Well ID	Easting	Northing	Model Layer	Observed Groundwater Elevation (ft amsl)	Simulated Groundwater Elevation (ft amsl)	Residual (ft)
GM-026C	25964837	371702	7	1,038.45	1,038.87	-0.42
UG-06	25972812	372515	7	1,053.18	1,060.40	-7.22
GM-002B	25969704	370130	8	1,046.50	1,054.01	-7.52
GM-012	25969580	373036	8	1,055.28	1,057.84	-2.56
GM-025C	25965090	372546	8	1,039.65	1,042.82	-3.17
GM-027C	25965350	371198	8	1,039.12	1,039.17	-0.05
GM-062C	25967881	372897	8	1,051.73	1,052.17	-0.45

Residual Statistics	
Total Used	130
Minimum (ft)	-21.00
Maximum (ft)	22.72
Mean (ft)	0.046
Standard Deviation (ft)	6.43
Sum Squares Residual (ft^2)	5,745.84
Range in Observed Water Levels (ft)	65.95
Scaled RMS Error	9.75%

Notes and Acronyms:
ft amsl = feet above mean sea level
ft = feet
% = percent
ft^2 = feet squared
RMS = root mean square

Table 4.1-2
Steady-State Mass Balance
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Description	Inflow (ft^3/day)	Outflow (ft^3/day)	Inflow (gpm)	Outflow (gpm)
General Head	229,951	50,268	1,195	261
River	39,398	437,953	205	2,275
Wells	0	0	0	0
Recharge	222,777	0	1,157	0
Total	492,125	488,221	2,556	2,536
Percent Error	0.8%		0.8%	

Notes and Acronyms:
ft^3/day = cubic feet per day
gpm = gallons per minute
% = percent

Table 4.2-1
Transient Model Parameters
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Model Layer	Storativity
A Sand (Model Layer 1)	1.00E-08
A Sand/Confining Unit (Model Layer 2)	4.00E-08
Aquitard (Model Layer 3)	4.00E-08
B Sand (Model Layer 4)	4.00E-08
C1 Sand (Model Layer 5)	3.33E-08
C1 Sand (Model Layer 6)	3.08E-08
C2 Sand (Model Layer 7)	3.08E-08
D Sand (Model Layer 8)	1.54E-08

Table 4.2-2
Transient Calibration Statistics
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Residual Statistics	
Total Used	9413
Minimum (ft)	-23.85
Maximum (ft)	28.08
Mean (ft)	0.882
Standard Deviation (ft)	5.25
Sum Squares Residual (ft^2)	266,806
Range in Observed Water Levels (ft)	71.81
Scaled RMS Error	7.41%

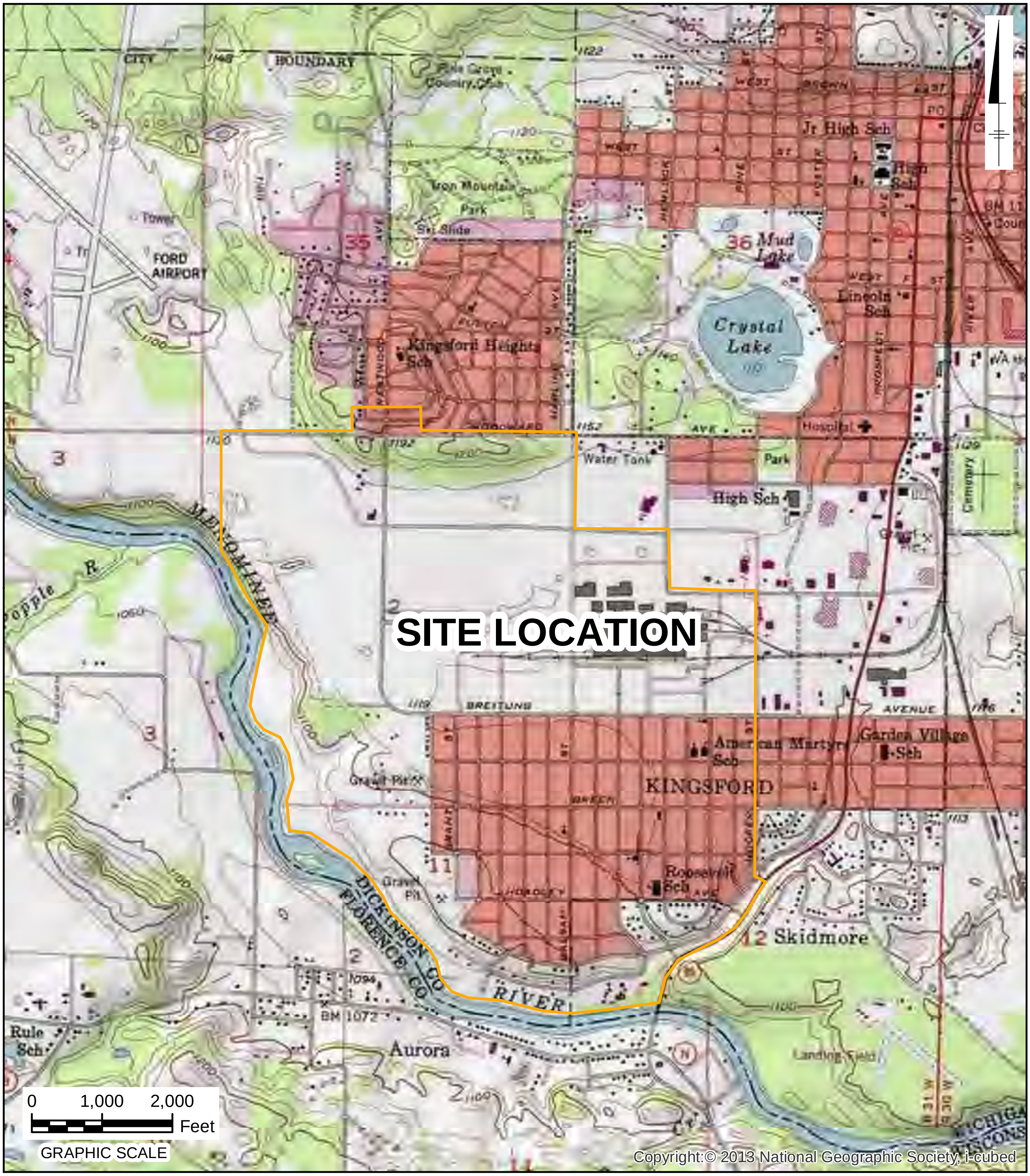
Notes and Acronyms:
ft = feet
RMS = root mean square
% = percent
(ft^2) = feet squared

Table 5.2-1
Transport Model Parameters
Groundwater Flow and Solute Transport Model Update
Ford-Kingsford Products Facility
Kingsford, Michigan

Model Layer	Areas	Mobile Porosity	Immobile Porosity	Retardation Factor	Mass Transfer Coefficient (day^{-1})	Dispersivity (ft)	Degradation Half-Life (Years)
A Sand (Model Layer 1)	K<1	0.030	0.070	1.16	0.001	5.0	9.4
	50<K<=1	0.075	0.175				
	K>=50	0.090	0.210				
A Sand/Confining Unit (Model Layer 2)	K<1	0.030	0.070	1.16	0.001	5.0	5.2
	50<K<=1	0.075	0.175				
	K>=50	0.090	0.210				
Aquitard (Model Layer 3)	K<1	0.030	0.070	1.16	0.001	5.0	7.2
	50<K<=1	0.075	0.175				
	K>=50	0.090	0.210				
B Sand (Model Layer 4)	50<K<=1	0.075	0.175	1.16	0.001	5.0	5.1
	K>=50	0.090	0.210				
C1 Sand (Model Layer 5)	50<K<=1	0.075	0.175	1.16	0.001	5.0	5.9
	K>=50	0.090	0.210				
C1 Sand (Model Layer 6)	50<K<=1	0.075	0.175	1.16	0.001	5.0	8.4
	K>=50	0.090	0.210				
C2 Sand (Model Layer 7)	50<K<=1	0.075	0.175	1.16	0.001	5.0	7.2
	K>=50	0.090	0.210				
D Sand (Model Layer 8)	N/A	0.075	0.175	1.16	0.001	5.0	7.2

Notes and Acronyms:
ft = feet
K = horizontal hydraulic conductivity (ft/day)
N/A = not applicable
day^{-1} = per day

FIGURES



AREA OF CONCERN

SOURCE:

USGS 7.5 MINUTE TOPOGRAPHIC MAP,
IRON MOUNTAIN,
MICHIGAN QUADRANGLE,
1955 PHOTOREVISED 1982

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

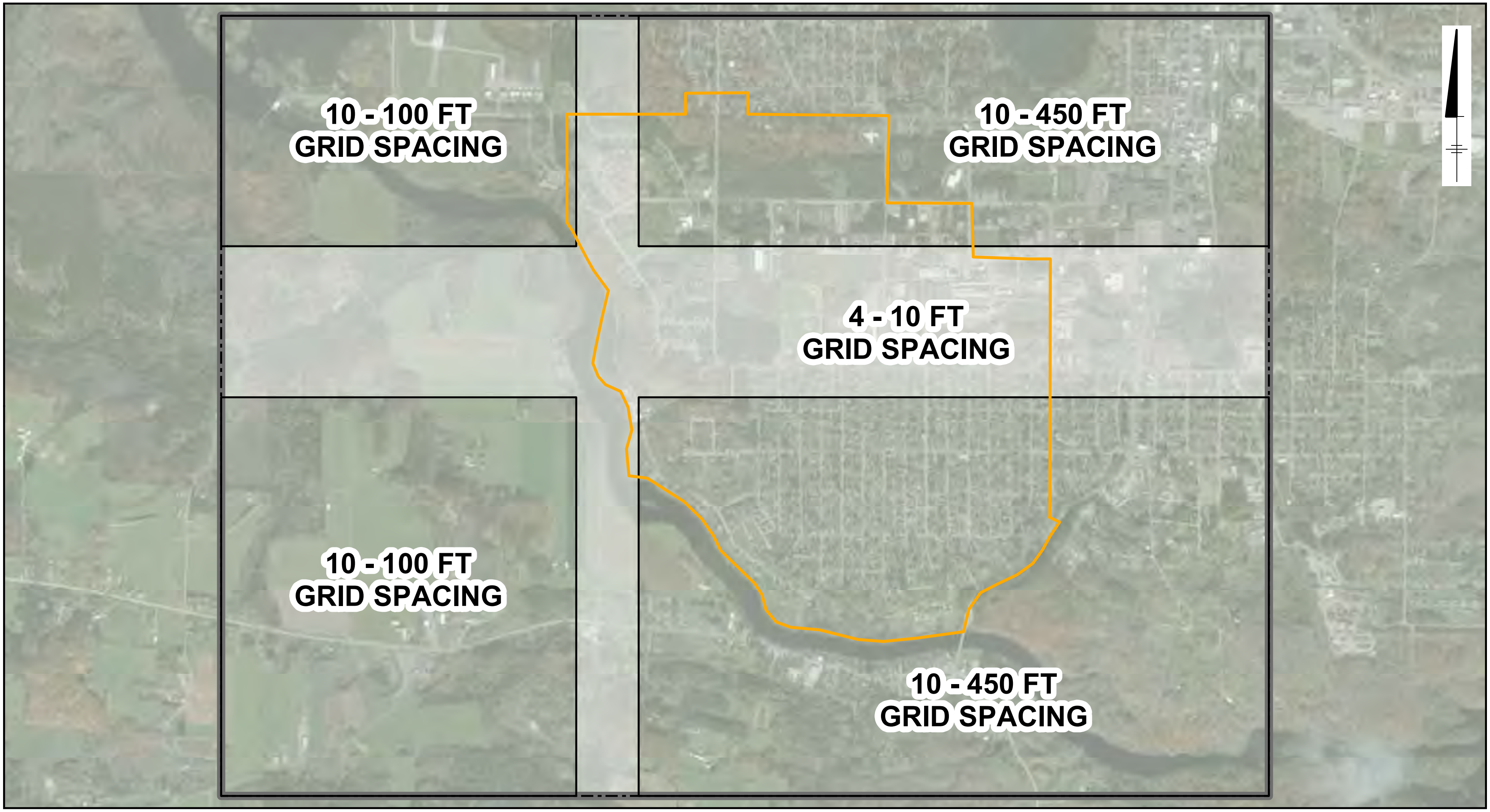
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

SITE LOCATION

FIGURE
1-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-03\Site_Location_Map.mxd

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Finite_Diff_Grid_20180417.mxd 4/17/2018 9:55:33 AM



LEGEND:

- FINITE DIFFERENCE GRID
- MODEL EXTENT
- AREA OF CONCERN

0 2,300 4,600 Feet
GRAPHIC SCALE

NOTES:

1) FT = FEET
2) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

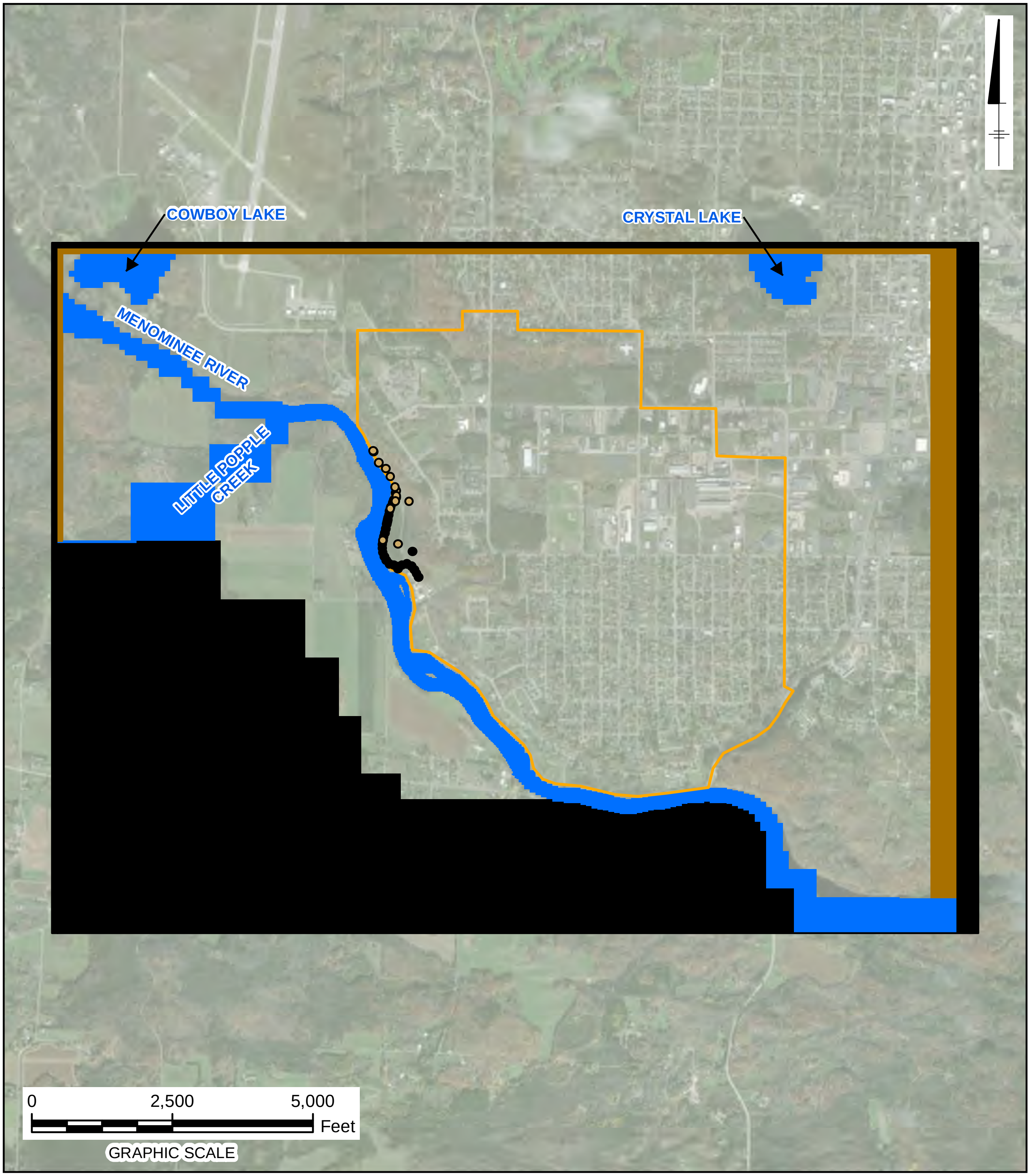
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

FINITE DIFFERENCE GRID

ARCADIS

FIGURE
3.2-1



LEGEND:

EXTRACTION WELLS

- A SANDS
- C SANDS
- AREA OF CONCERN
- GENERAL HEAD BOUNDARY
- NO FLOW
- RIVER (LAYER 1 ONLY)
- MODEL EXTENT

NOTES:

1) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

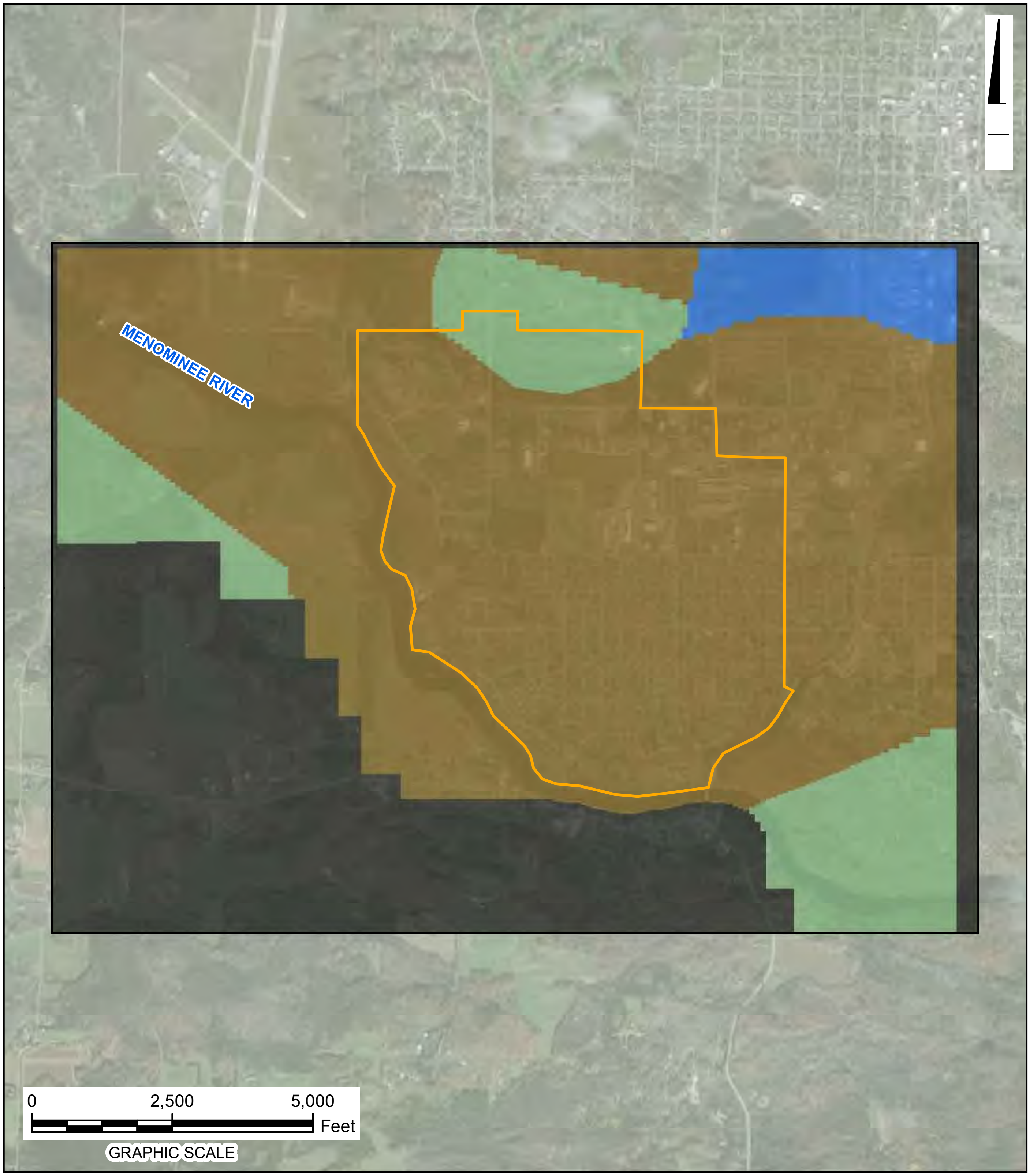
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

MODEL DOMAIN AND BOUNDARY CONDITIONS

FIGURE
3.4-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-03\Model_Domain_Bdy_Cond_20180316.mxd



LEGEND:

RECHARGE (IN/YR)
- 0.02
- 8.01
- 9.77

- NO FLOW
- AREA OF CONCERN
- MODEL EXTENT

NOTES:
1) IN/YR = INCHES PER YEAR
2) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

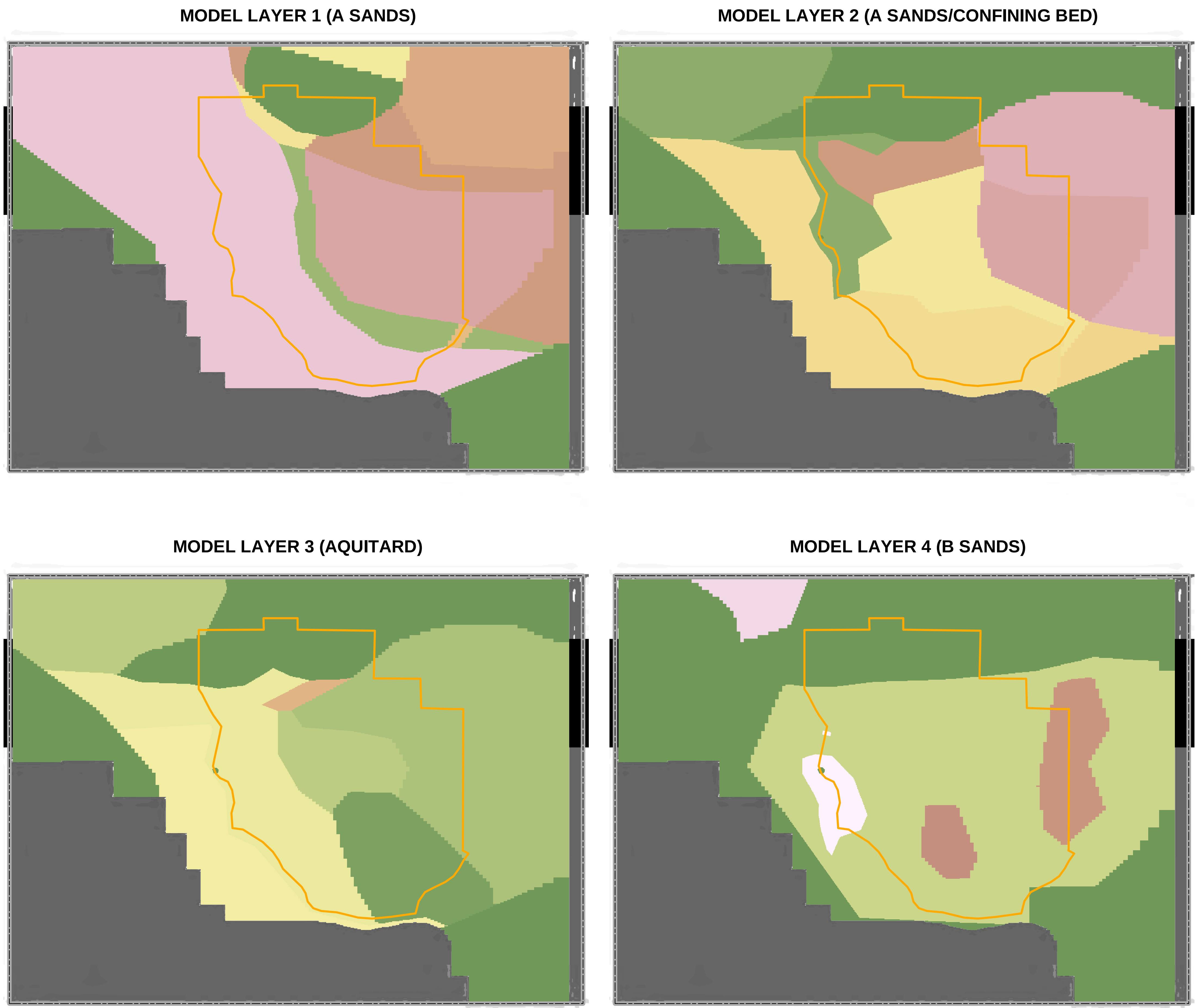
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

SIMULATED RECHARGE DISTRIBUTION

ARCADIS

FIGURE
3.4-2

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Sim_Recharge_Dist_20180417.mxd



LEGEND:

HYDRAULIC CONDUCTIVITY (FPD)

0.001 : 0.00005	8.9 : 0.69
0.1 : 0.0008	13 : 0.1
0.2 : 0.002	19.5 : 1.5
0.5 : 0.005	20 : 0.4
1 : 0.0008	20.8 : 1.6
1 : 0.01	22.1 : 0.17
1 : 0.02	26 : 2.6
2 : 0.12	32.5 : 0.1
2 : 0.17	32.5 : 1
2 : 1.82	32.5 : 2.5
4 : 0.33	45.5 : 0.35
5 : 0.04	50 : 0.2
5 : 0.05	52 : 0.4
5 : 0.33	88.5 : 6.81
5 : 0.39	100 : 10
5 : 0.42	104 : 8
8 : 0.07	126.0 : 0.97
	126.0 : 3.88

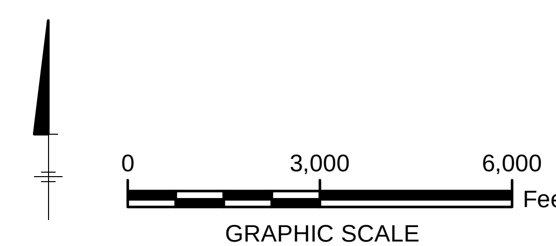
NO FLOW

MODEL EXTENT

AREA OF CONCERN

NOTES:

1) HYDRAULIC CONDUCTIVITY VALUES REPRESENT HORIZONTAL : VERTICAL CONDUCTIVITIES
2) FPD = FEET PER DAY



FORD-KINGSFORD PRODUCTS FACILITY

KINGSFORD, MICHIGAN

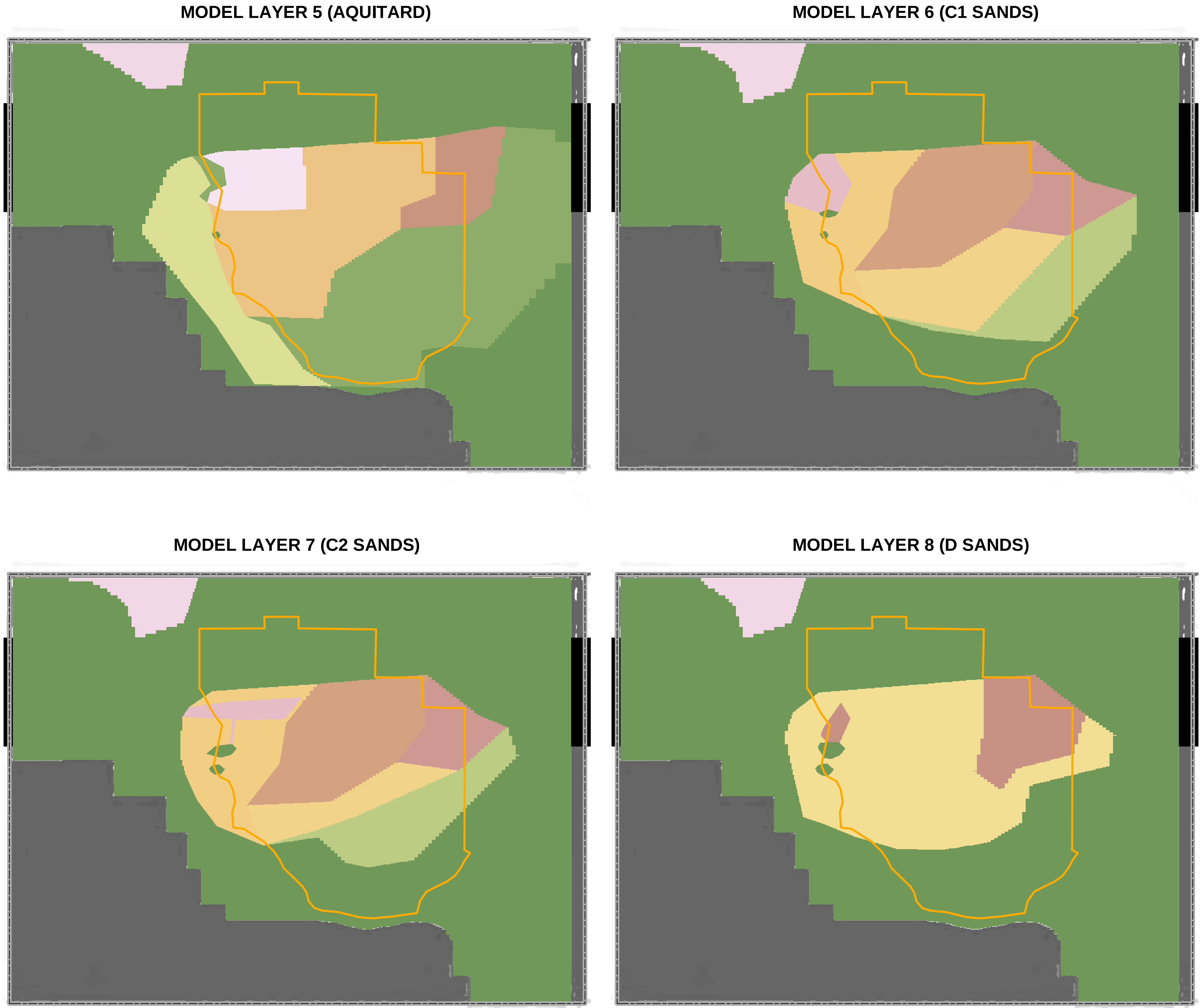
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

HYDRAULIC CONDUCTIVITY DISTRIBUTION - MODEL LAYERS 1-4

FIGURE

3.5-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-03\Hyd_Cond_L1_L4_20180319.mxd



LEGEND:

HYDRAULIC CONDUCTIVITY (FPD)

- 0.001 : 0.00005
- 0.1 : 0.0008
- 0.2 : 0.002
- 0.5 : 0.005
- 1 : 0.0008
- 1 : 0.01
- 1 : 0.02
- 2 : 0.12
- 2 : 0.17
- 2 : 1.82
- 4 : 0.33
- 5 : 0.04
- 5 : 0.05
- 5 : 0.33
- 5 : 0.39
- 5 : 0.42
- 8 : 0.07
- 8.9 : 0.69
- 13 : 0.1
- 19.5 : 1.5
- 20 : 0.4
- 20.8 : 1.6
- 22.1 : 0.17
- 26 : 2.6
- 32.5 : 0.1
- 32.5 : 1
- 32.5 : 2.5
- 45.5 : 0.35
- 50 : 0.2
- 52 : 0.4
- 88.5 : 6.81
- 100 : 10
- 104 : 8
- 126.0 : 0.97
- 126.0 : 3.88

- NO FLOW
- MODEL EXTENT
- AREA OF CONCERN

NOTES:

1) HYDRAULIC CONDUCTIVITY VALUES REPRESENT HORIZONTAL : VERTICAL CONDUCTIVITIES
2) FPD = FEET PER DAY

0 3,000 6,000 Feet

GRAPHIC SCALE

FORD-KINGSFORD PRODUCTS FACILITY

KINGSFORD, MICHIGAN

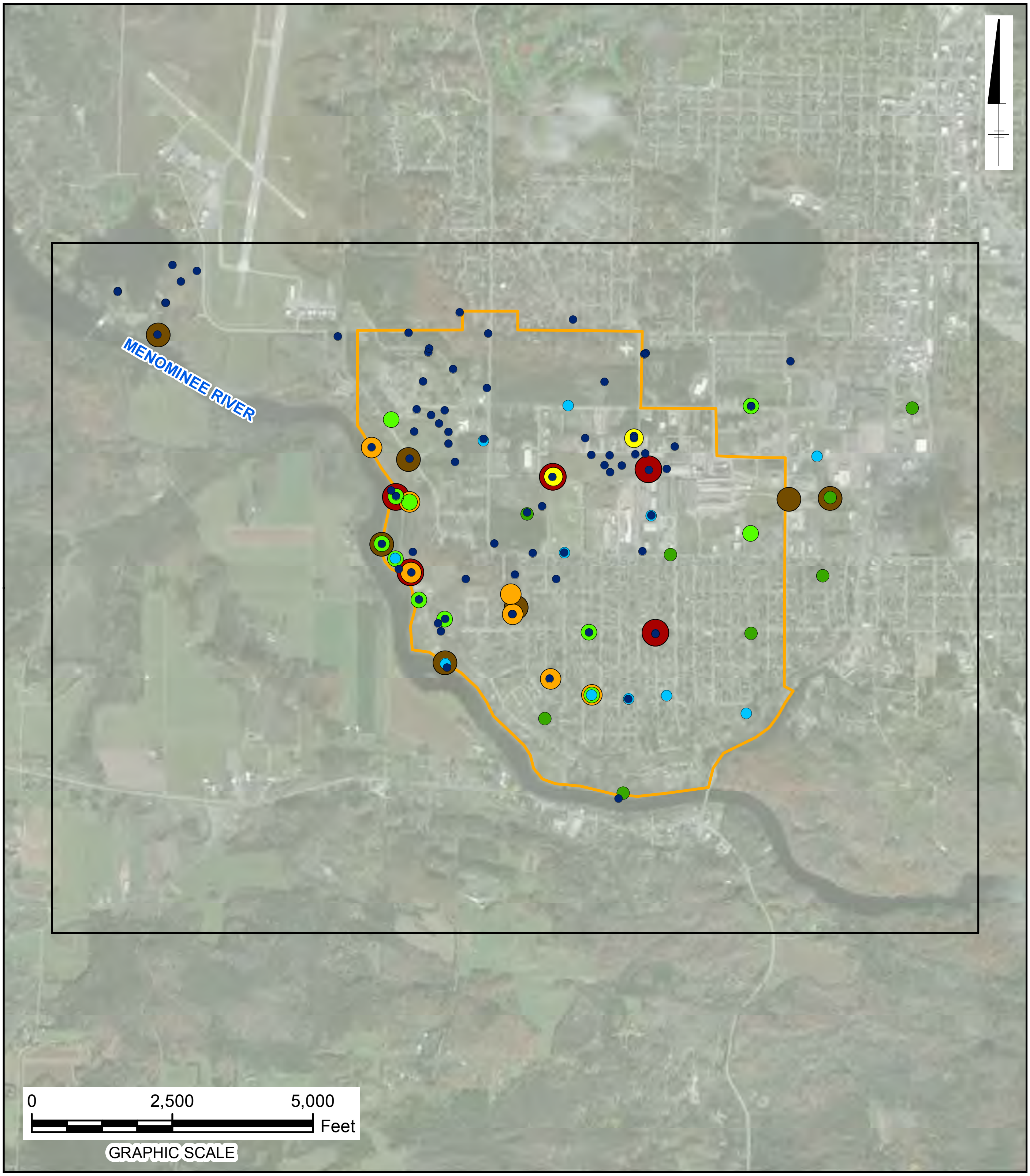
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

HYDRAULIC CONDUCTIVITY DISTRIBUTION - MODEL LAYERS 5-8

FIGURE

3.5-2

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-03\Hyd_Cond_L5_L8_20180319.mxd



LEGEND:

AREA OF CONCERN

MODEL EXTENT

TARGETS

LAYER 1 (A SANDS)

LAYER 2 (A SANDS/CONFINING BED)

LAYER 3 (AQUITARD)

LAYER 4 (B SANDS)

LAYER 5 (AQUITARD)

LAYER 6 (C1 SANDS)

LAYER 7 (C2 SANDS)

LAYER 8 (D SANDS)

NOTES:

1) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

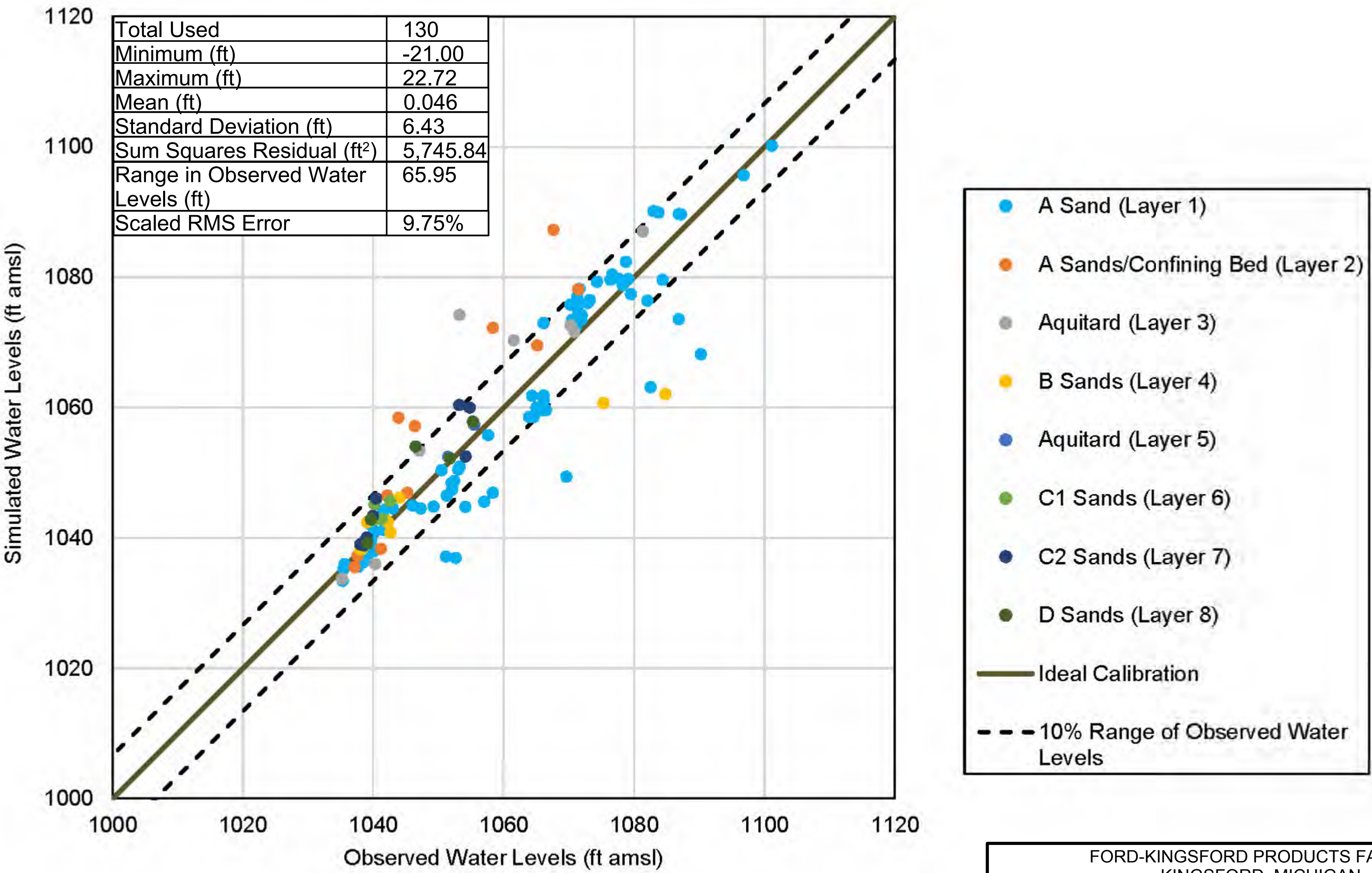
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

STEADY-STATE HEAD OBSERVATION TARGETS

FIGURE
4.1-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\SS_Head_Targets_20180410.mxd



Notes:

1) ft = feet

2) ft^2 = feet squared

3) amsl = above mean sea level

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

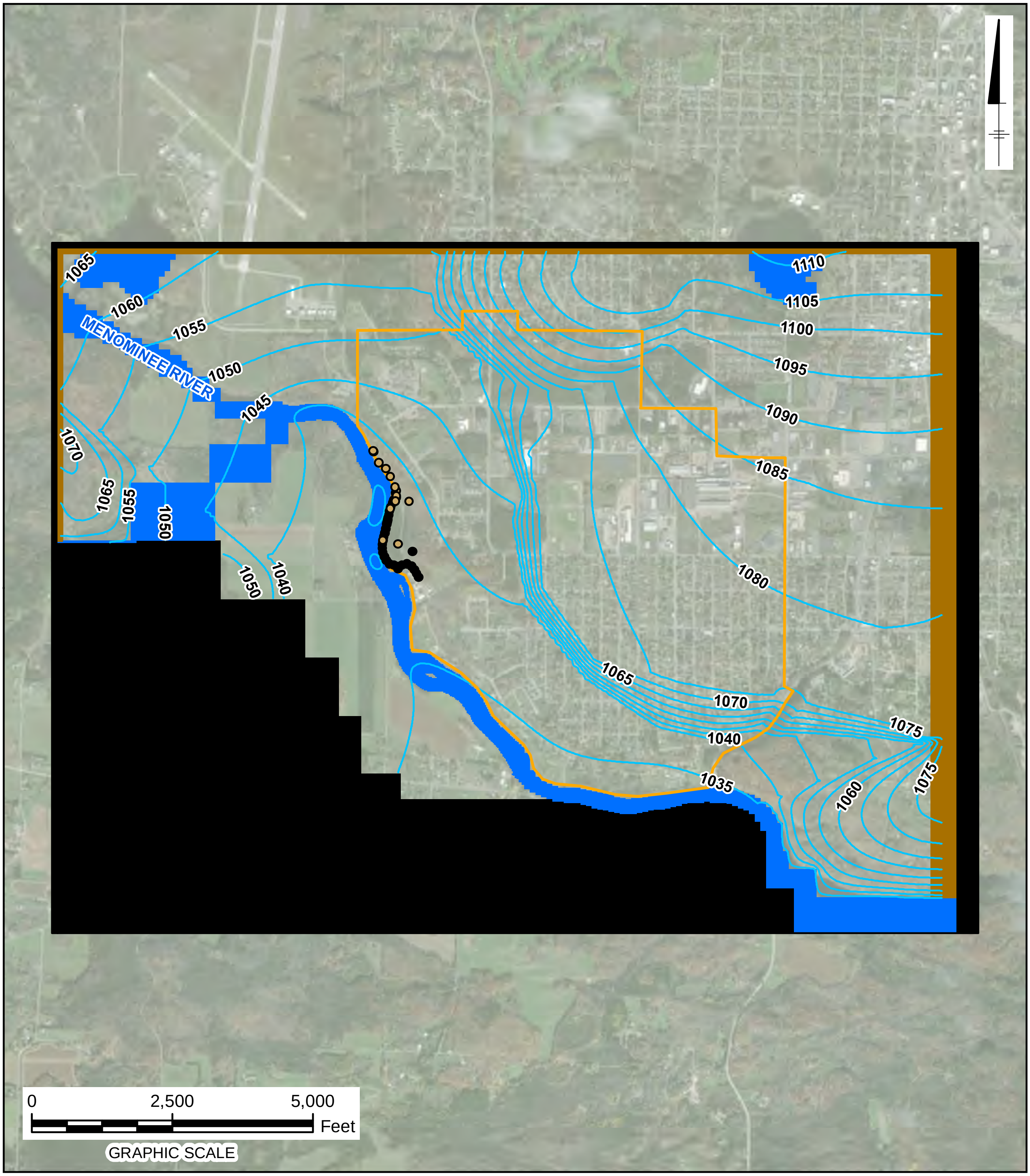
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

STEADY-STATE SIMULATED VERSUS OBSERVED WATER LEVELS

ARCADIS Design & Consultancy for natural and built assets

FIGURE

4.1-2



LEGEND:

EXTRACTION WELLS

- A SANDS
- C SANDS

AREA OF CONCERN

GENERAL HEAD BOUNDARY

SIMULATED GROUNDWATER ELEVATIONS (FT AMSL)

NO FLOW

RIVER

MODEL EXTENT

NOTES:

1) FT AMSL = FEET ABOVE MEAN SEA LEVEL
2) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

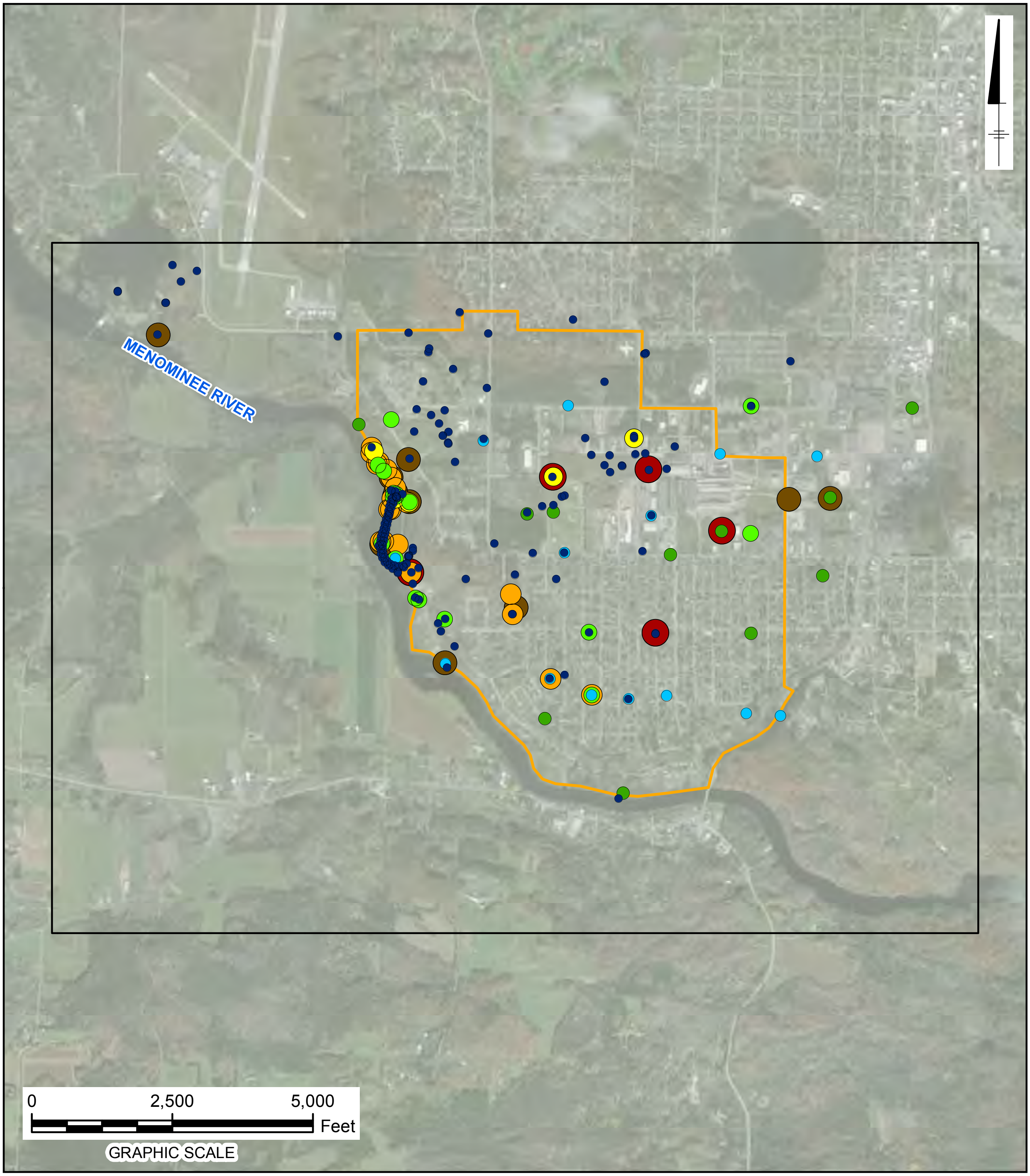
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

STEADY-STATE SIMULATED WATER TABLE ELEVATION – 2000

FIGURE
4.1-3

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\SS_SimWaterTable_Elev_20180417.mxd



LEGEND:

AREA OF CONCERN

MODEL EXTENT

TARGETS

- LAYER 1 (A SANDS)
- LAYER 2 (A SANDS/CONFINING BED)
- LAYER 3 (AQUITARD)
- LAYER 4 (B SANDS)
- LAYER 5 (AQUITARD)
- LAYER 6 (C1 SANDS)
- LAYER 7 (C2 SANDS)
- LAYER 8 (D SANDS)

NOTES:

1) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

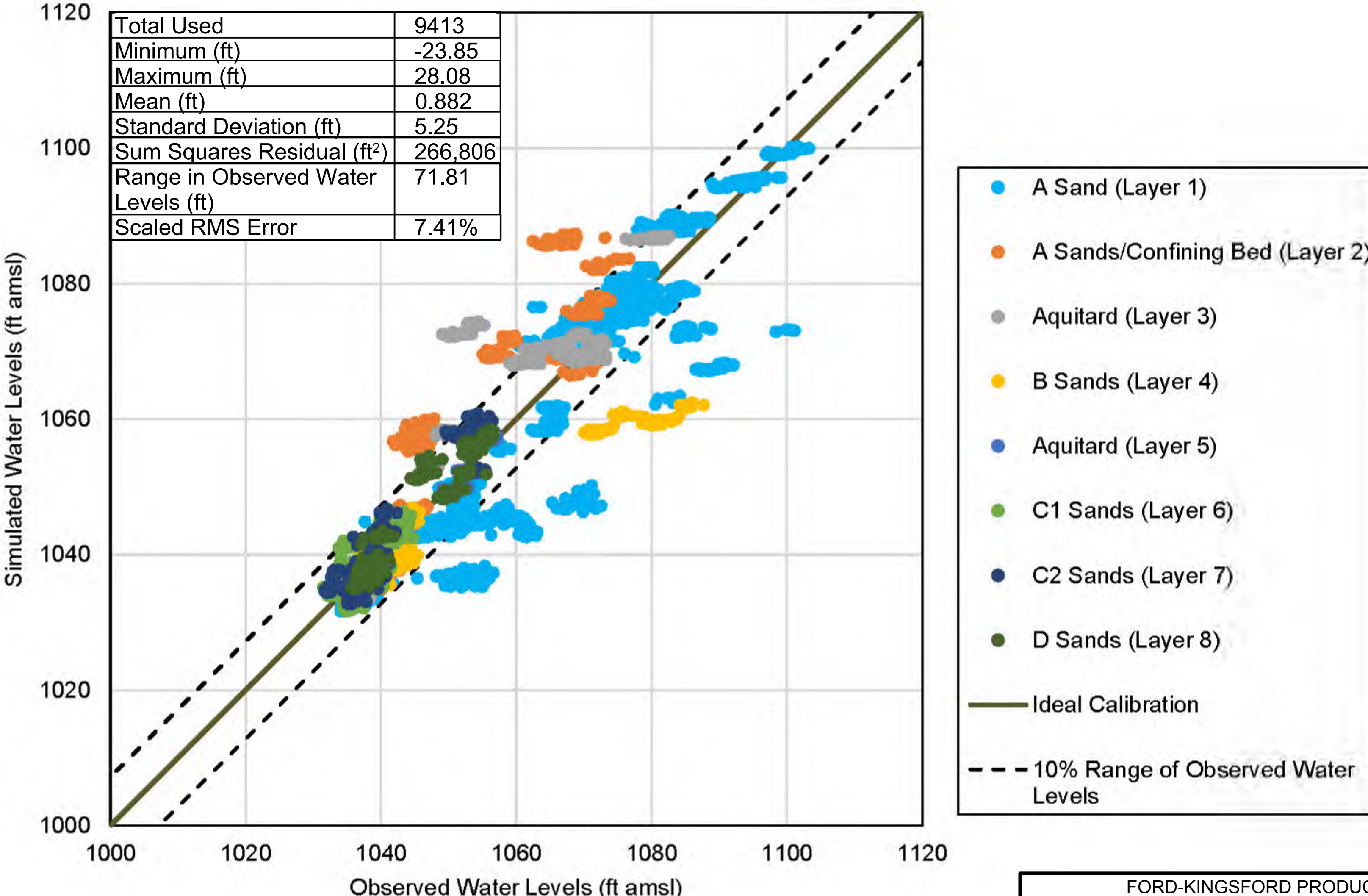
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HEAD OBSERVATION TARGETS

ARCADIS

FIGURE
4.2-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Transient_Head_Targets_20180411.mxd



Total Used	9413
Minimum (ft)	-23.85
Maximum (ft)	28.08
Mean (ft)	0.882
Standard Deviation (ft)	5.25
Sum Squares Residual (ft^2)	266,806
Range in Observed Water Levels (ft)	71.81
Scaled RMS Error	7.41%

Notes:

1) ft = feet

2) ft^2 = feet squared

3) amsl = above mean sea level

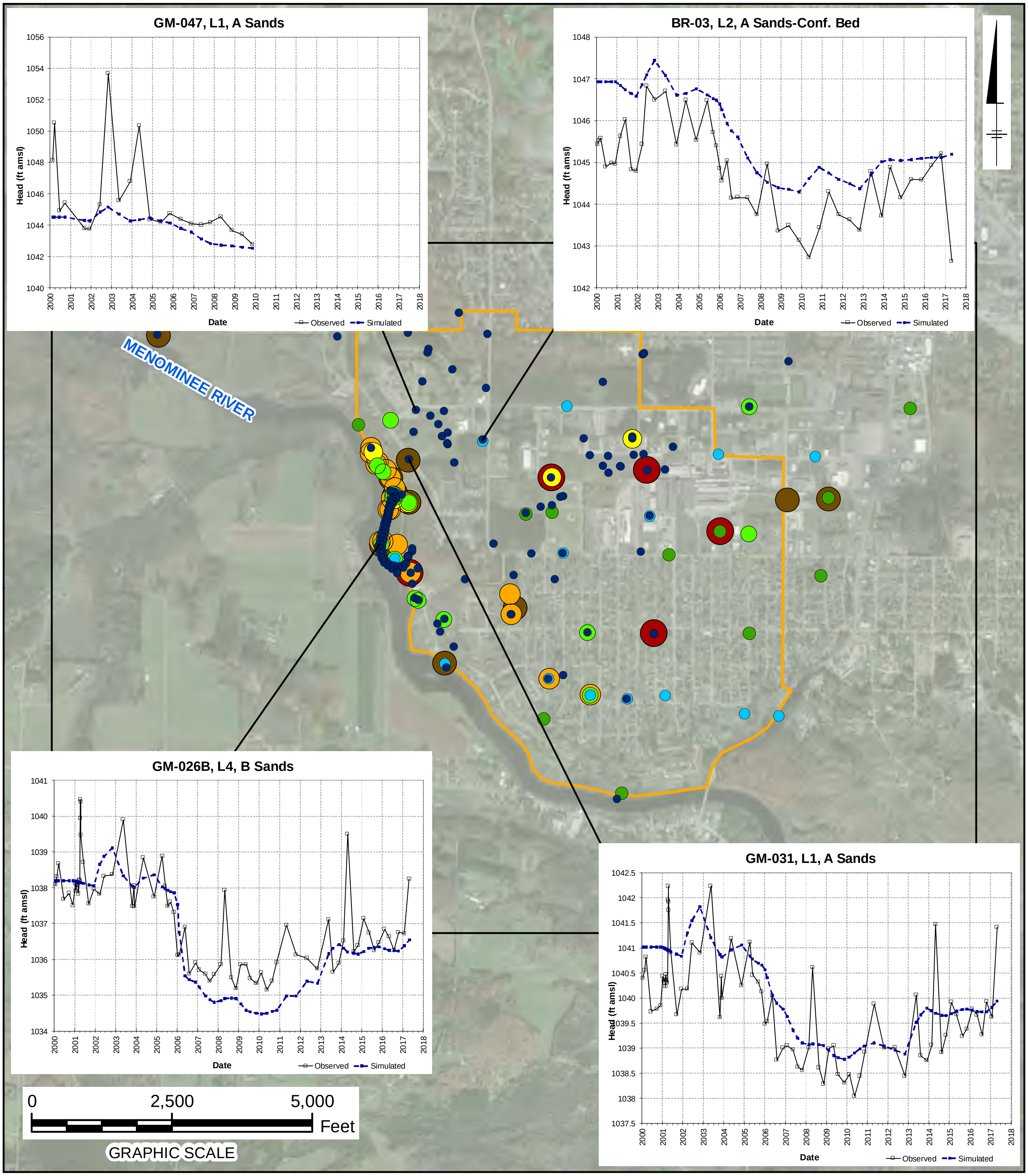
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT SIMULATED VERSUS OBSERVED WATER LEVELS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
4.2-2



LEGEND:

- AREA OF CONCERN
- MODEL EXTENT

TARGETS

- LAYER 1 (A SANDS)
- LAYER 2 (A SANDS/CONFINING BED)
- LAYER 3 (AQUITARD)
- LAYER 4 (B SANDS)
- LAYER 5 (AQUITARD)
- LAYER 6 (C1 SANDS)
- LAYER 7 (C2 SANDS)
- LAYER 8 (D SANDS)

NOTES:

1) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

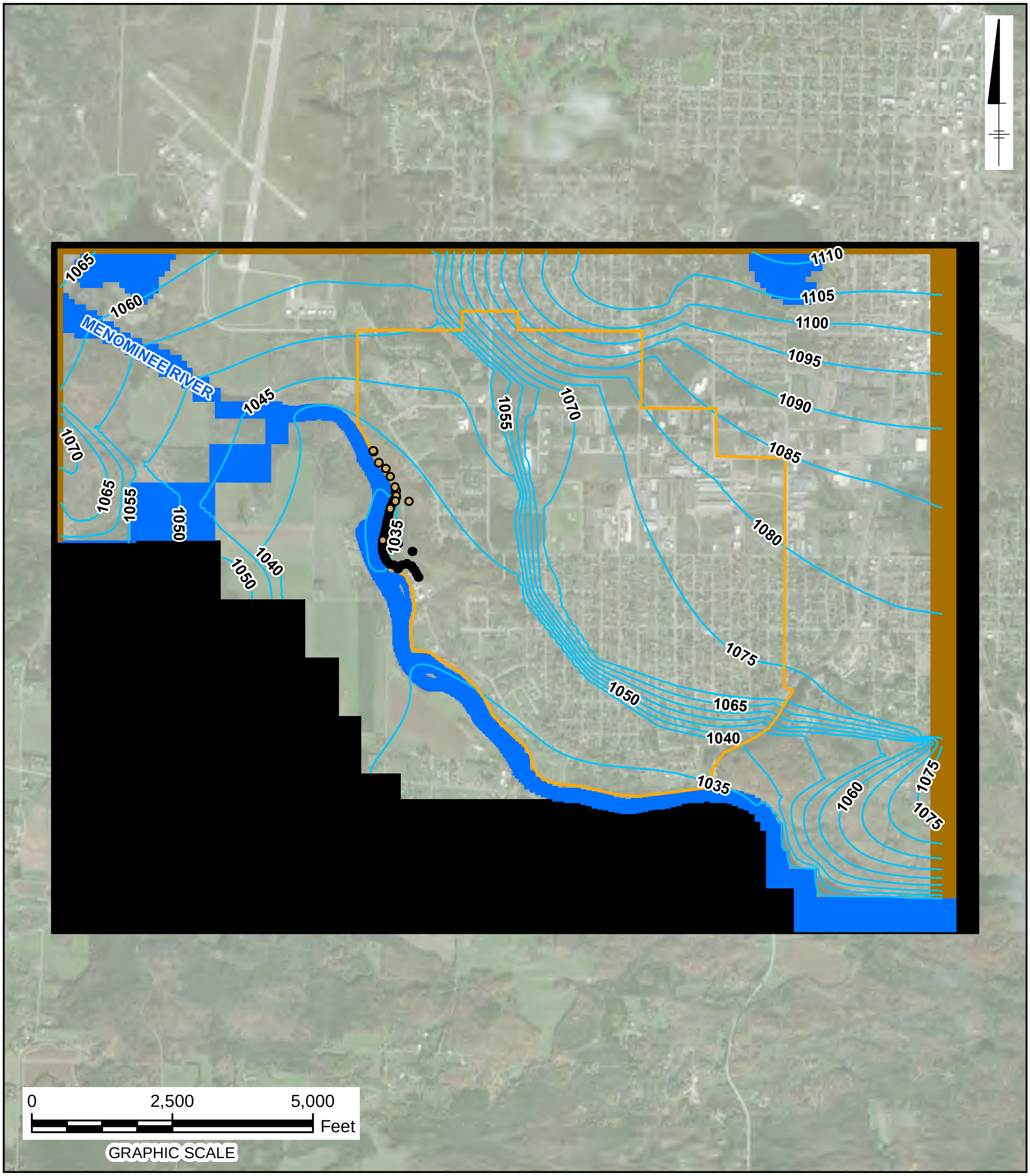
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS AT SELECT MONITORING WELLS

ARCADIS

FIGURE
4.2-3

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Transient_Hydrographs_20180411.mxd



LEGEND:

EXTRACTION WELLS

- A SANDS
- C SANDS
- AREA OF CONCERN
- GENERAL HEAD BOUNDARY
- SIMULATED GROUNDWATER ELEVATIONS (FT AMSL)
- NO FLOW
- RIVER
- MODEL EXTENT

NOTES:

1) FT AMSL = FEET ABOVE MEAN SEA LEVEL
2) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

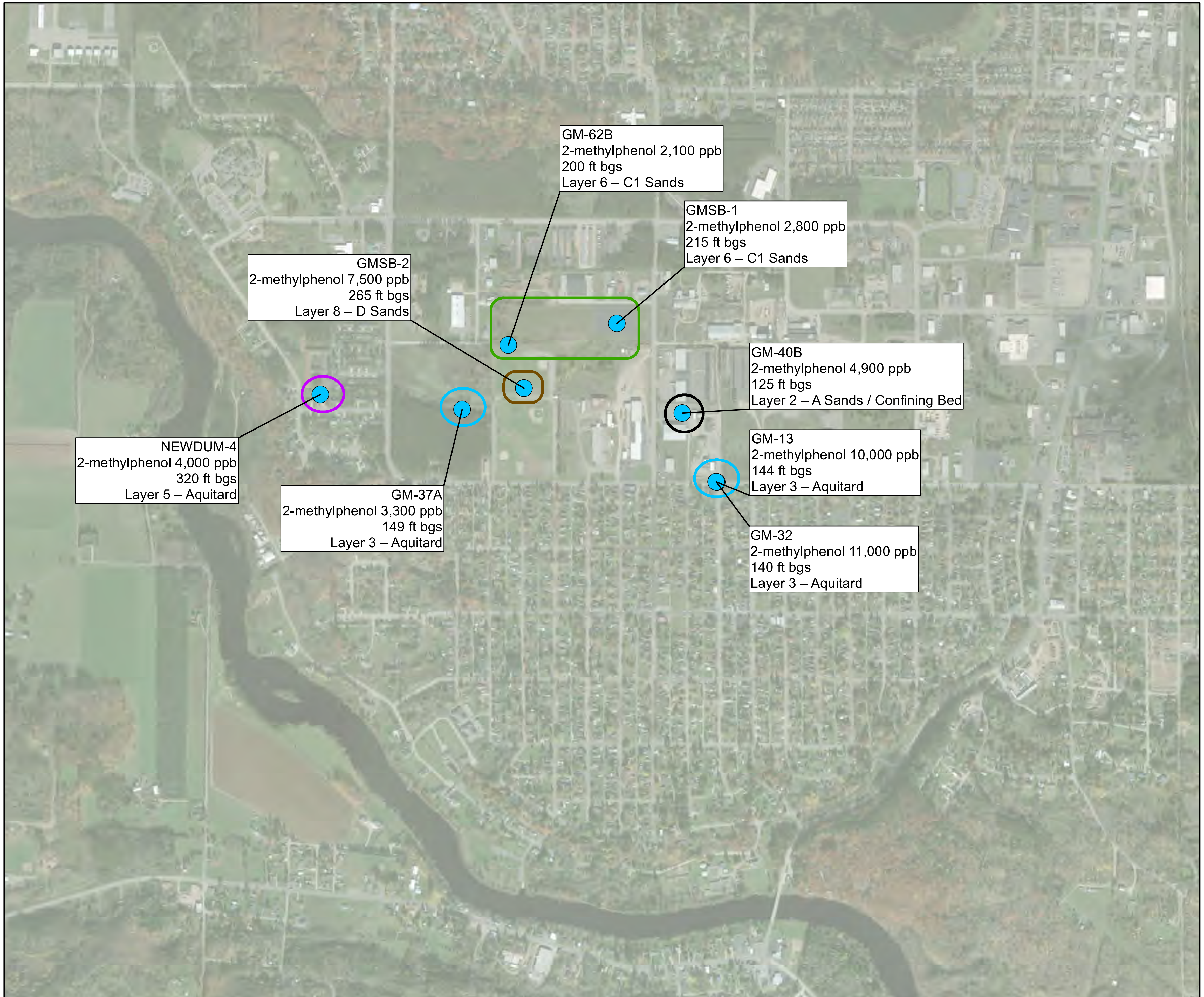
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT SIMULATED WATER TABLE ELEVATION – 2017

FIGURE
4.2-4

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Transient_SimWaterTable_Elev_20180417.mxd



LEGEND:

- 2-METHYLPHENOL DISTRIBUTION
- LAYER 2 SOURCE
- LAYER 3 SOURCE
- LAYER 4 SOURCE
- LAYER 5 SOURCE
- LAYER 6 SOURCE
- LAYER 8 SOURCE

DASHED LINES INDICATE SOURCE AREA THAT MAY NOT BE USED.

LAYER 1 – A SANDS
LAYER 2 – A SANDS / CONFINING BED
LAYER 3 – AQUITARD
LAYER 4 – B SANDS
LAYER 5 – AQUITARD
LAYER 6 – C1 SANDS
LAYER 7 – C2 SANDS
LAYER 8 – D SANDS

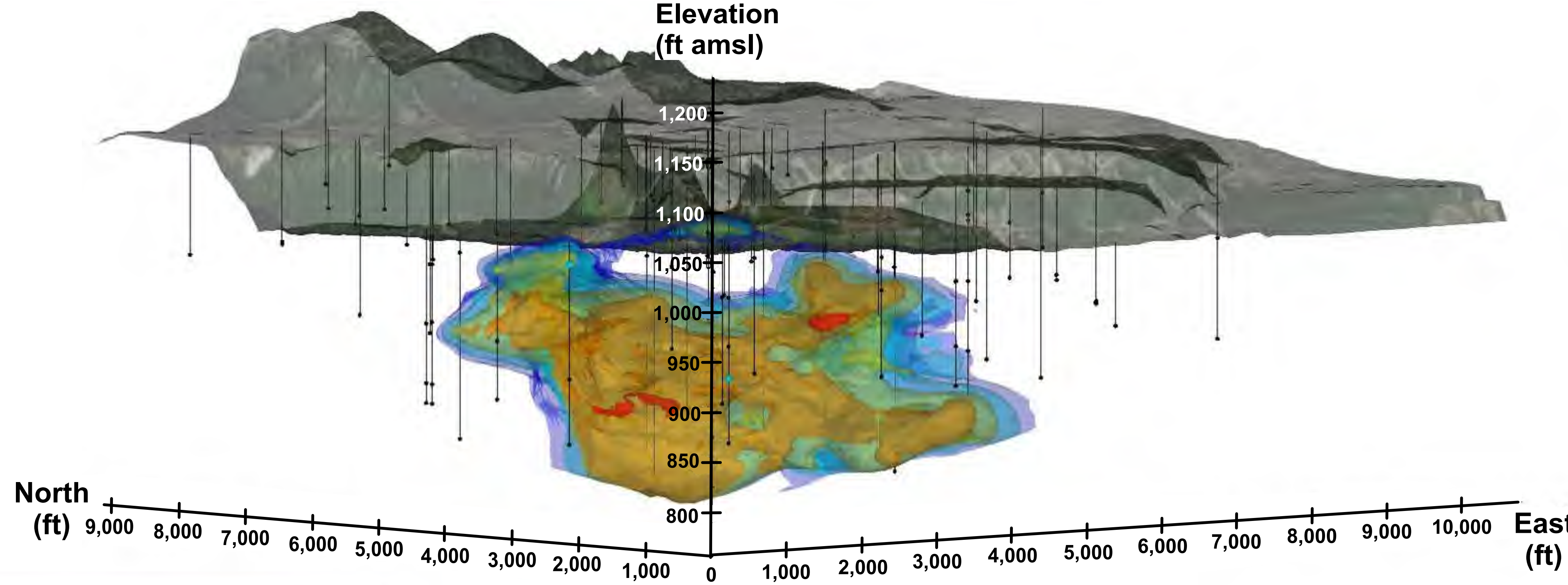
0 1,000 2,000 Feet
GRAPHIC SCALE

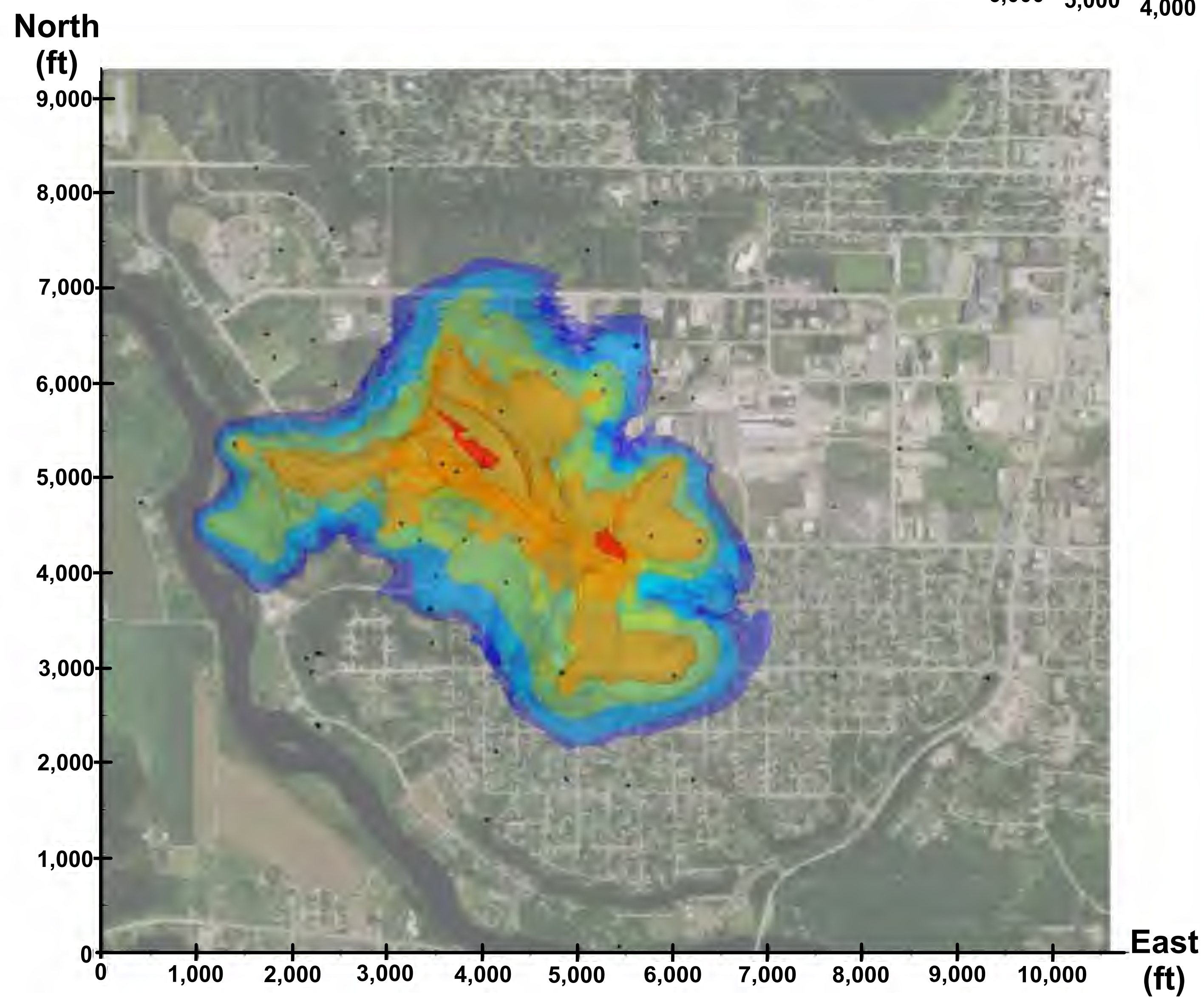
NOTES:
1) FT BGS = FEET BELOW GROUND SURFACE
2) PPB = PARTS PER BILLION
3) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

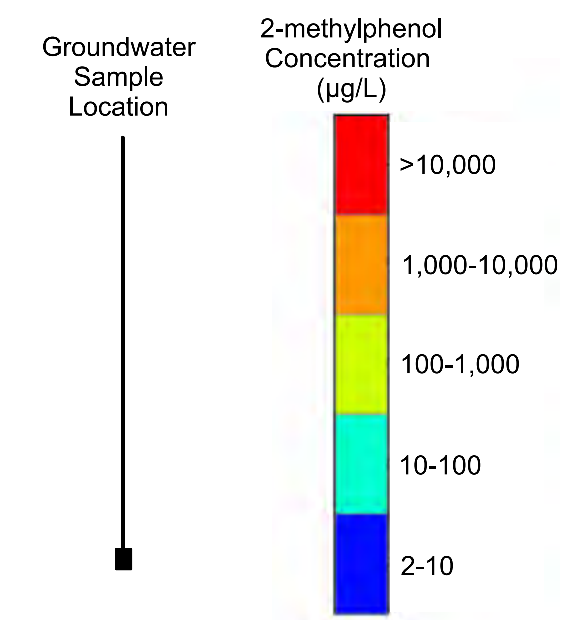
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

SOURCE AREAS

FIGURE
5.2-1







Vertical exaggeration = 10x

Notes:

1) ft = feet

2) amsl = above mean sea level

3) µg/L = micrograms per liter

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

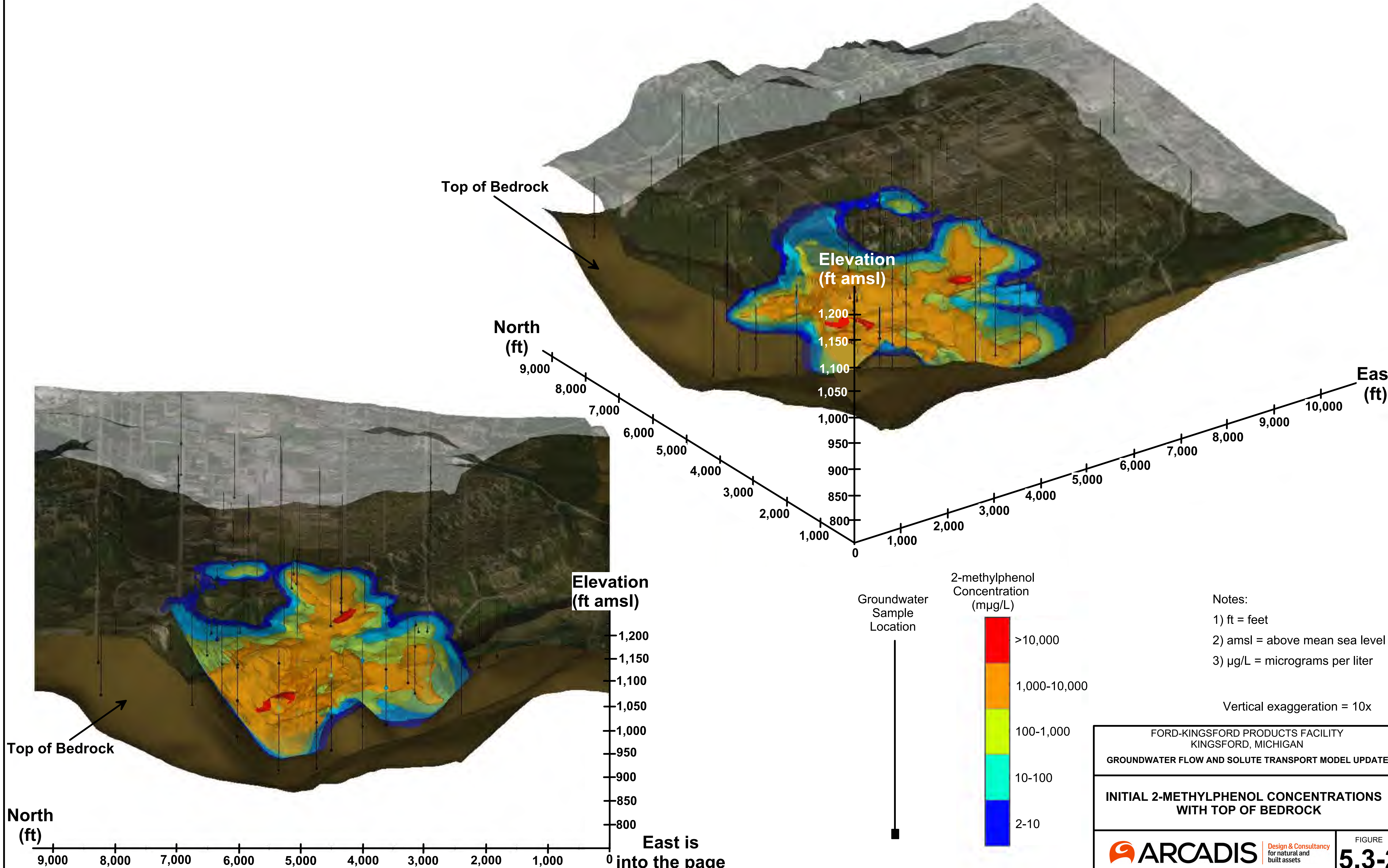
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

INITIAL 2-METHYLPHENOL CONCENTRATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE

5.3-1



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

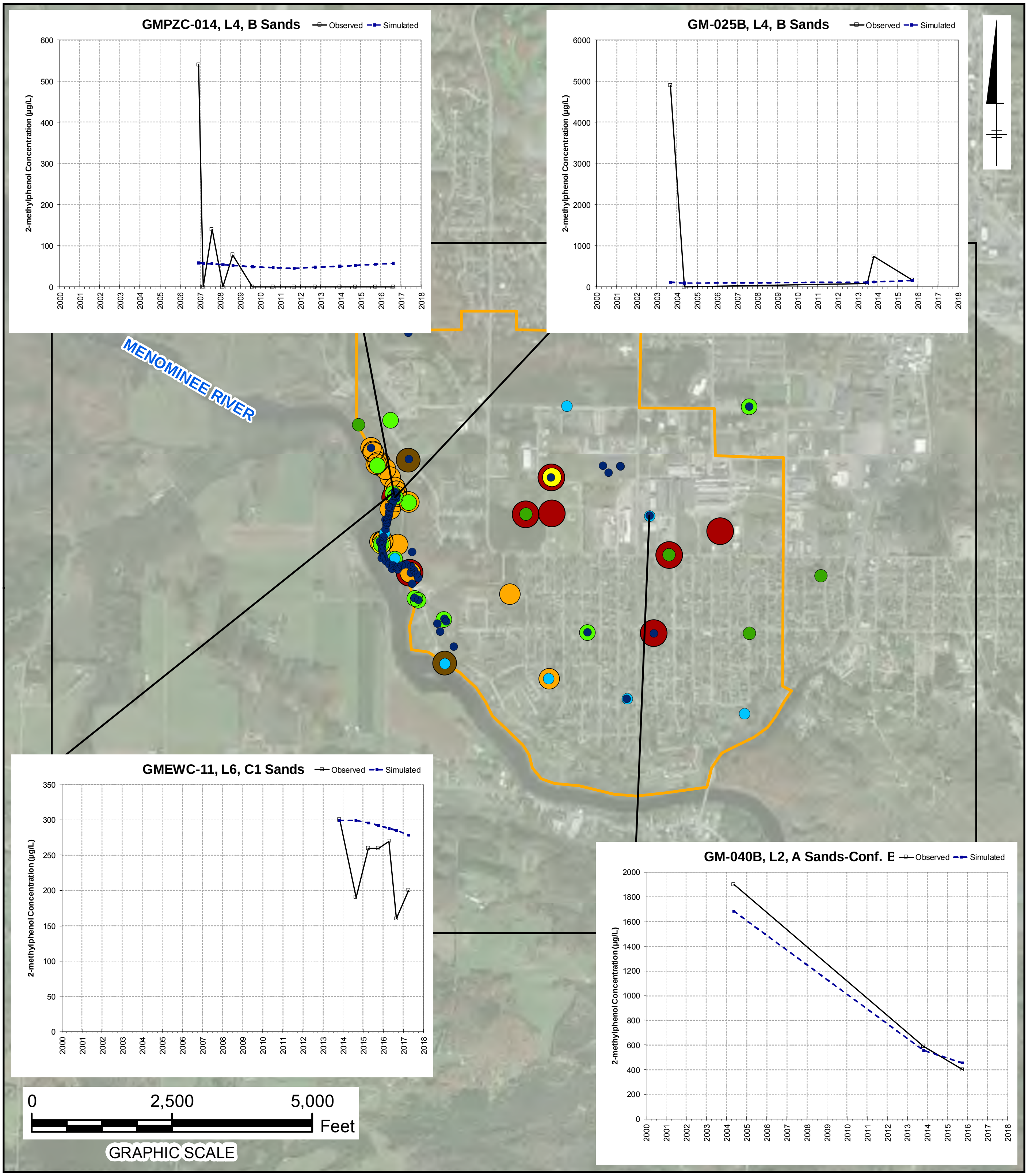
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

INITIAL 2-METHYLPHENOL CONCENTRATIONS WITH TOP OF BEDROCK

ARCADIS Design & Consultancy for natural and built assets

FIGURE

5.3-2



LEGEND:

- AREA OF CONCERN
- MODEL EXTENT

TARGETS

- LAYER 1 (A SANDS)
- LAYER 2 (A SANDS/CONFINING BED)
- LAYER 3 (AQUITARD)
- LAYER 4 (B SANDS)
- LAYER 5 (AQUITARD)
- LAYER 6 (C1 SANDS)
- LAYER 7 (C2 SANDS)
- LAYER 8 (D SANDS)

NOTES:
1) µg/L = MICROGRAMS PER LITER
2) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

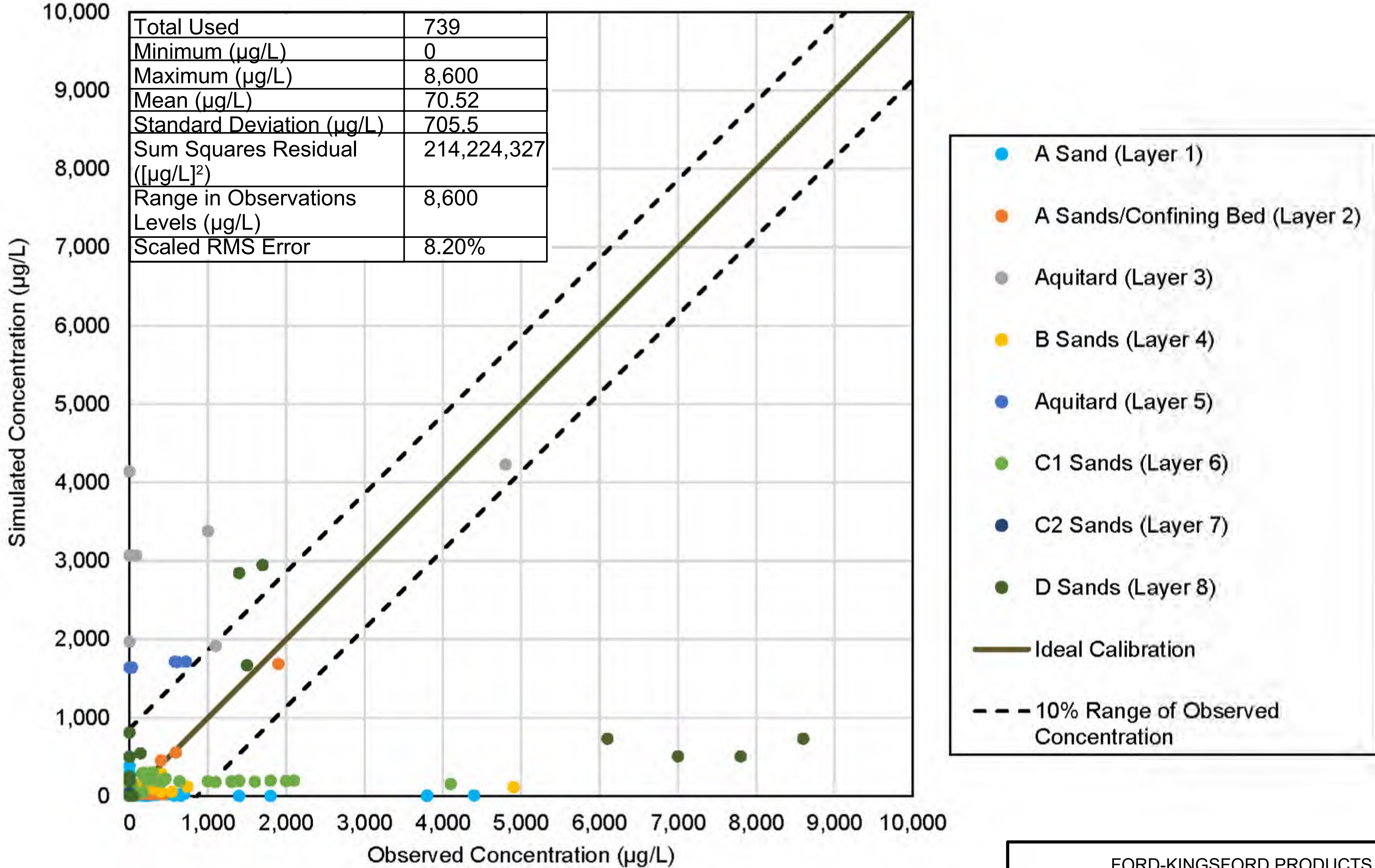
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL CONCENTRATION OVER TIME AT SELECT WELLS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
5.4-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-04\Transient_Select_24-Methyl_20180411.mxd



Total Used	739
Minimum (µg/L)	0
Maximum (µg/L)	8,600
Mean (µg/L)	70.52
Standard Deviation (µg/L)	705.5
Sum Squares Residual ([µg/L]^2)	214,224,327
Range in Observations Levels (µg/L)	8,600
Scaled RMS Error	8.20%

Notes:

1) µg/L = micrograms per liter

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

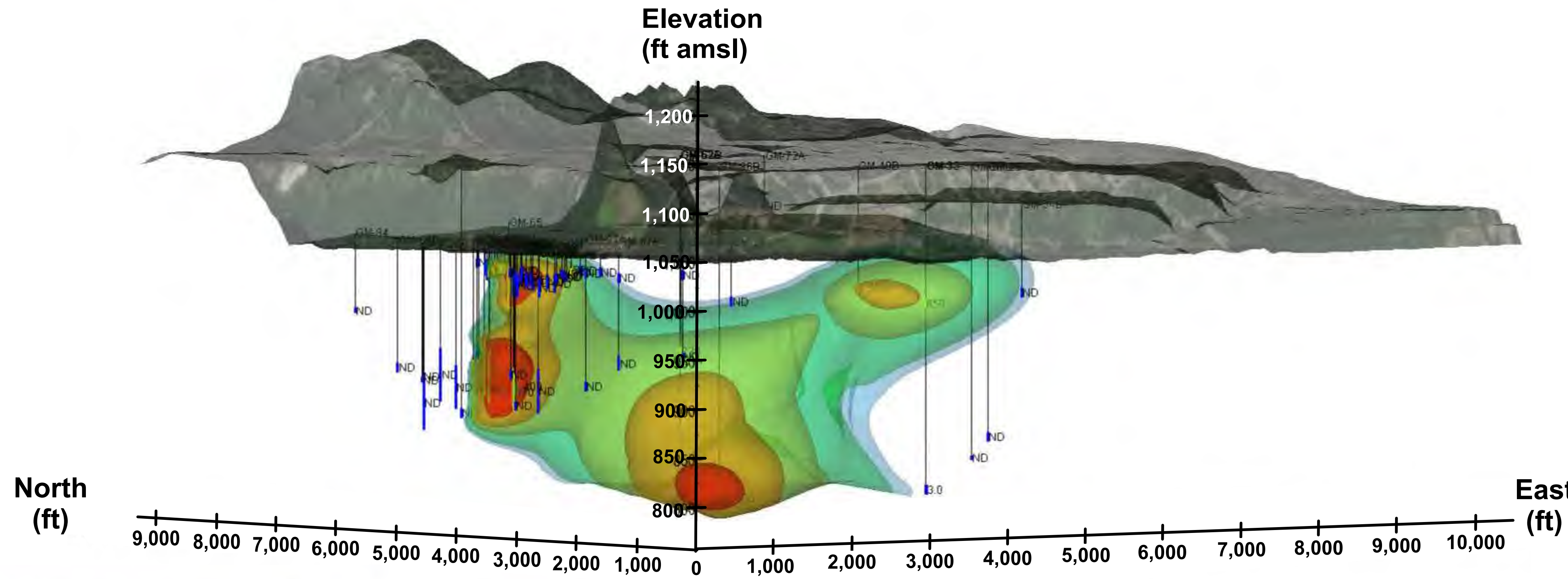
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

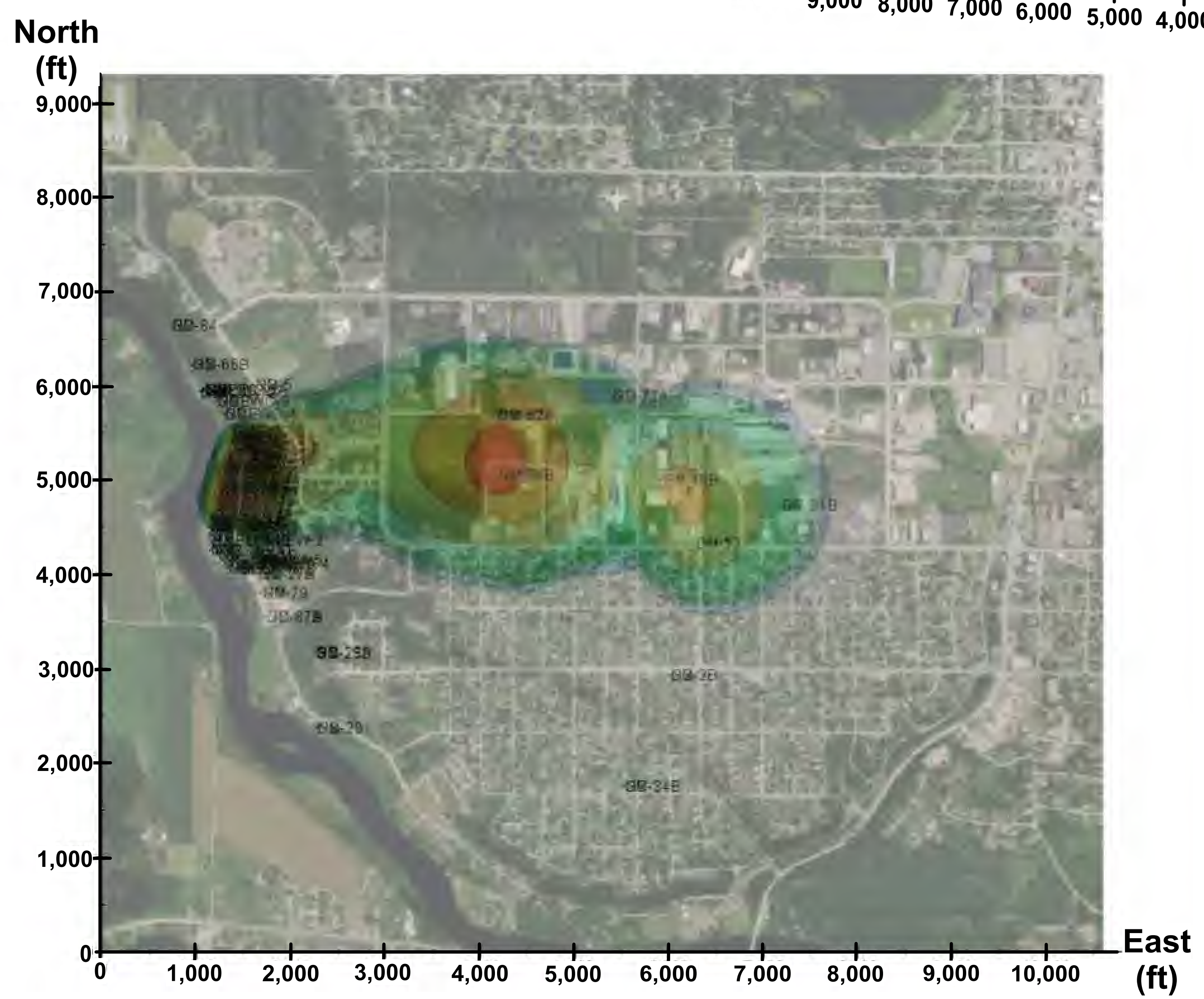
SIMULATED VS OBSERVED 2-METHYLPHENOL CONCENTRATION

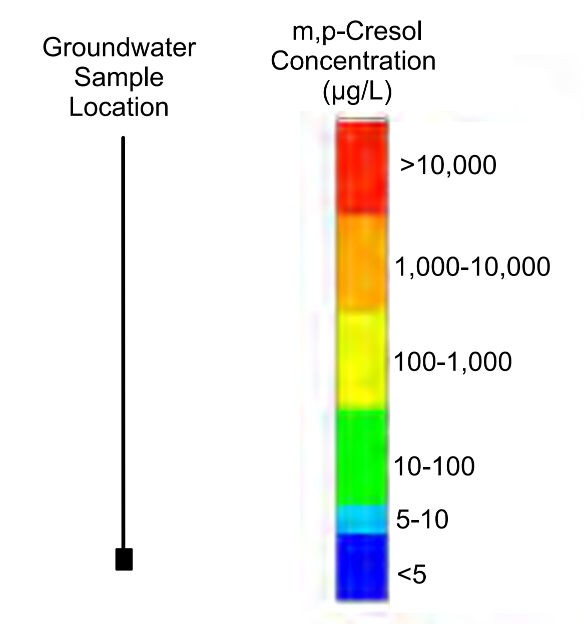
ARCADIS Design & Consultancy for natural and built assets

FIGURE

5.4-2







Vertical exaggeration = 10x

Notes:

1) ft = feet

2) amsl = above mean sea level

3) µg/L = micrograms per liter

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

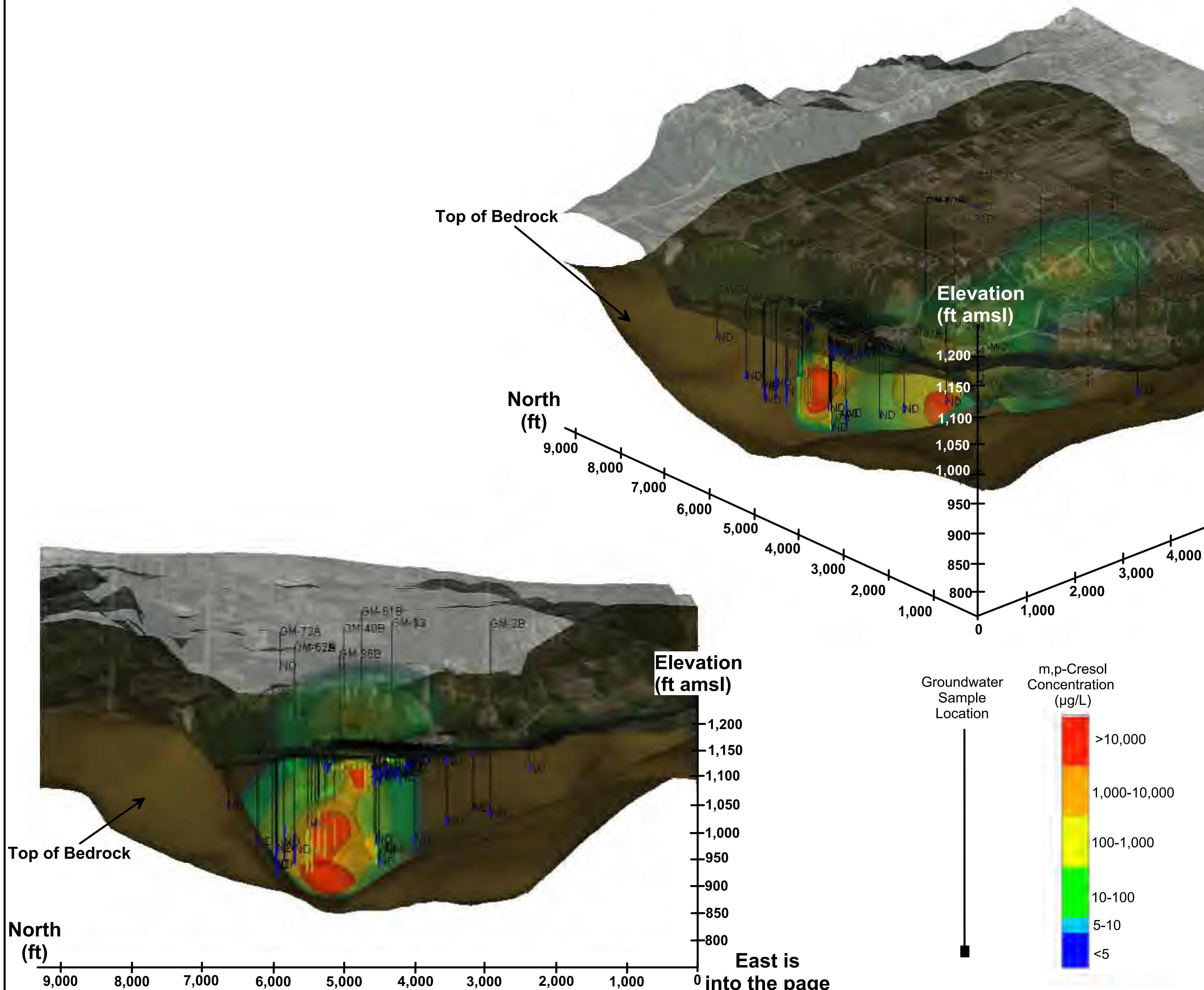
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

INITIAL M,P-CRESOL CONCENTRATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE

6.1-1



Notes:

1) ft = feet

2) amsl = above mean sea level

3) μg/L = micrograms per liter

Vertical exaggeration = 10x

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

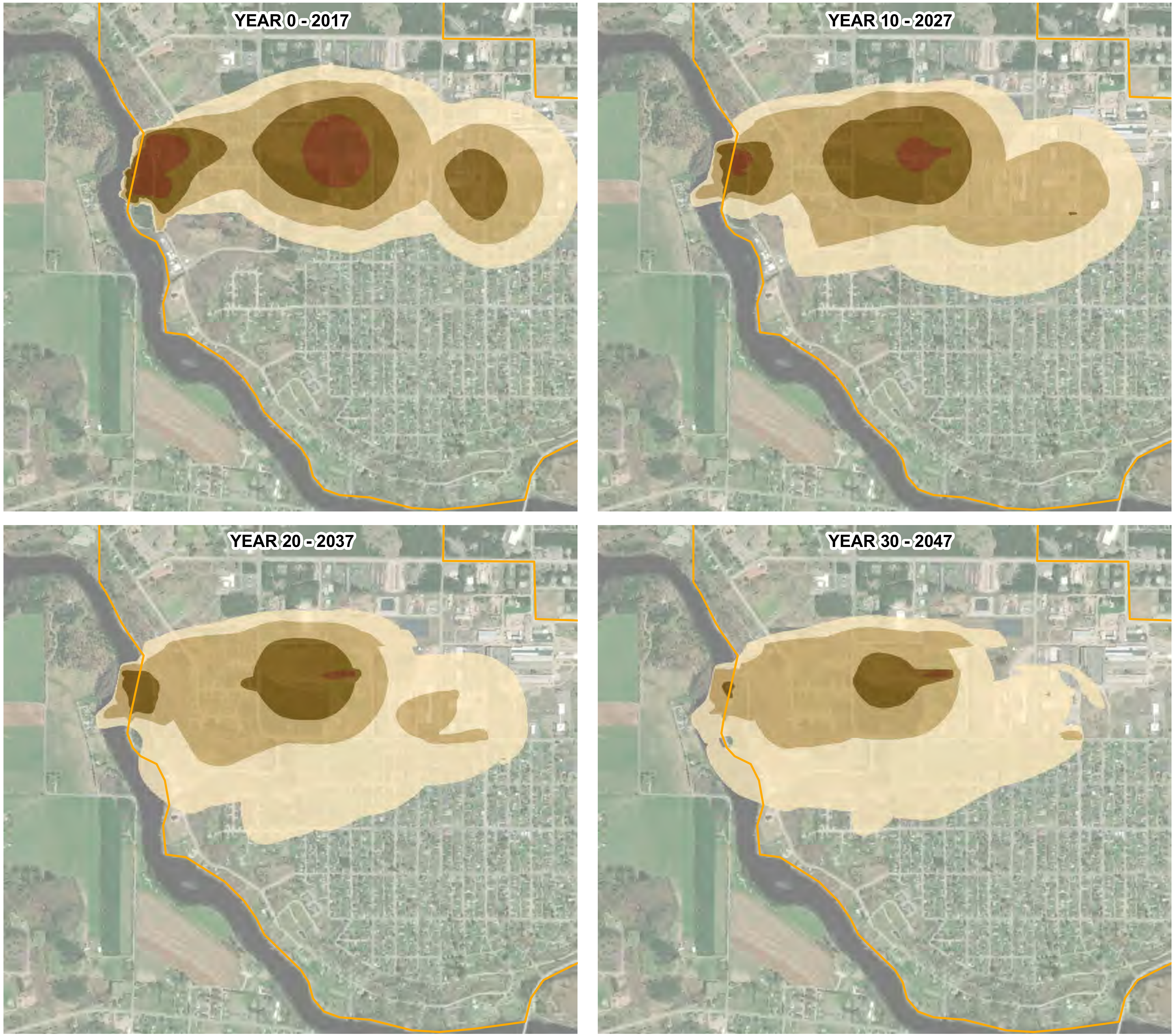
GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

INITIAL M,P-CRESOL CONCENTRATIONS WITH TOP OF BEDROCK

ARCADIS Design & Consultancy for natural and built assets

FIGURE

6.1-2



LEGEND:

M,P-CRESOL CONCENTRATION
(µg/L)

- 5 - 45
- 45.1 - 450
- 450.1 - 4,500
- >4,500
- MODEL EXTENT
- AREA OF CONCERN

NOTES:

1) PLUMES FOR EACH YEAR REPRESENT THE MAXIMUM M,P-CRESOL CONCENTRATION IN LAYERS 1 THROUGH 8.
2) µg/L = MICROGRAMS PER LITER
3) AERIAL IMAGE: 10/25/2016, DIGITALGLOBE, VIVID-USA

0 1,500 3,000 Feet
GRAPHIC SCALE

FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FLOW AND SOLUTE TRANSPORT MODEL UPDATE

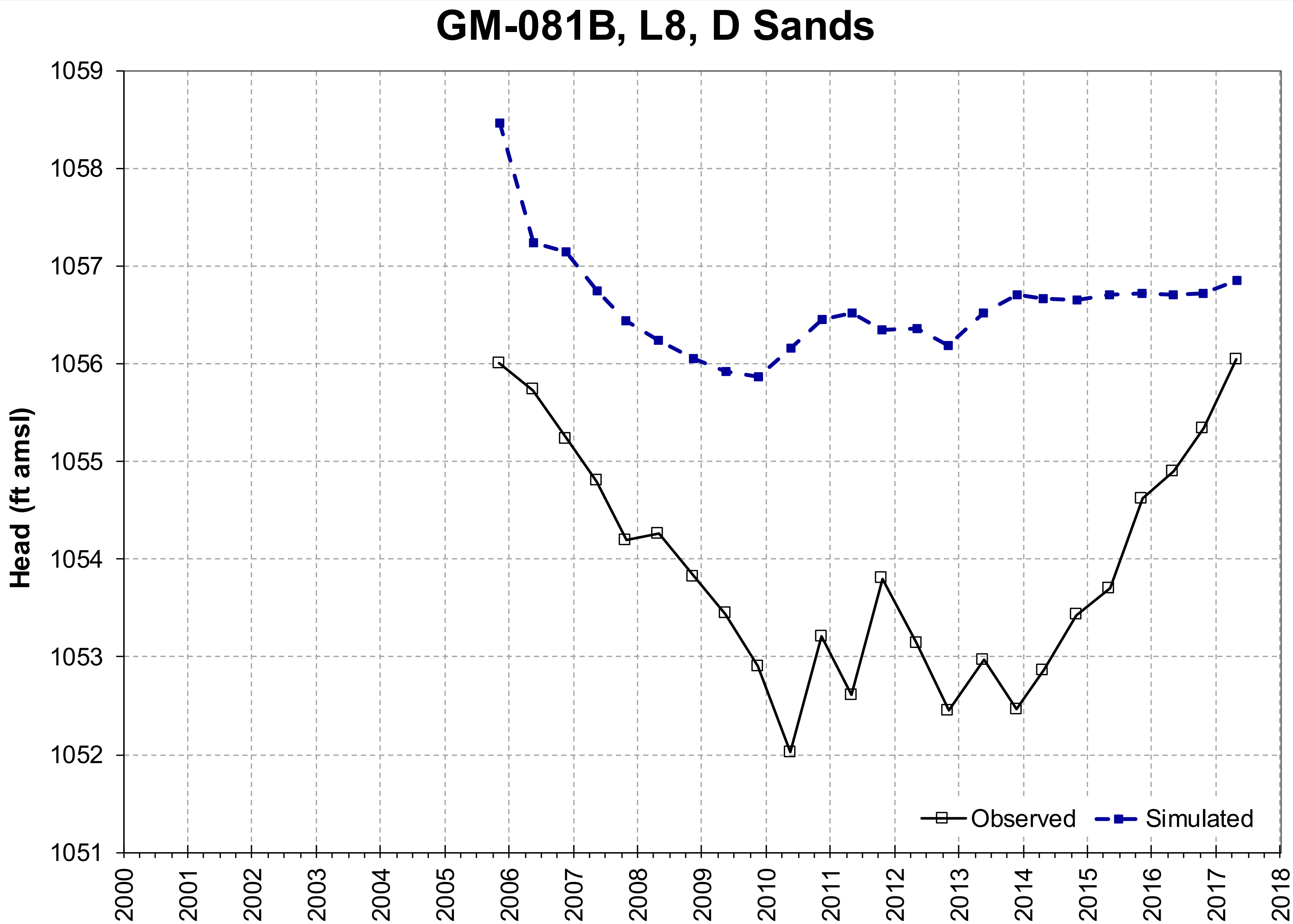
SIMULATED MAXIMUM M,P-CRESOL CONCENTRATION – YEAR 0, 10, 20, 30

FIGURE
6.2-1

CITY: MINNEAPOLIS/CITRIX DIV/GROUP: IMDV DB: MG
FORD KINGSFORD (WI001600)
Document Path: Z:\GISProjects_ENV\Ford\Ford_Kingsford\MXD\2018\2018-10\Sim_Max_mpCresol_20181031.mxd

APPENDIX A

Transient Hydrographs

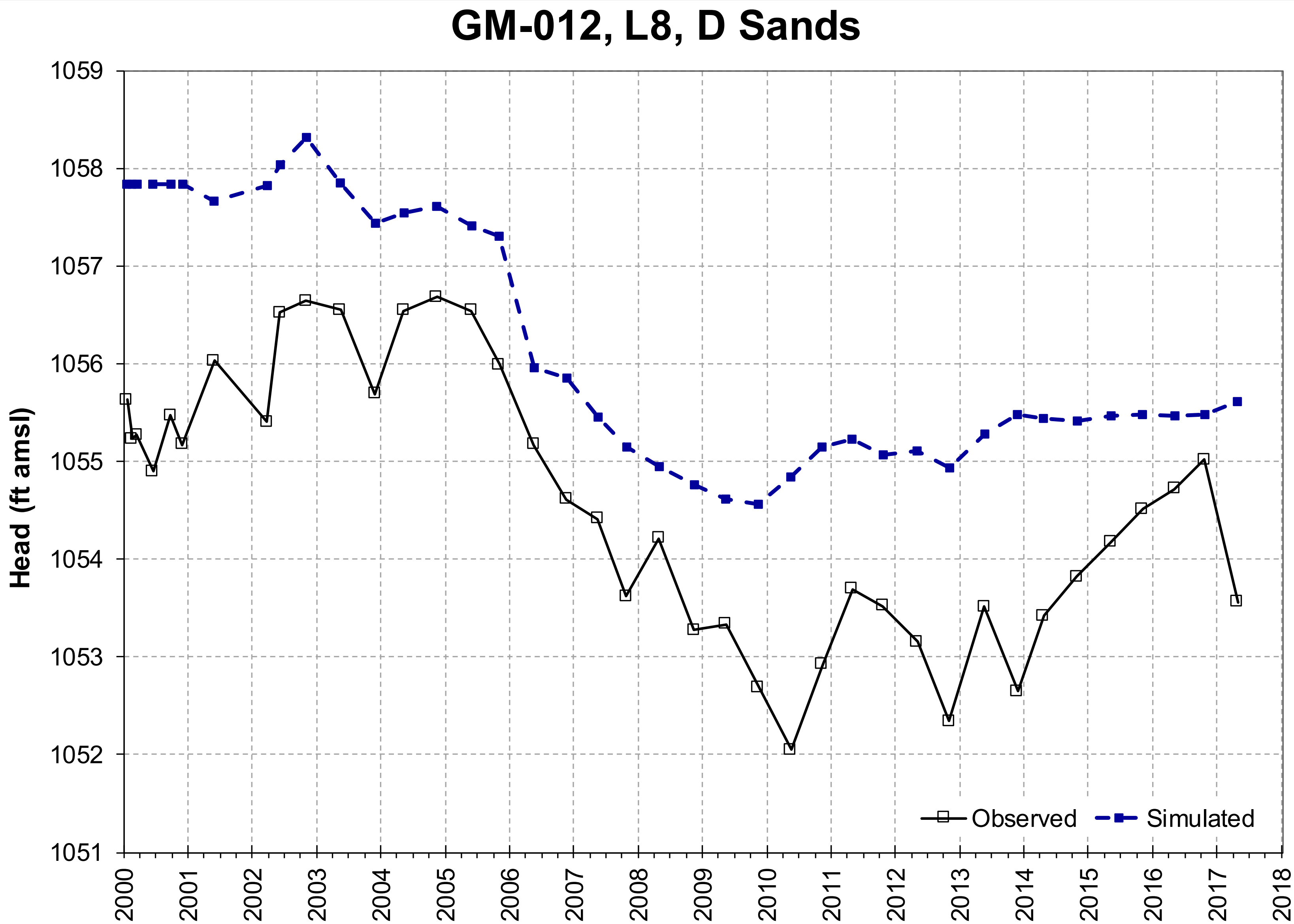


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



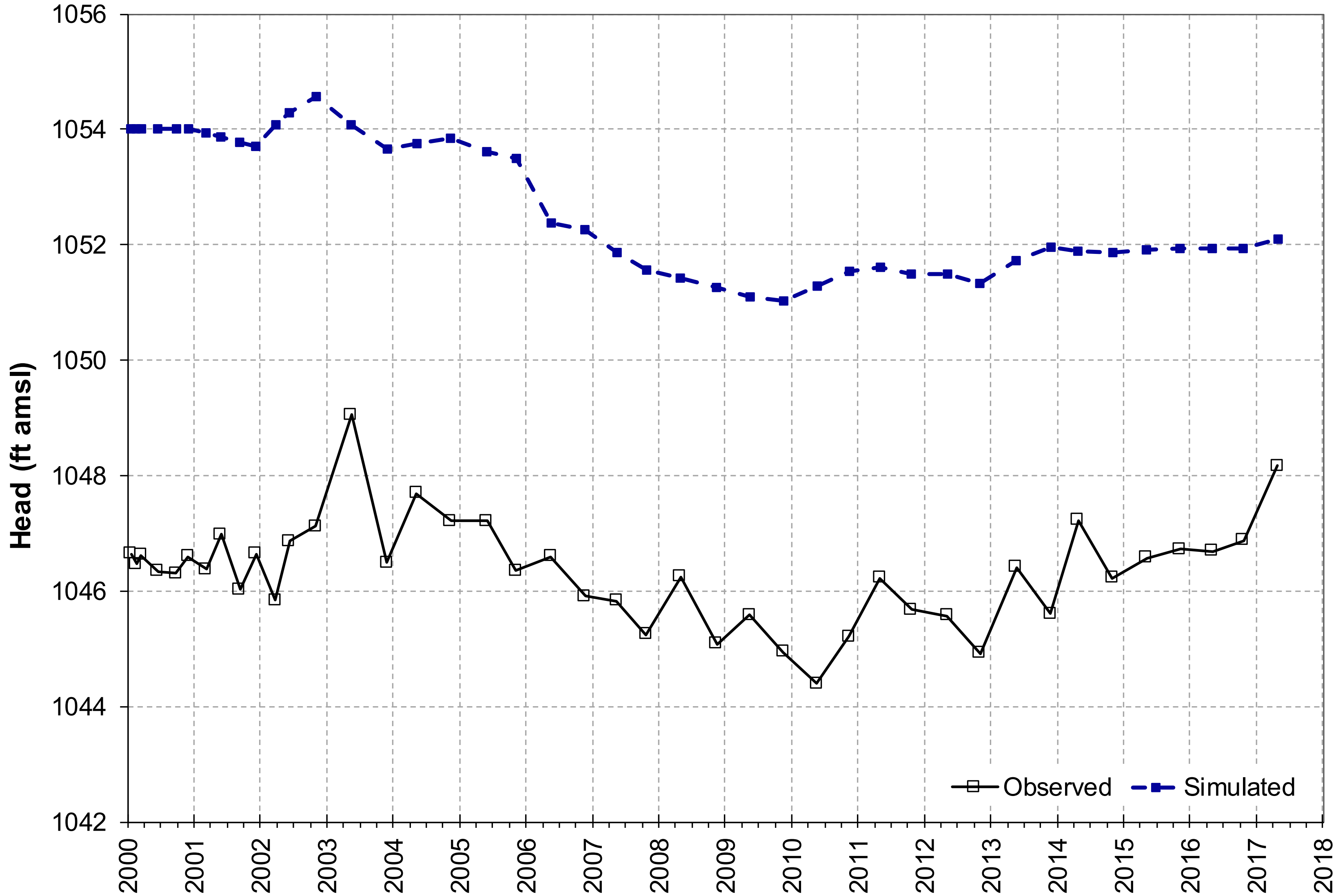
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-002B, L8, D Sands

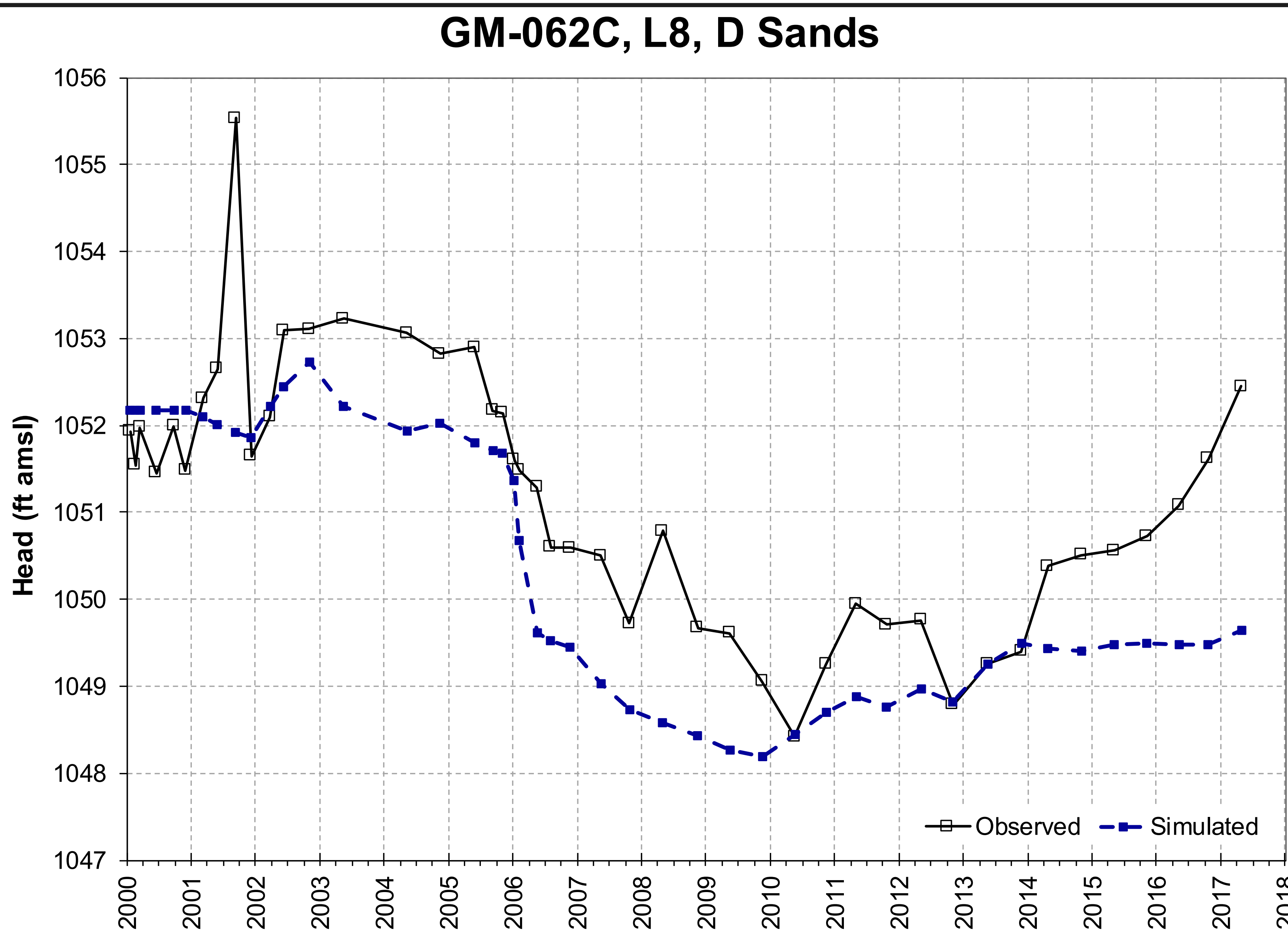


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

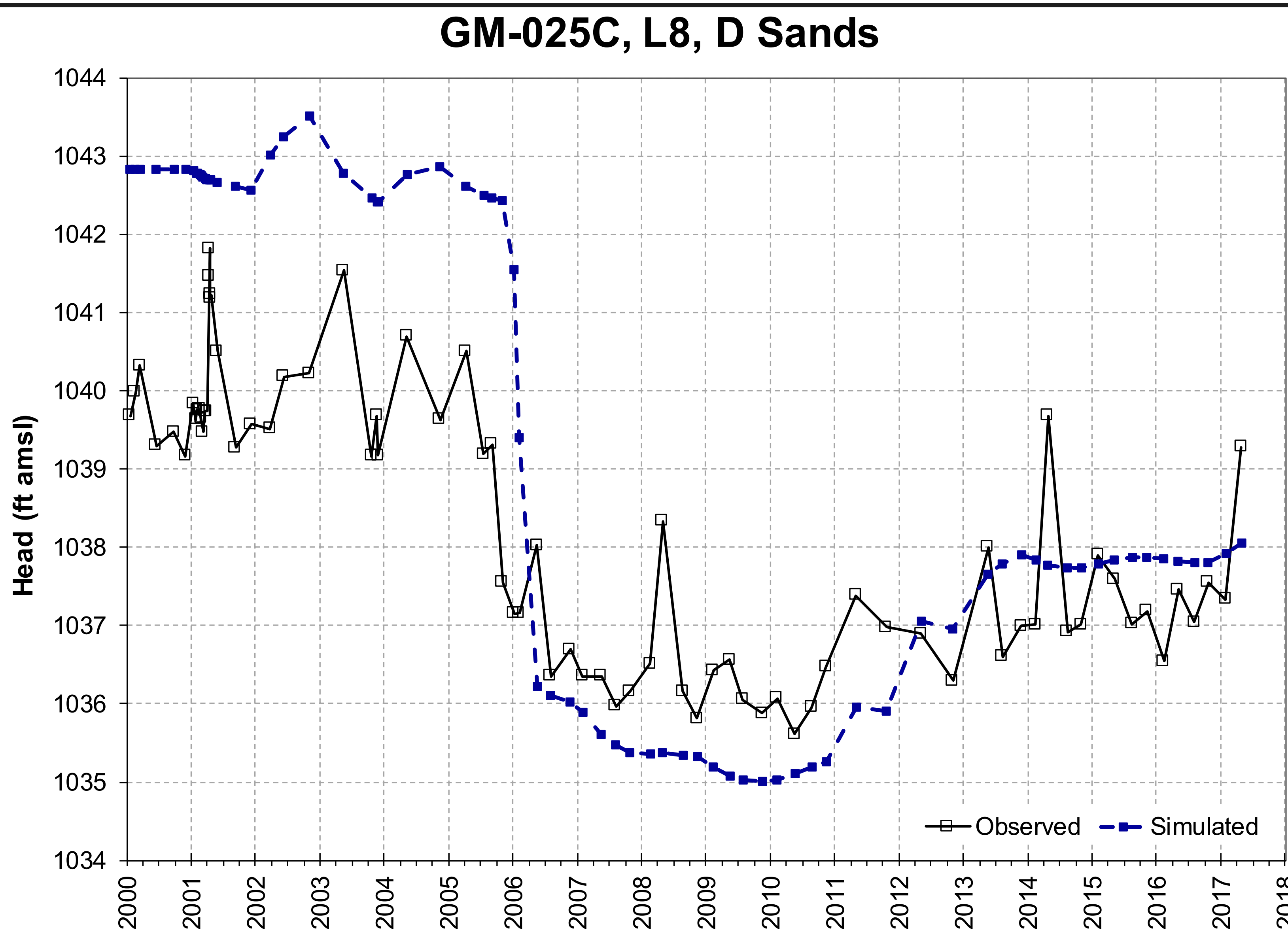


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

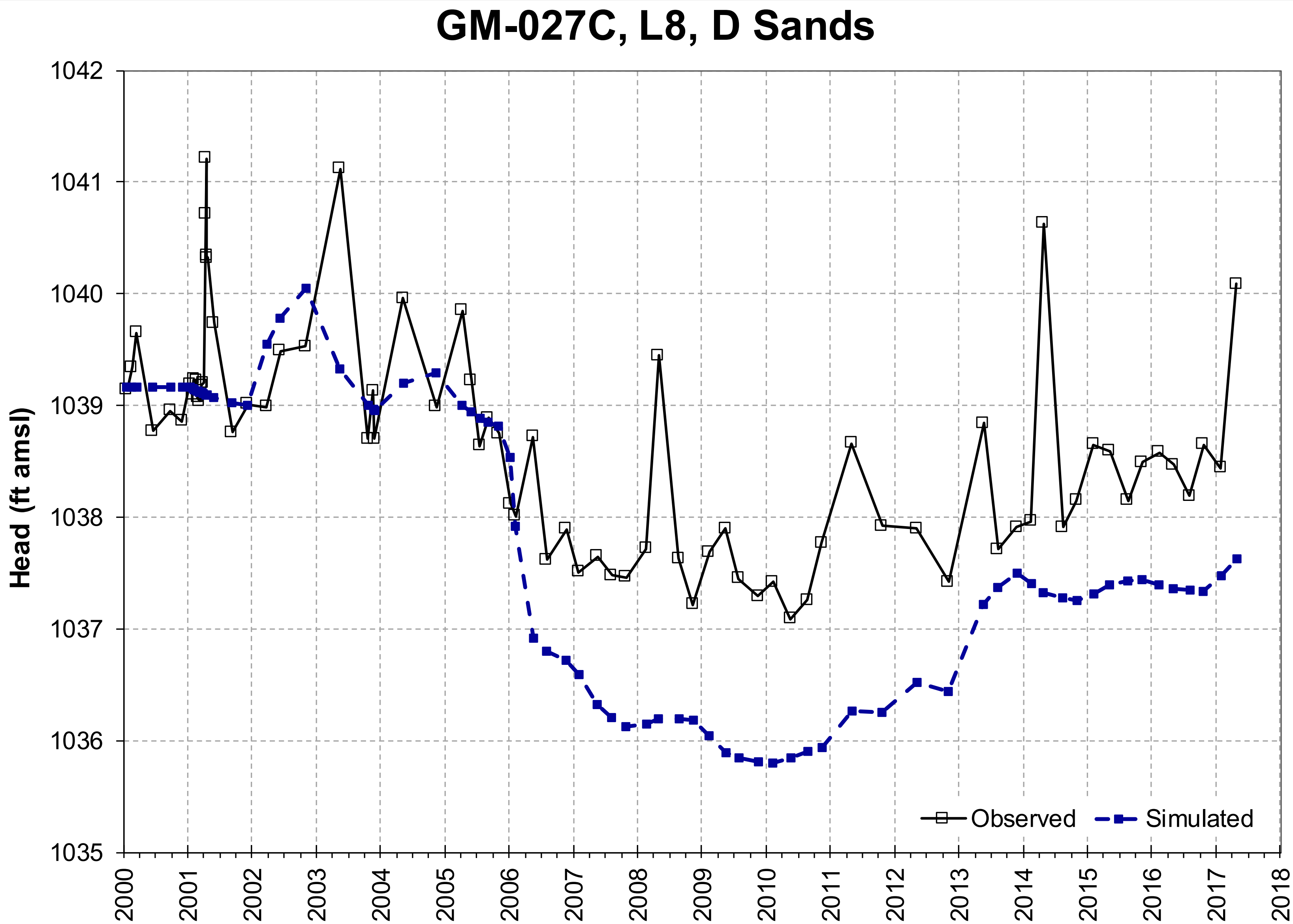


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

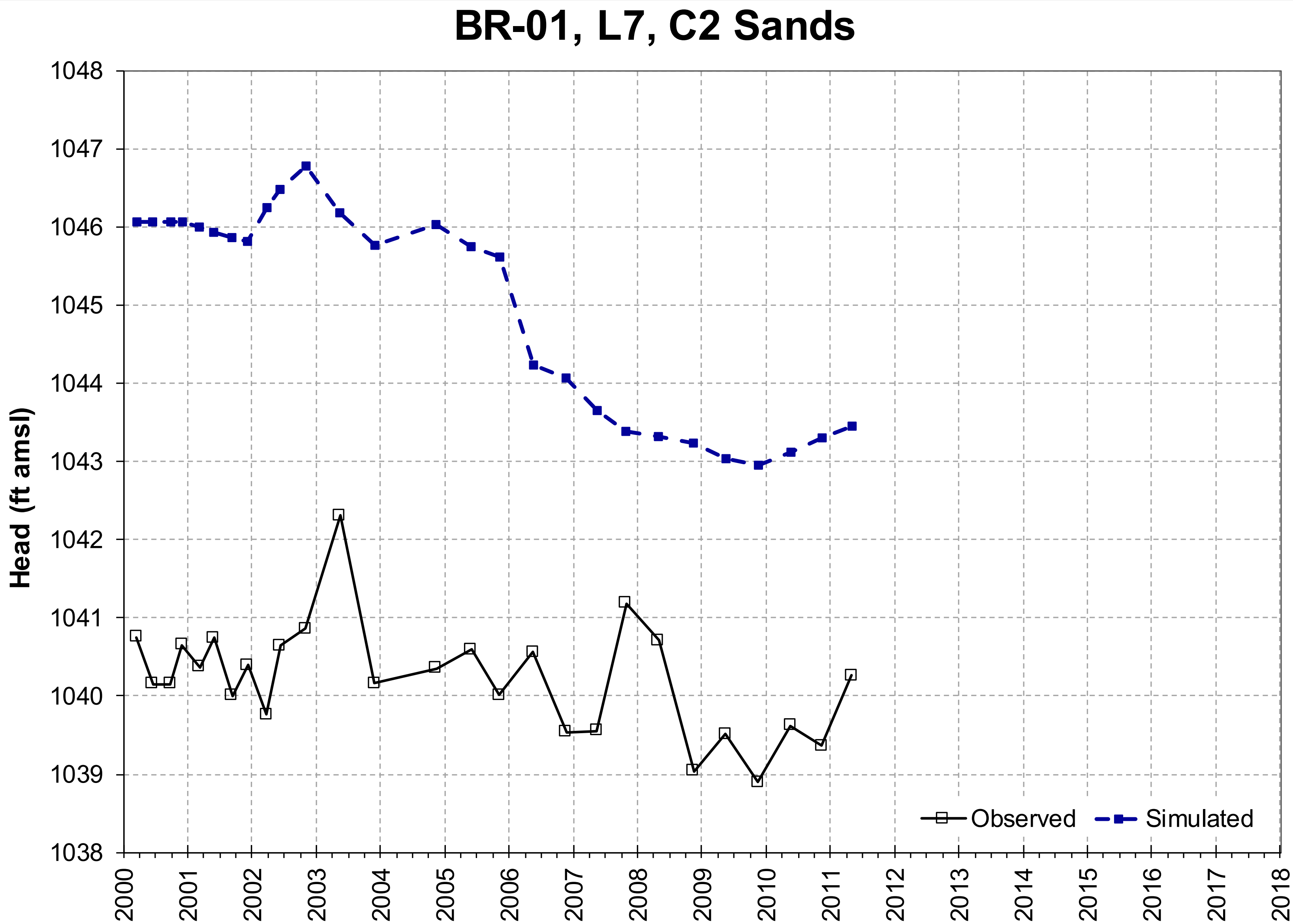


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

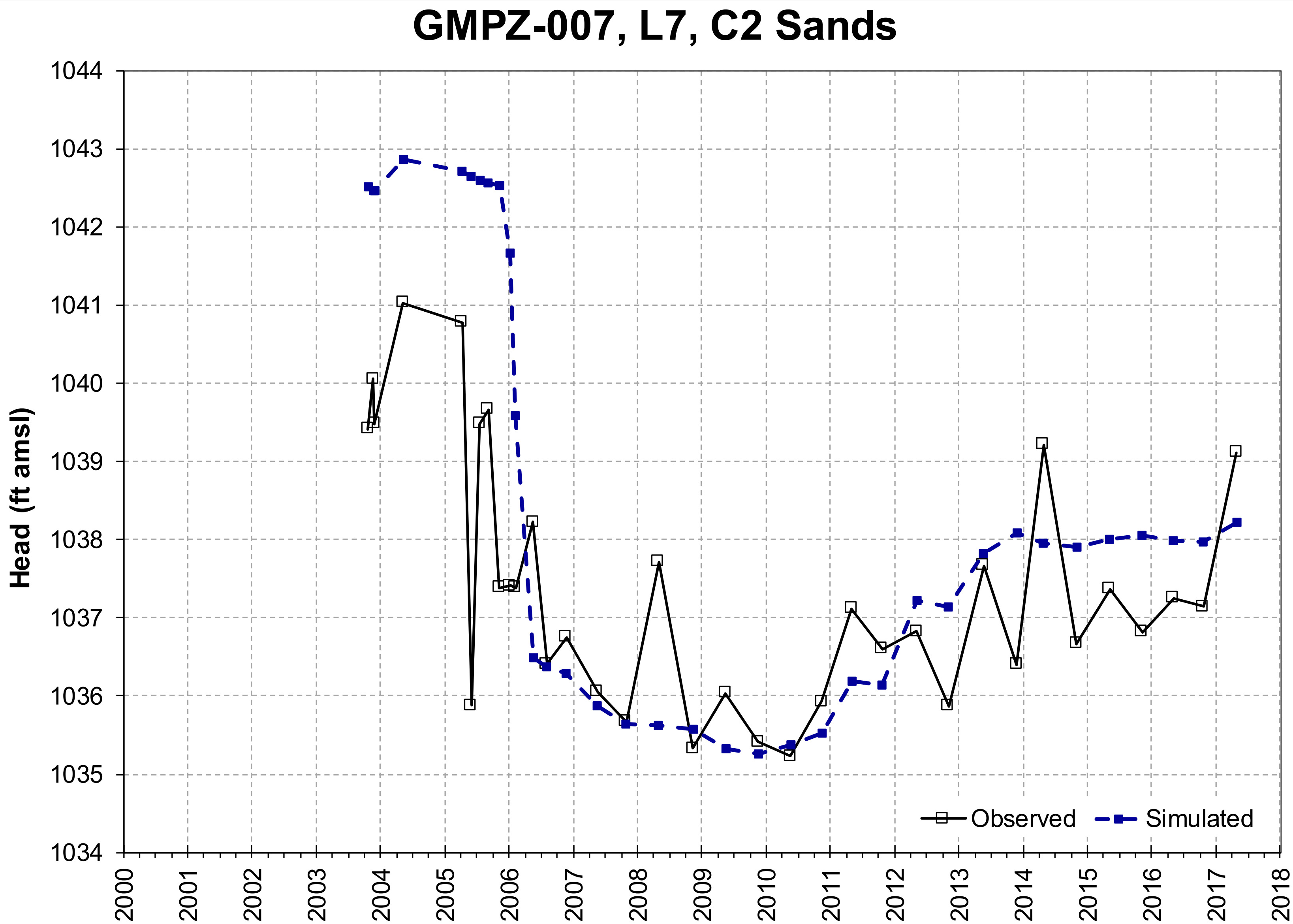


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

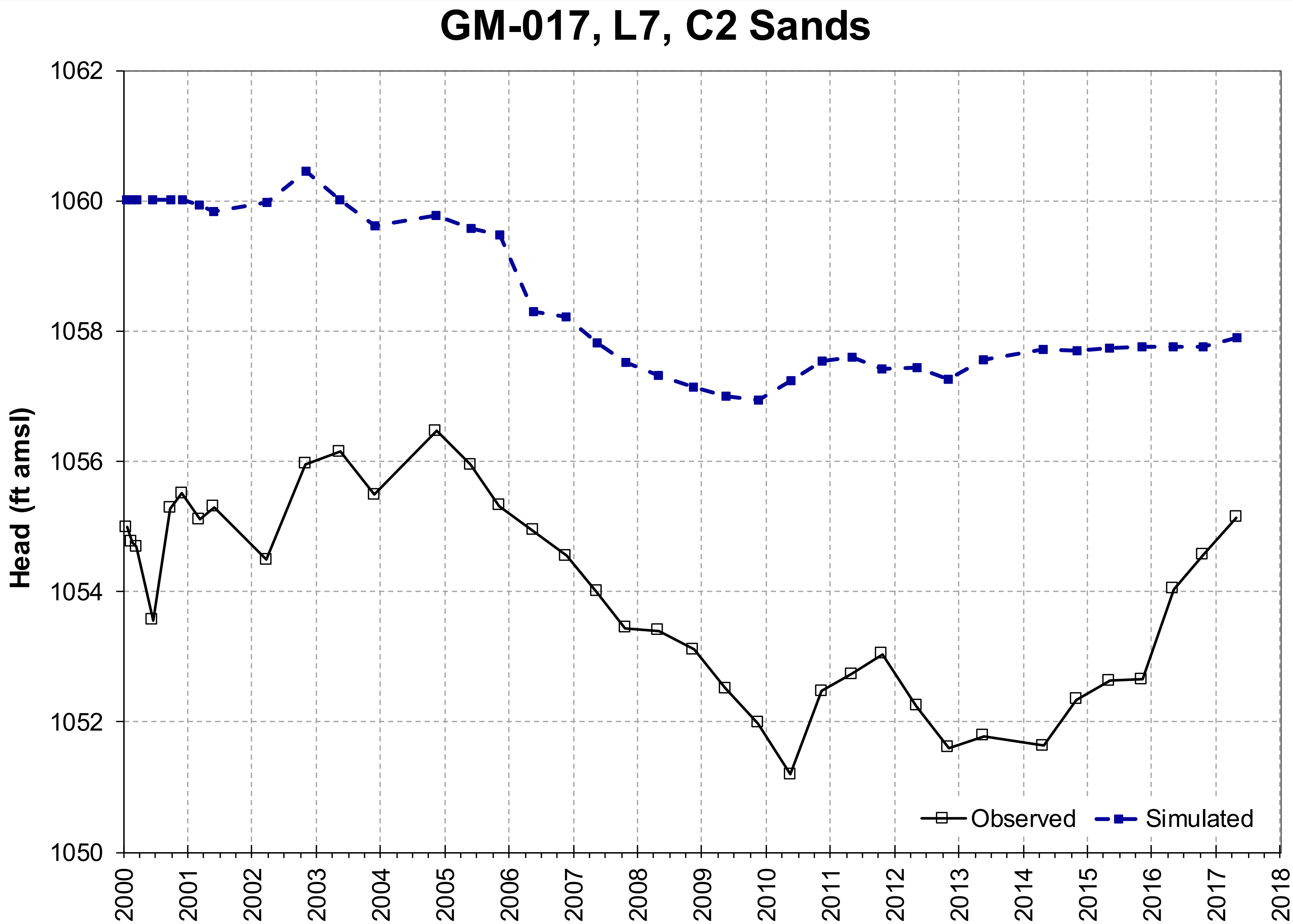


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



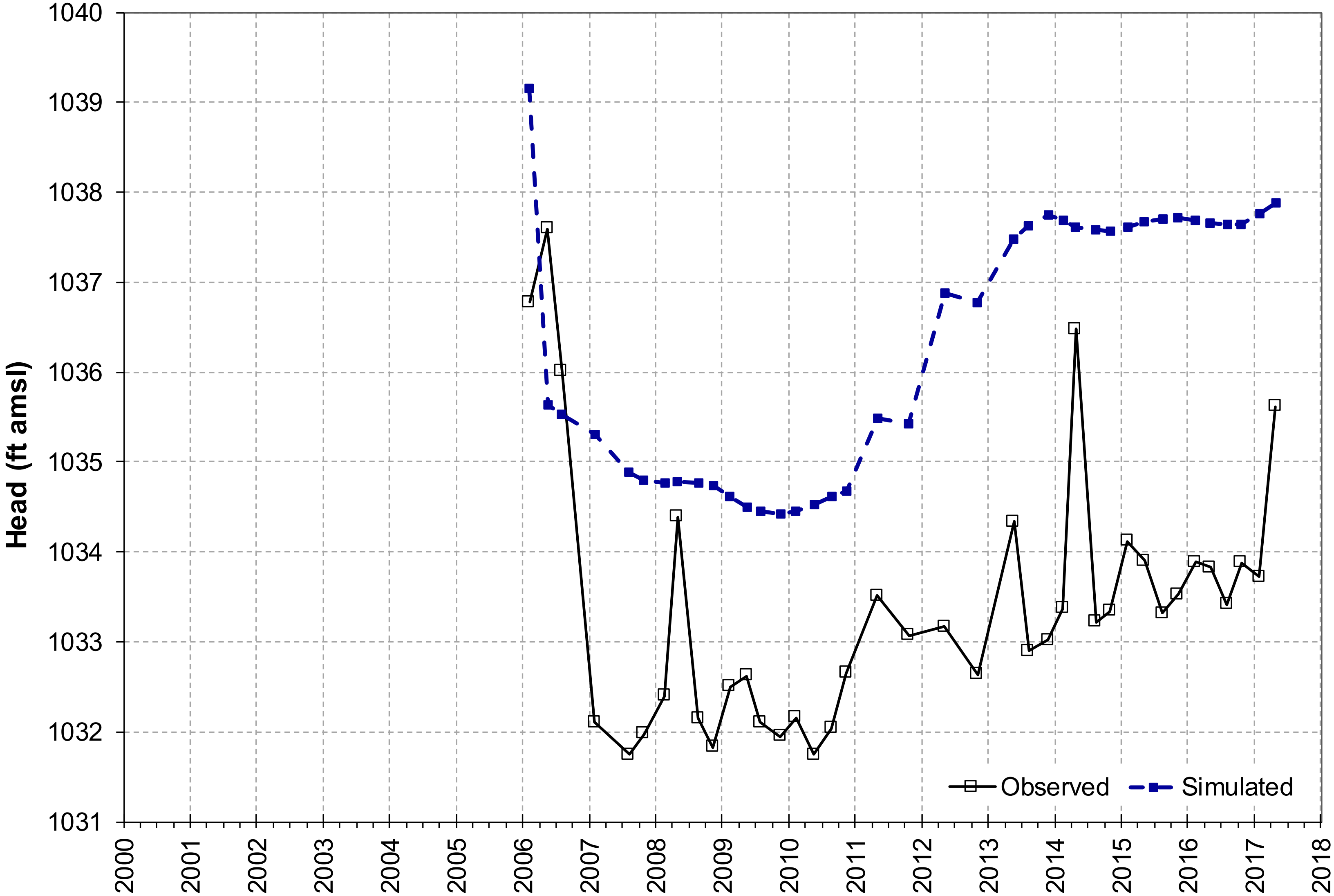
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-018, L7, C2 Sands



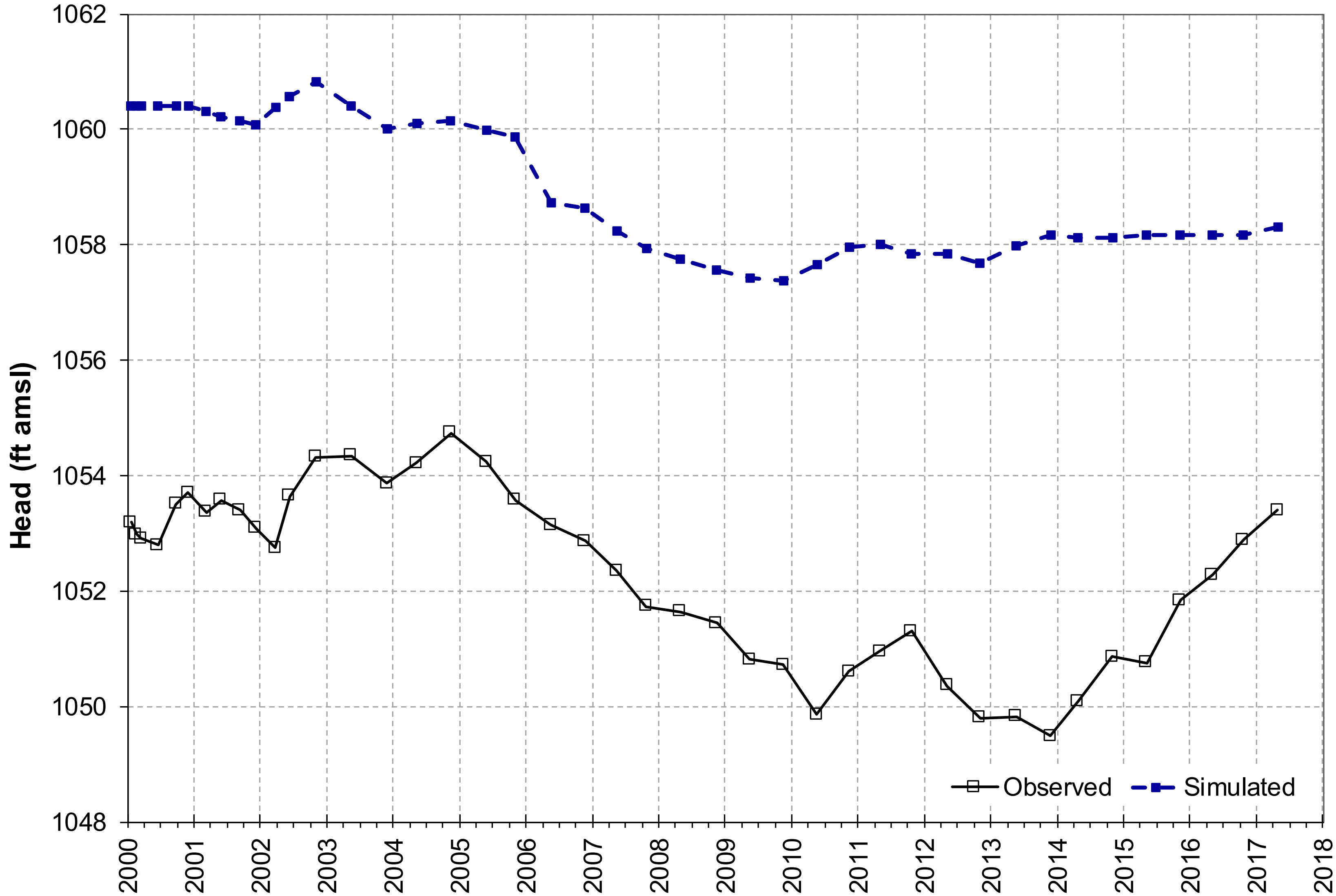
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

UG-06, L7, C2 Sands



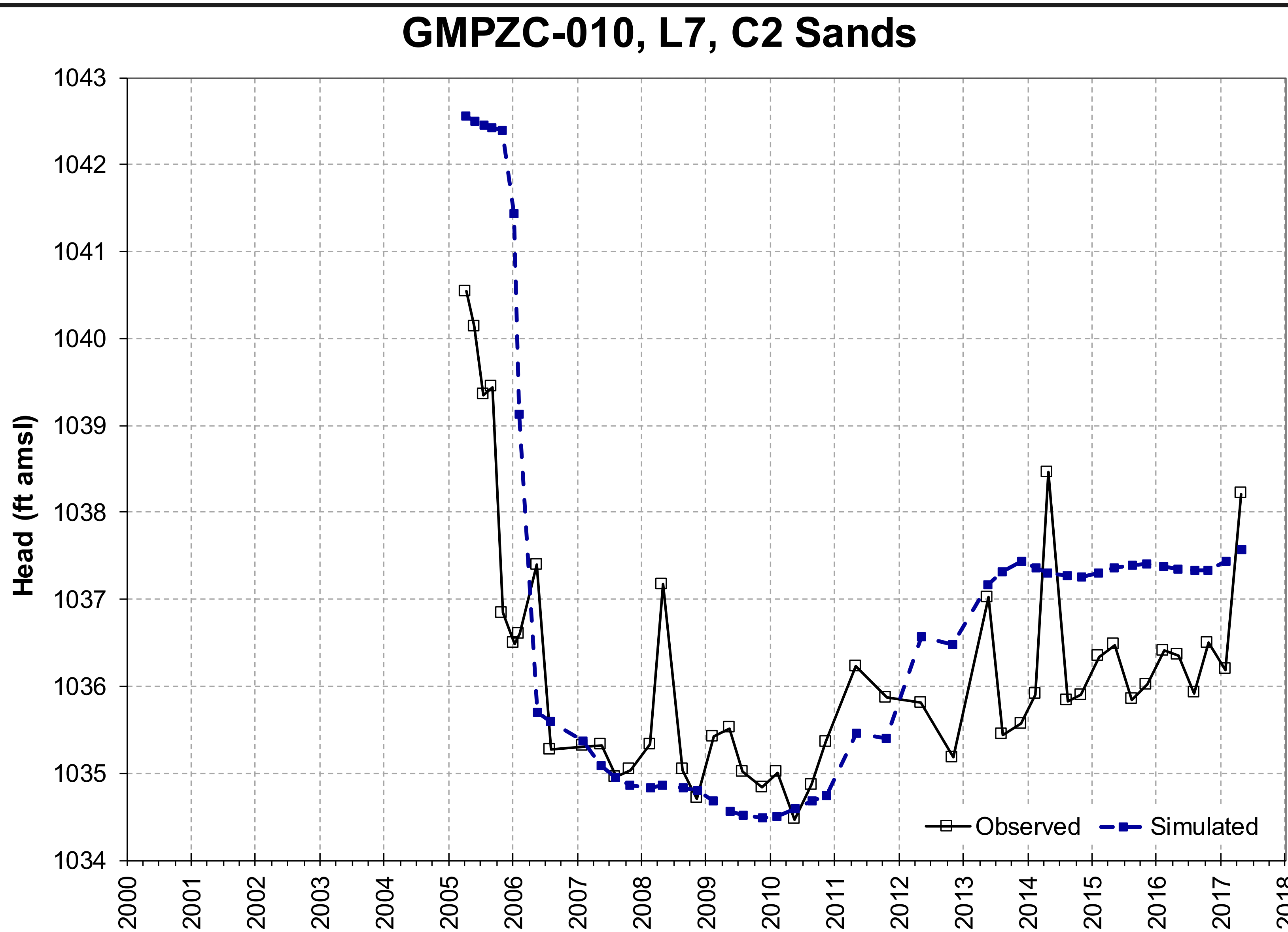
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-010, L7, C2 Sands



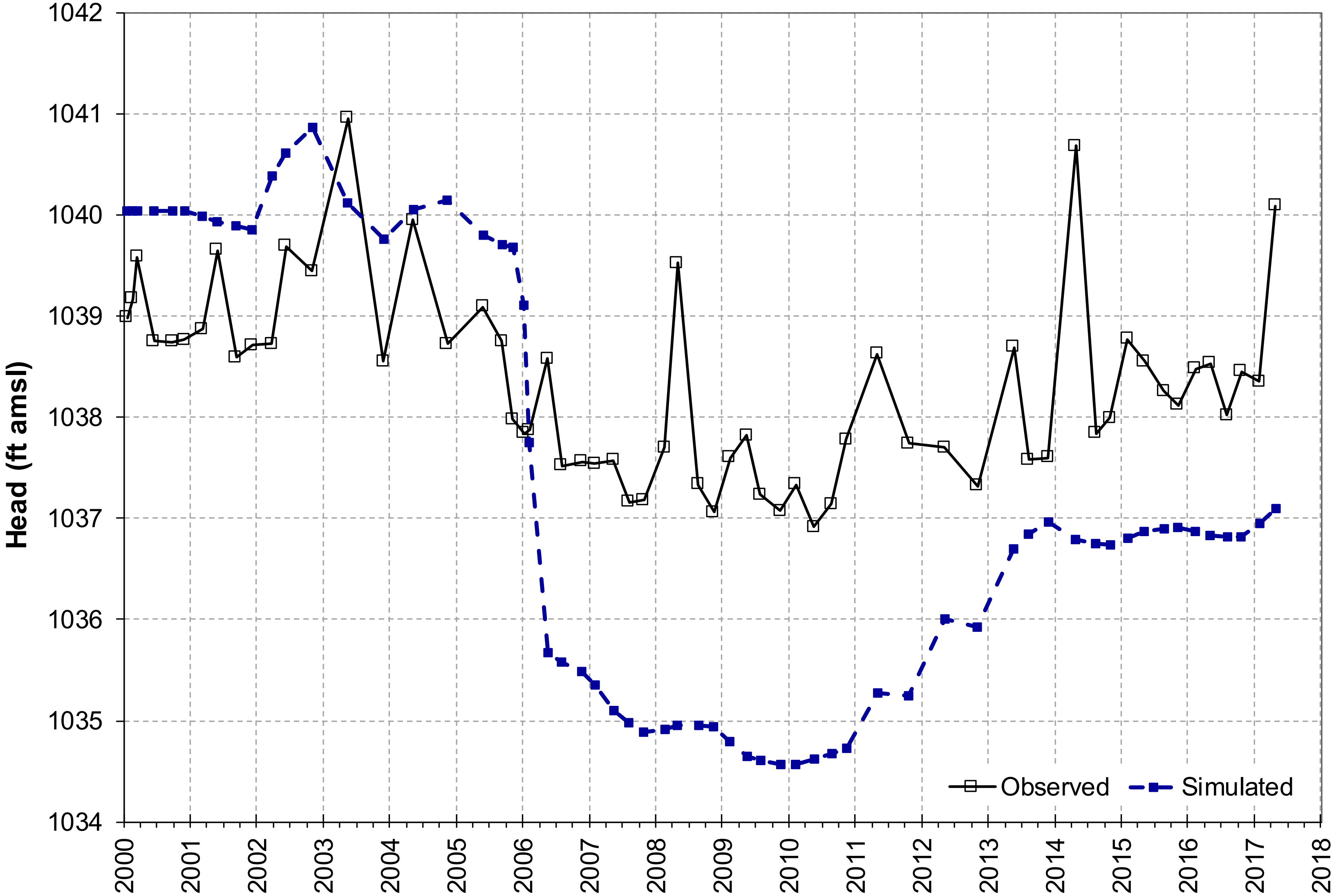
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-010, L7, C2 Sands

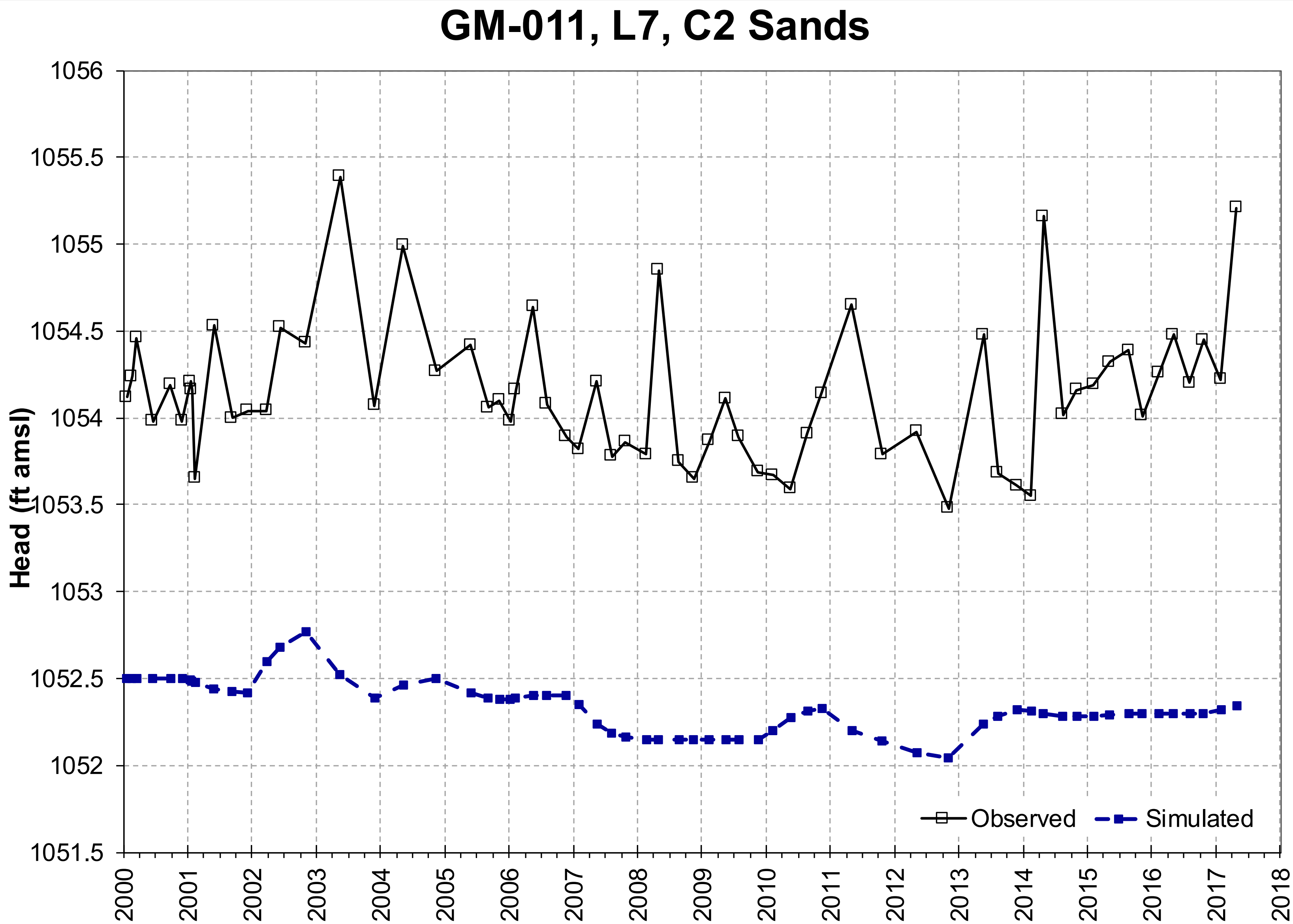


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

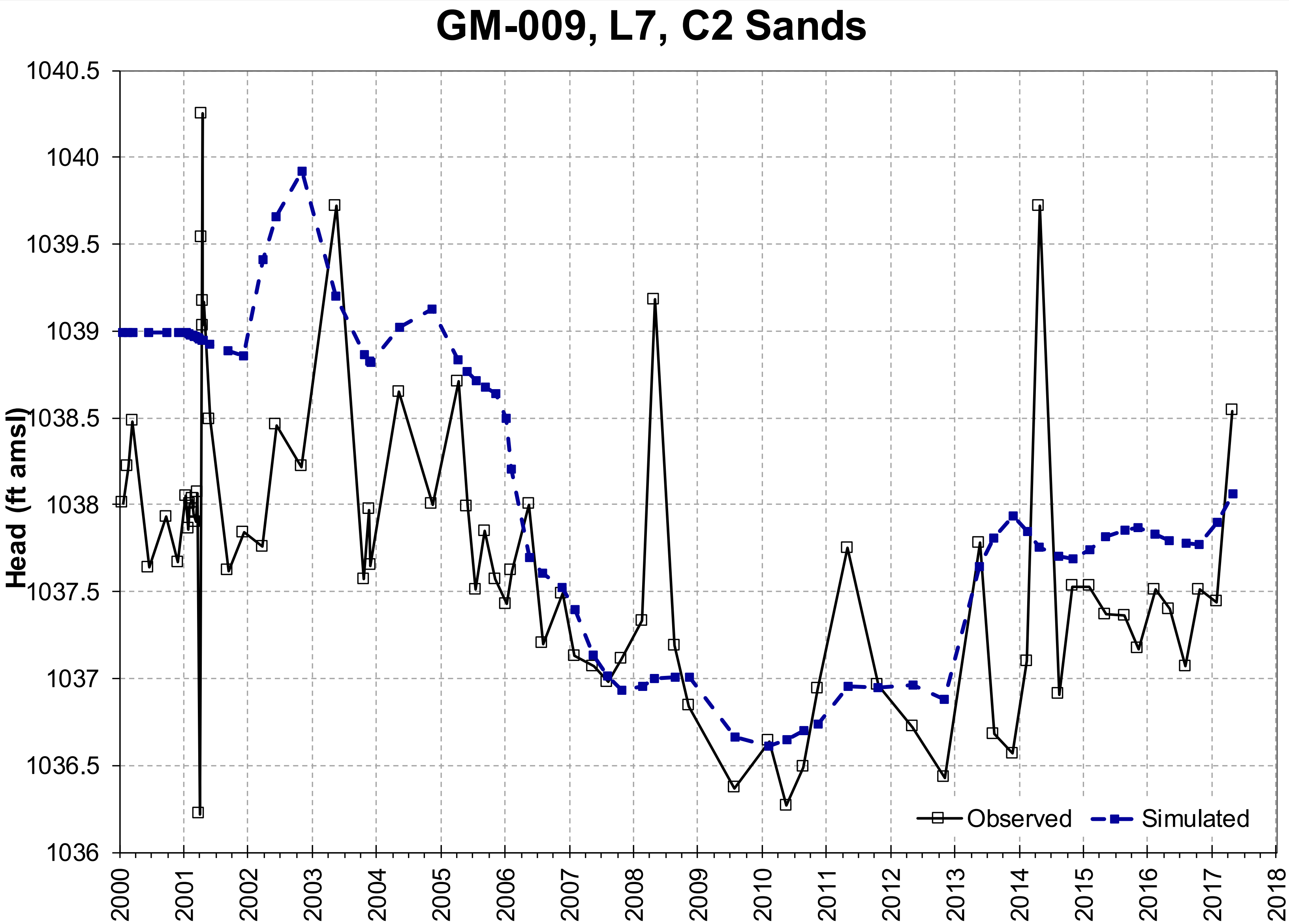


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

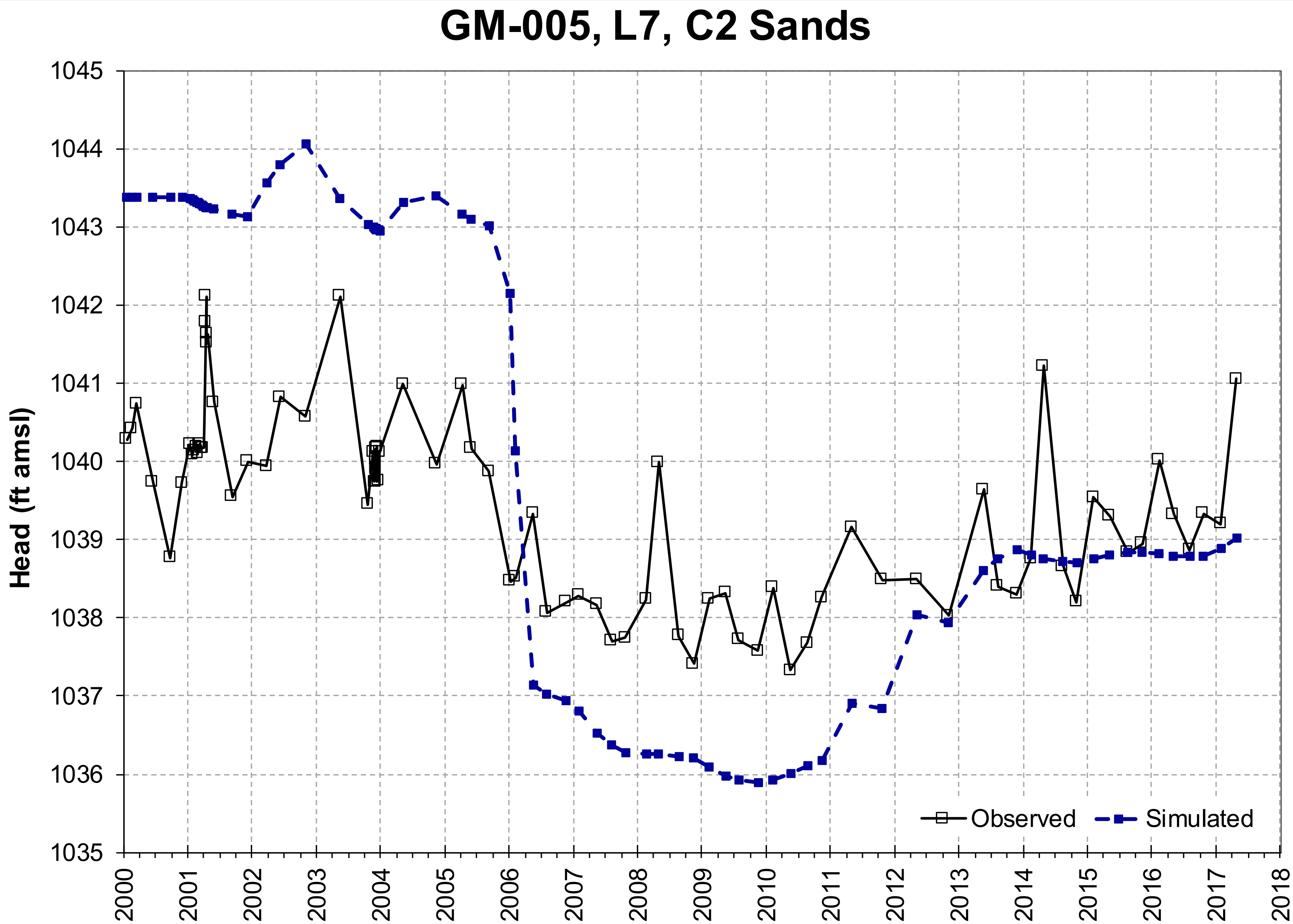


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

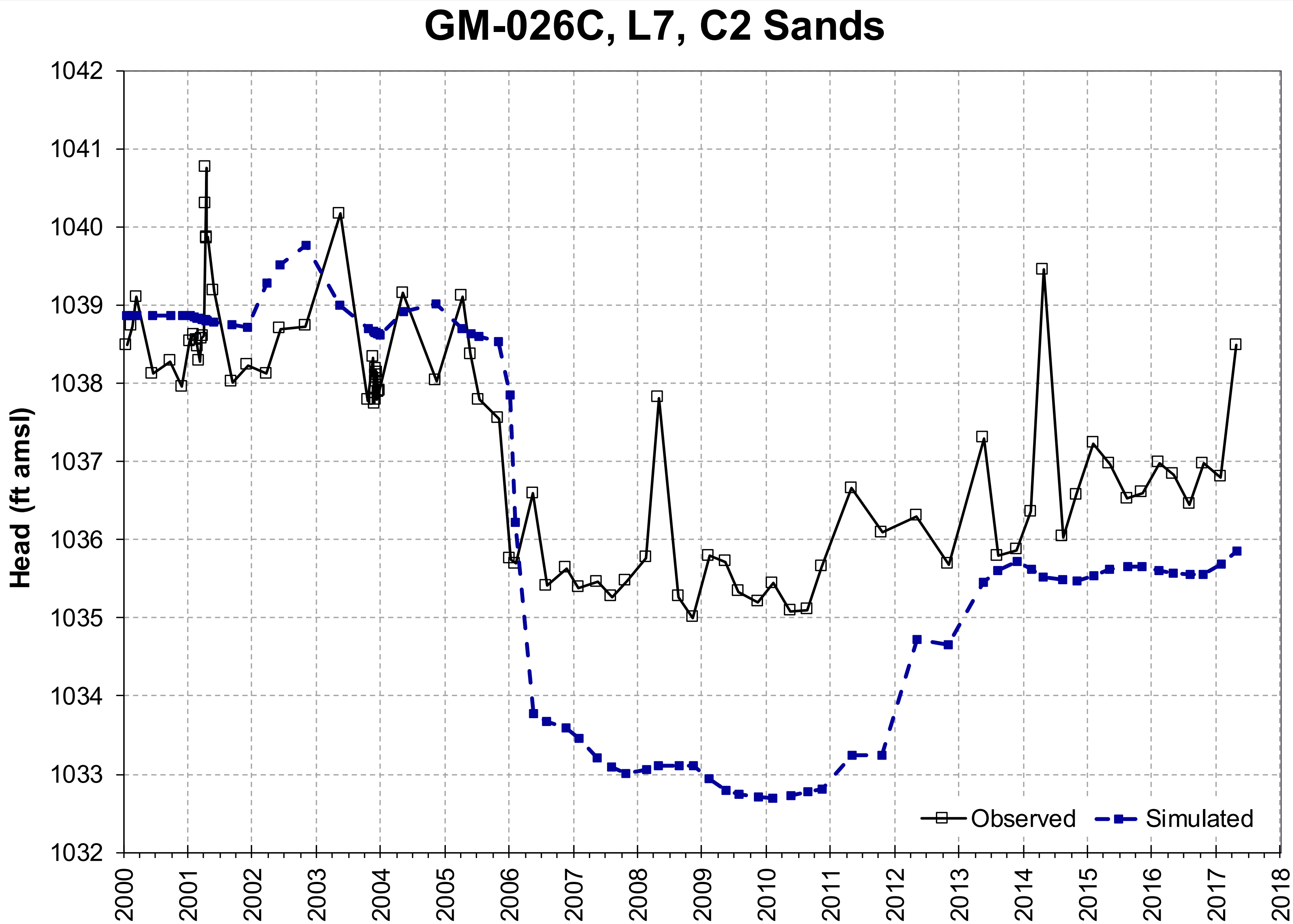


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

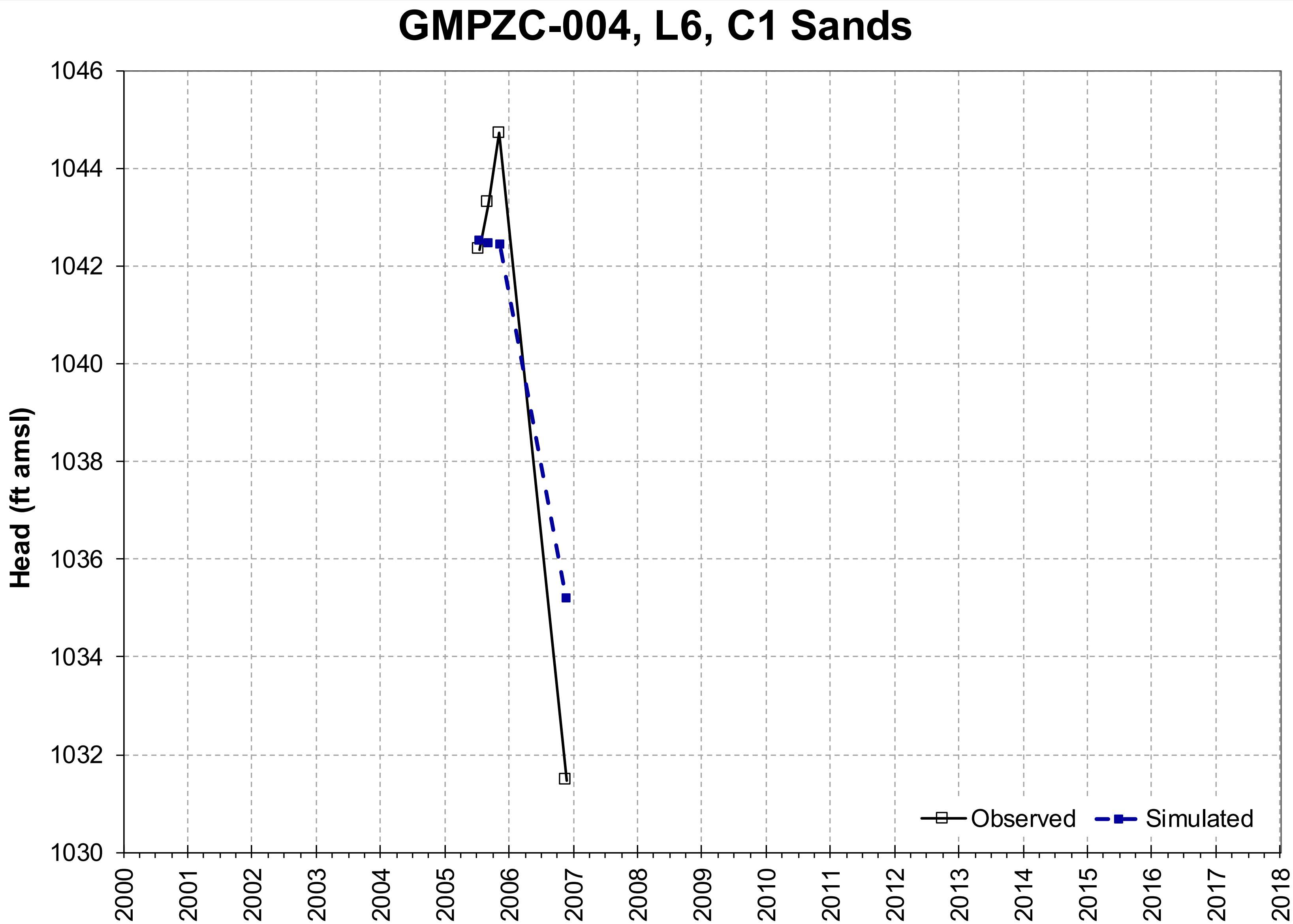


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

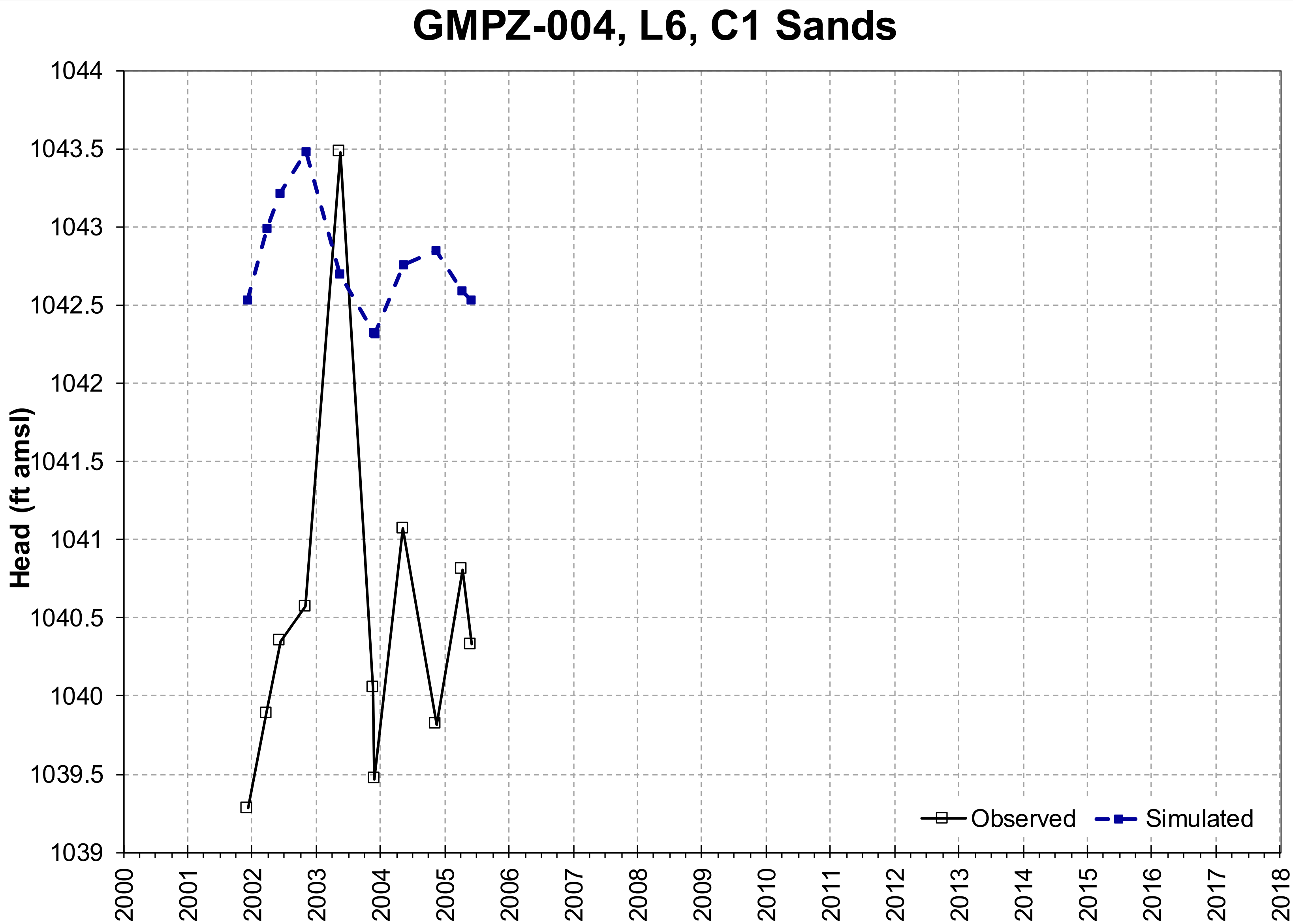


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

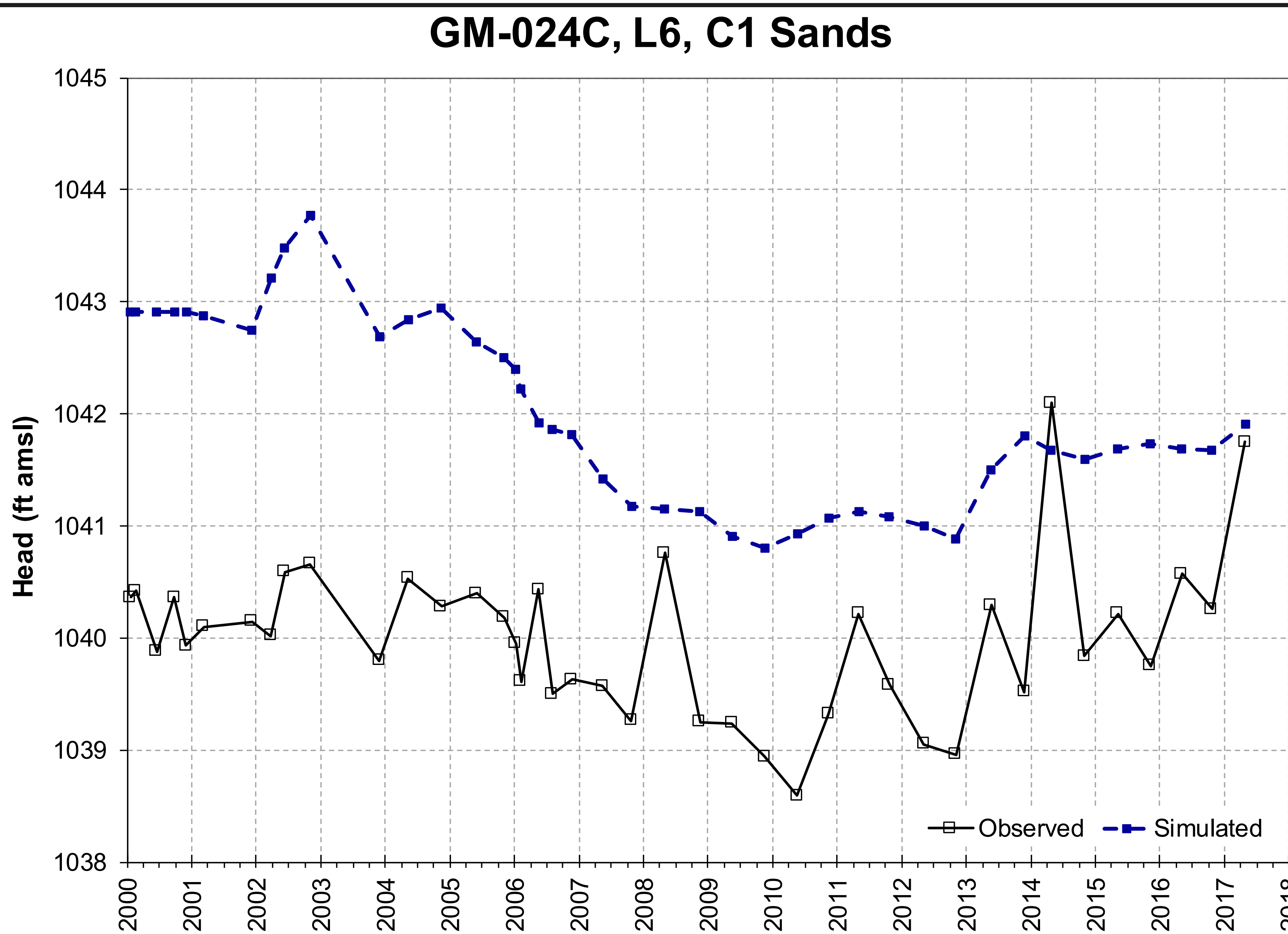


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

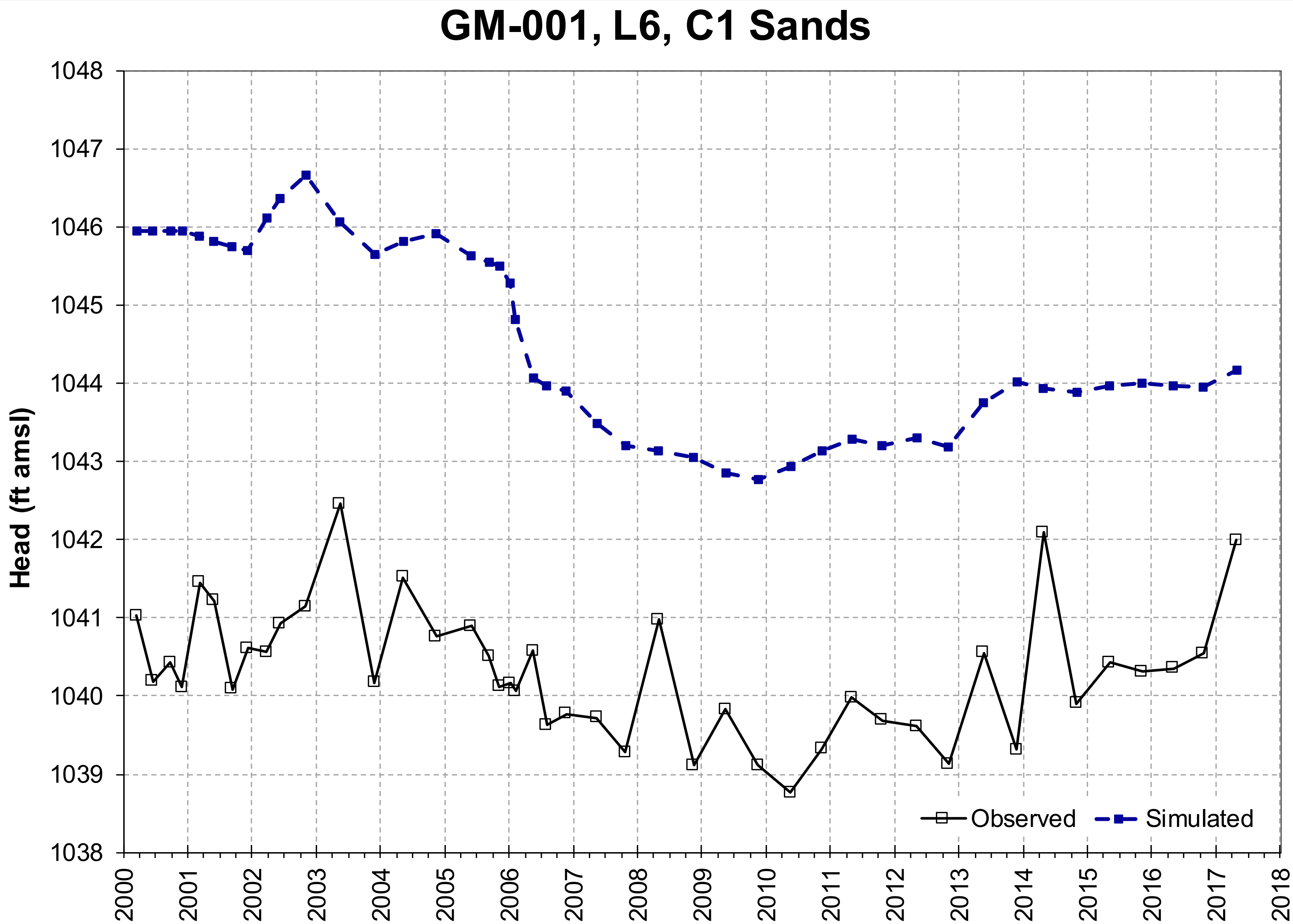


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



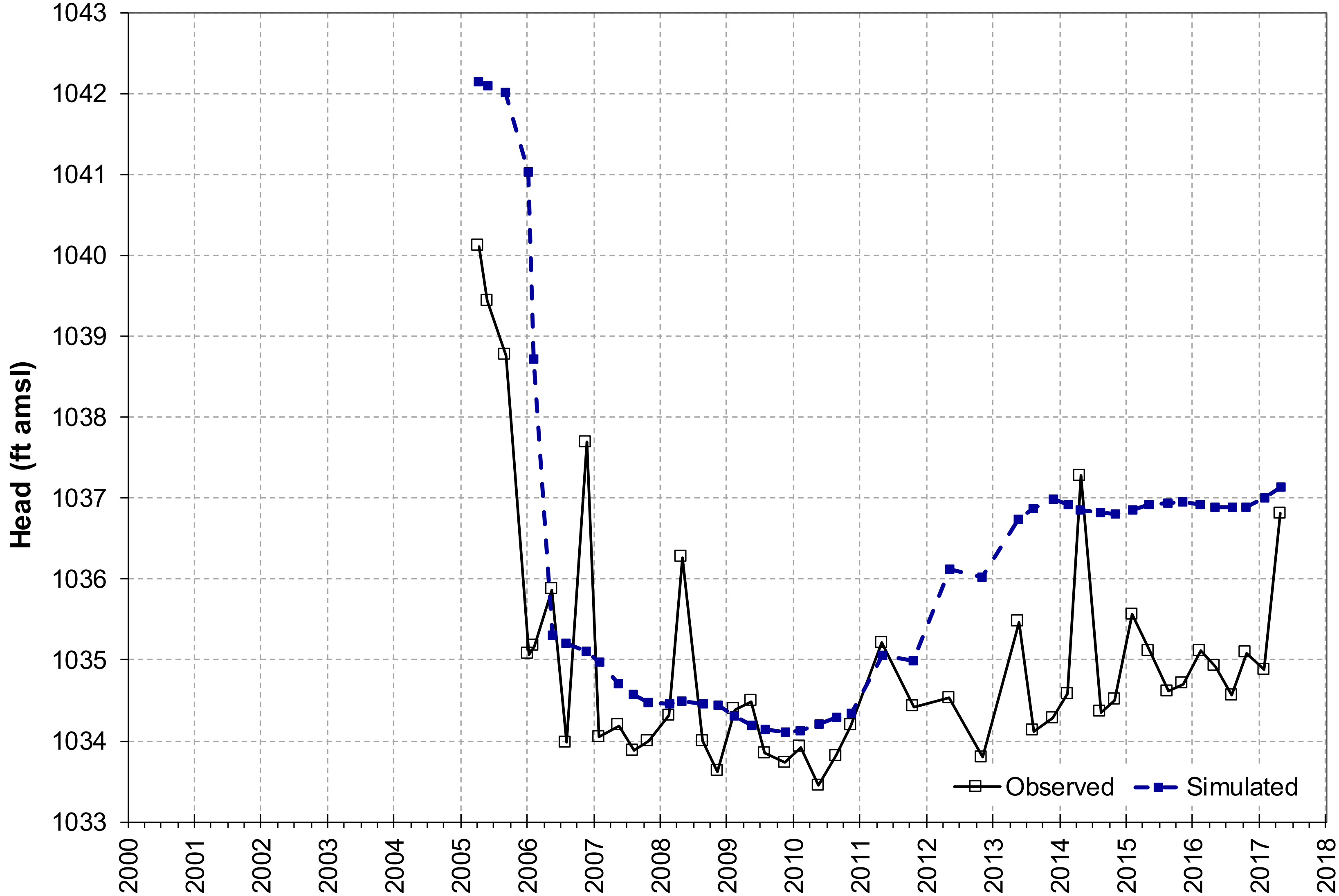
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-016, L6, C1 Sands

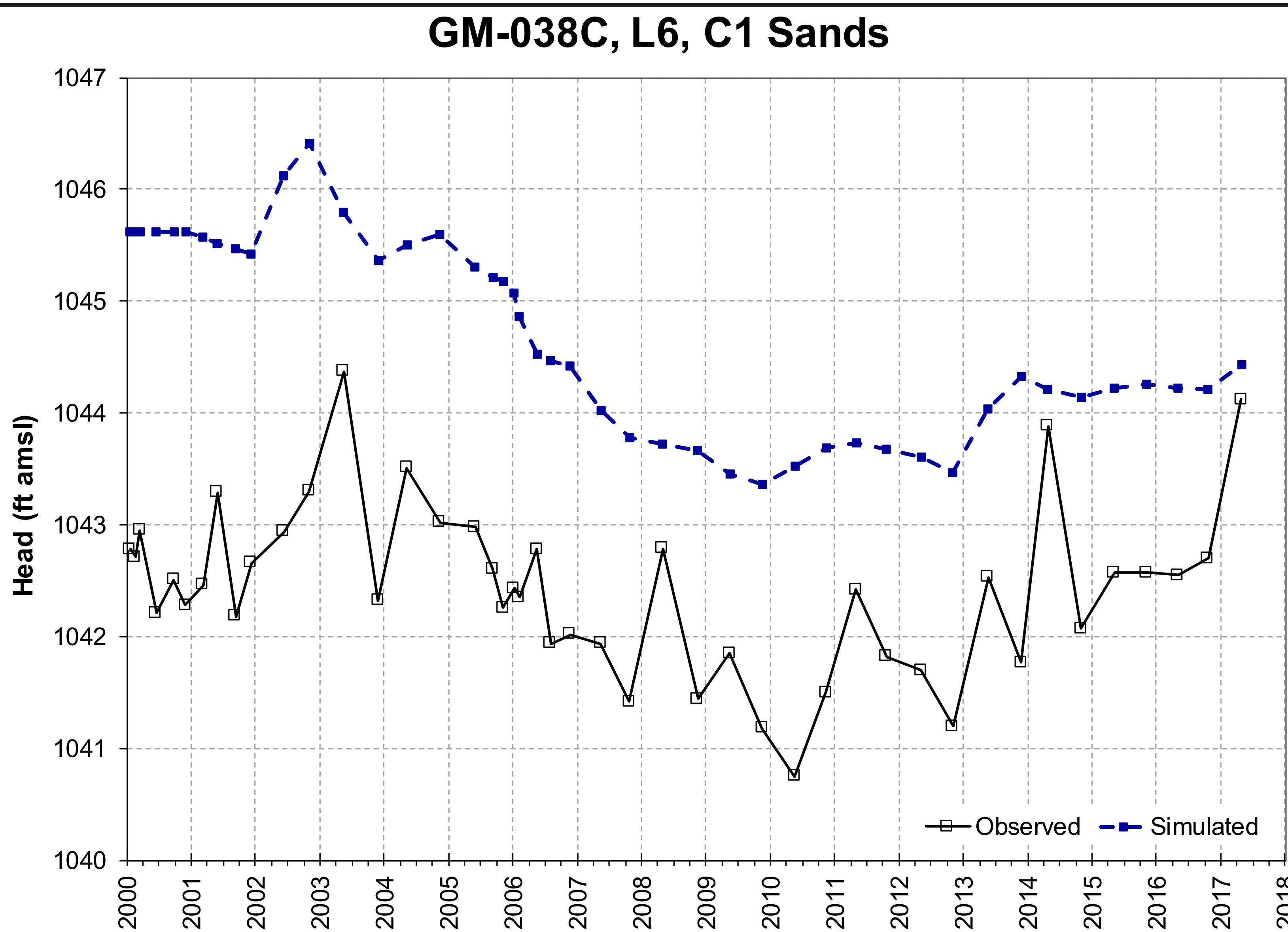


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

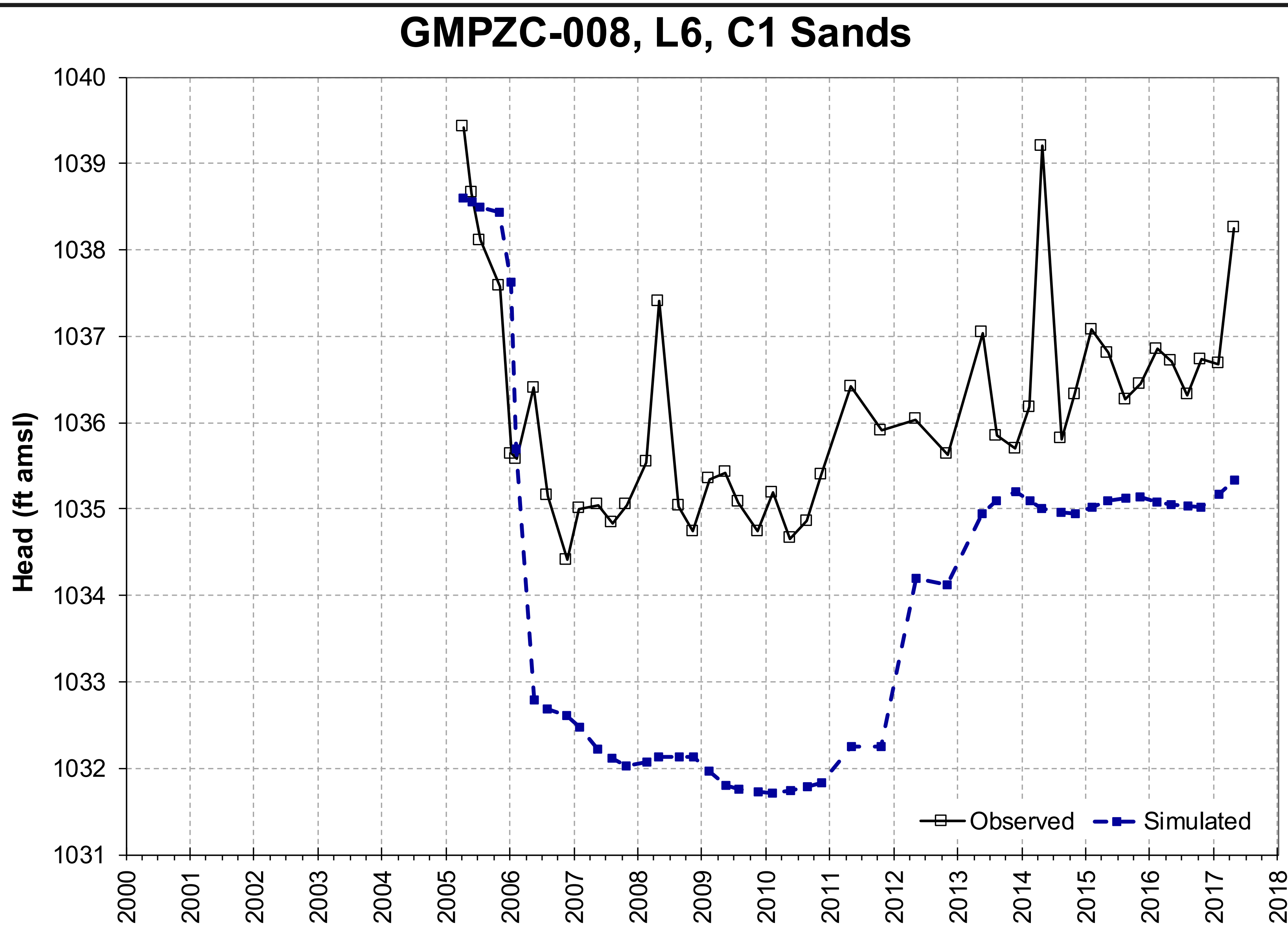


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

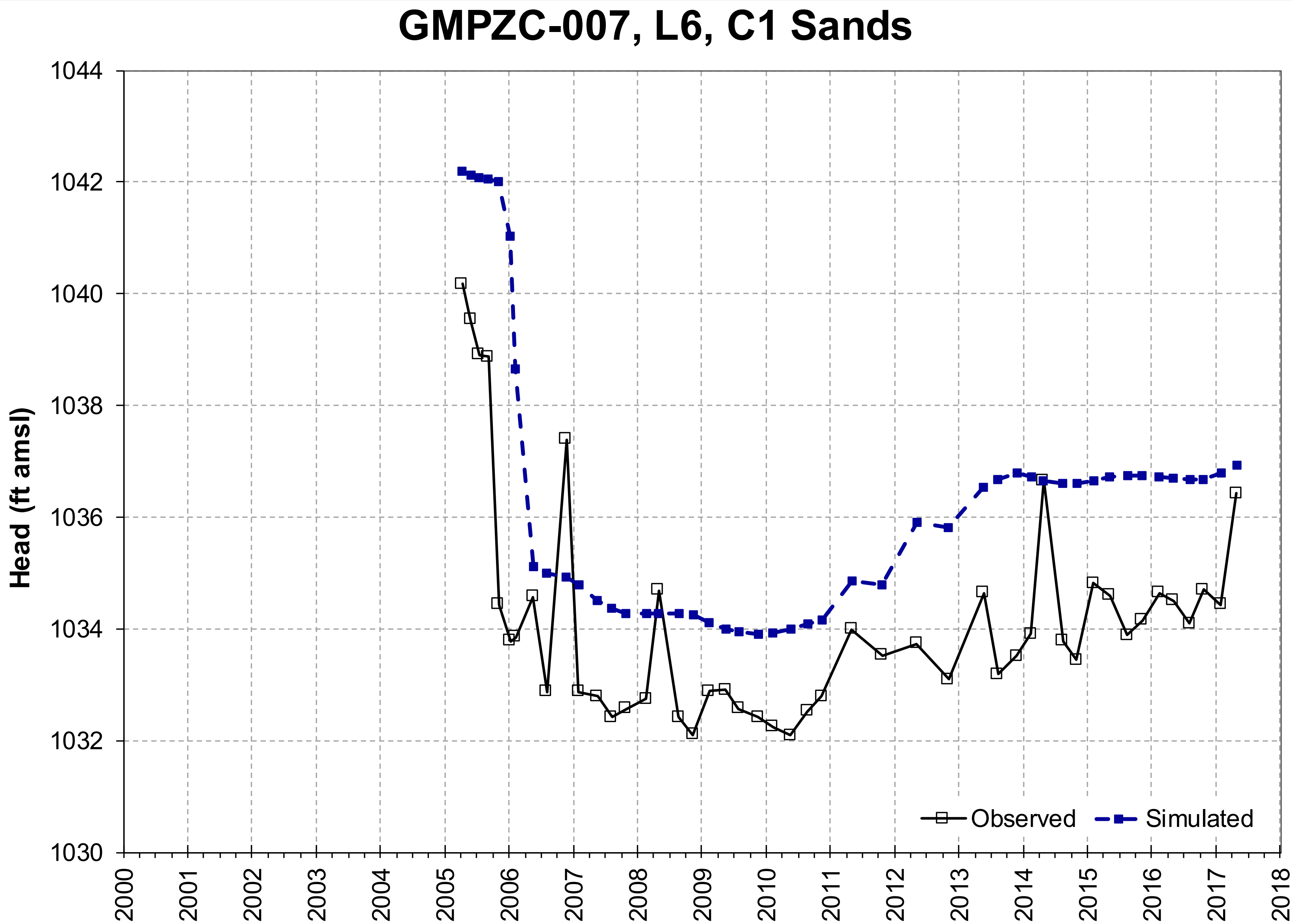


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



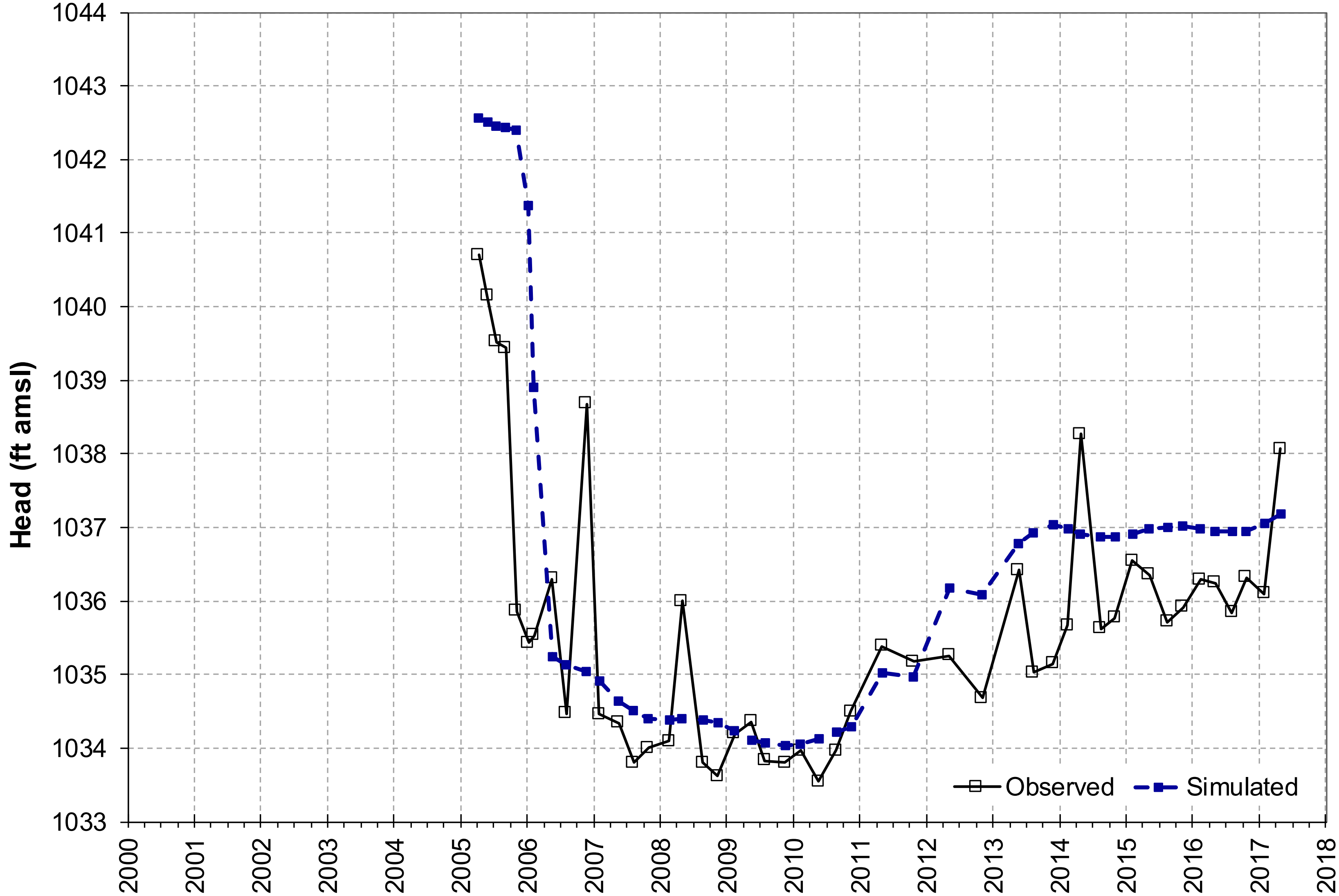
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-005, L6, C1 Sands

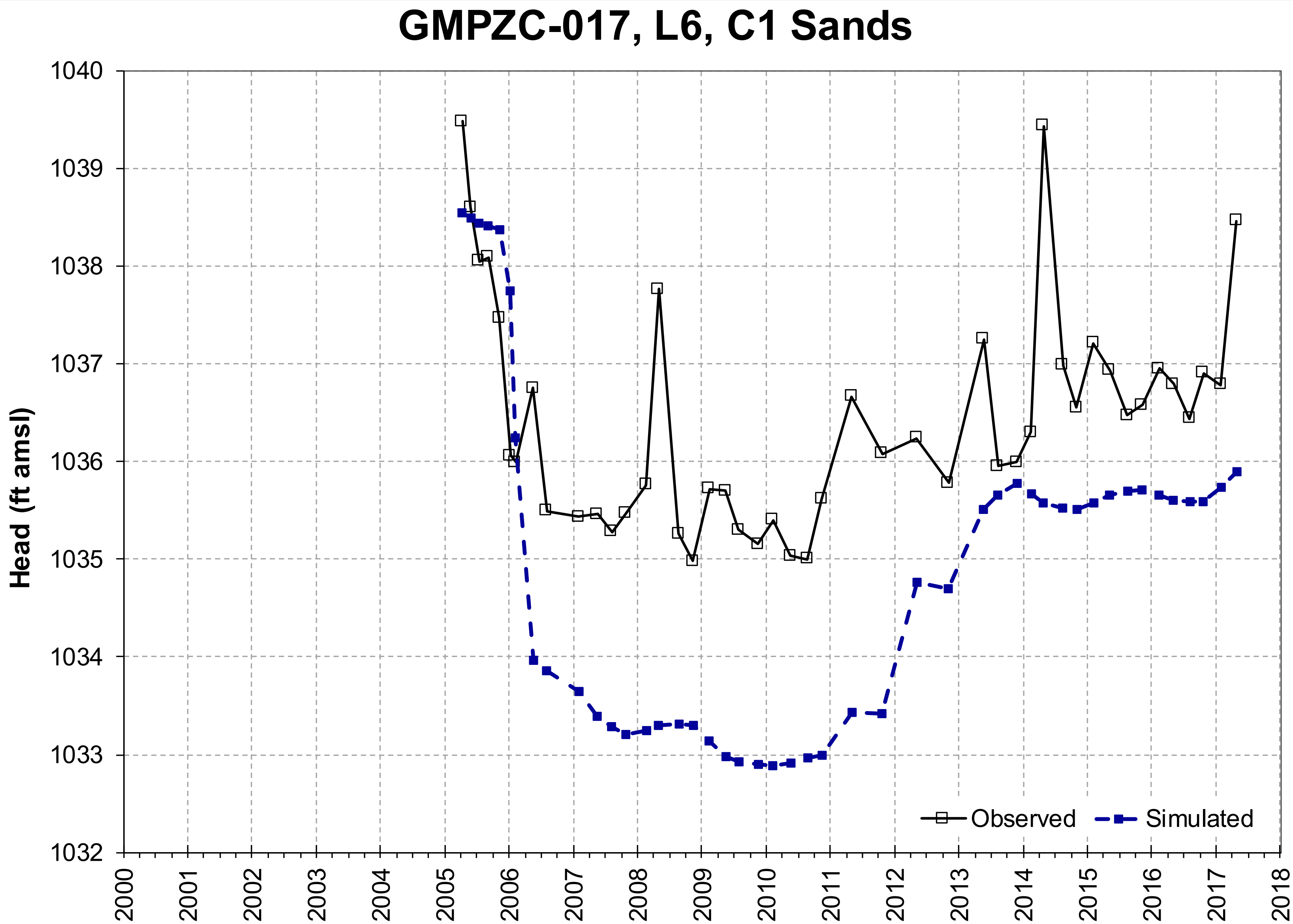


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



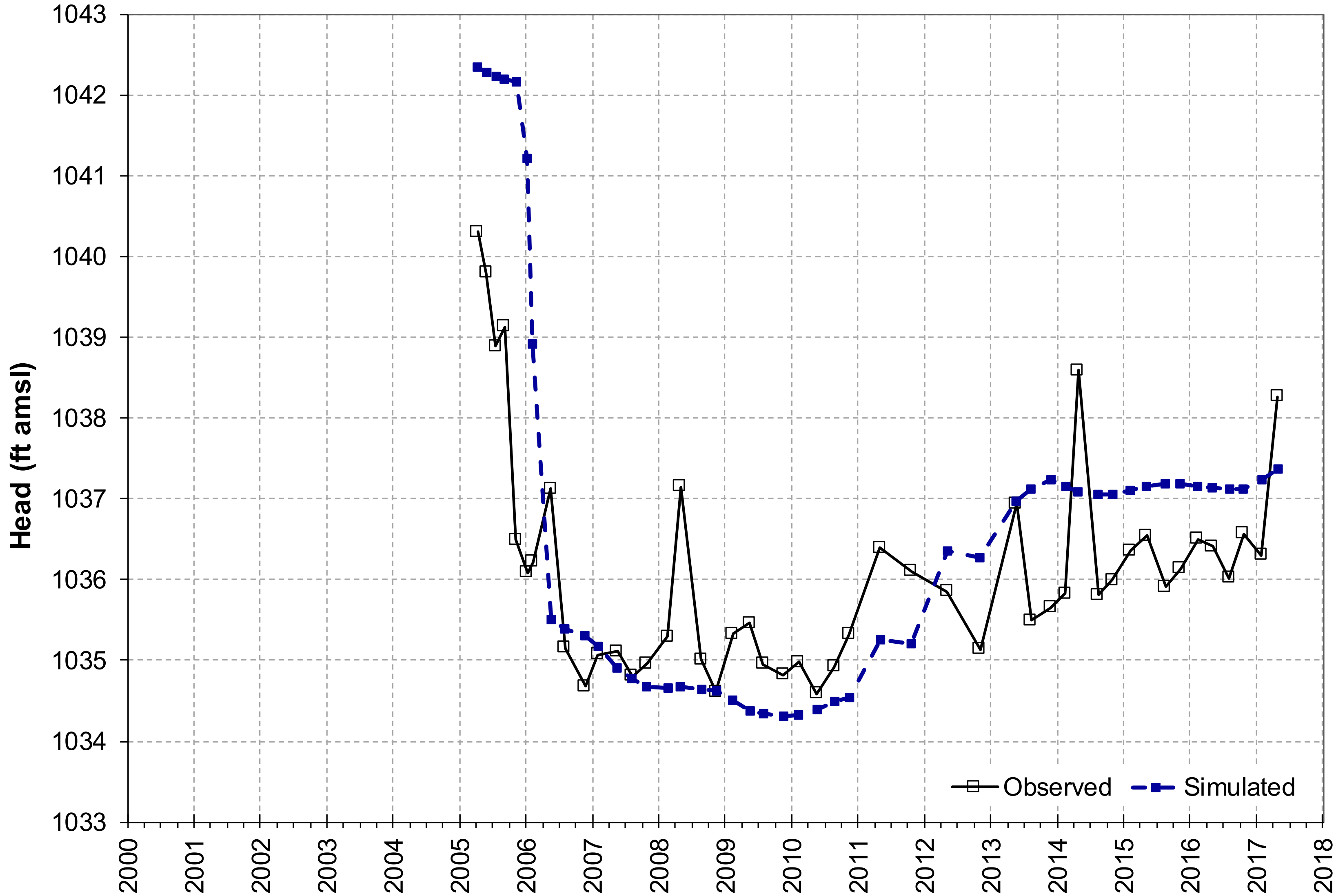
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-015, L6, C1 Sands

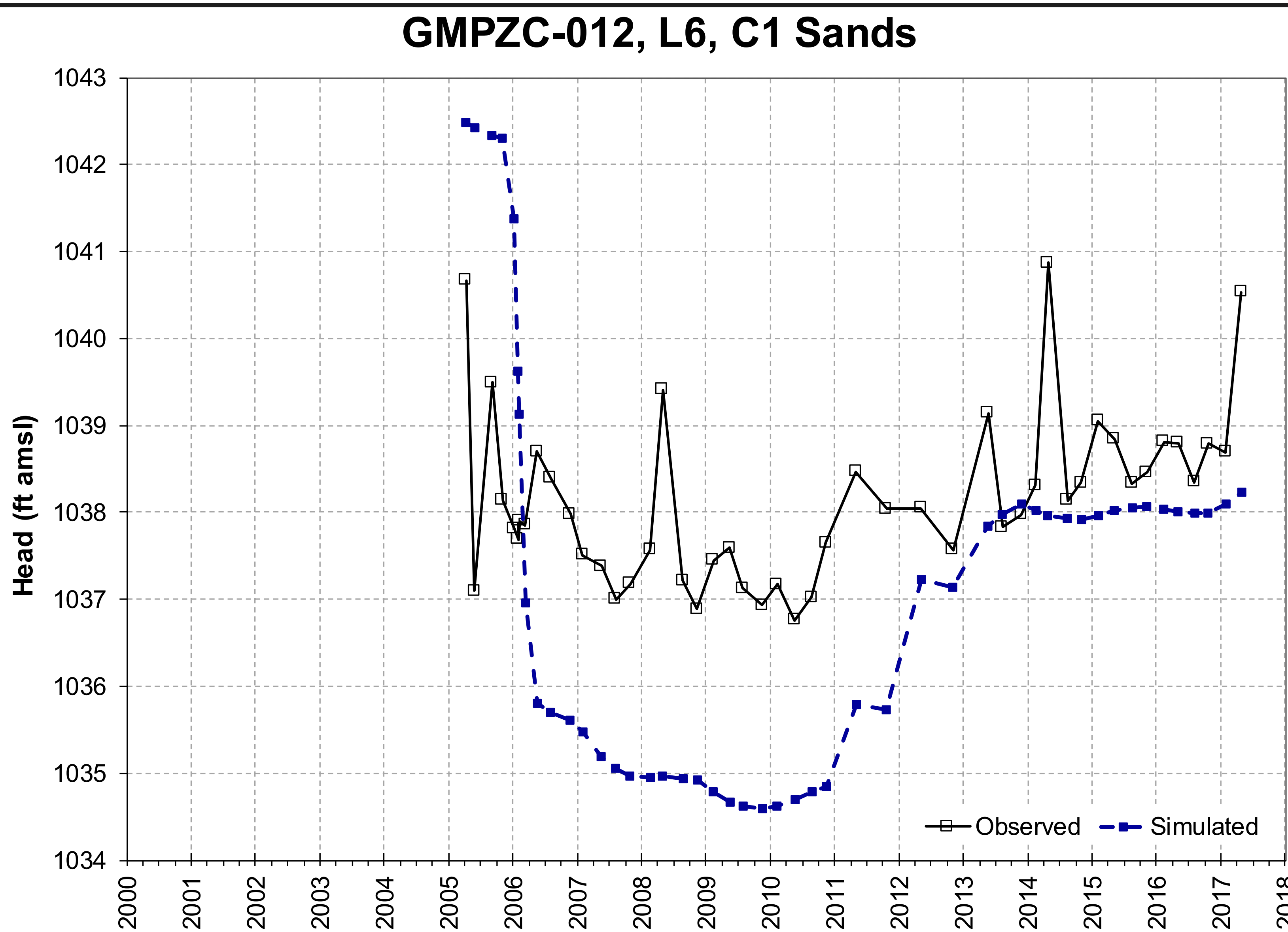


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

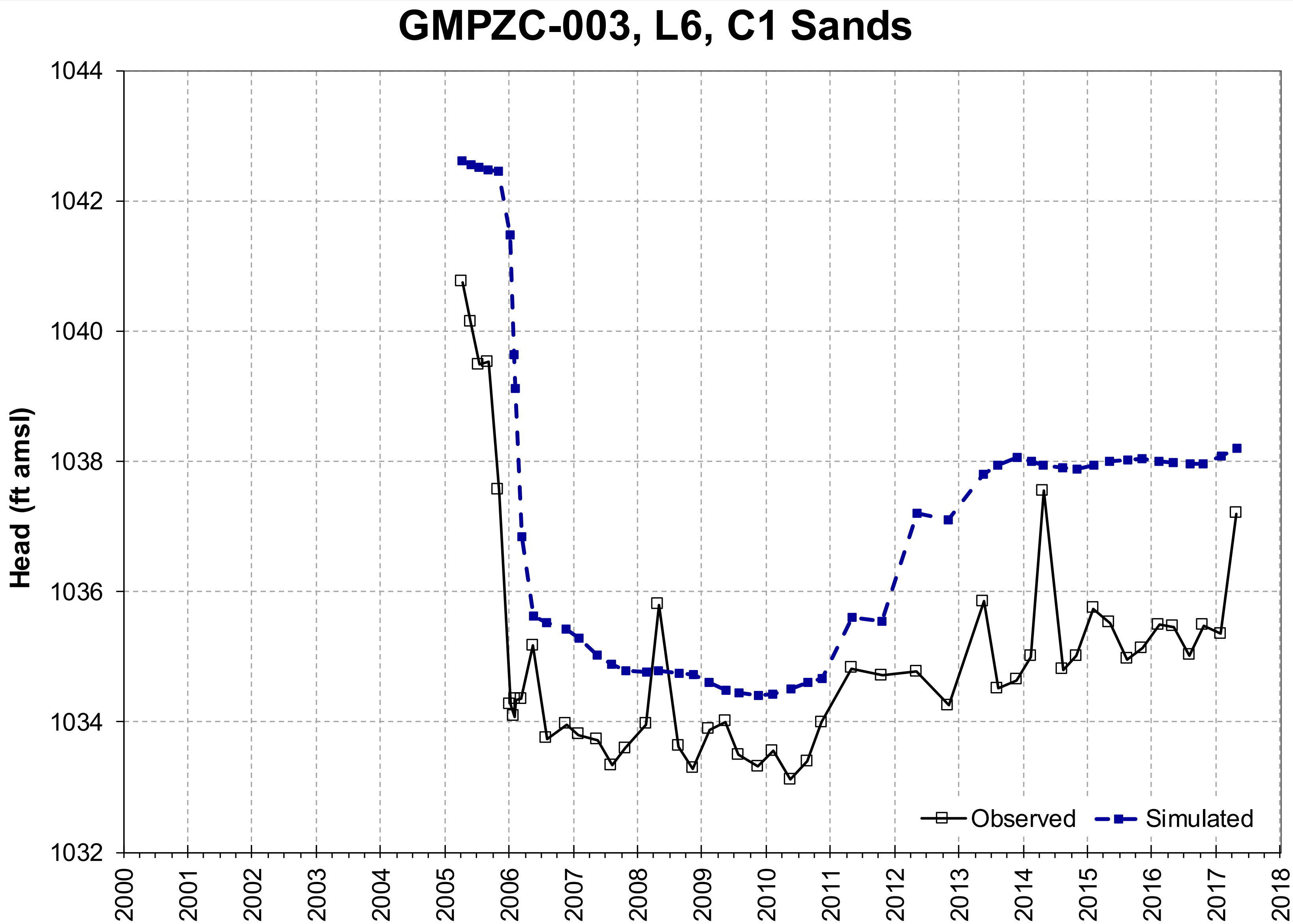


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

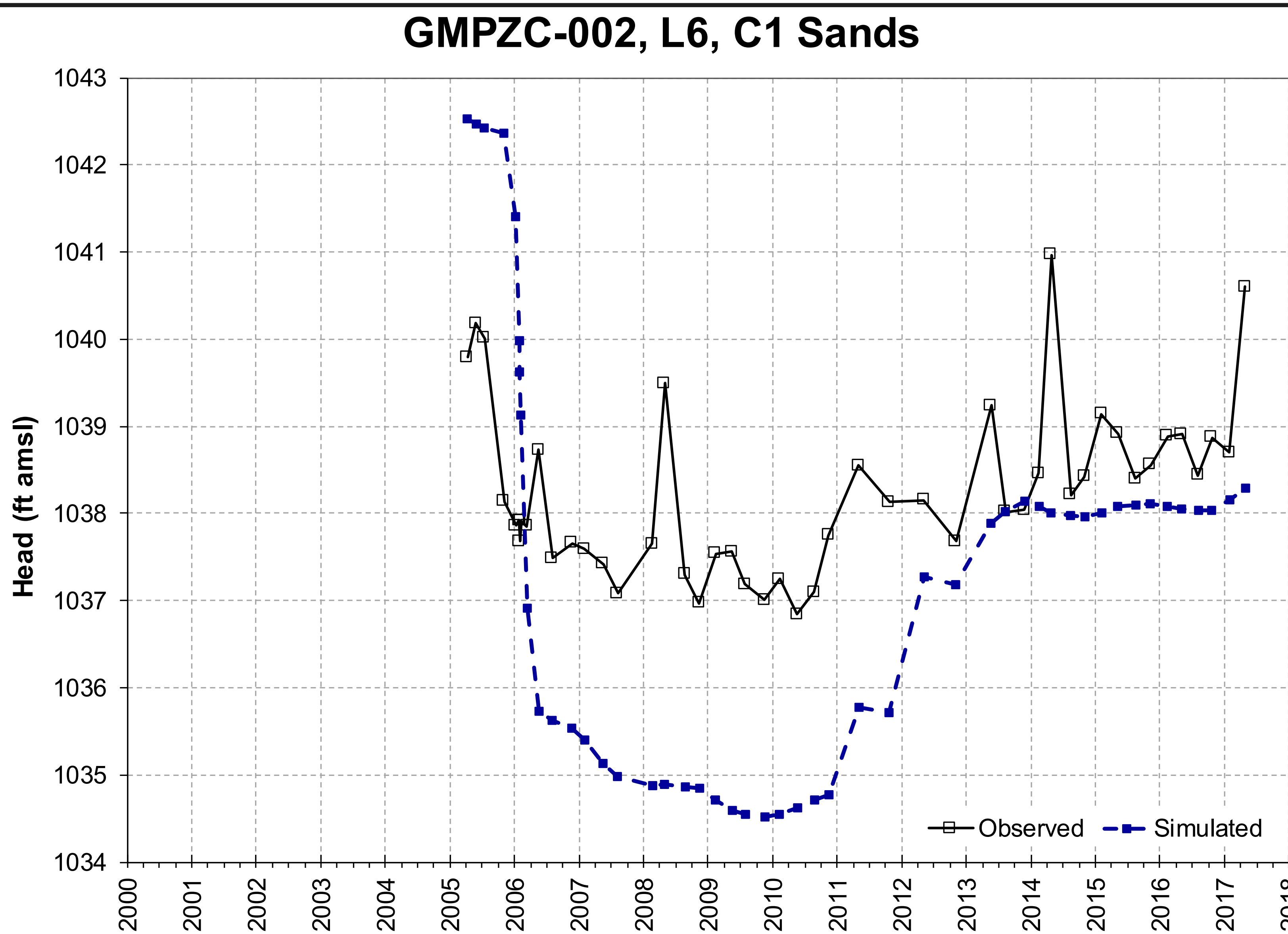


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

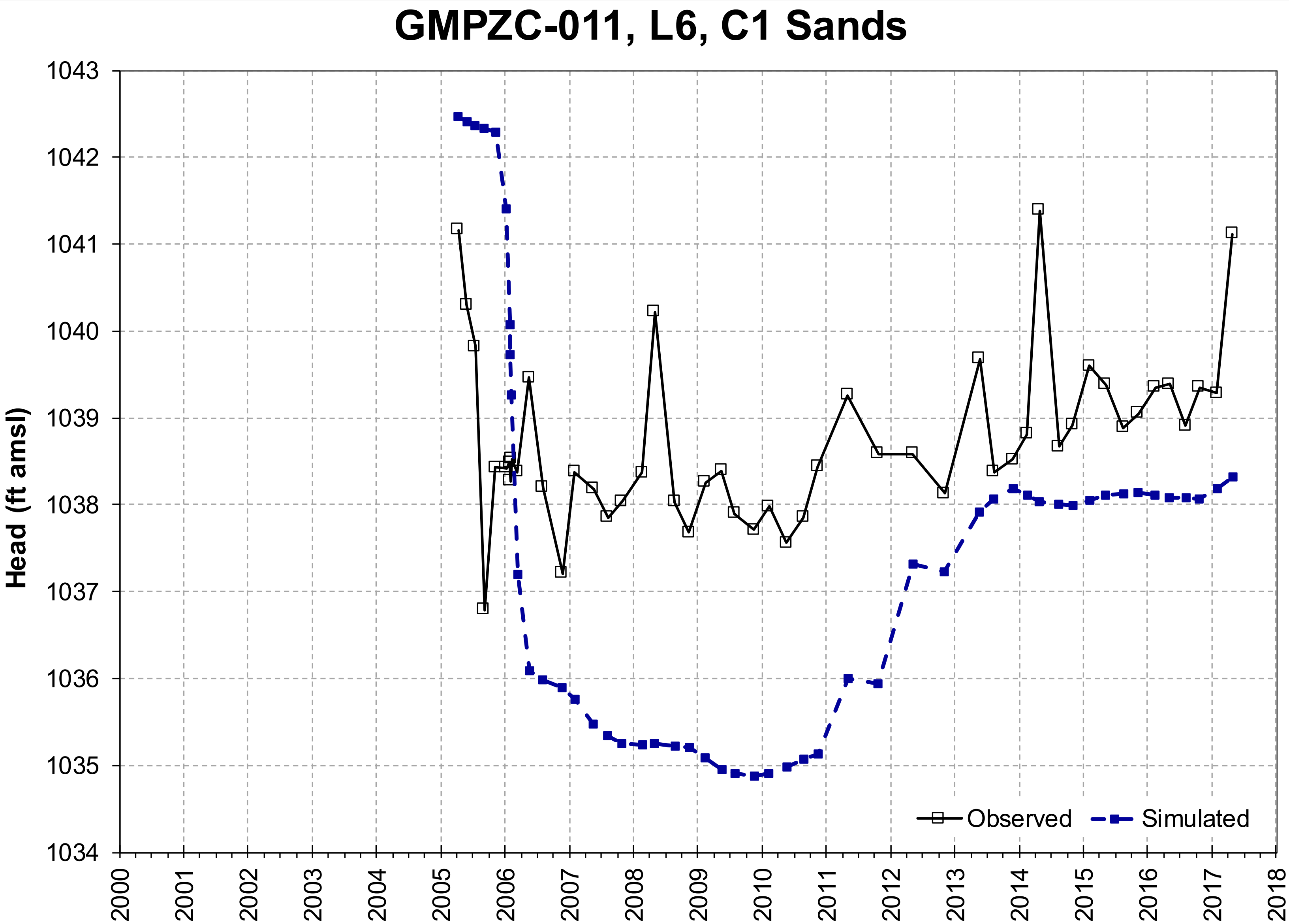


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

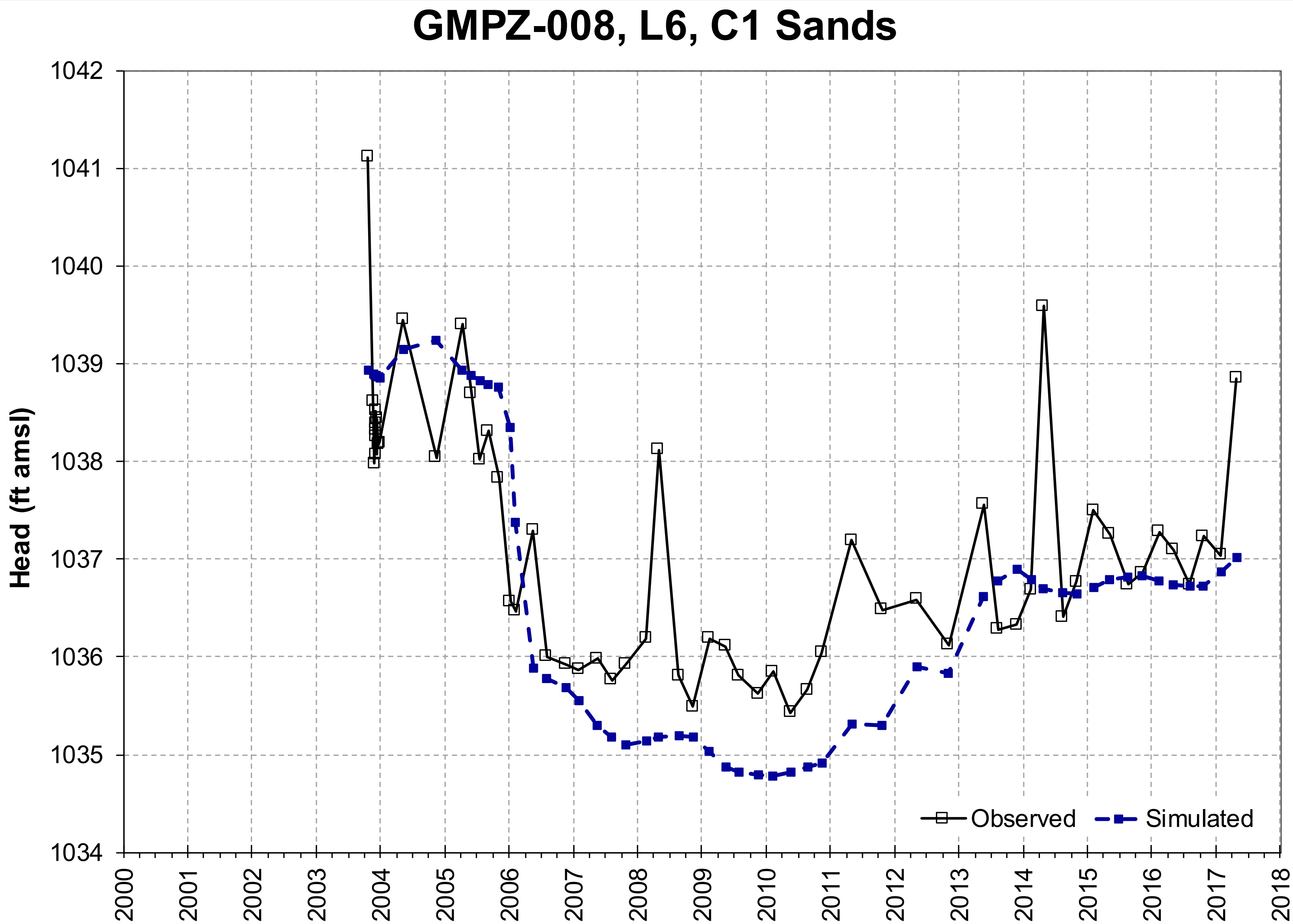


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



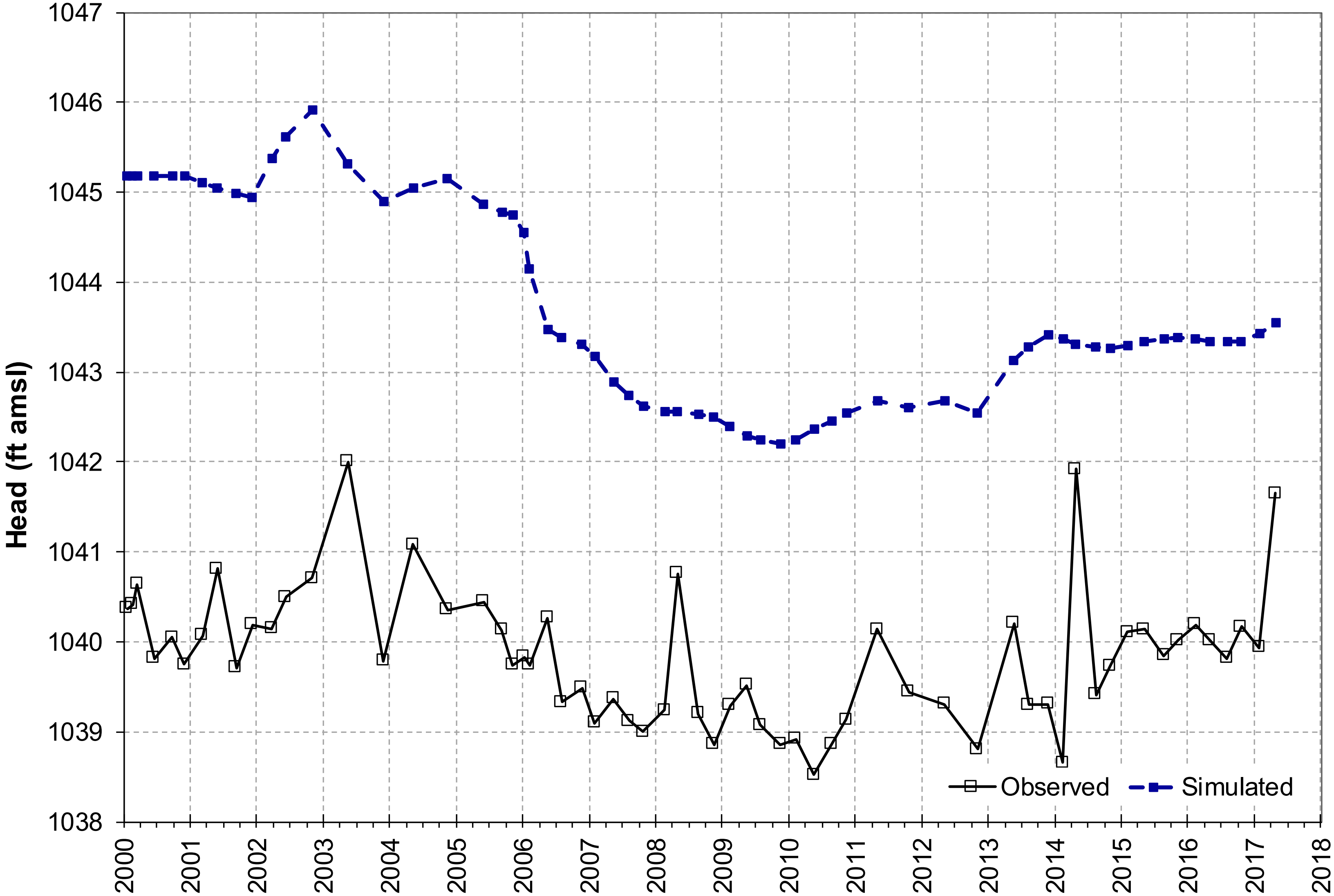
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-053B, L6, C1 Sands

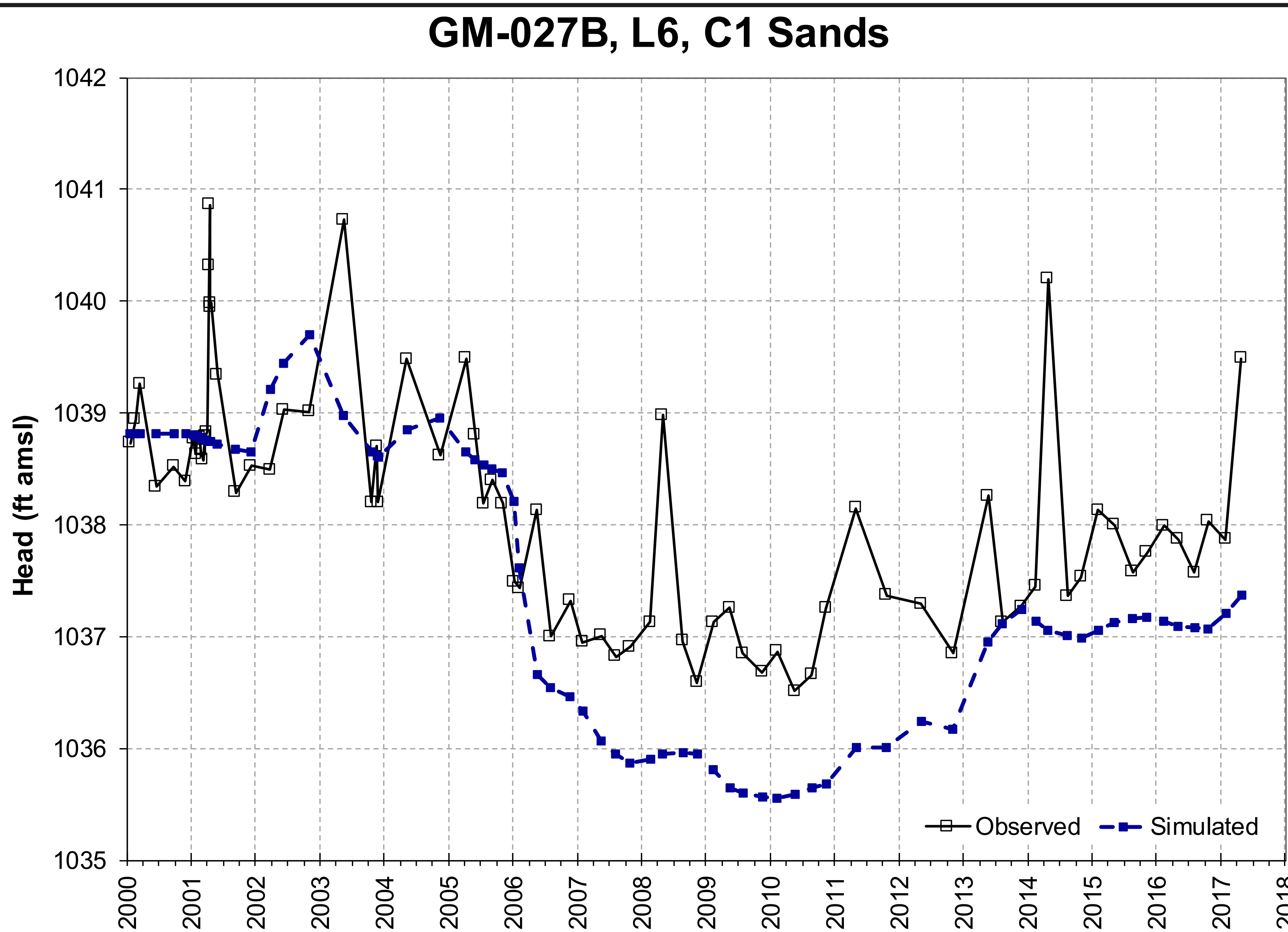


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

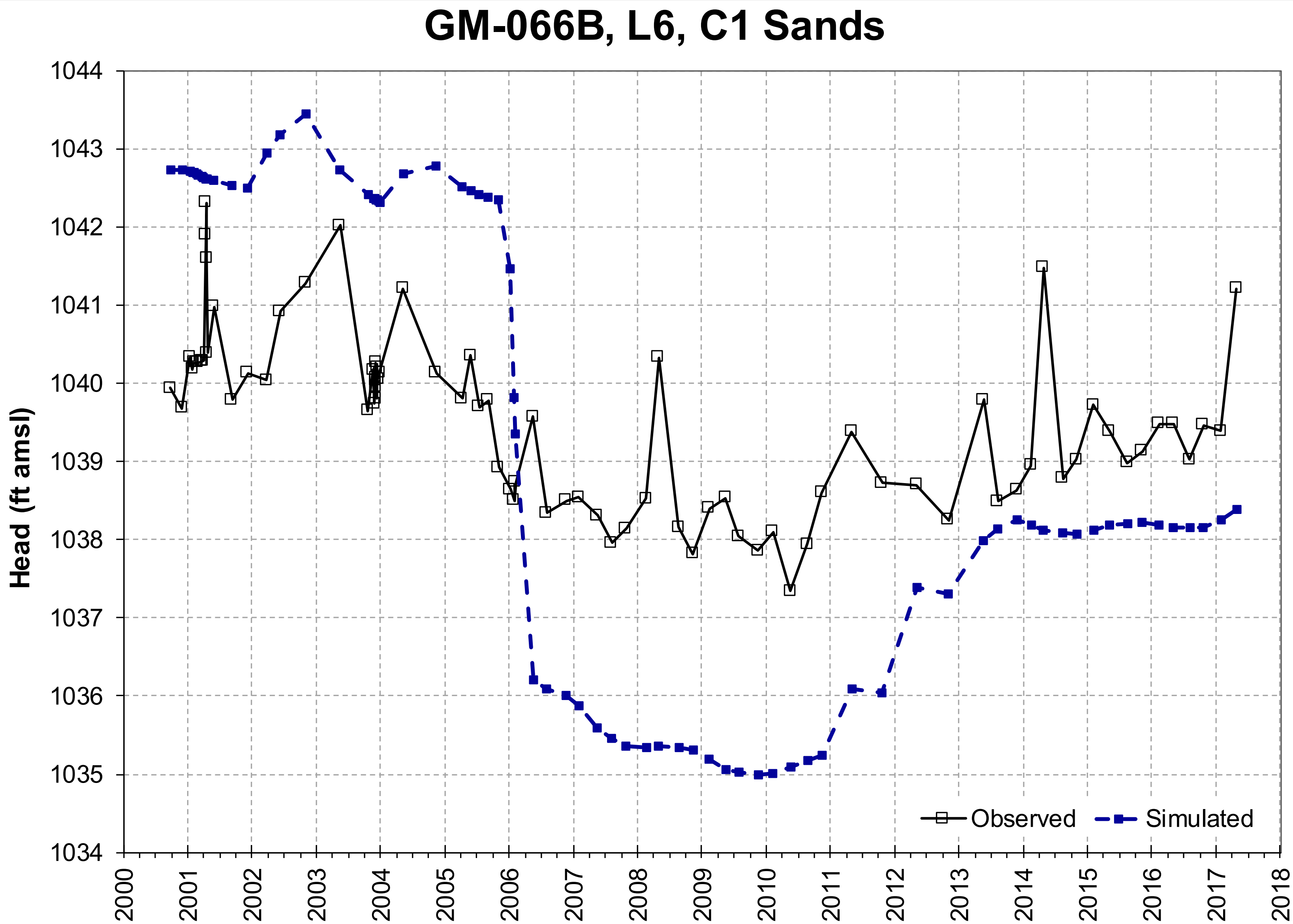


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

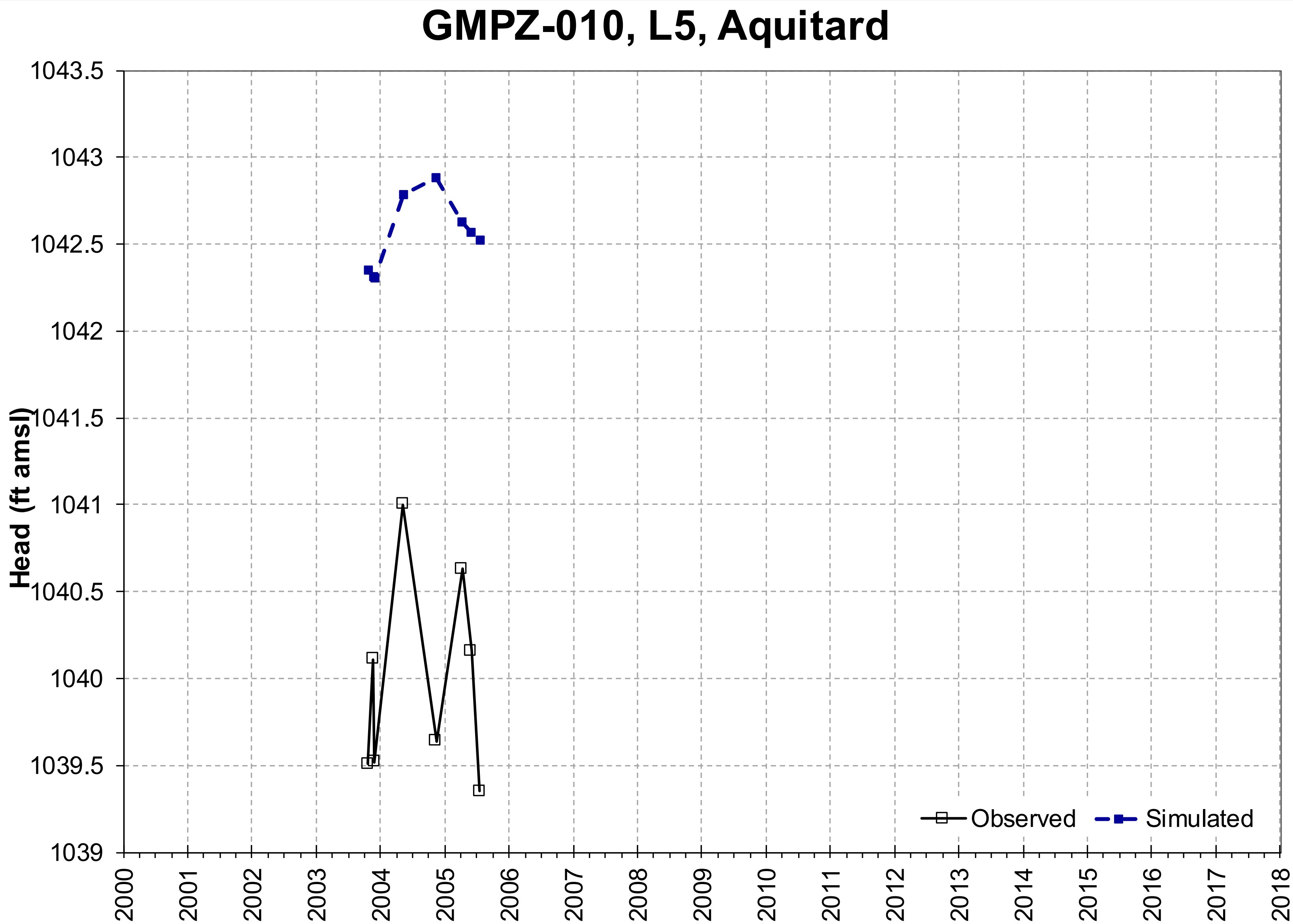


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

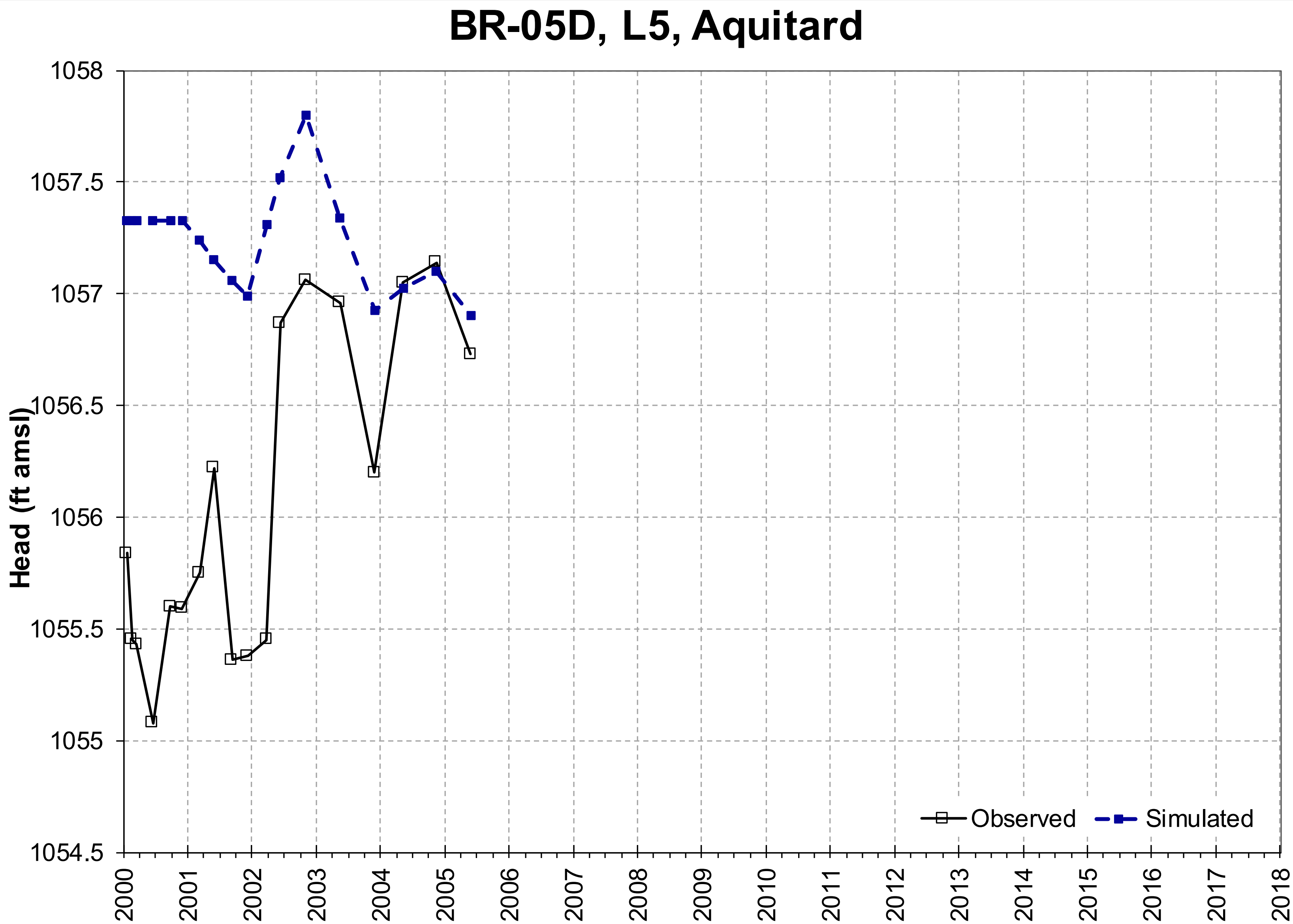


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

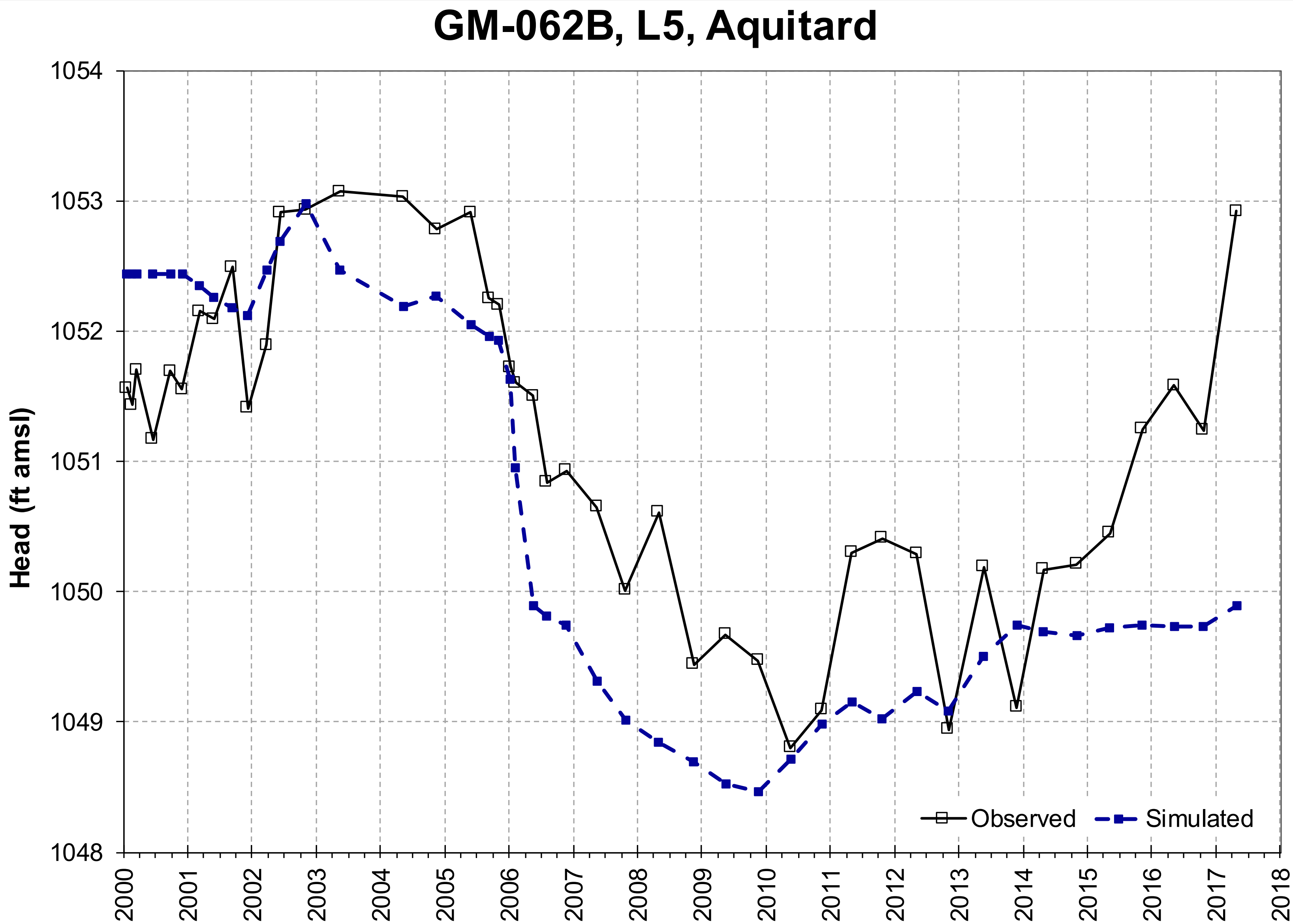


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

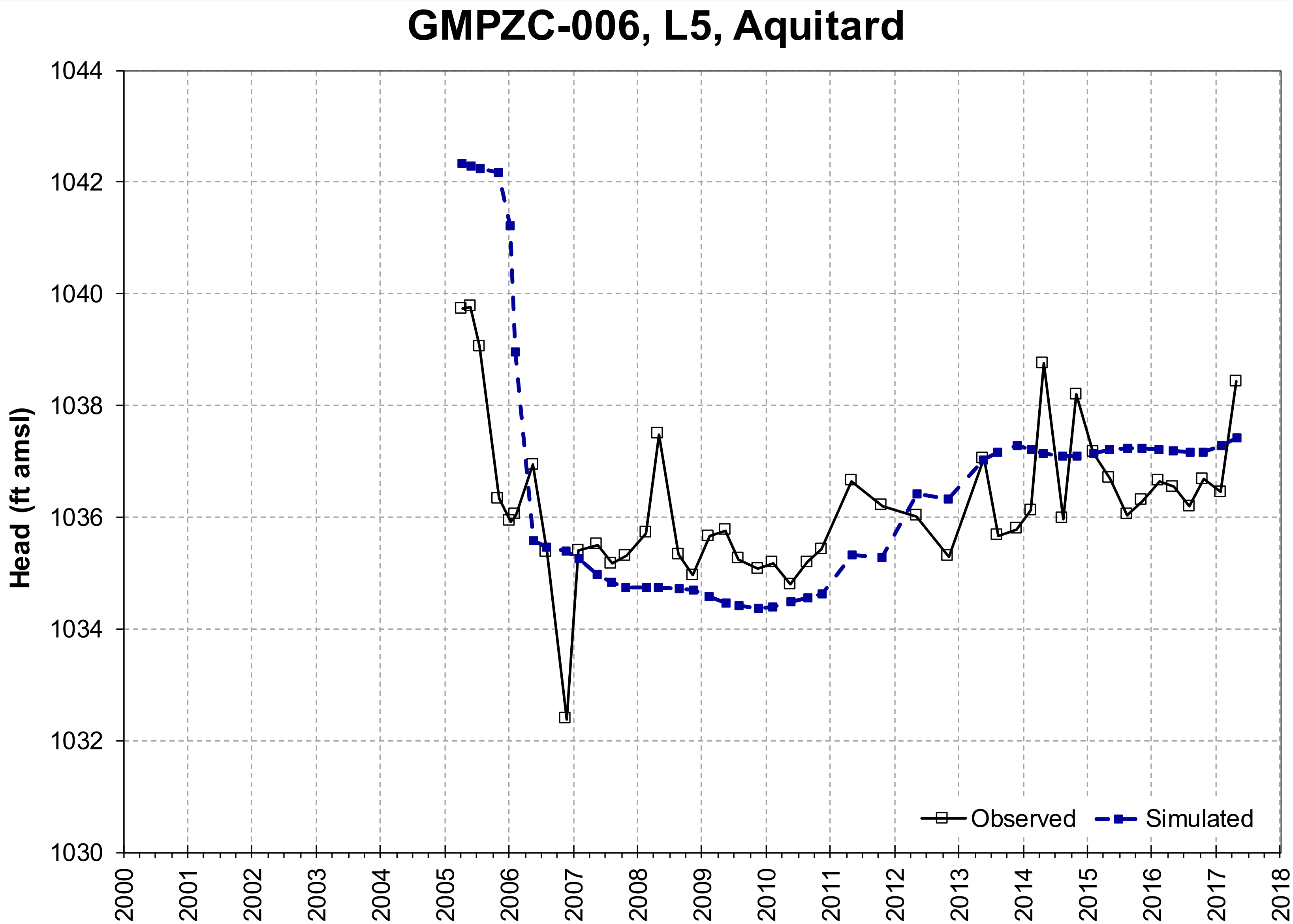


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

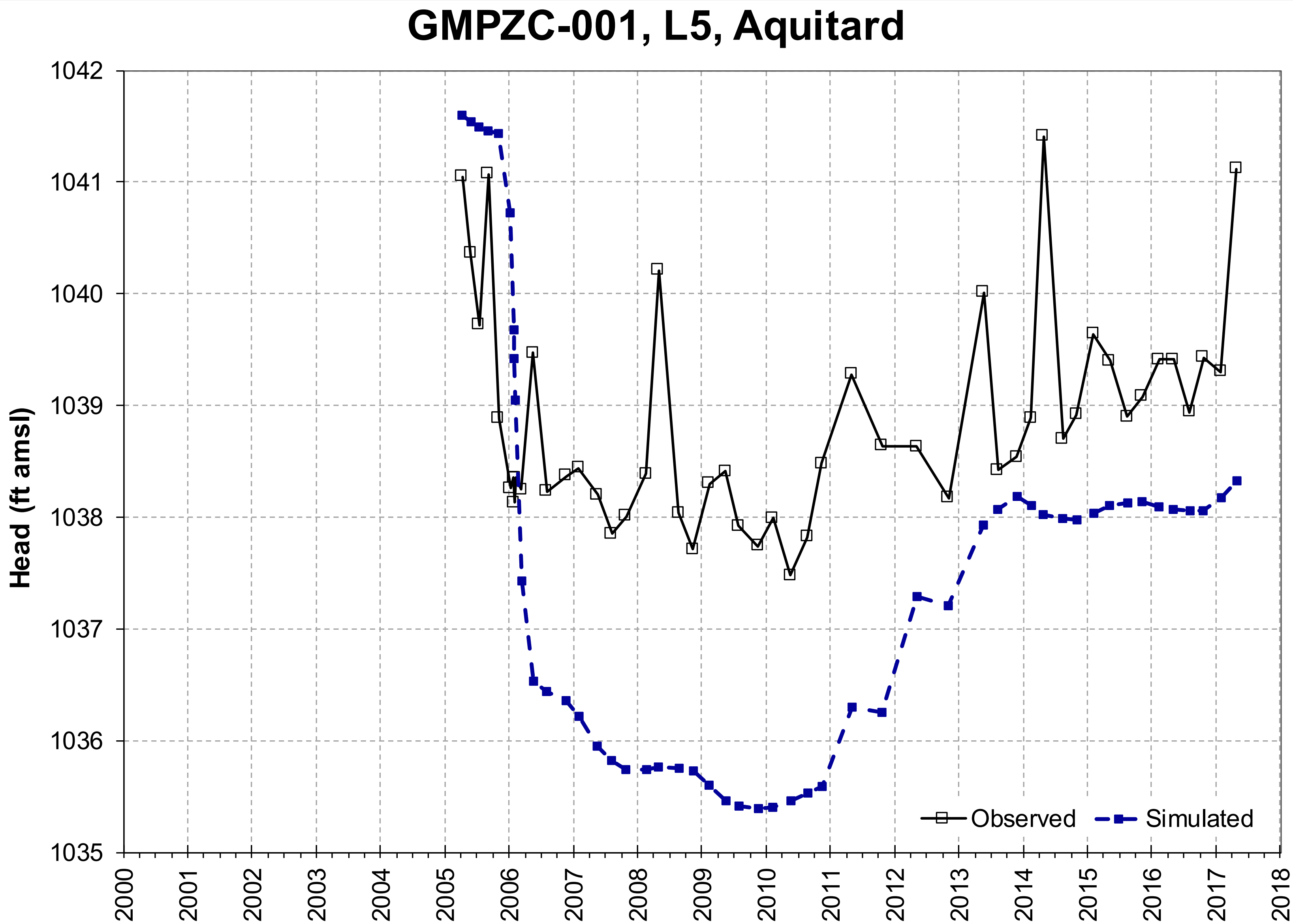


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

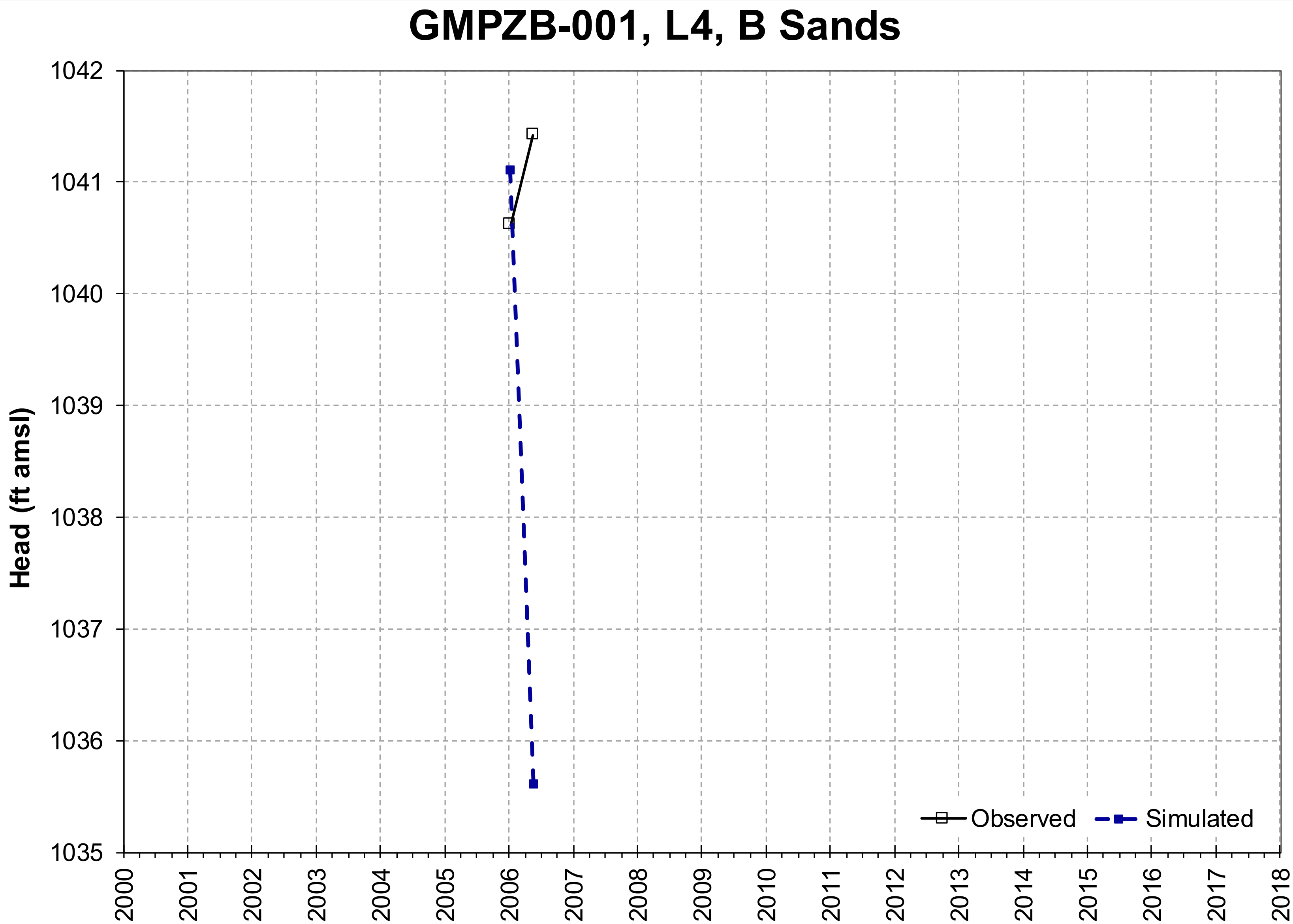


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

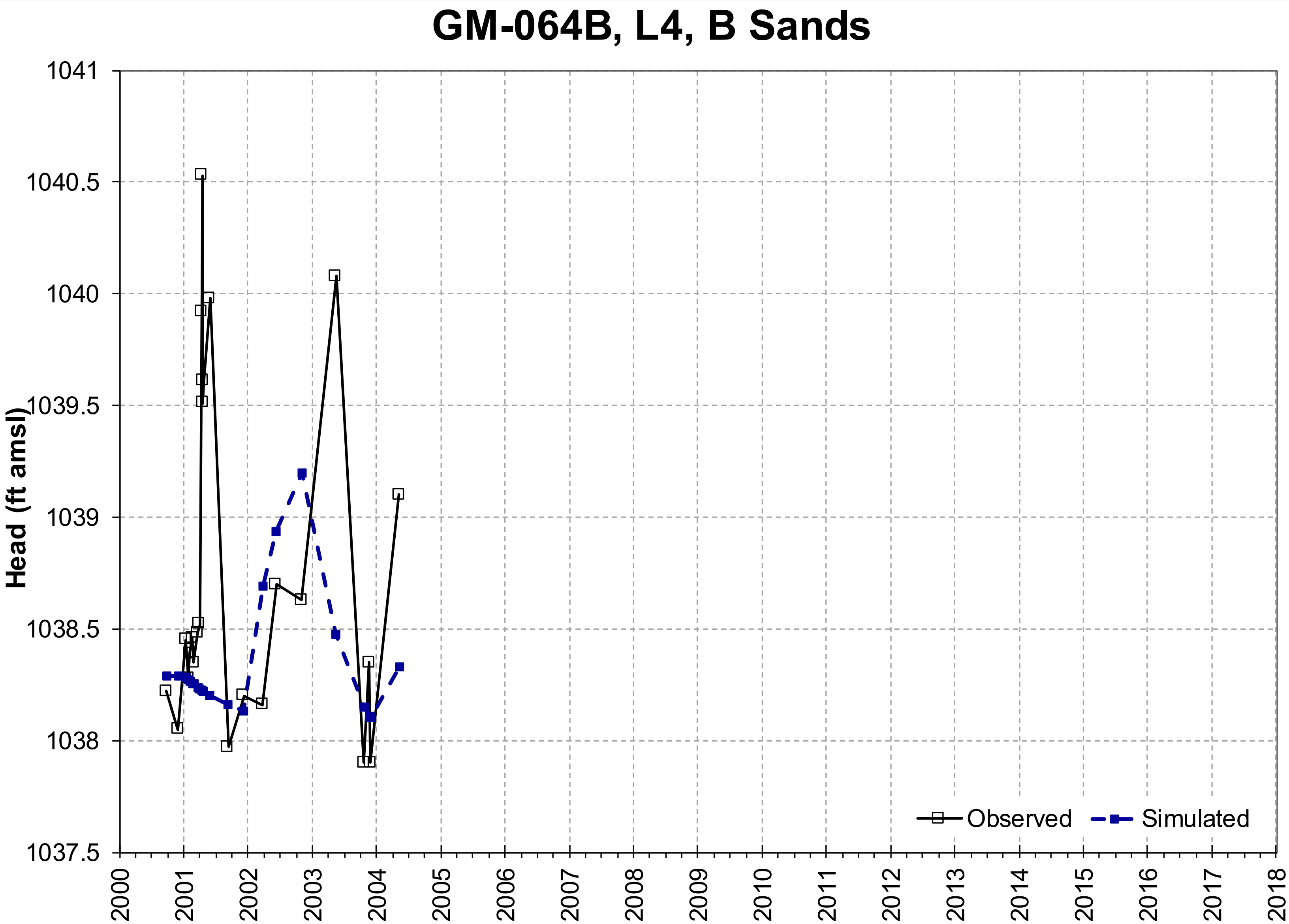


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

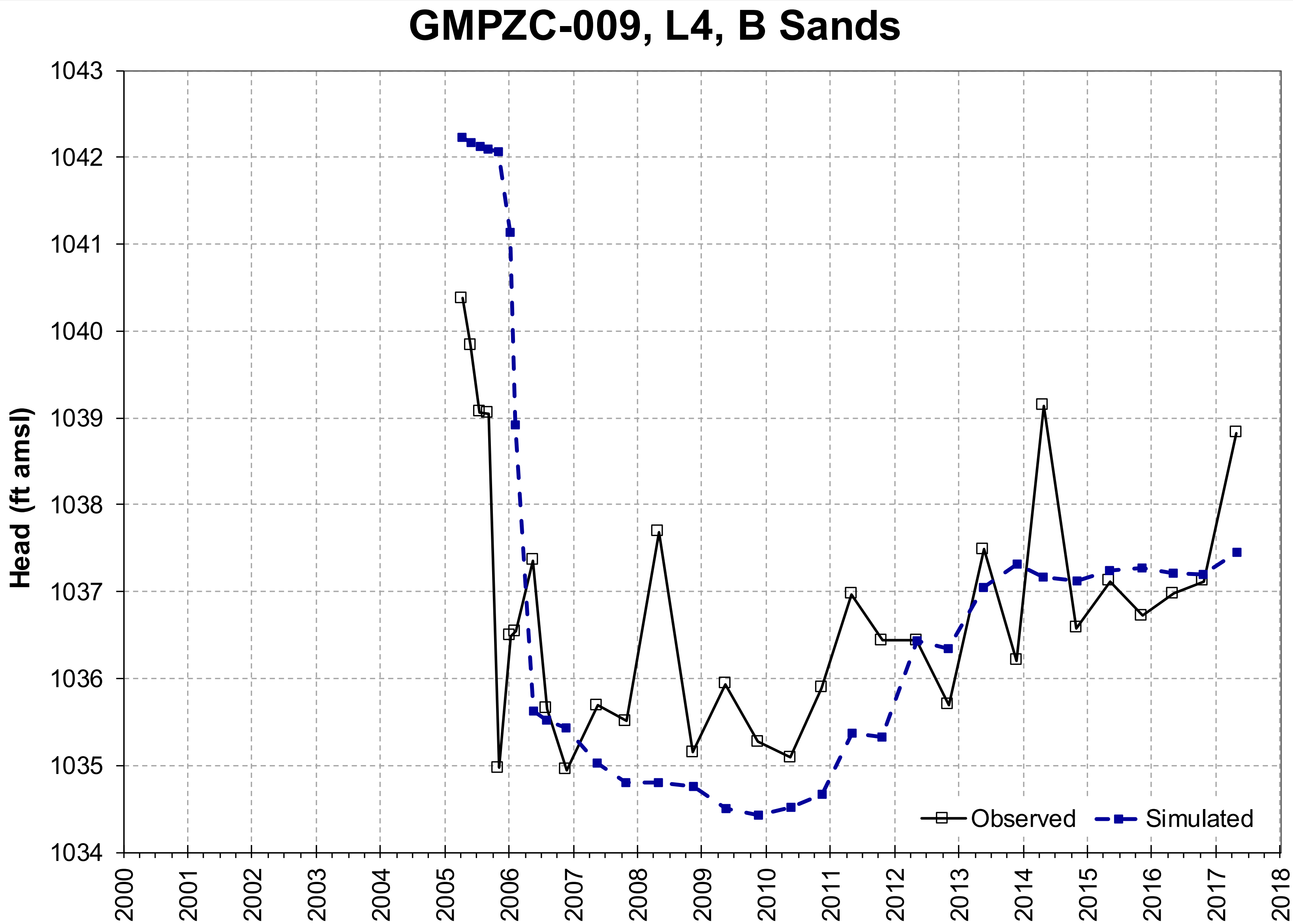


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

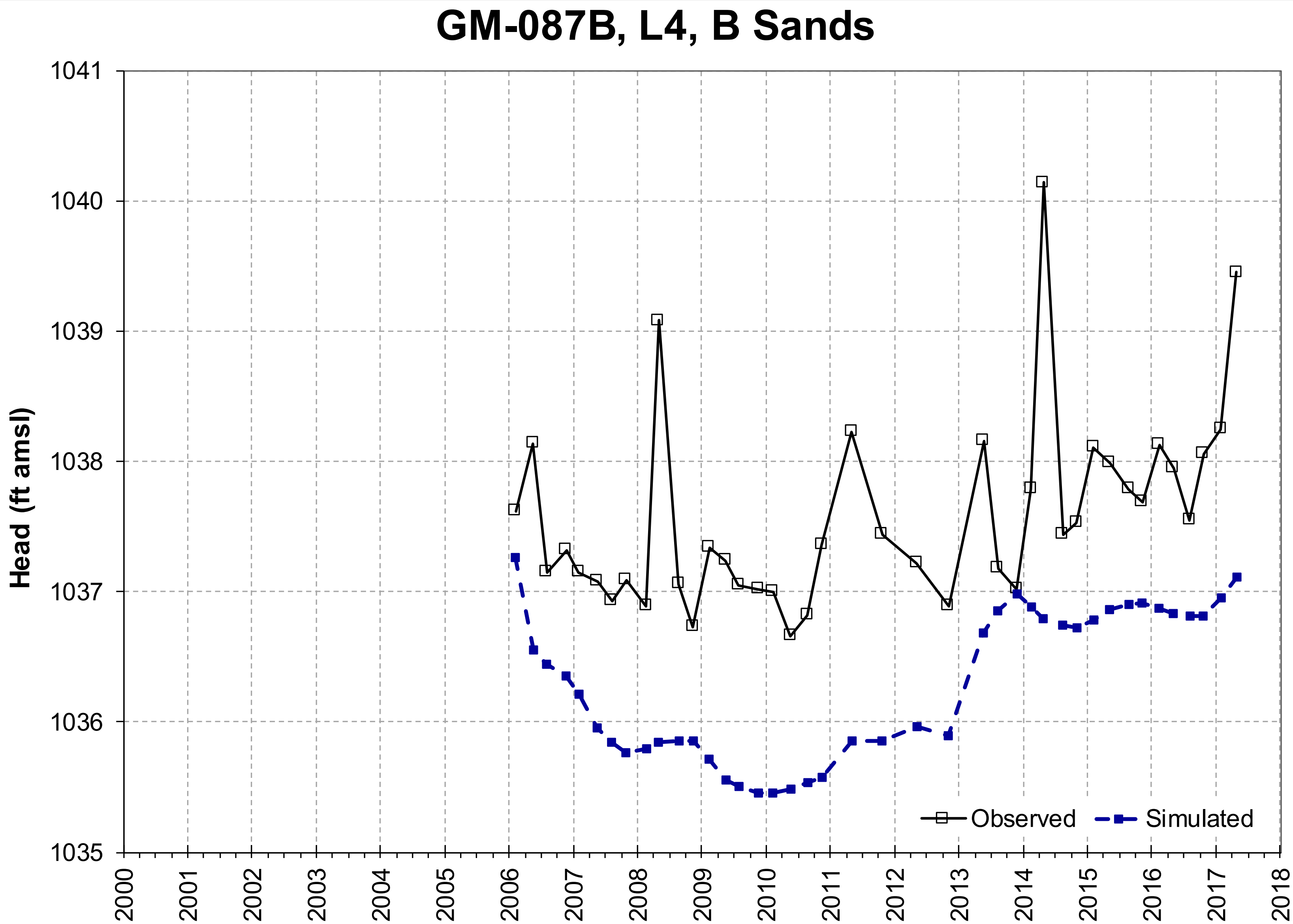


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

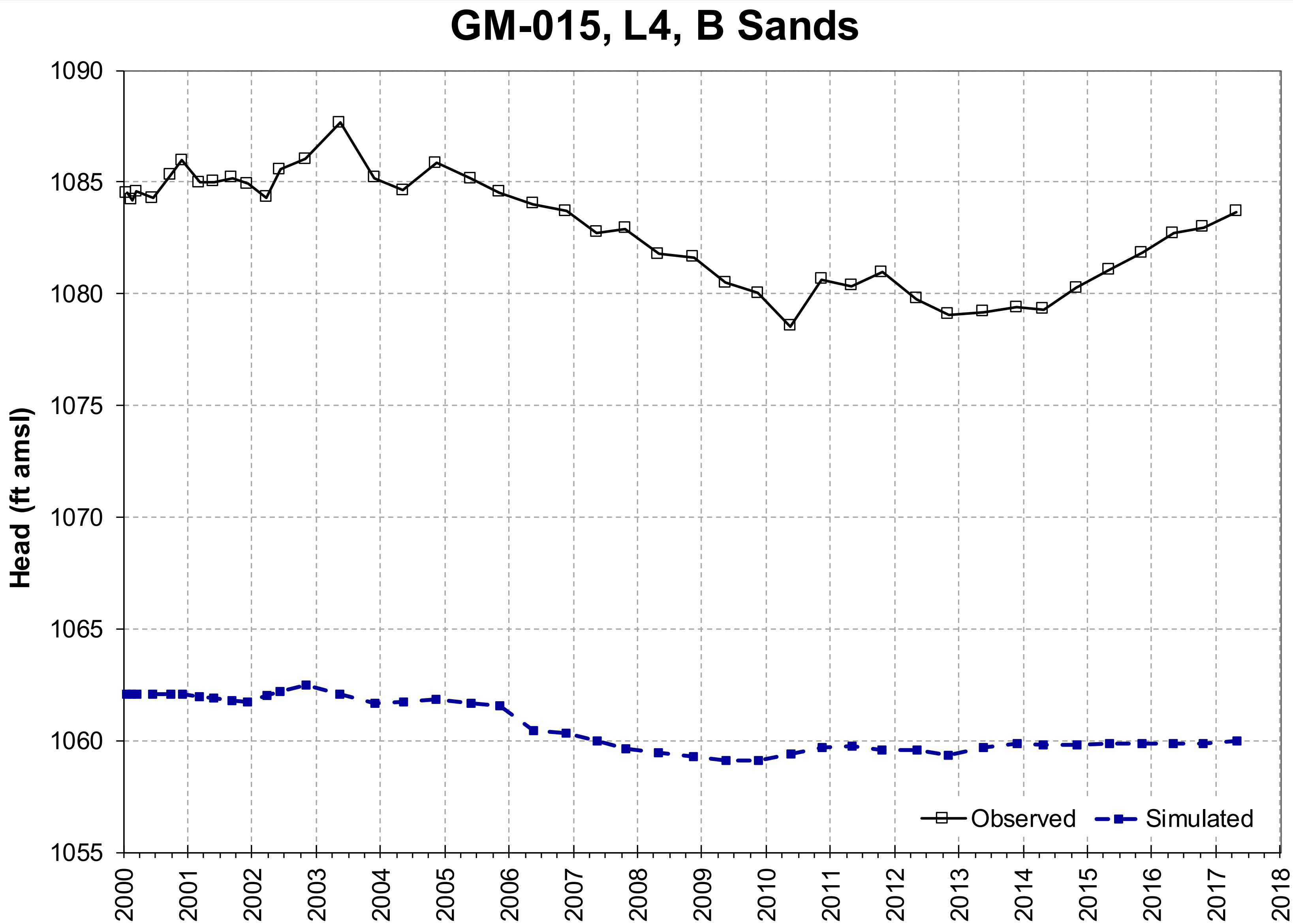


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

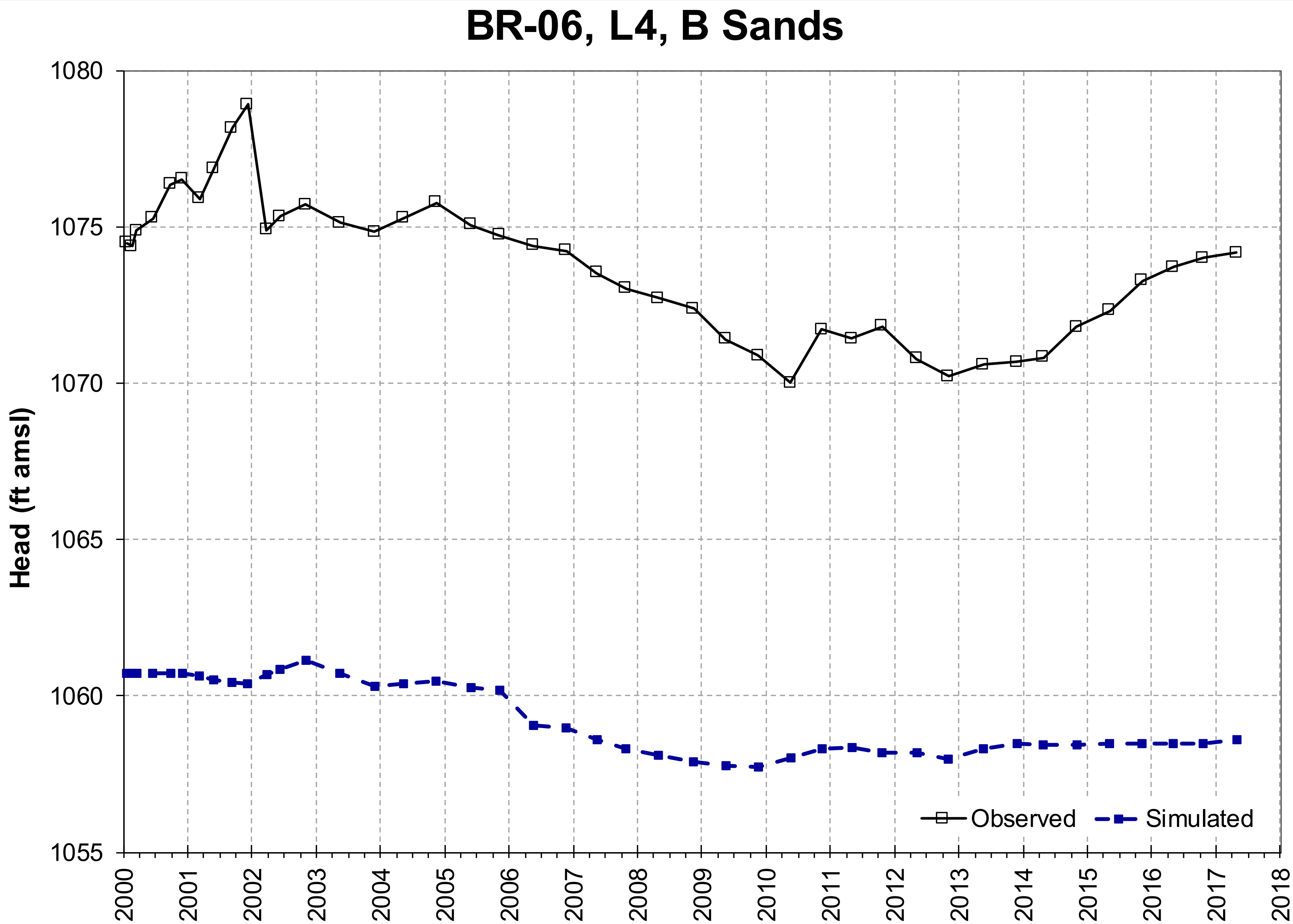


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

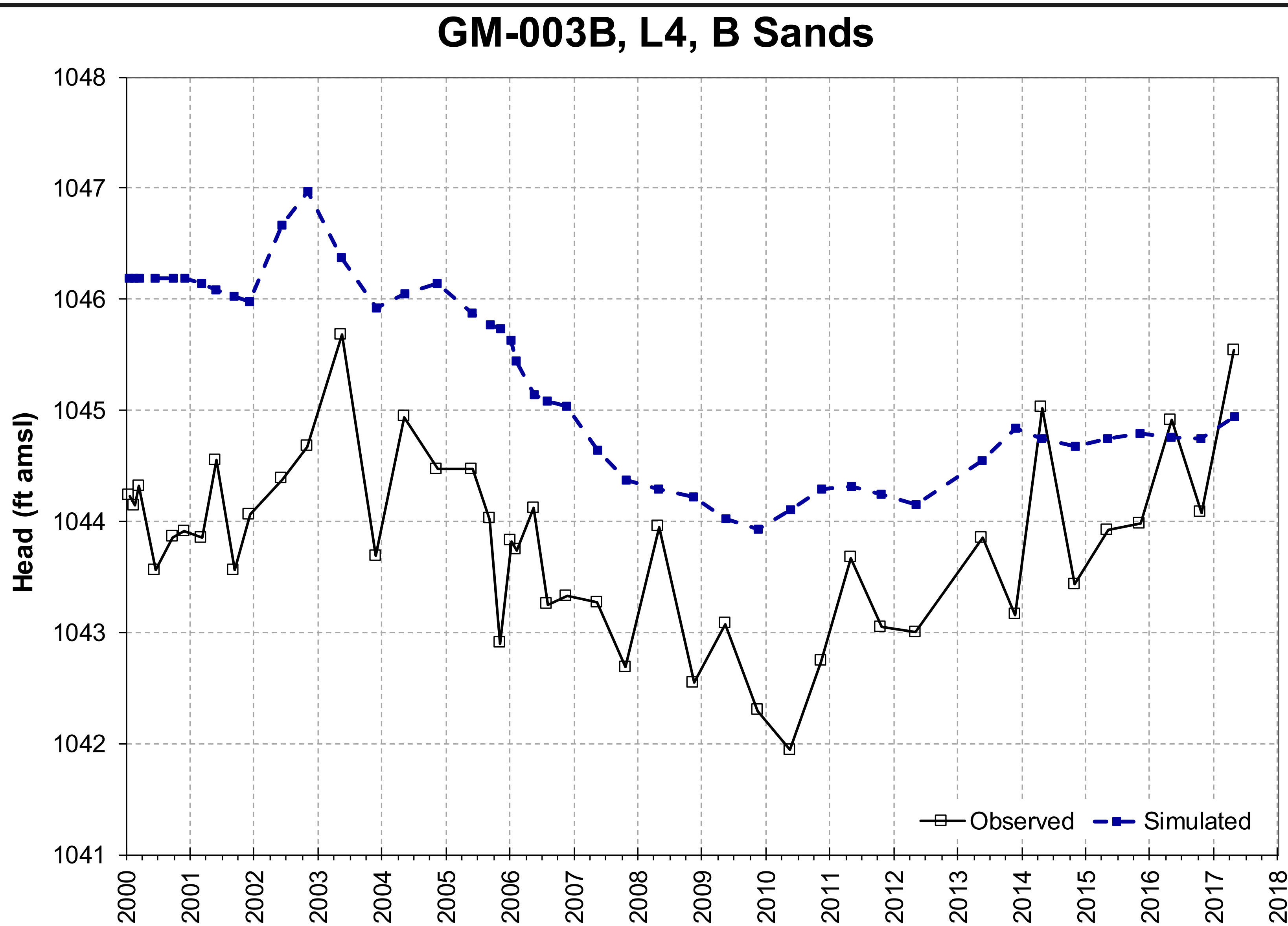


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

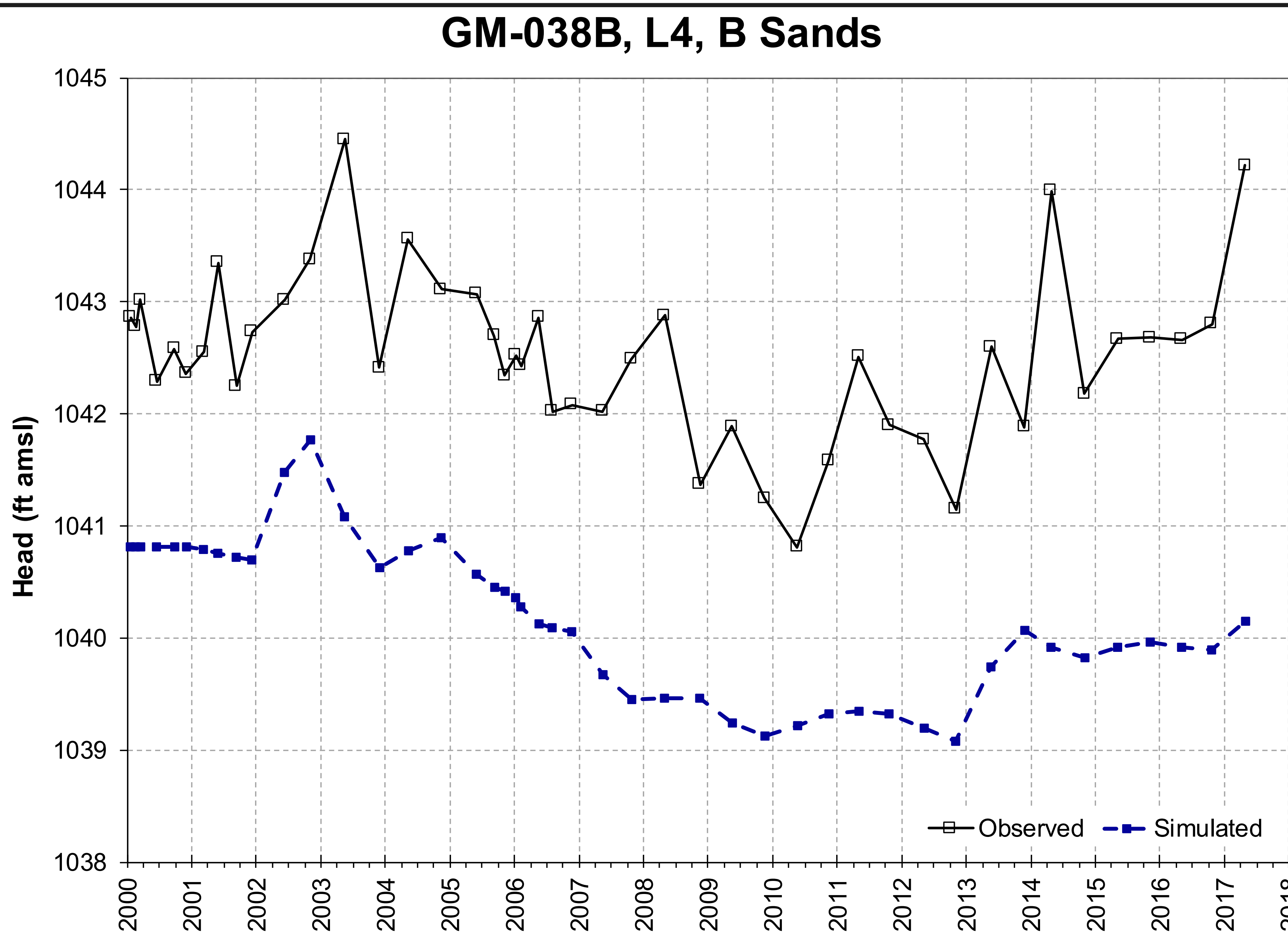


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

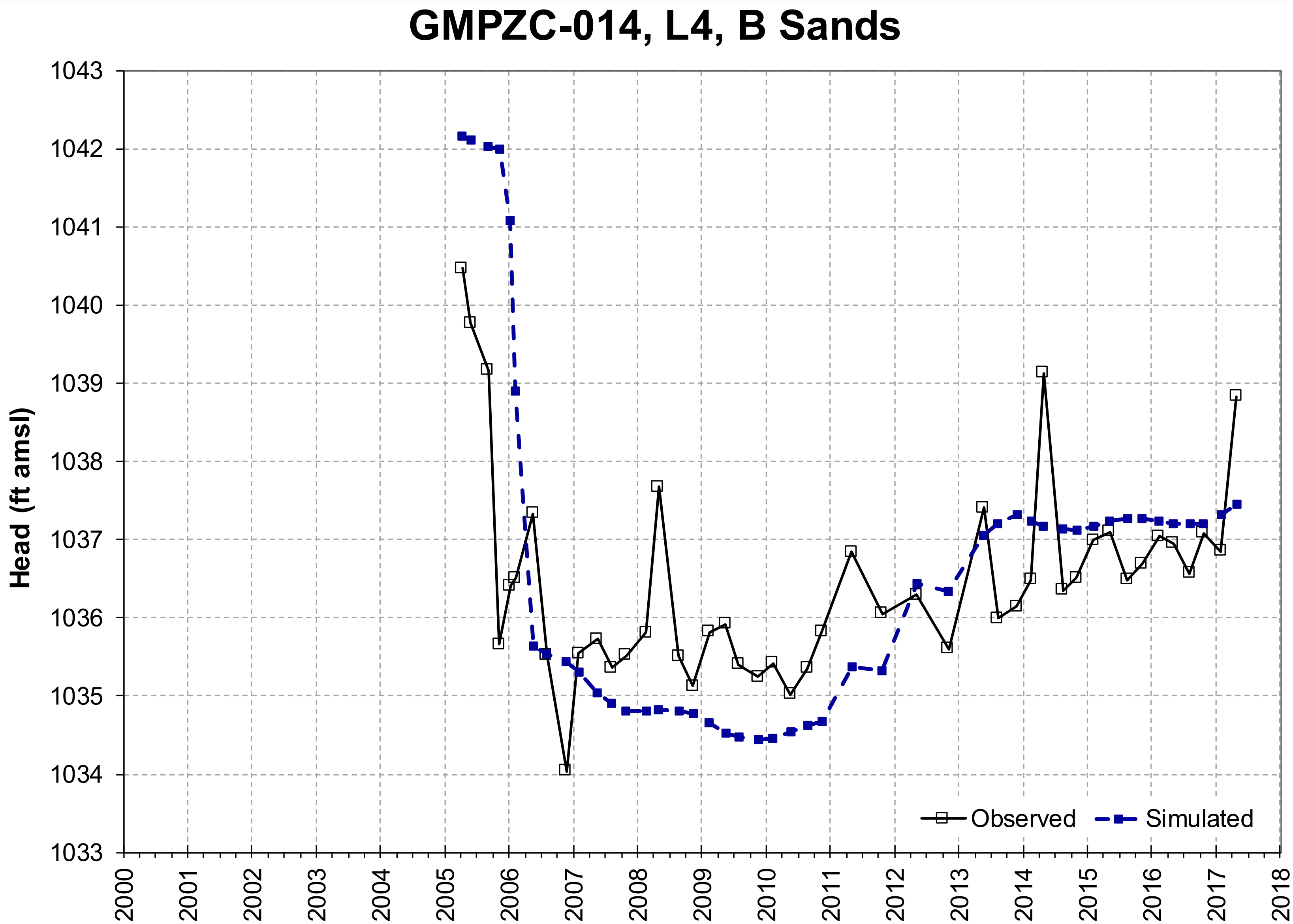


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

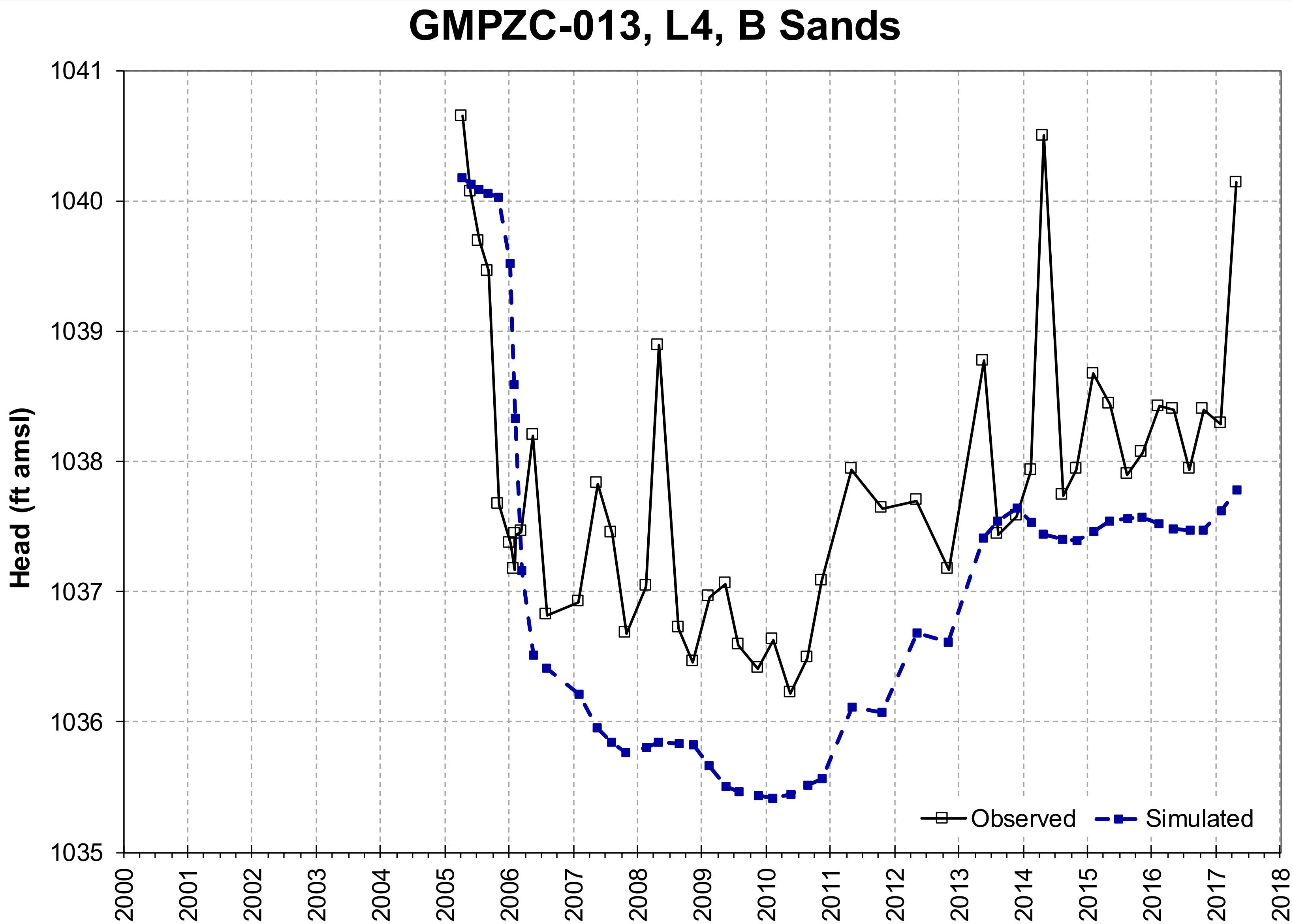


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

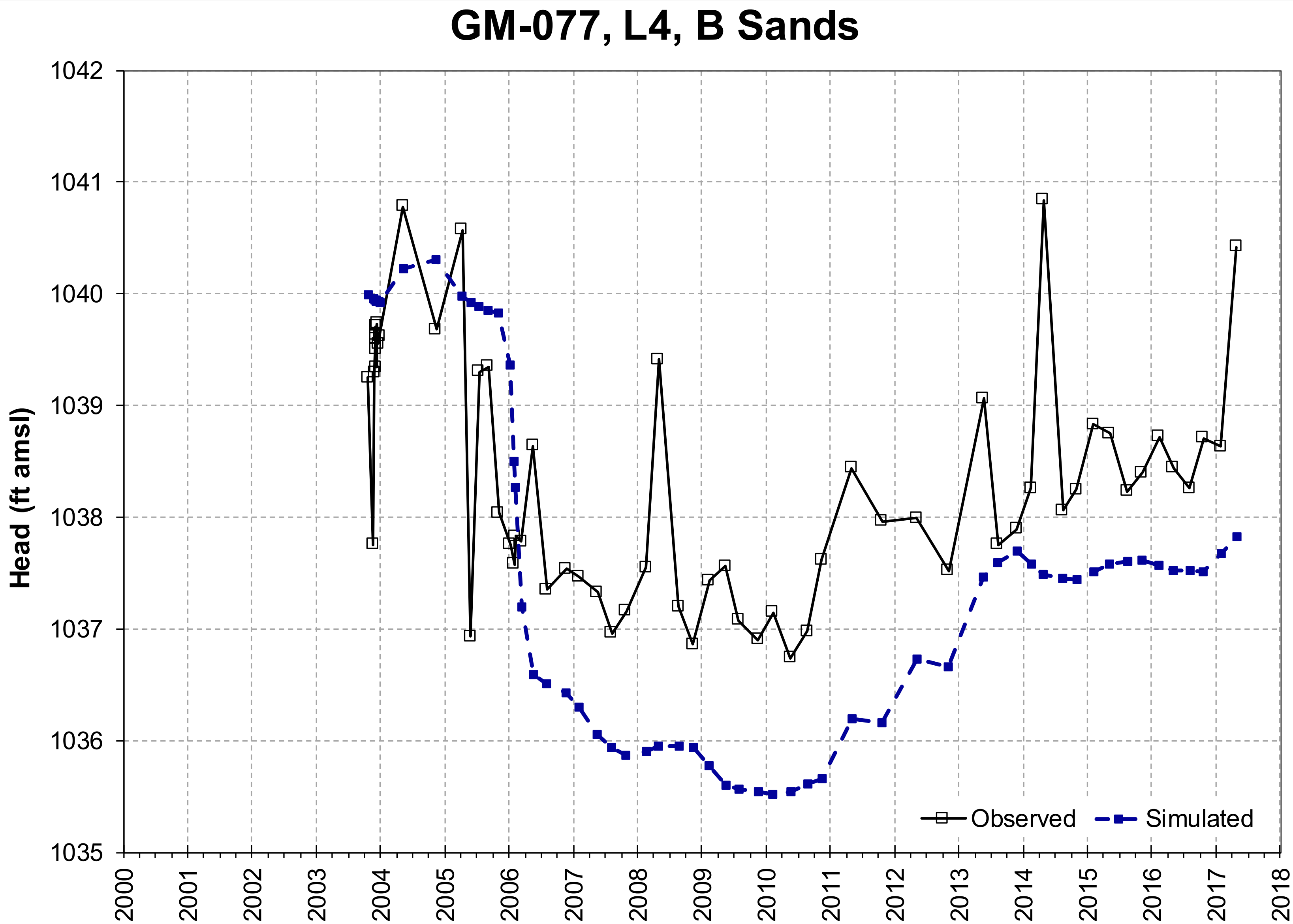


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

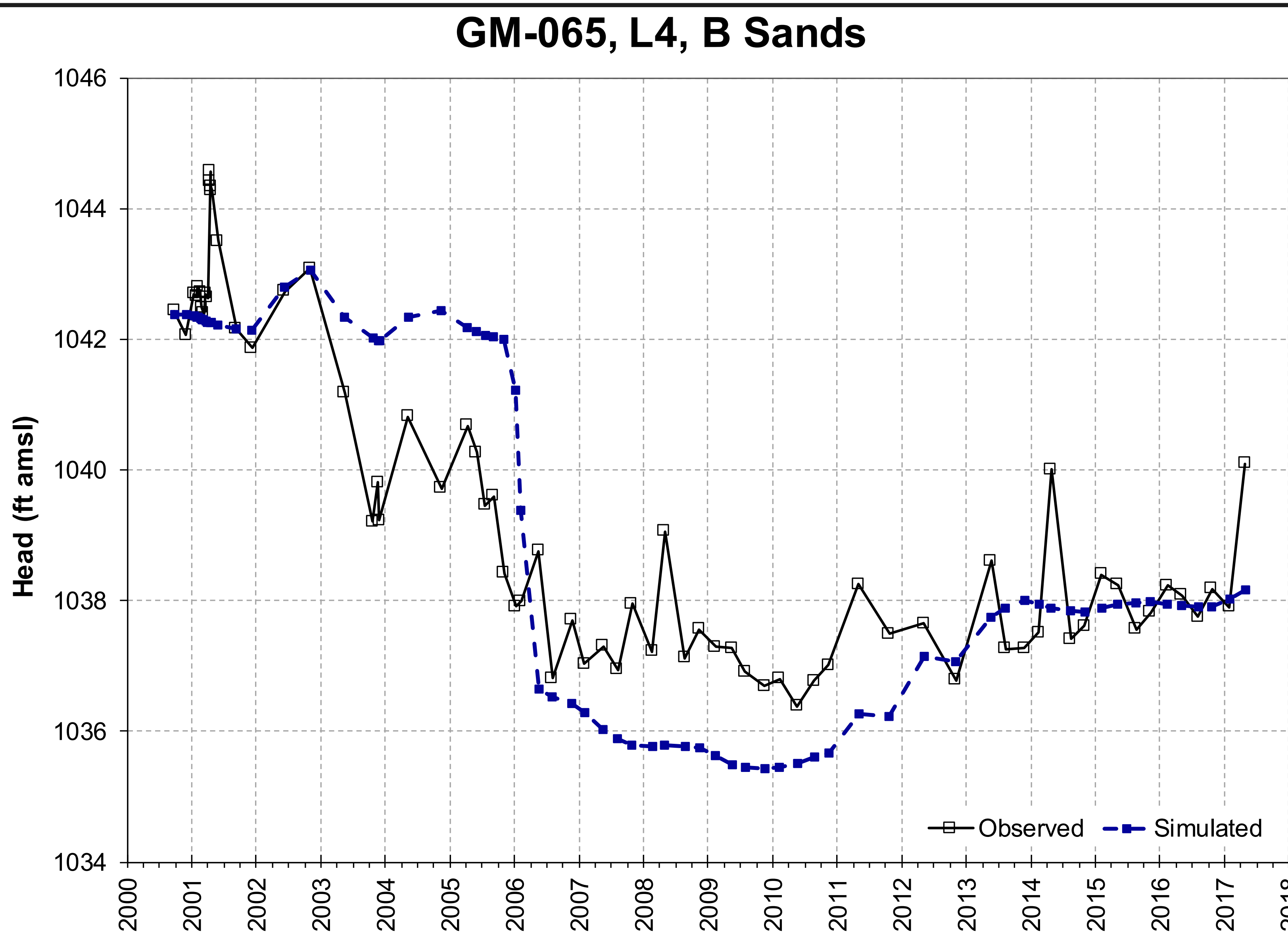


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

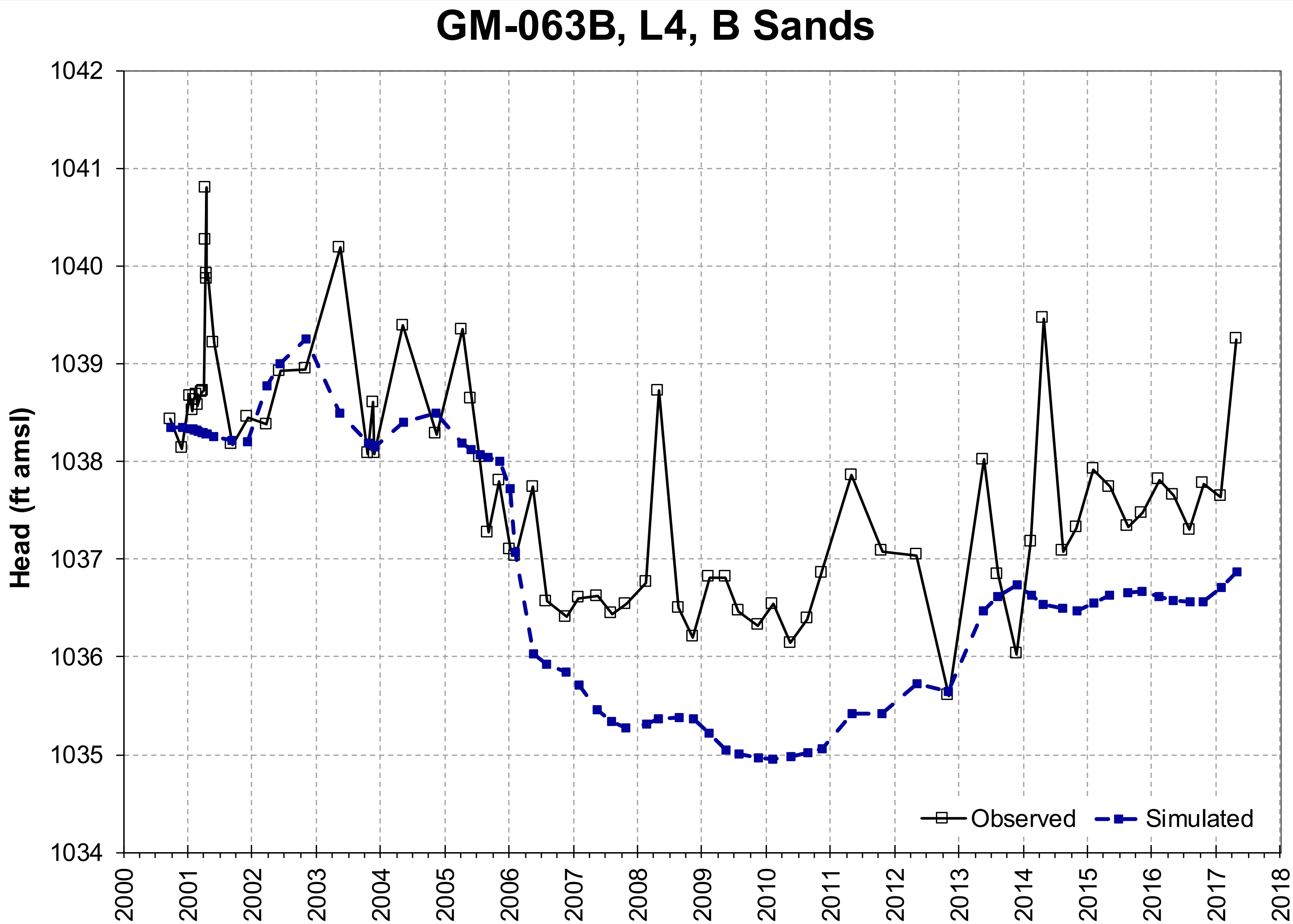


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



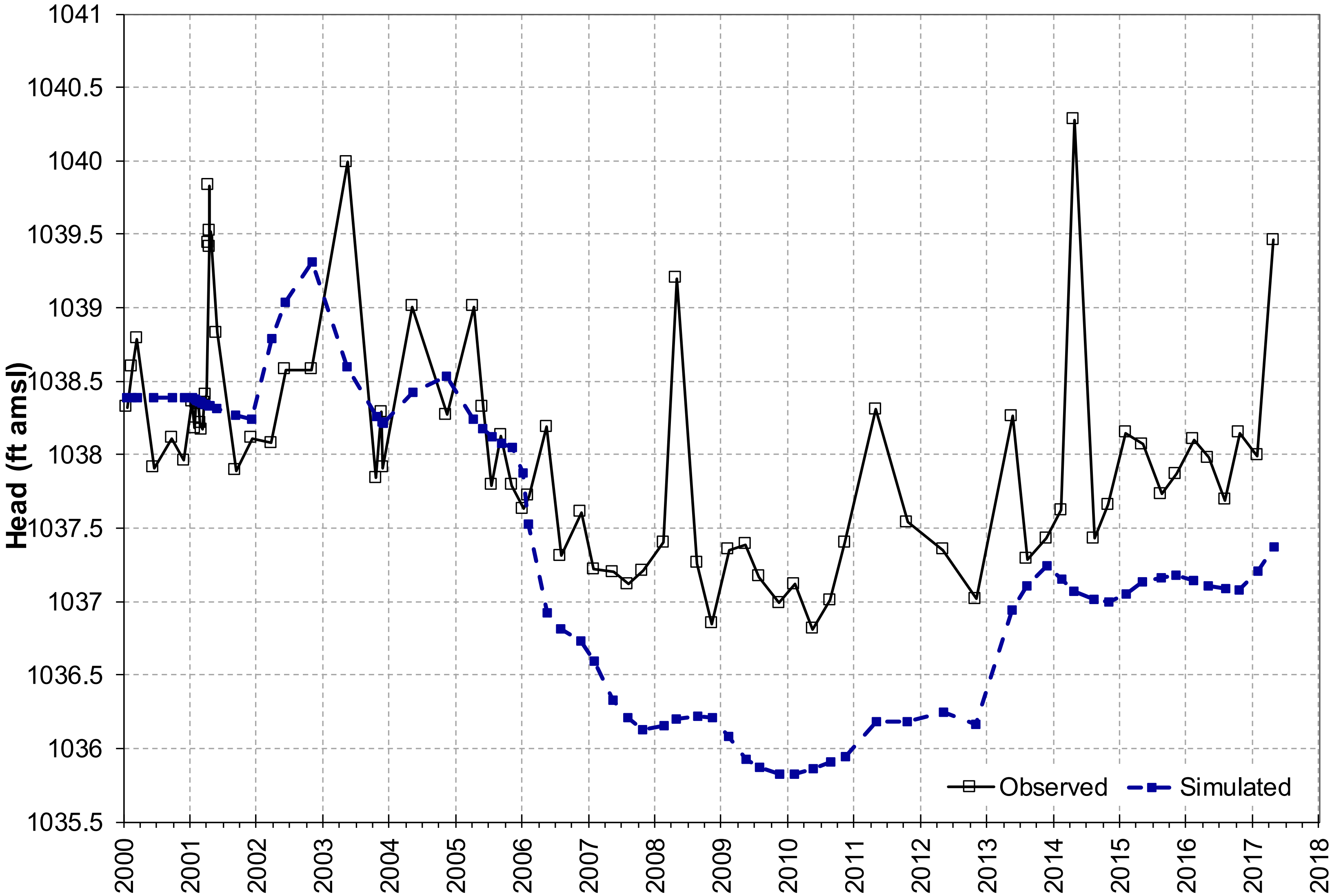
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-028B, L4, B Sands

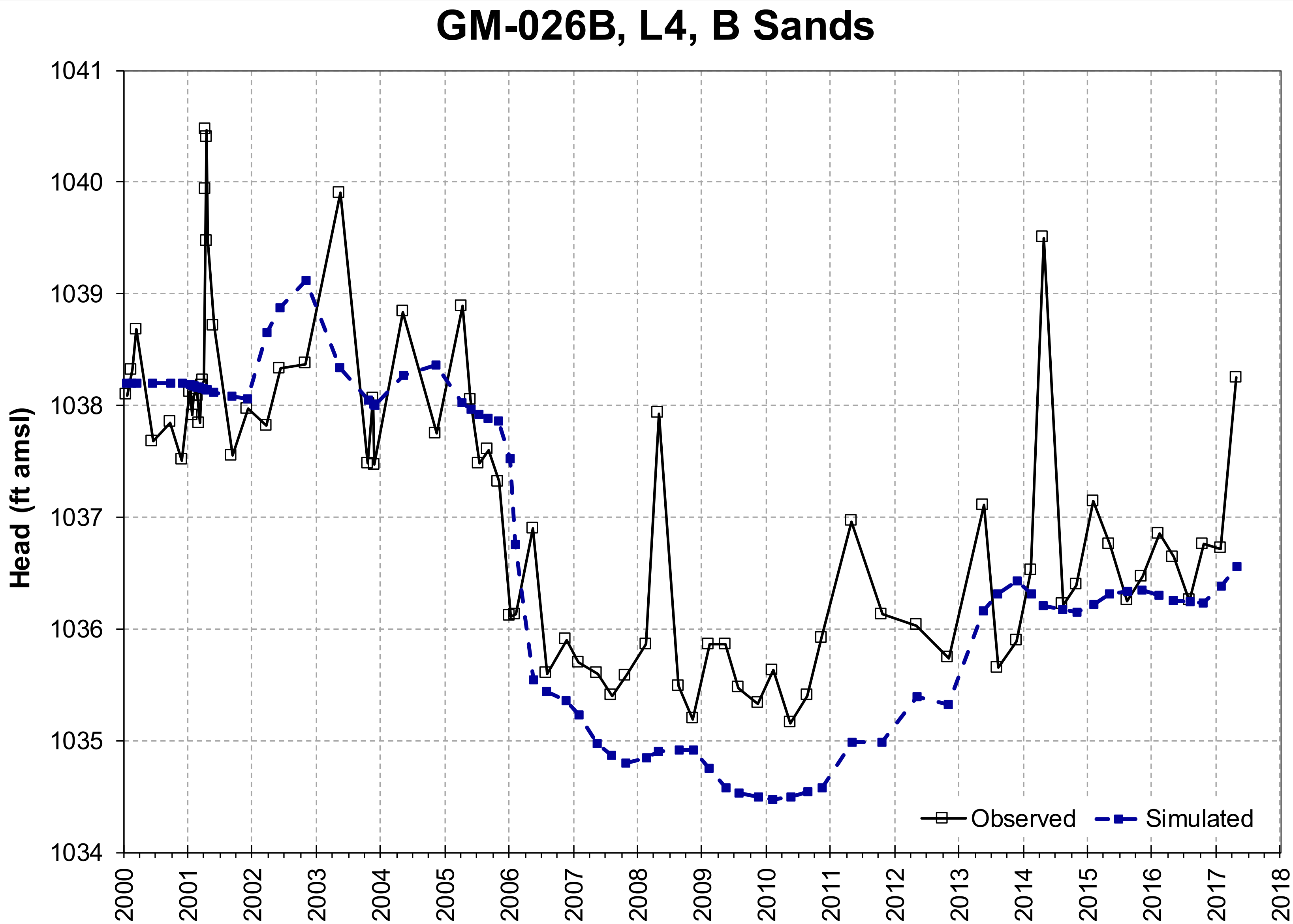


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

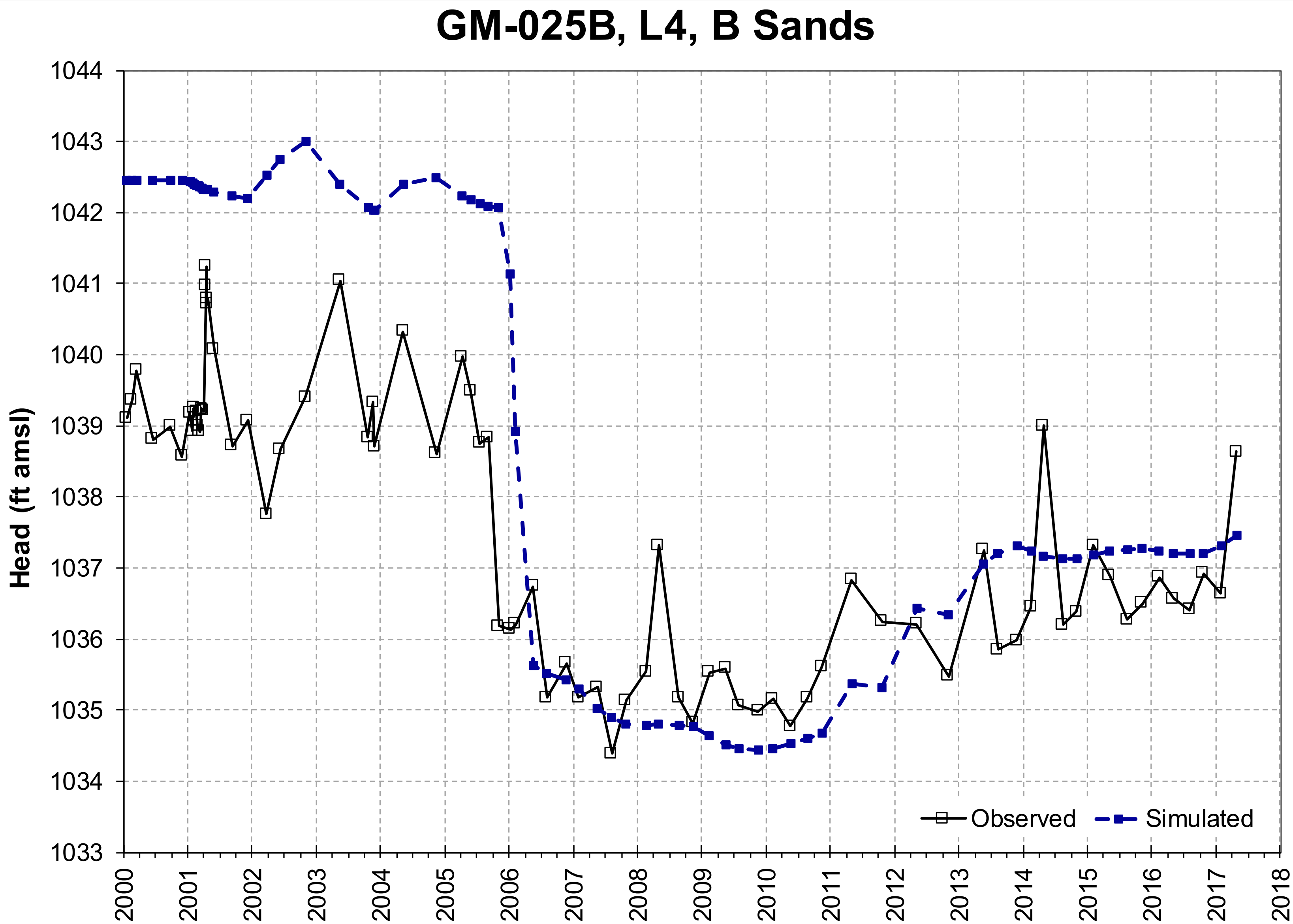


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

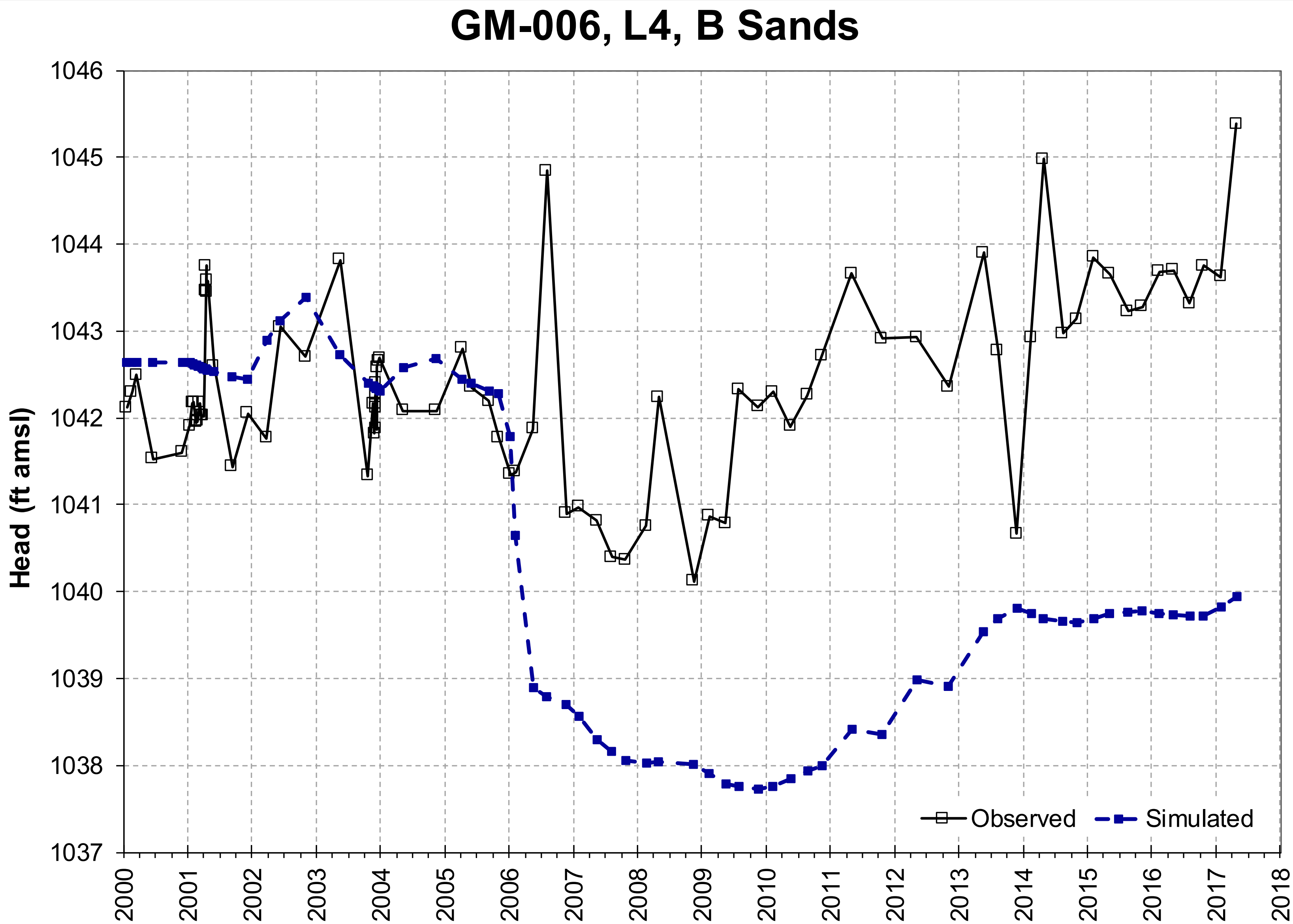


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

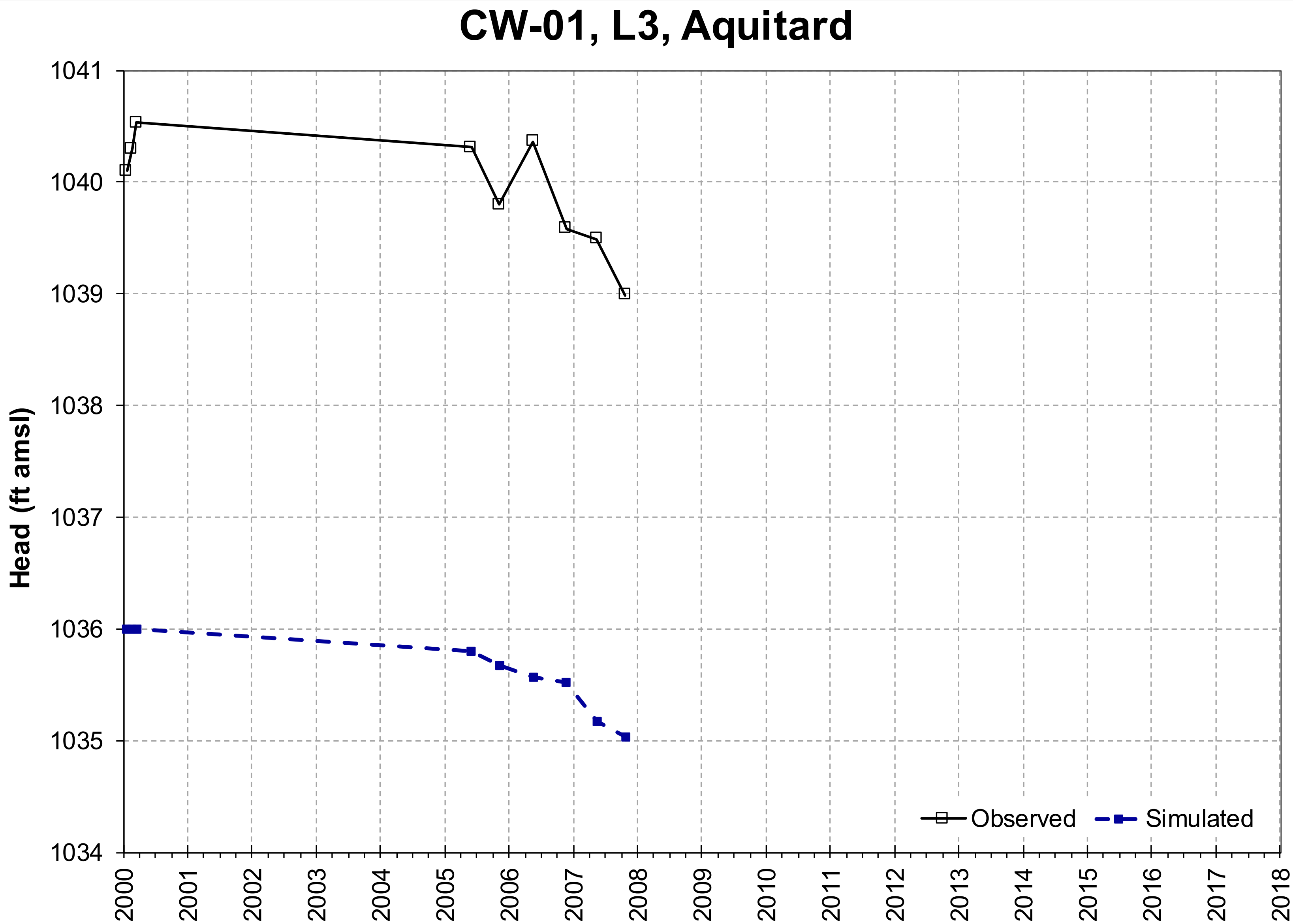


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



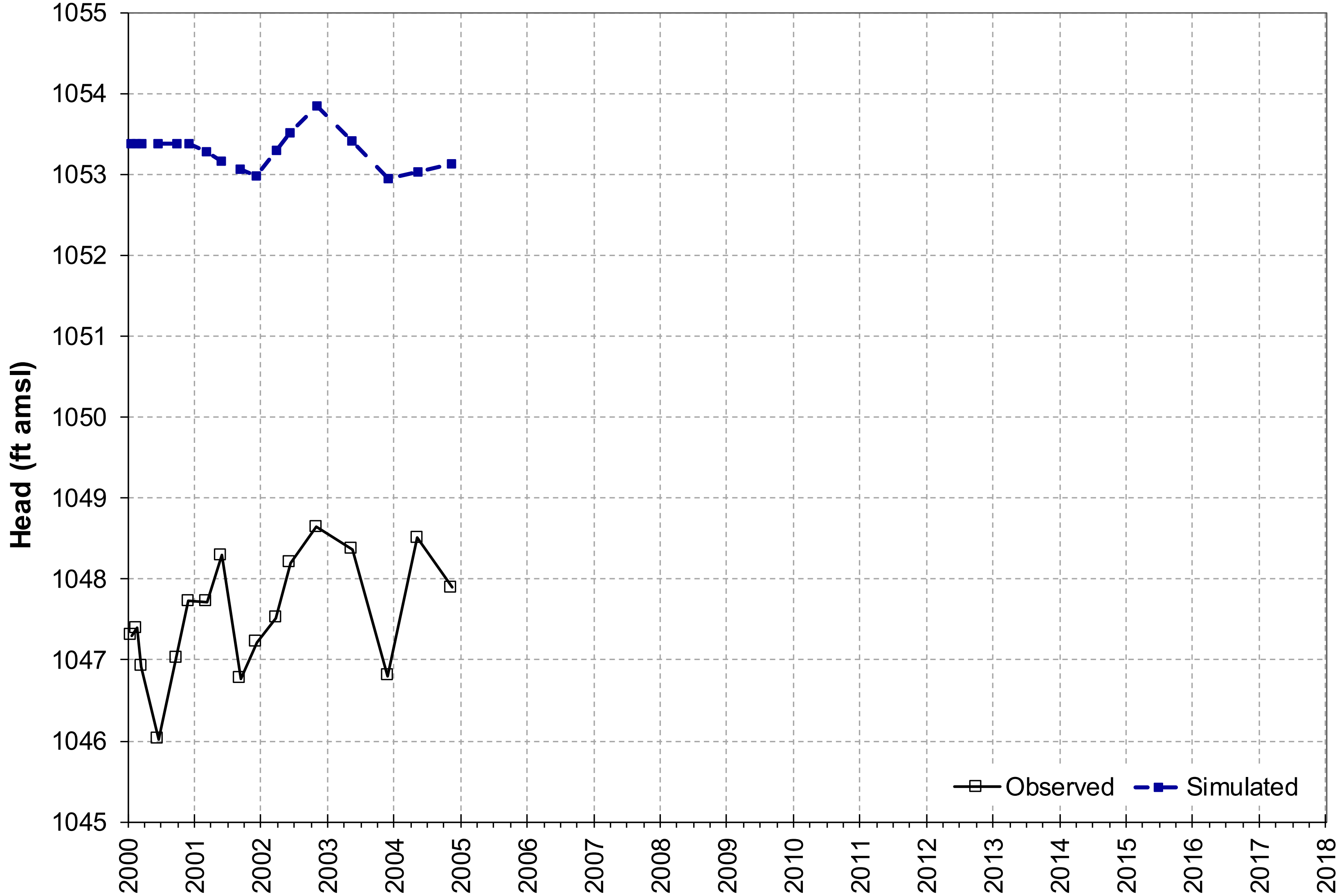
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-037A, L3, Aquitard

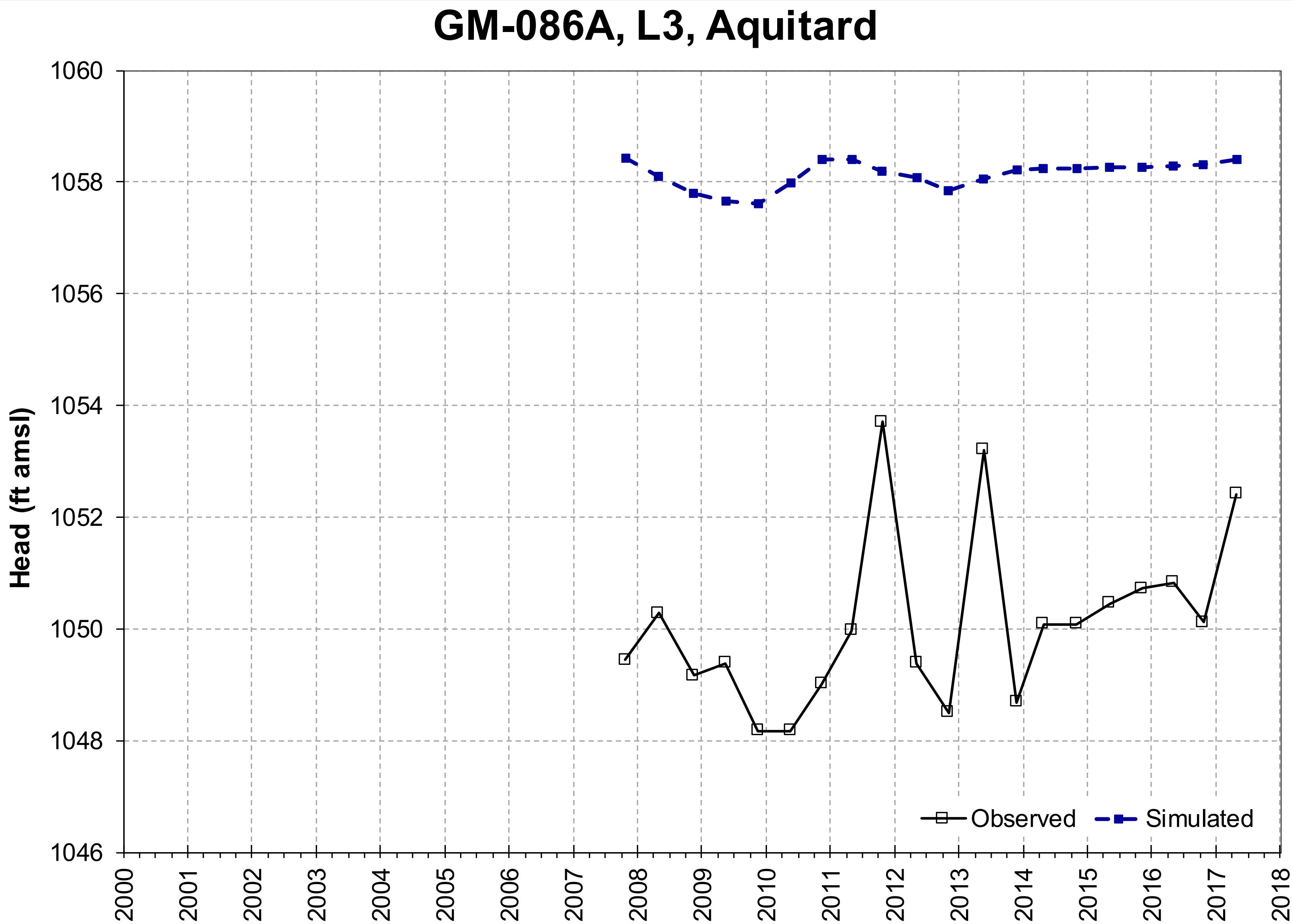


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

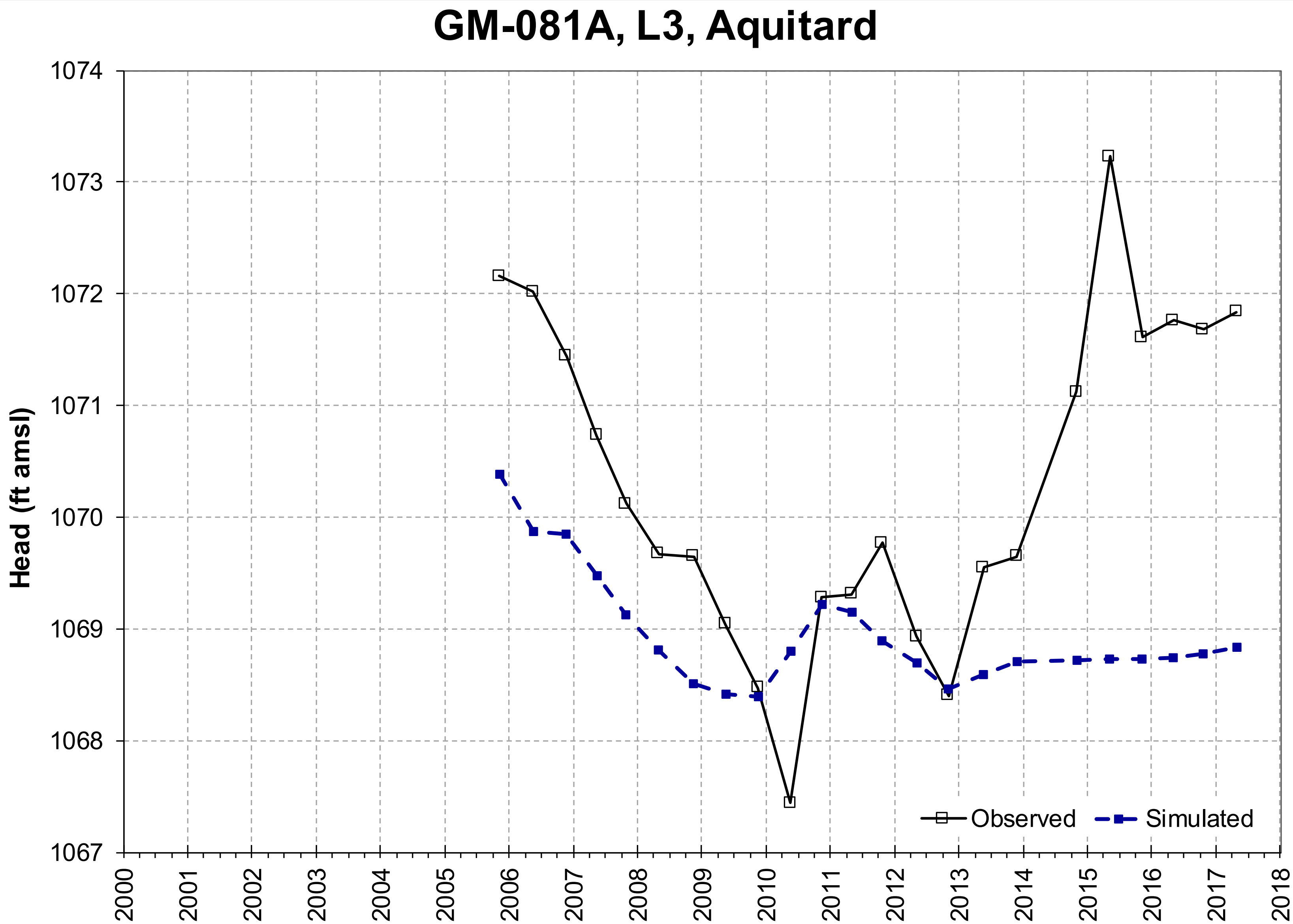


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

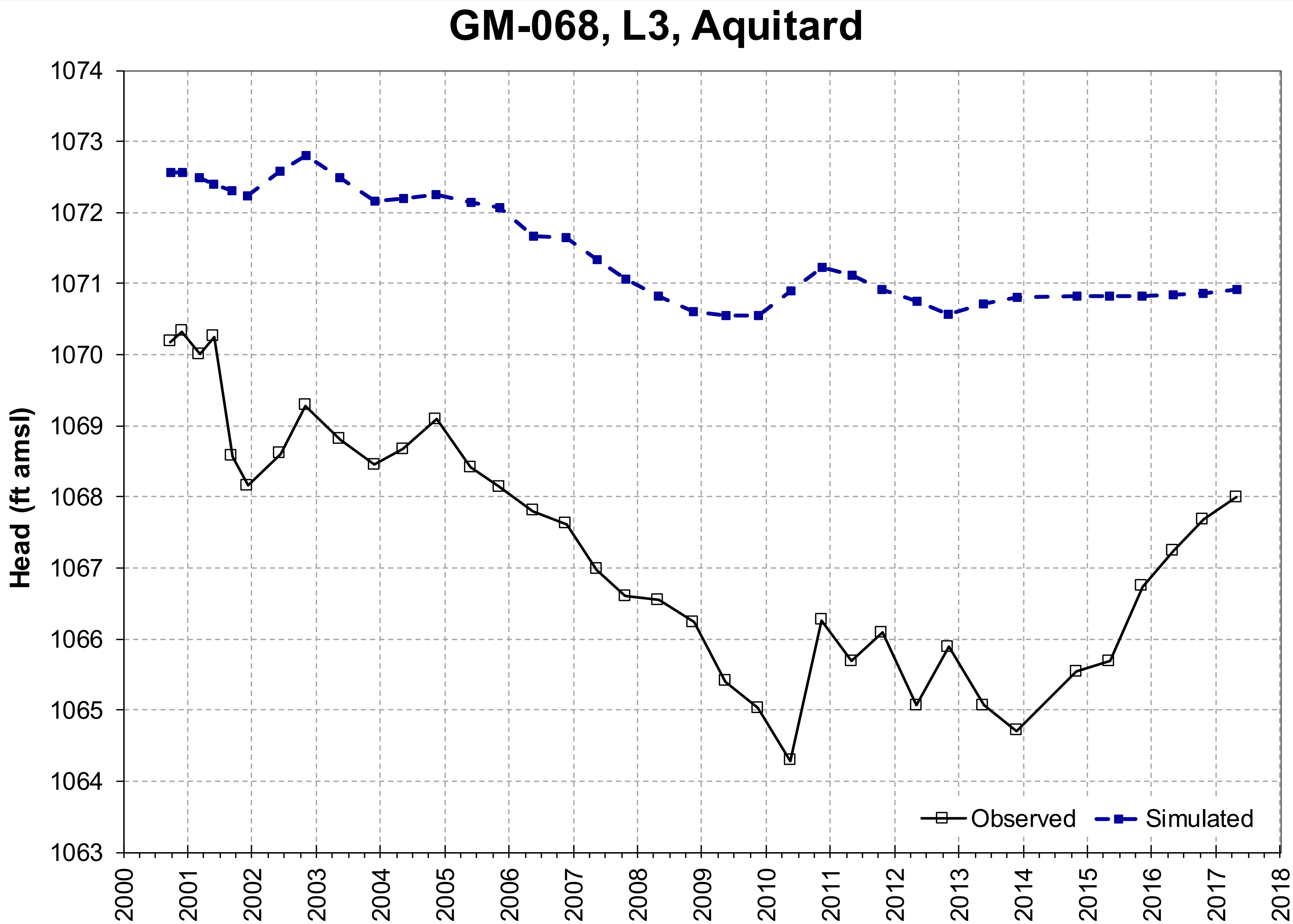


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

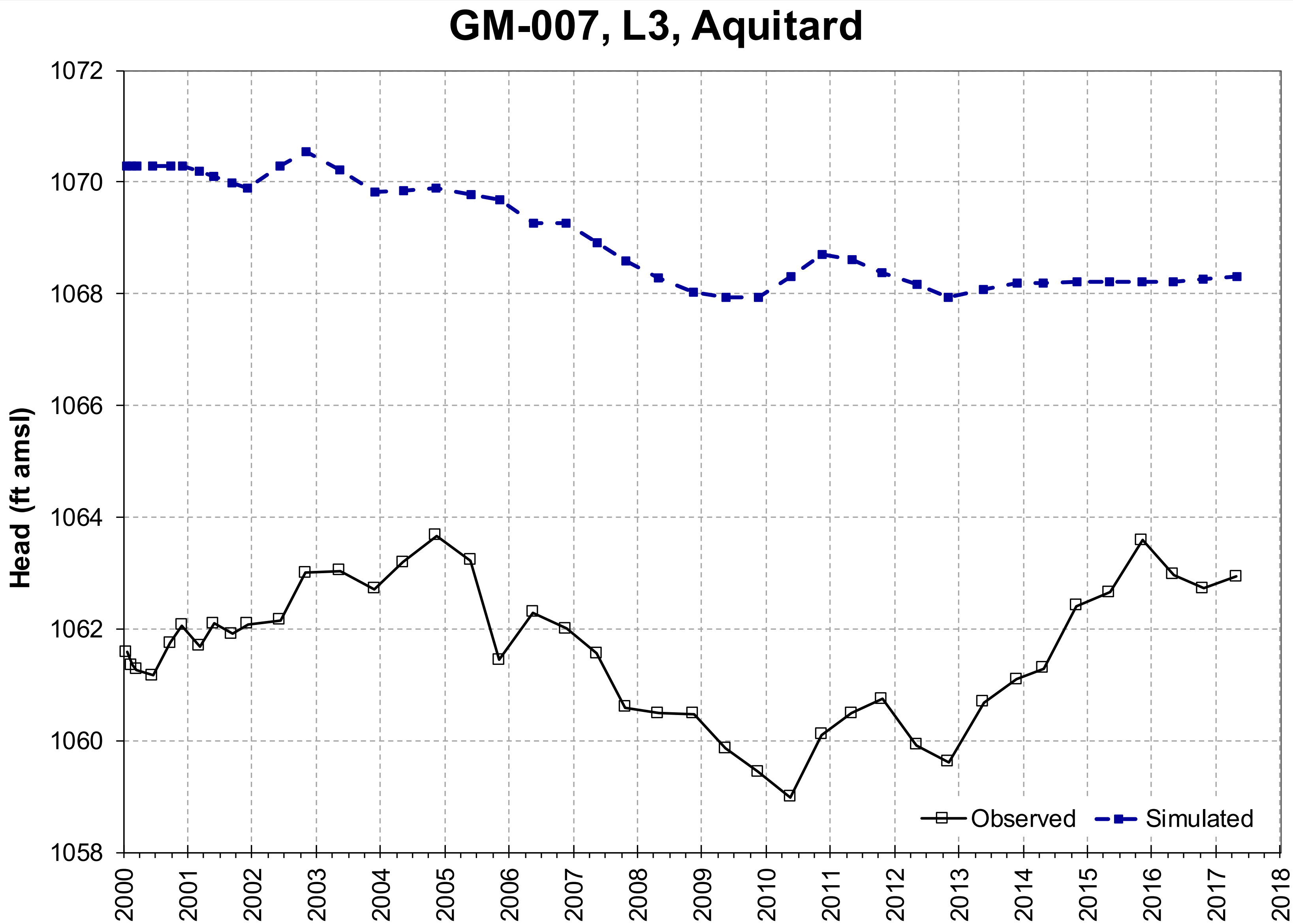


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

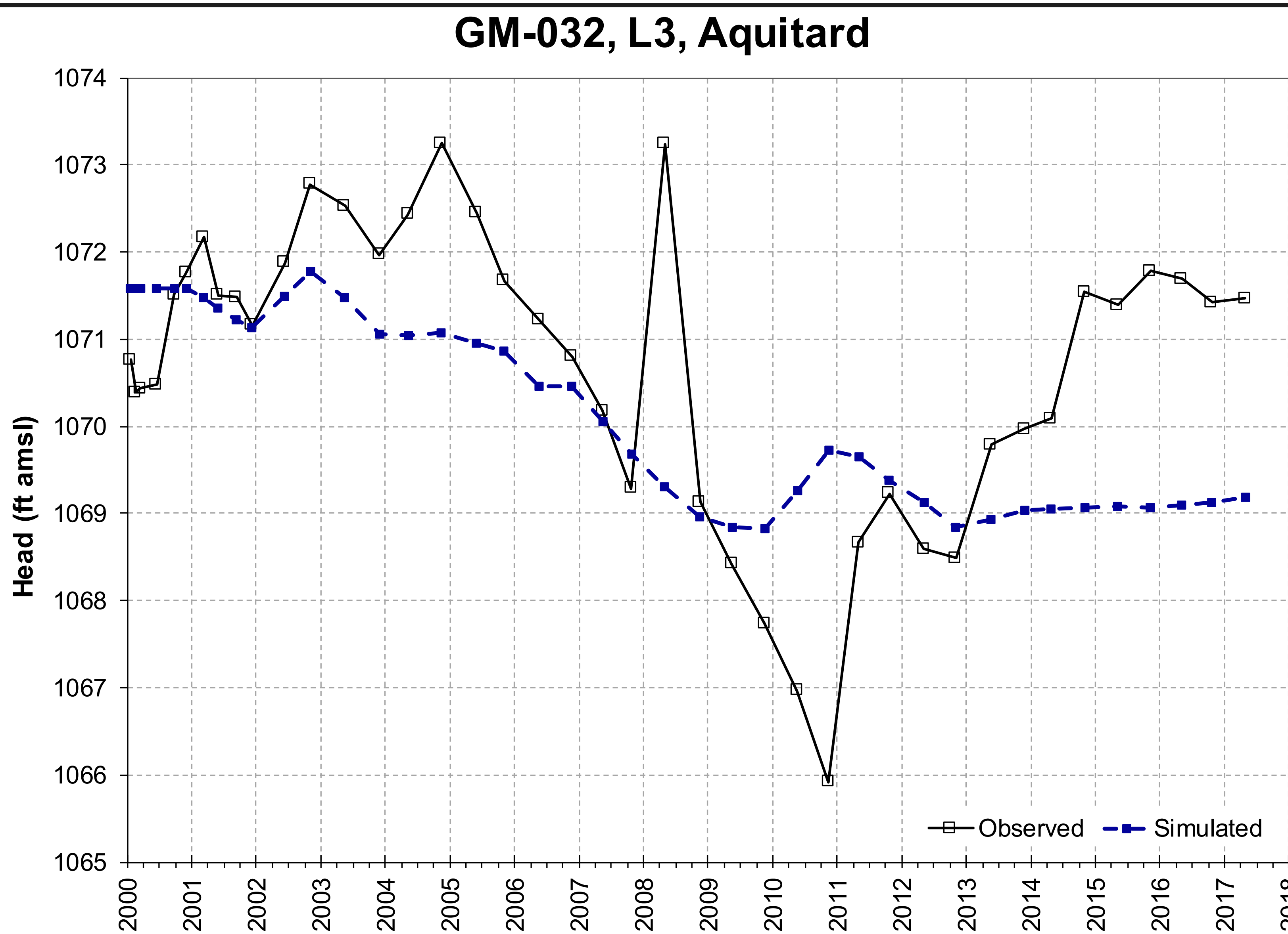


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

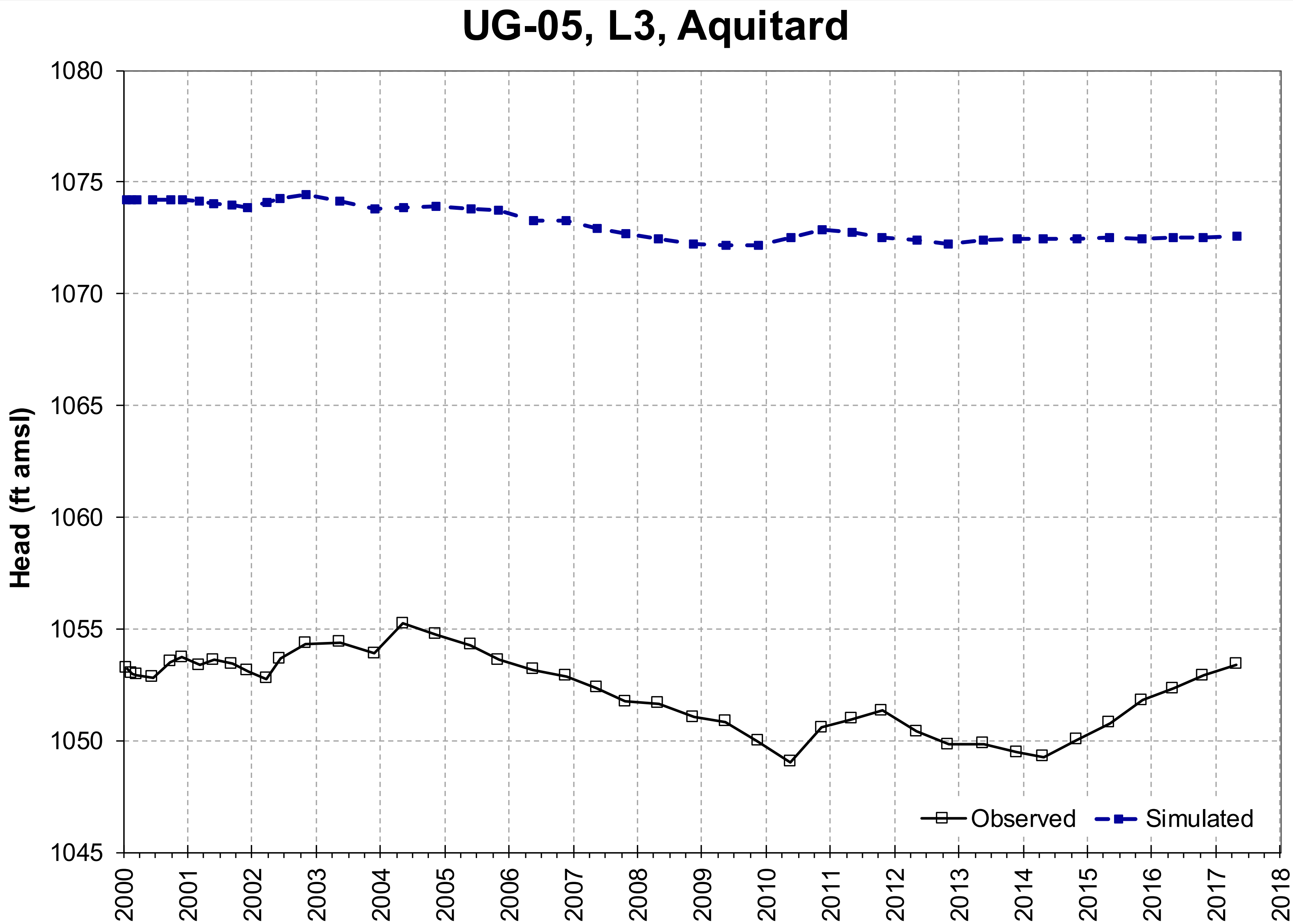


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

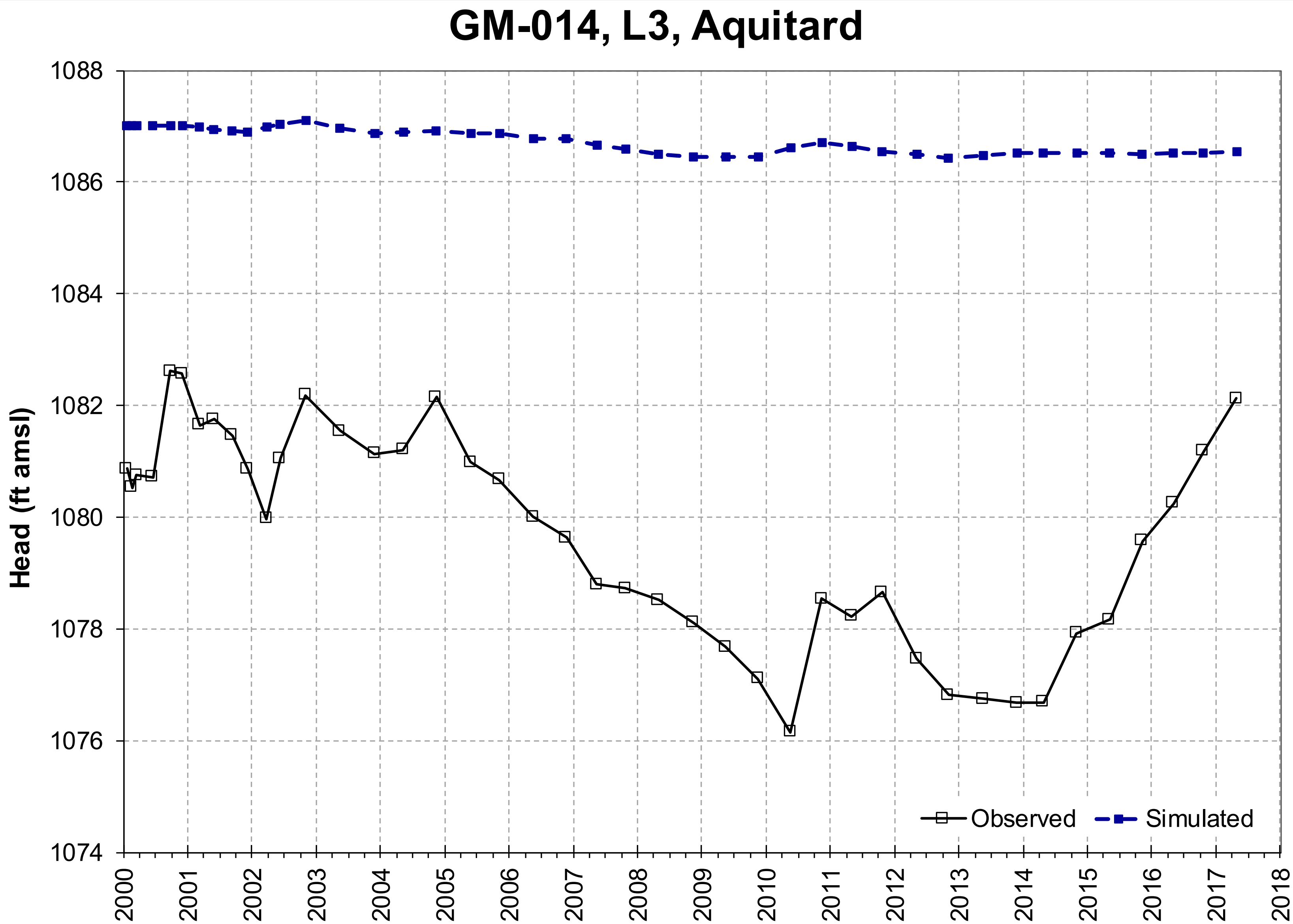


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



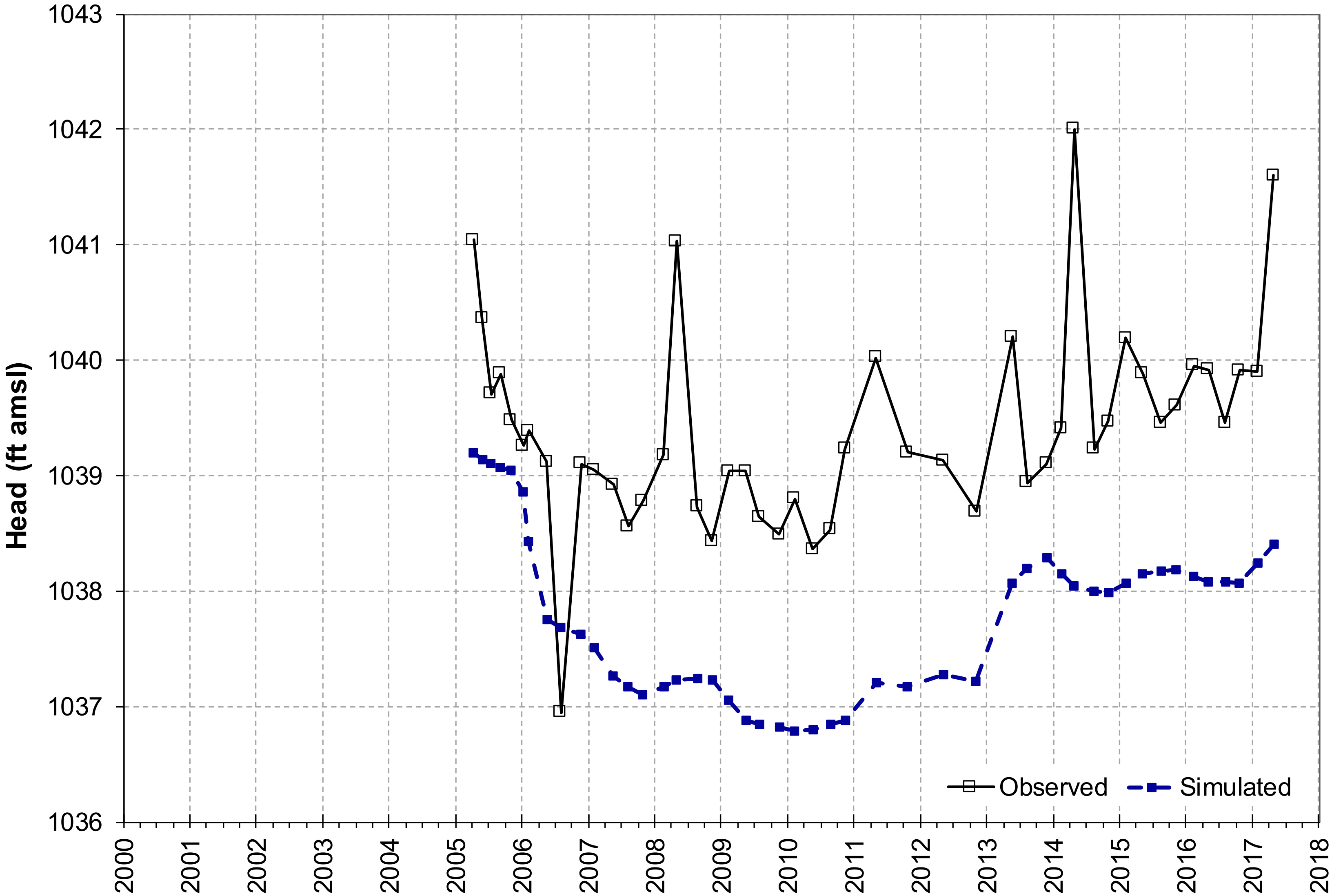
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-084, L3, Aquitard

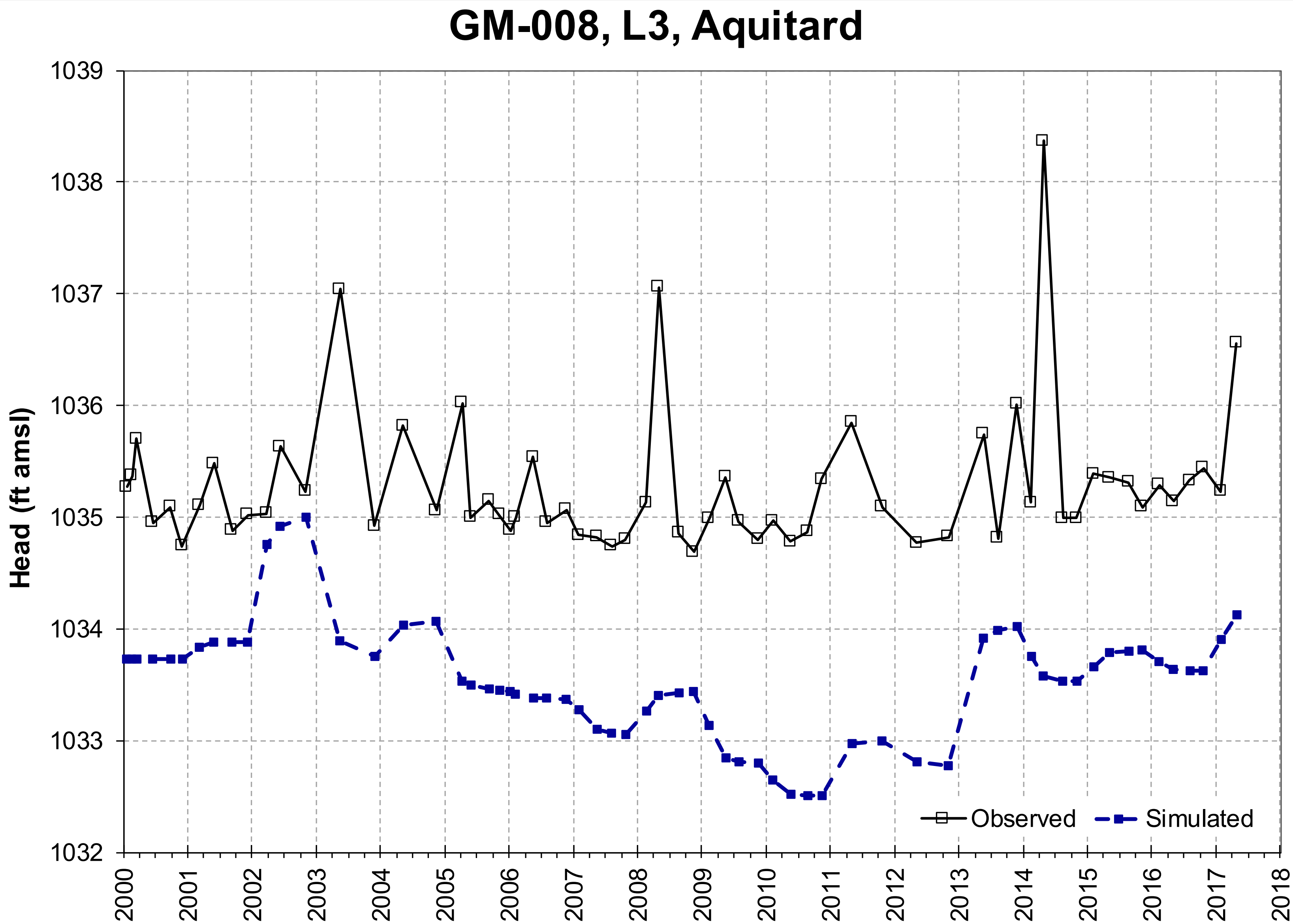


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

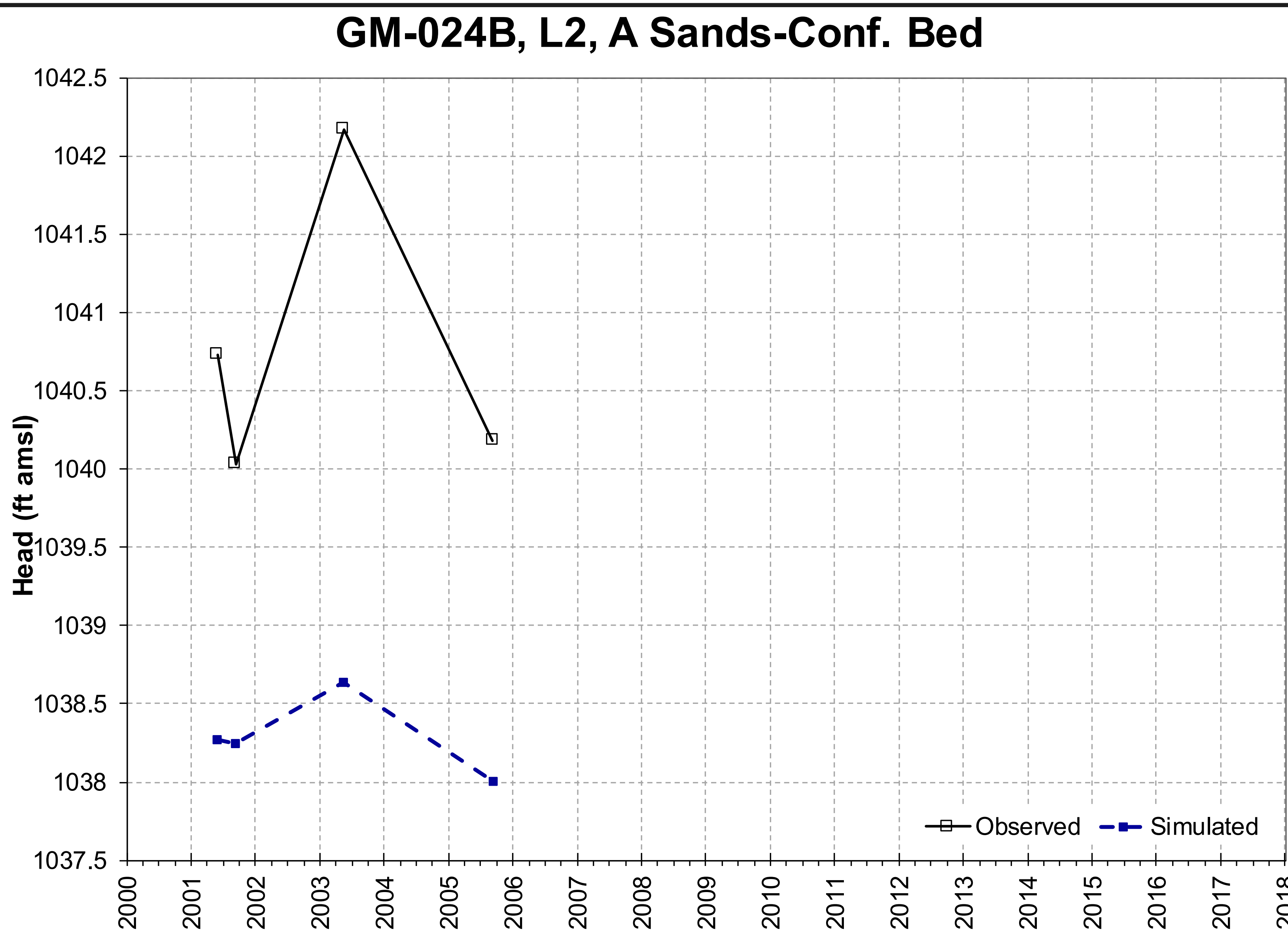


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

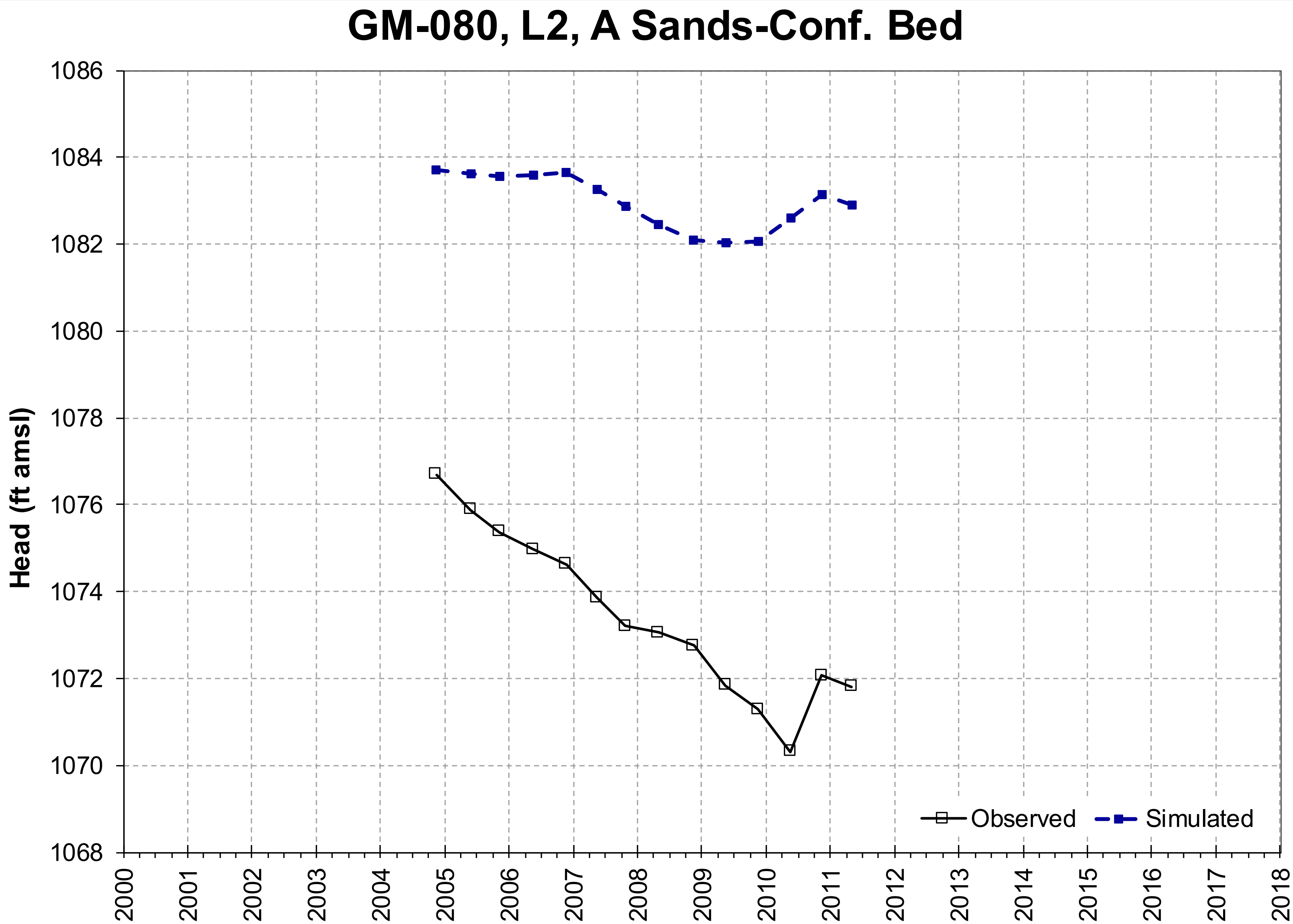


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

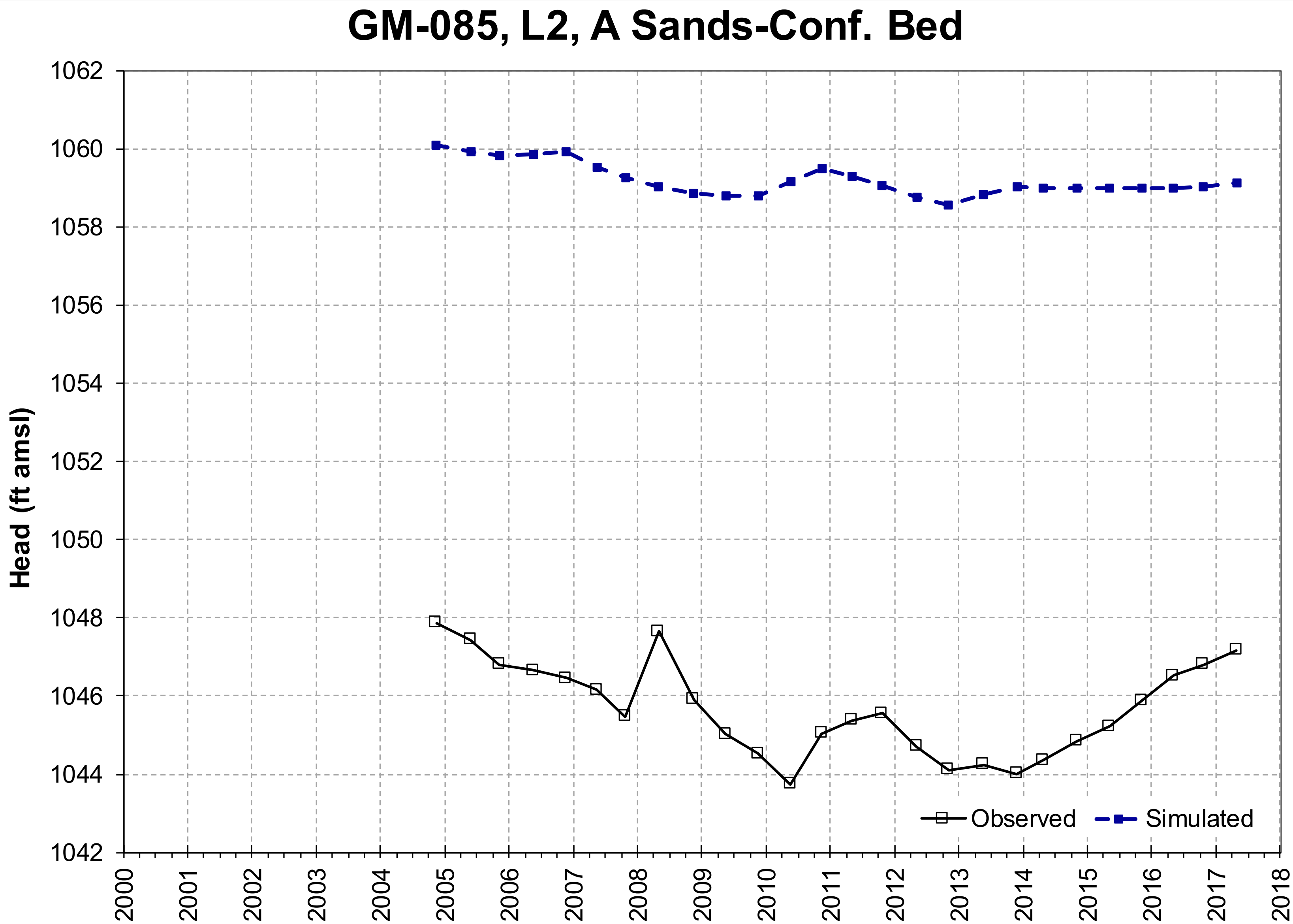


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

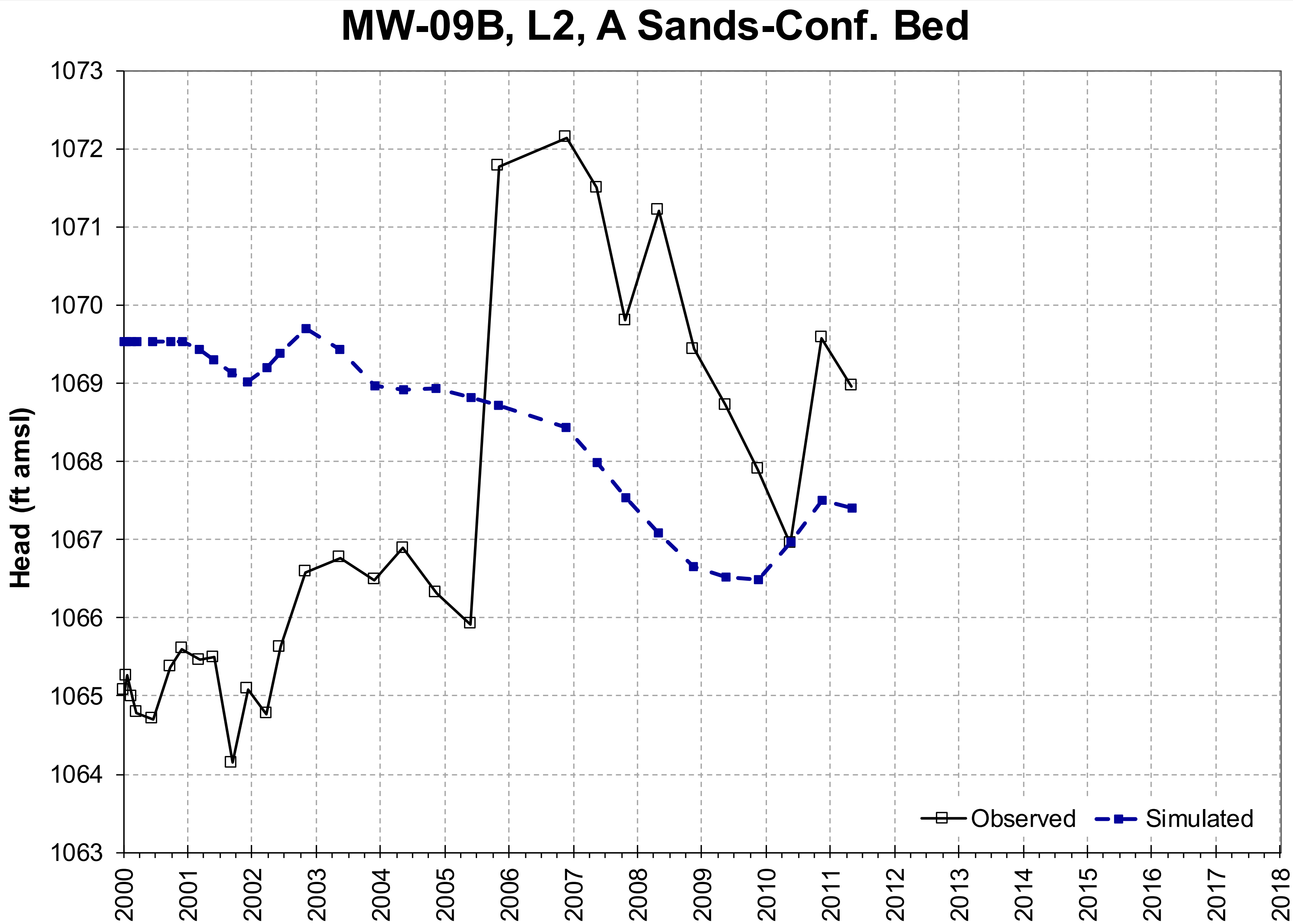


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



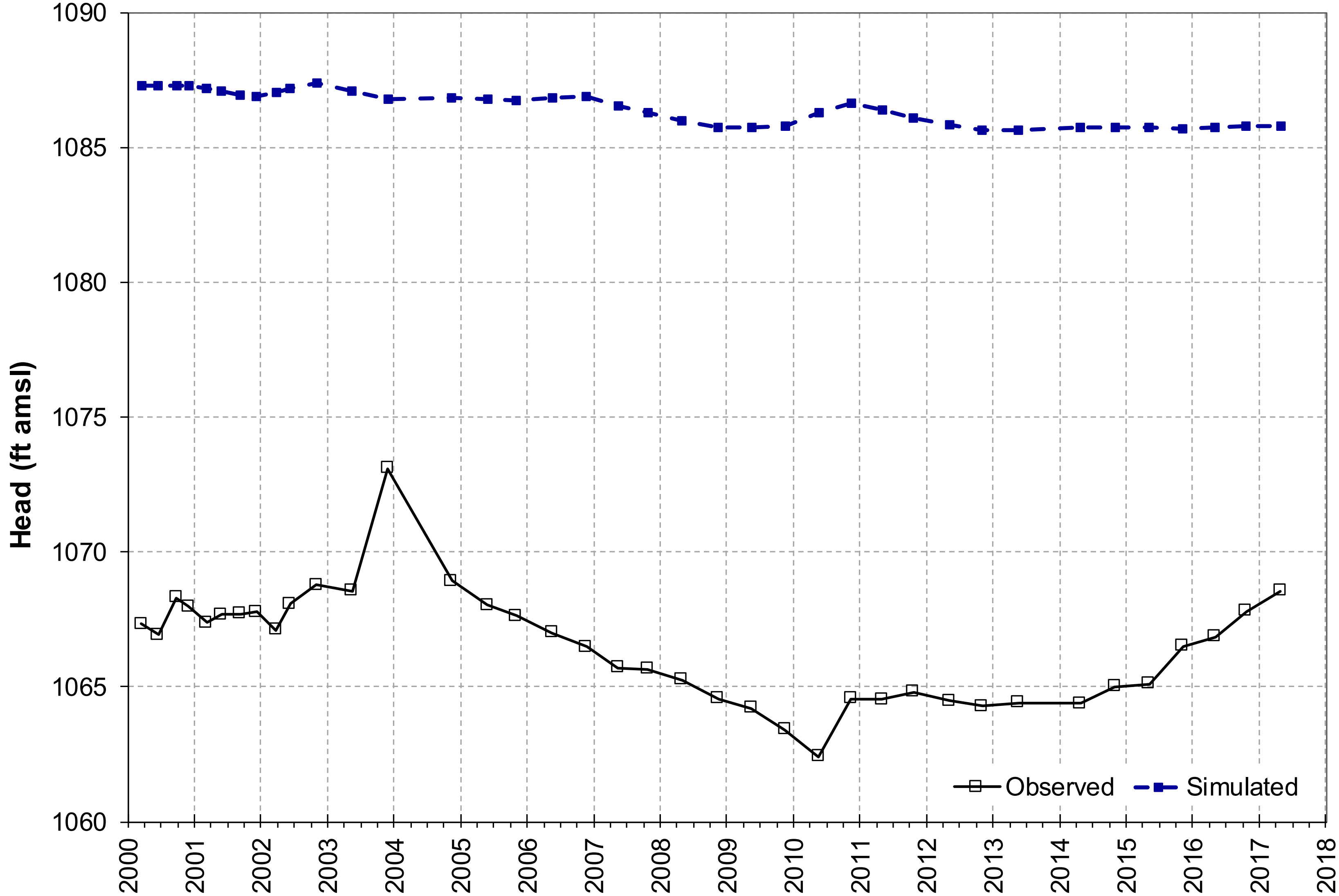
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

UG-04, L2, A Sands-Conf. Bed

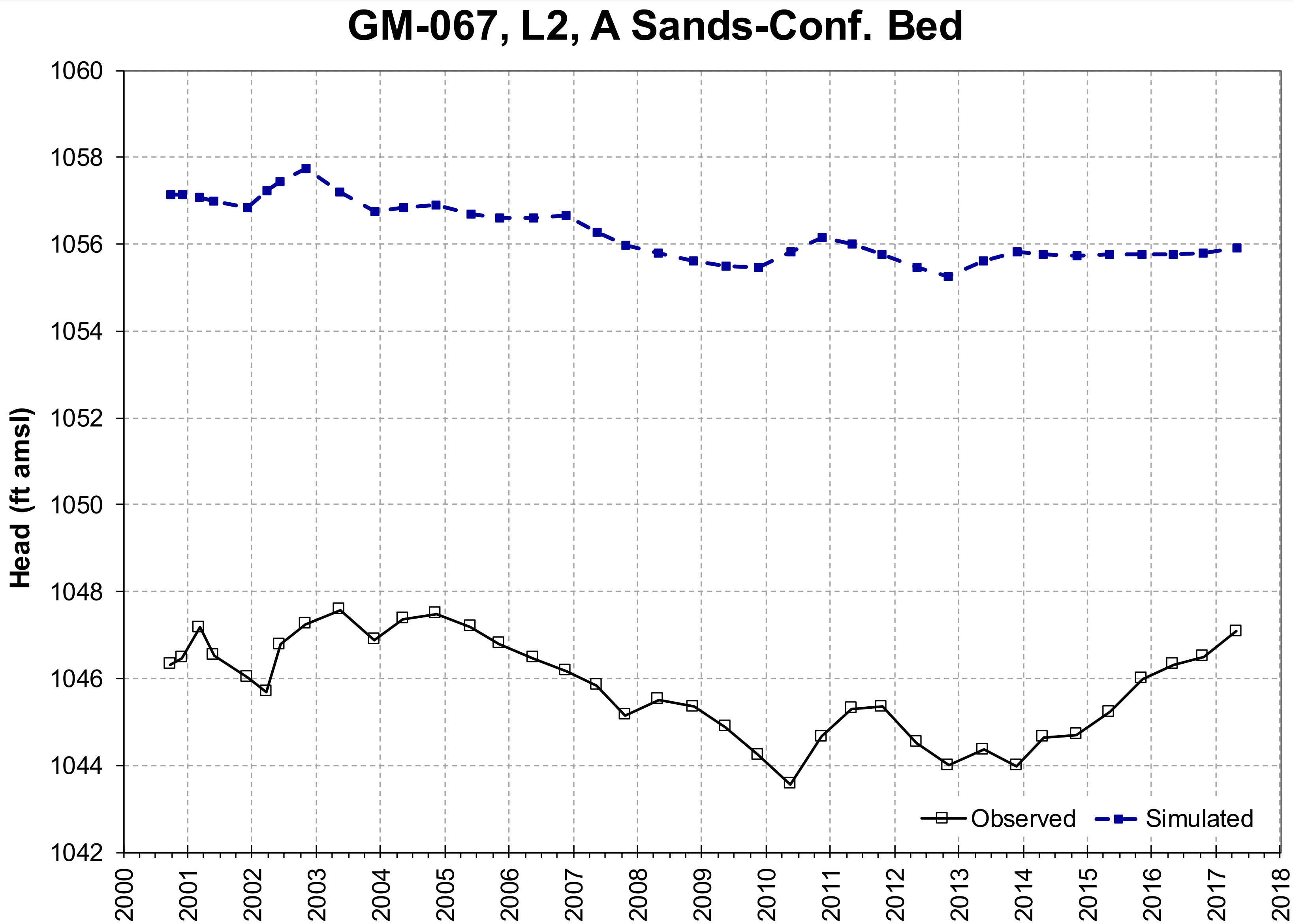


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

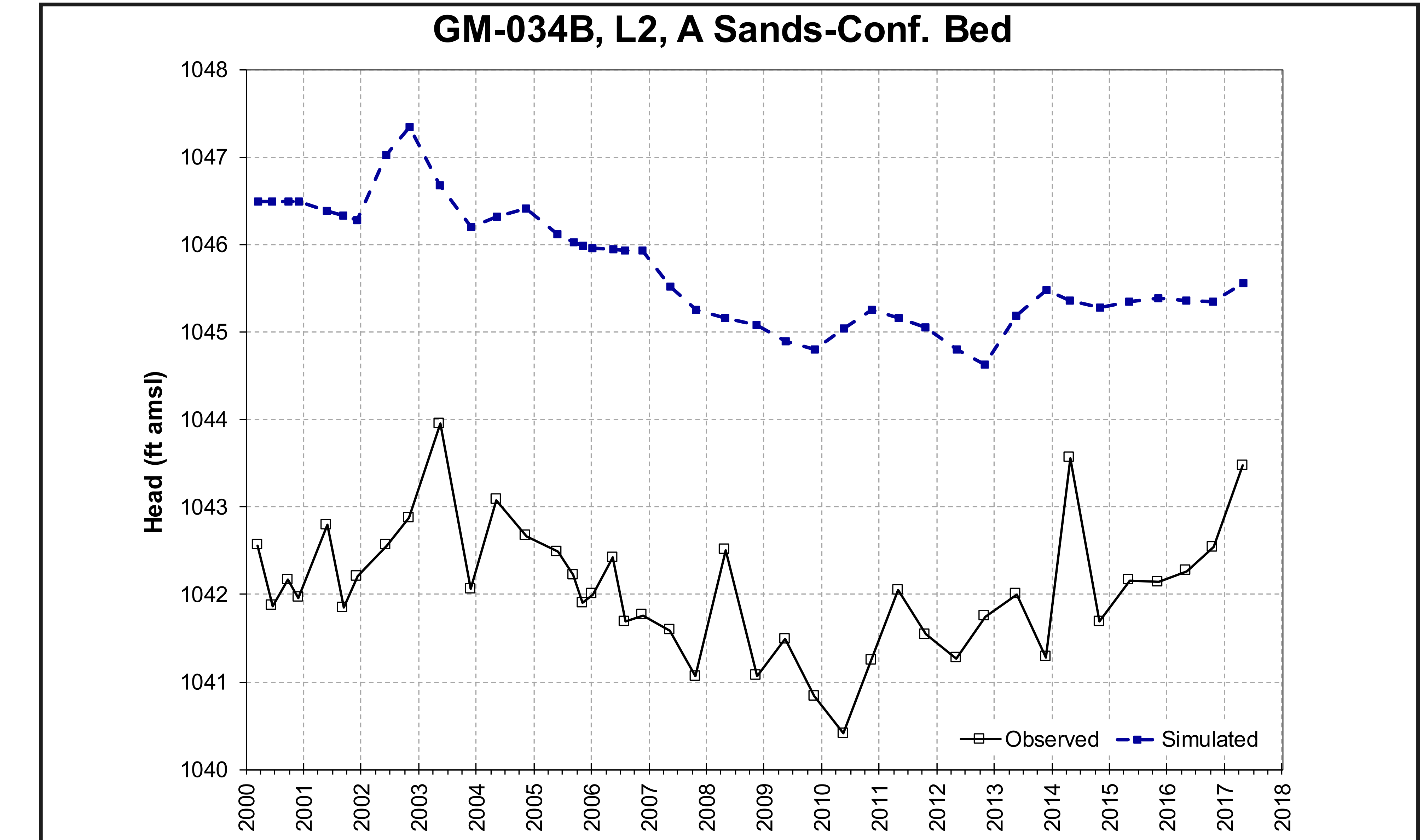


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

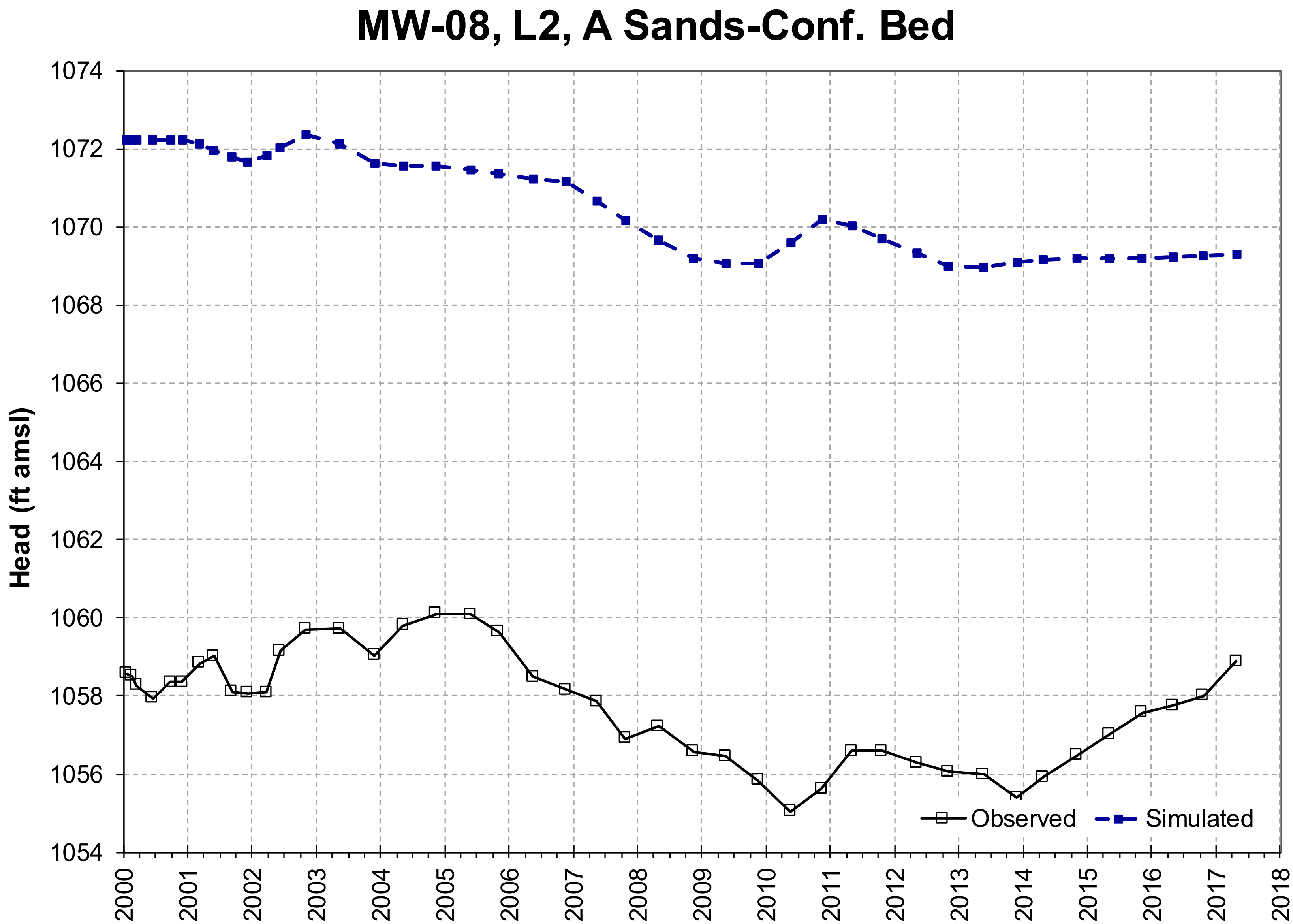


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



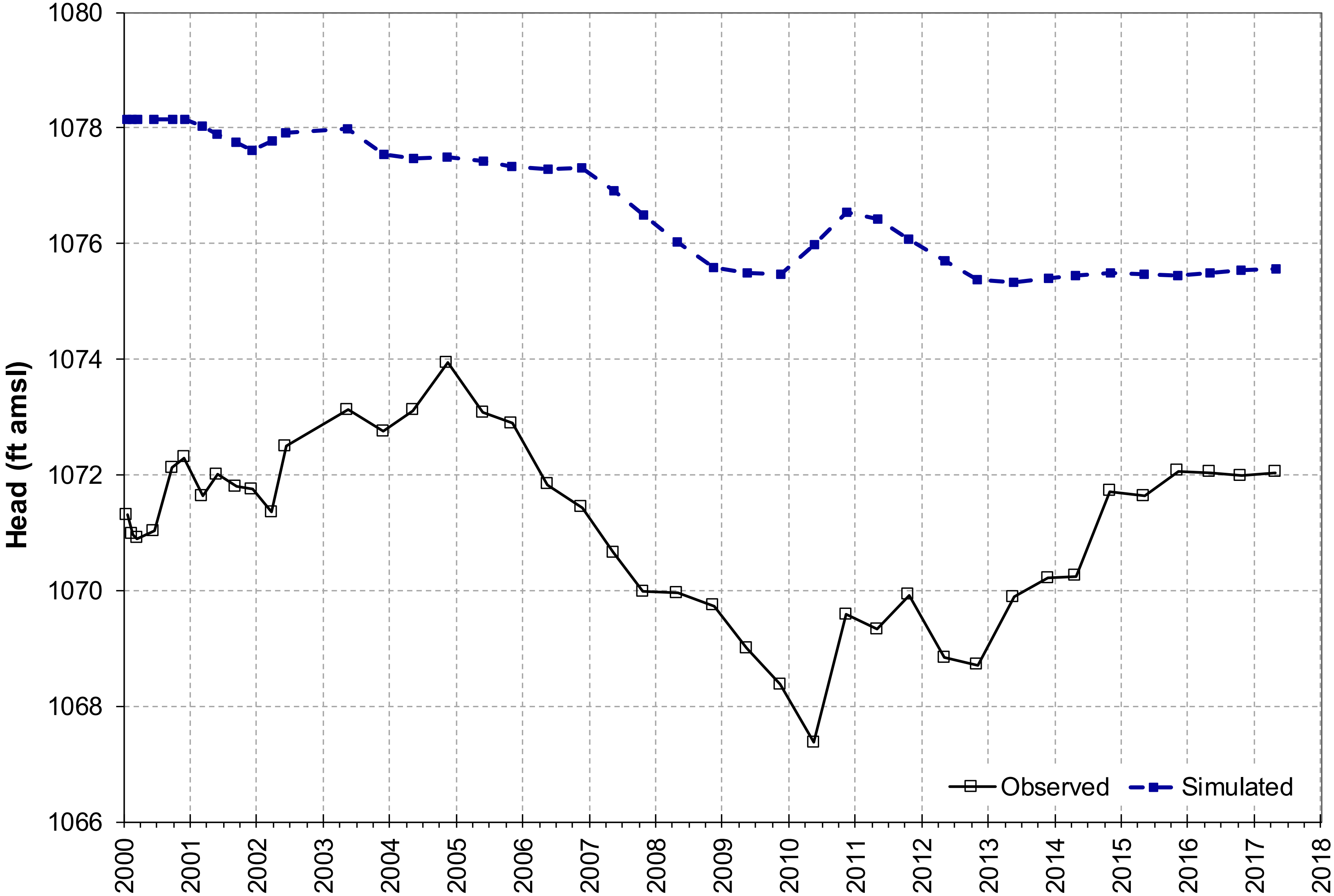
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-040B, L2, A Sands-Conf. Bed

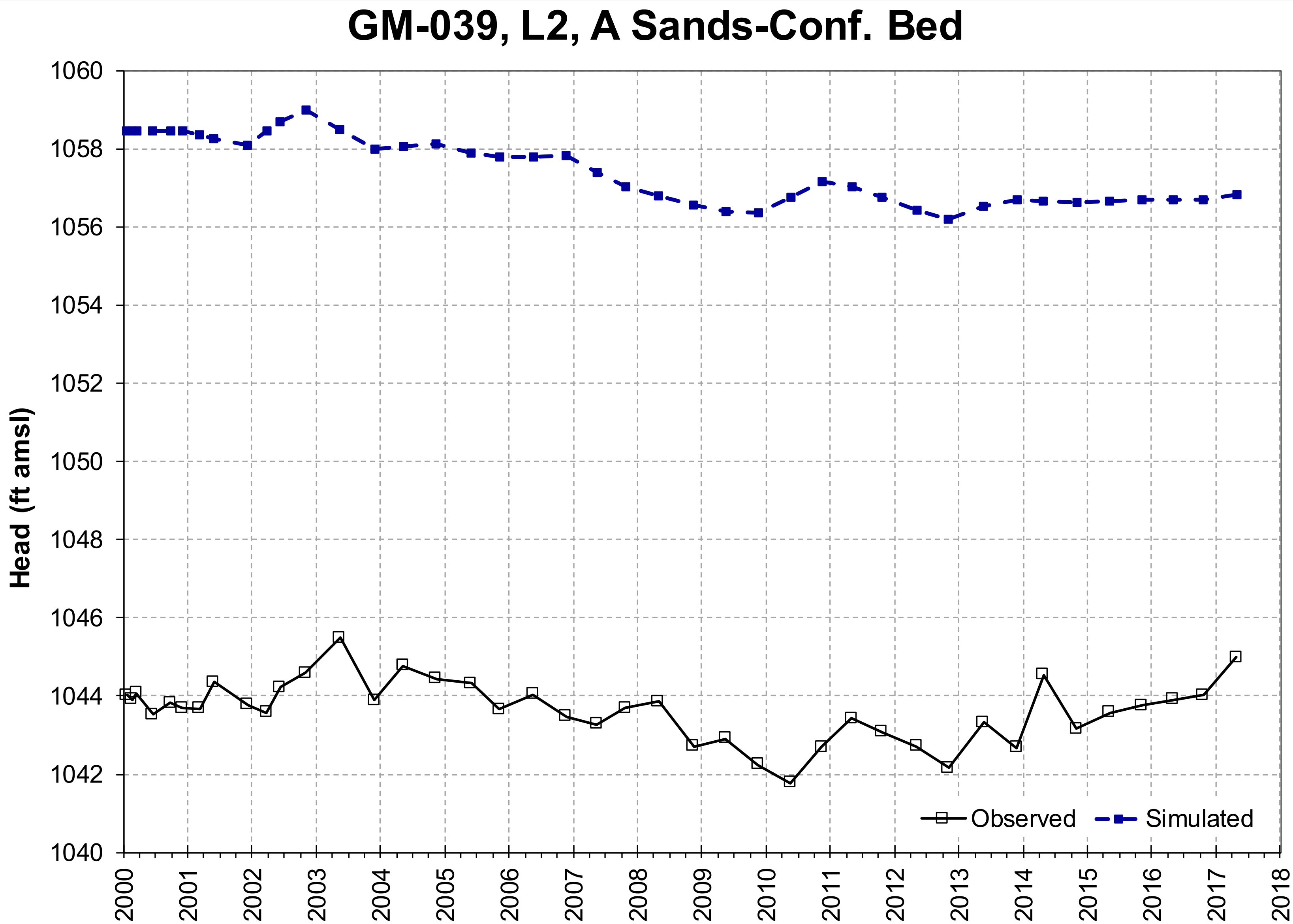


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

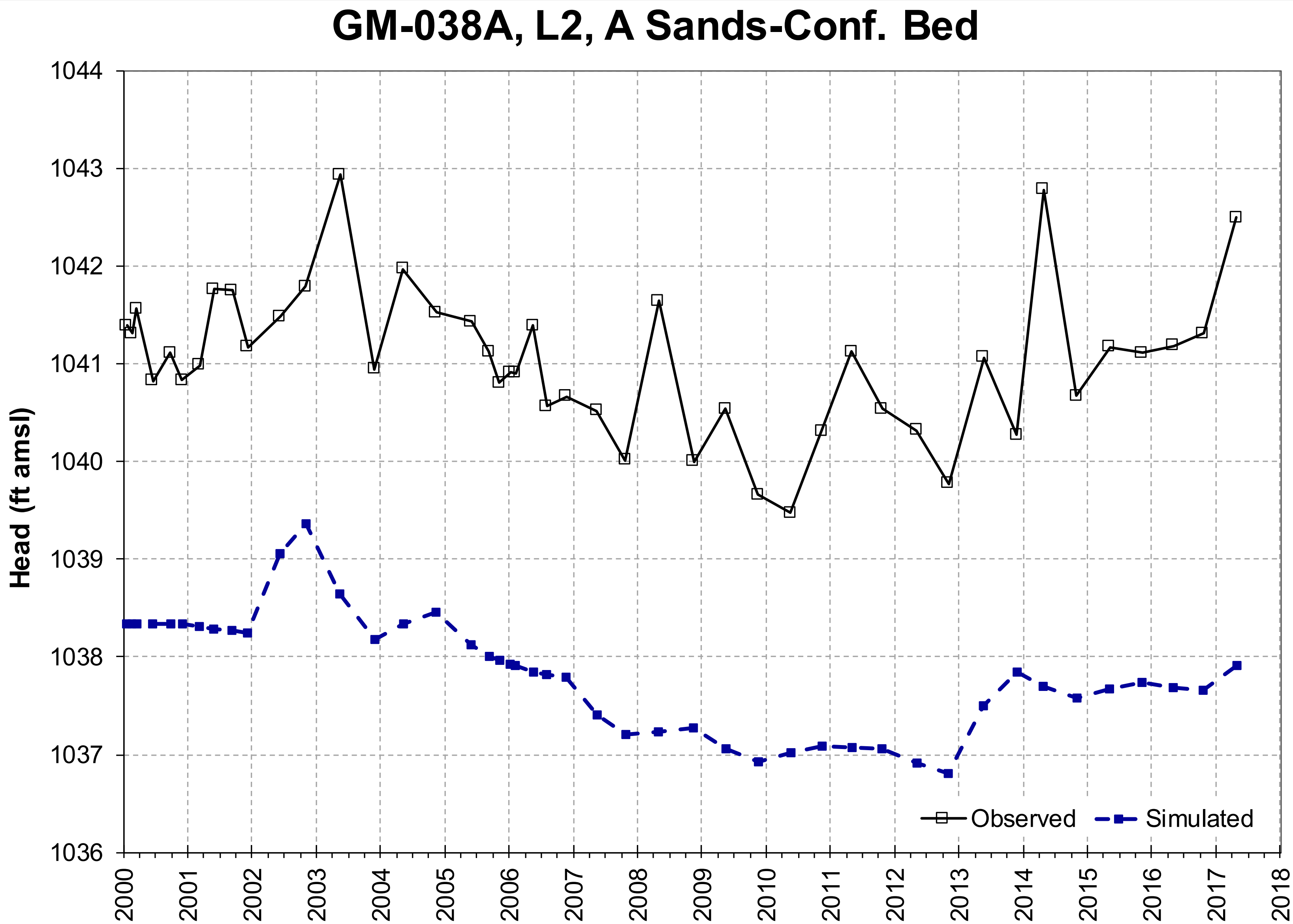


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

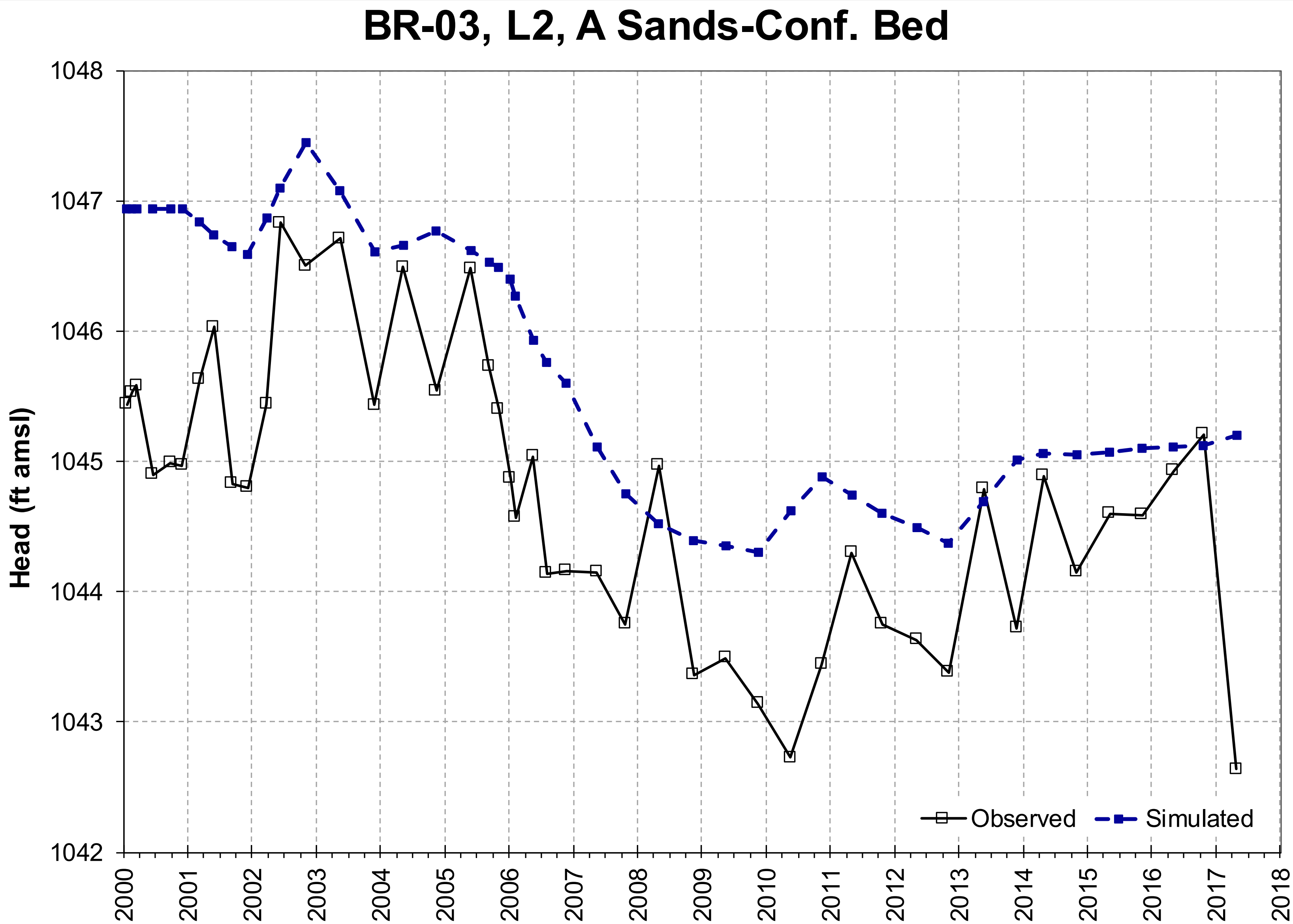


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

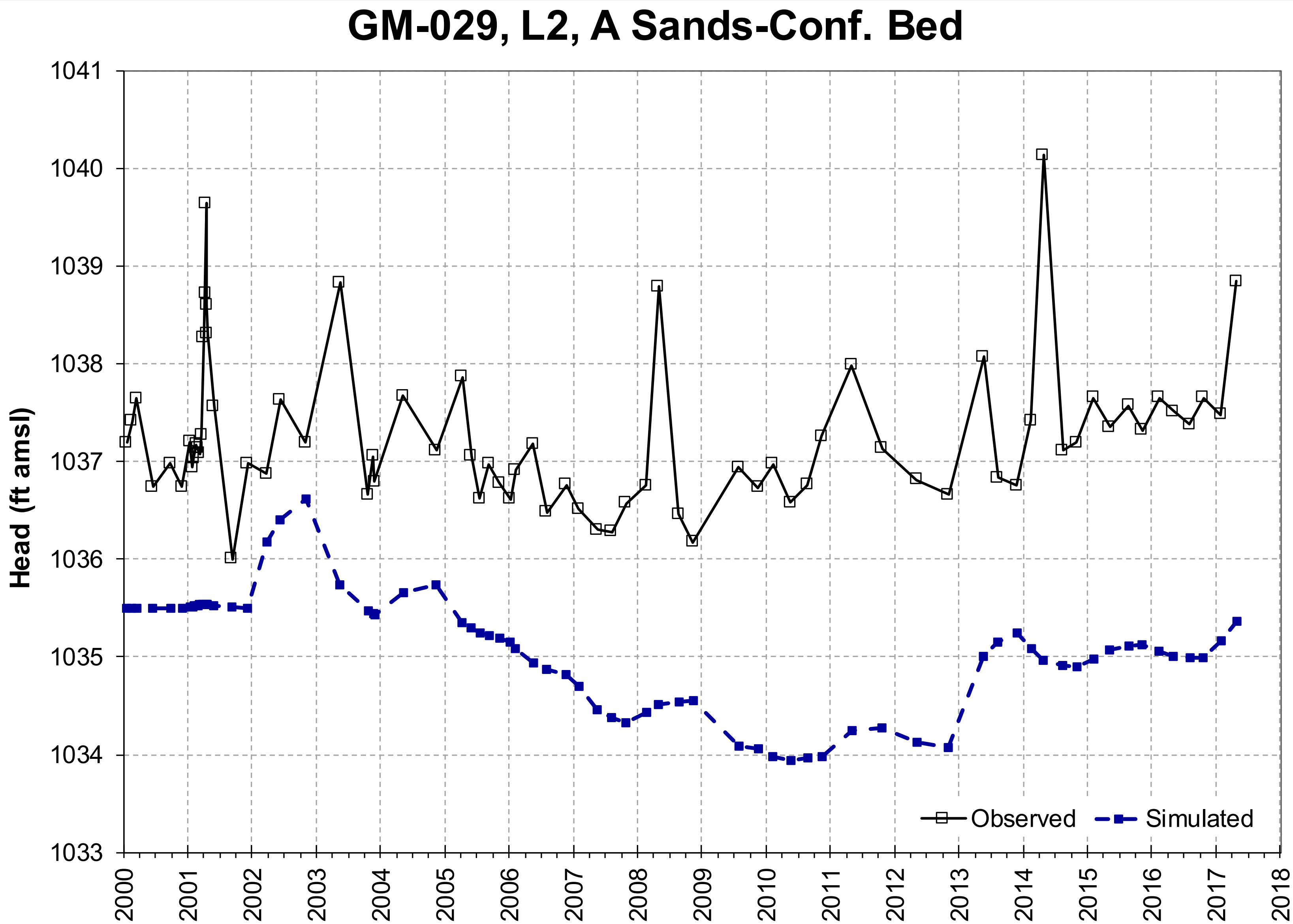


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

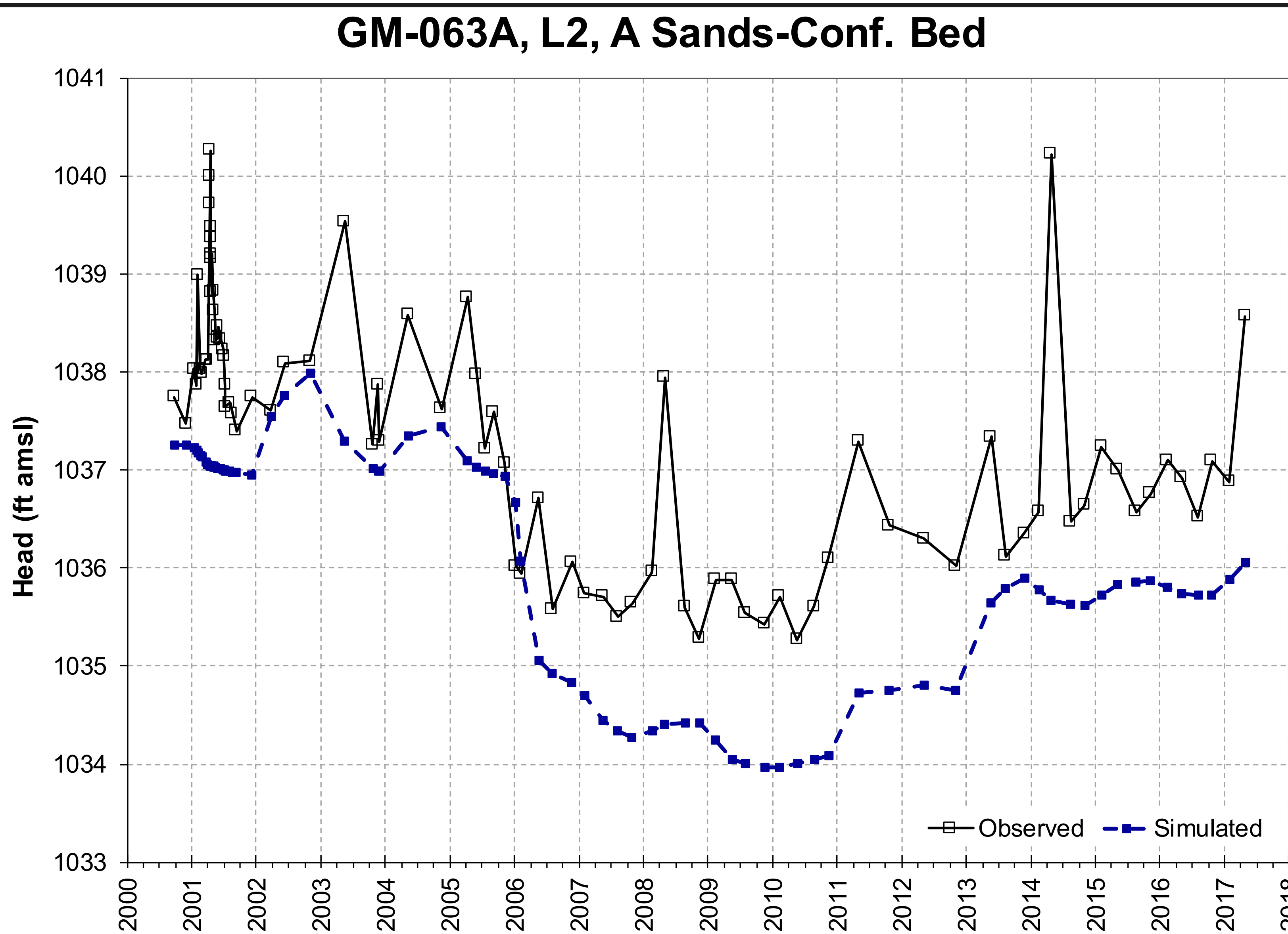


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

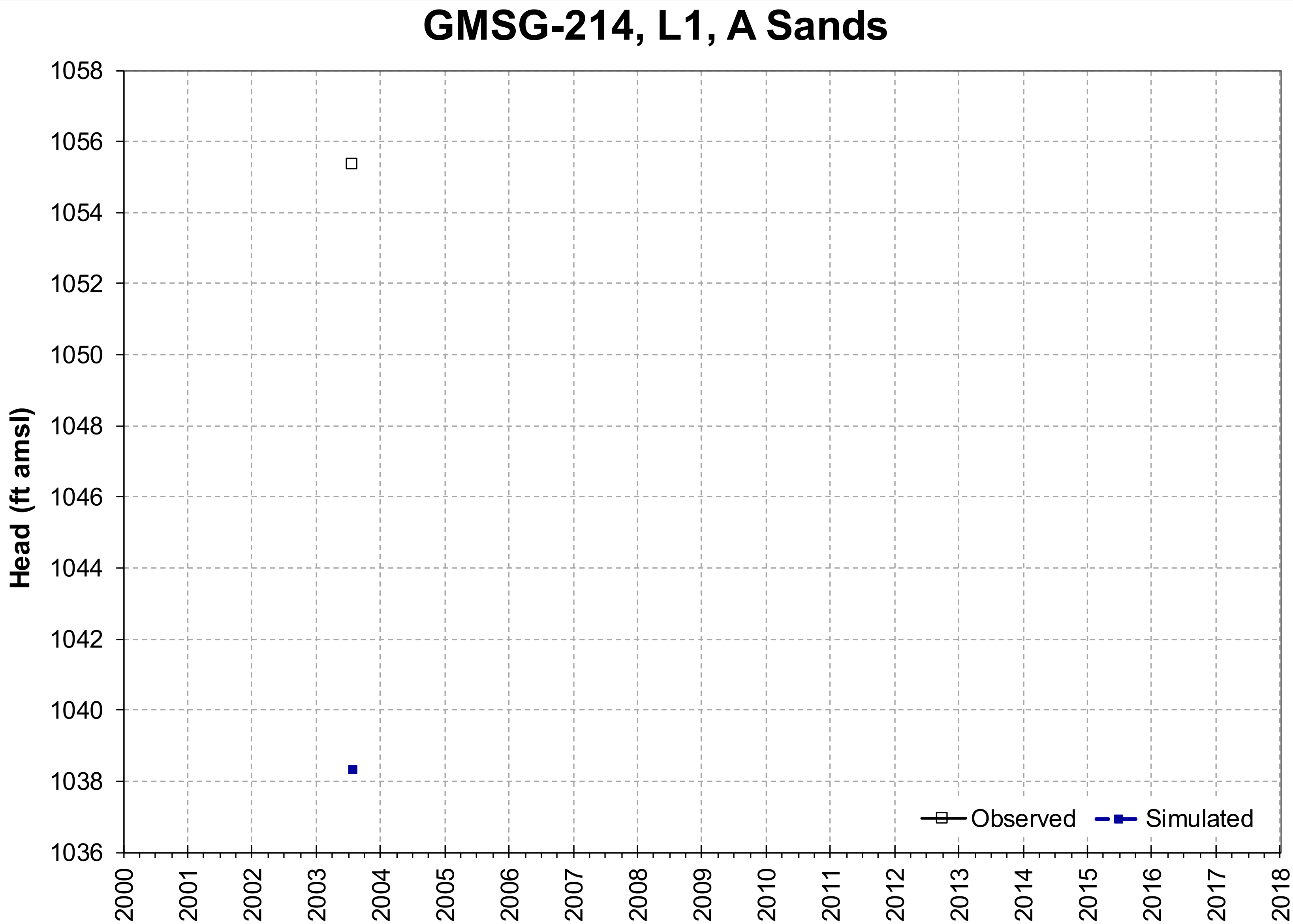


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



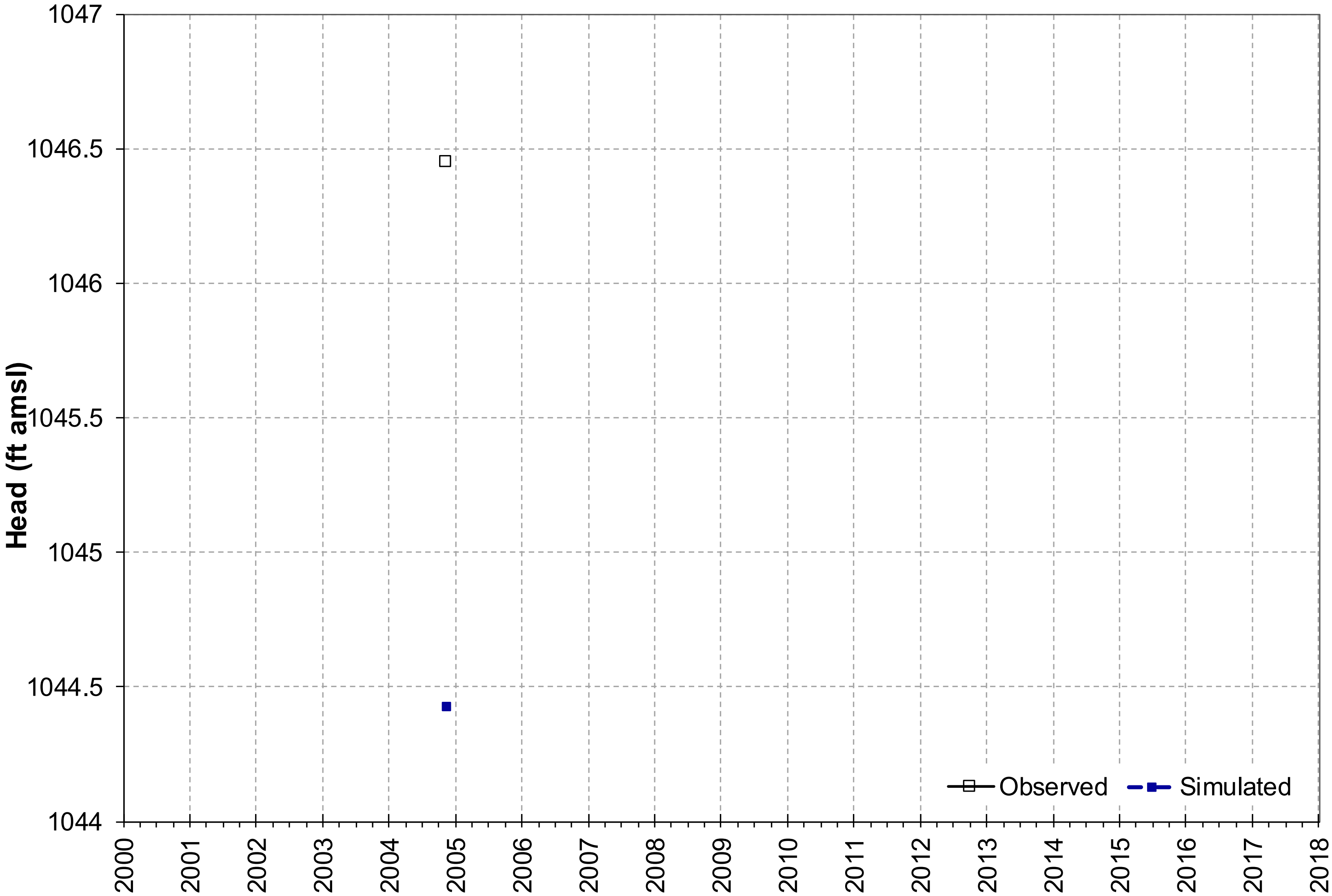
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-030A, L1, A Sands

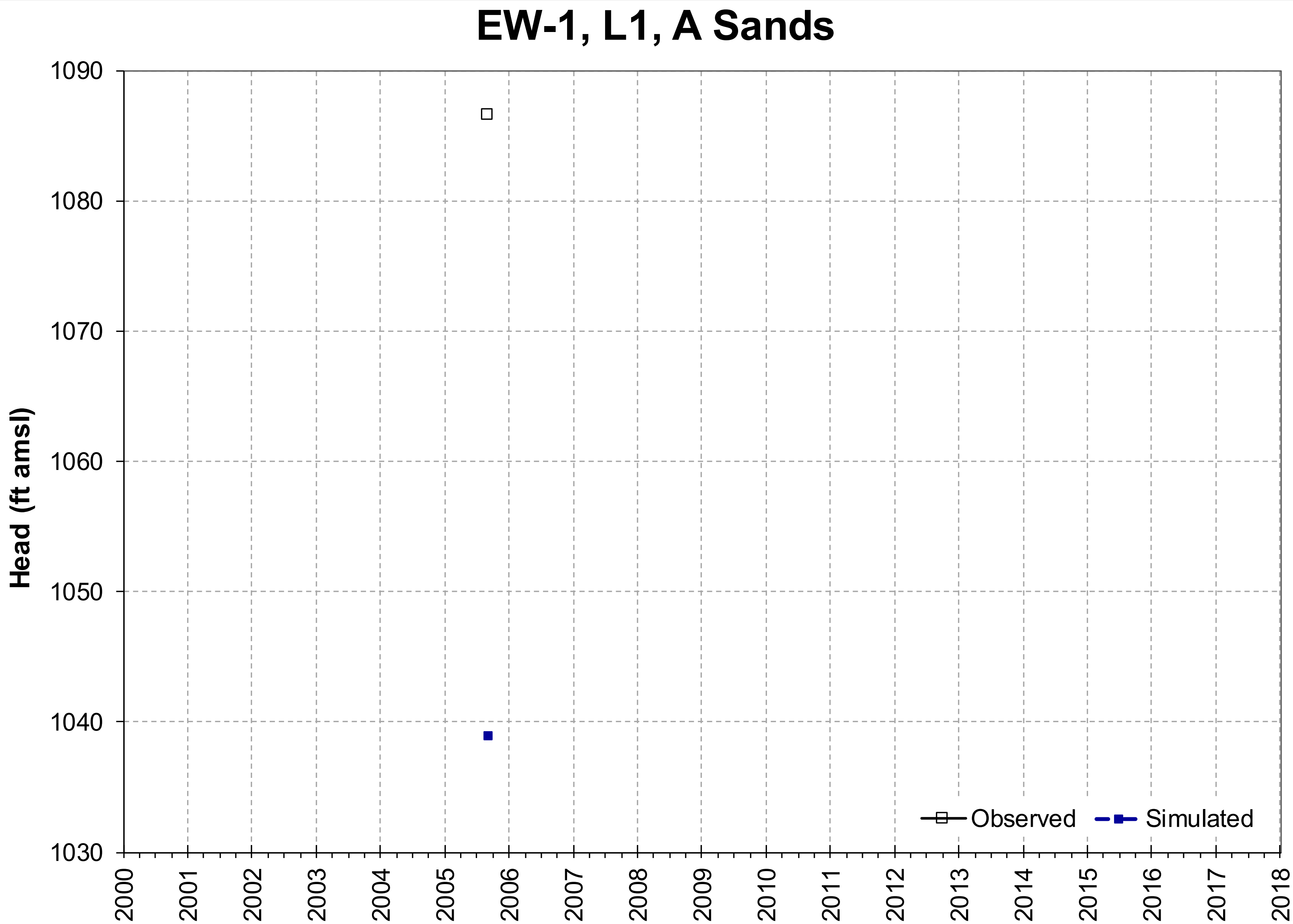


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

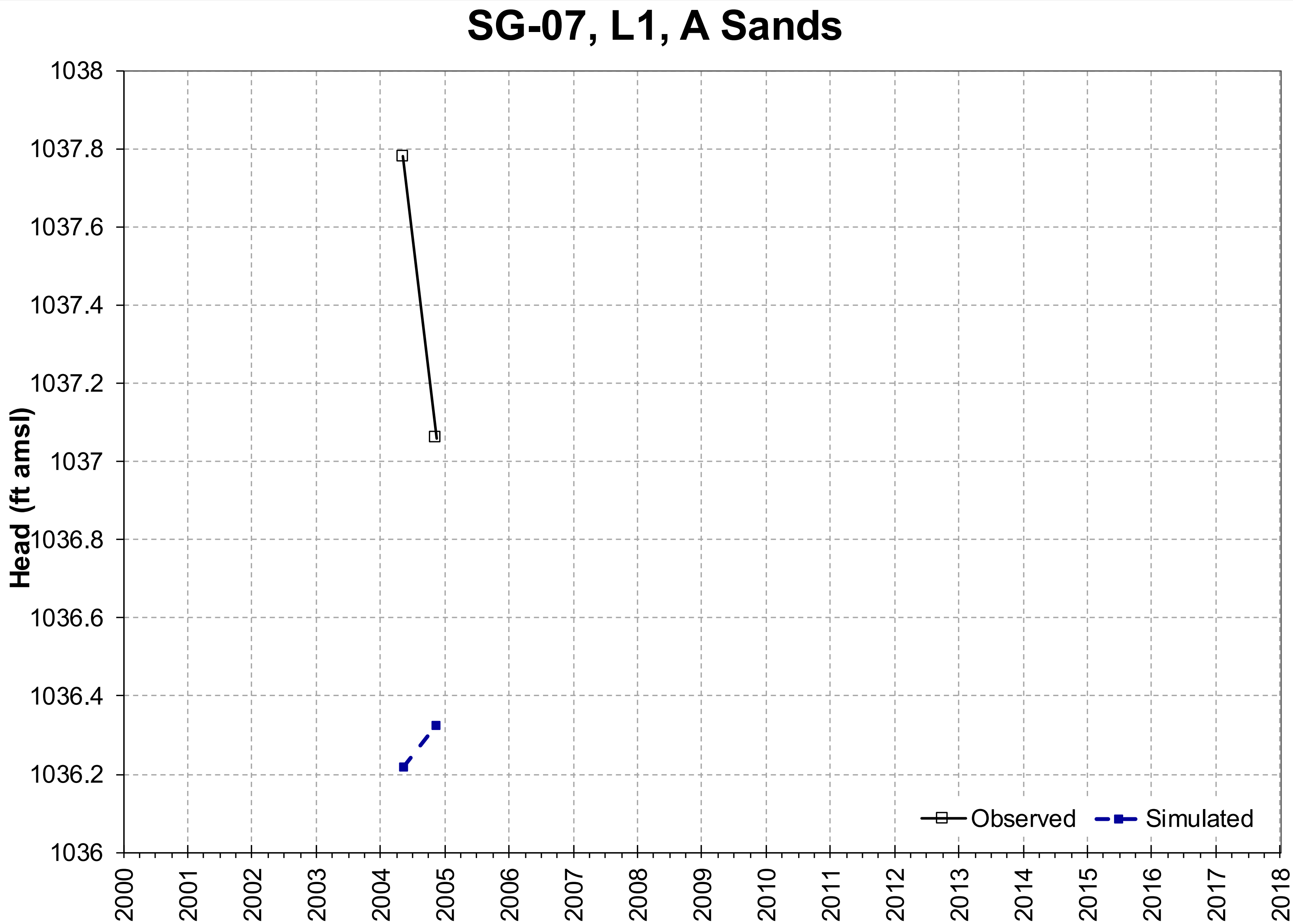


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

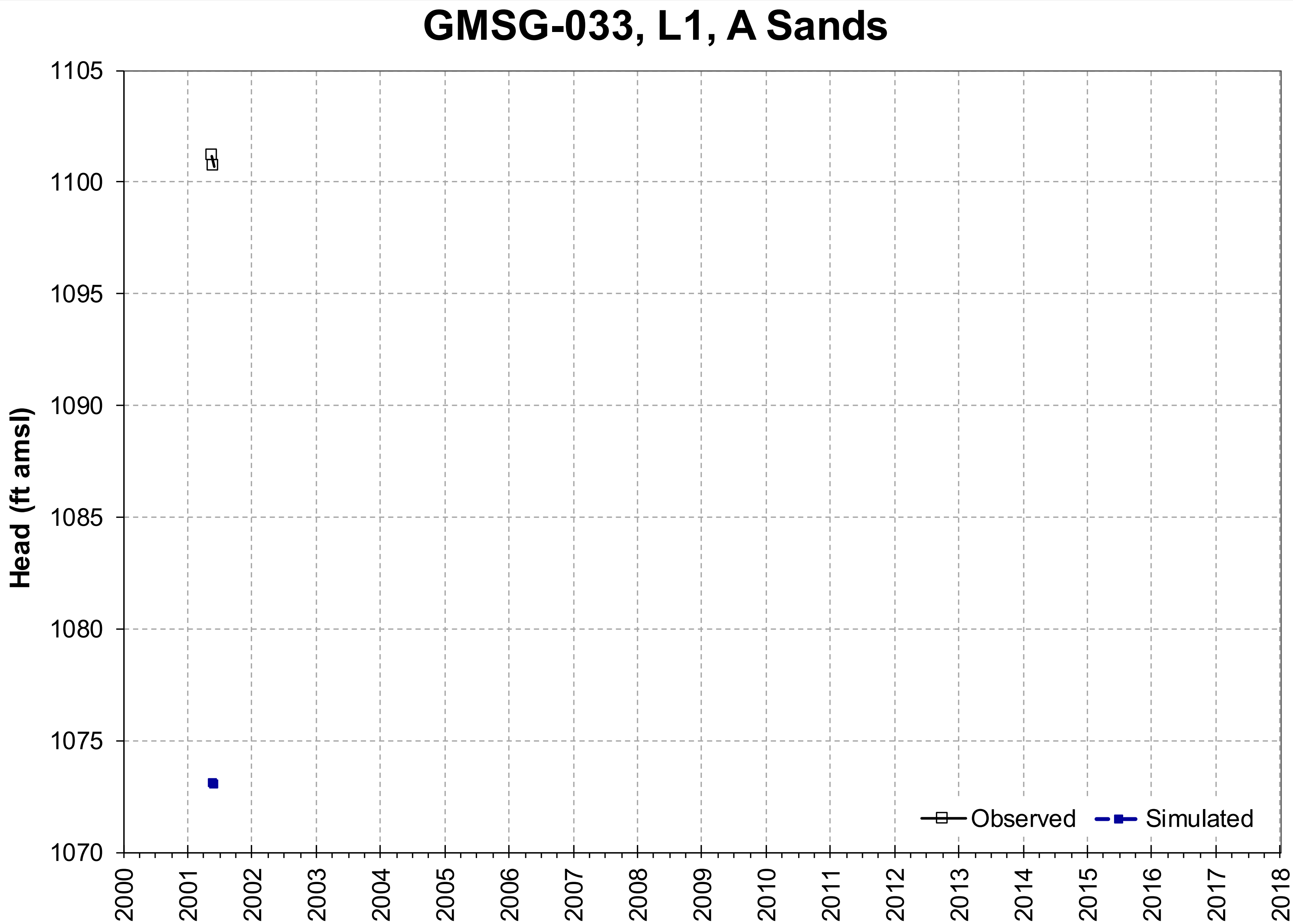


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

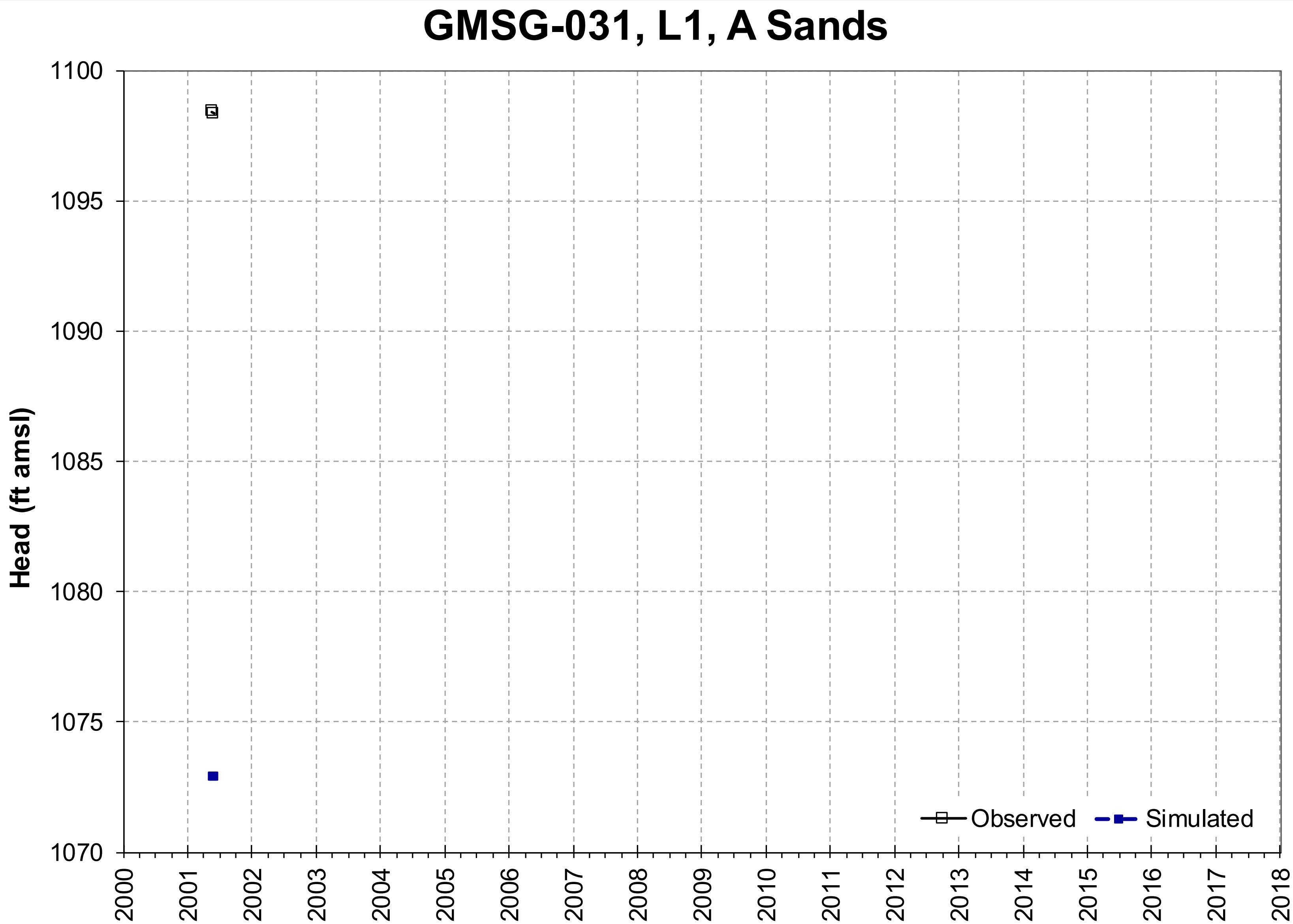


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



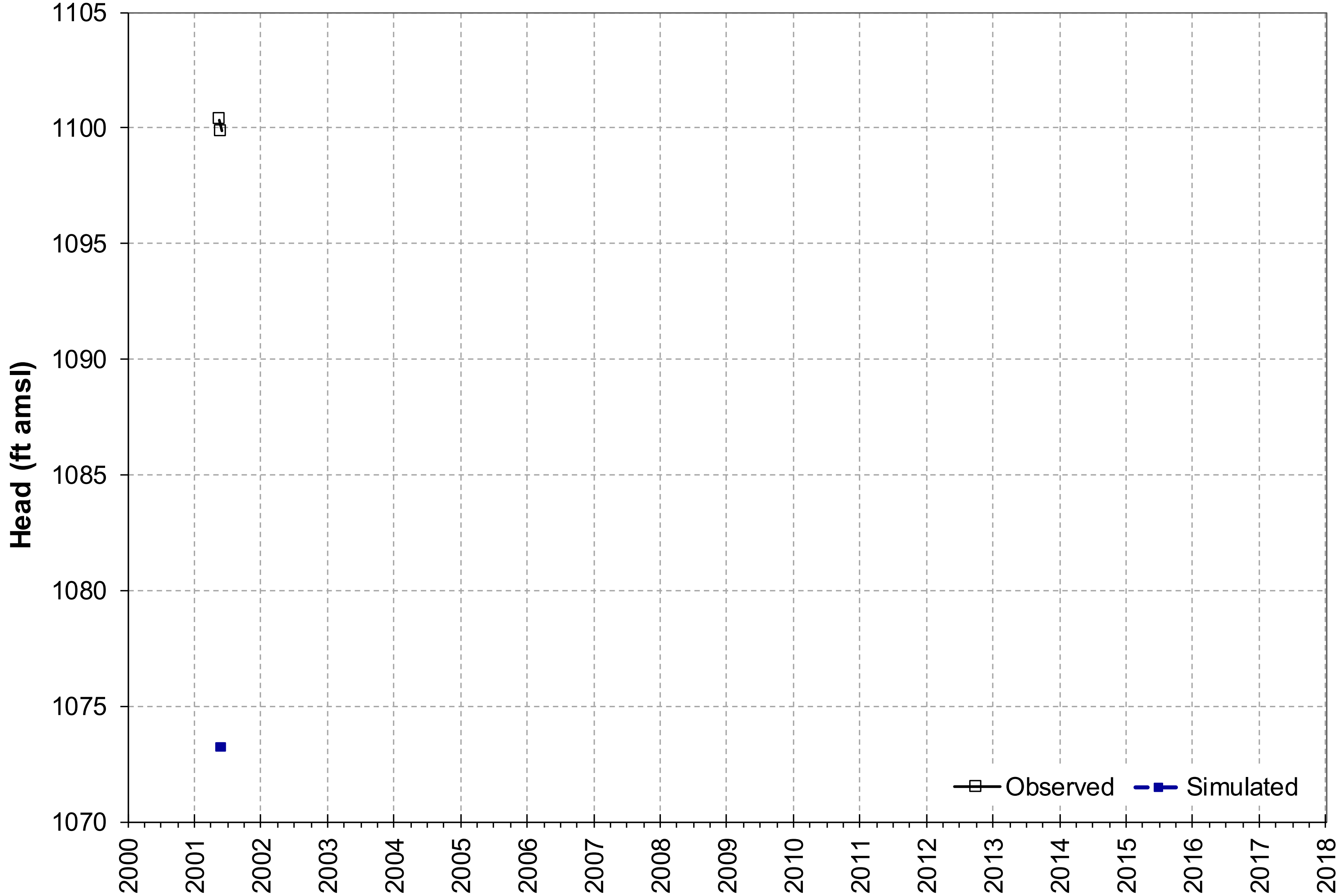
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMSG-029, L1, A Sands

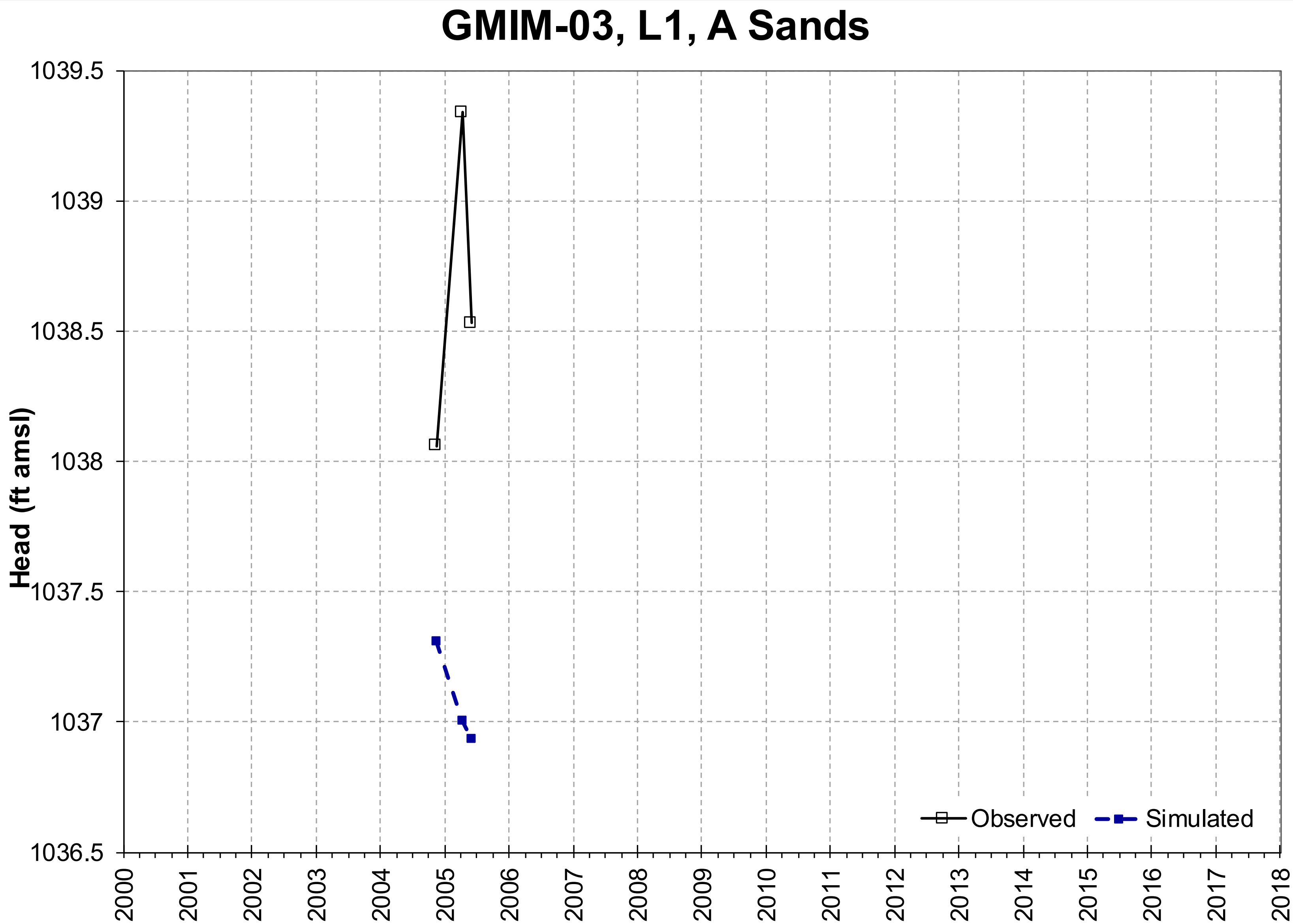


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

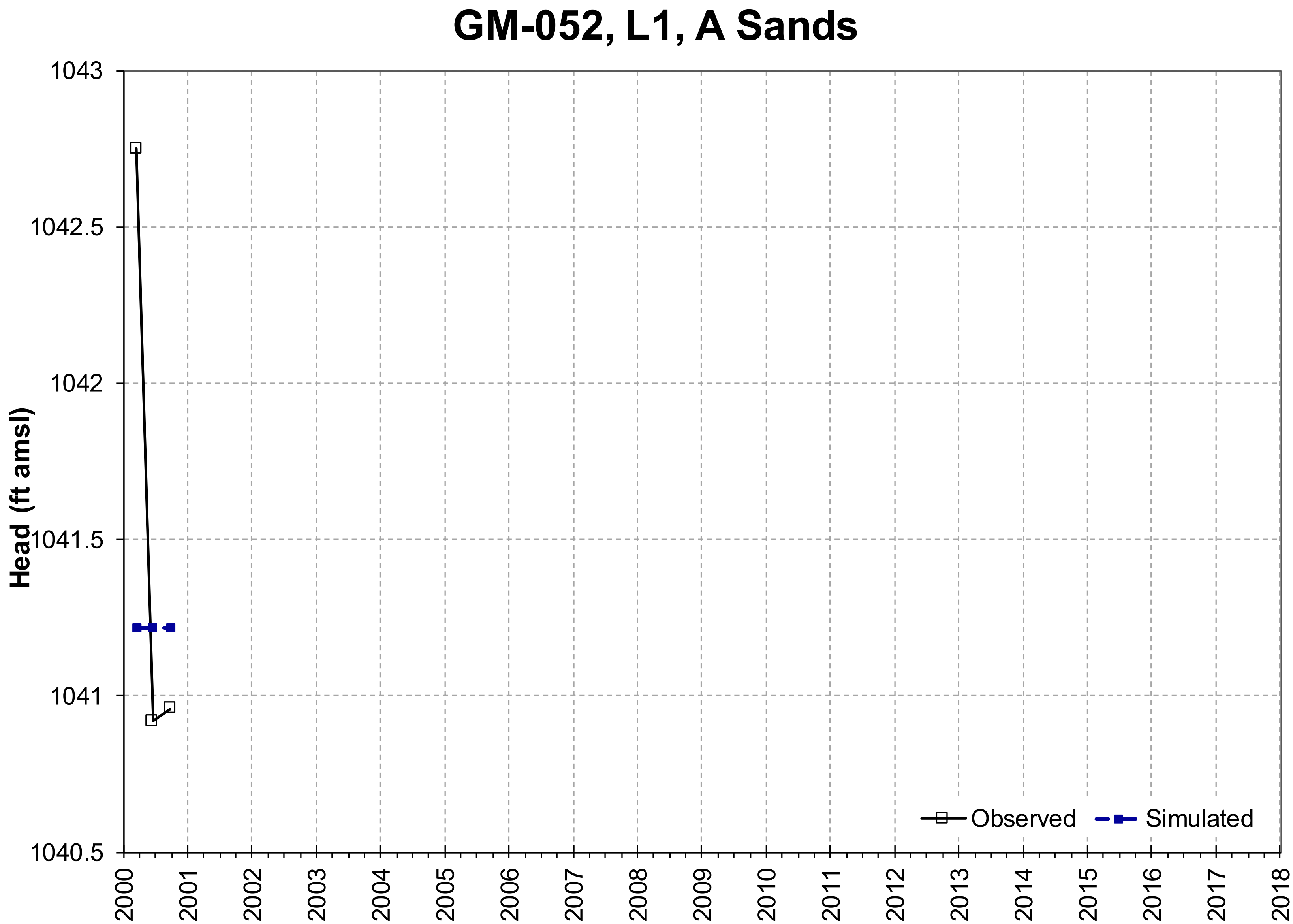


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



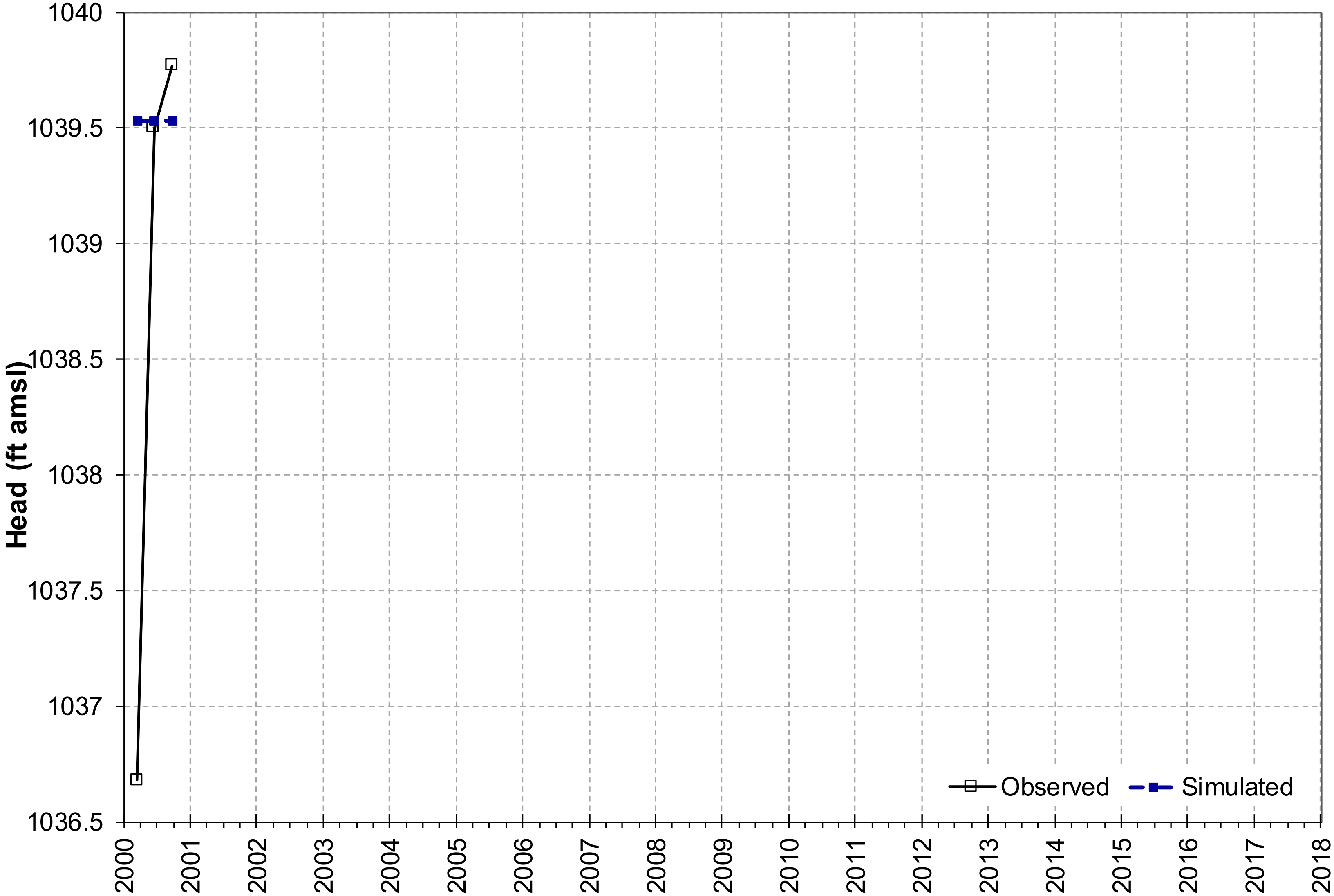
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-100, L1, A Sands

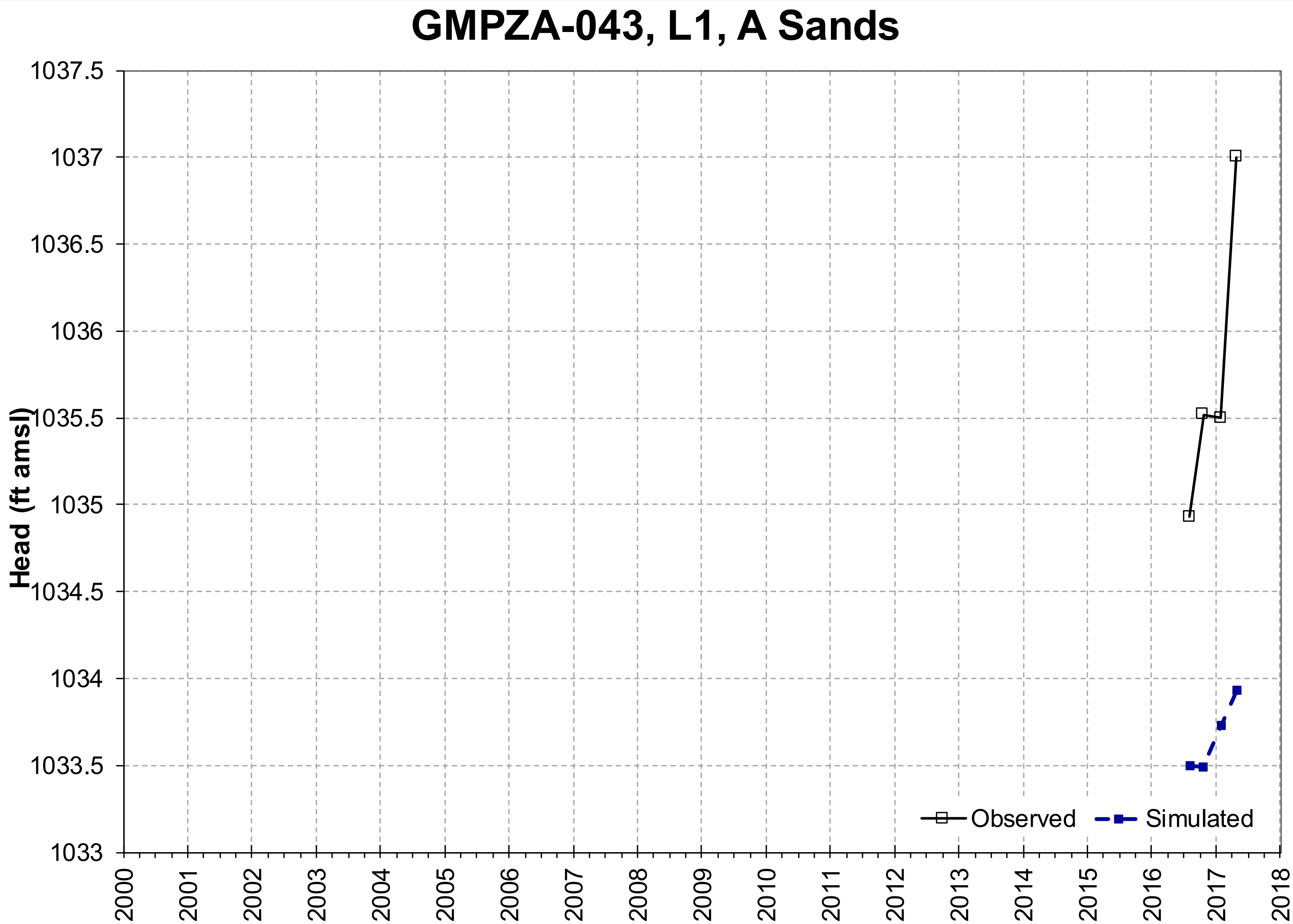


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

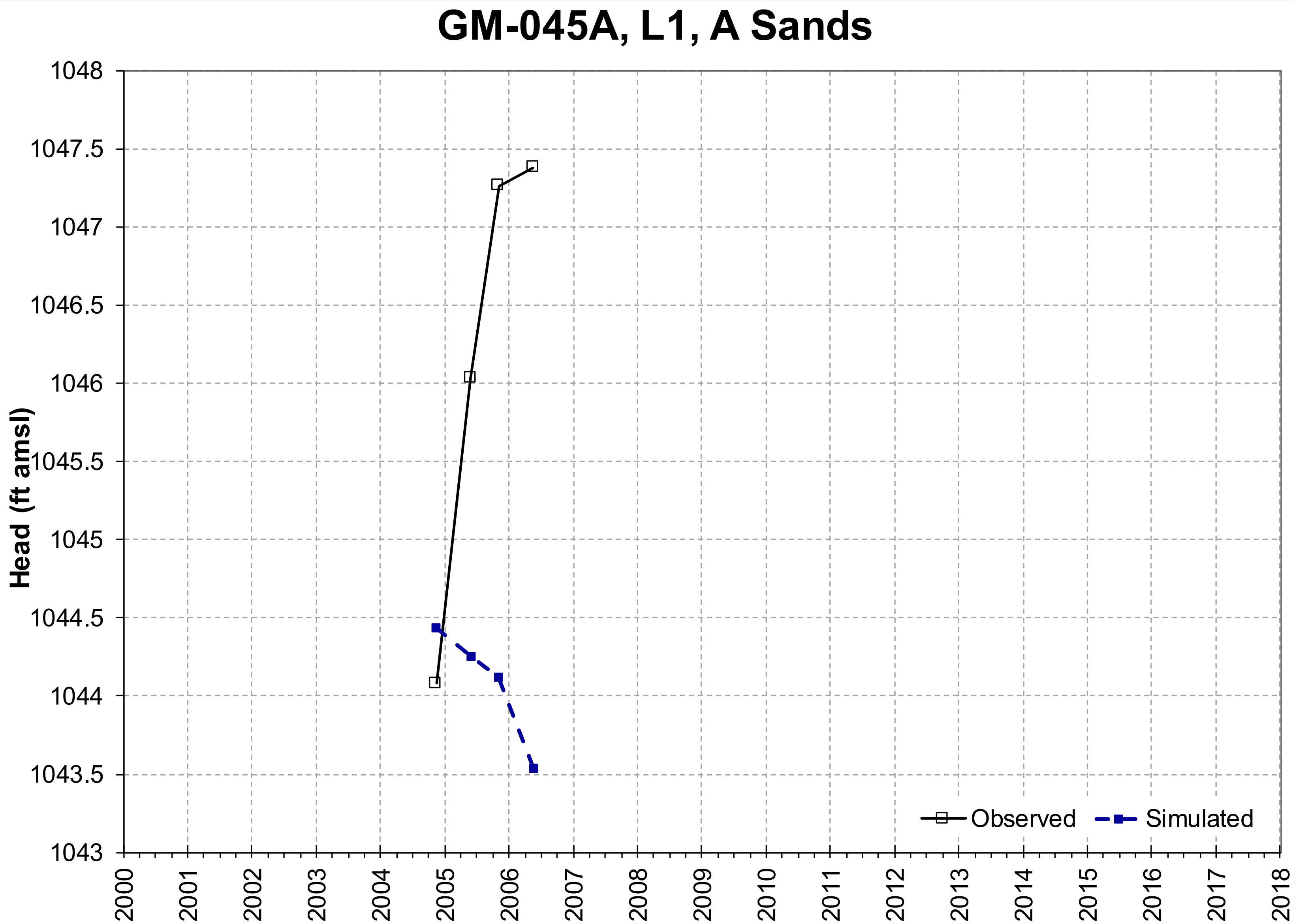


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

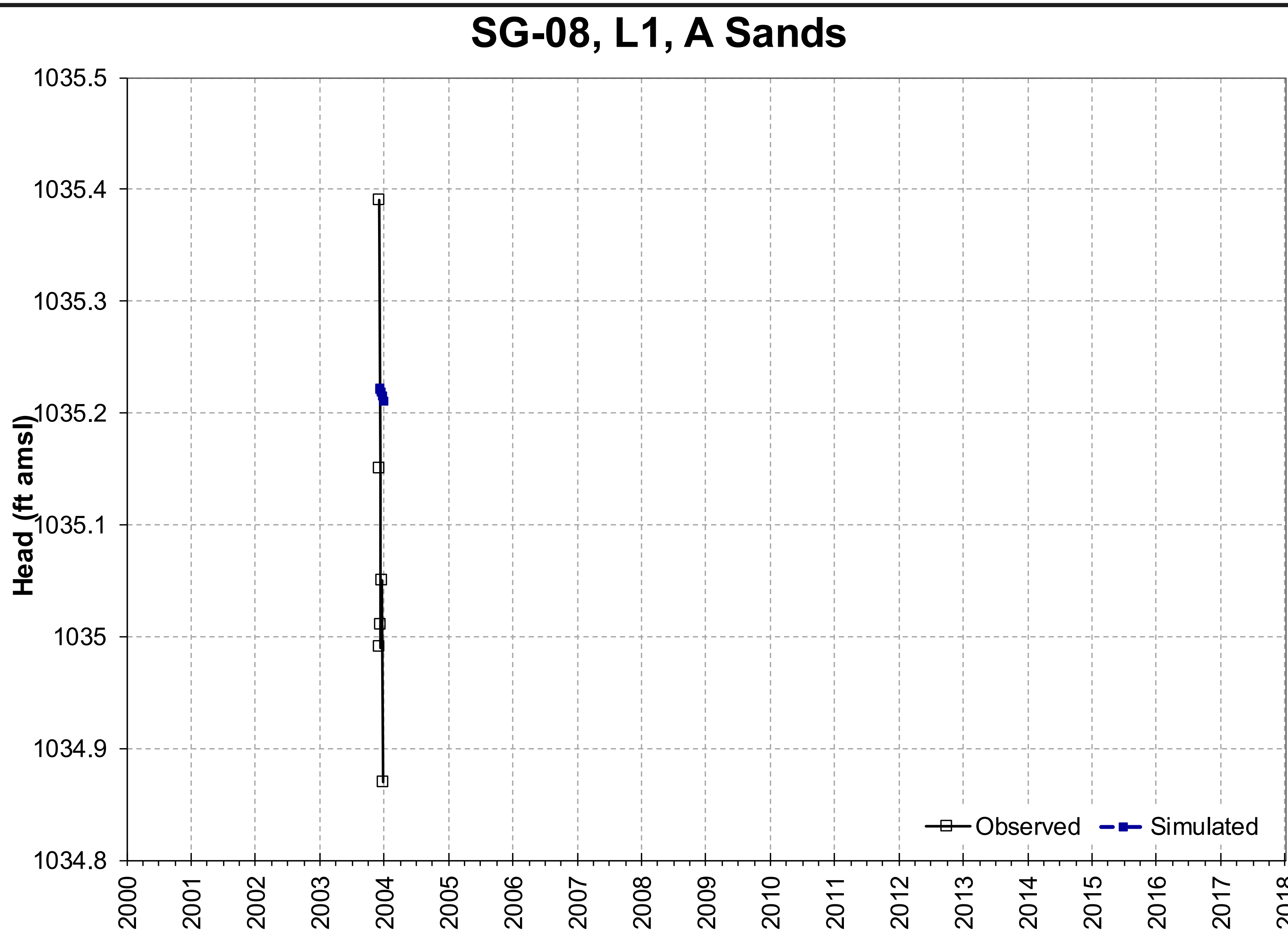


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

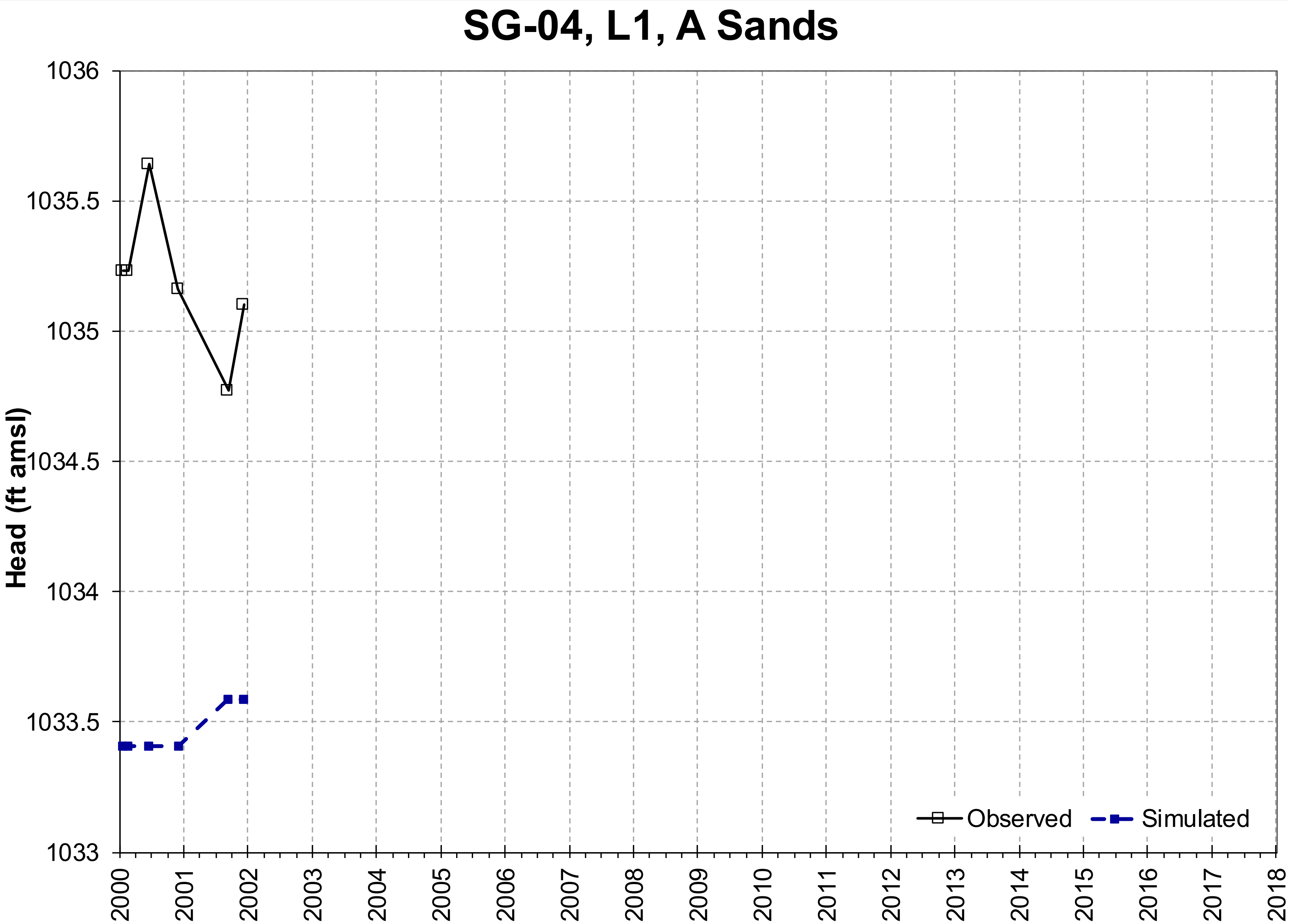


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

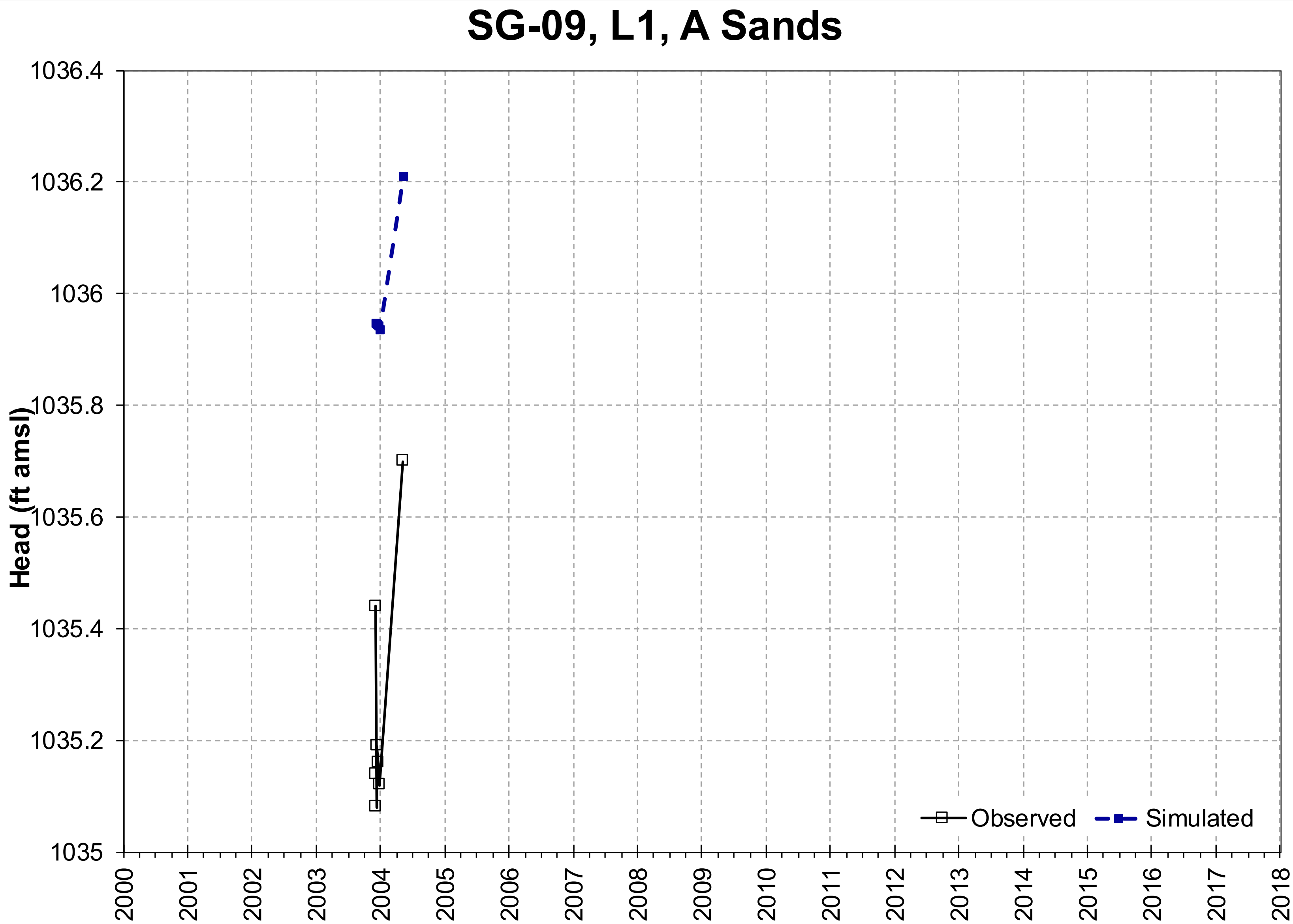


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

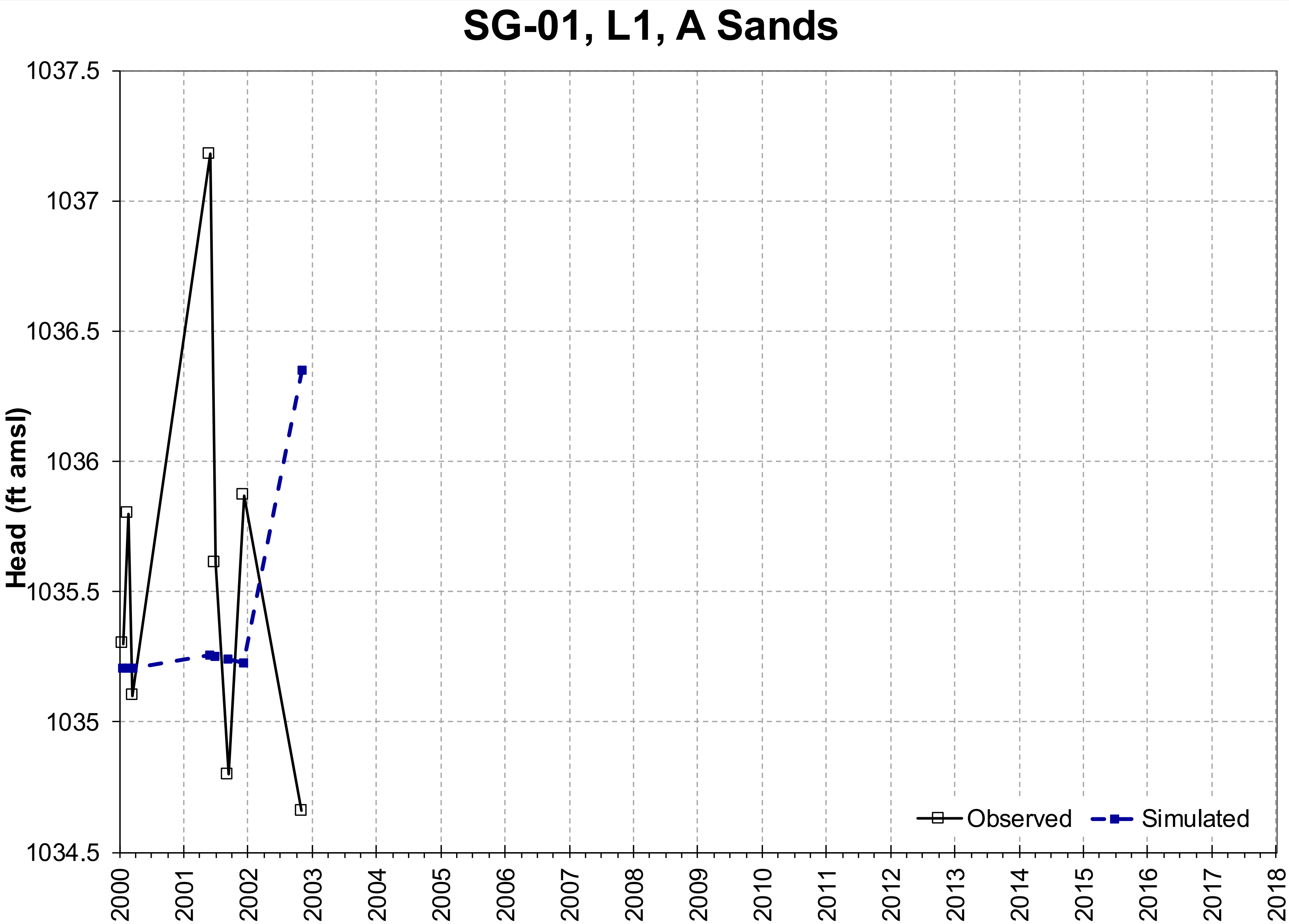


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

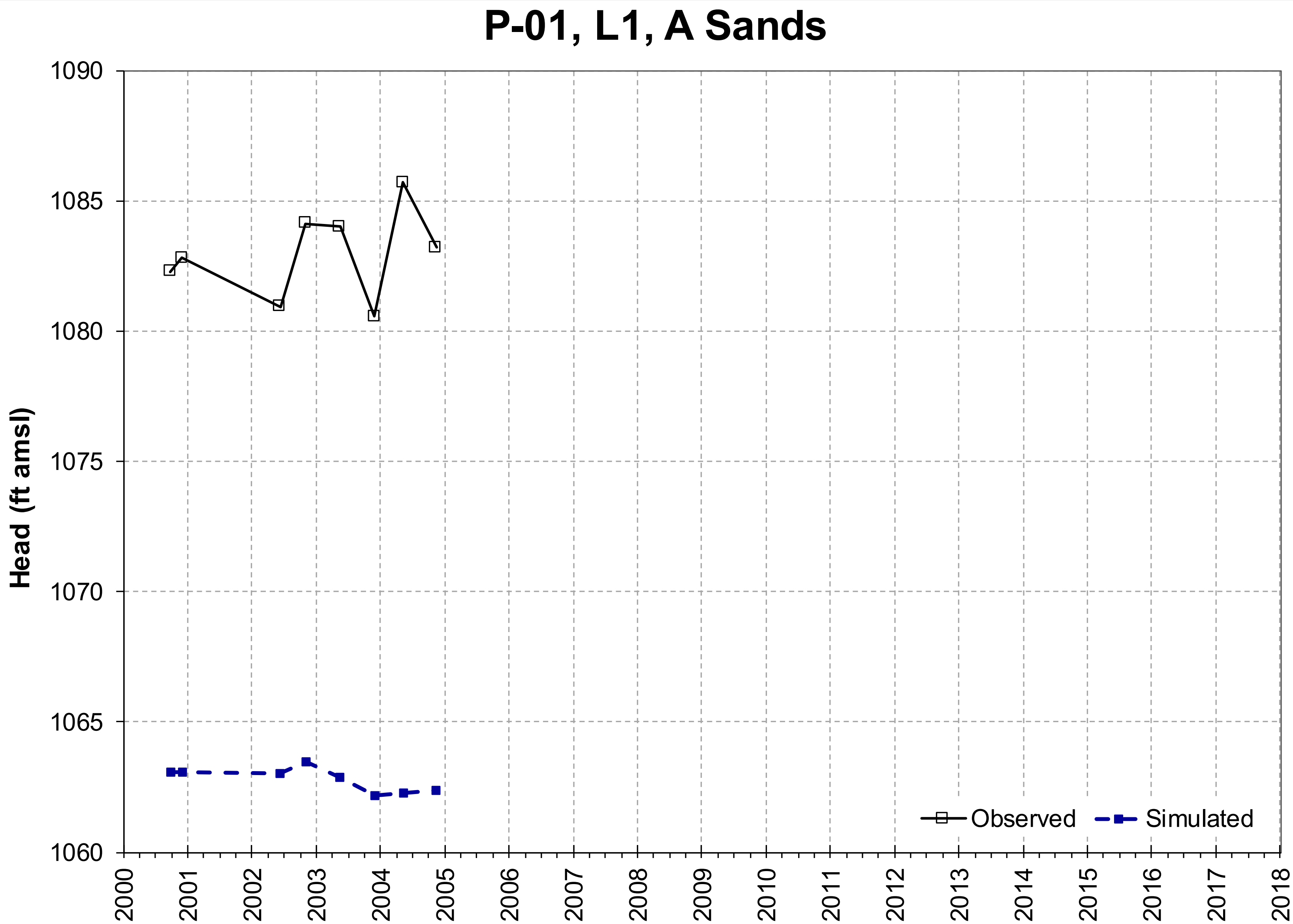


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

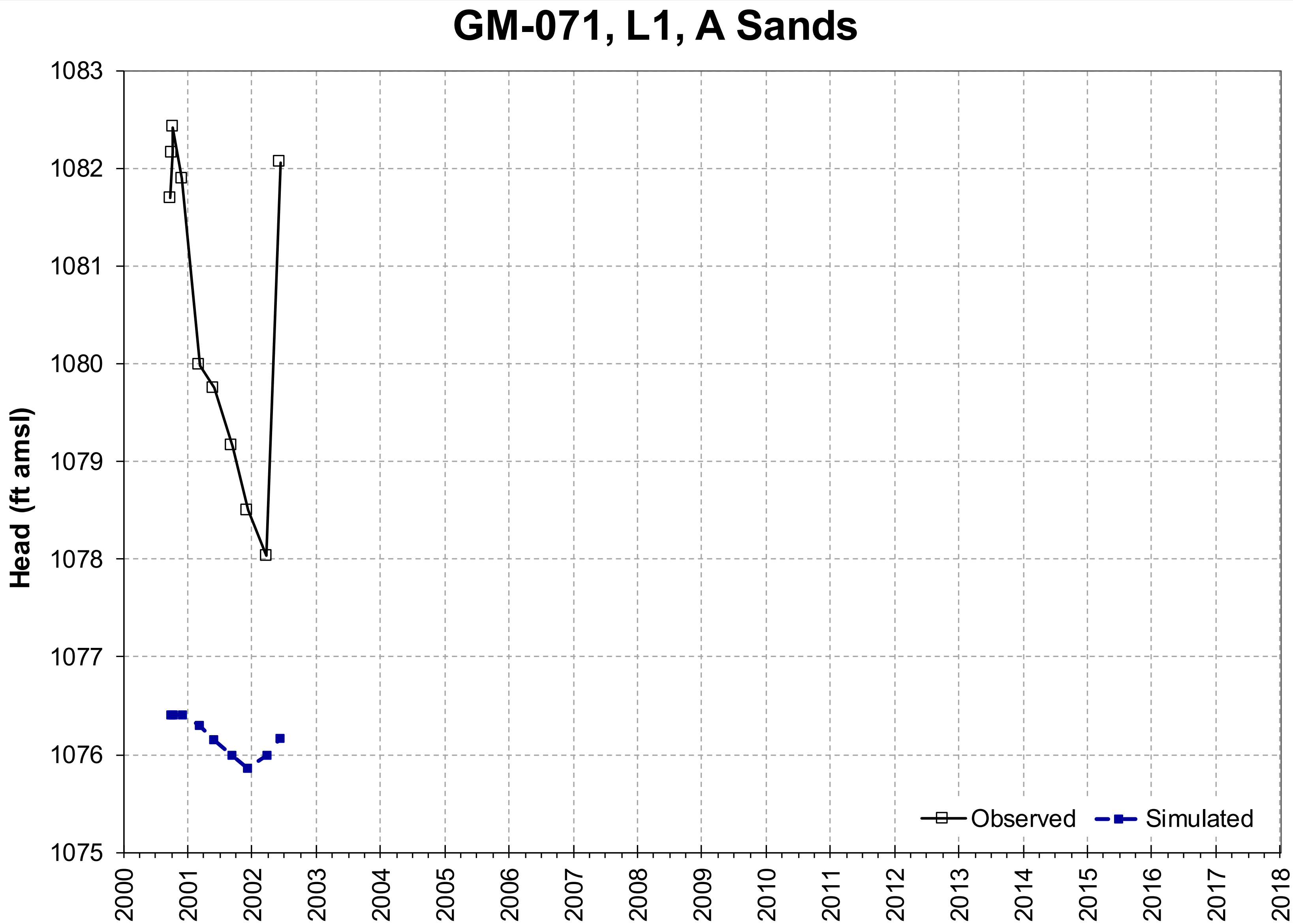


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



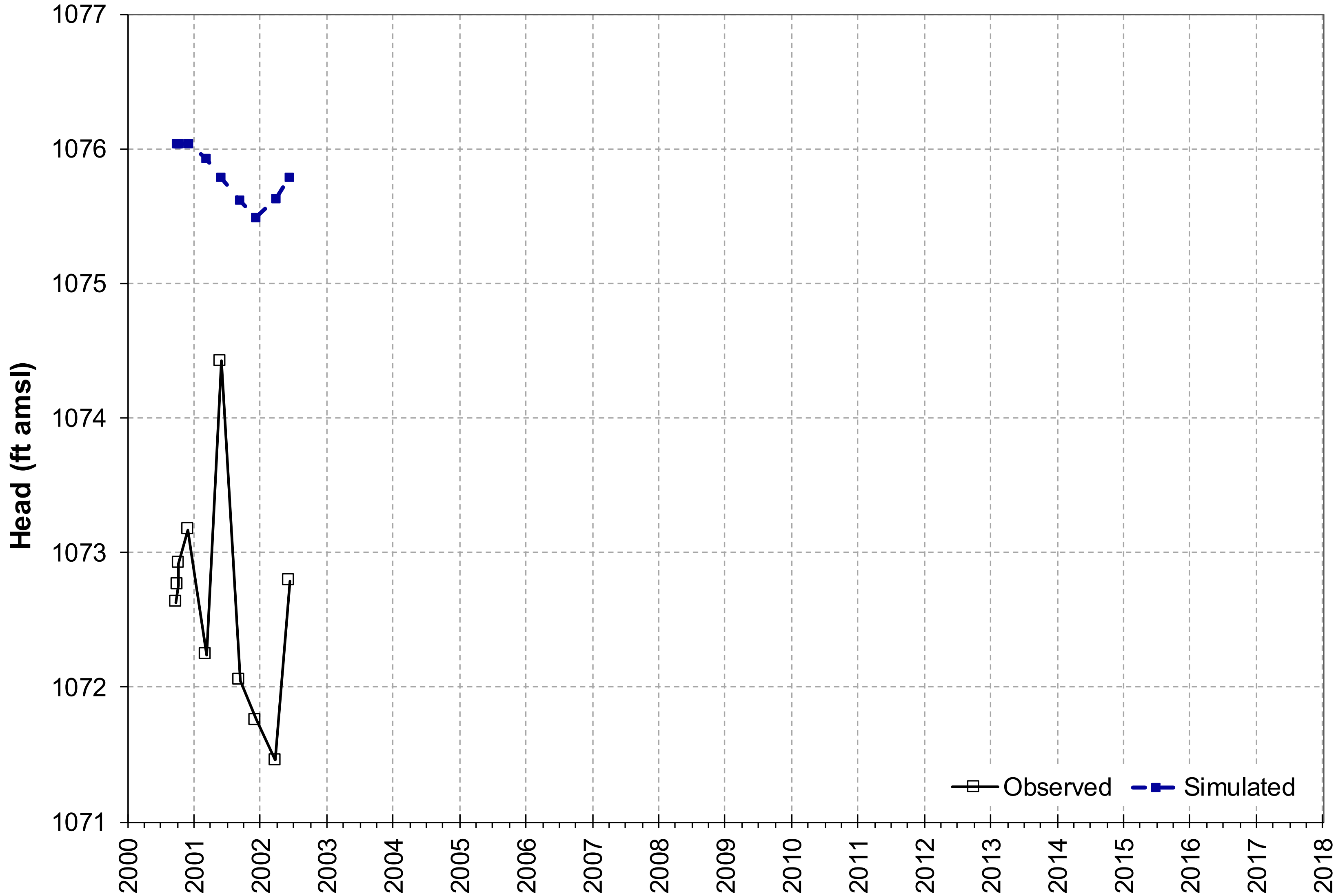
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-070, L1, A Sands

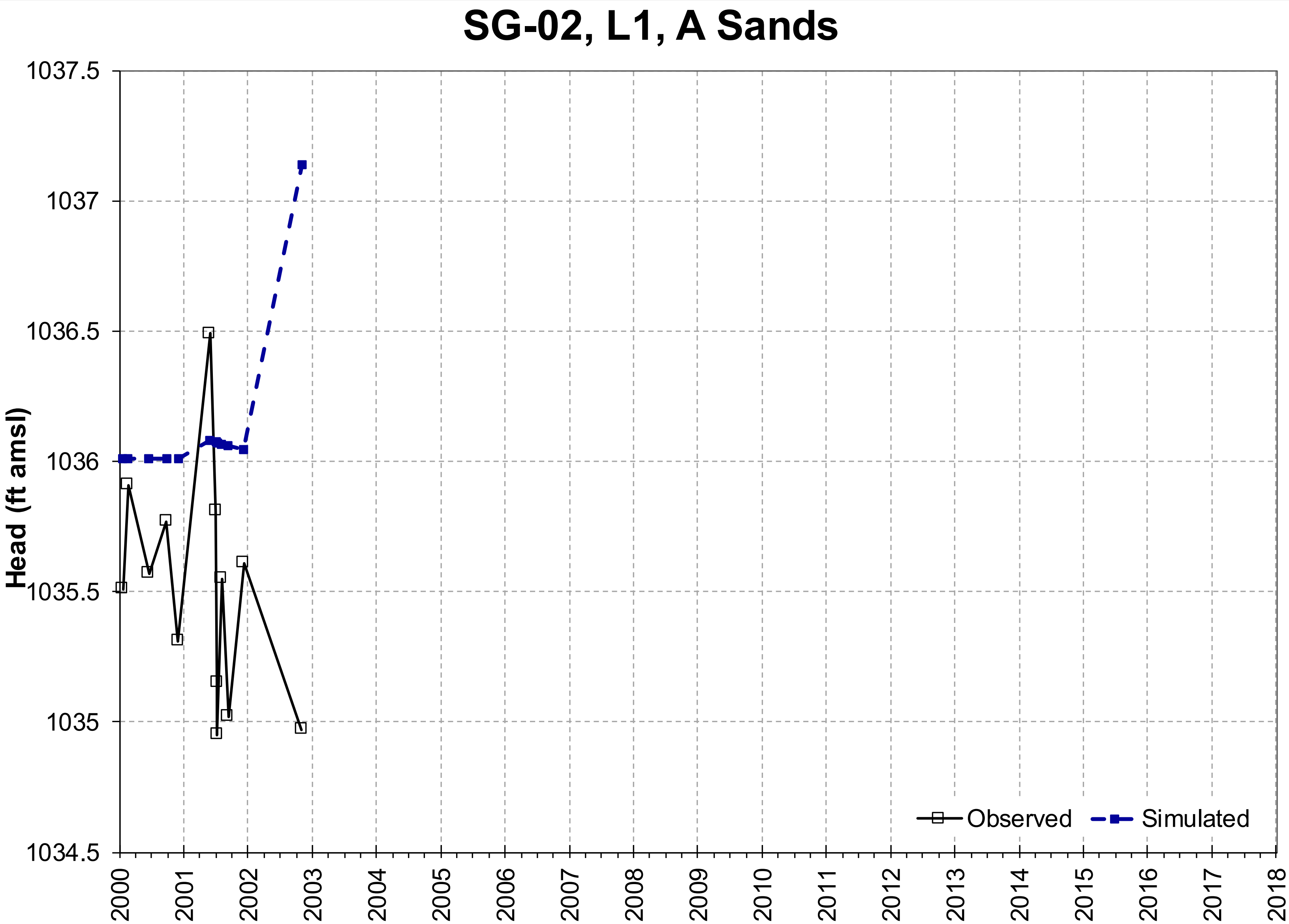


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

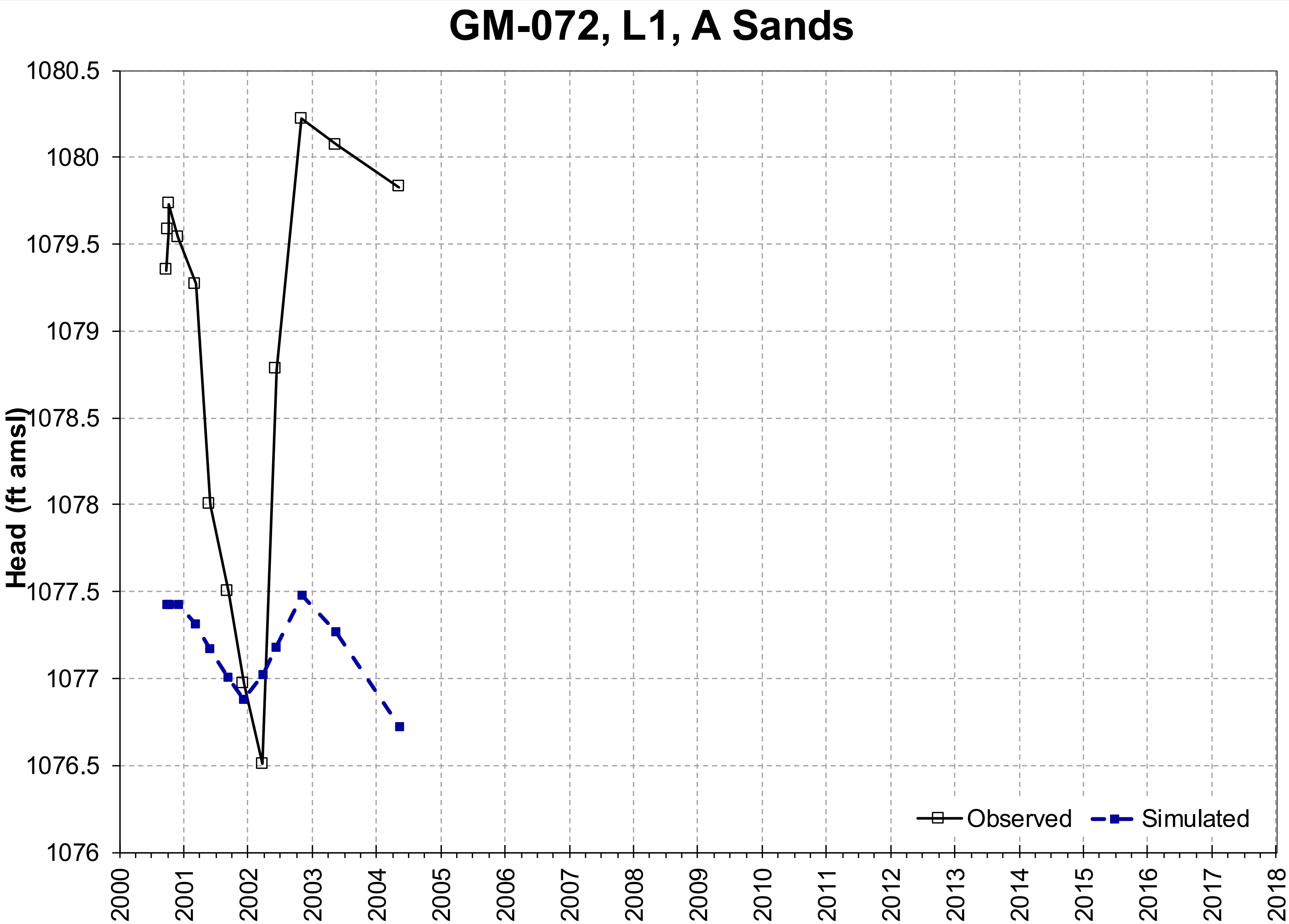


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

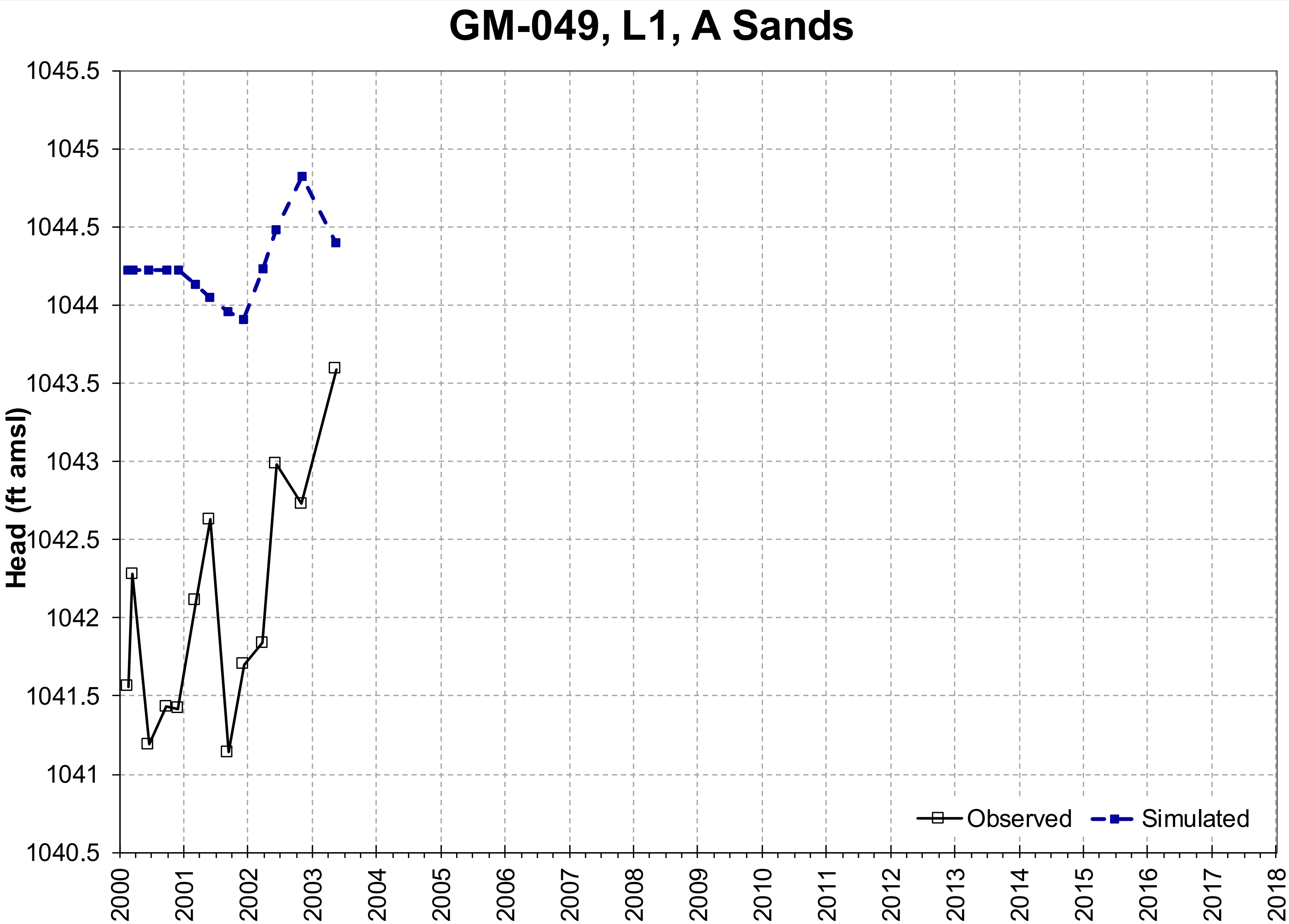


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

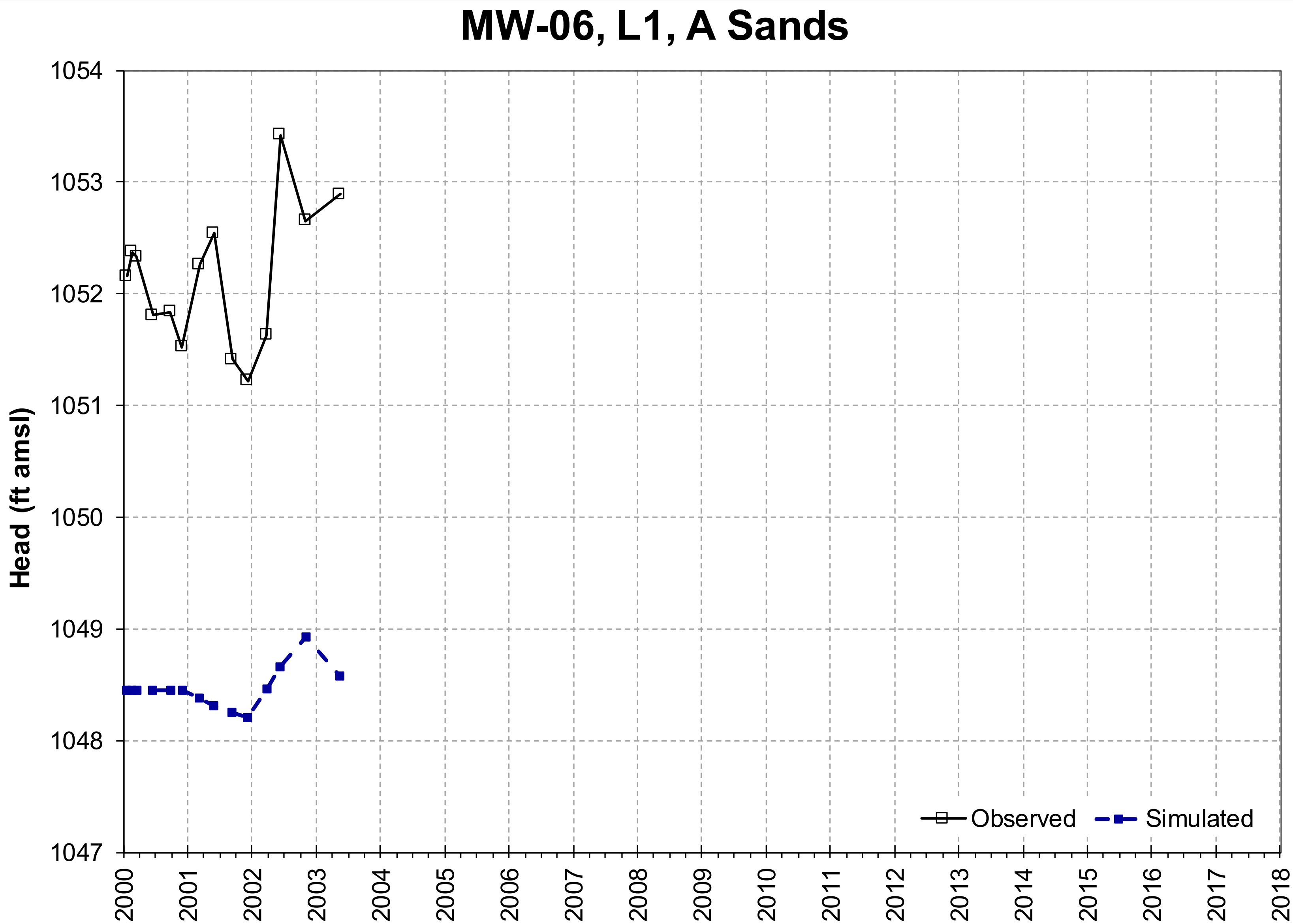


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

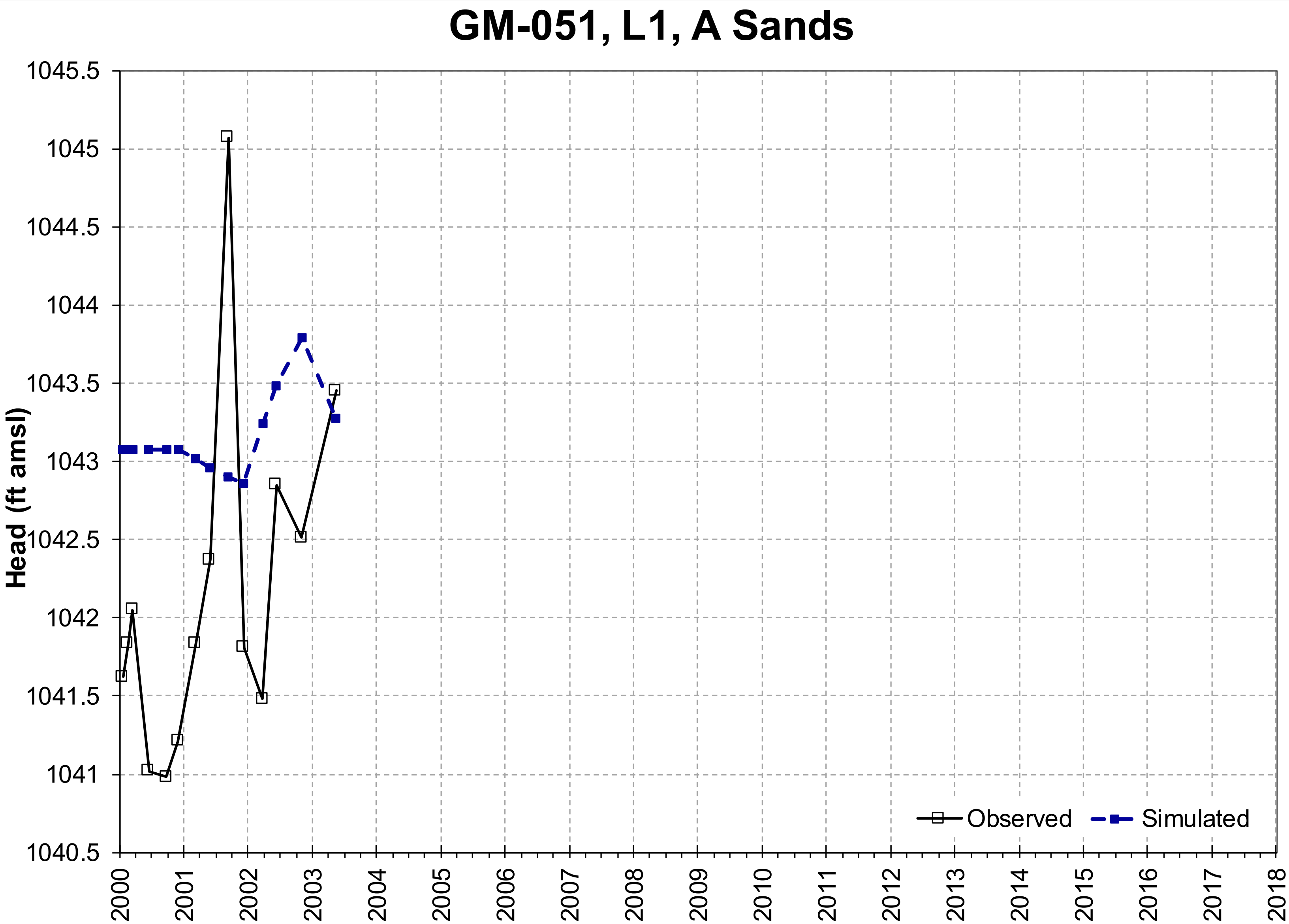


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

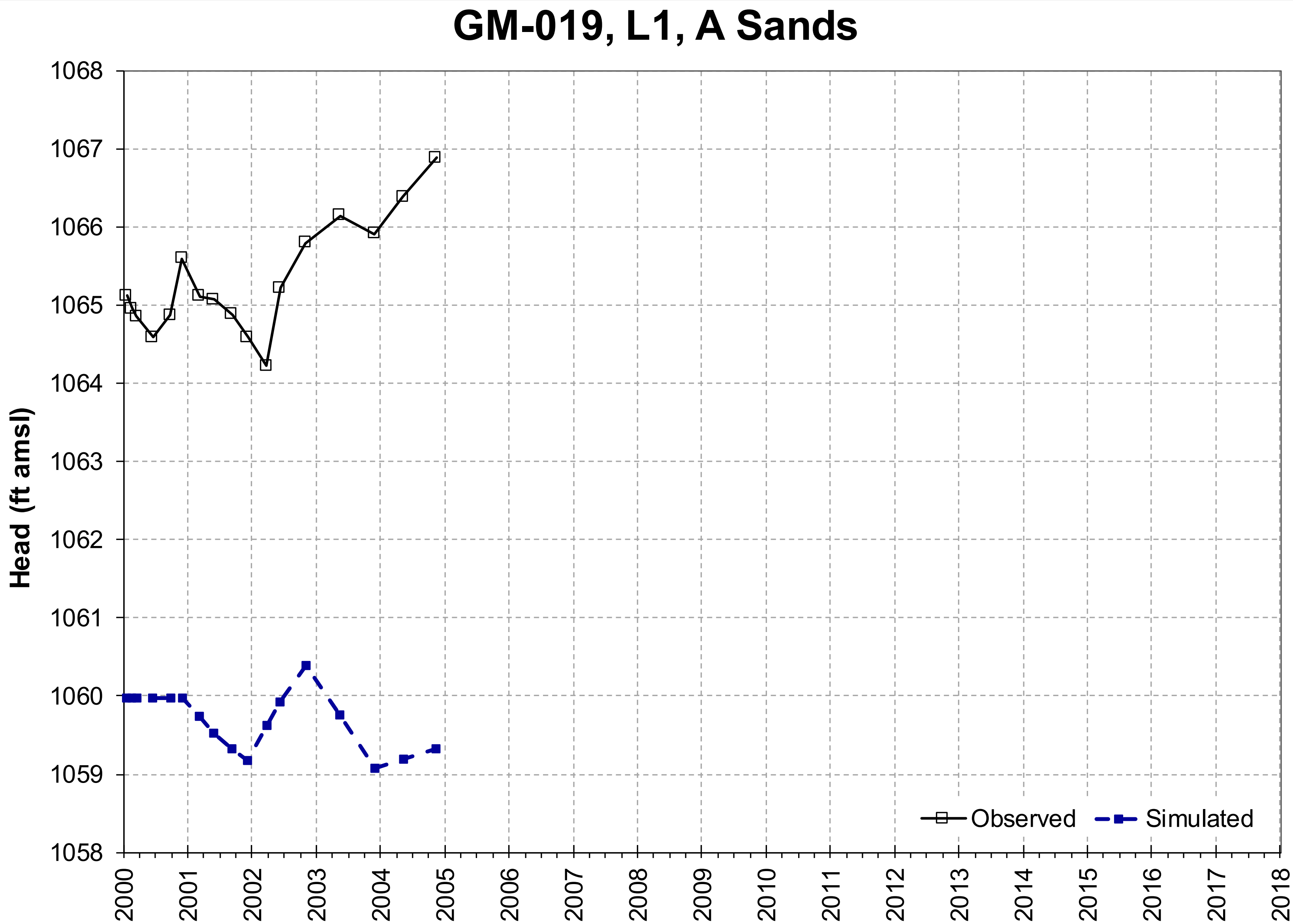


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

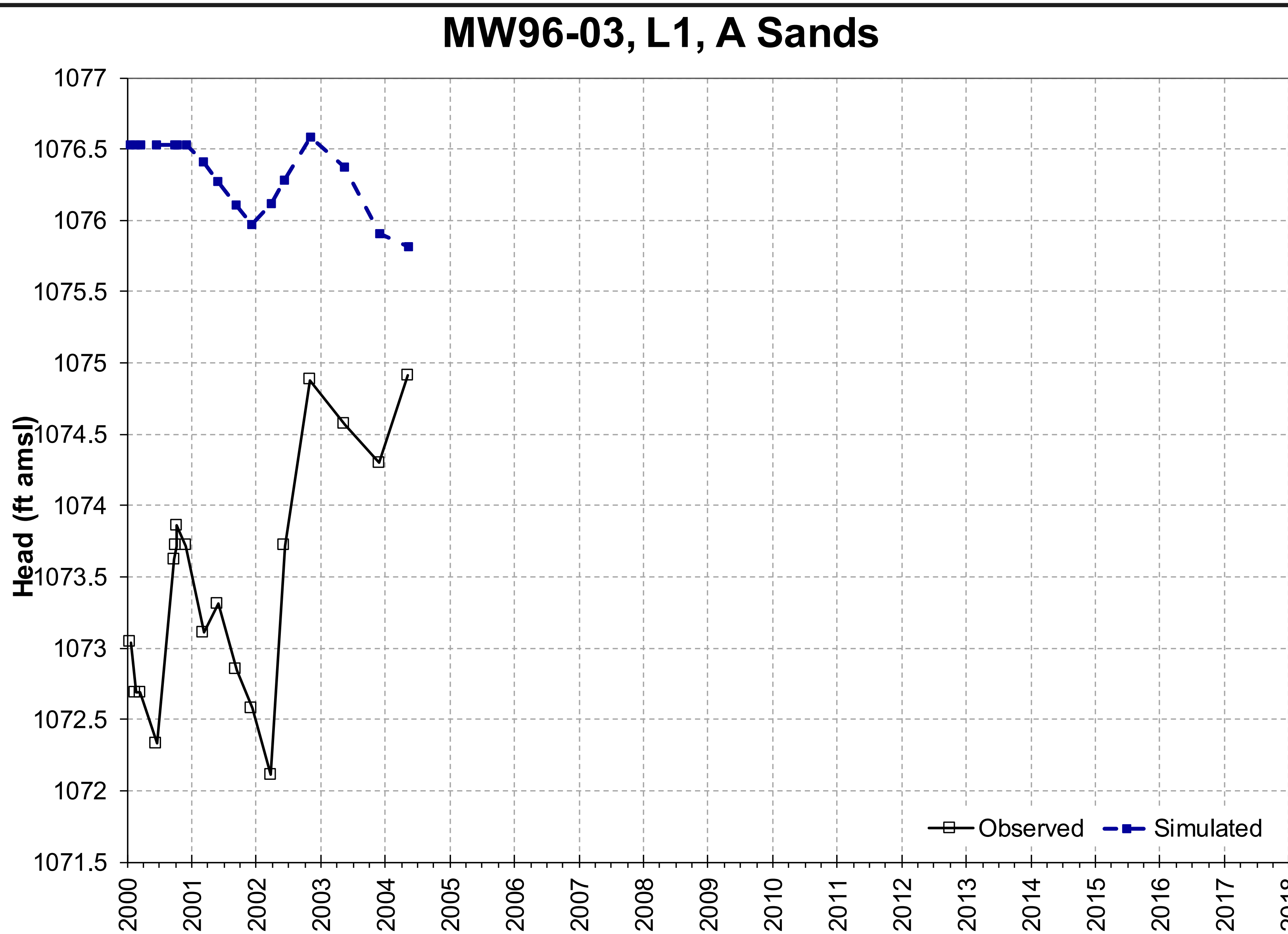


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

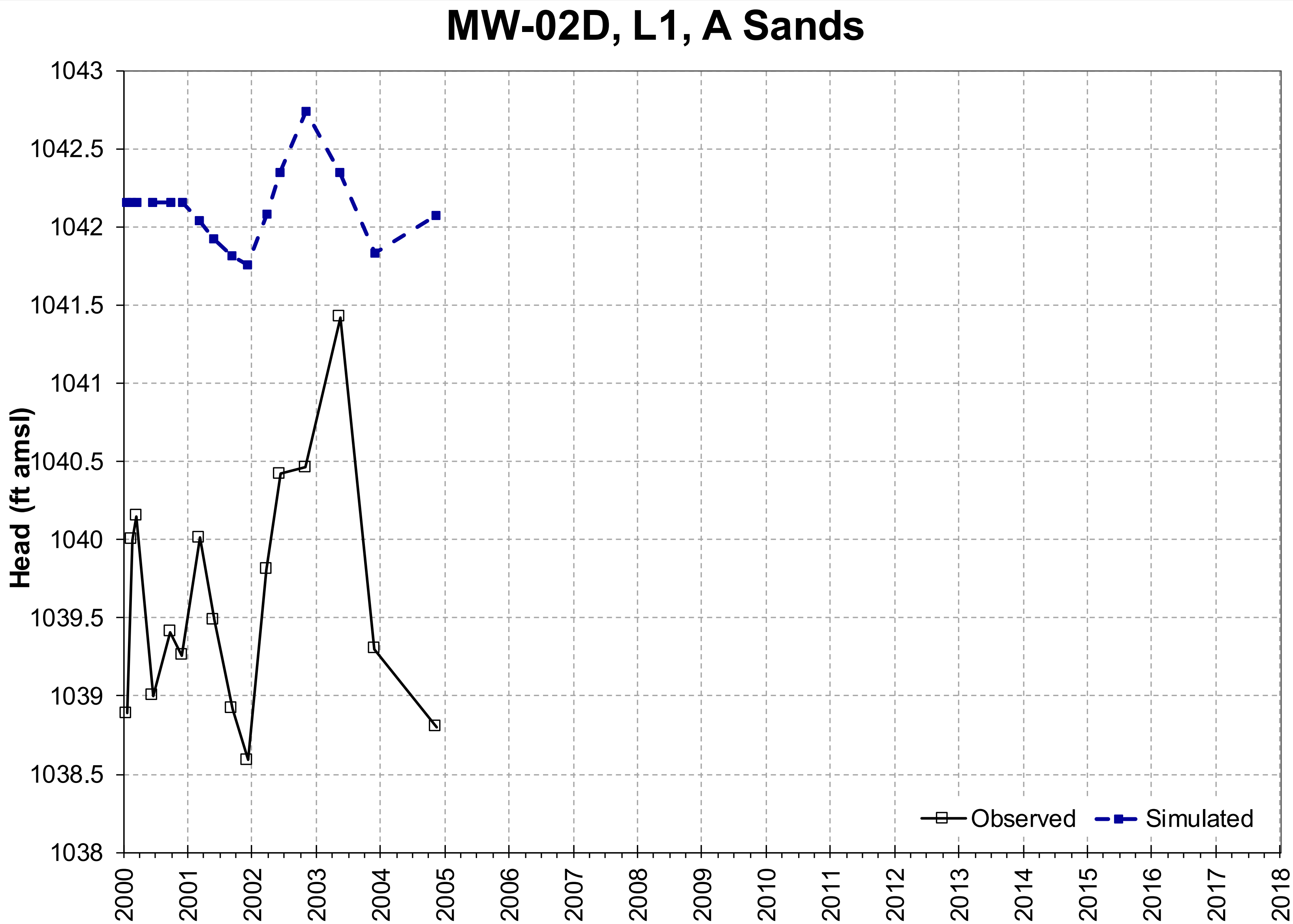


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



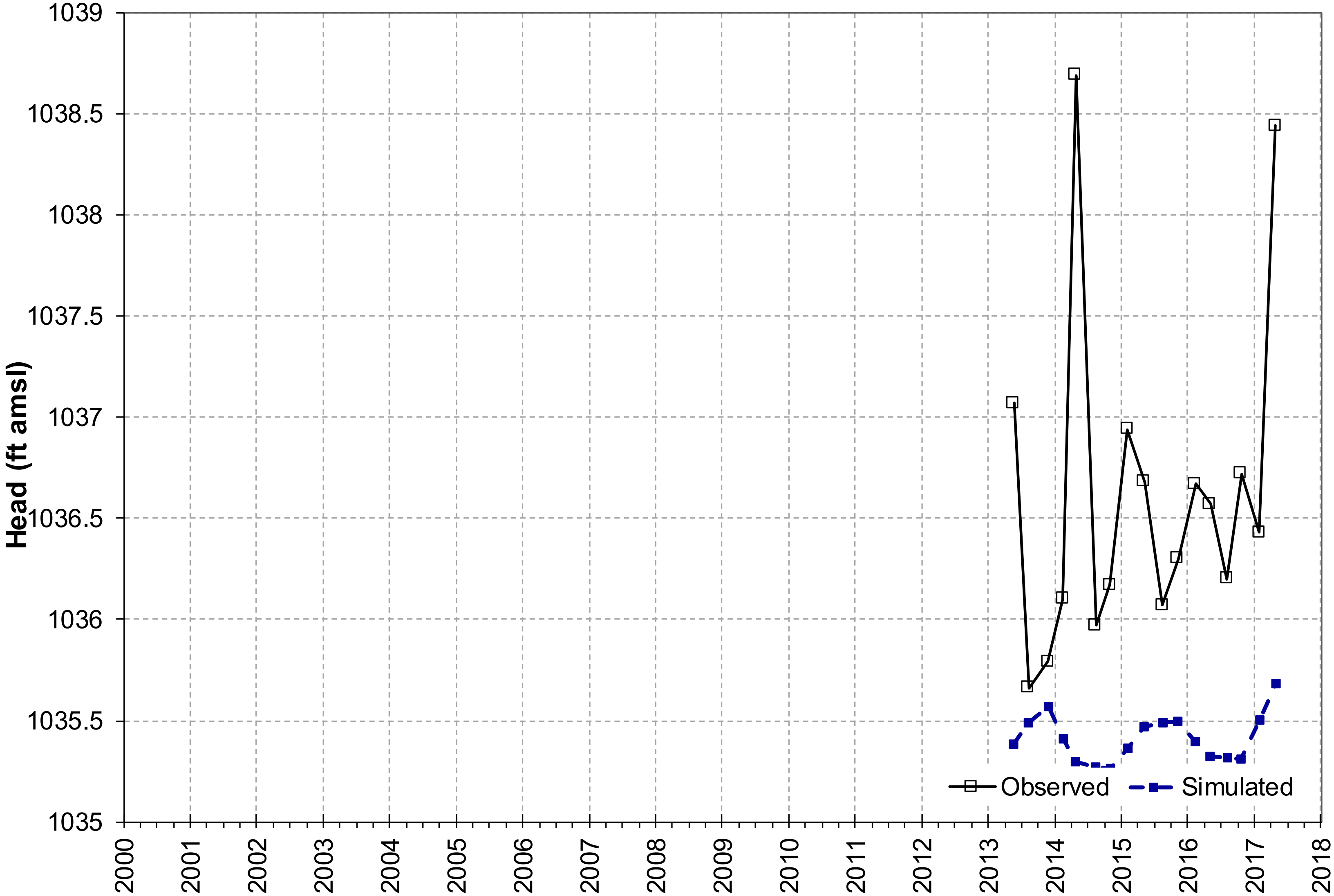
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZC-019, L1, A Sands

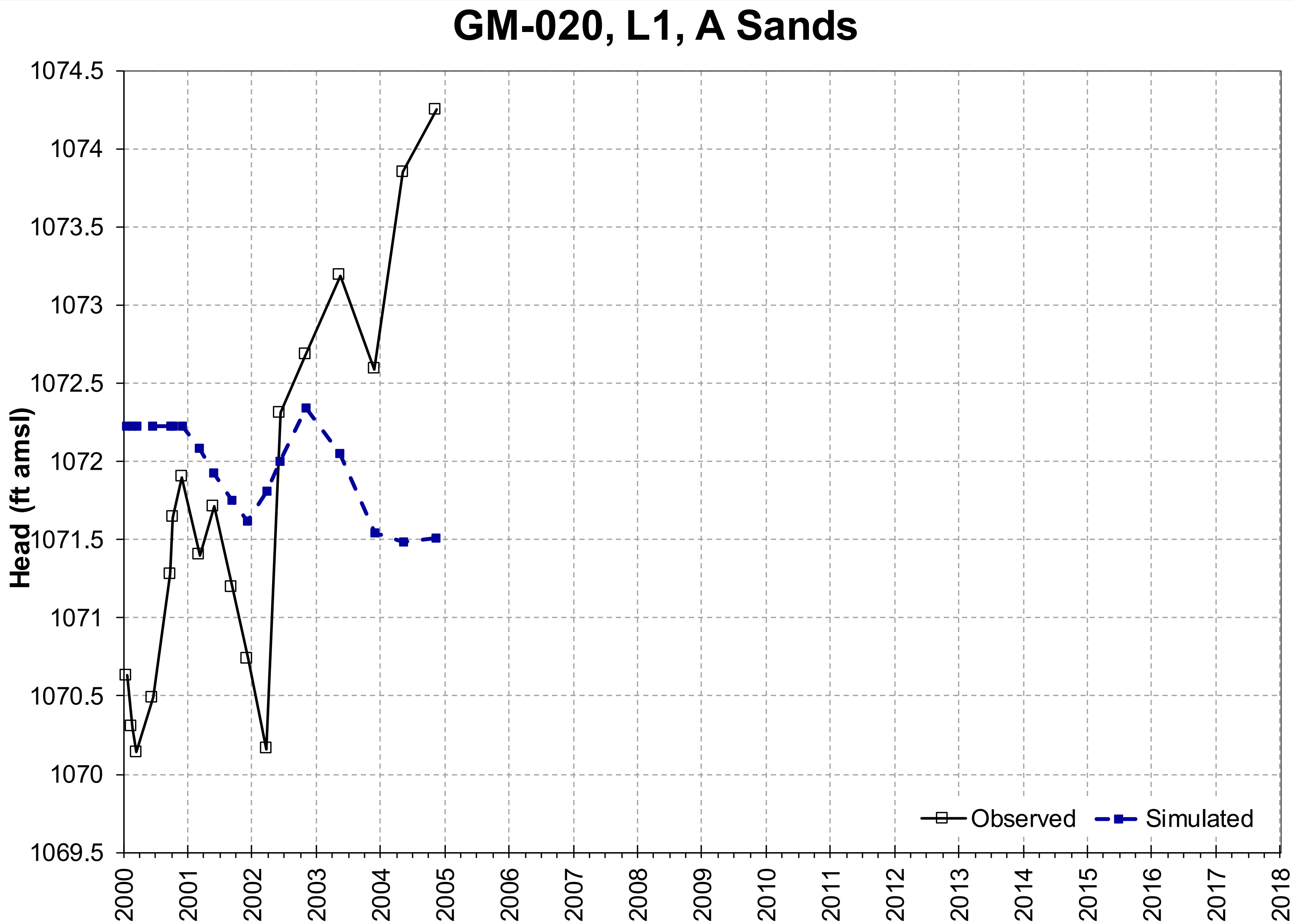


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



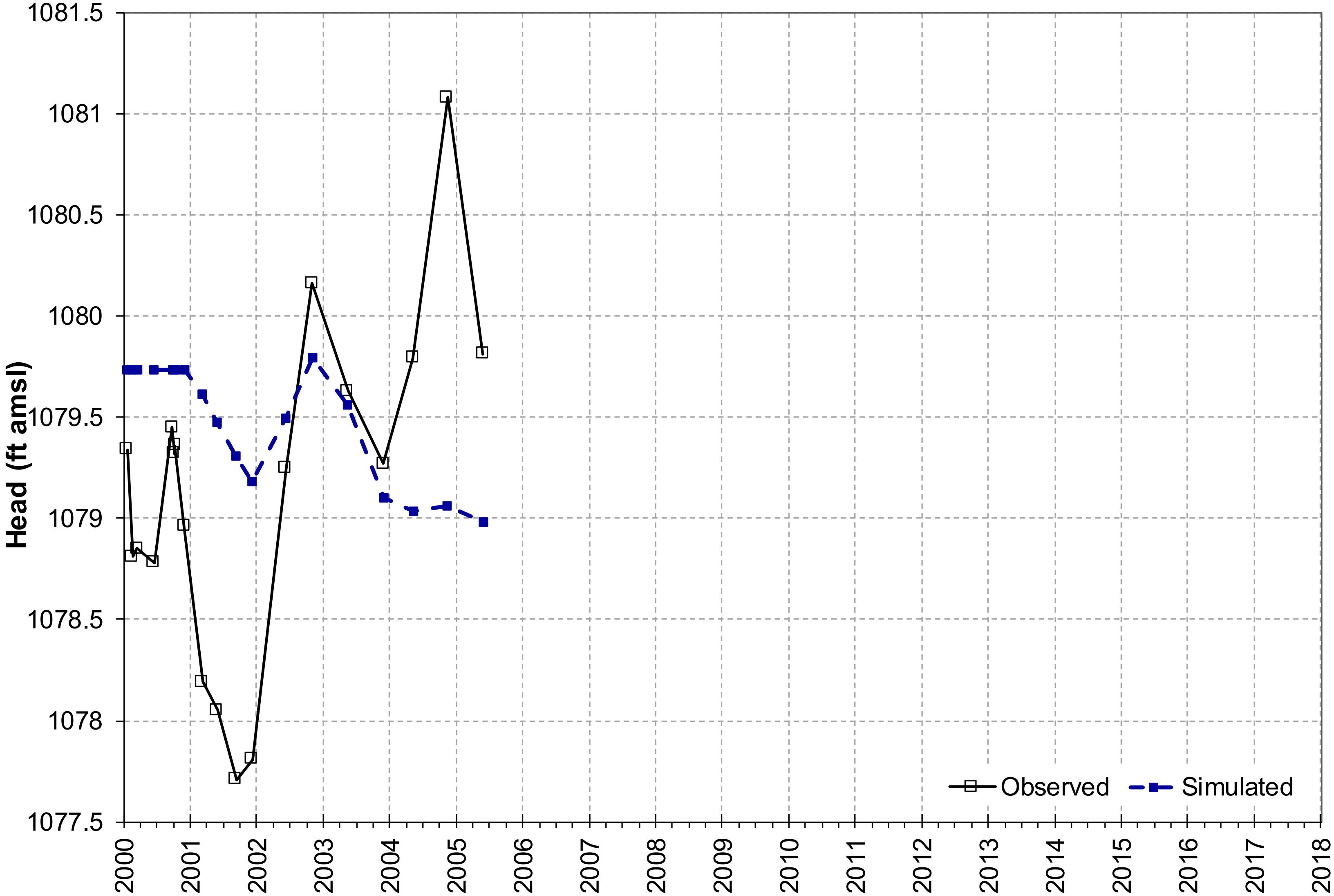
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

MW-03, L1, A Sands

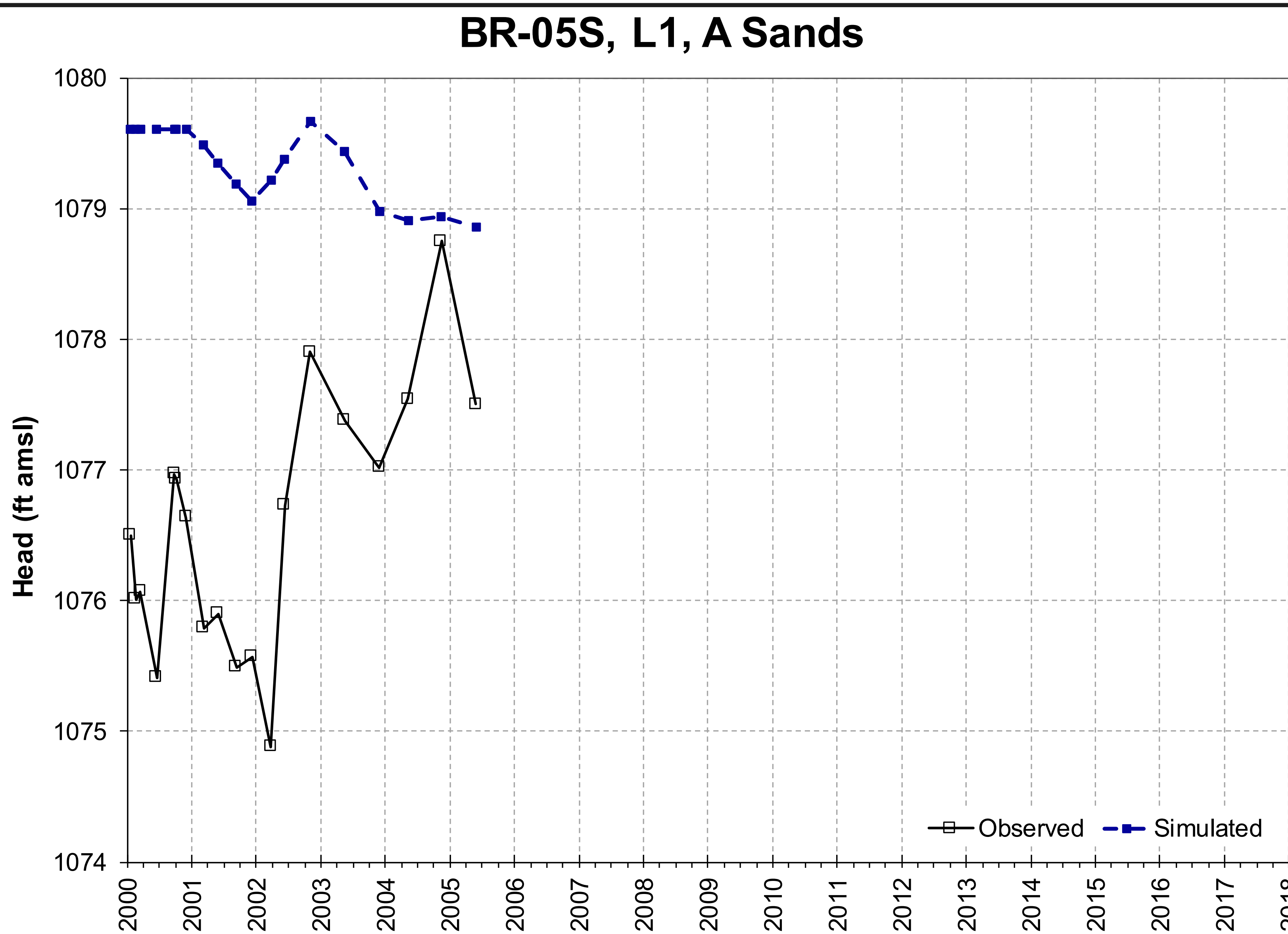


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

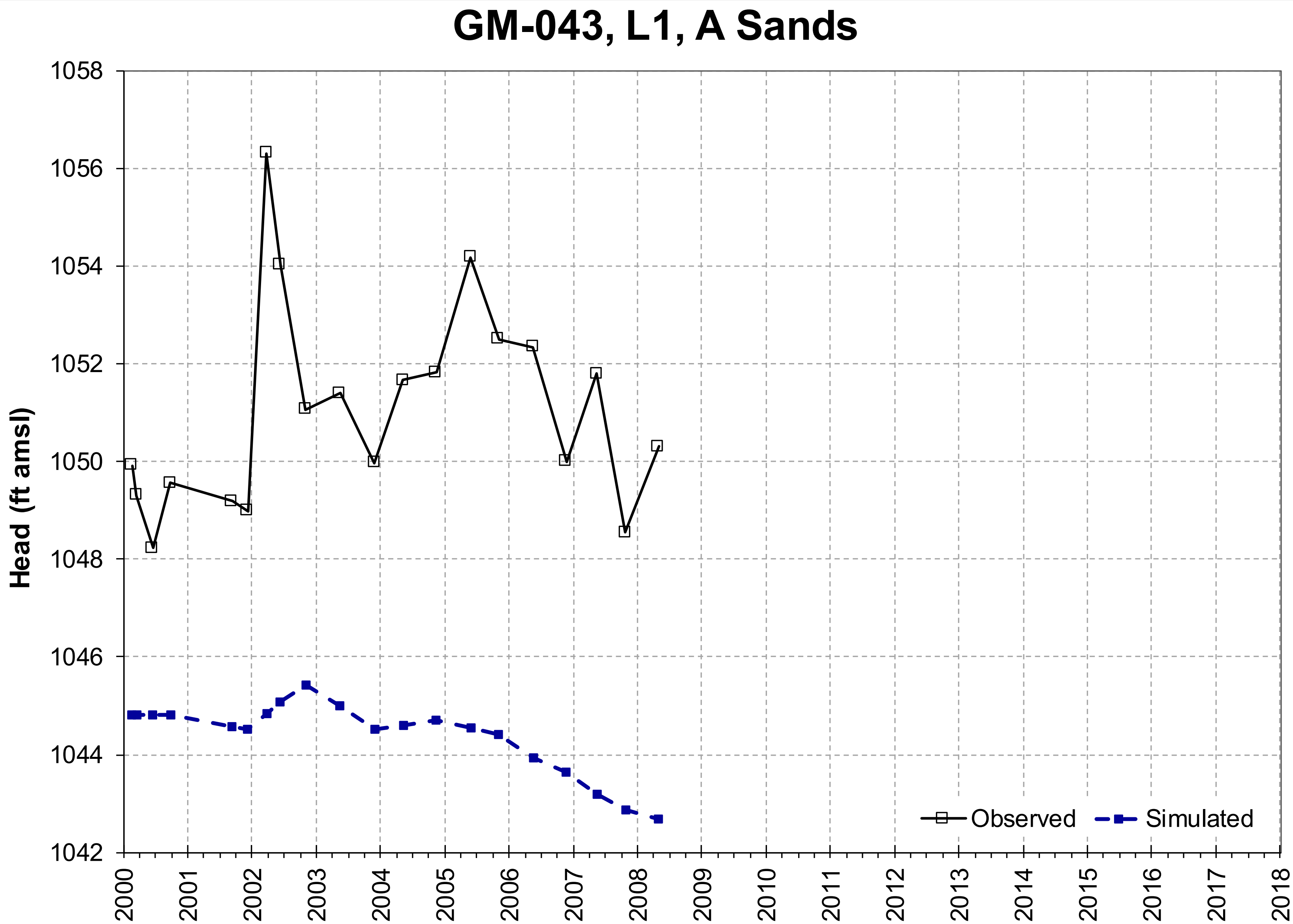


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

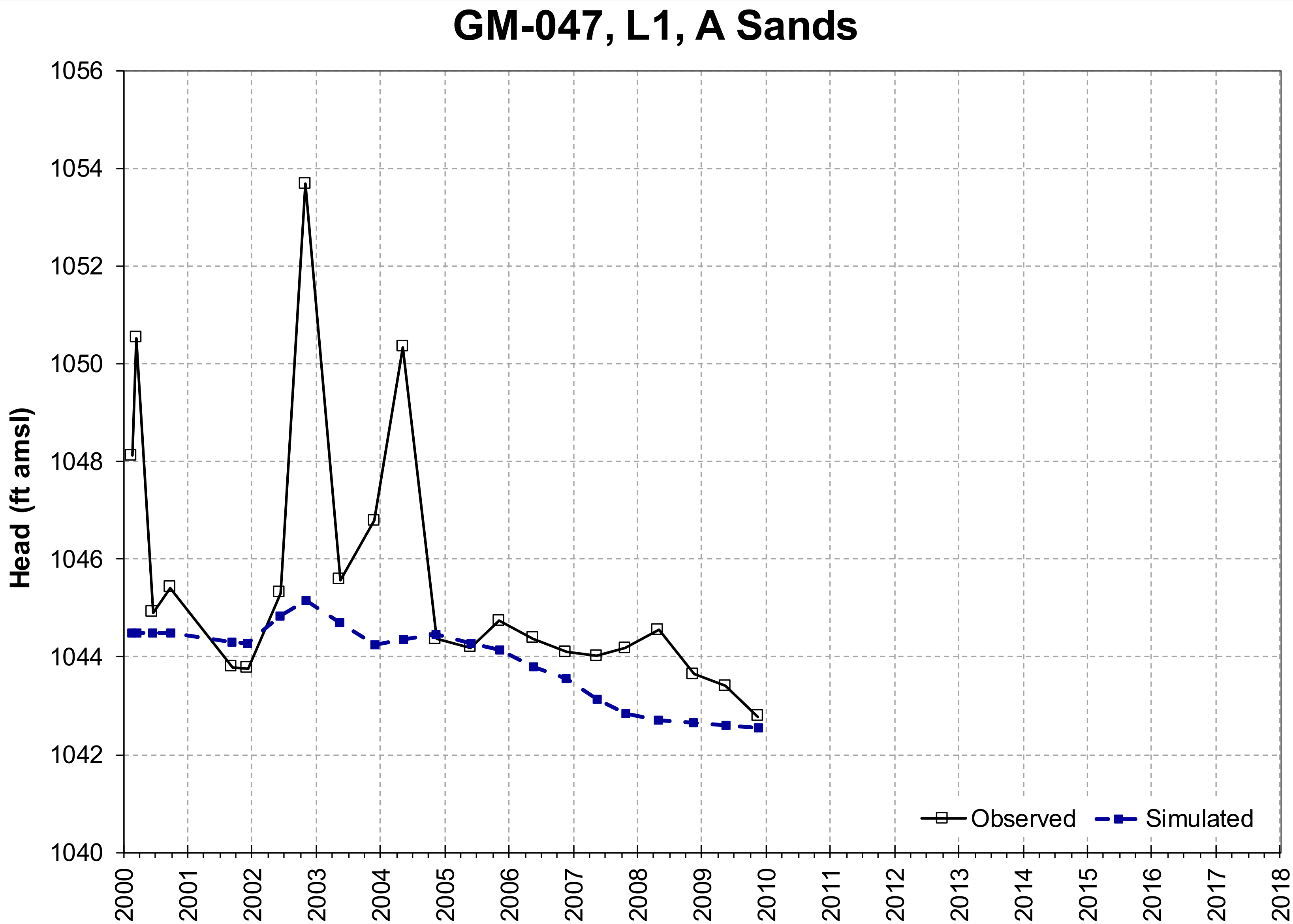


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

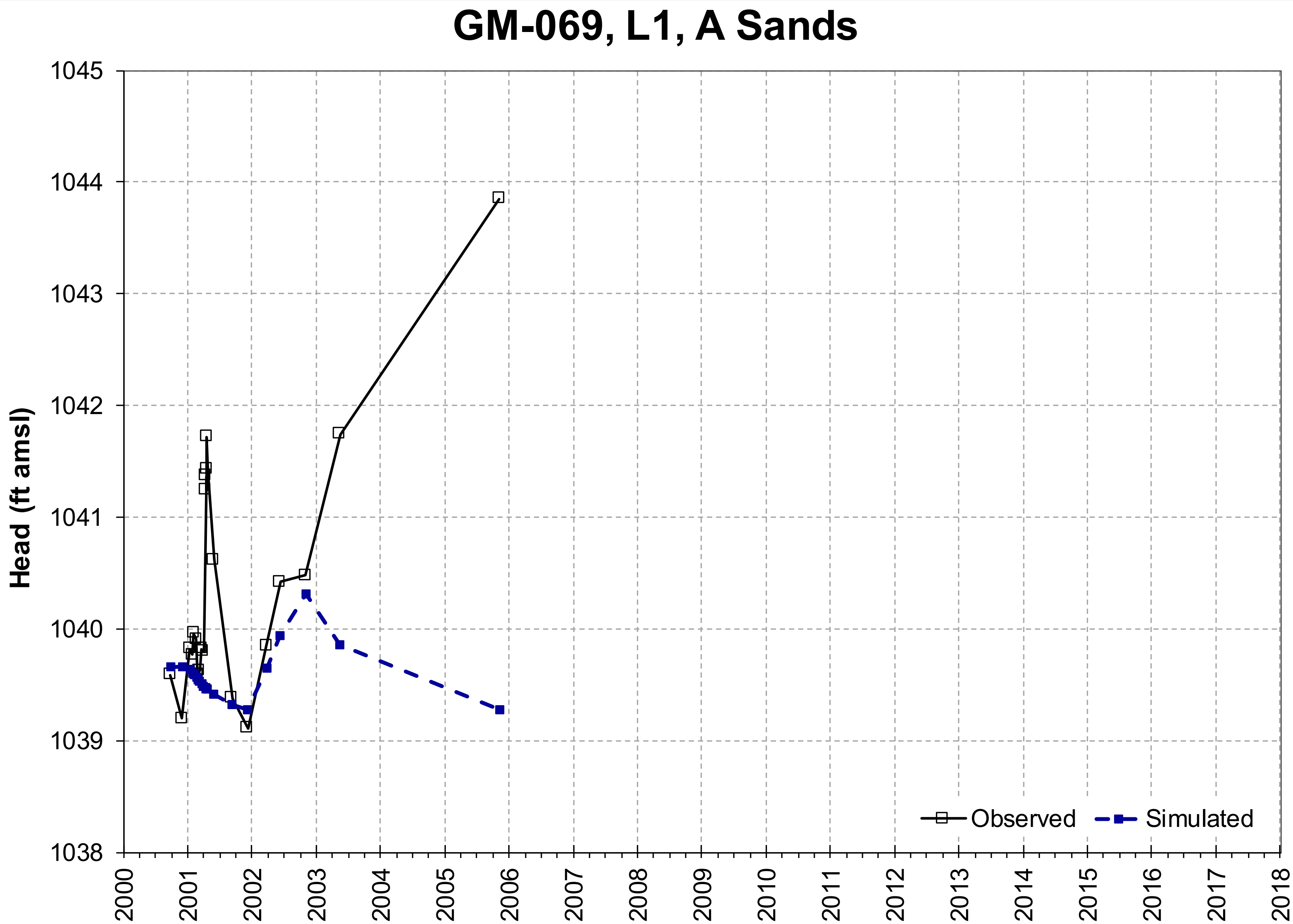


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

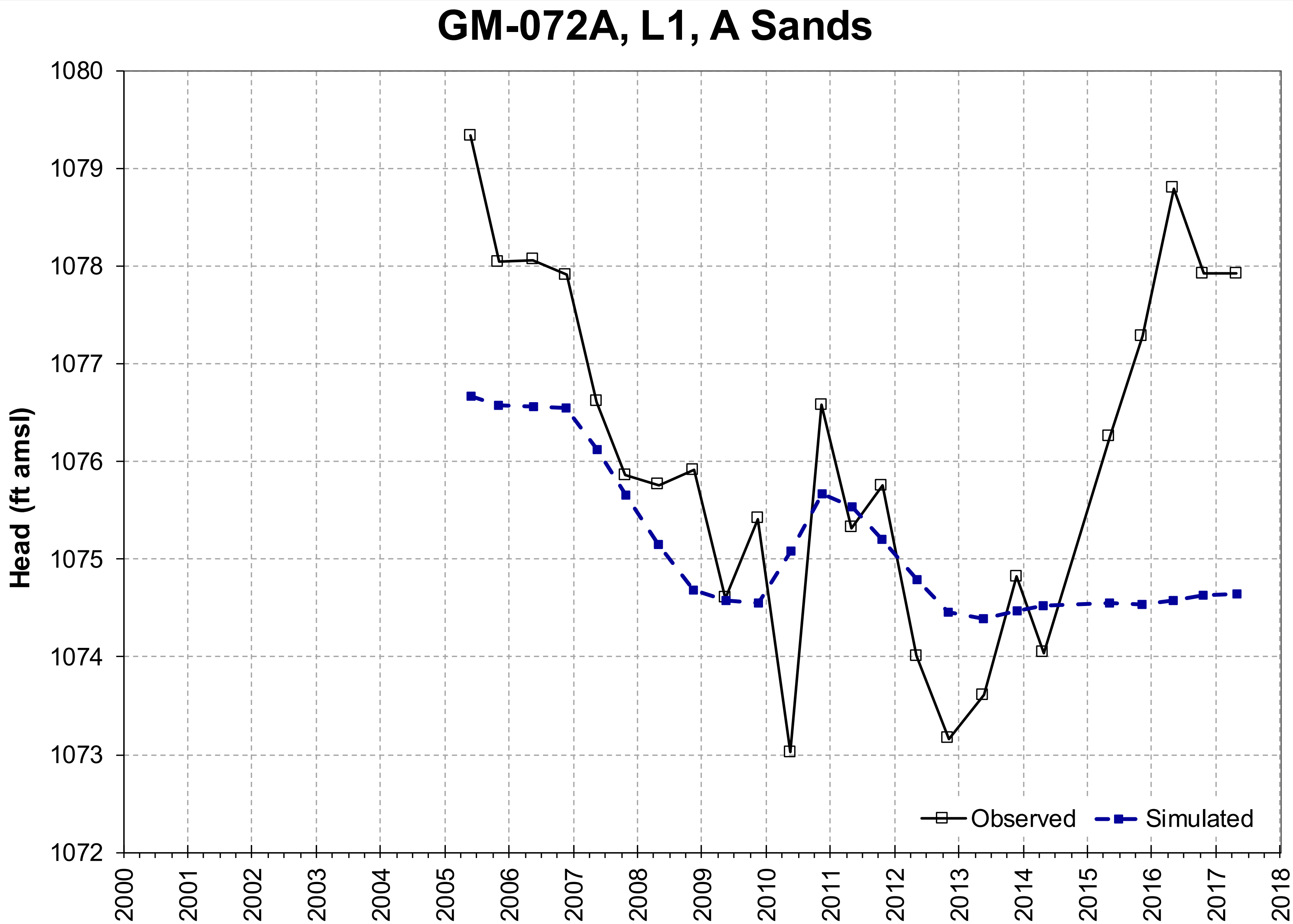


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS

FIGURE
A

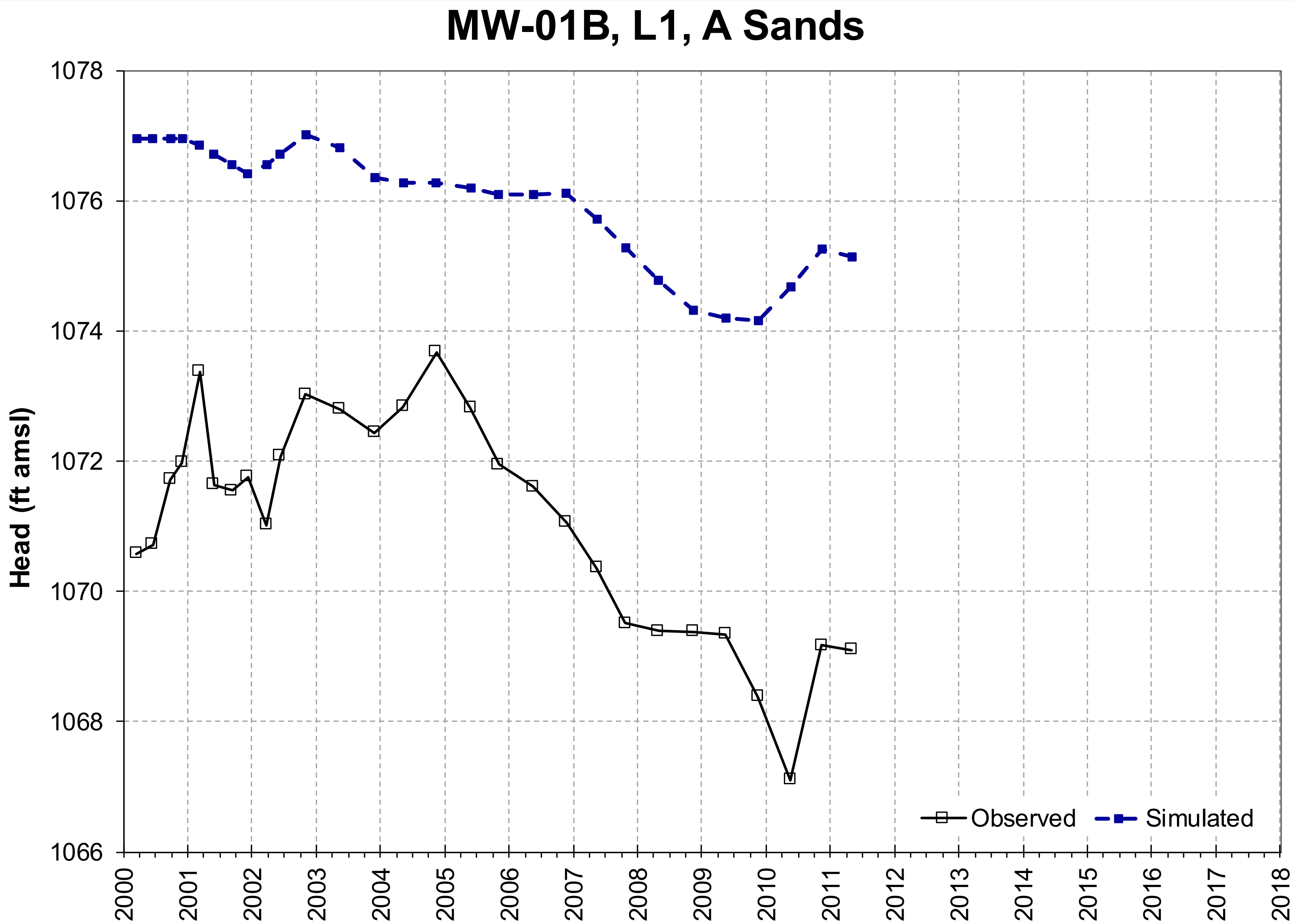


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

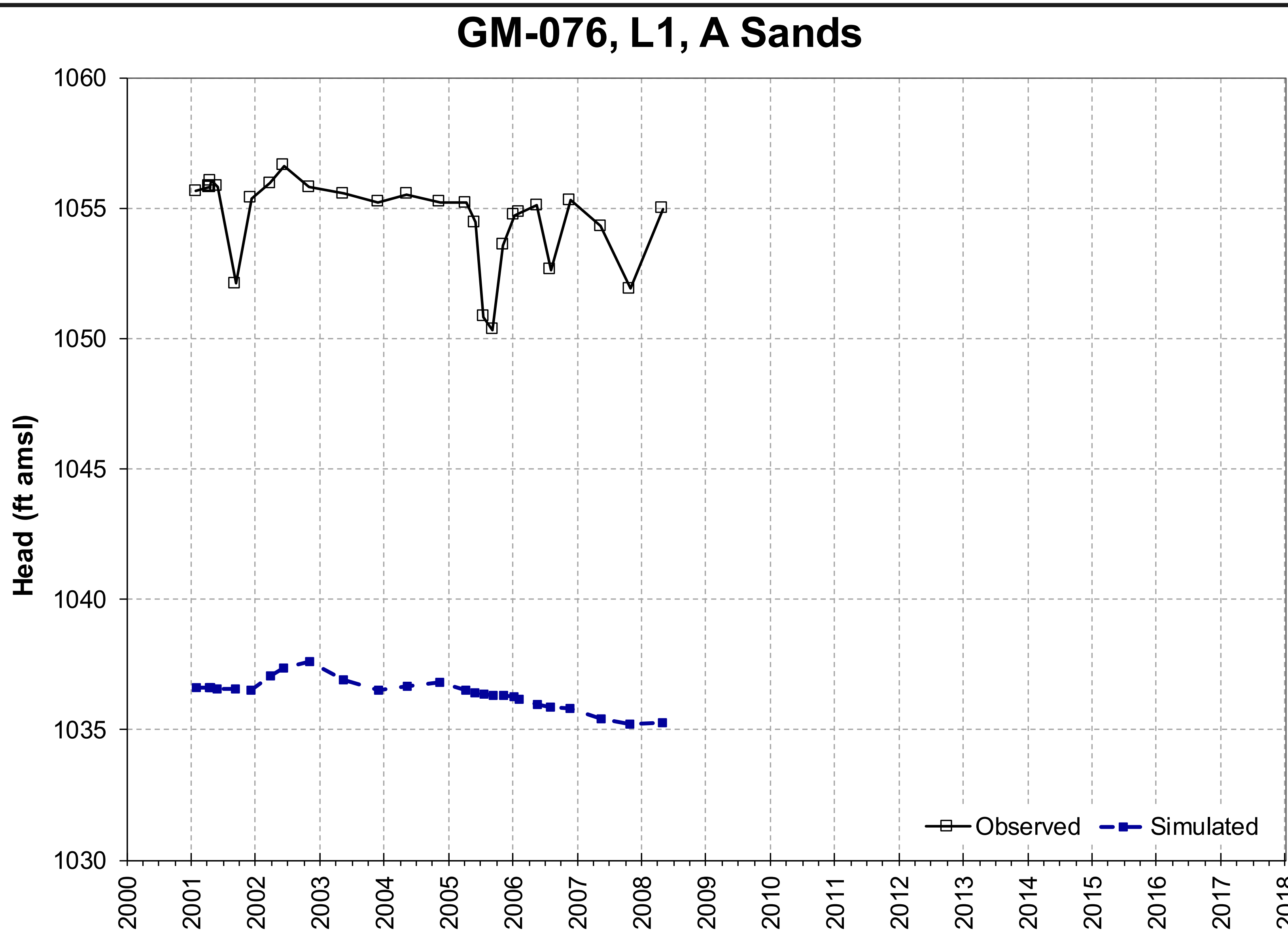


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

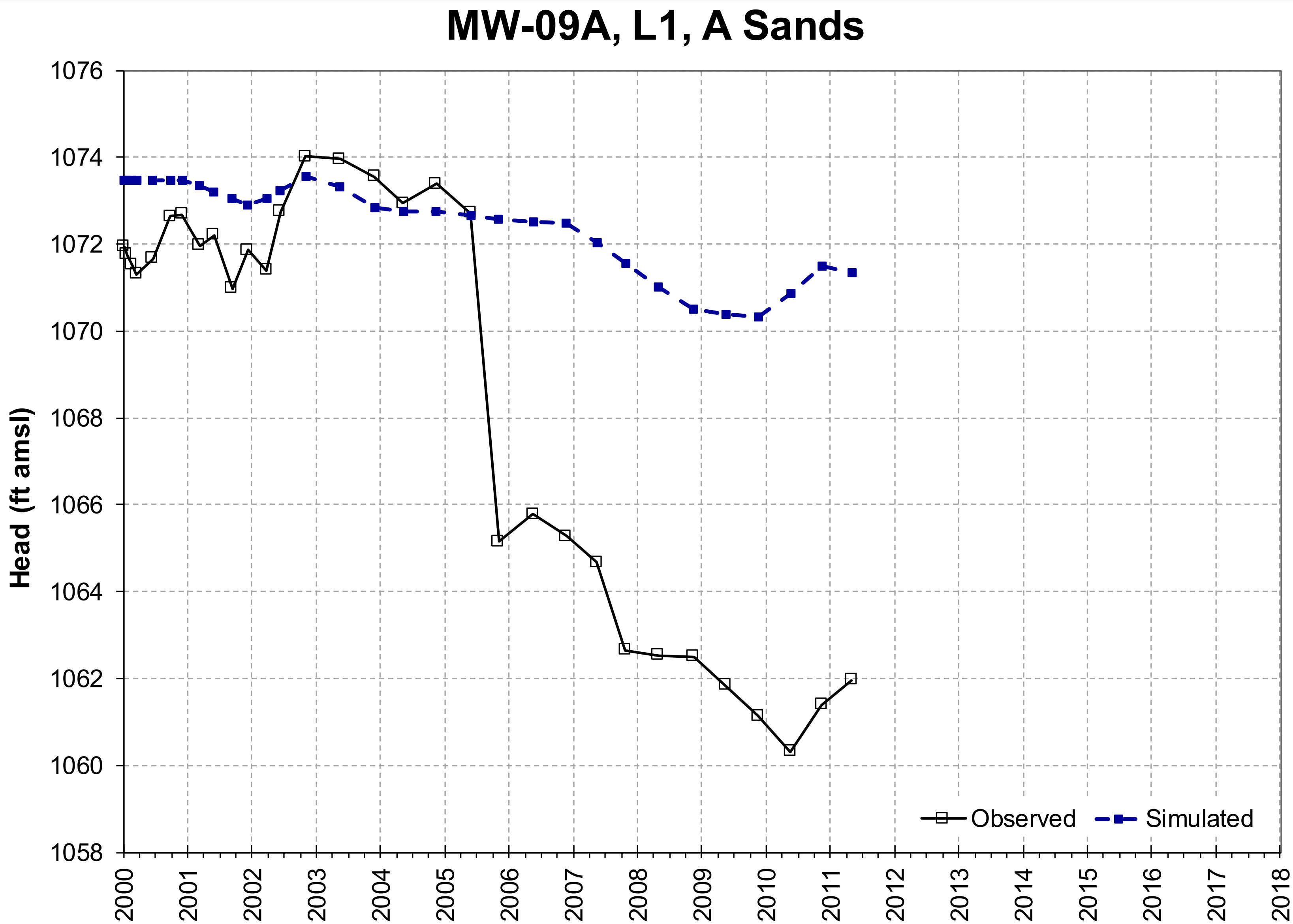


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

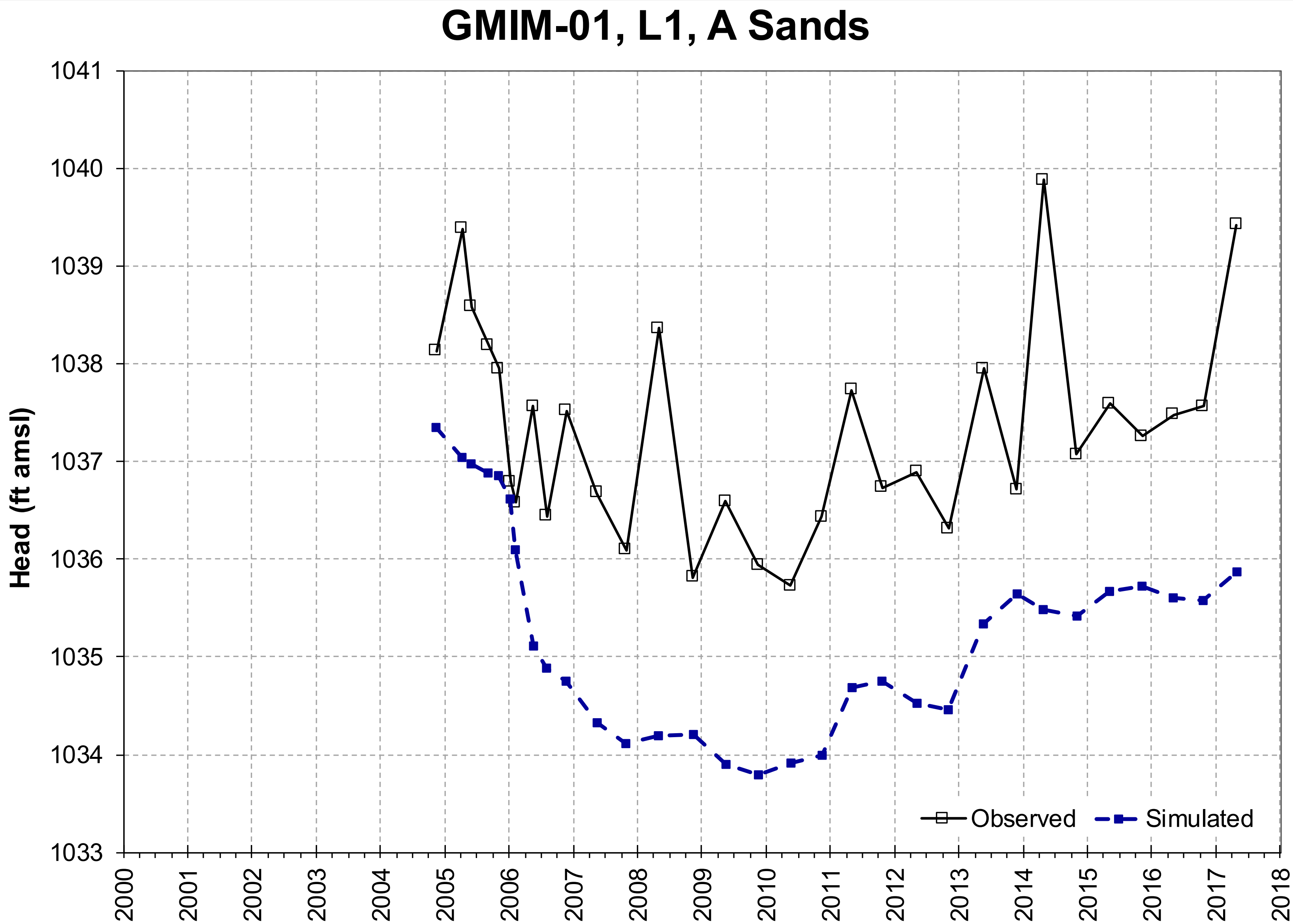


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

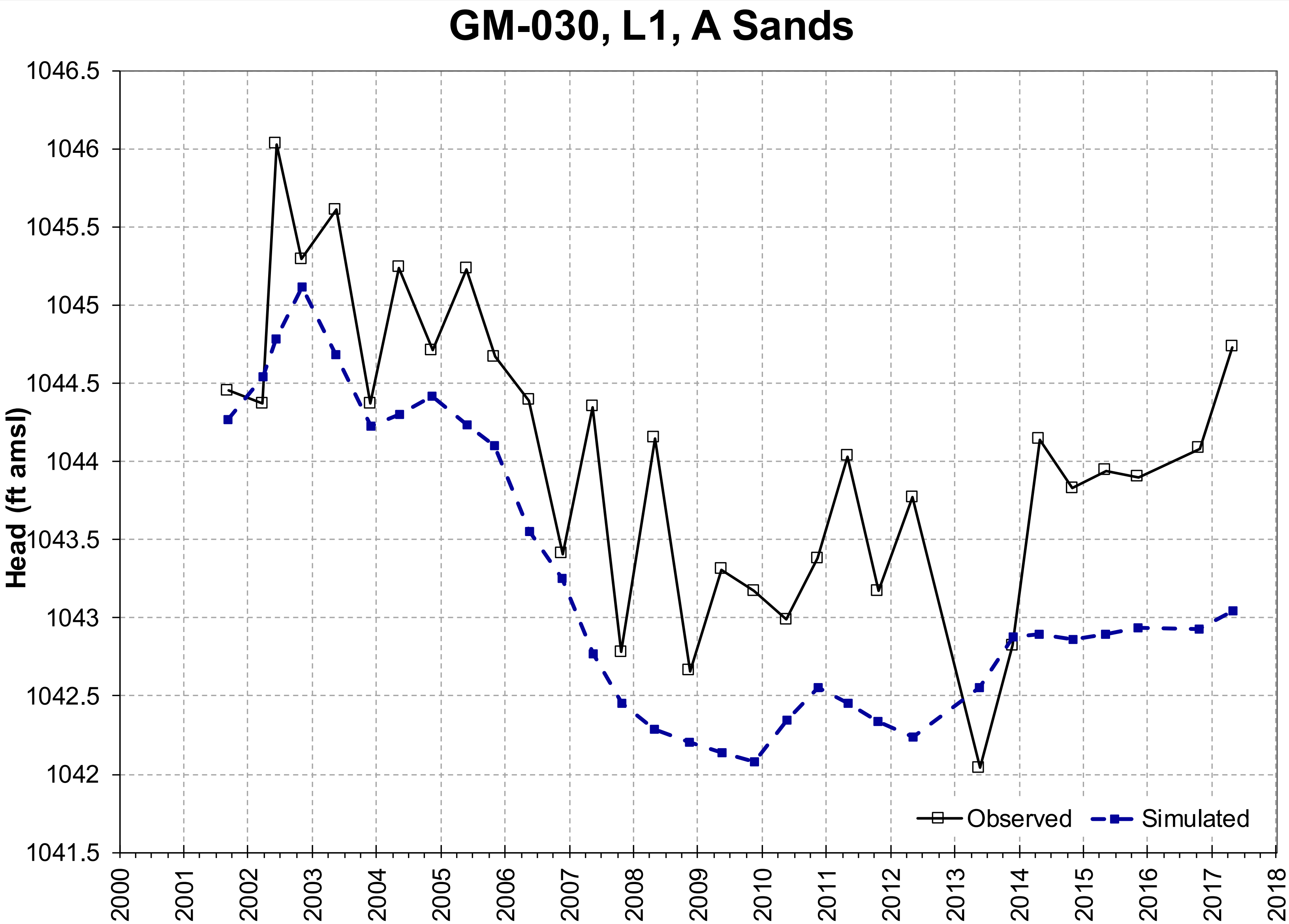


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

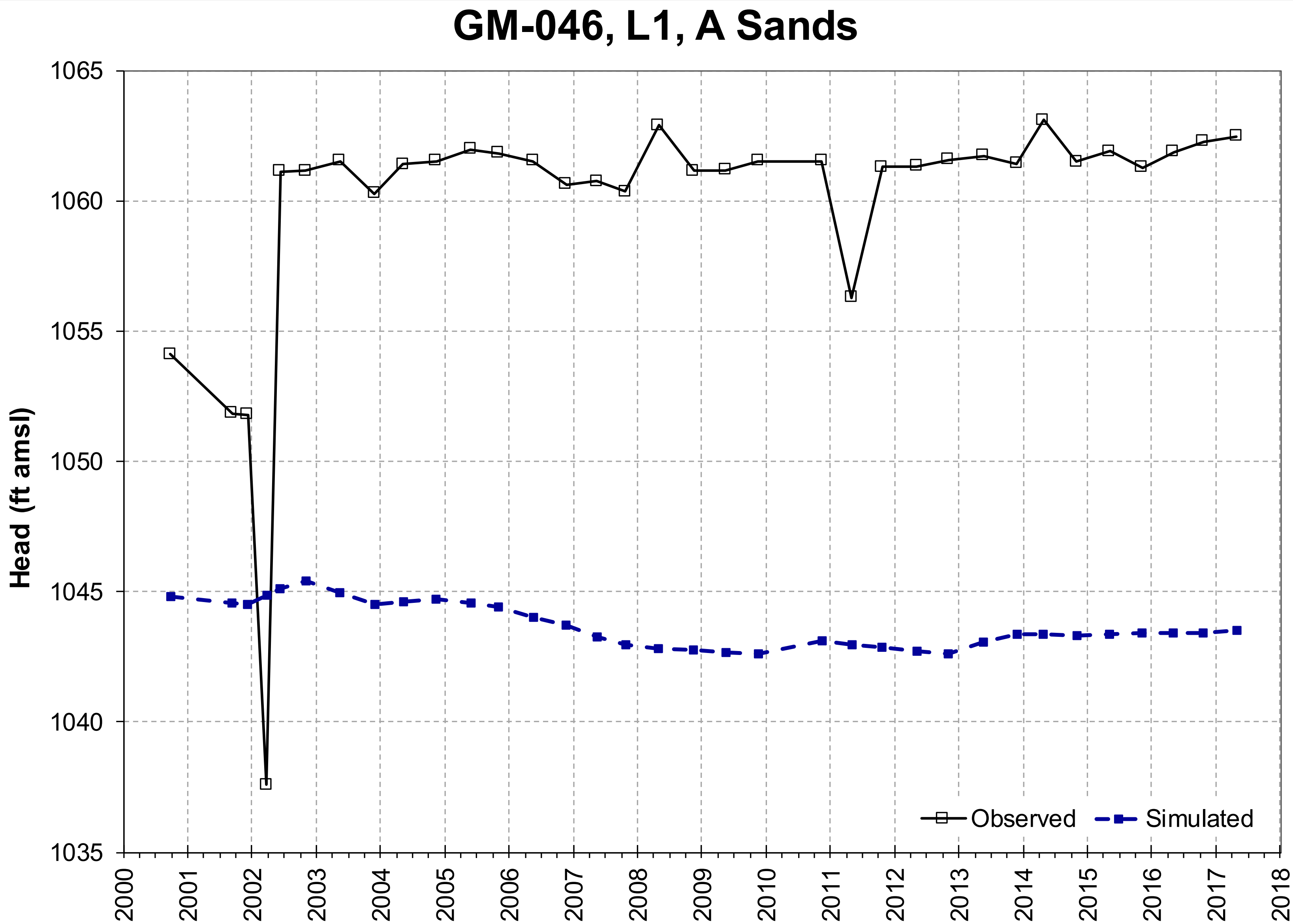


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



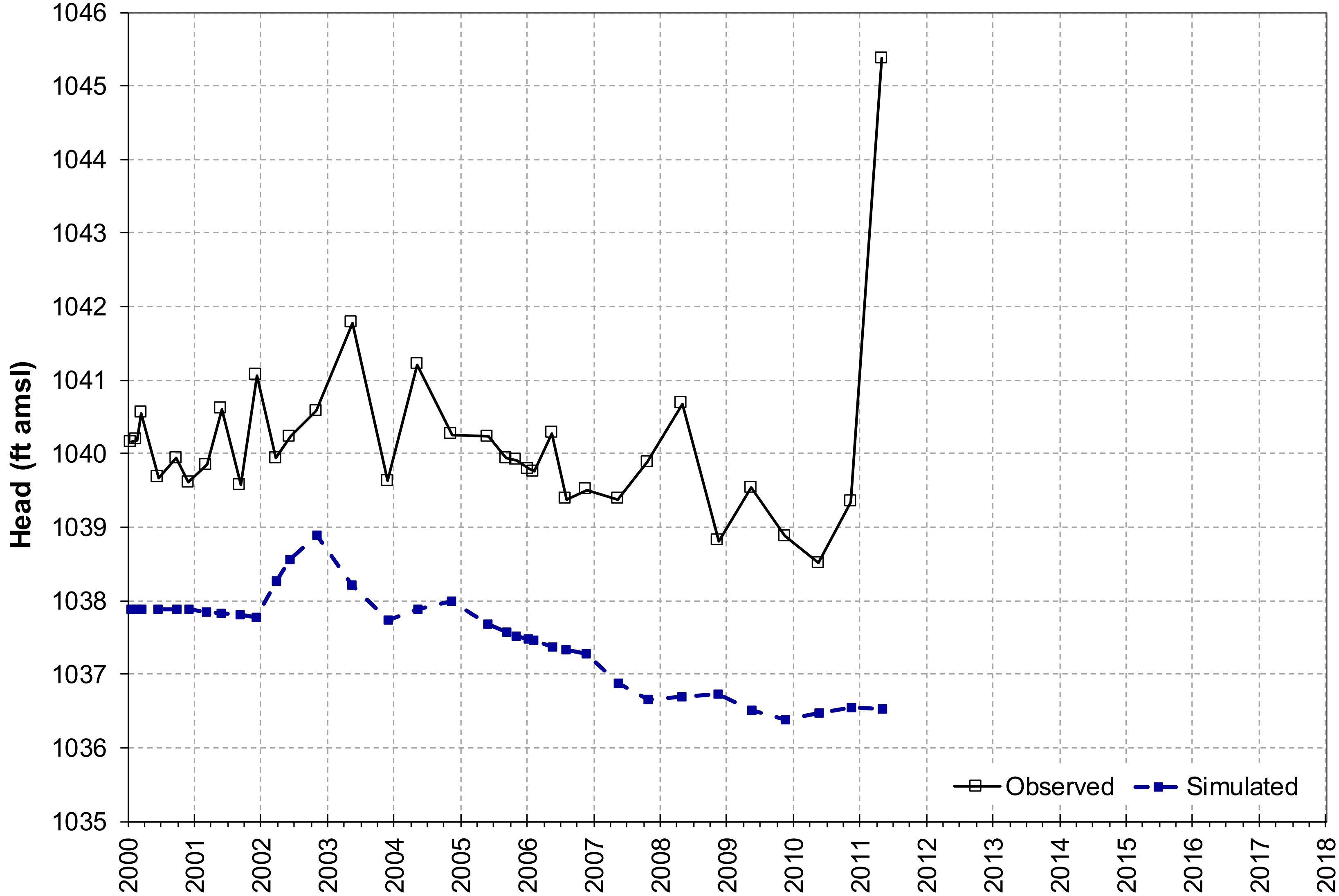
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-024A, L1, A Sands

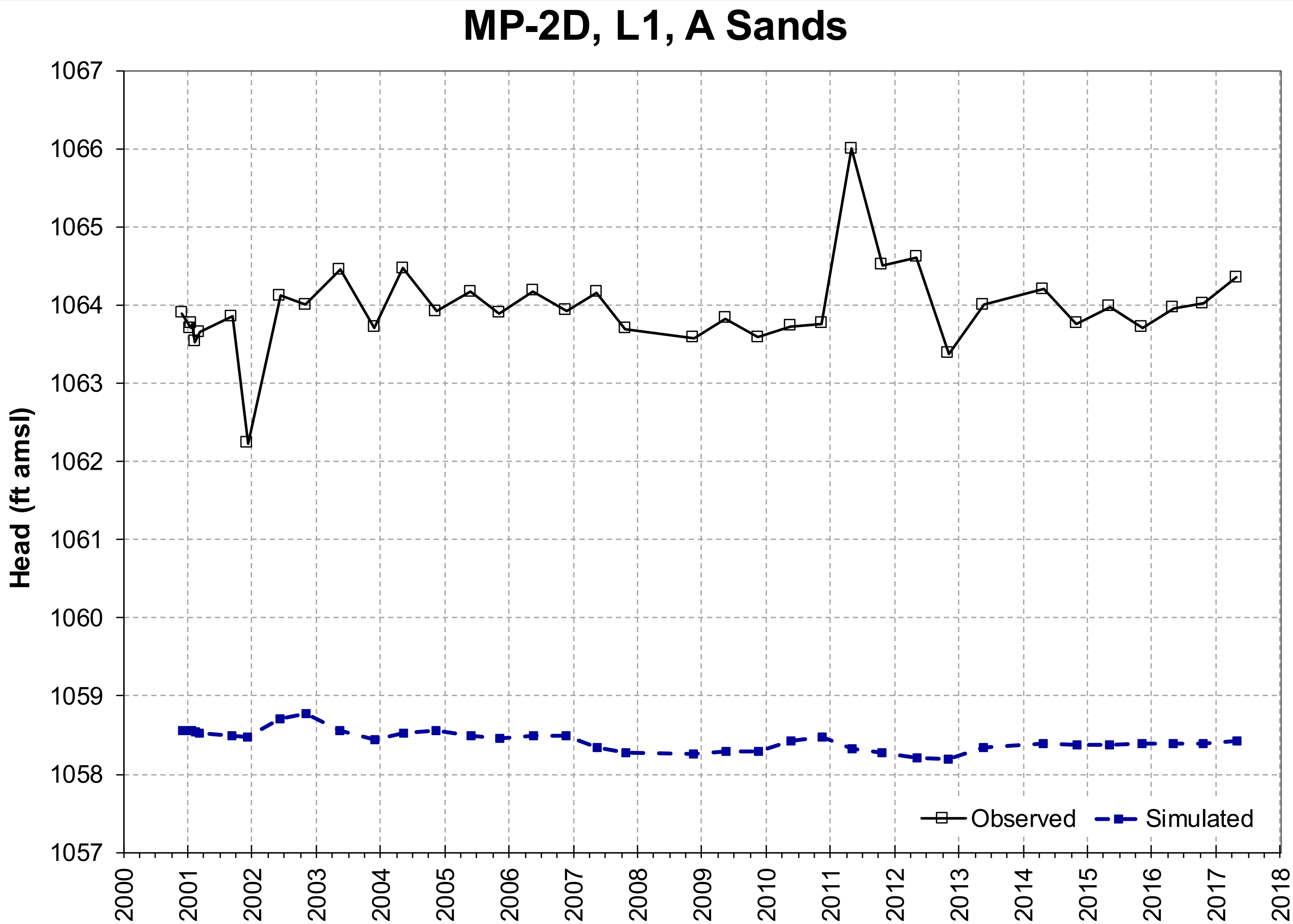


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

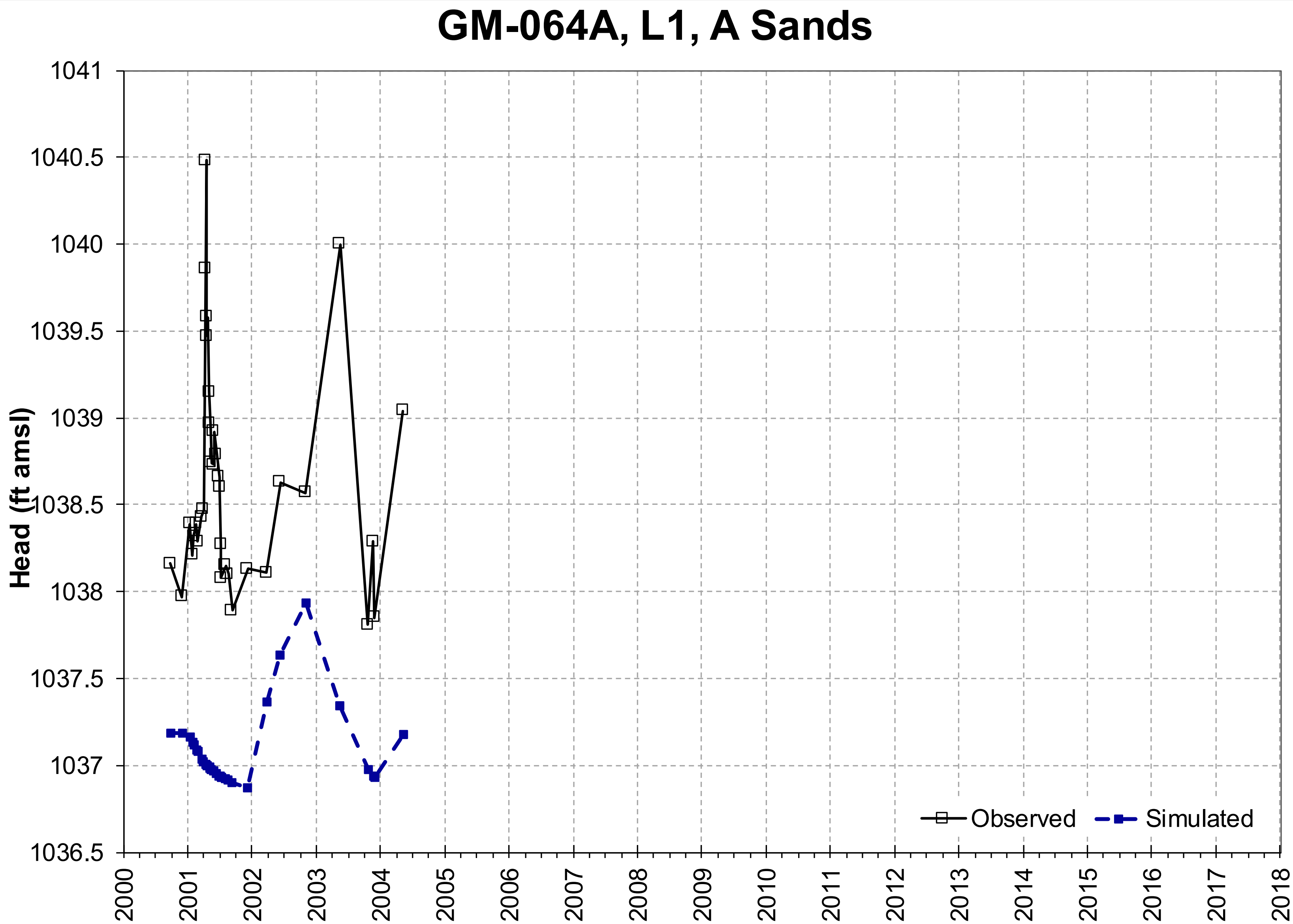


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

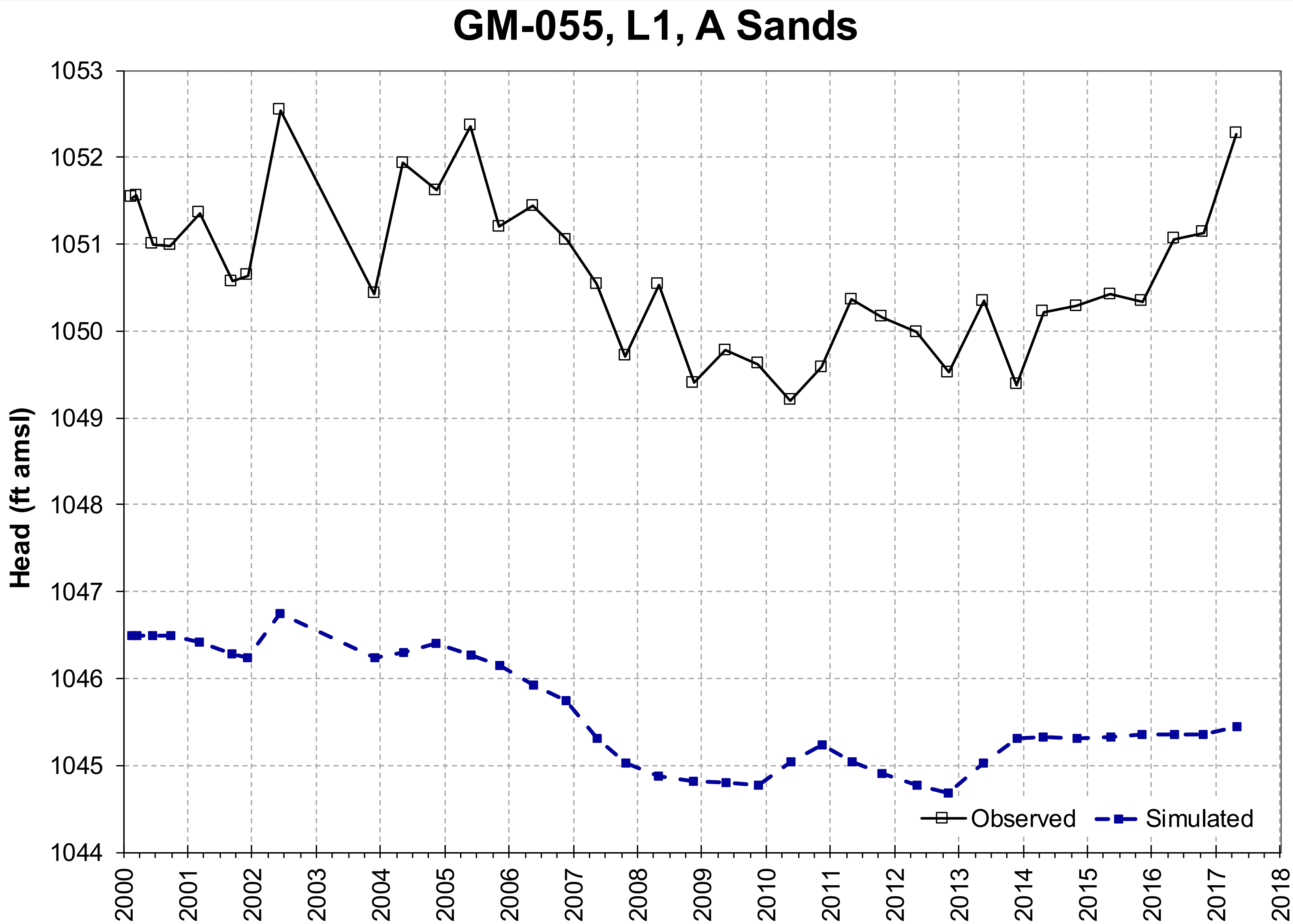


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

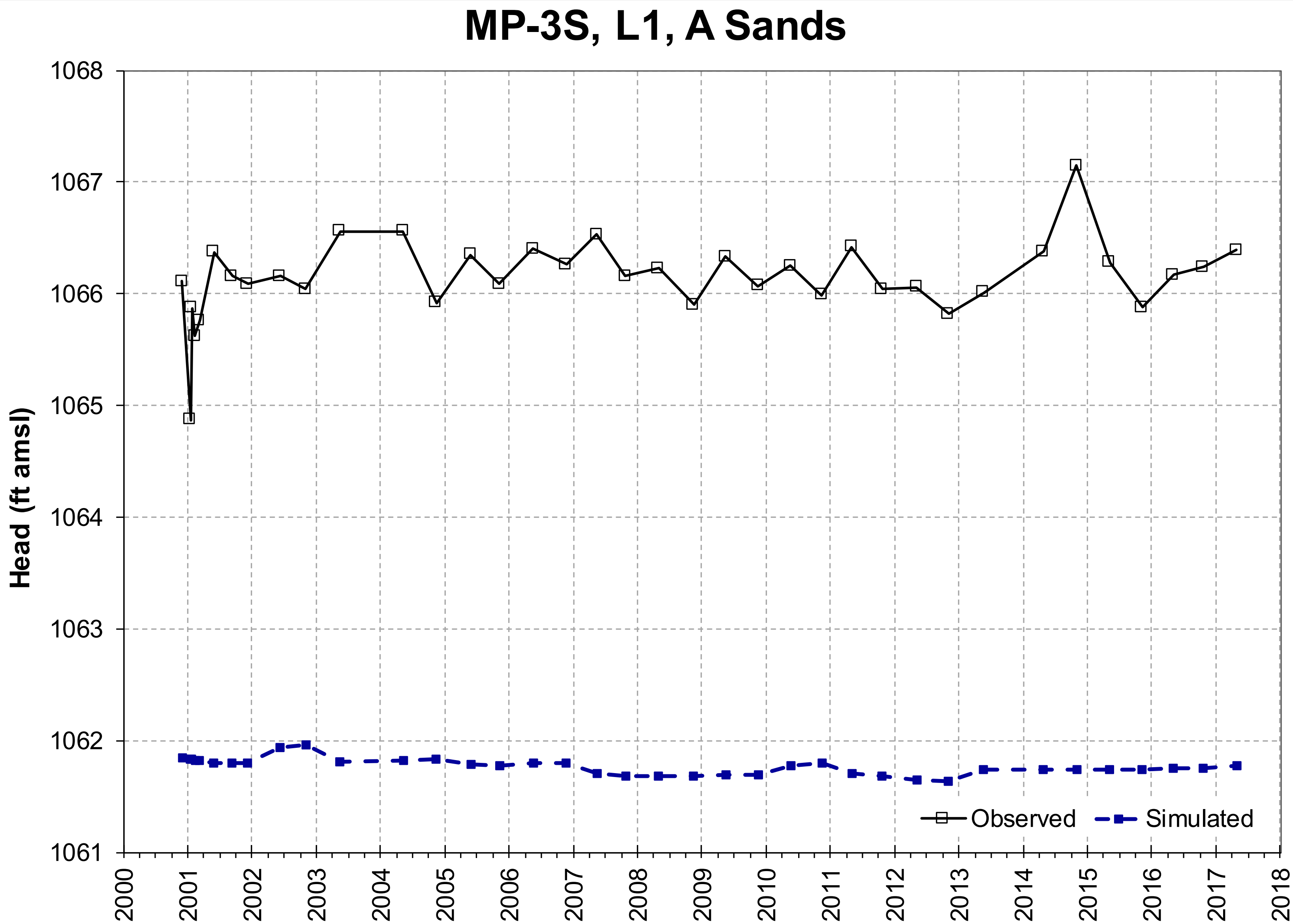


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



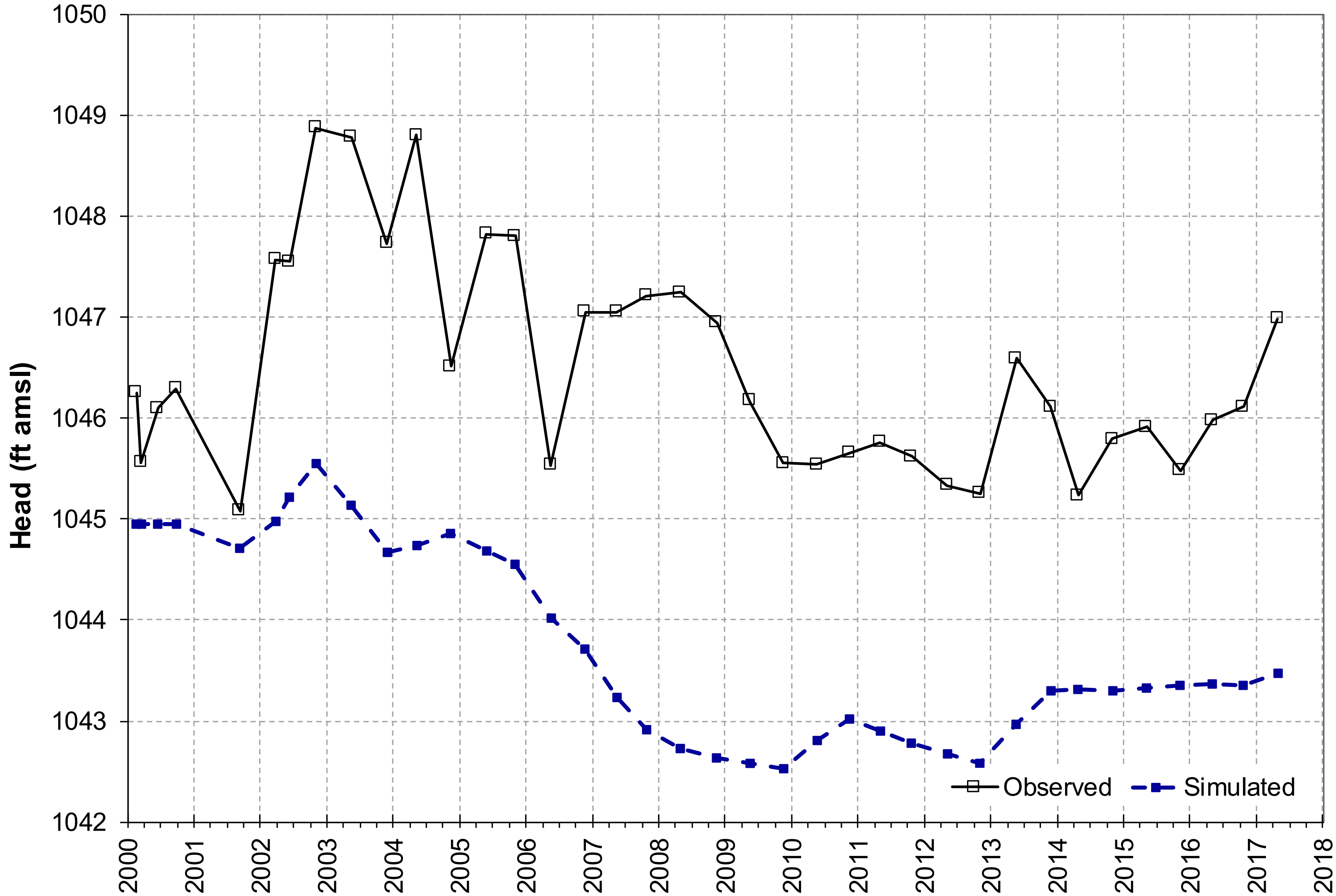
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-044, L1, A Sands

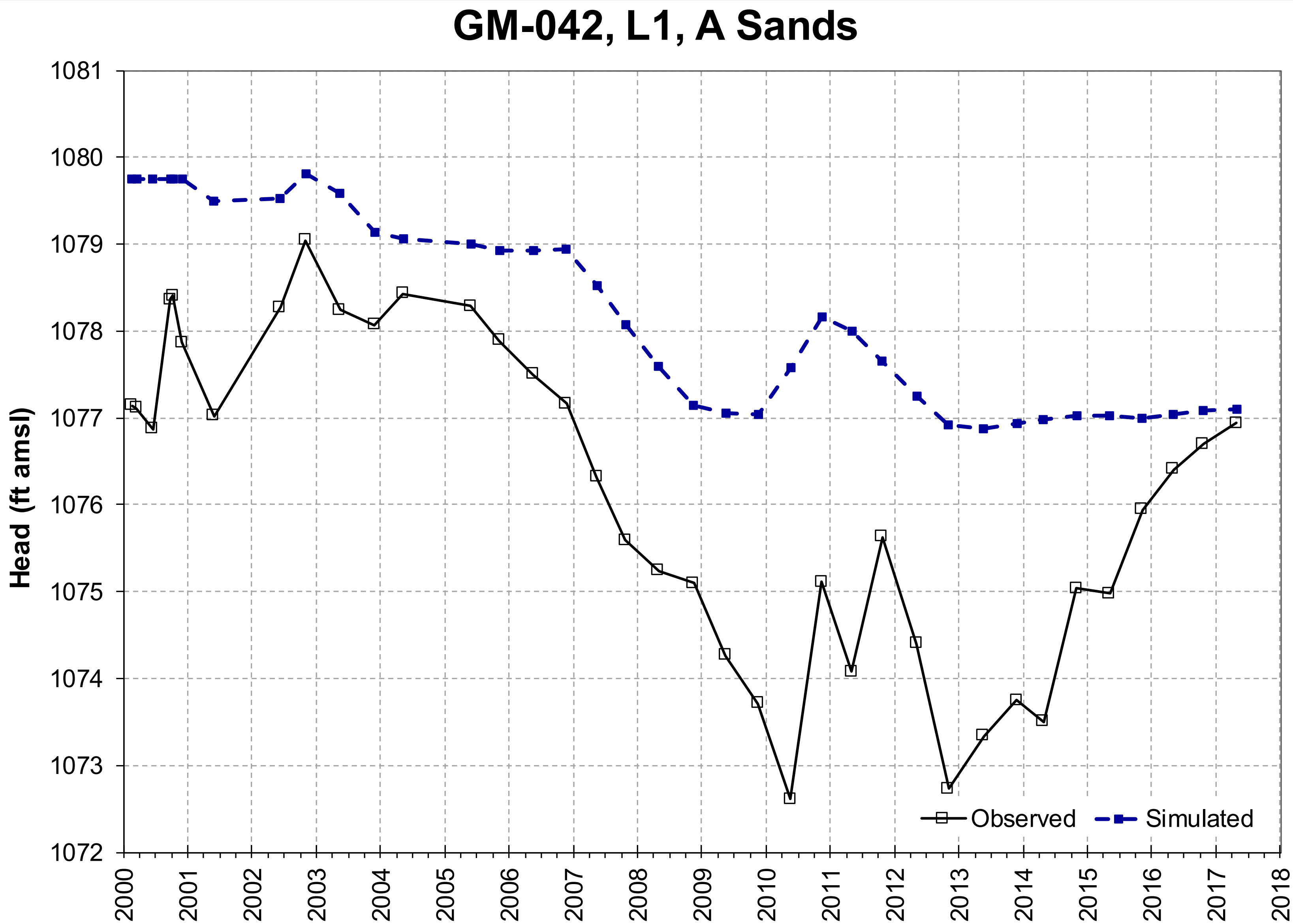


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

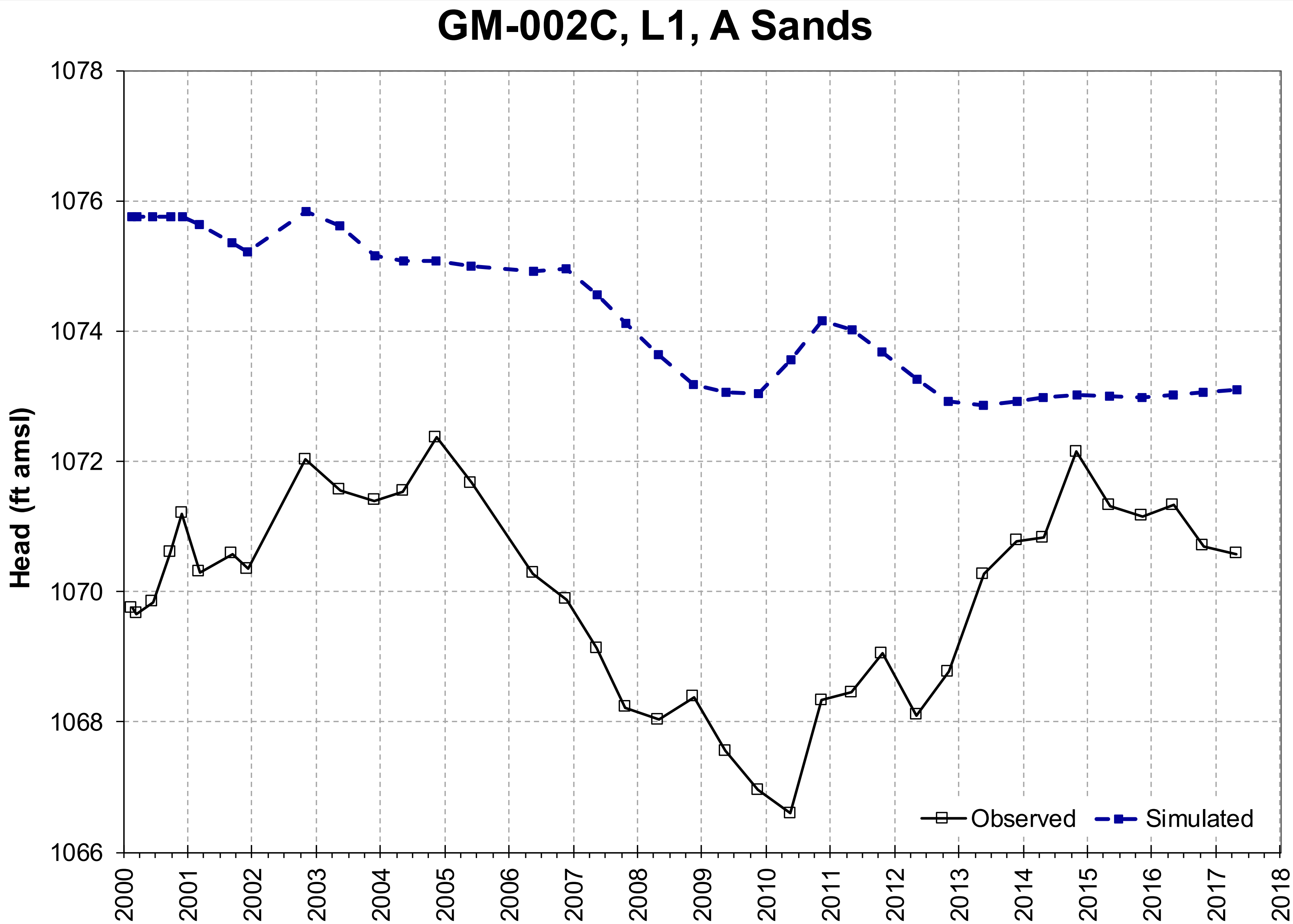


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

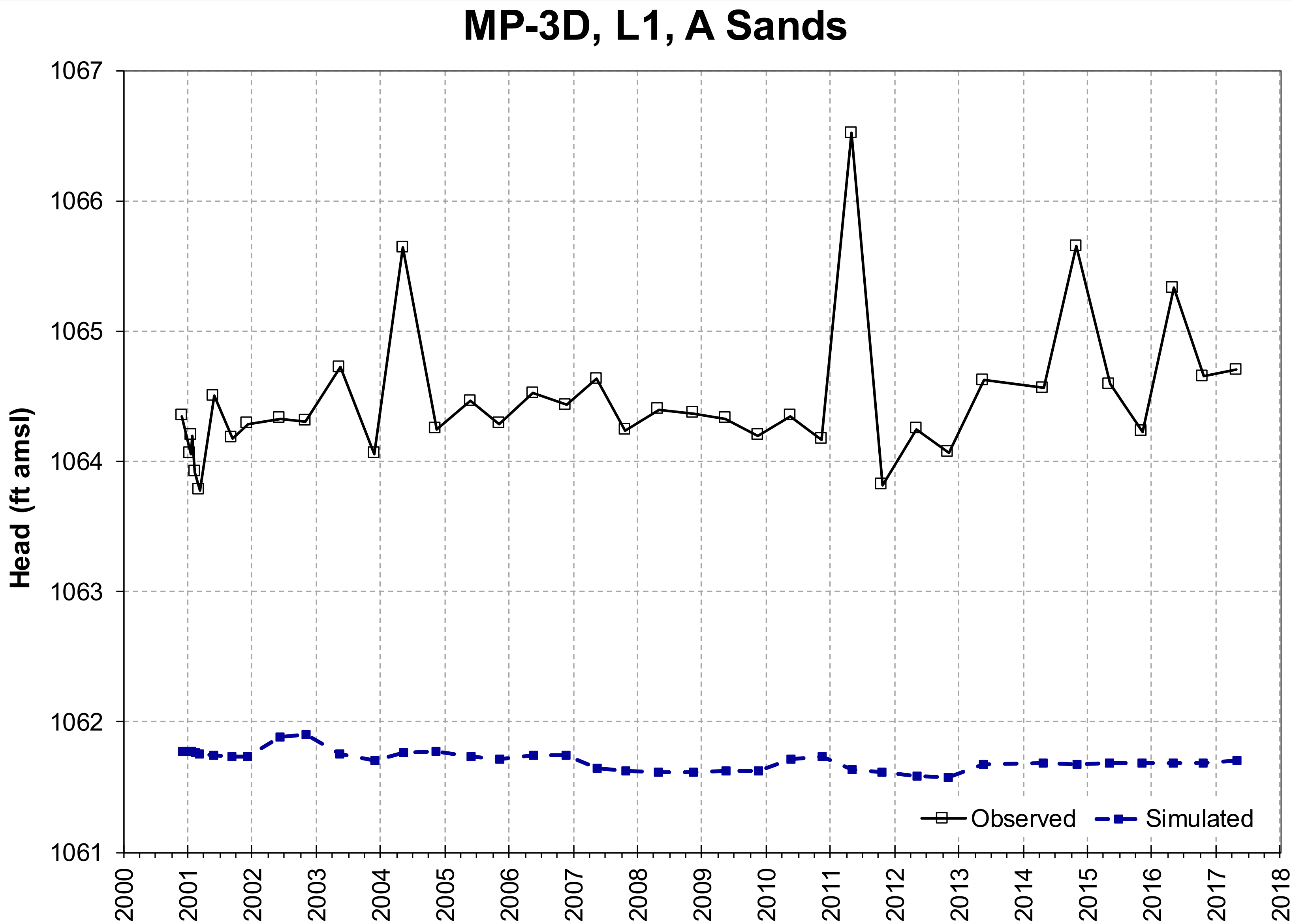


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

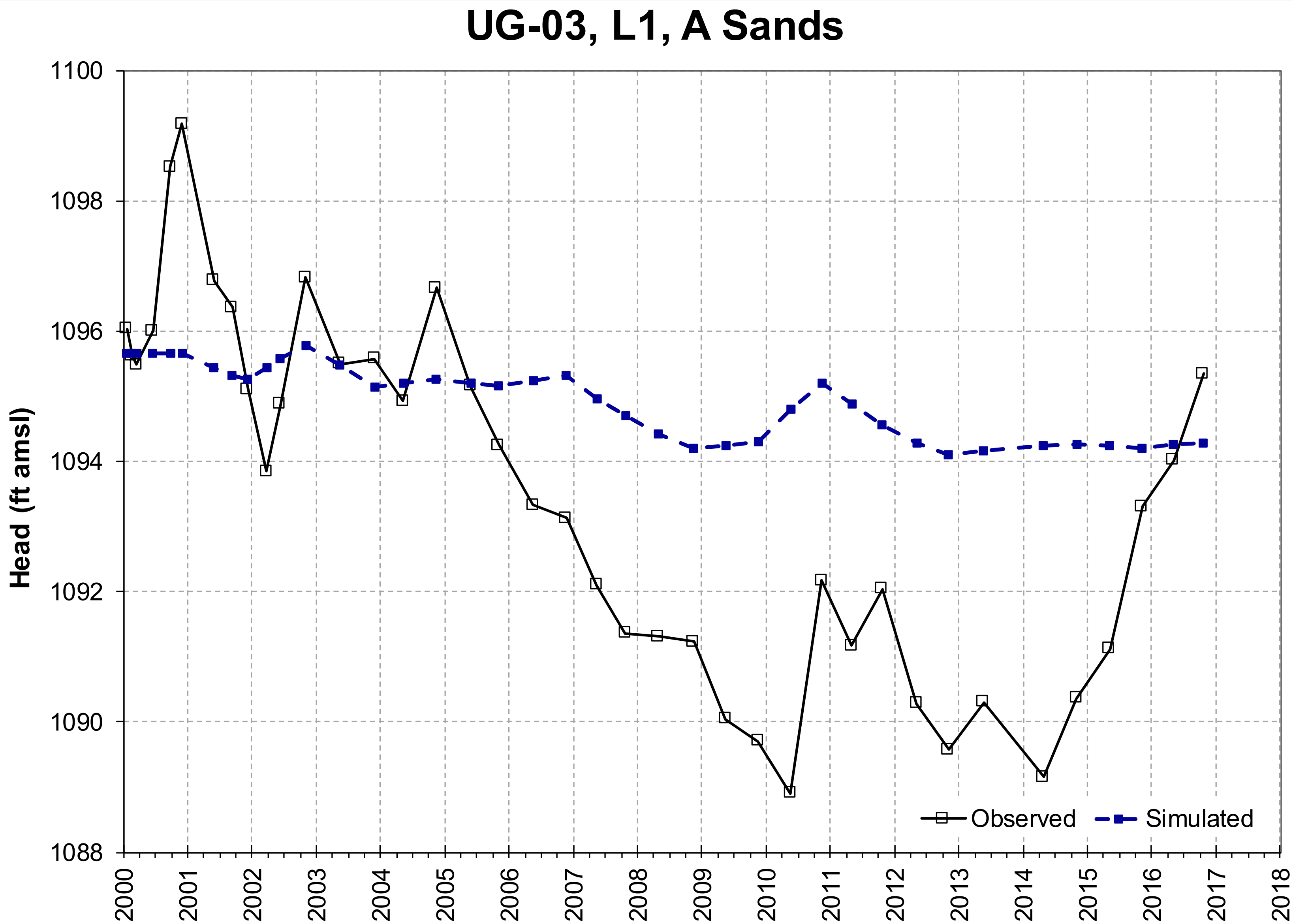


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

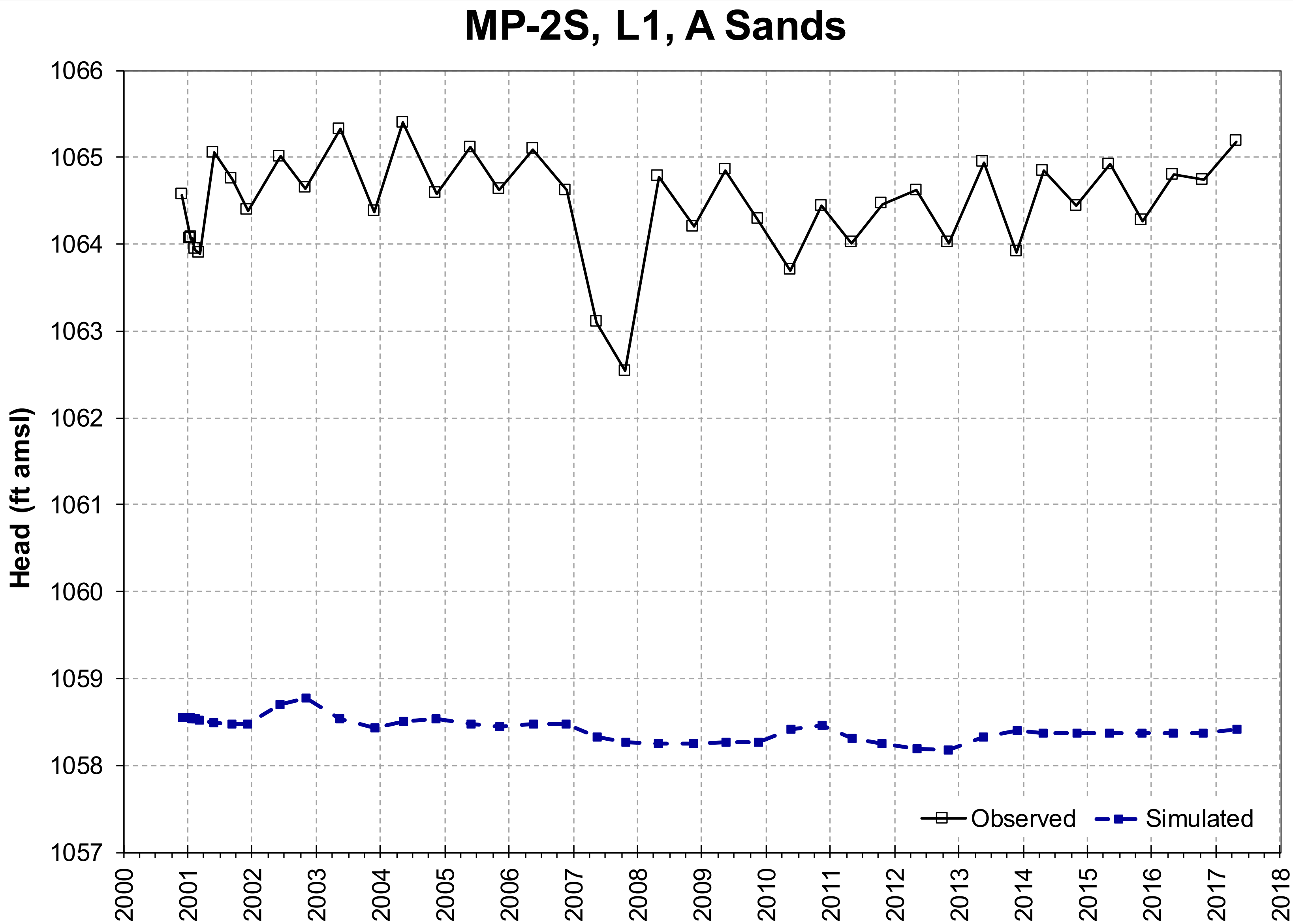


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

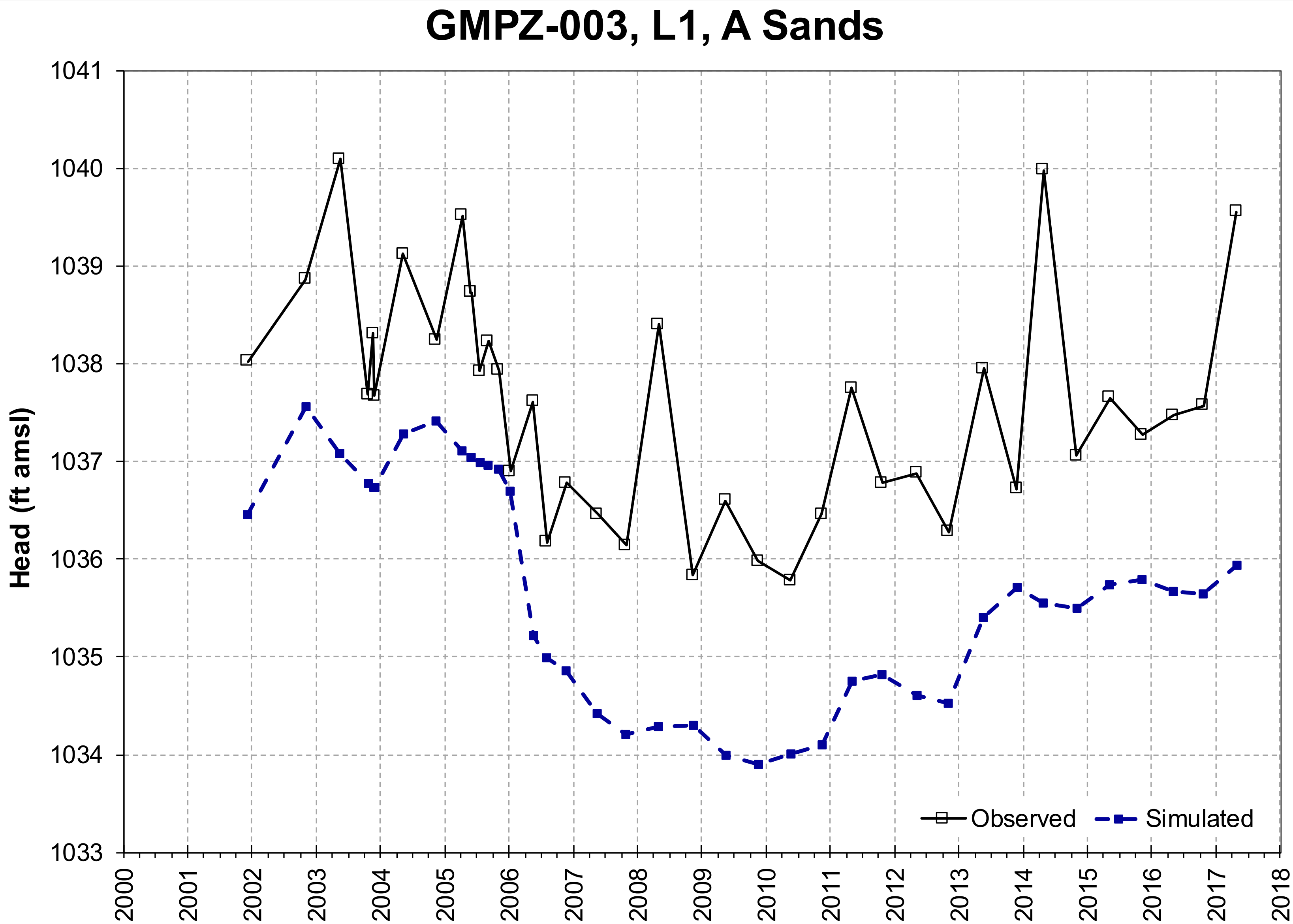


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

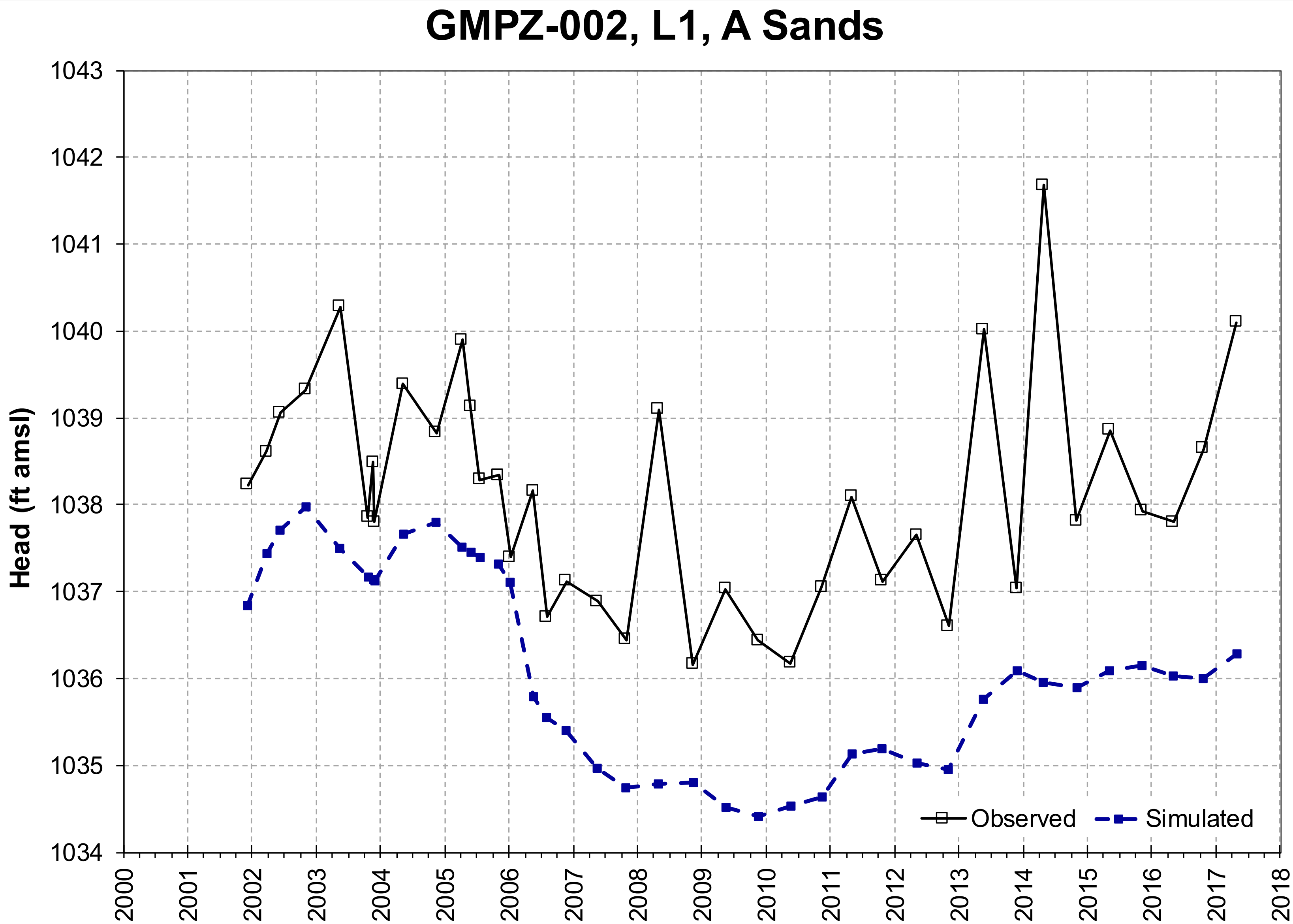


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

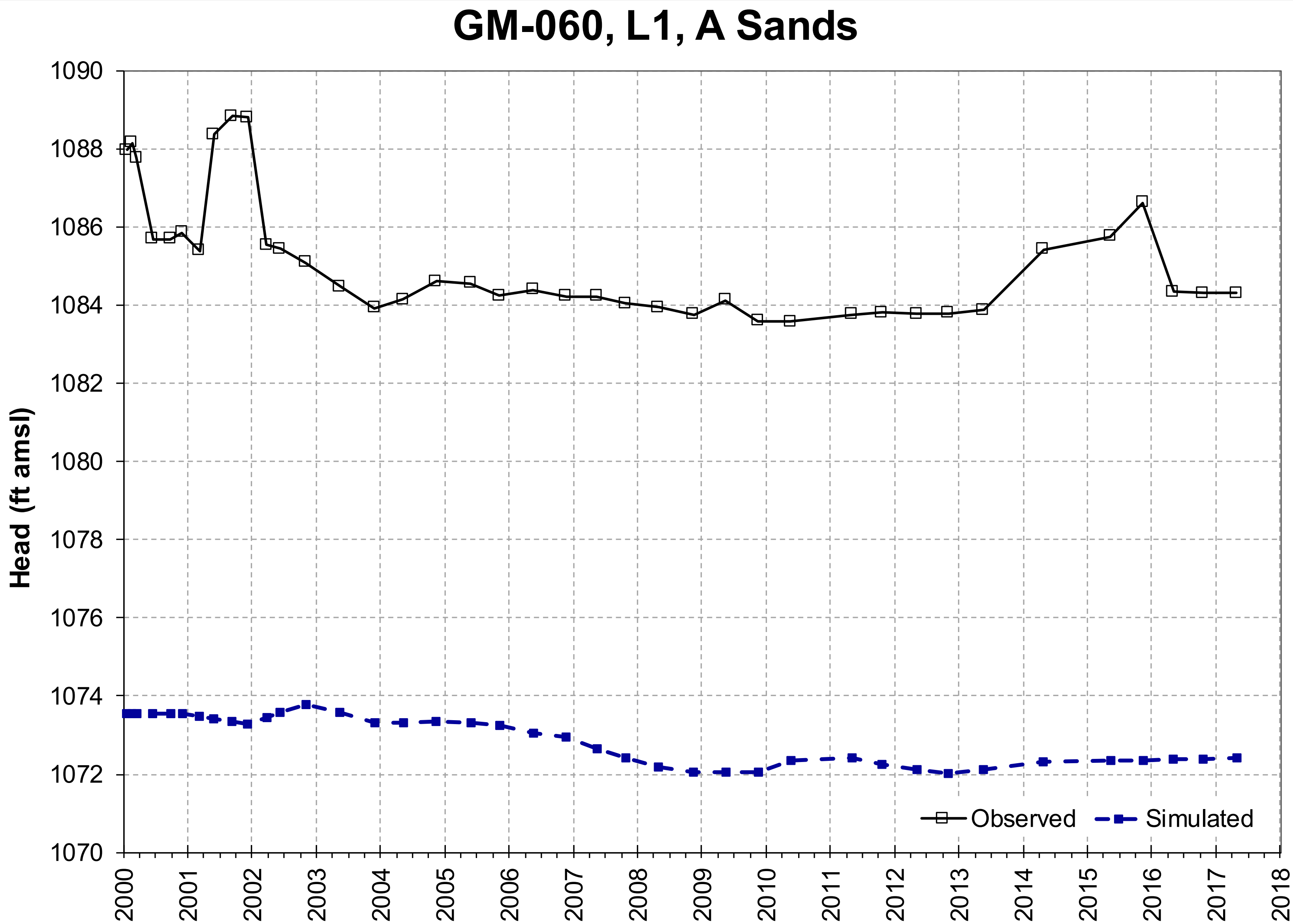


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

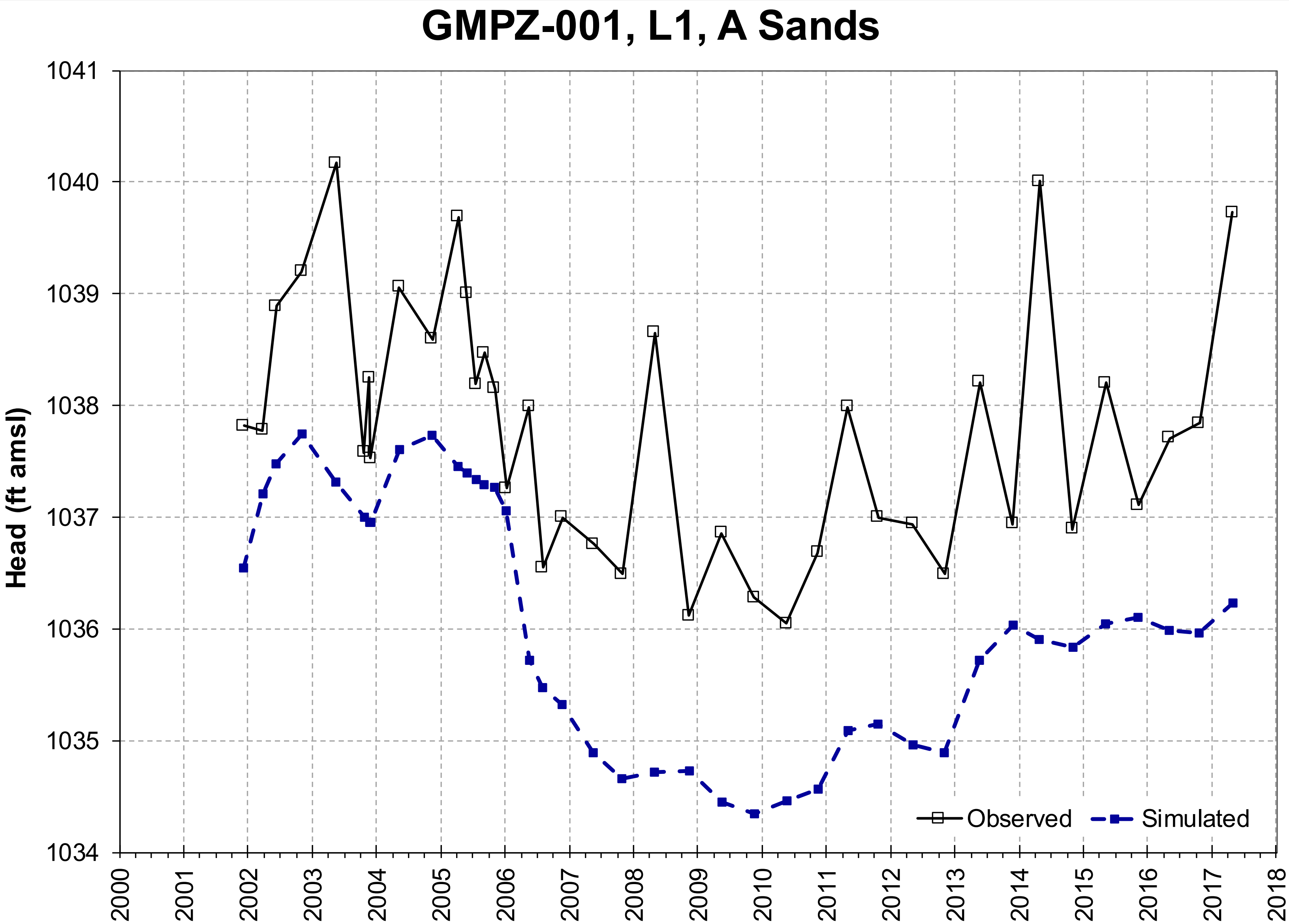


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

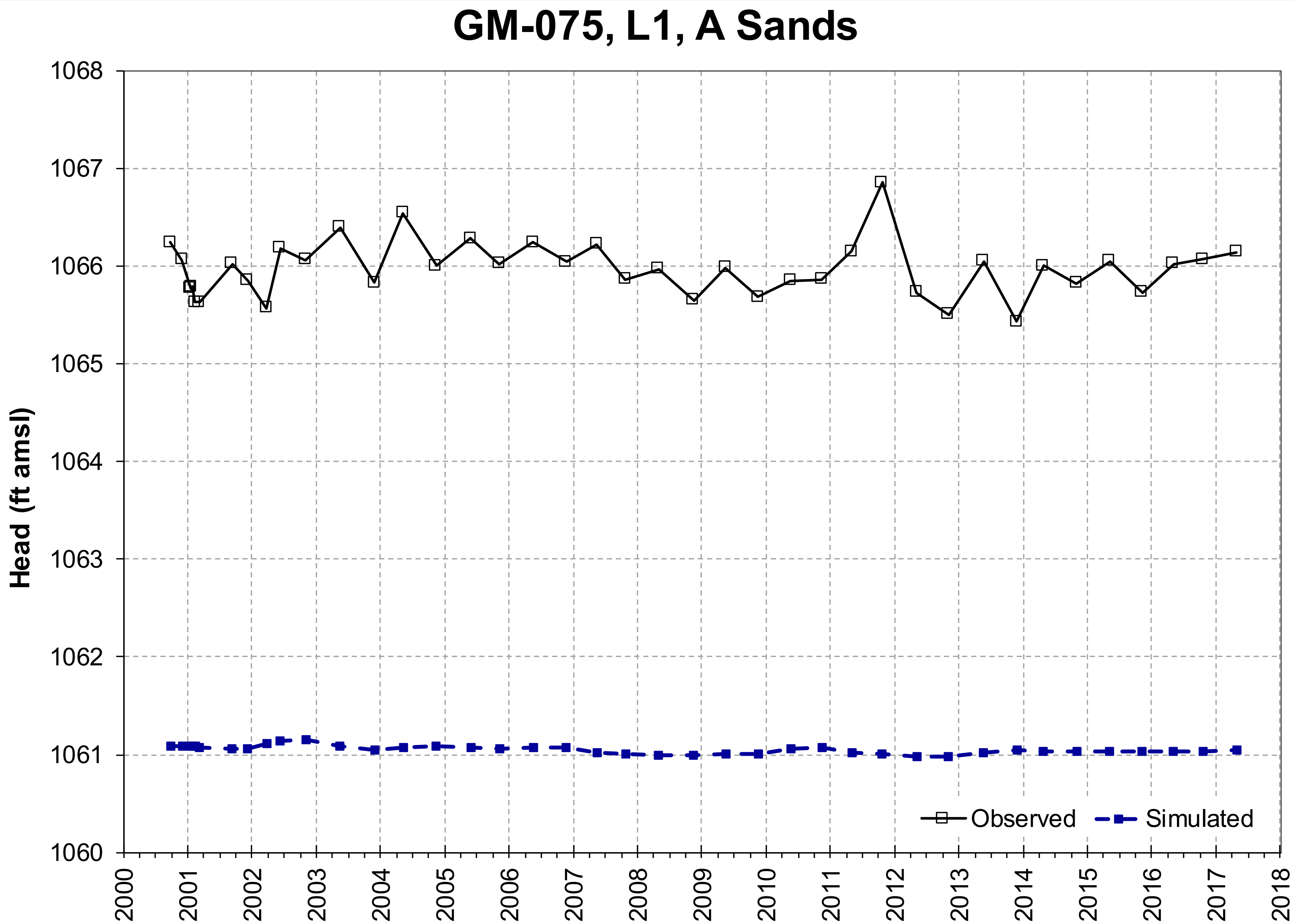


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

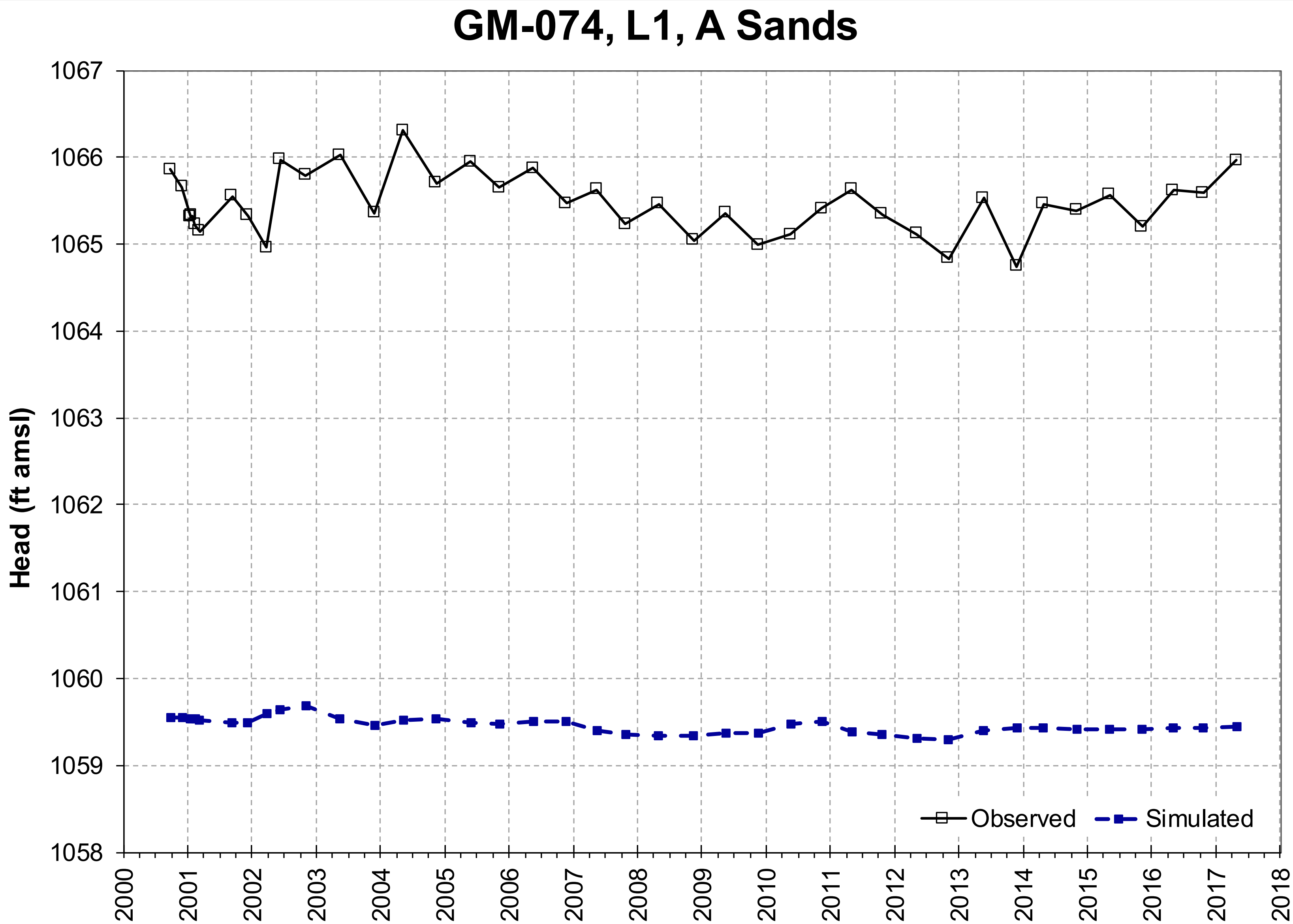


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

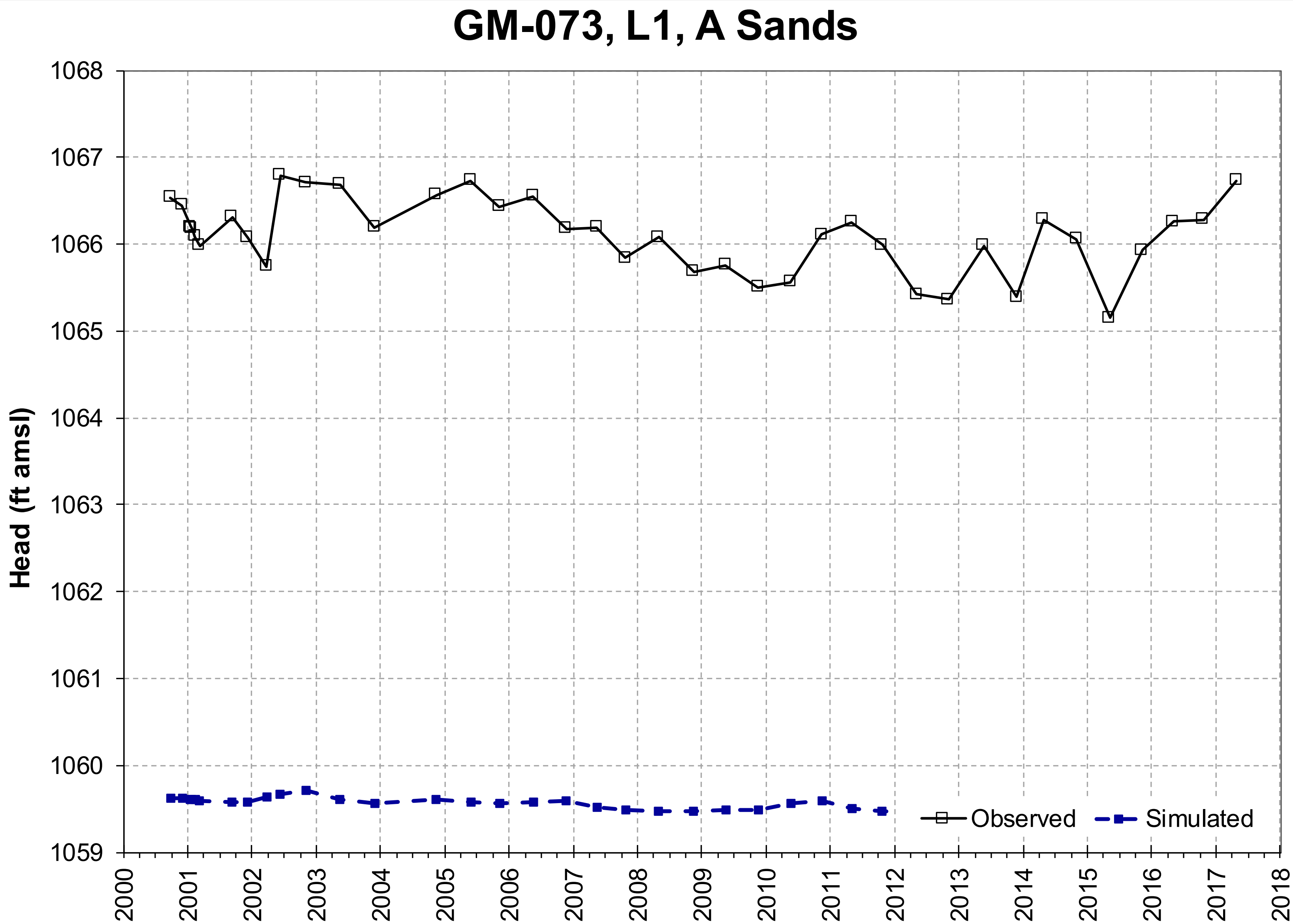


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

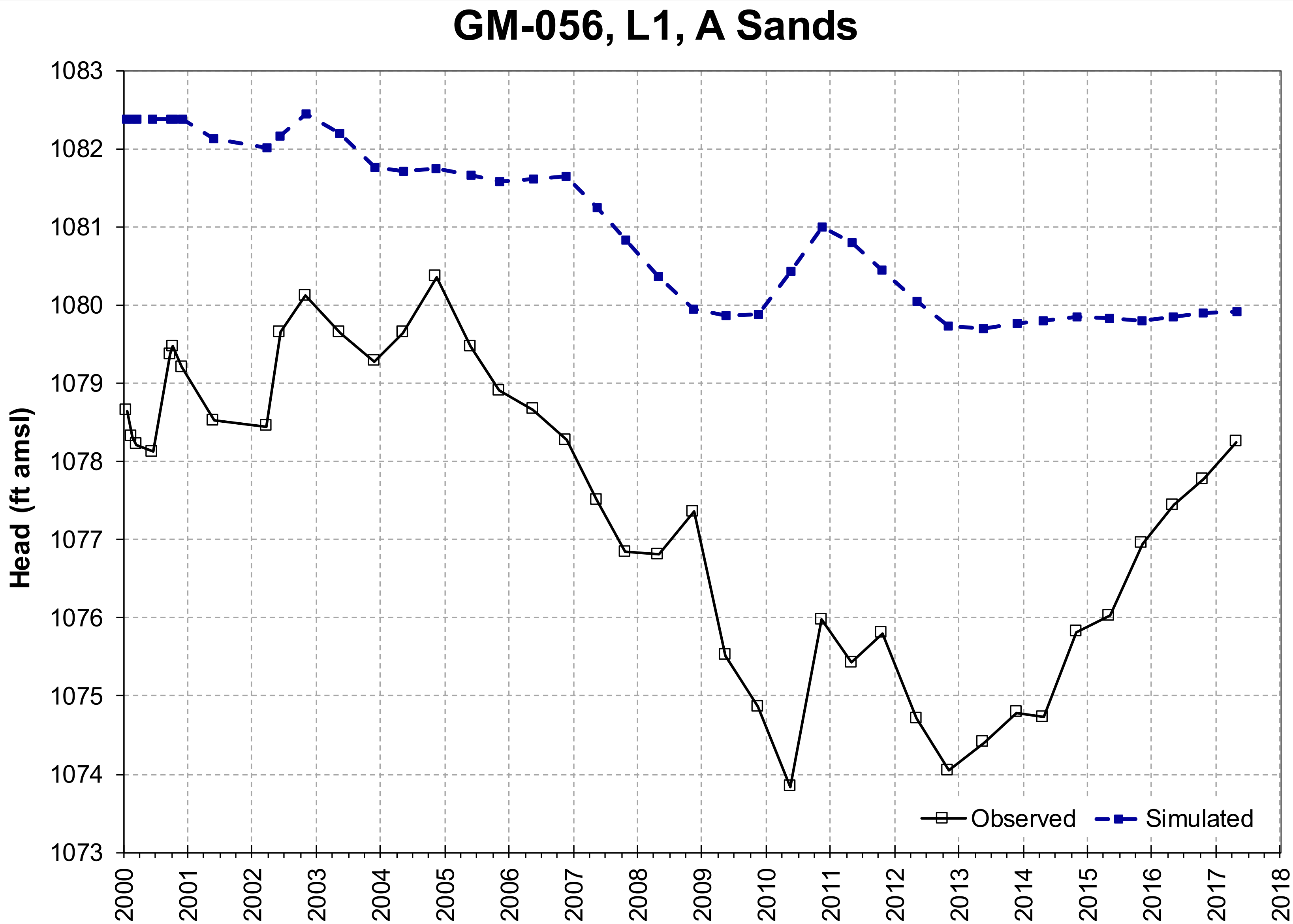


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

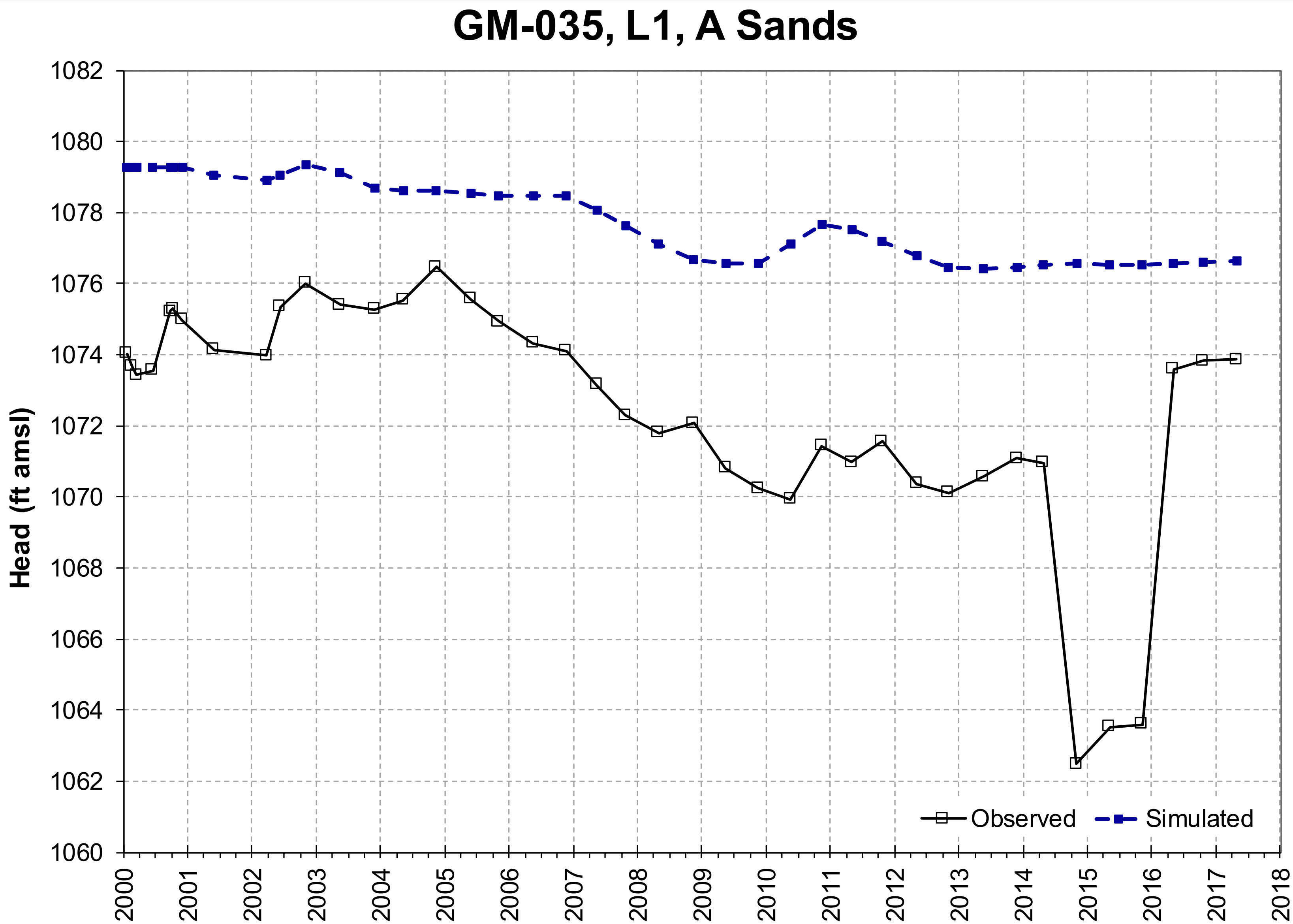


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

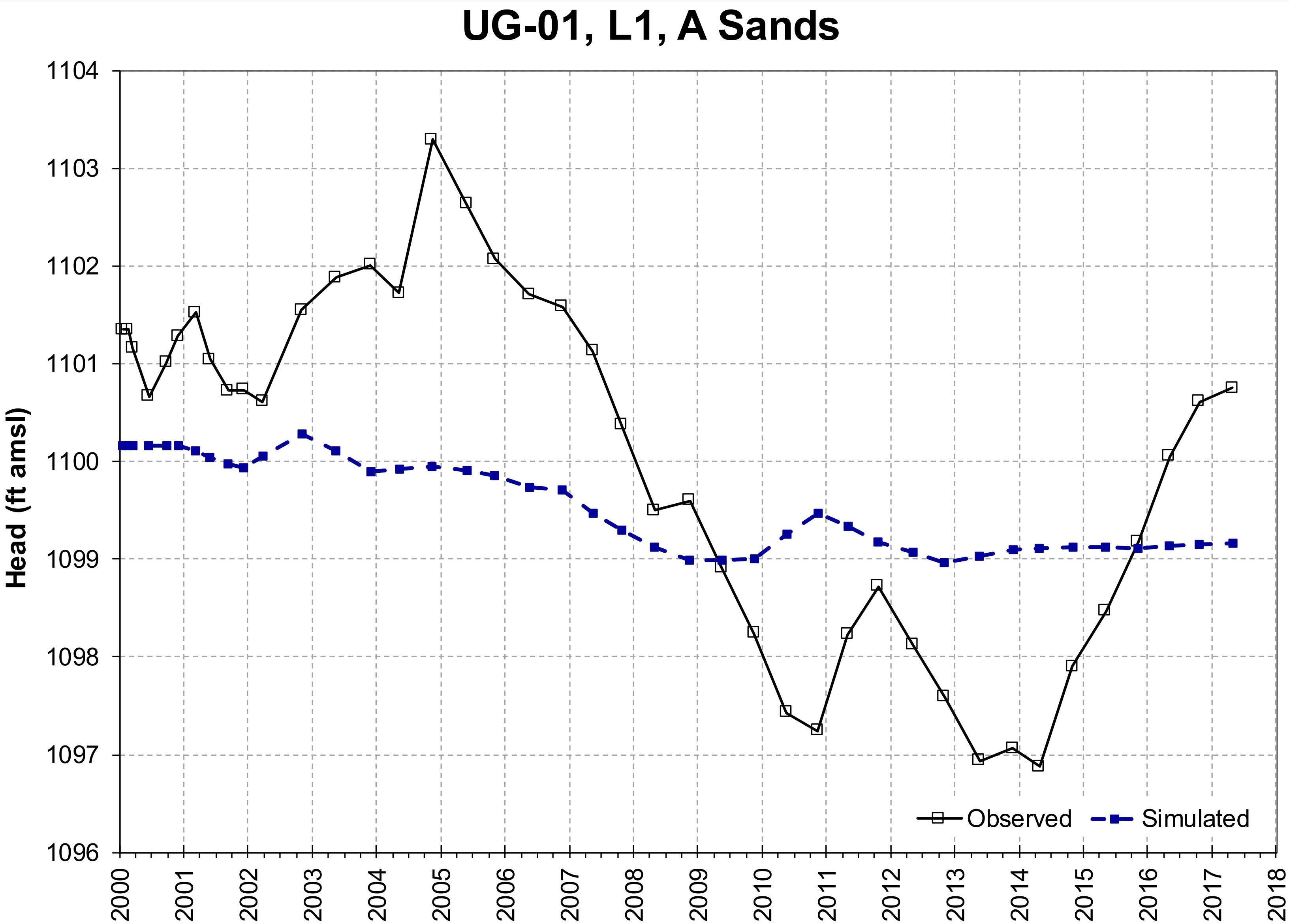


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



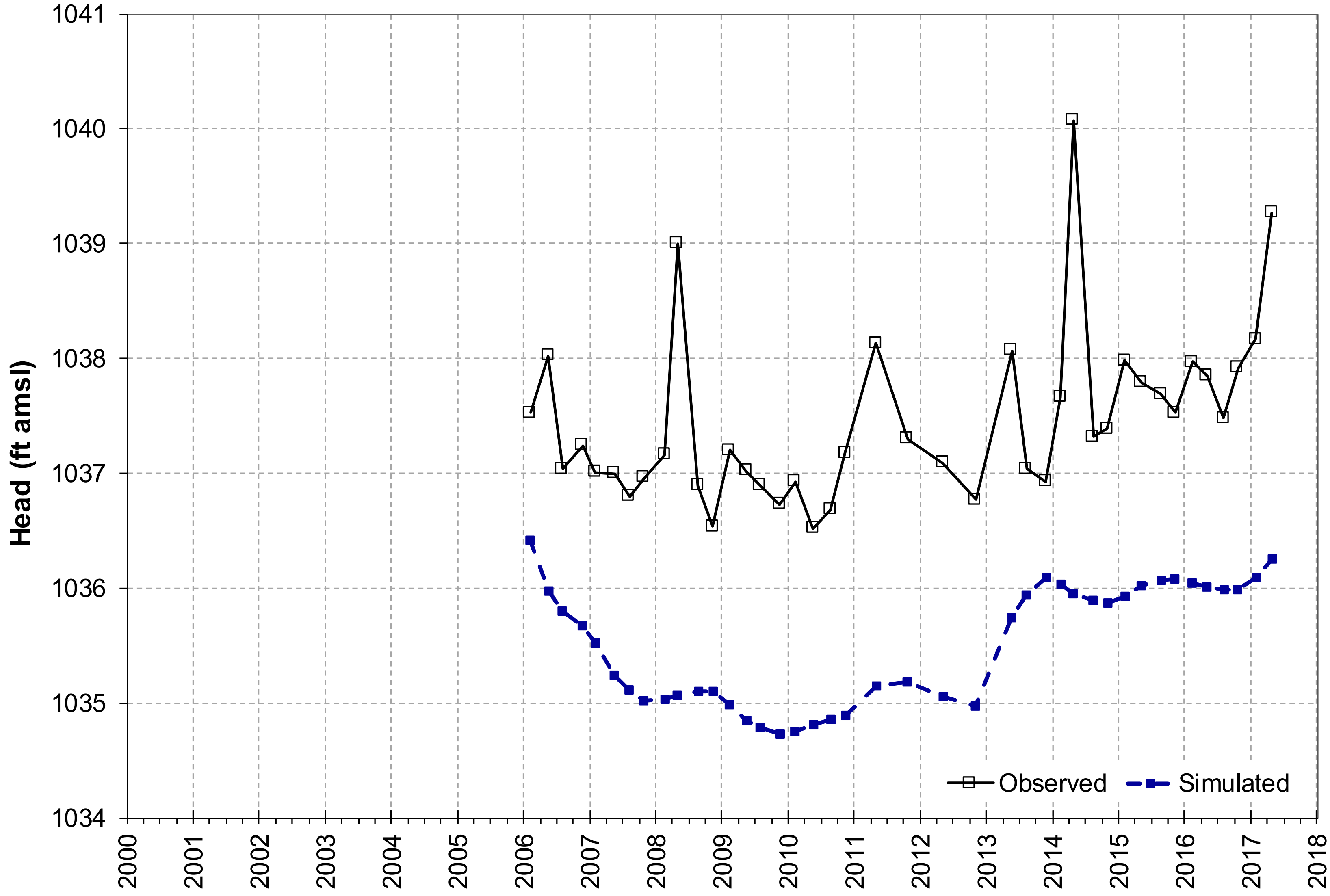
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-087A, L1, A Sands

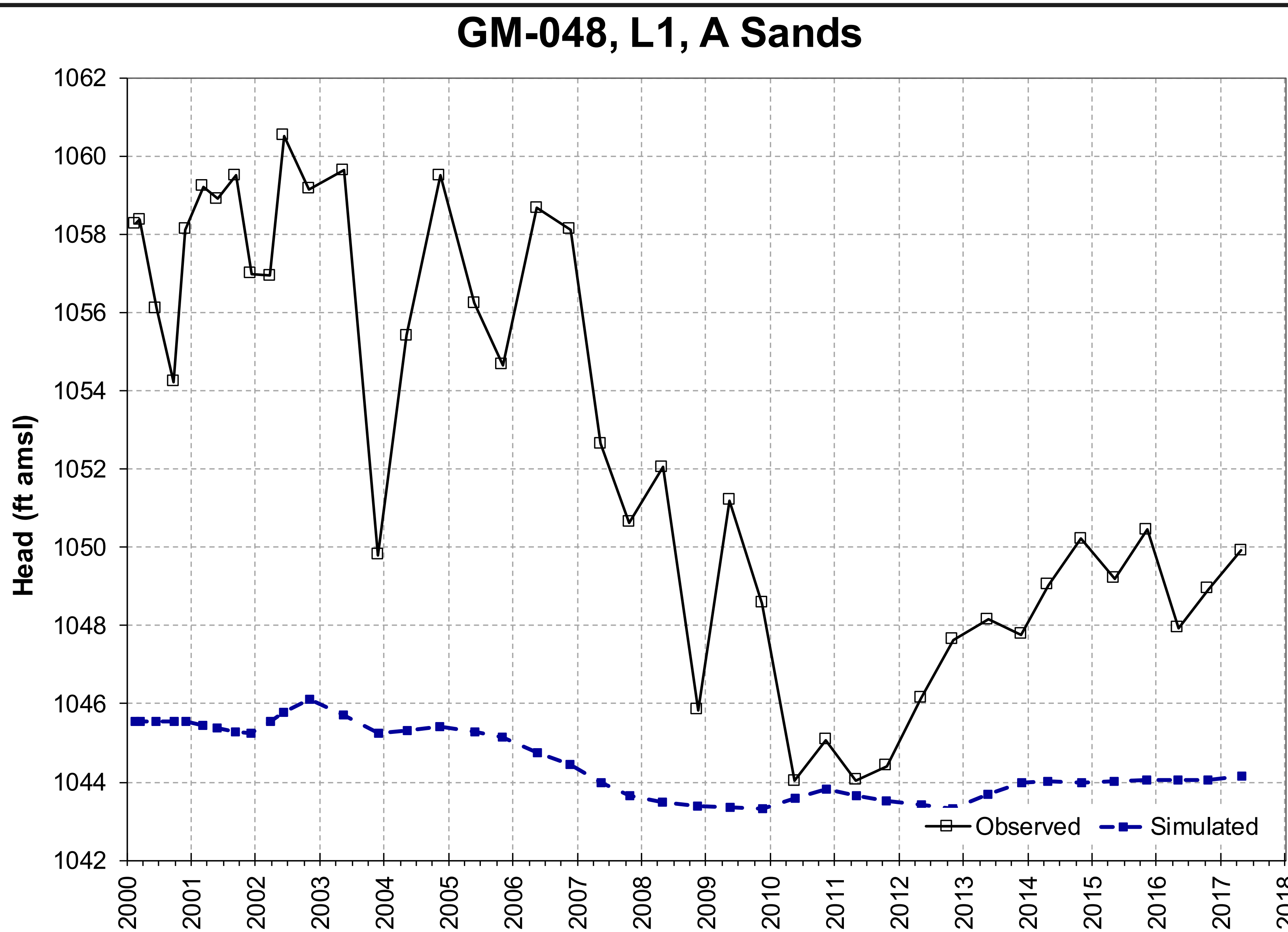


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



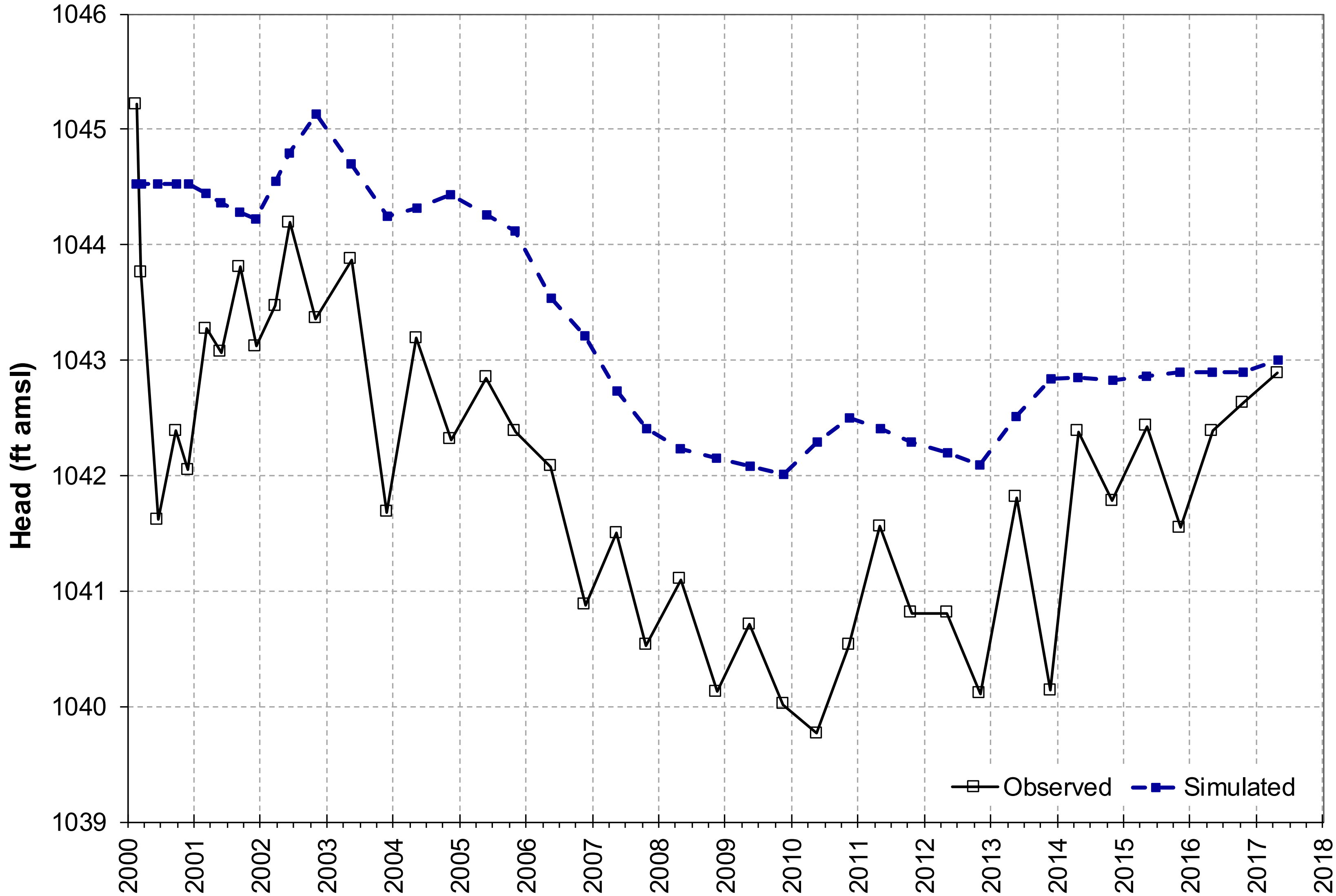
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-045, L1, A Sands

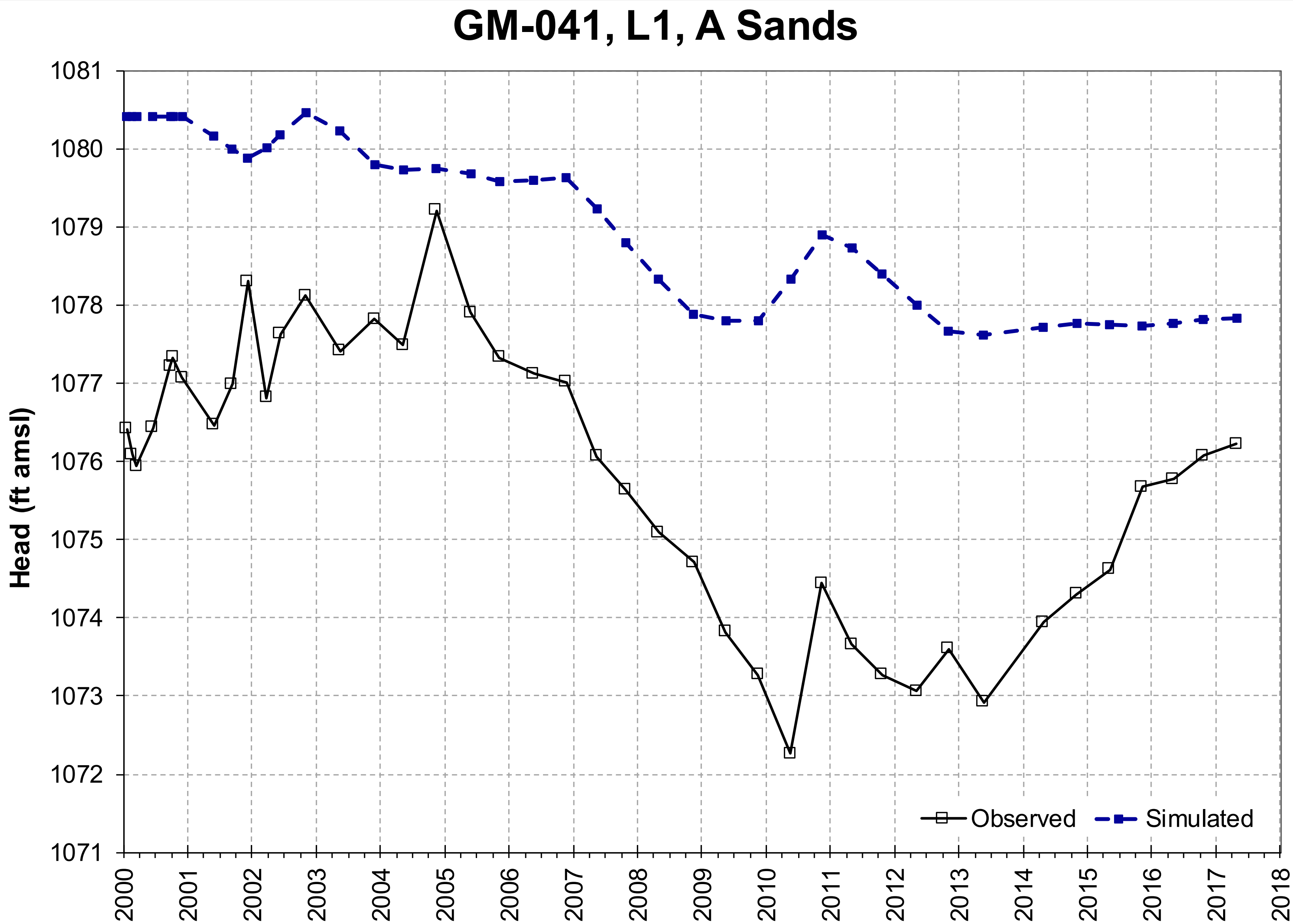


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



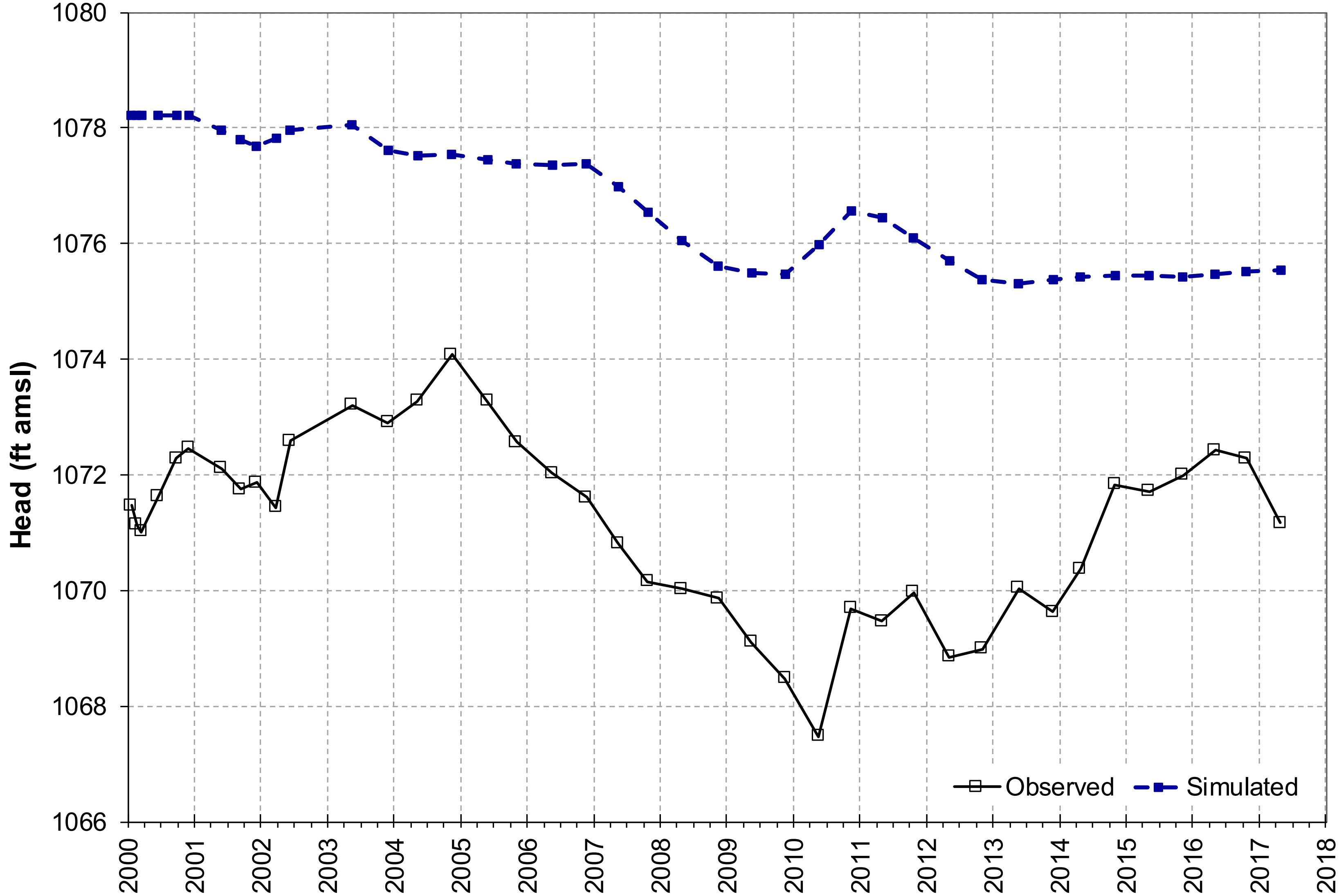
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-040A, L1, A Sands



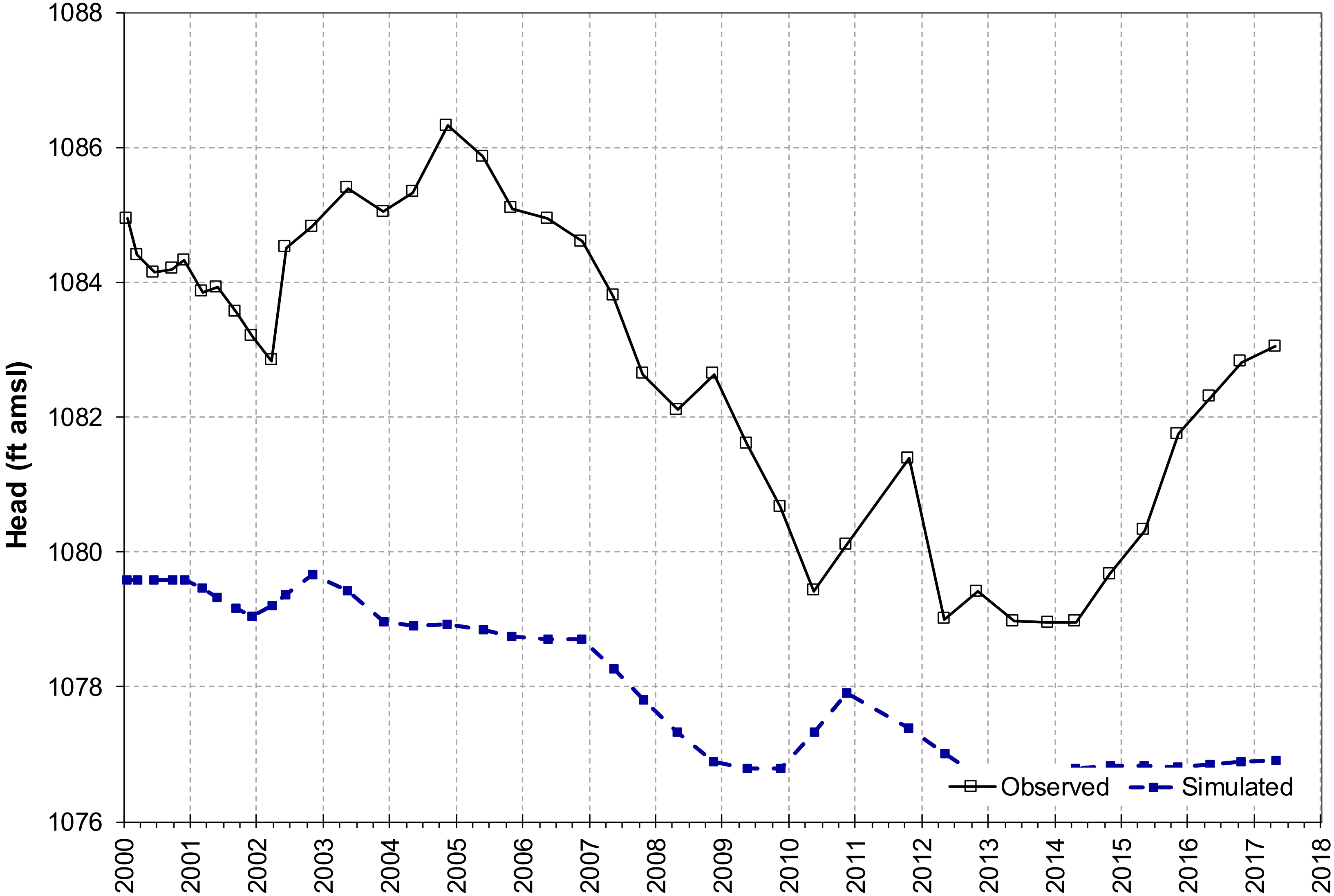
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-004, L1, A Sands

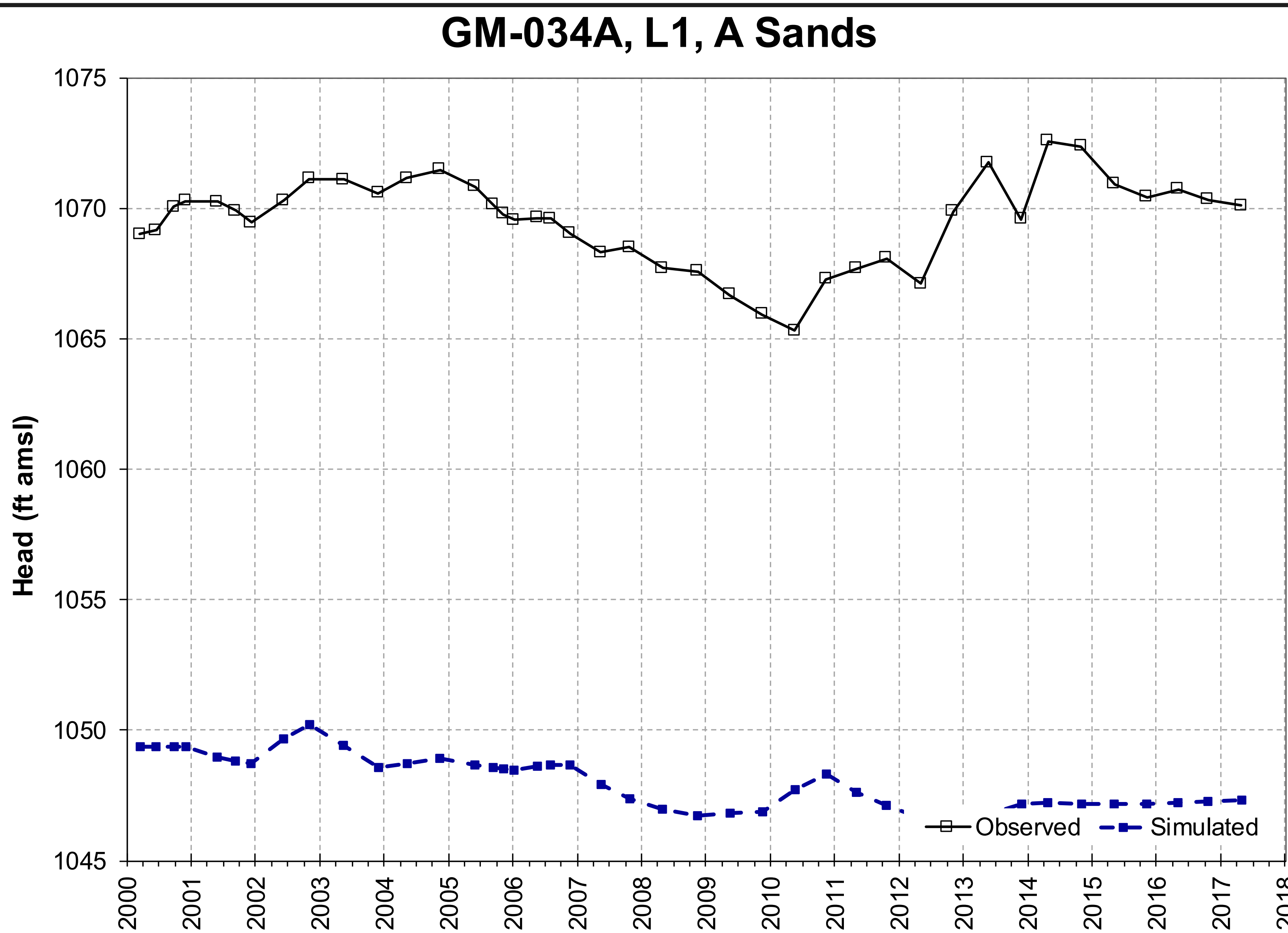


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

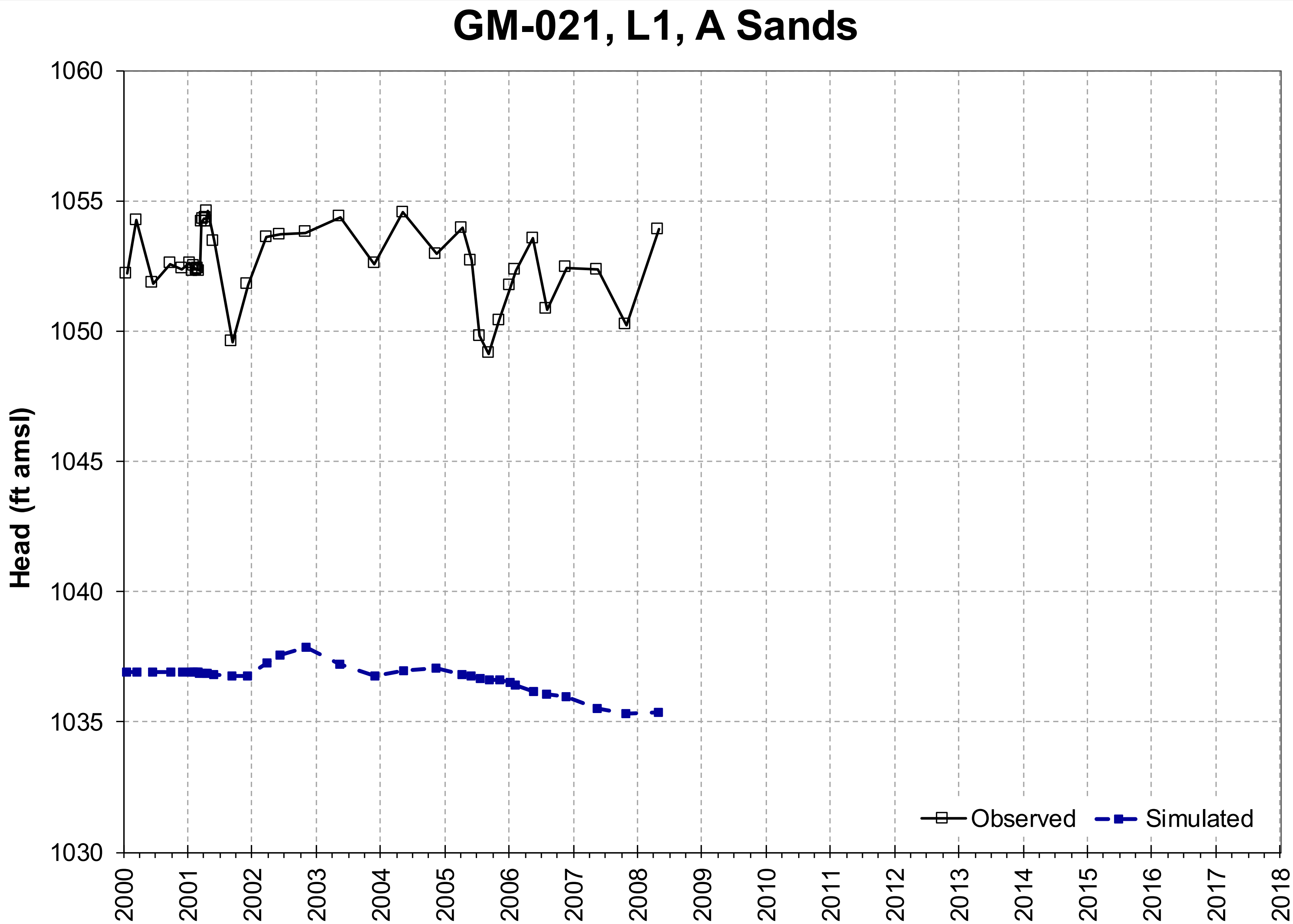


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



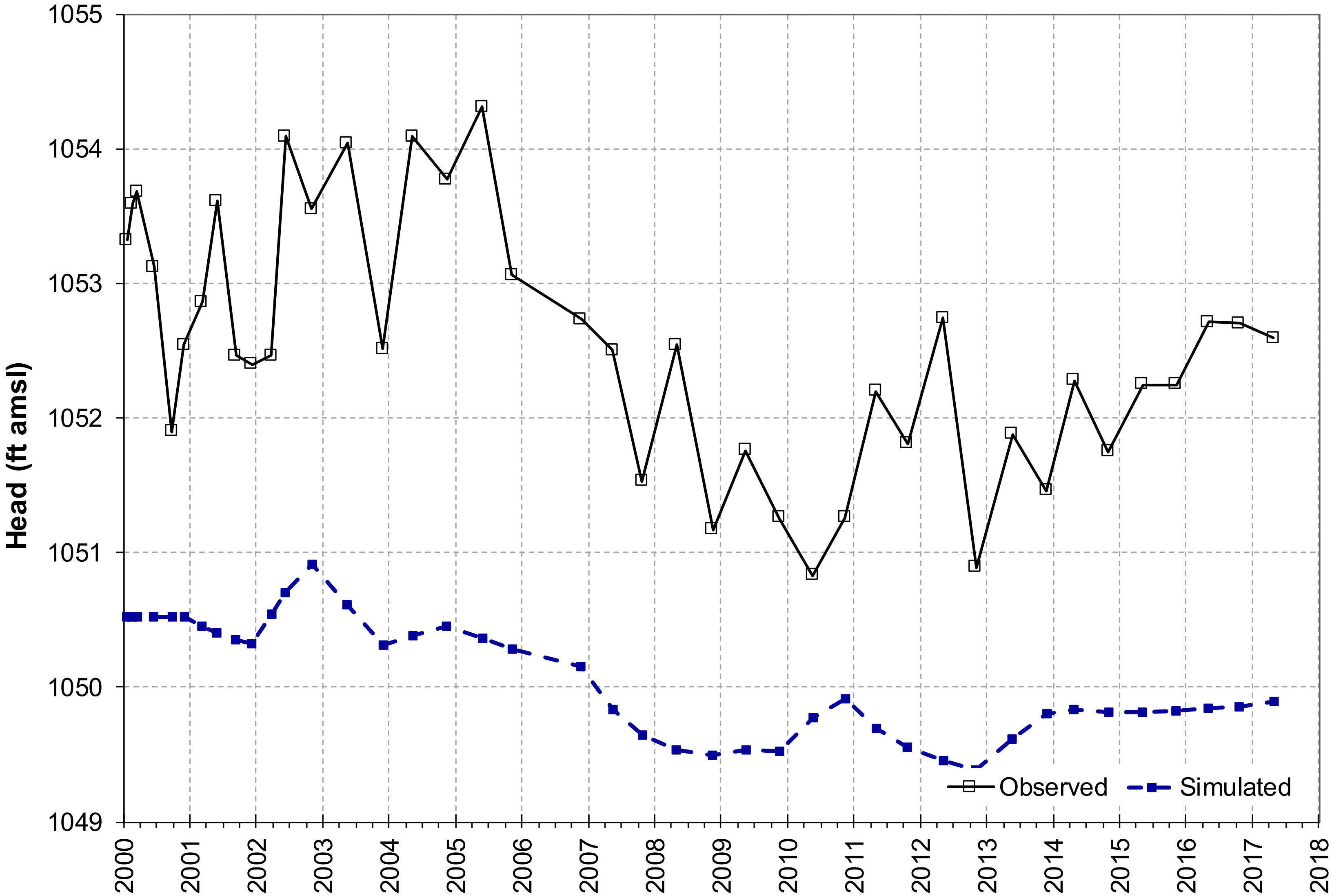
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-016, L1, A Sands

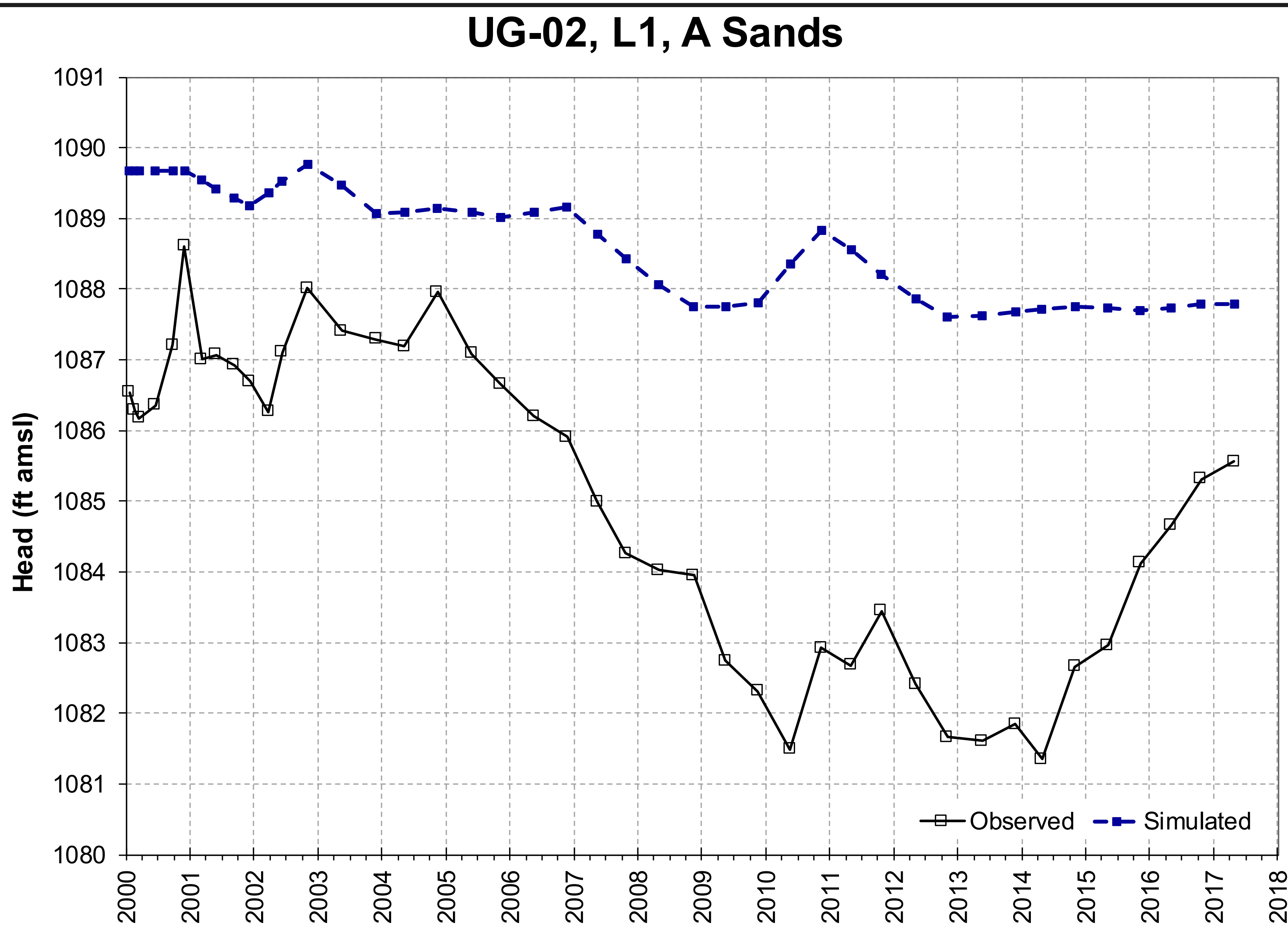


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

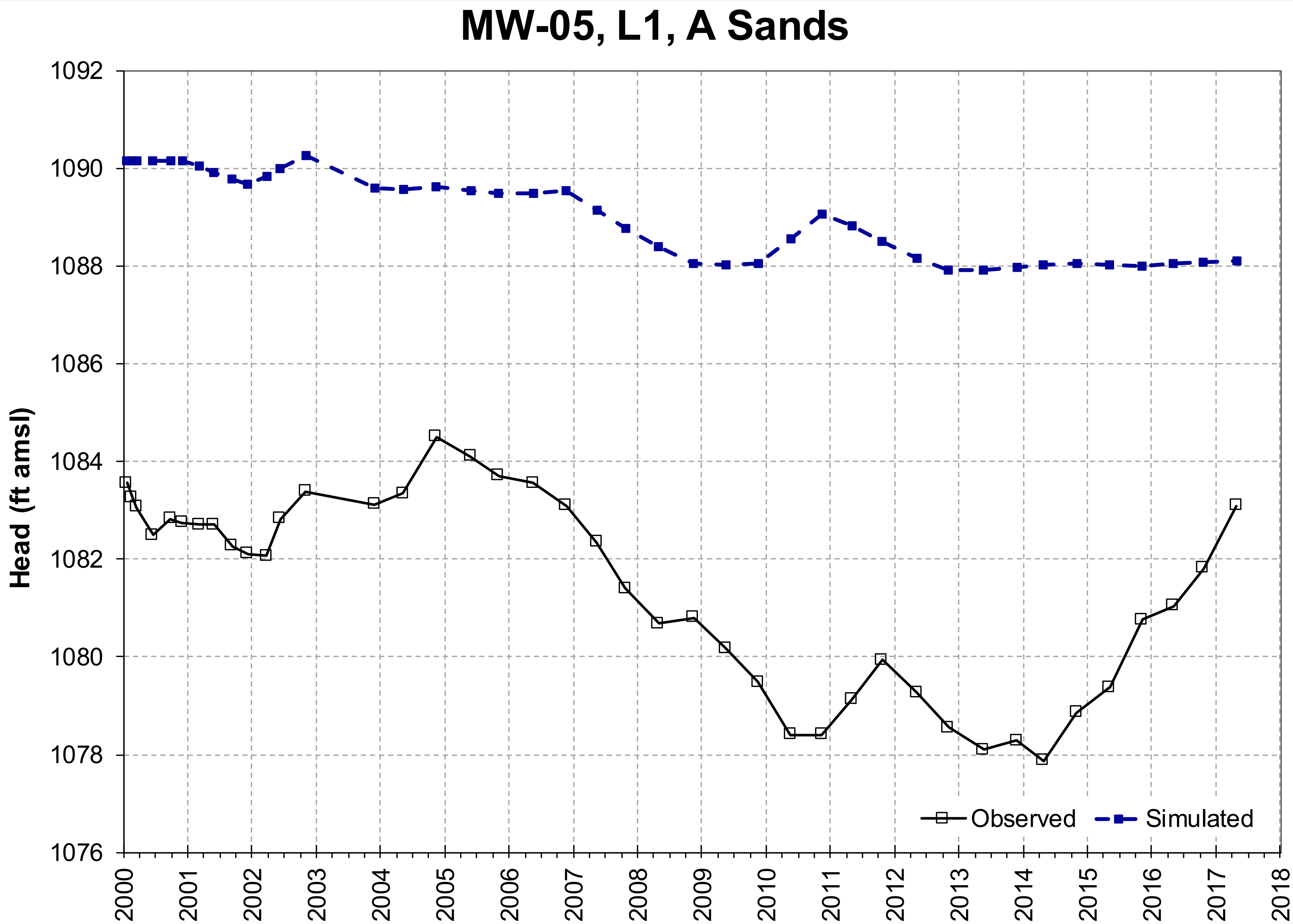


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

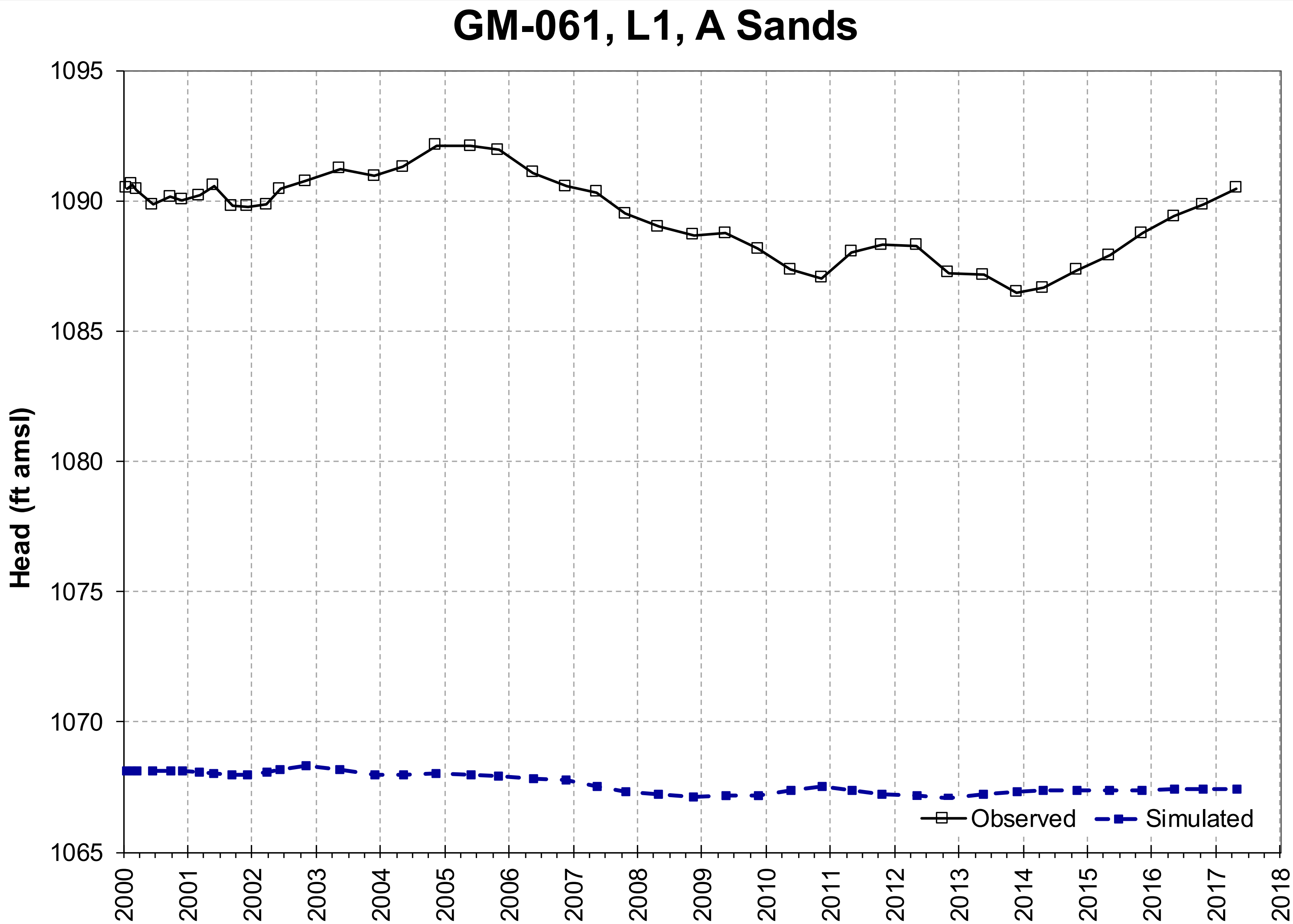


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

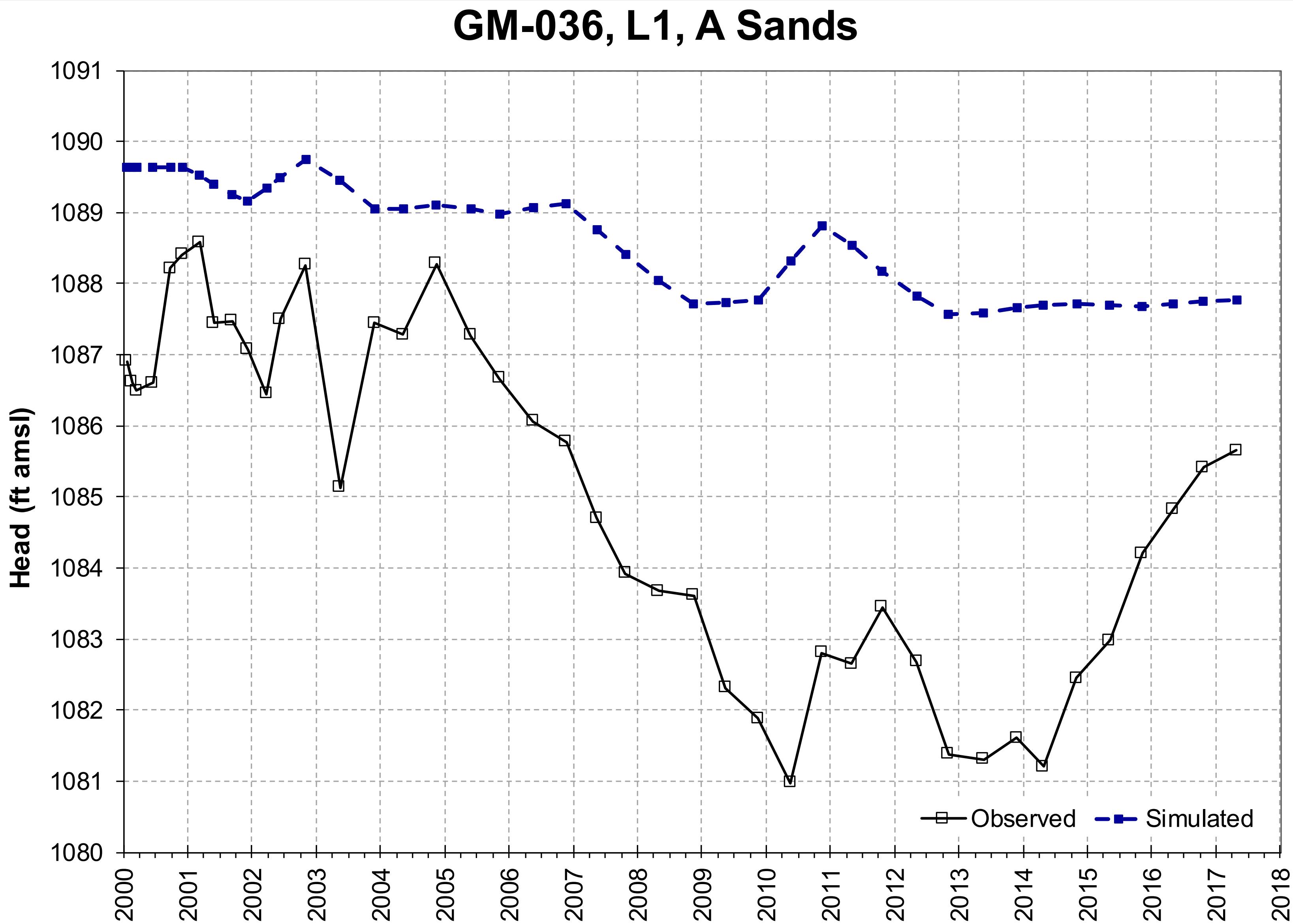


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

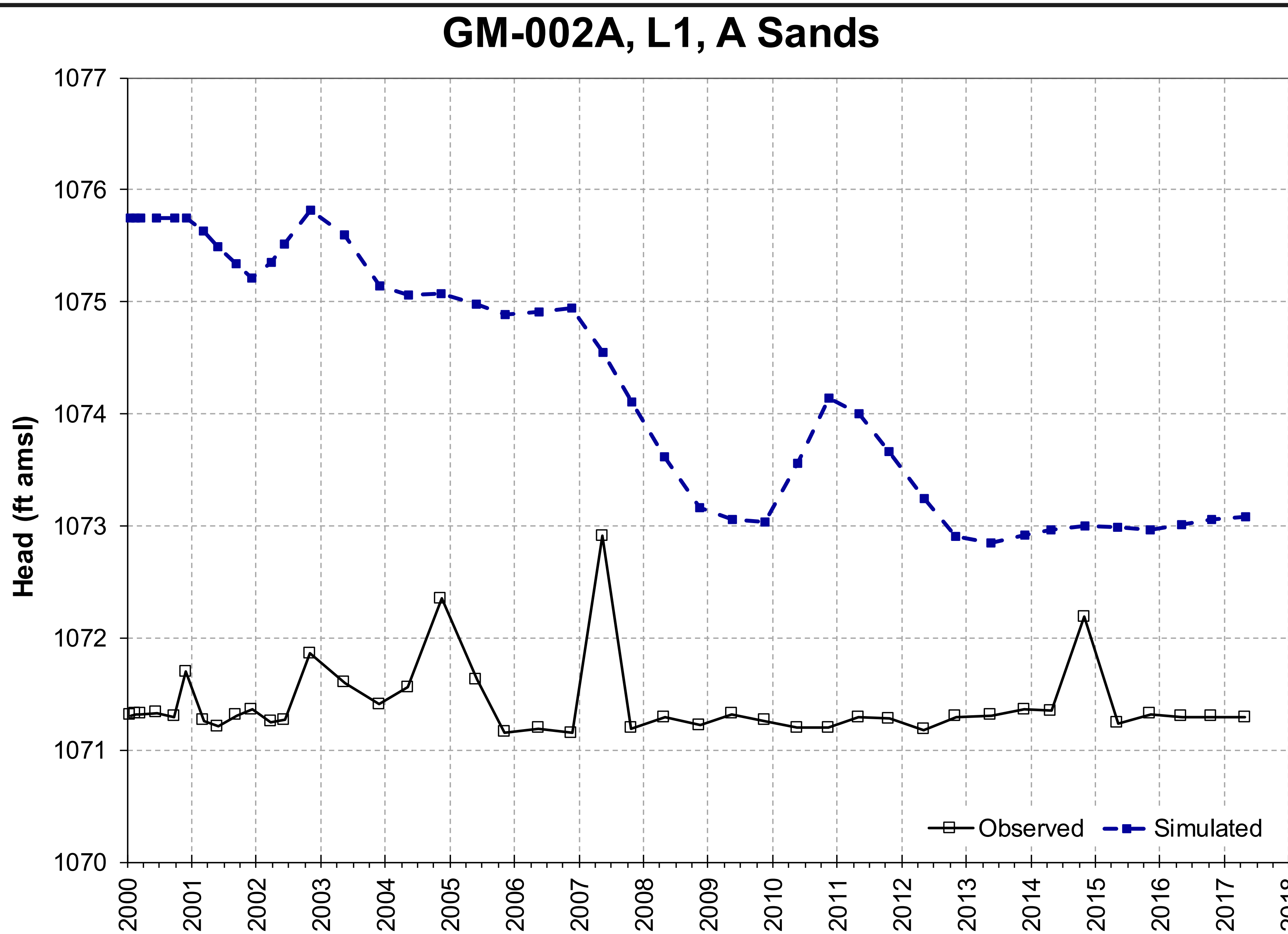


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



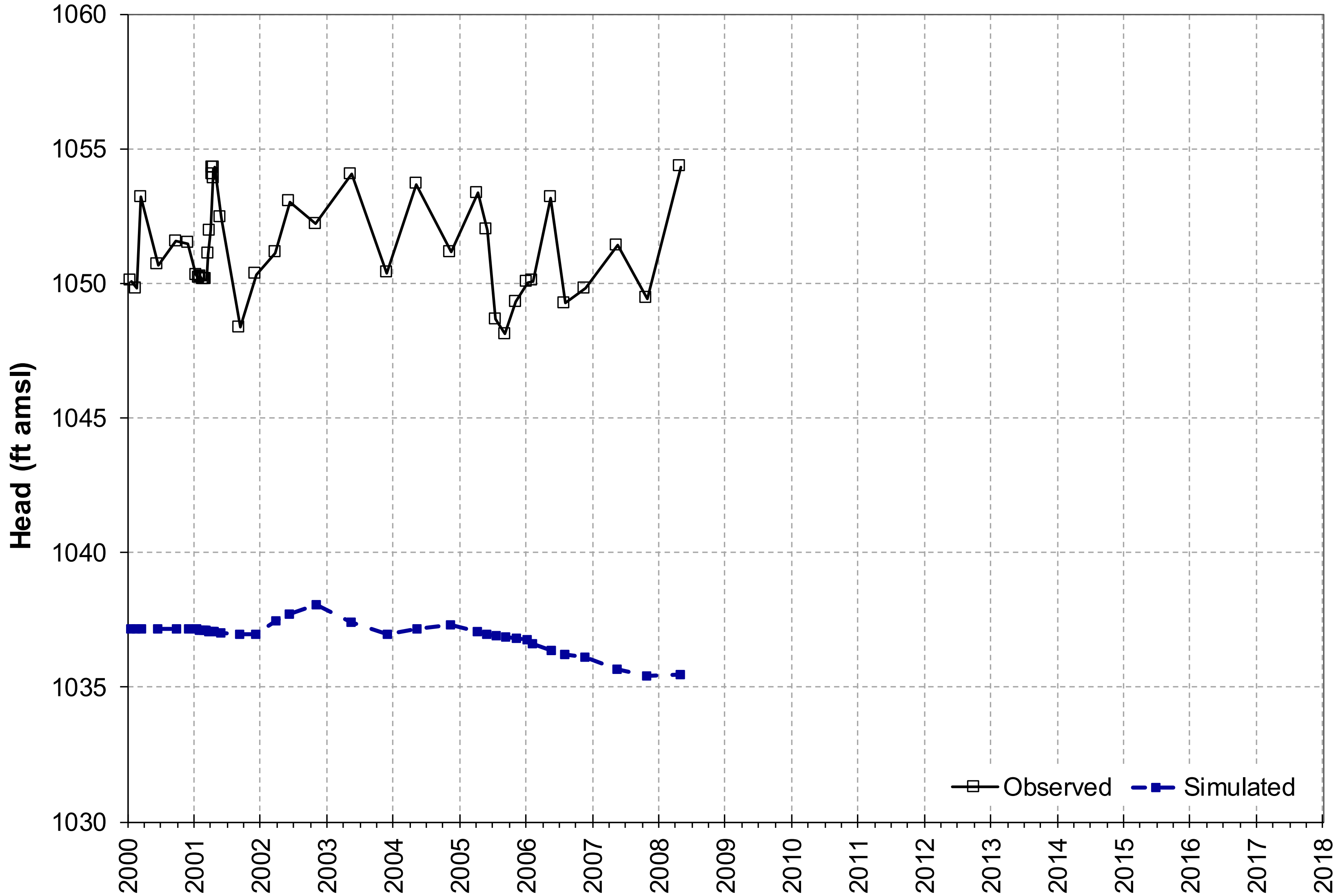
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-023, L1, A Sands

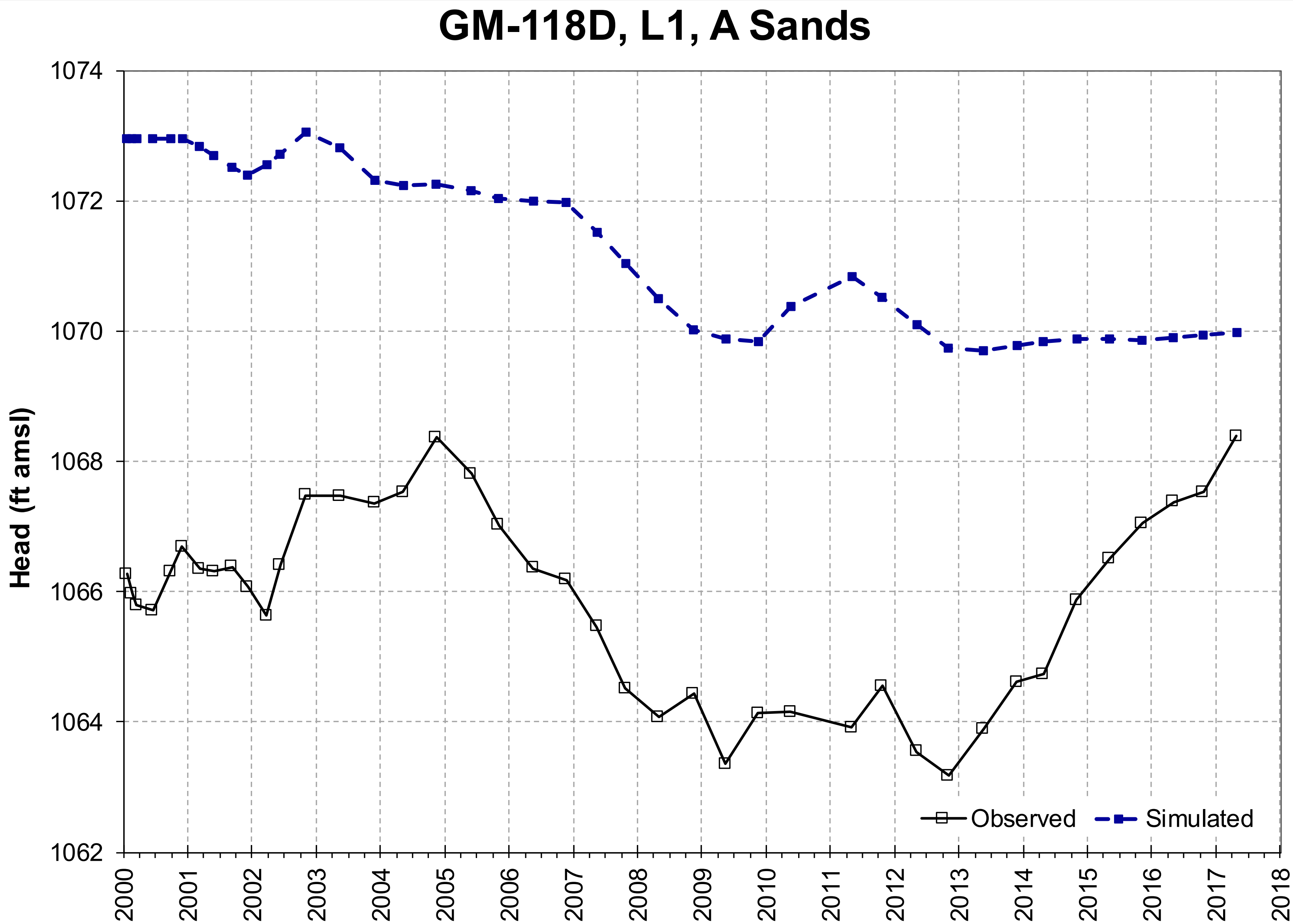


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



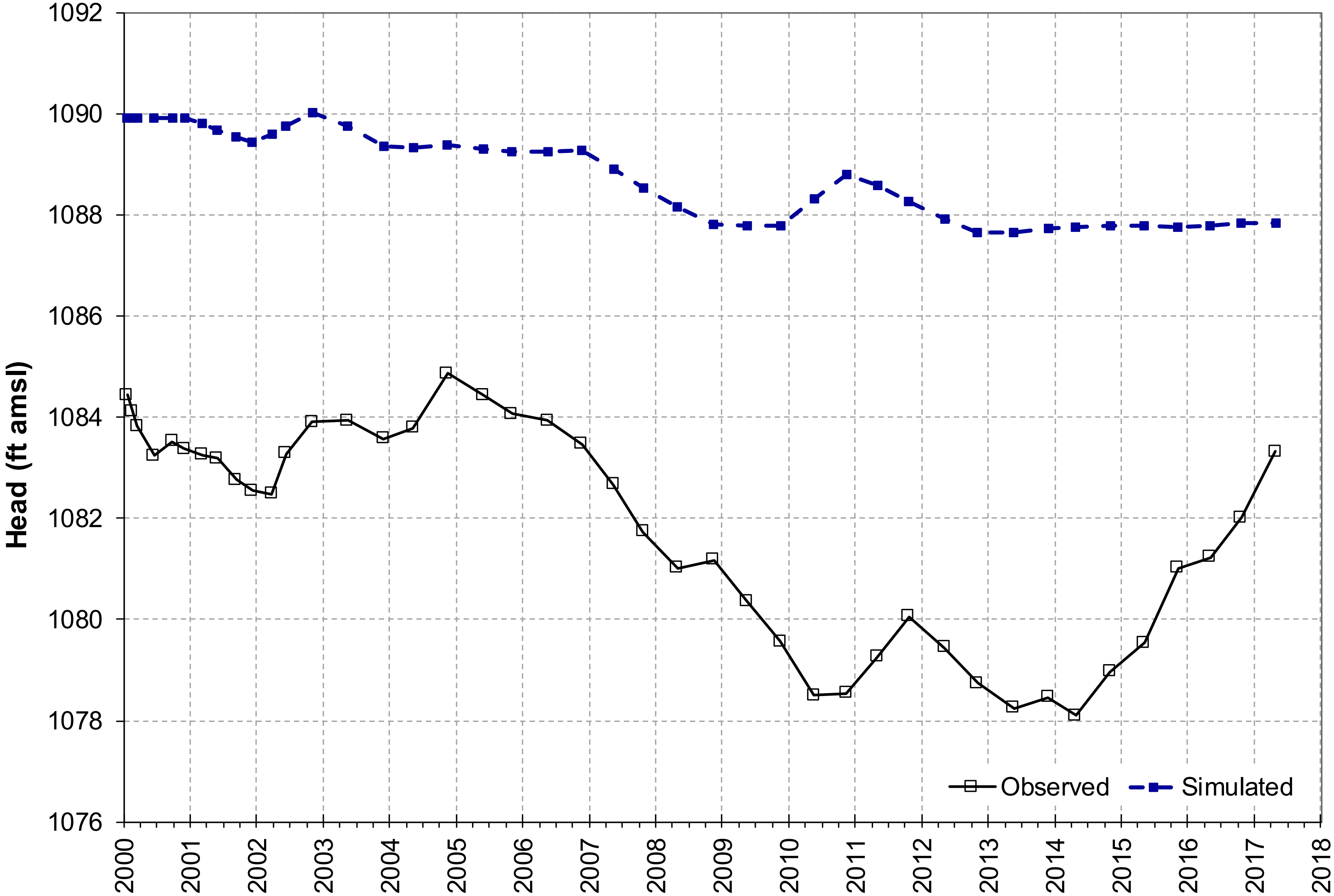
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

BR-02, L1, A Sands

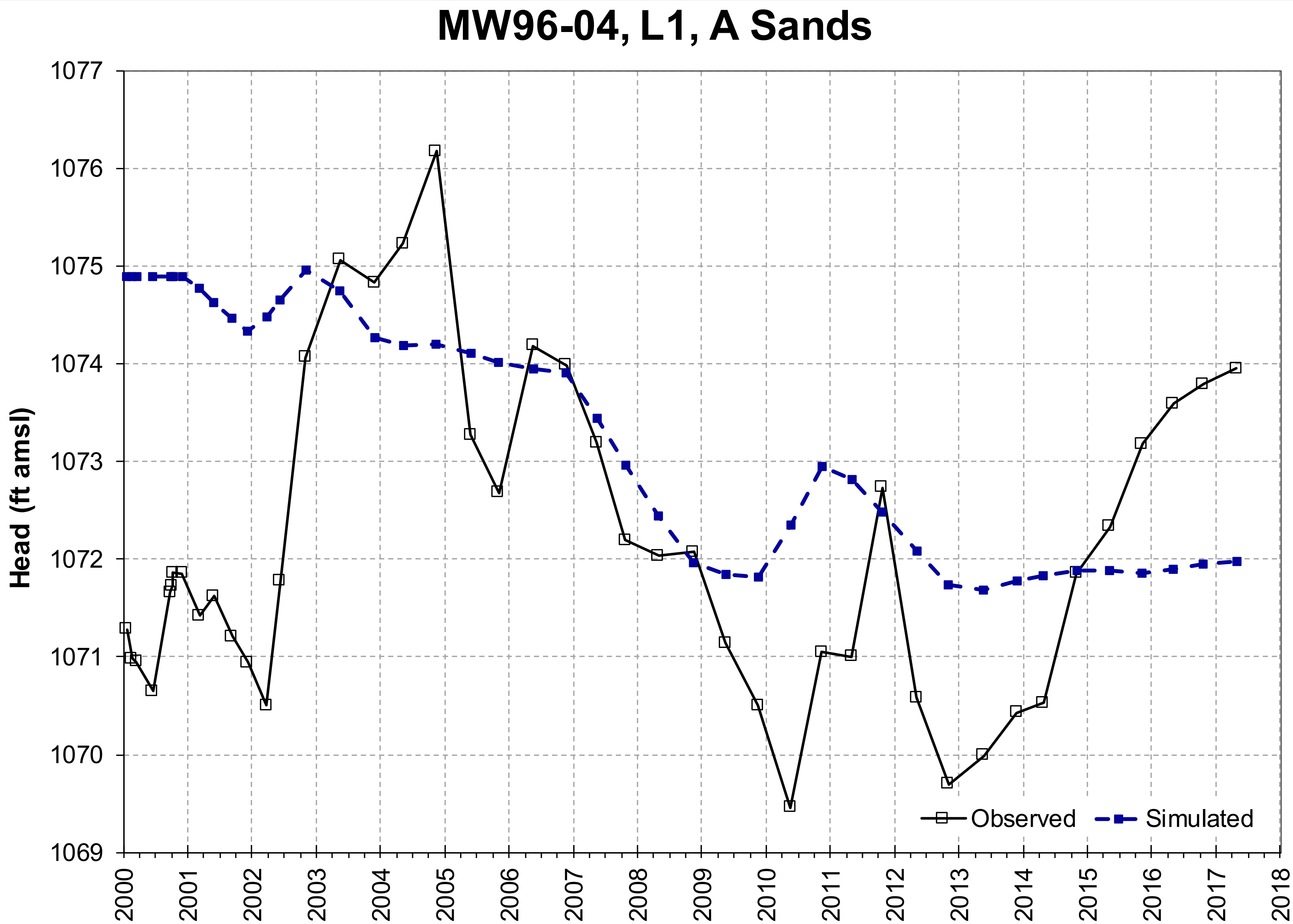


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

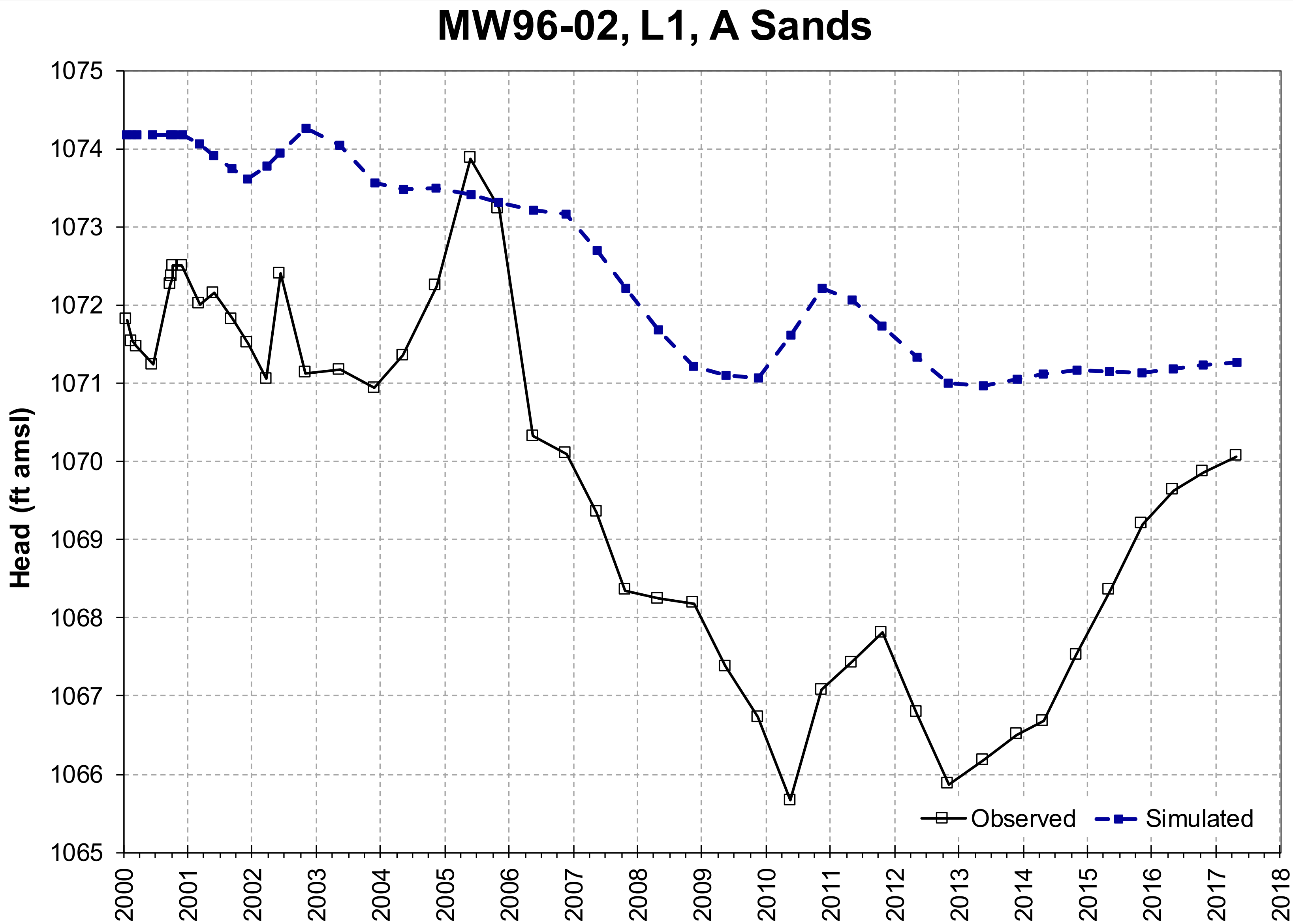


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

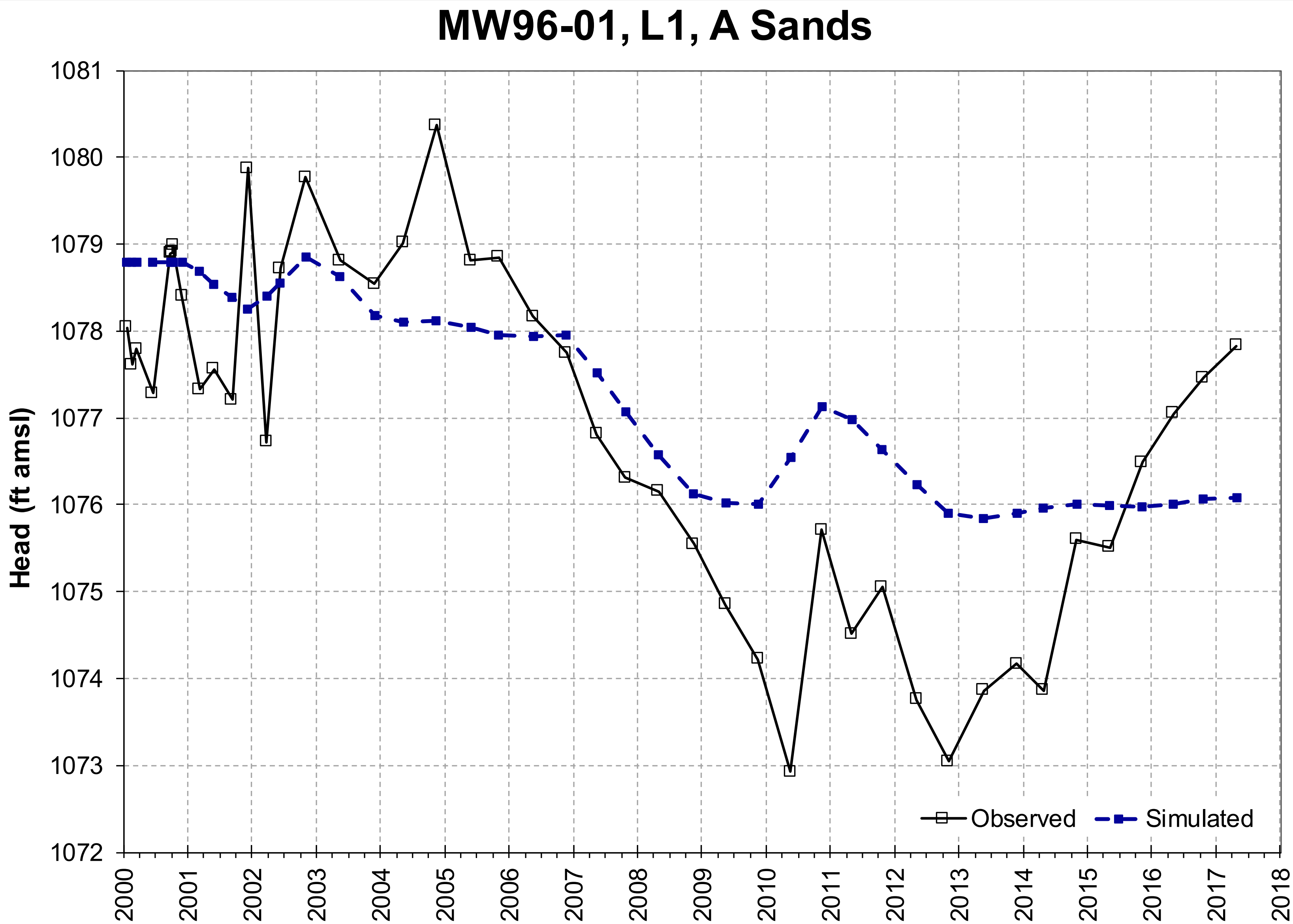


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

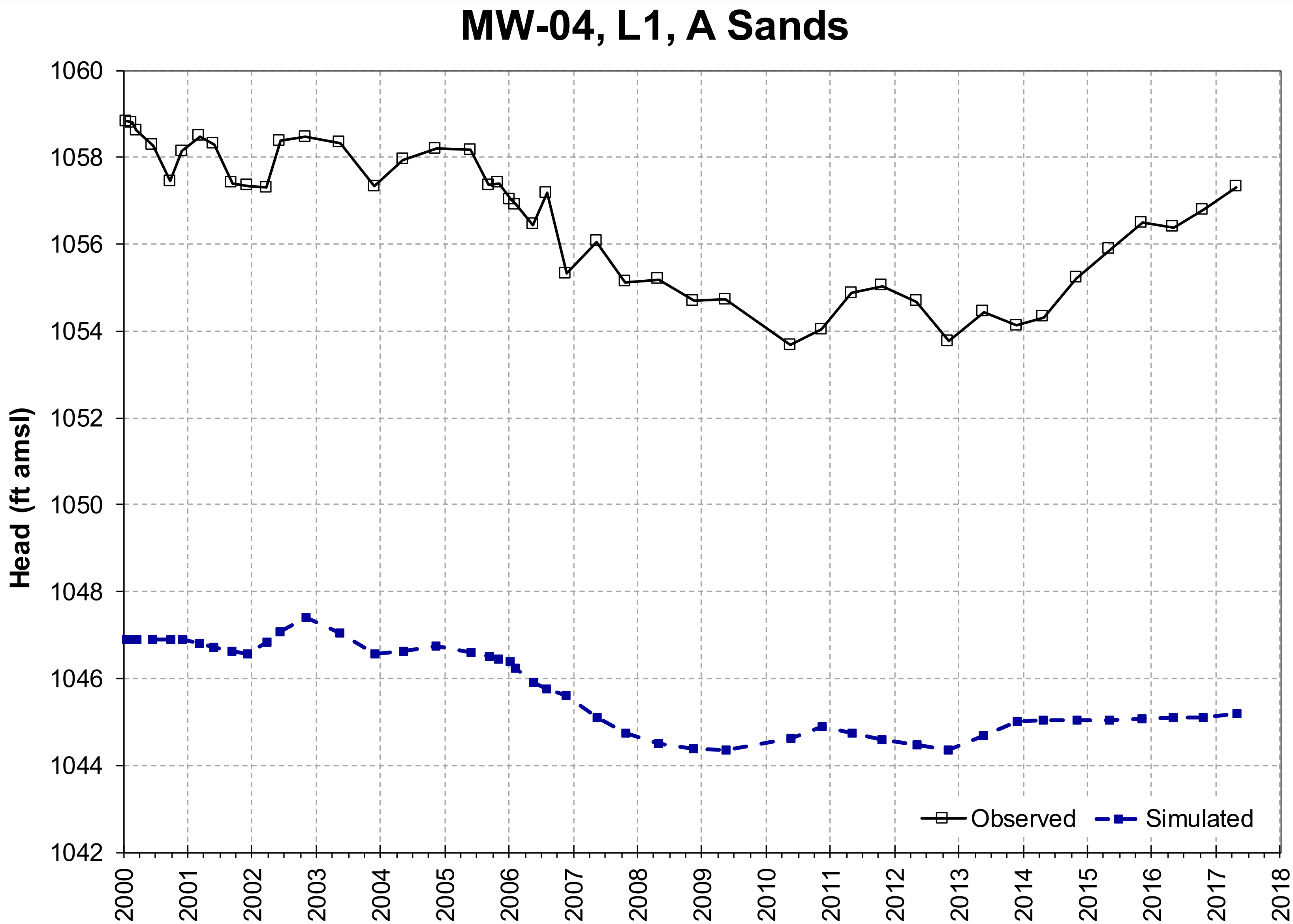


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

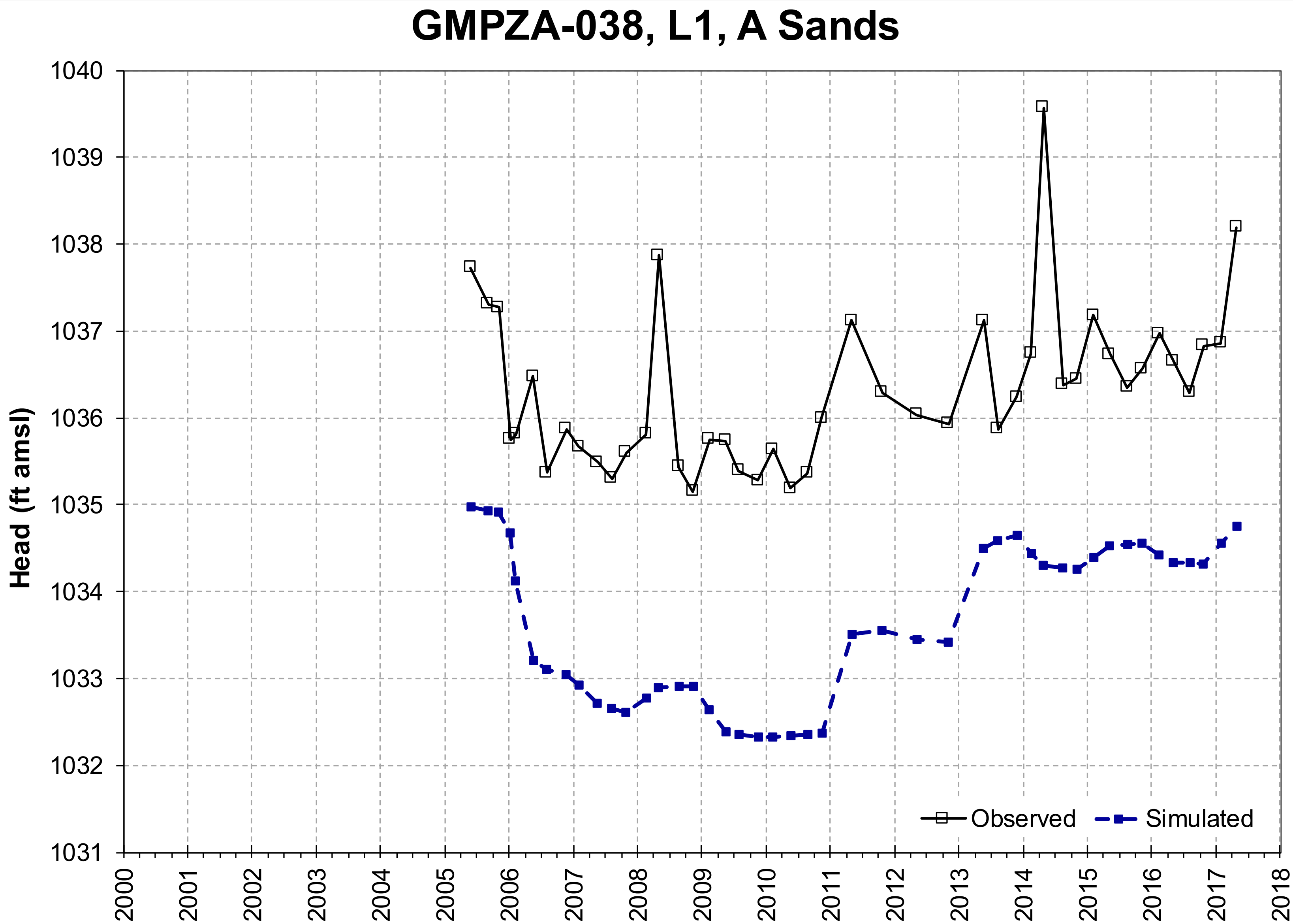


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

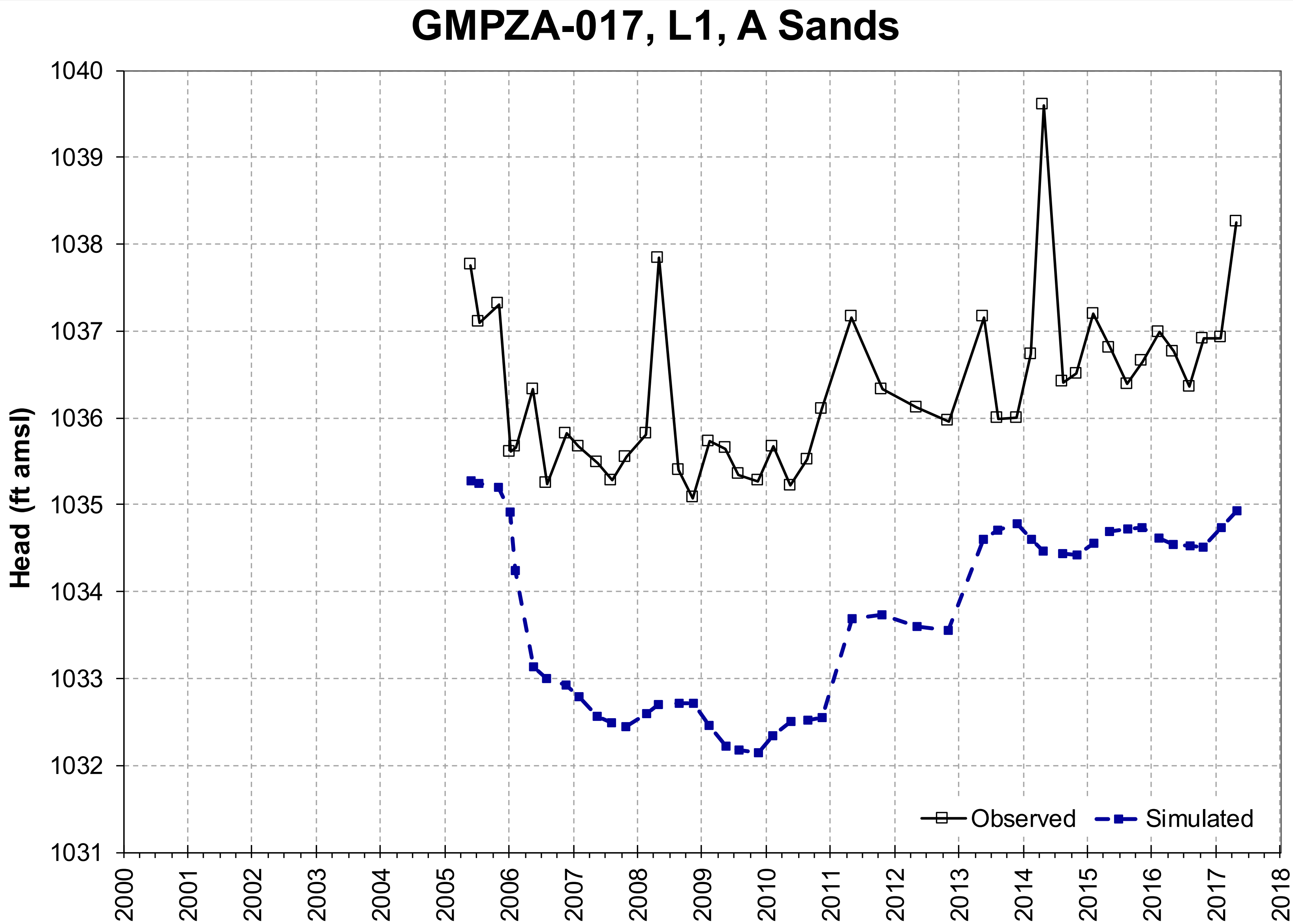


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

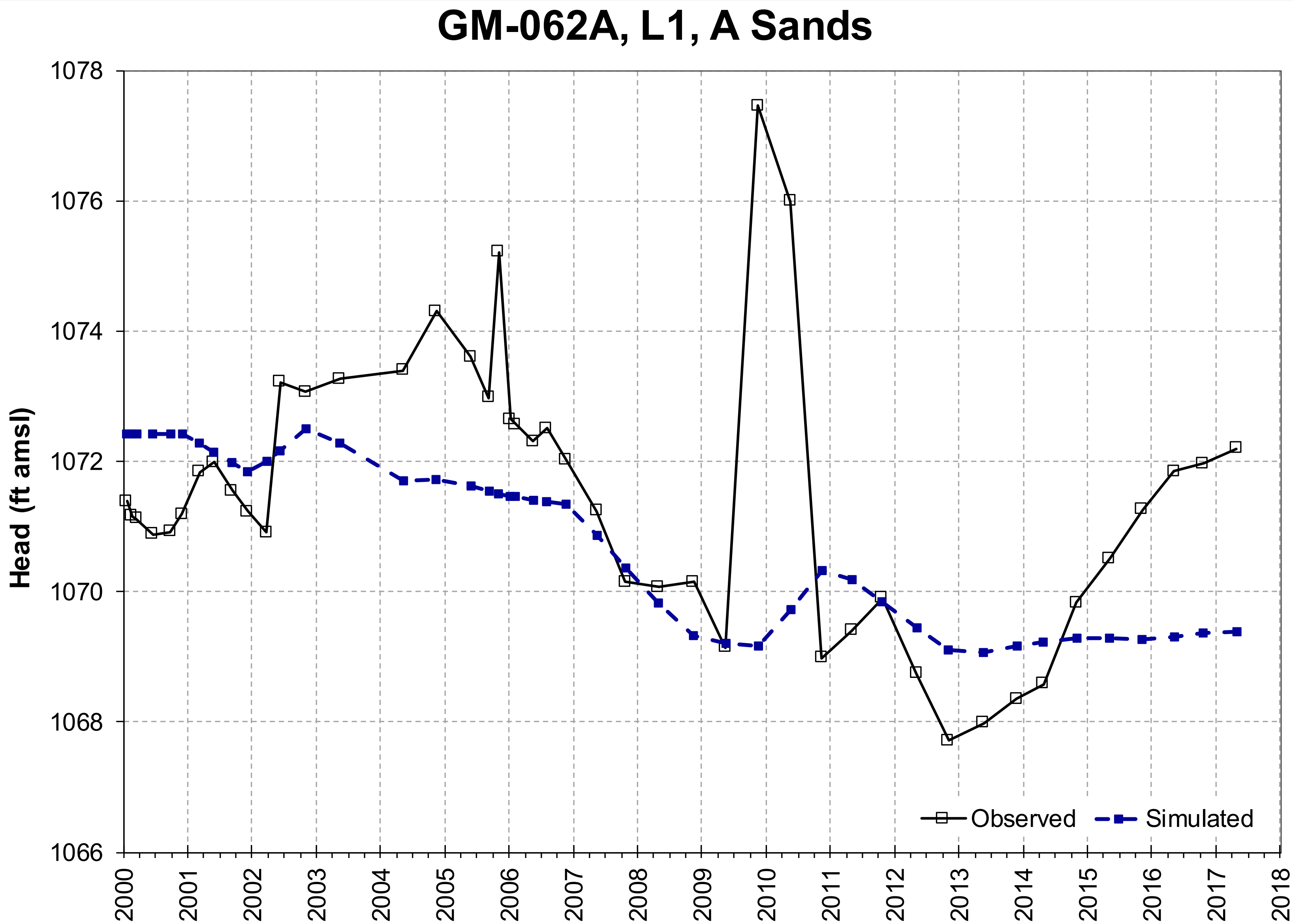


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

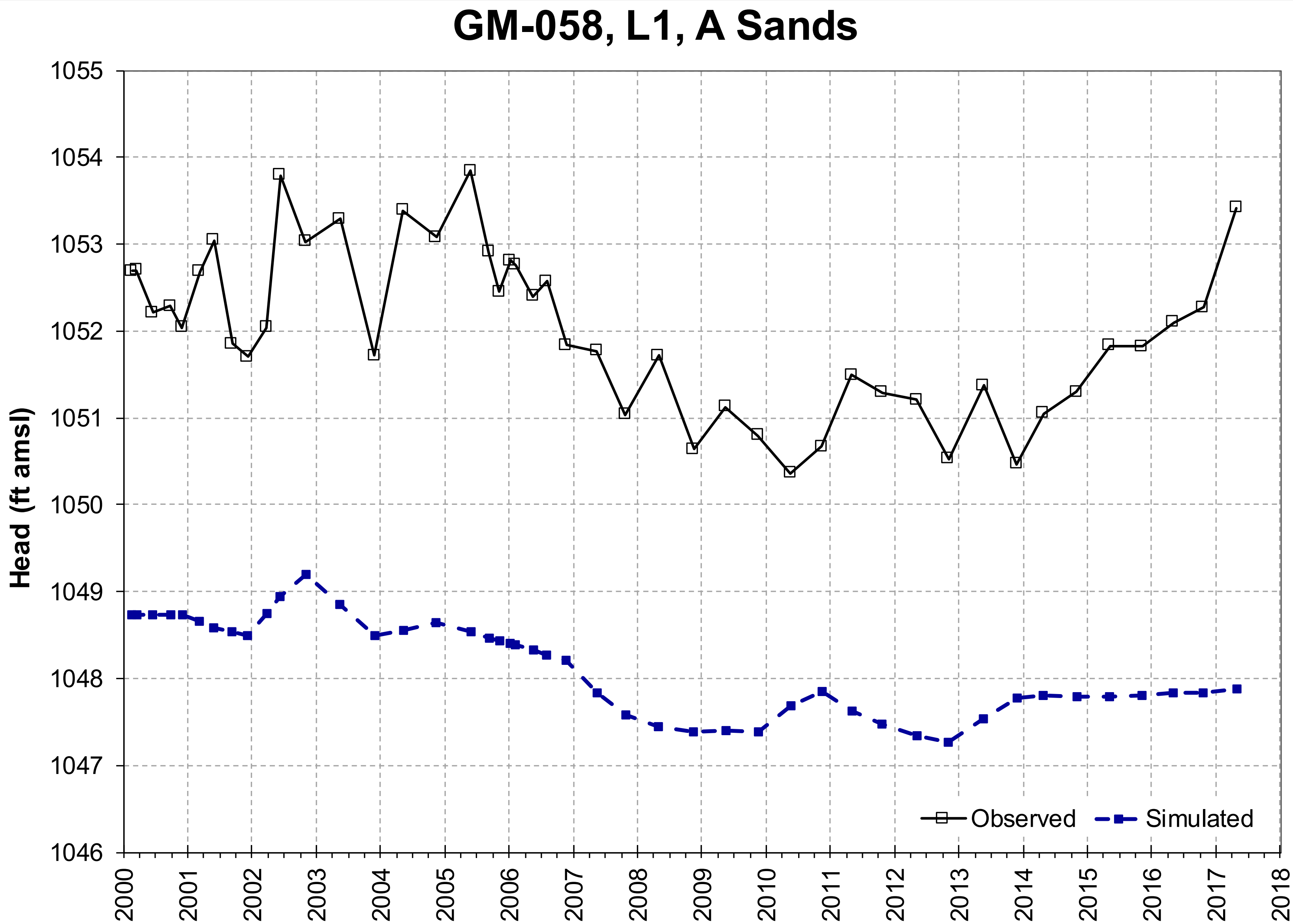


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

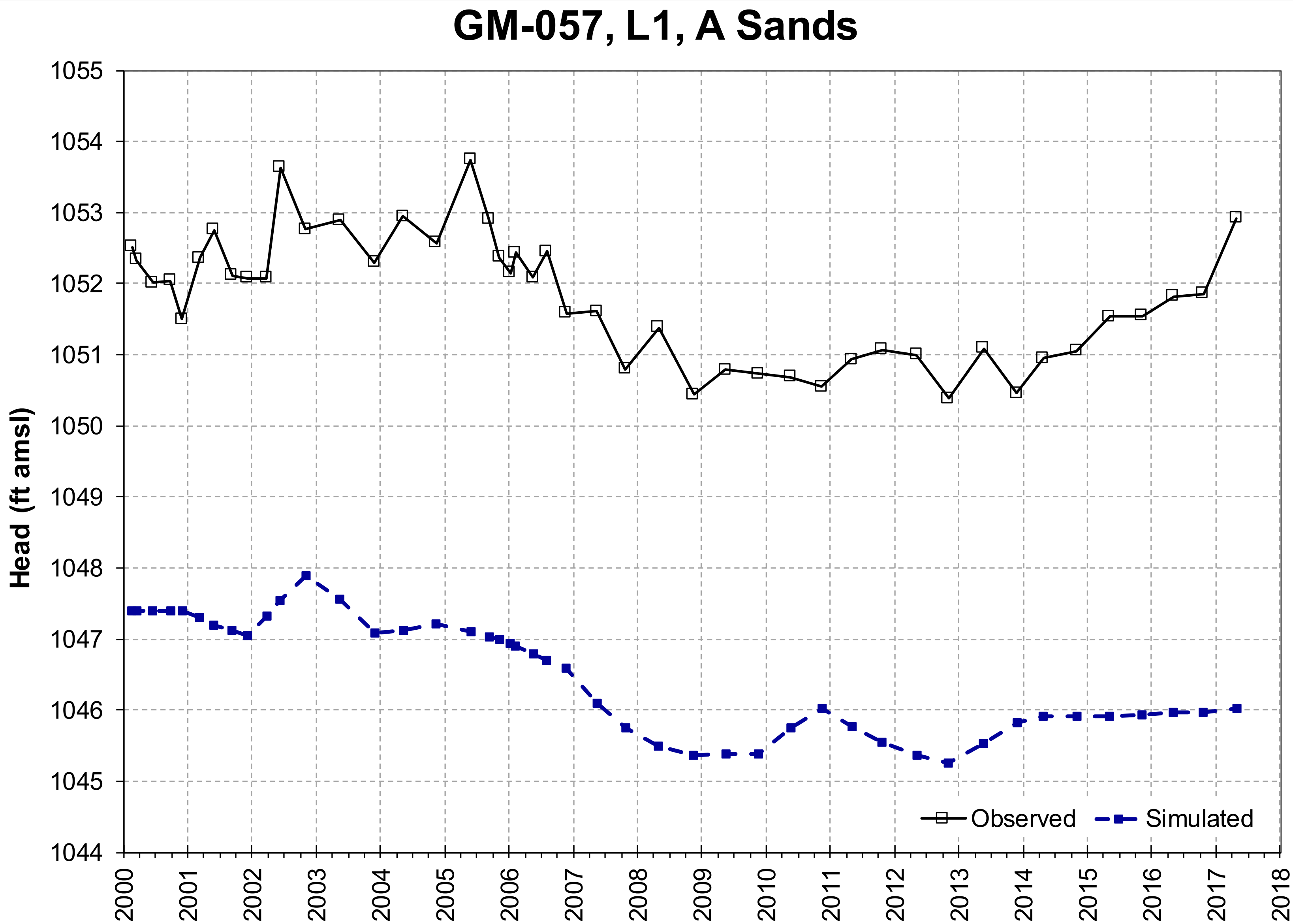


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

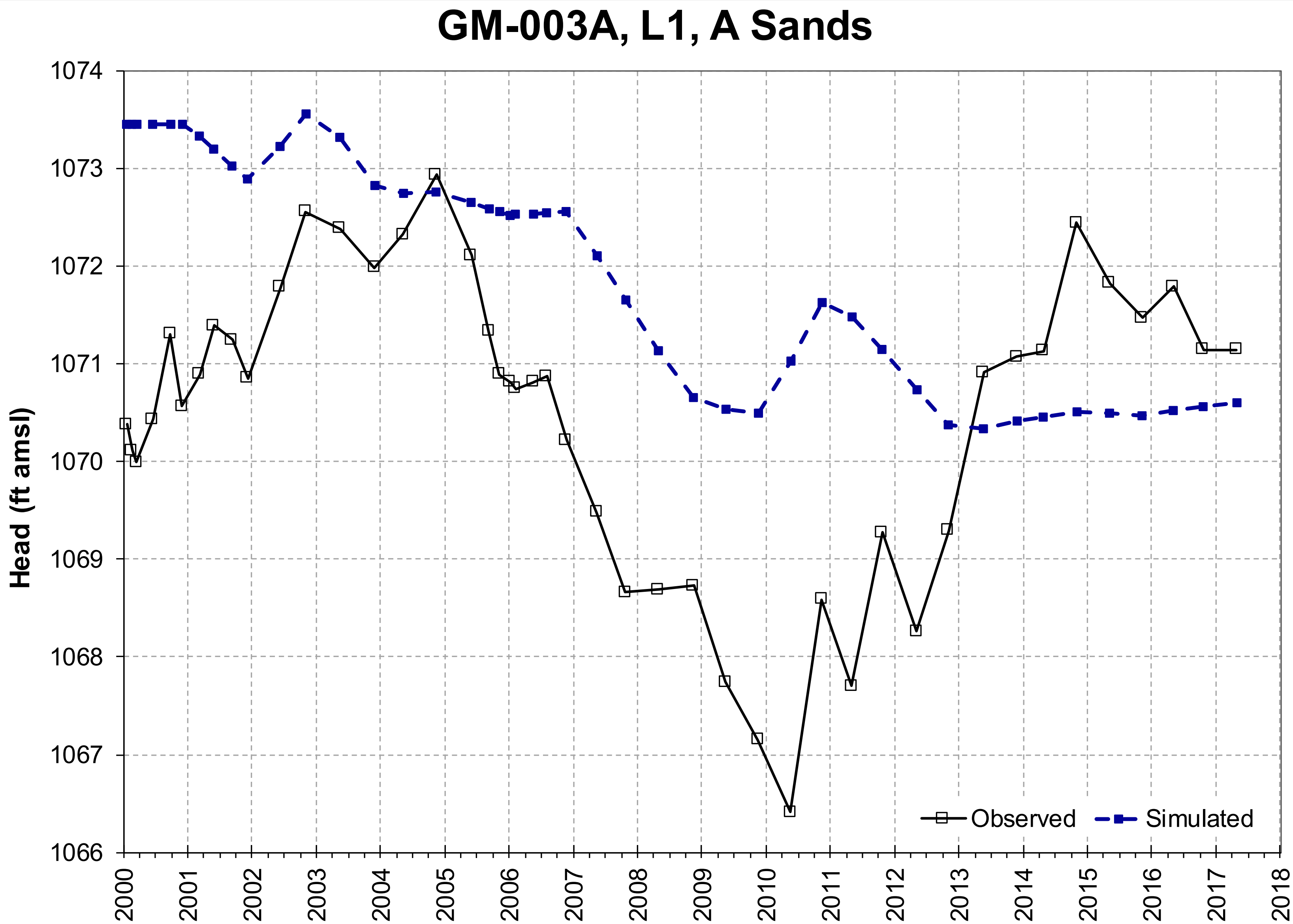


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

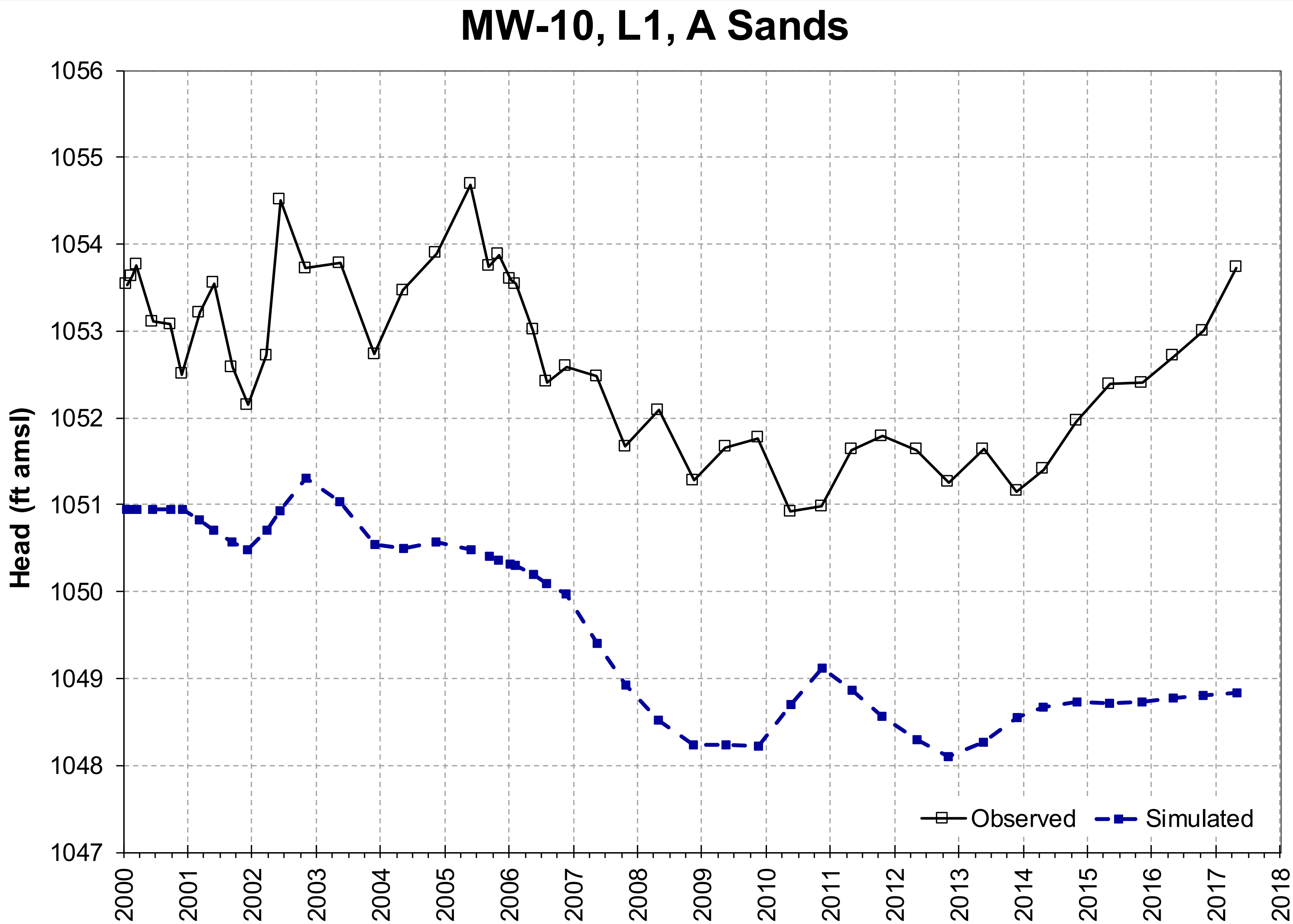


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

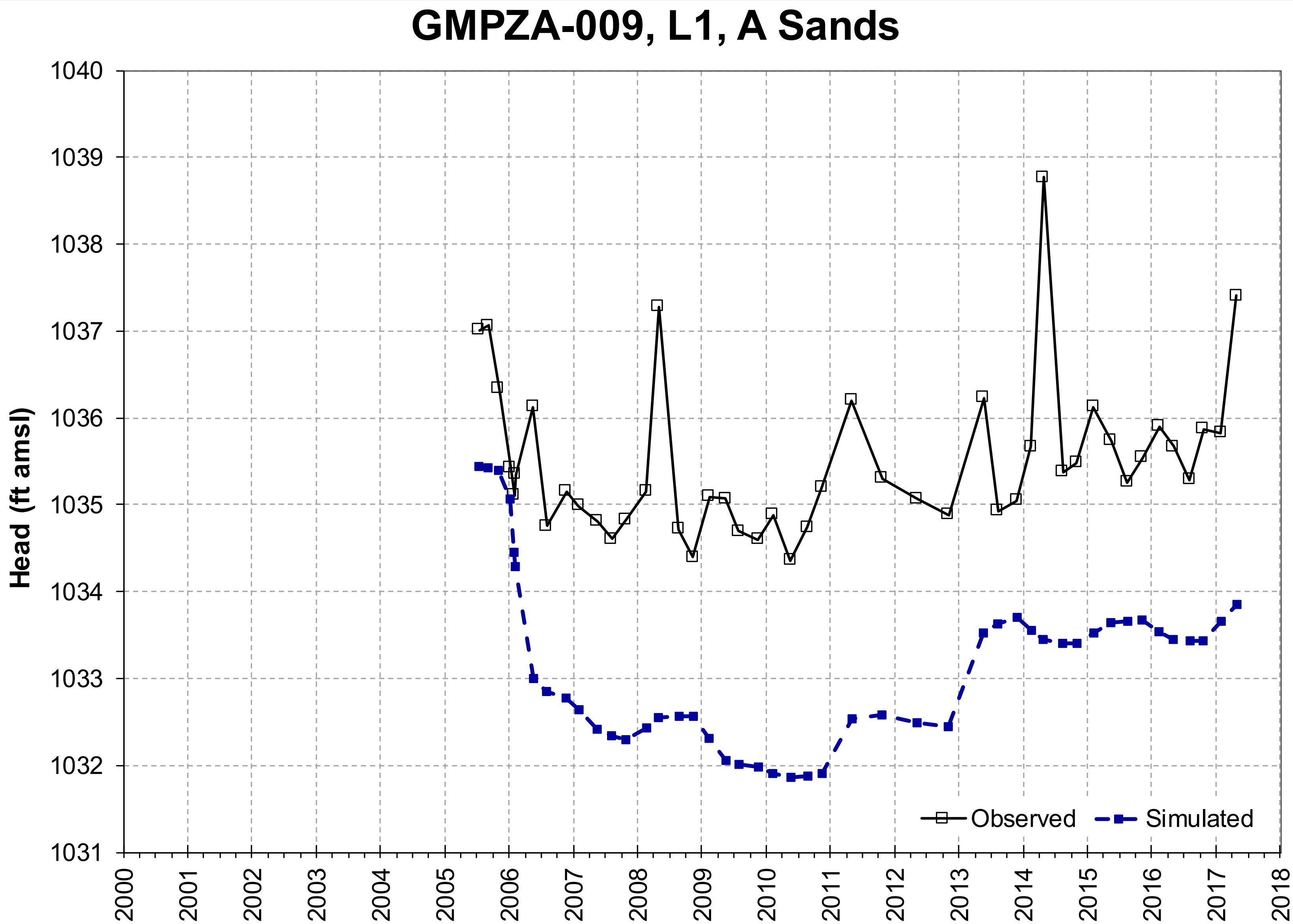


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

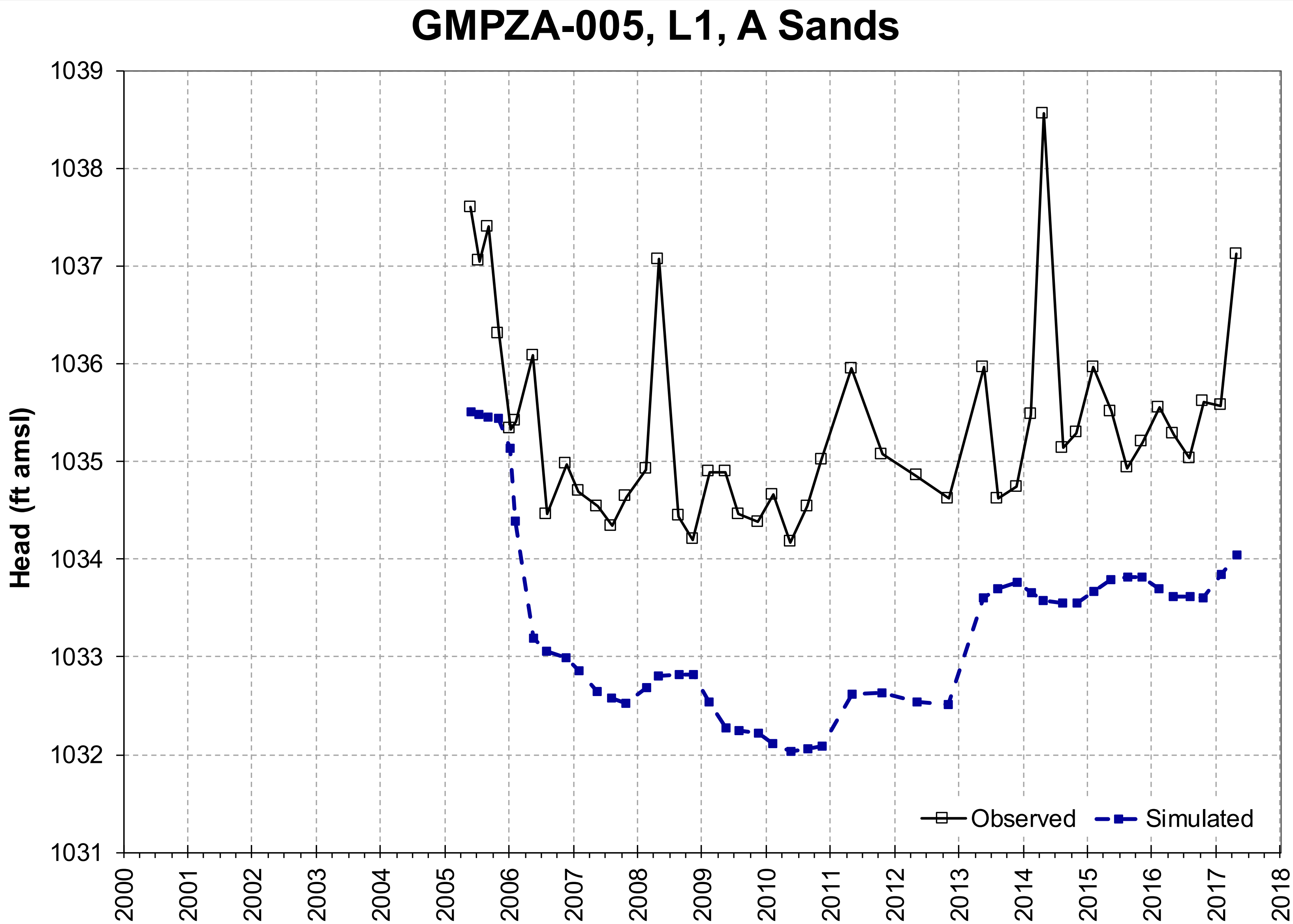


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

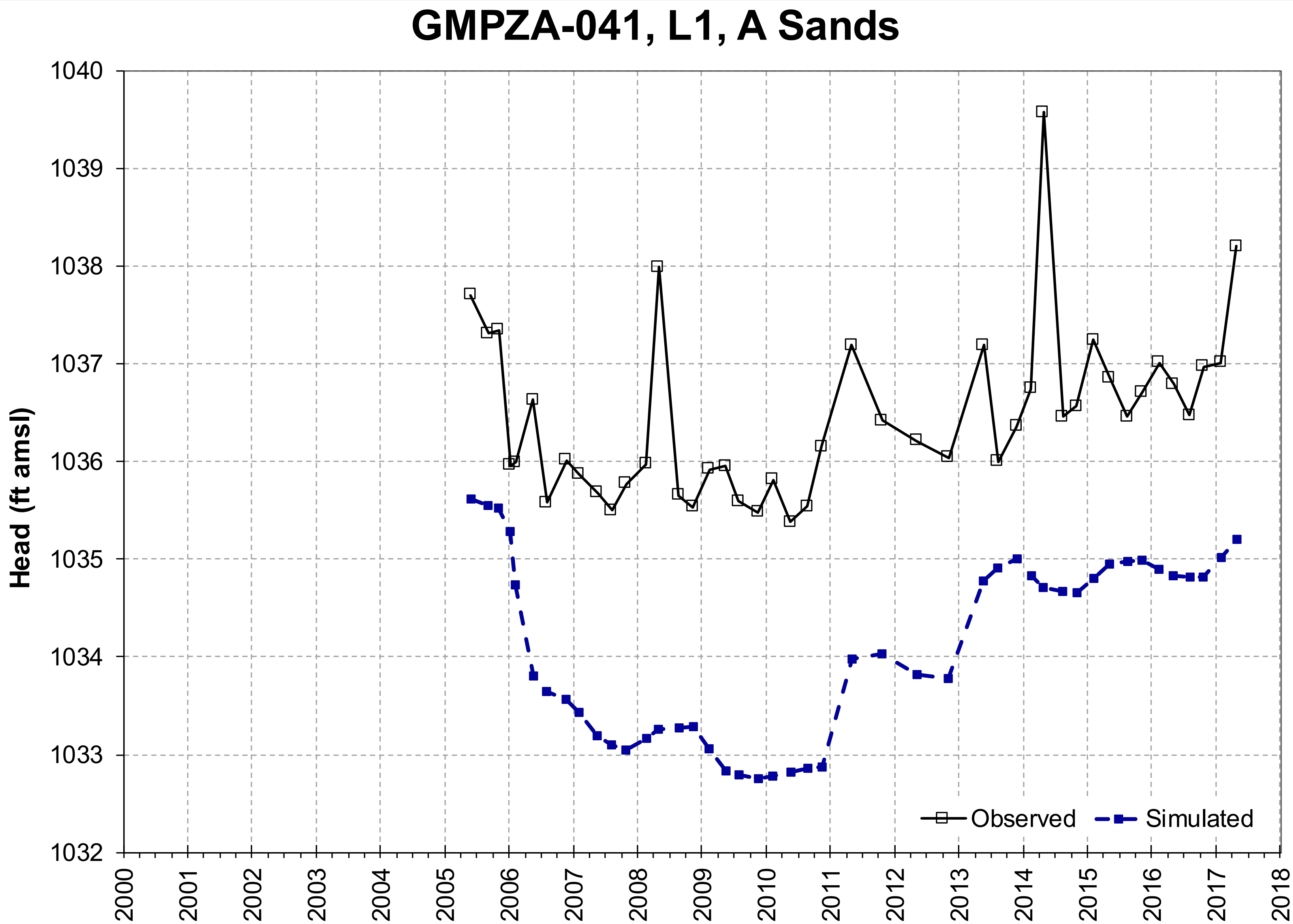


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

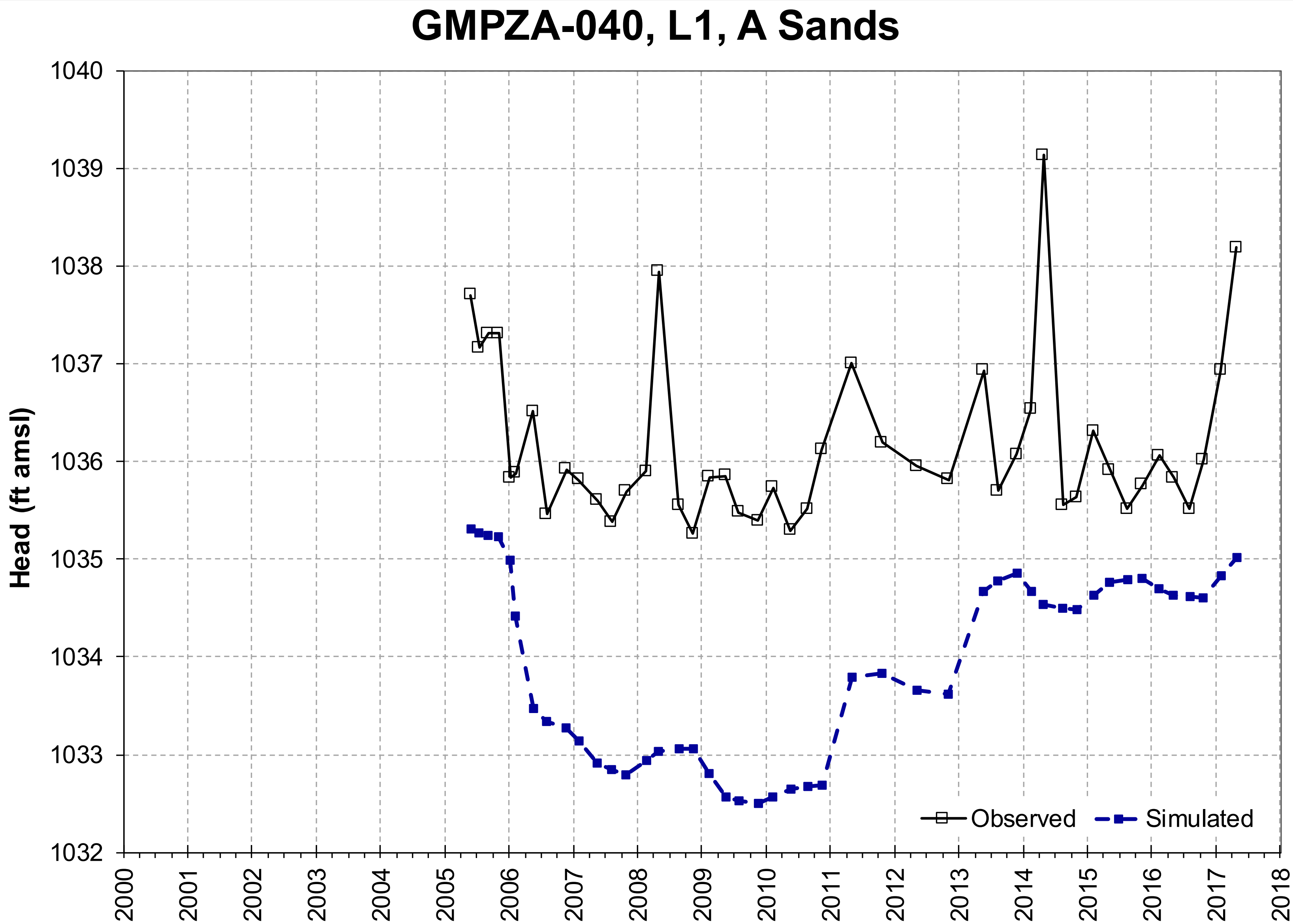


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



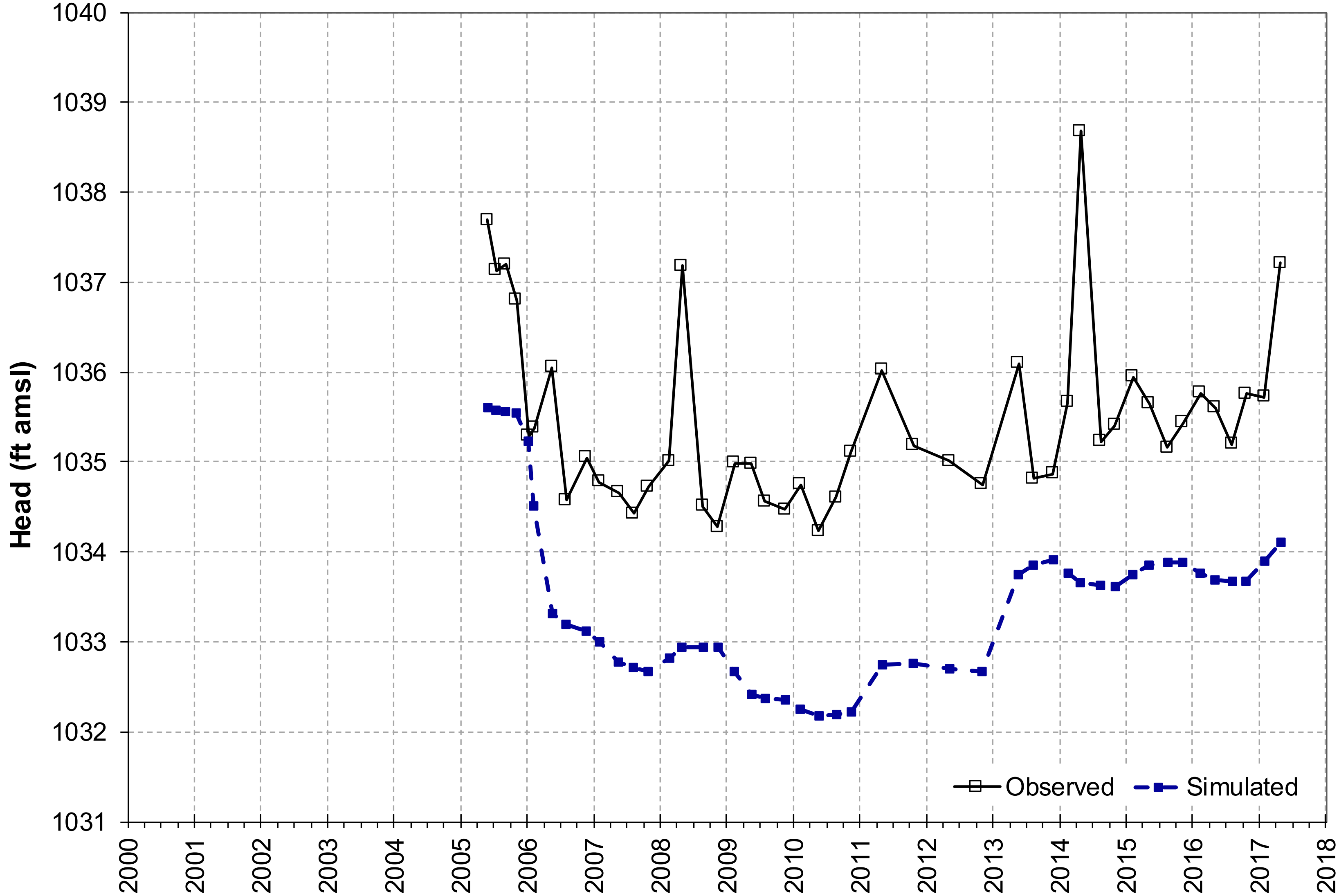
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-004, L1, A Sands

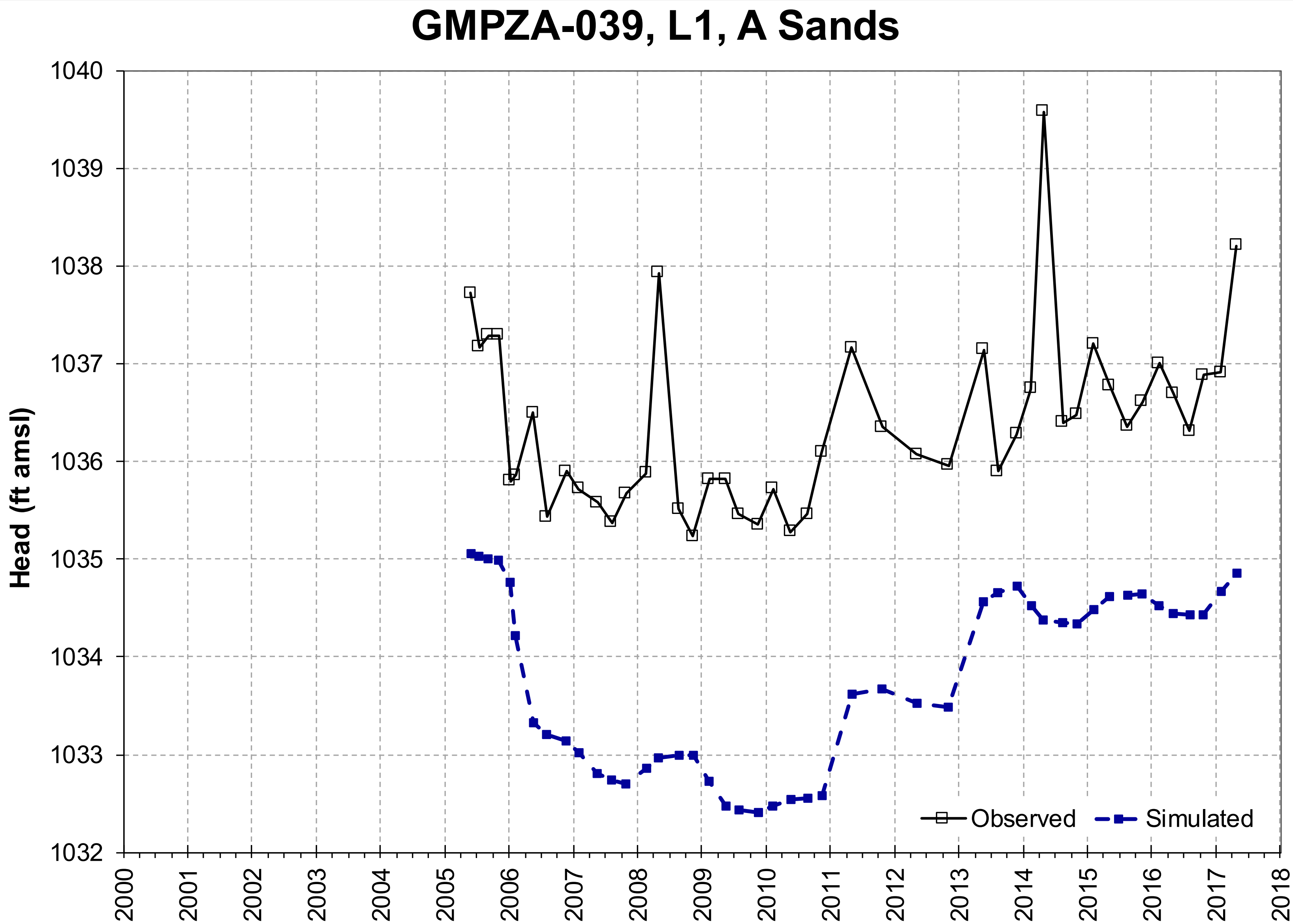


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

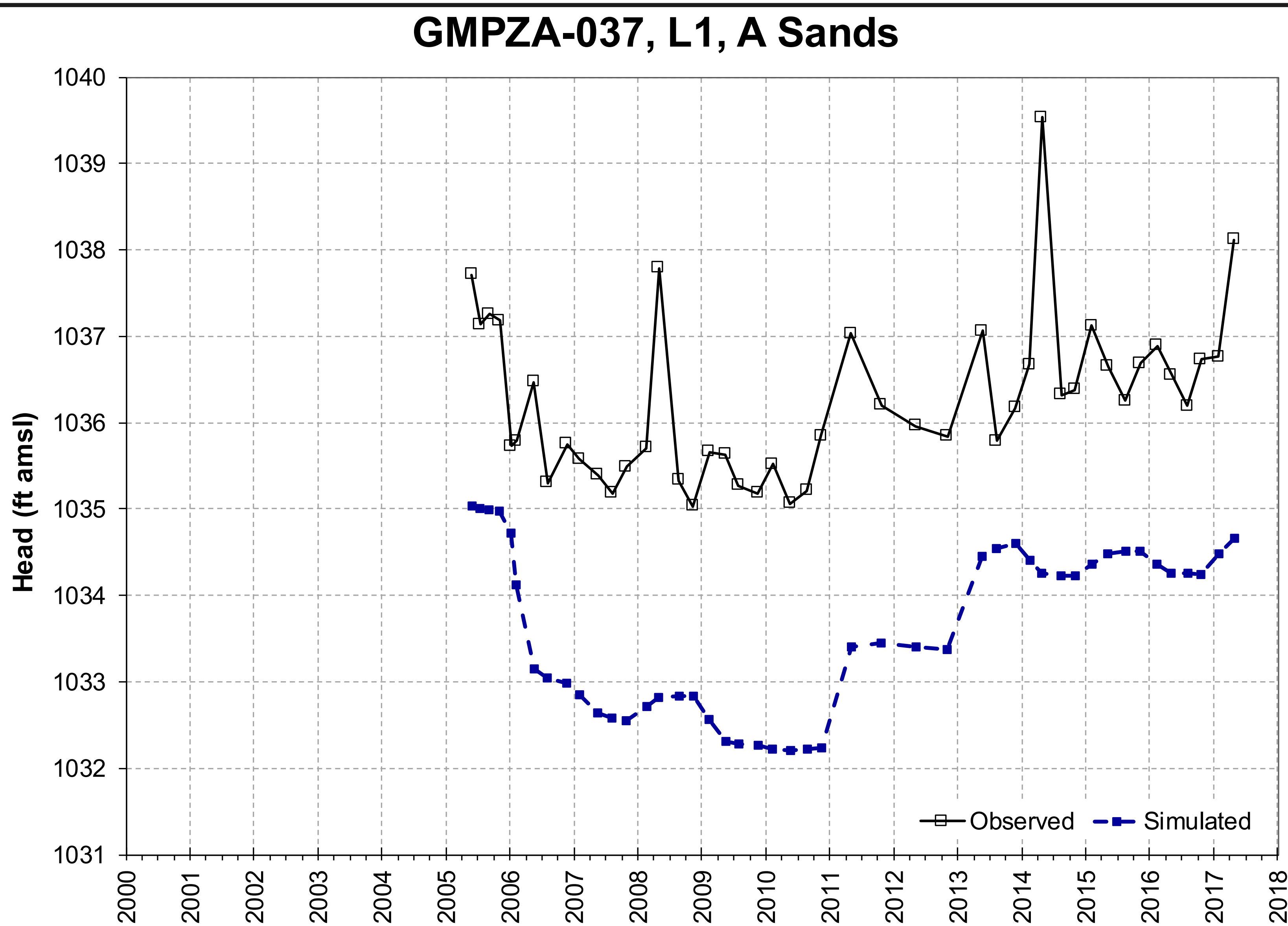


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



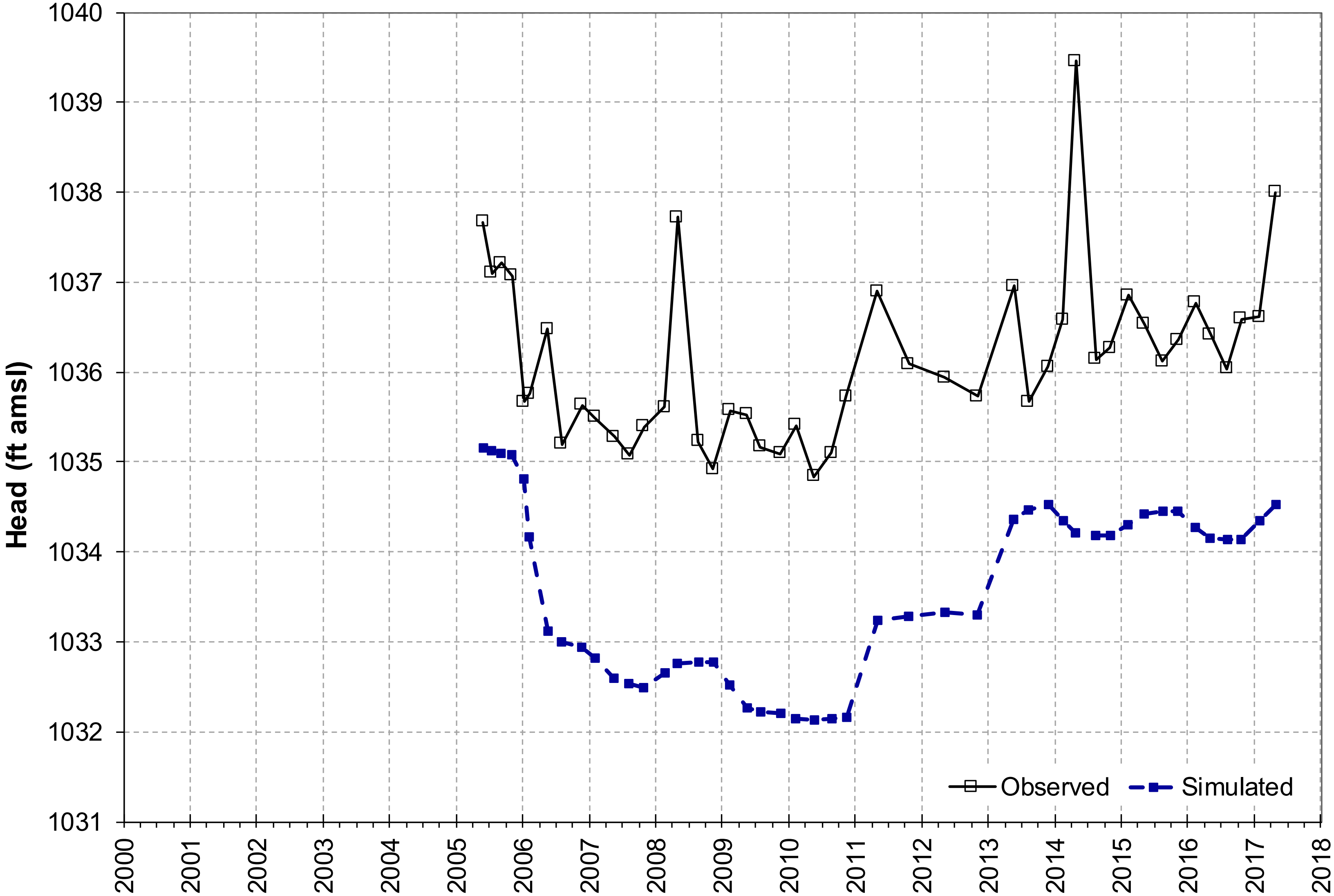
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-036, L1, A Sands

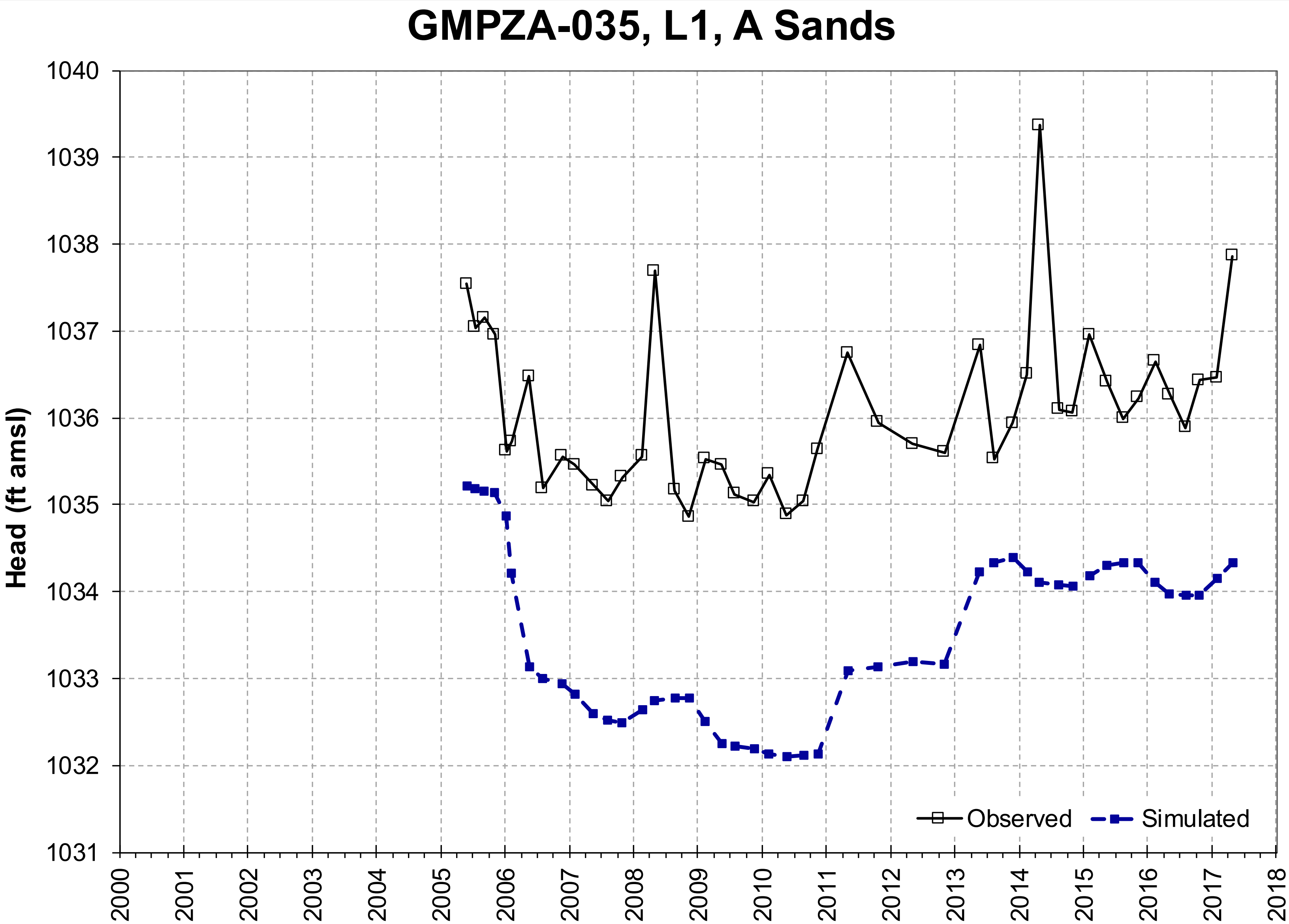


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

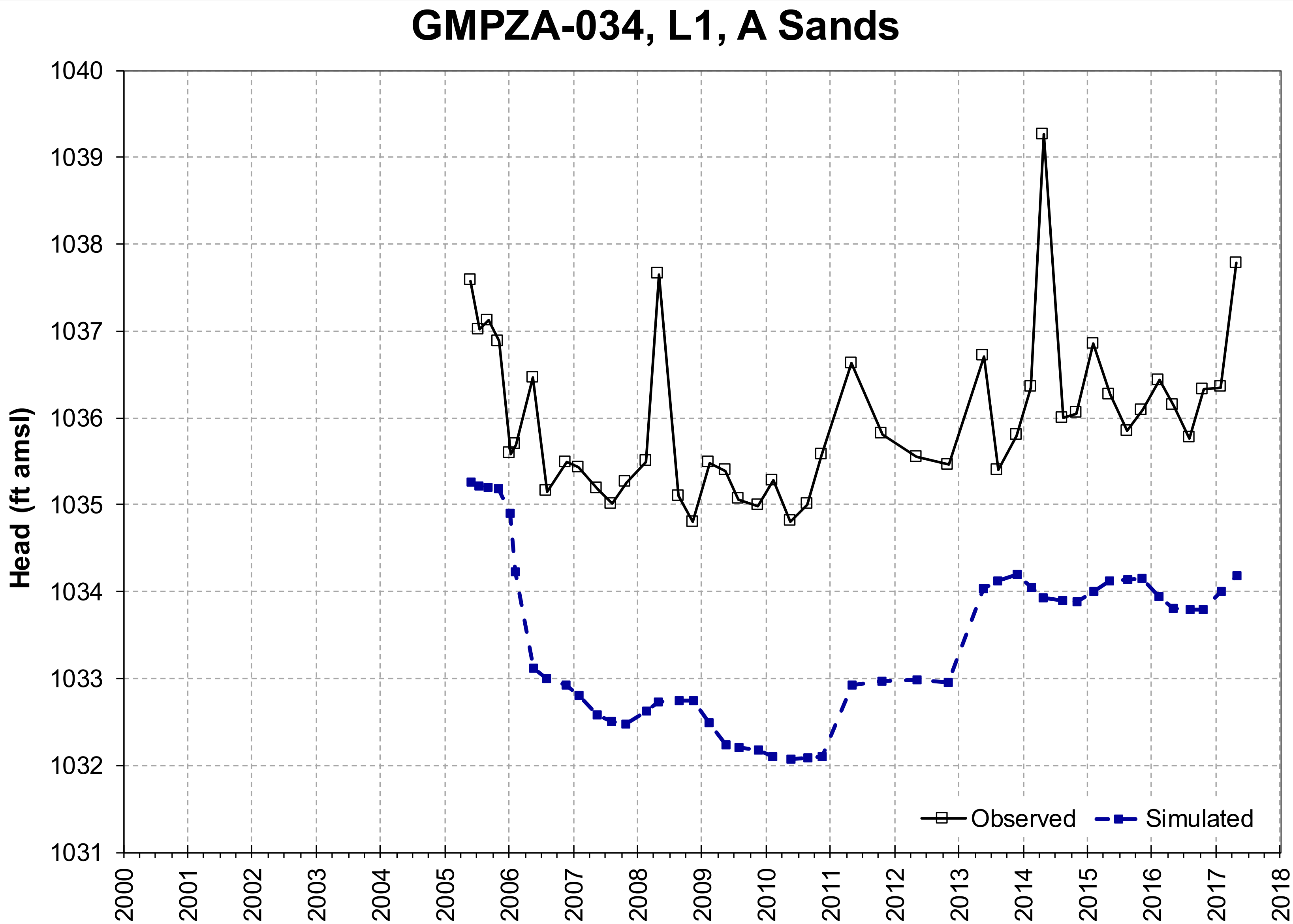


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

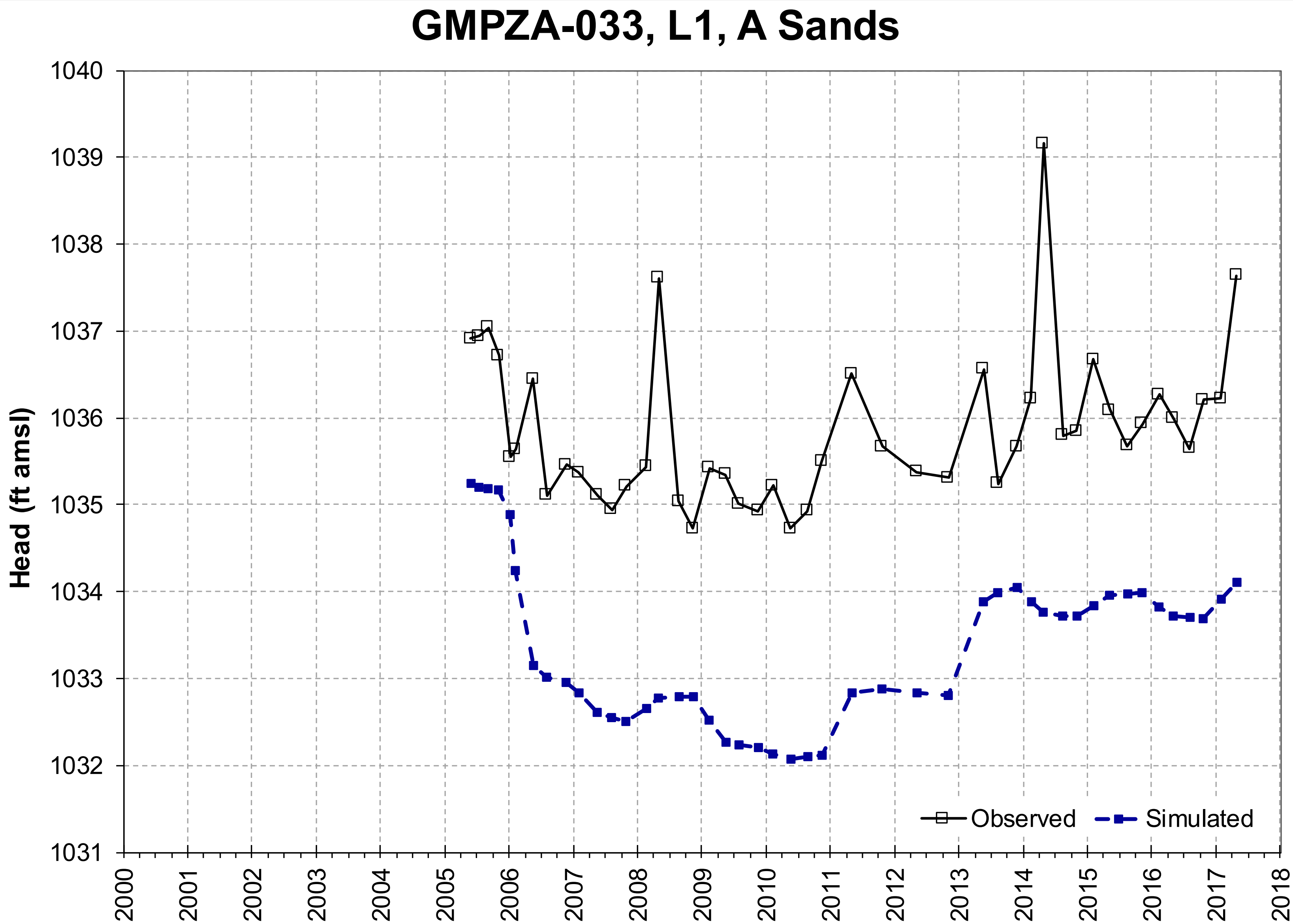


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



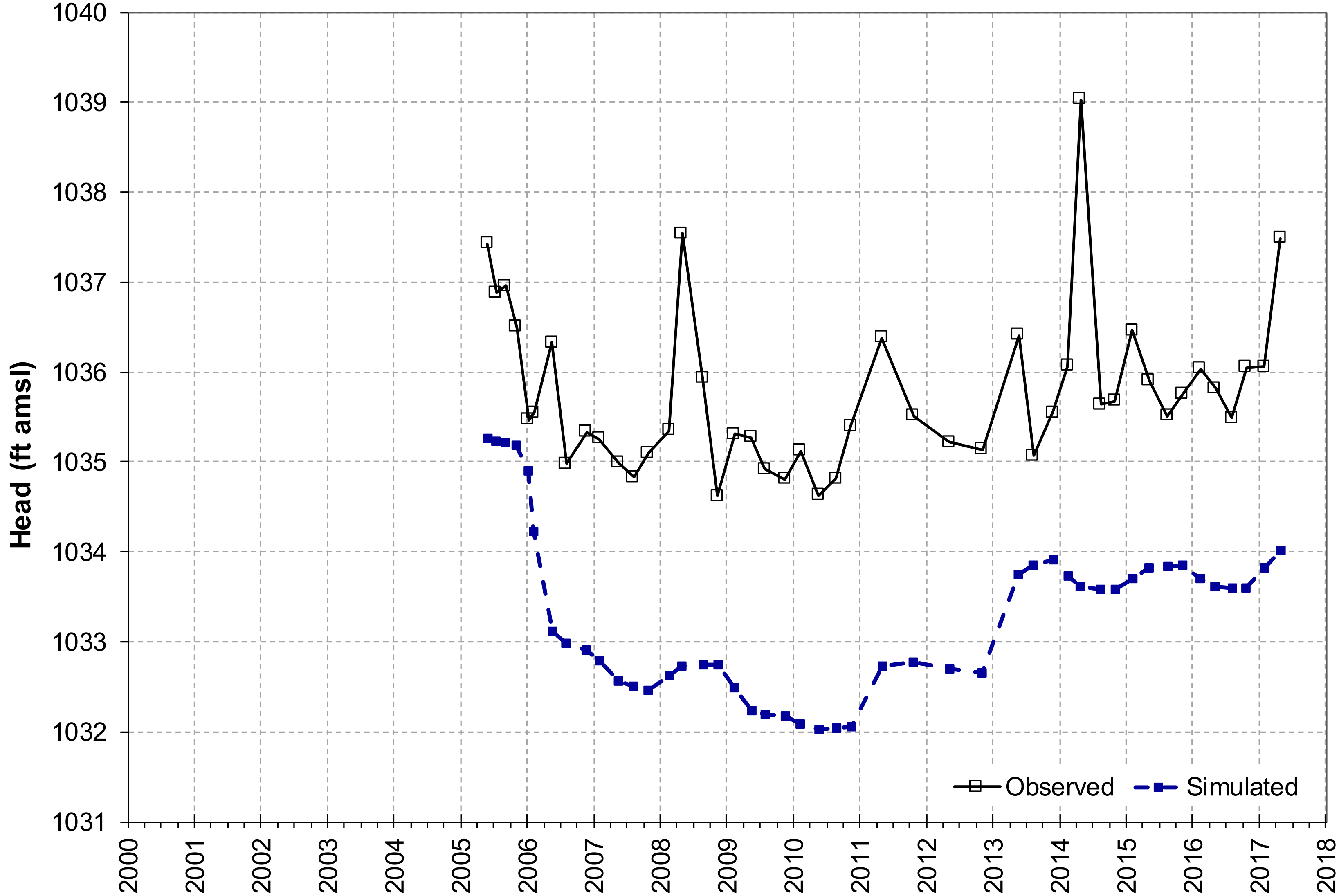
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-032, L1, A Sands

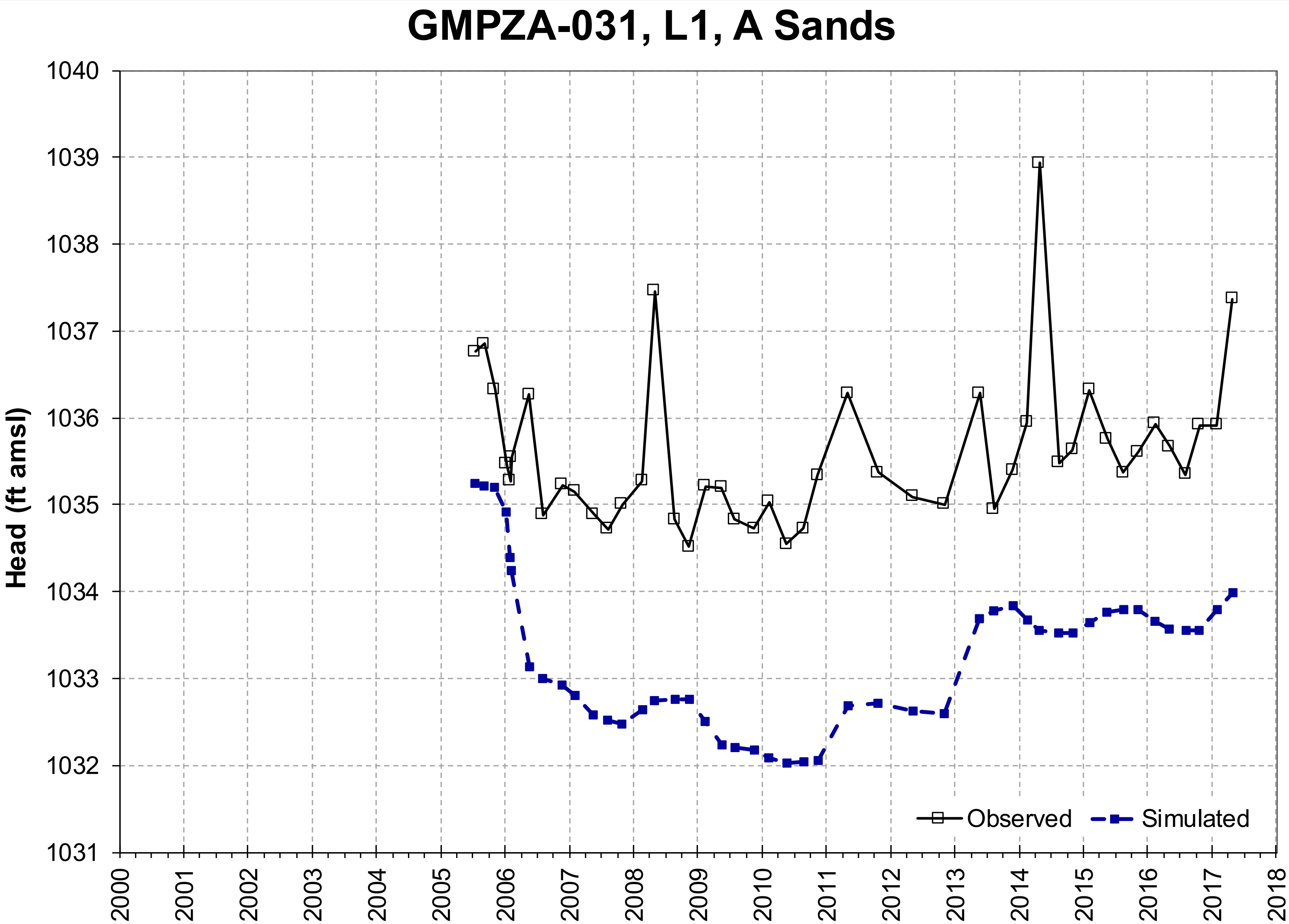


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



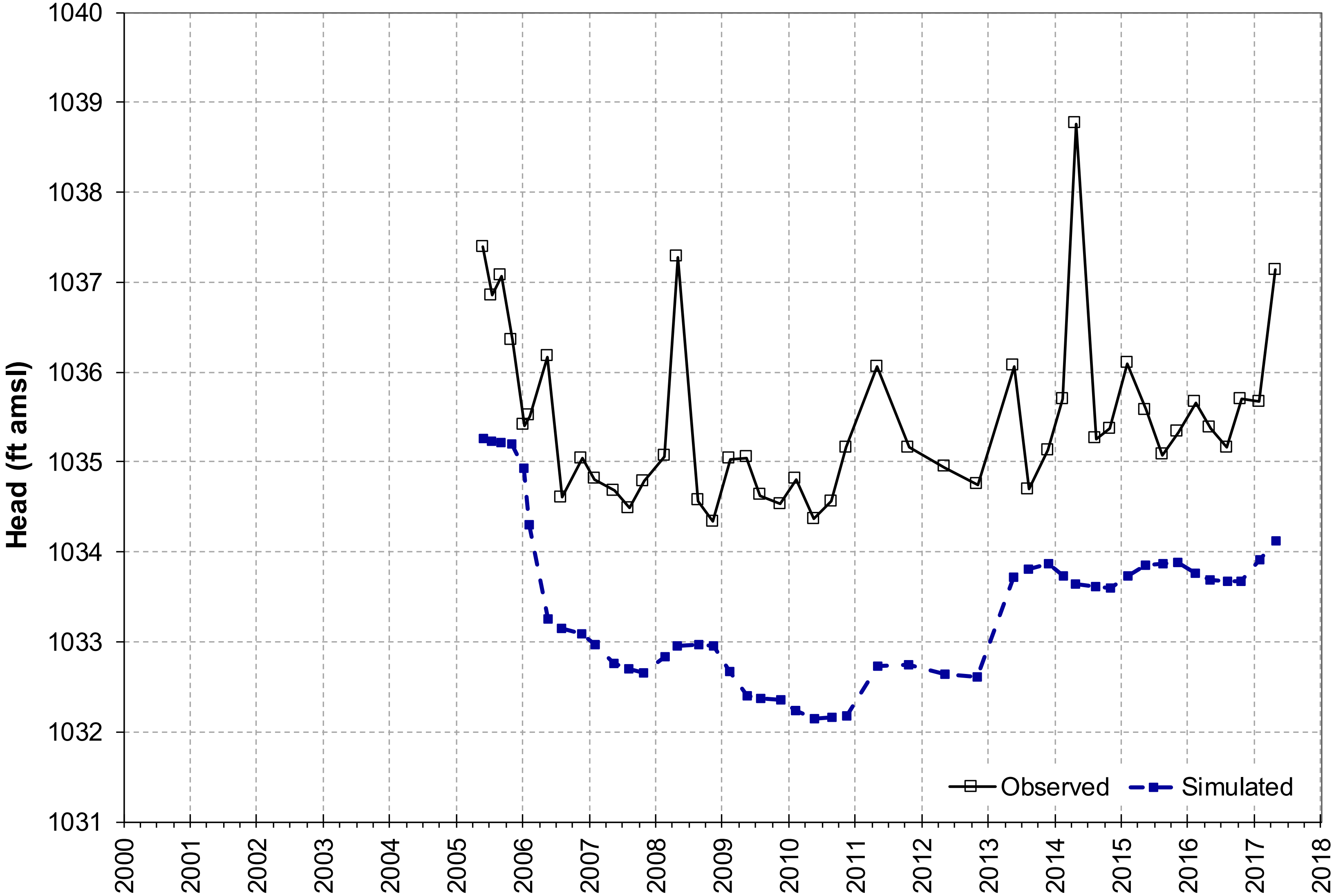
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-027, L1, A Sands

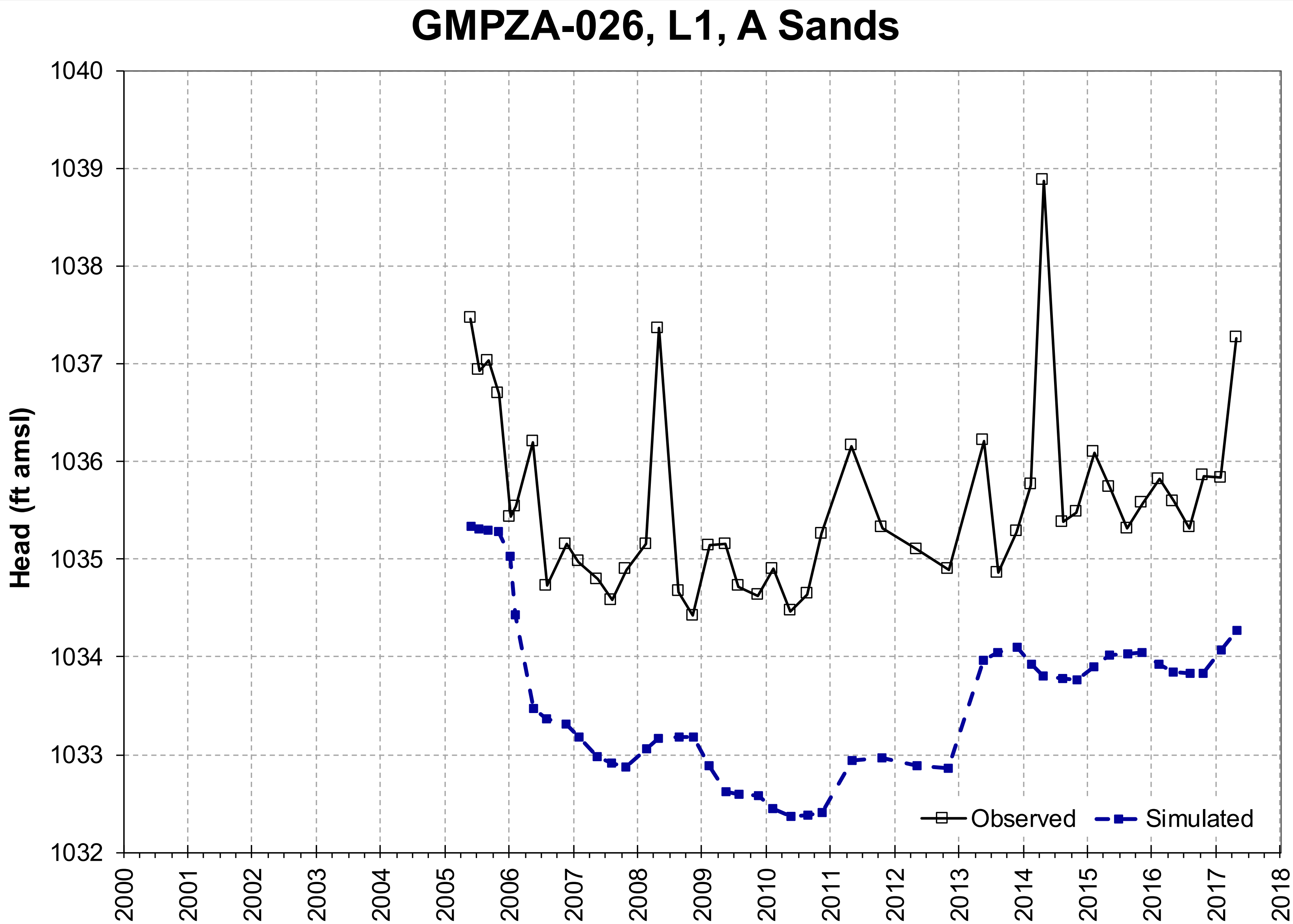


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

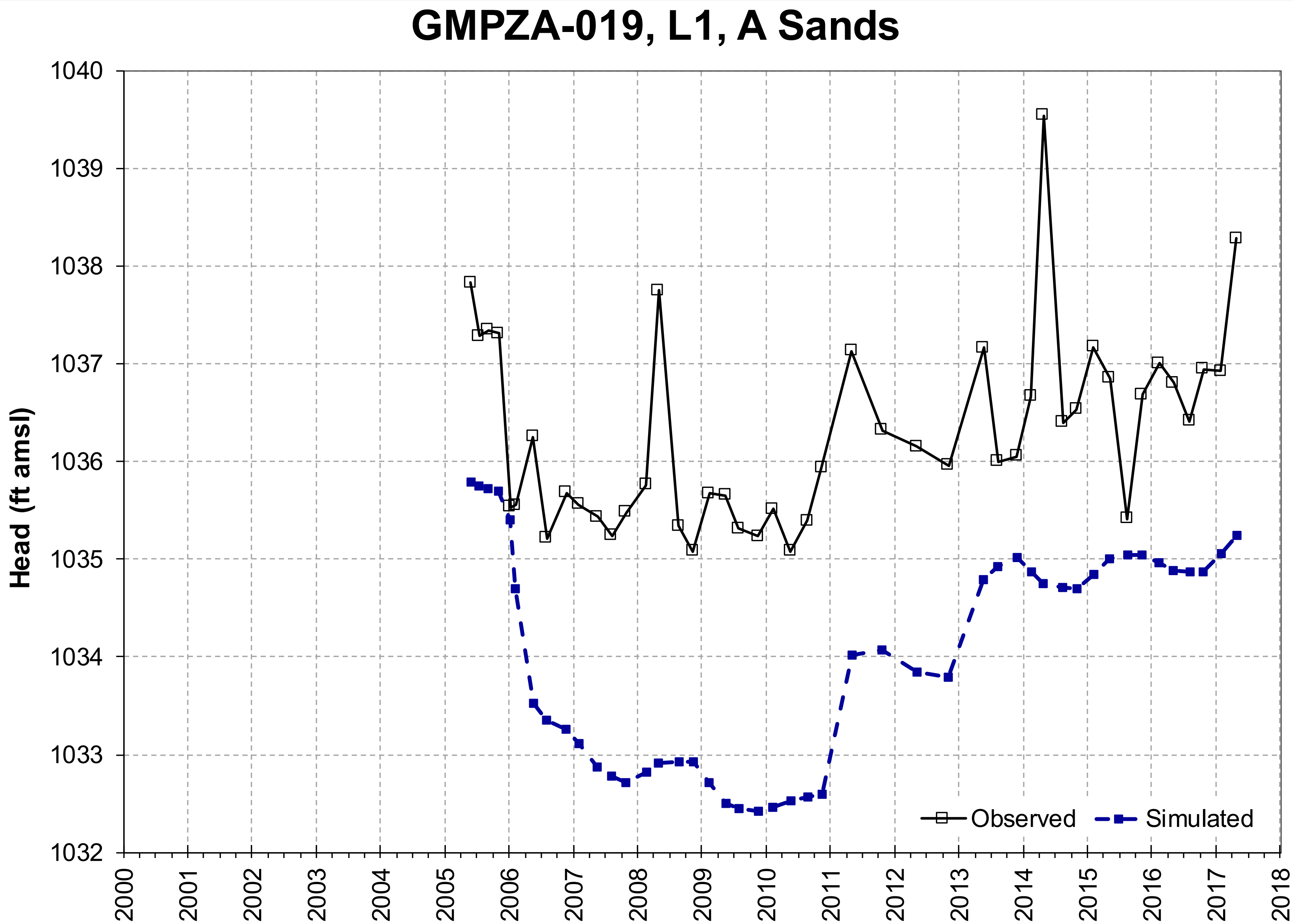


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

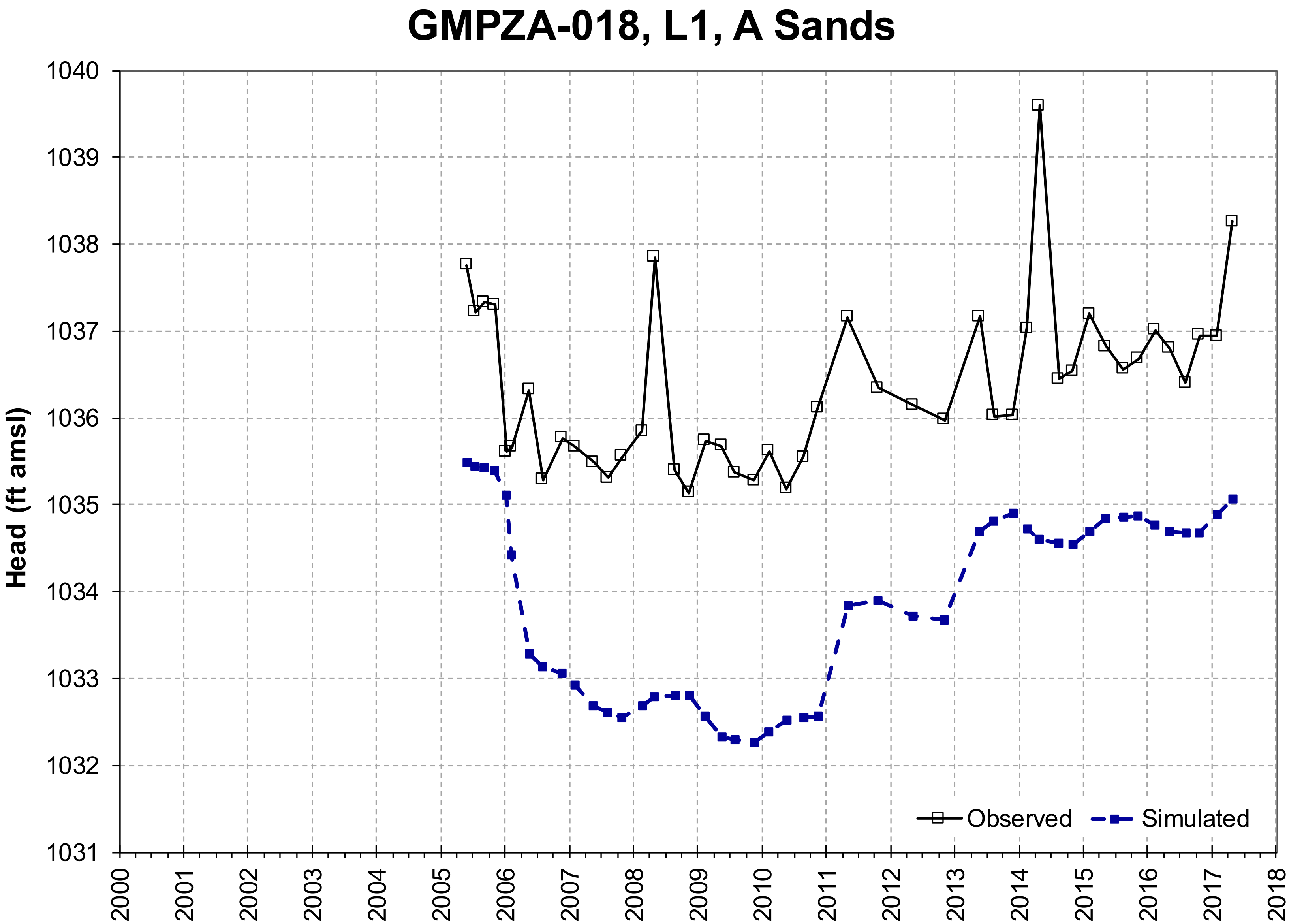


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

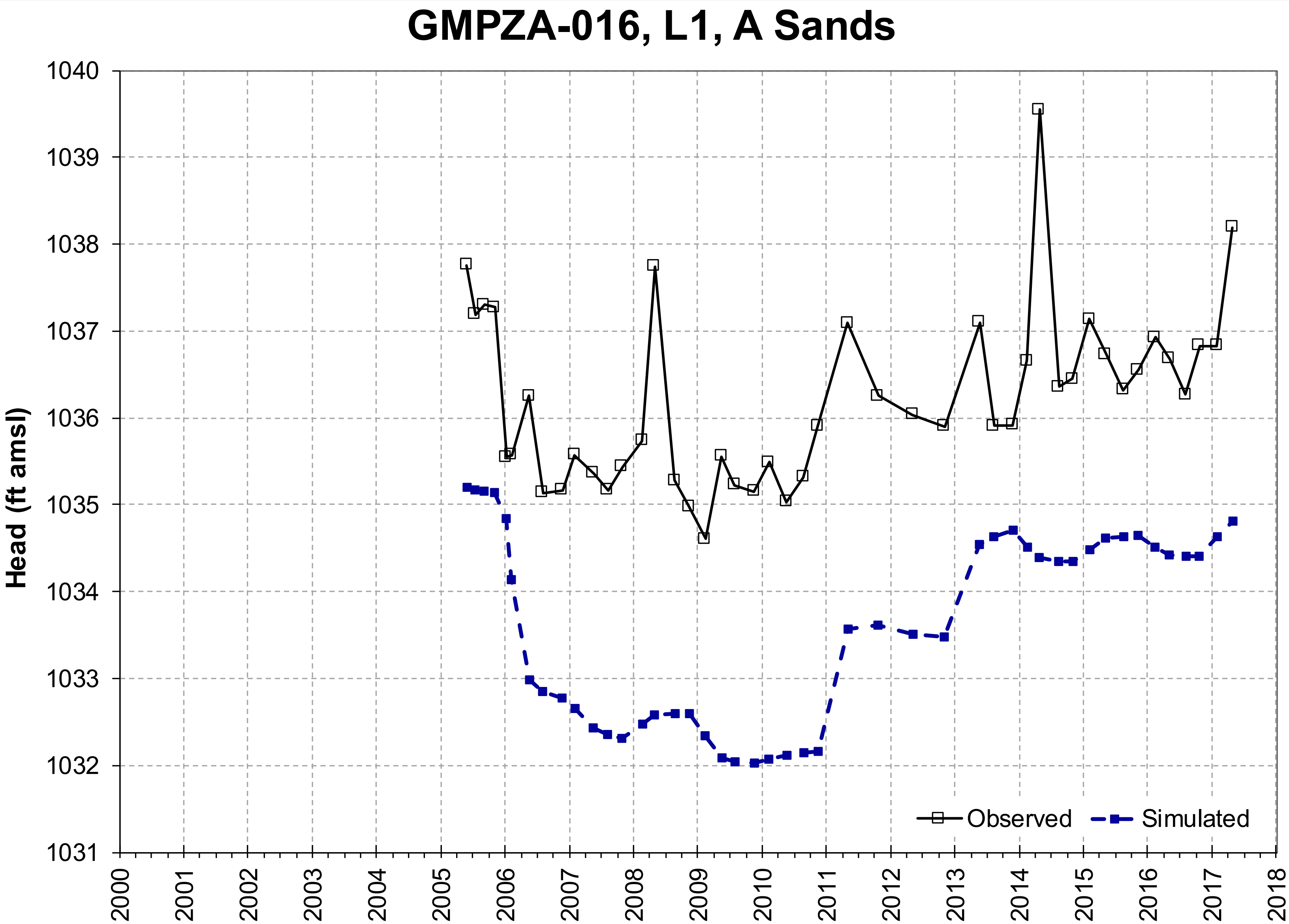


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

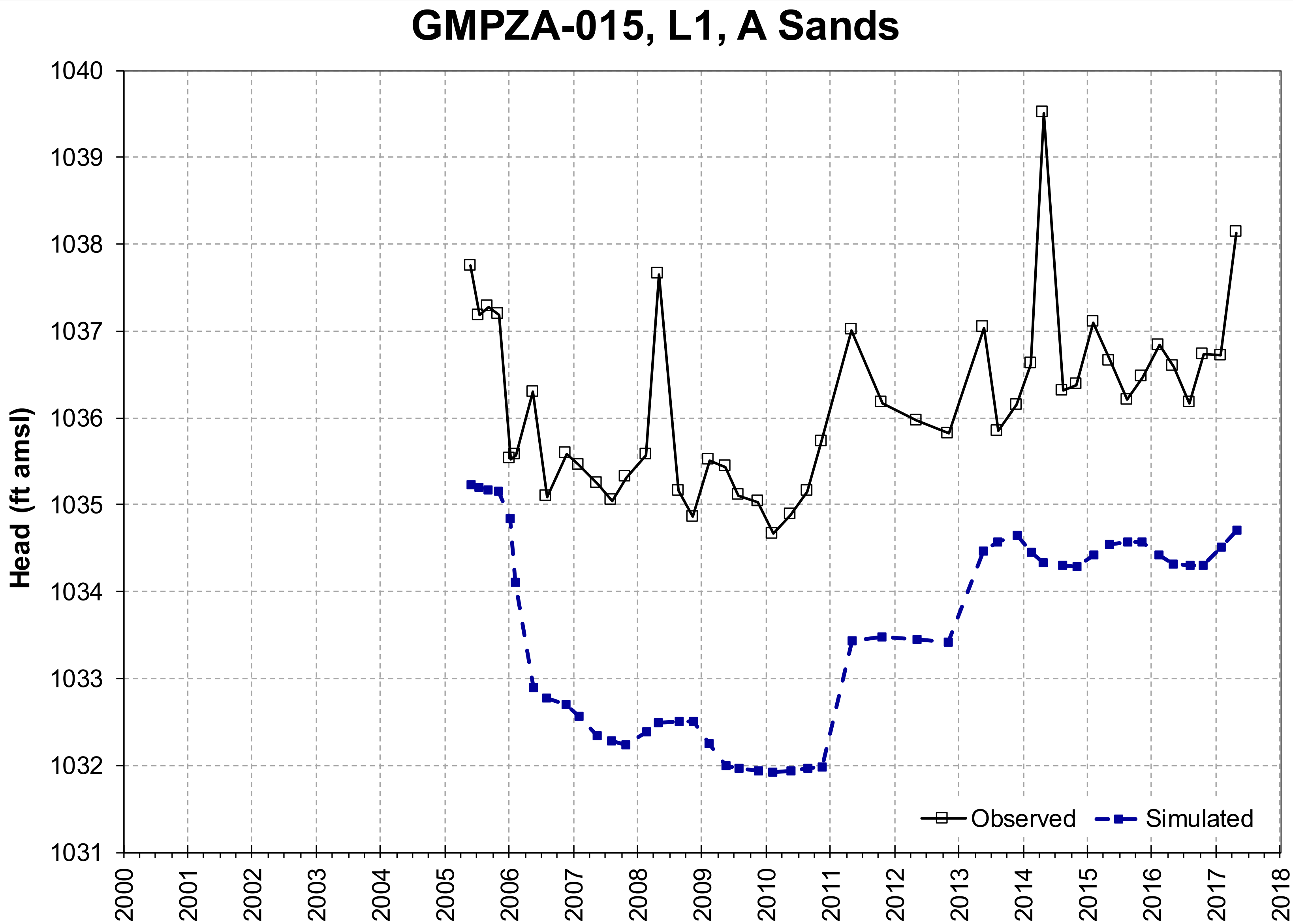


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

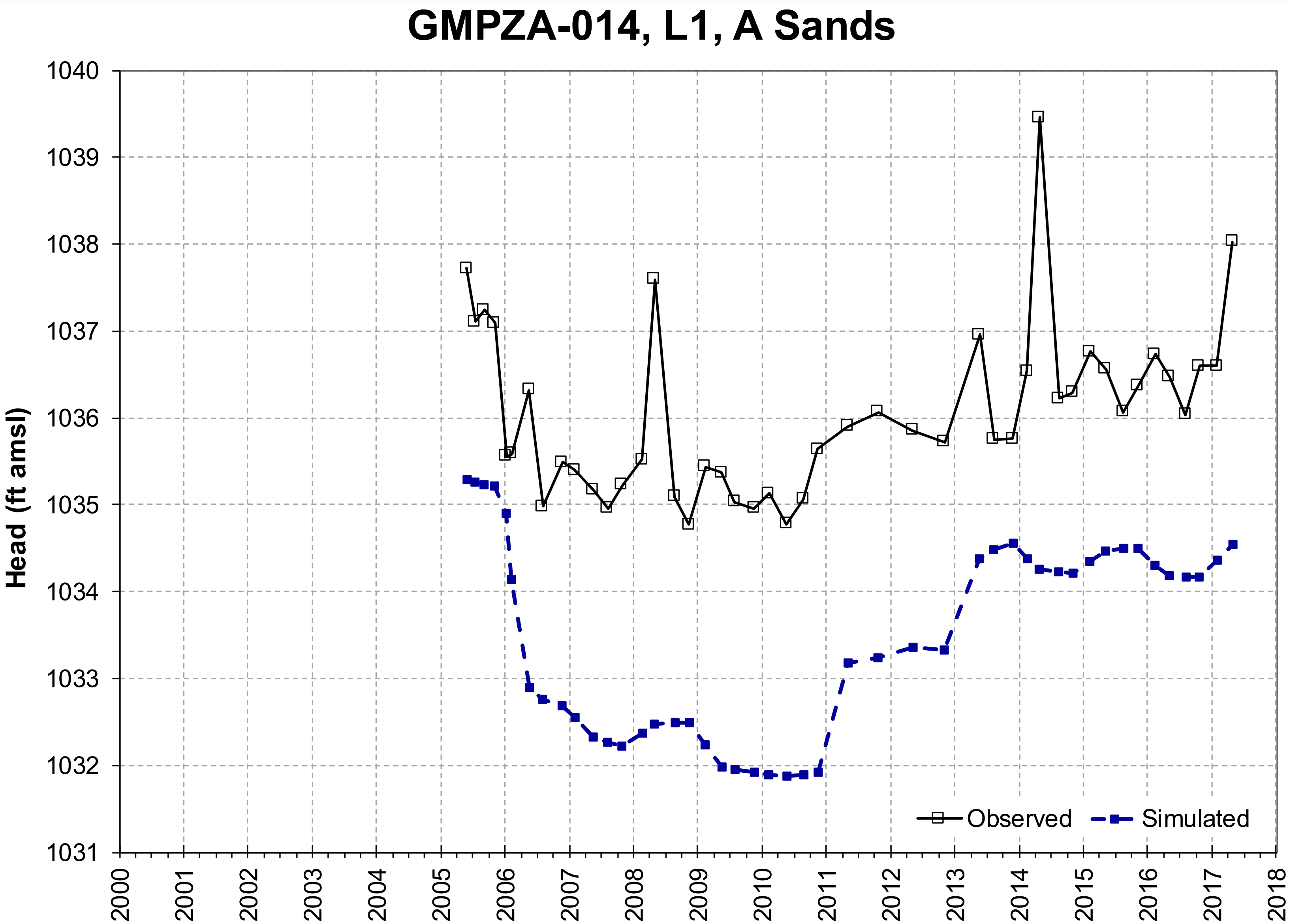


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

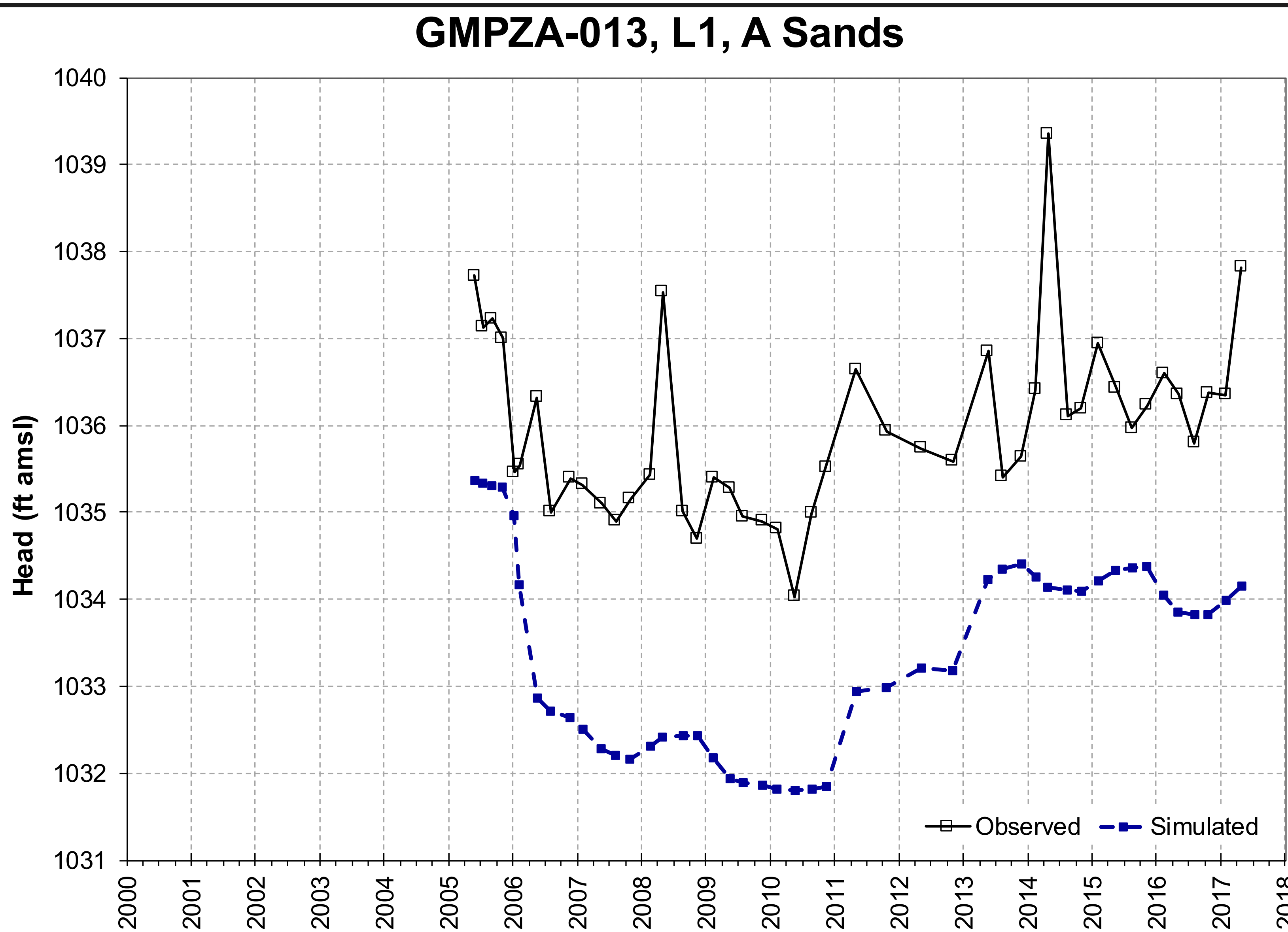


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

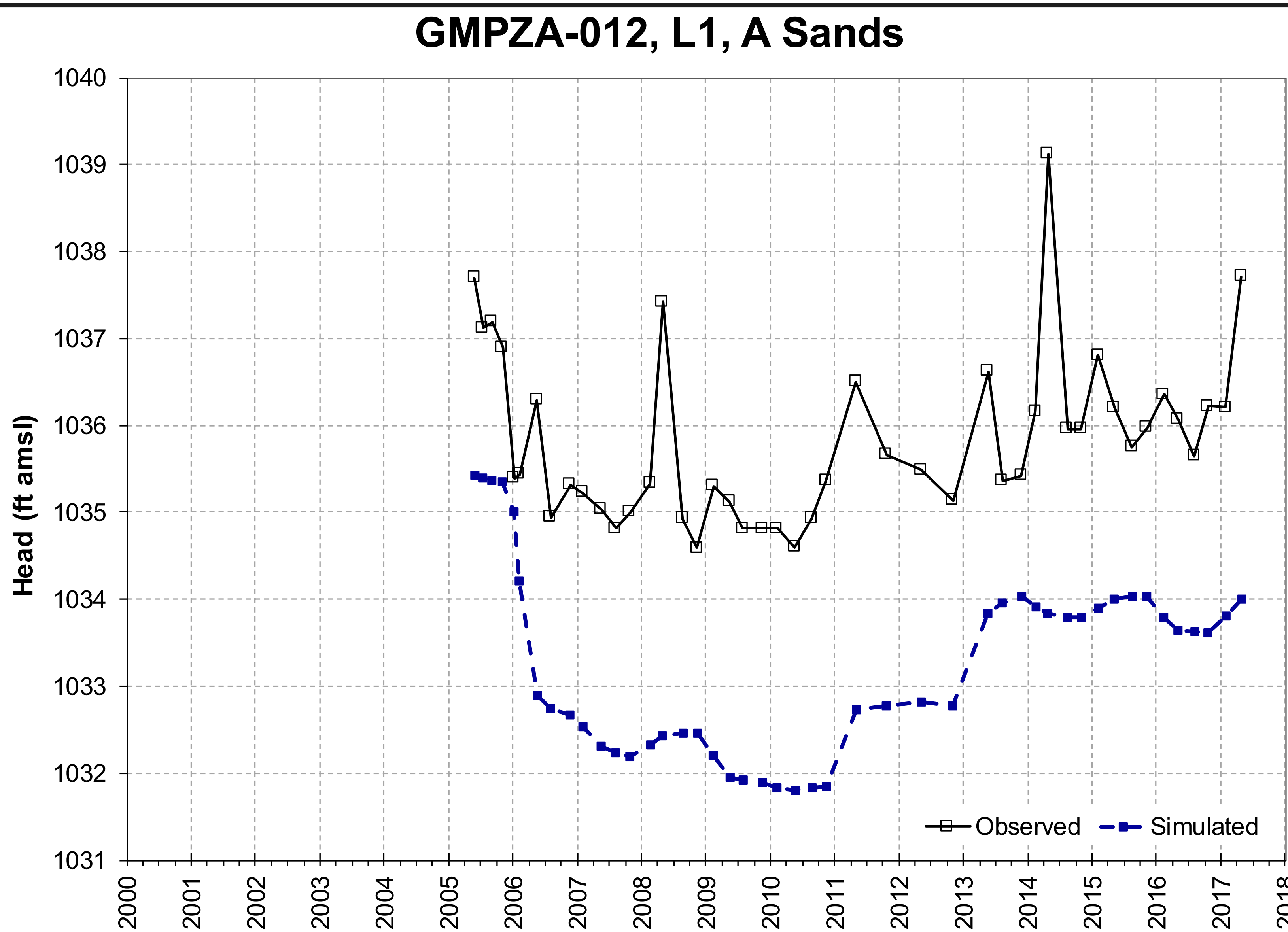


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

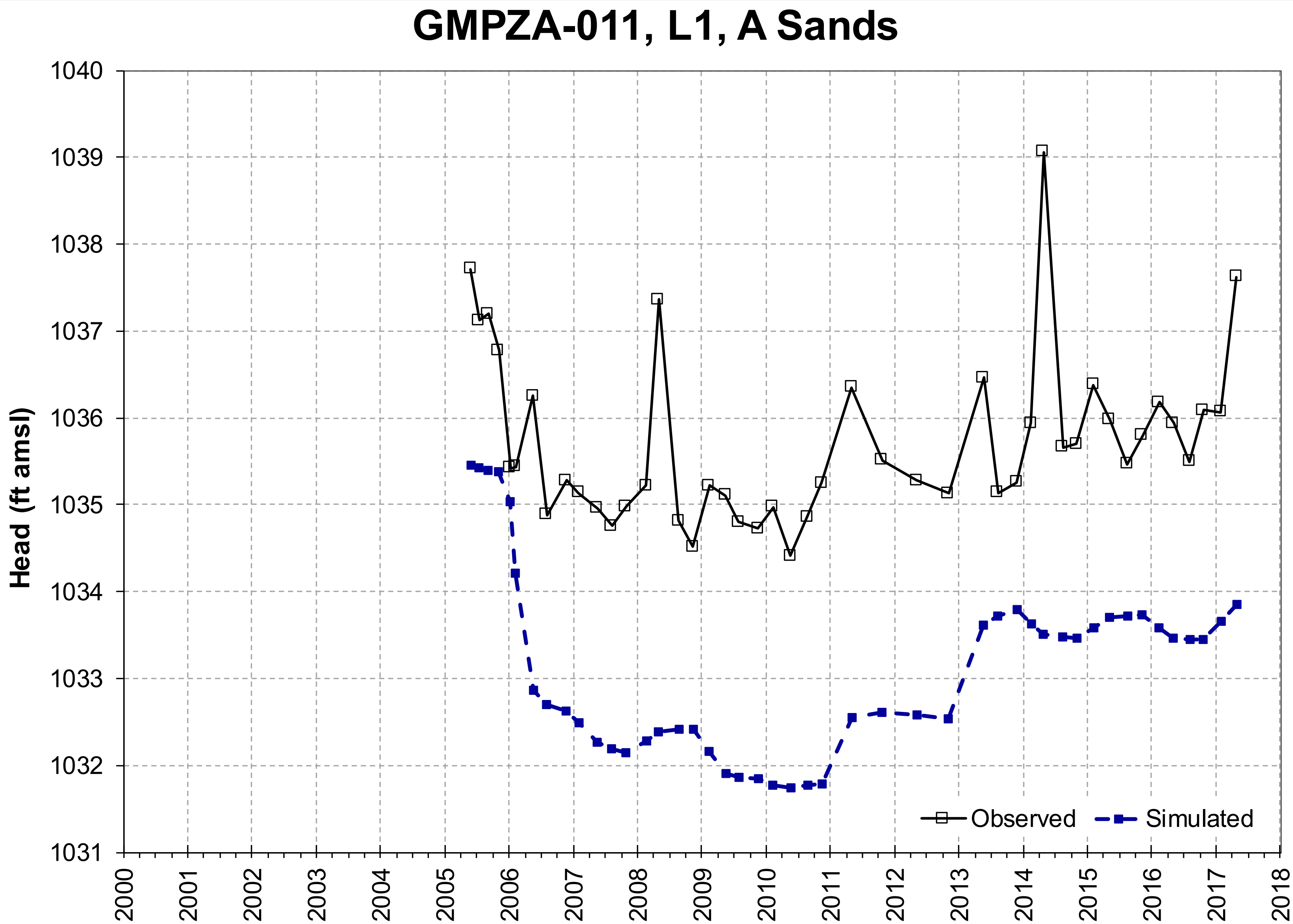


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

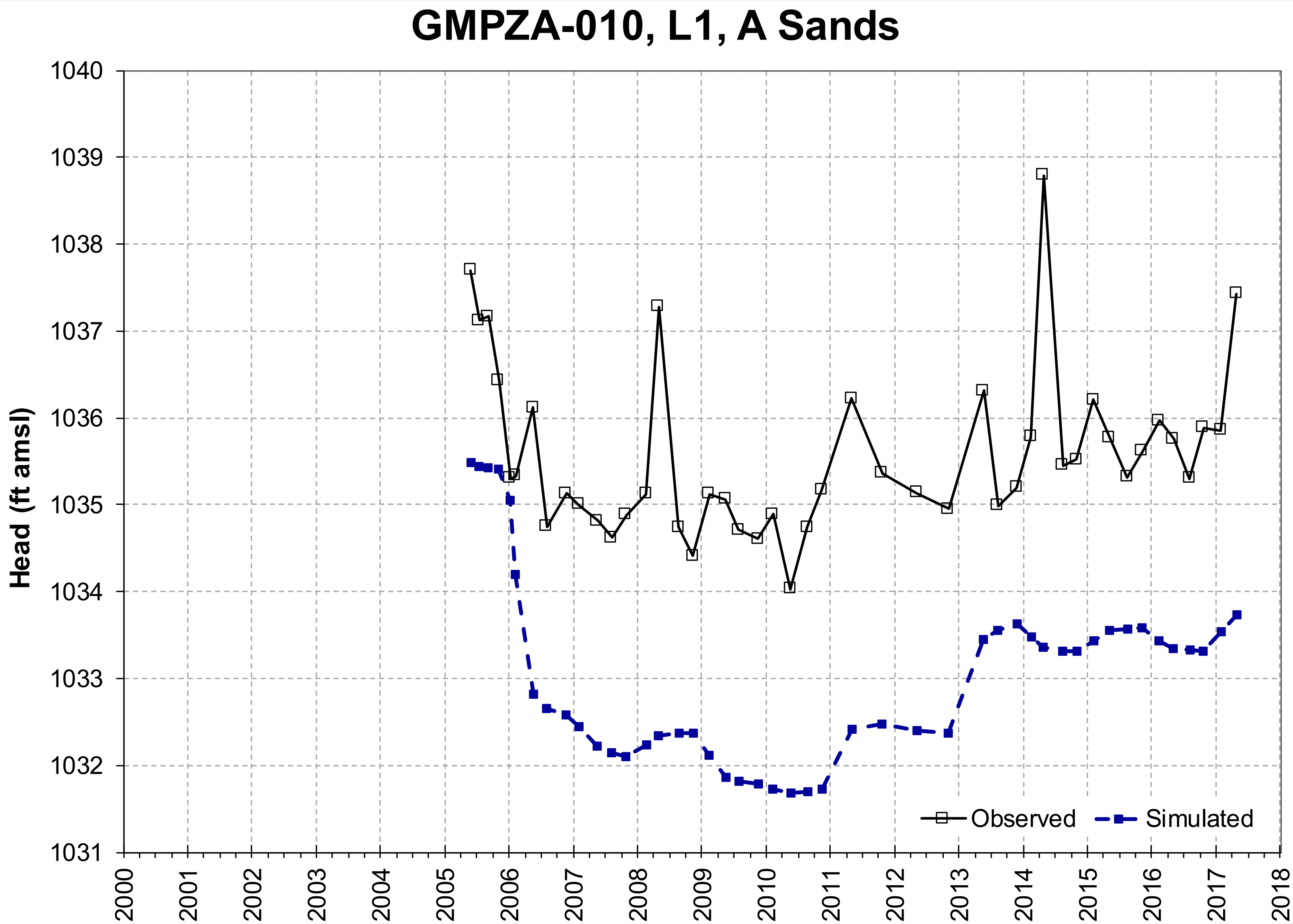


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

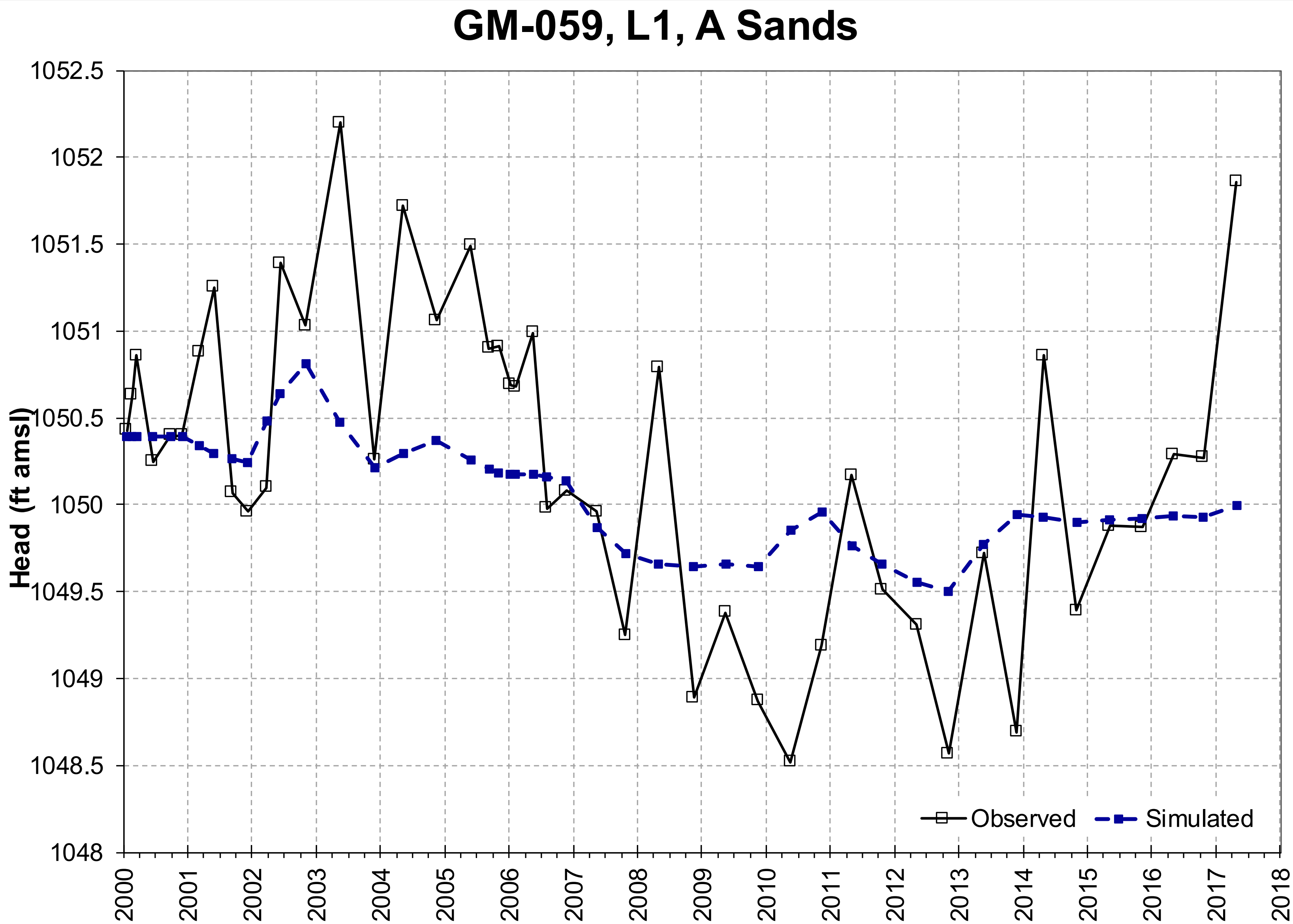


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

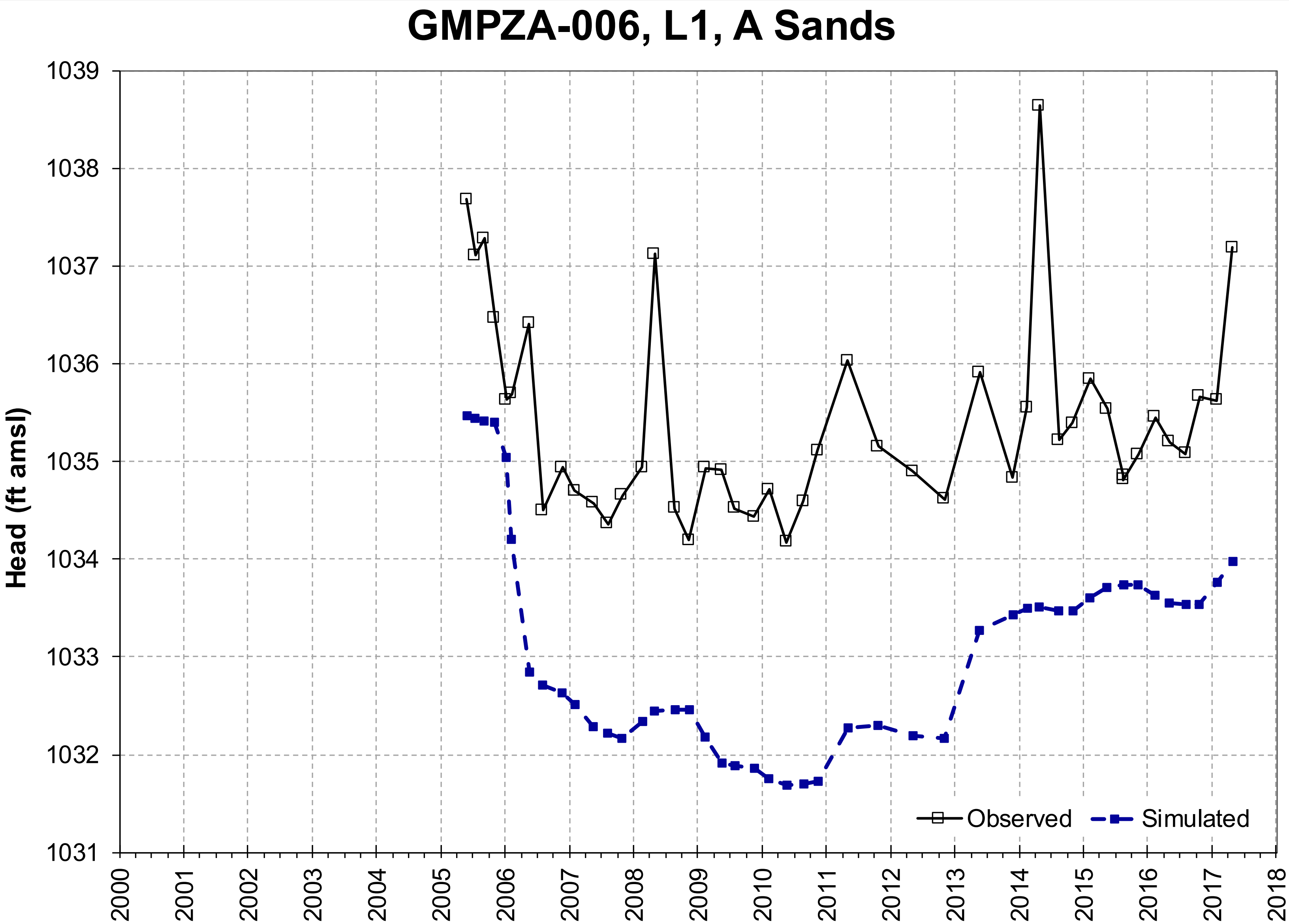


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

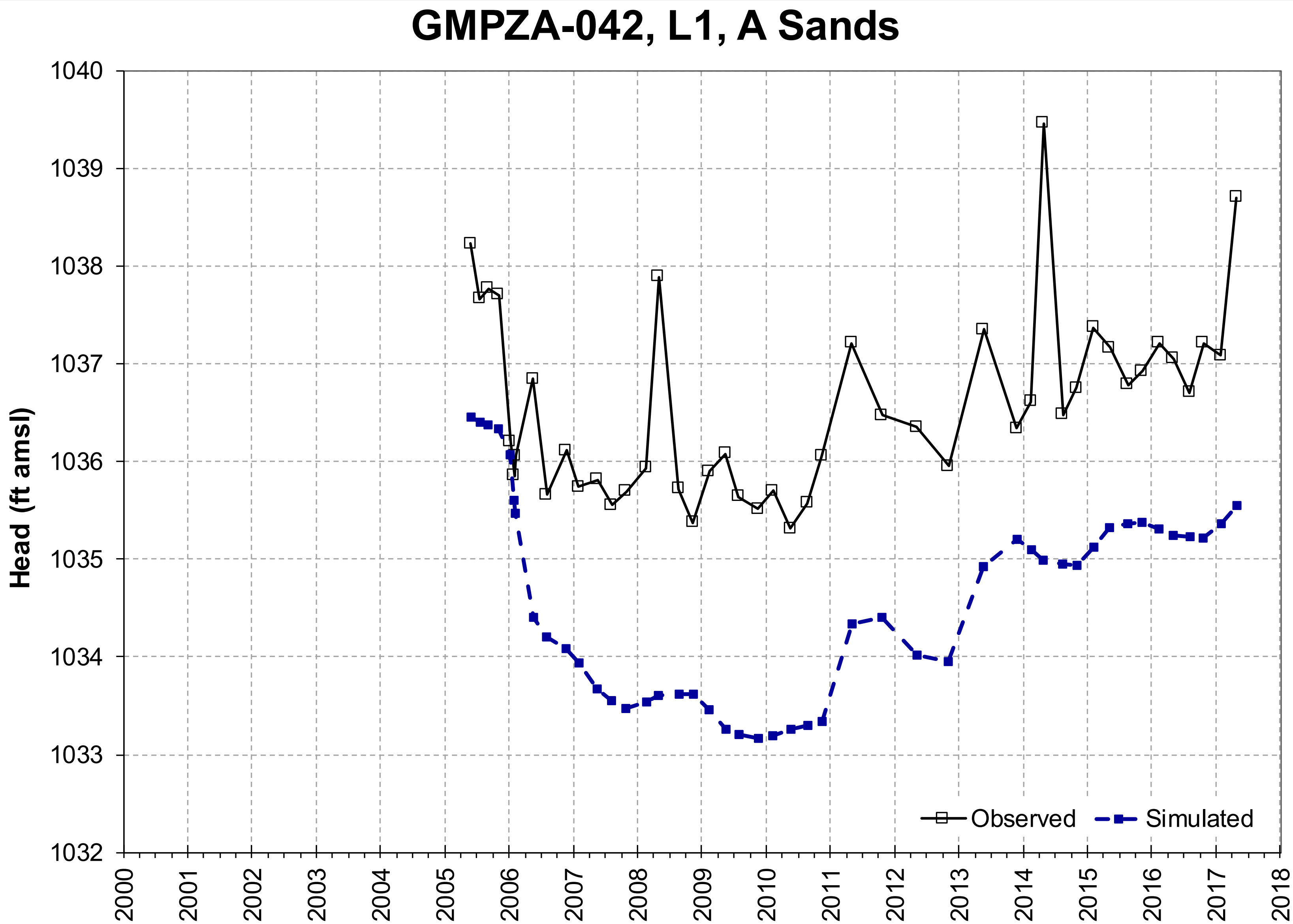


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

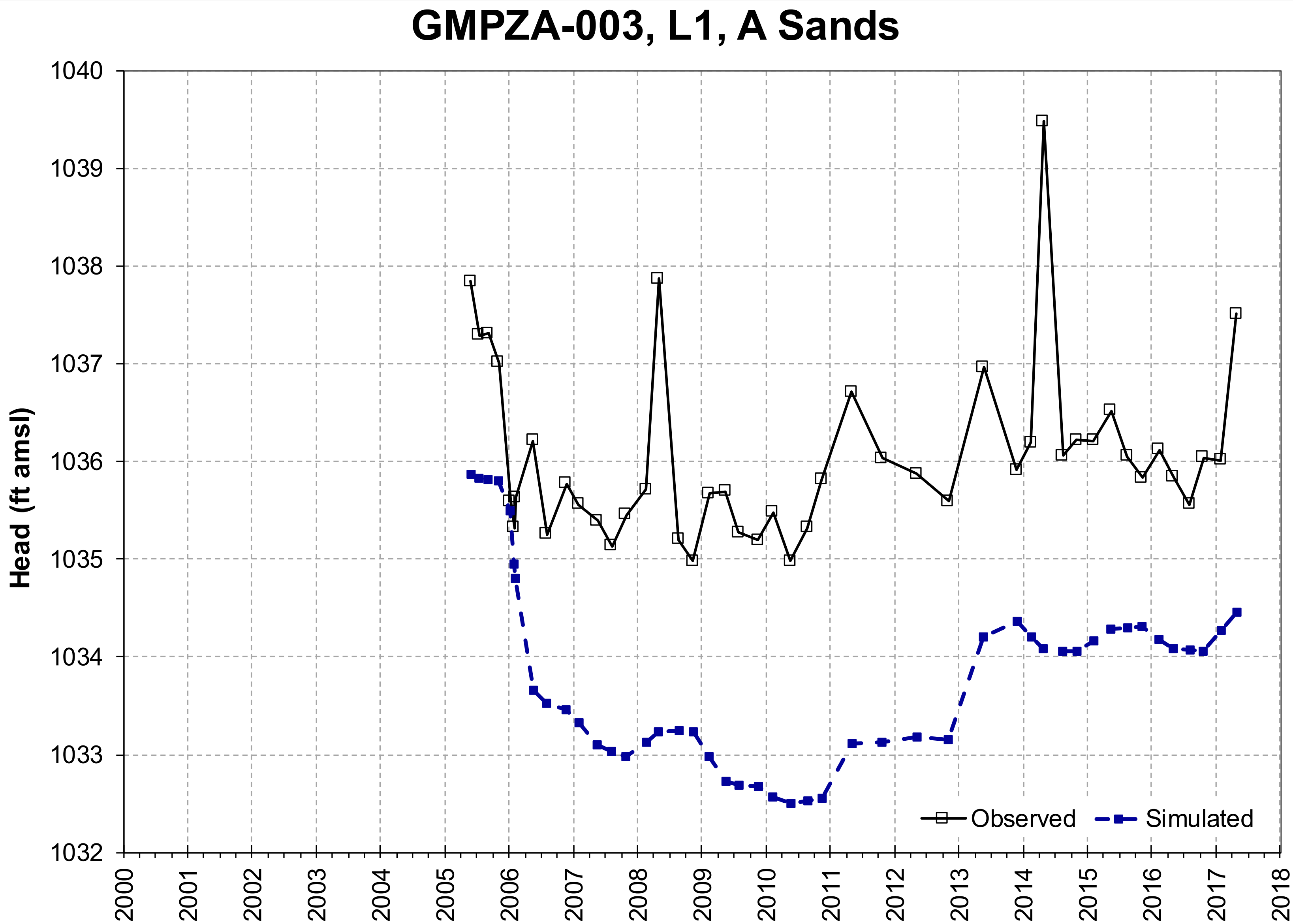


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

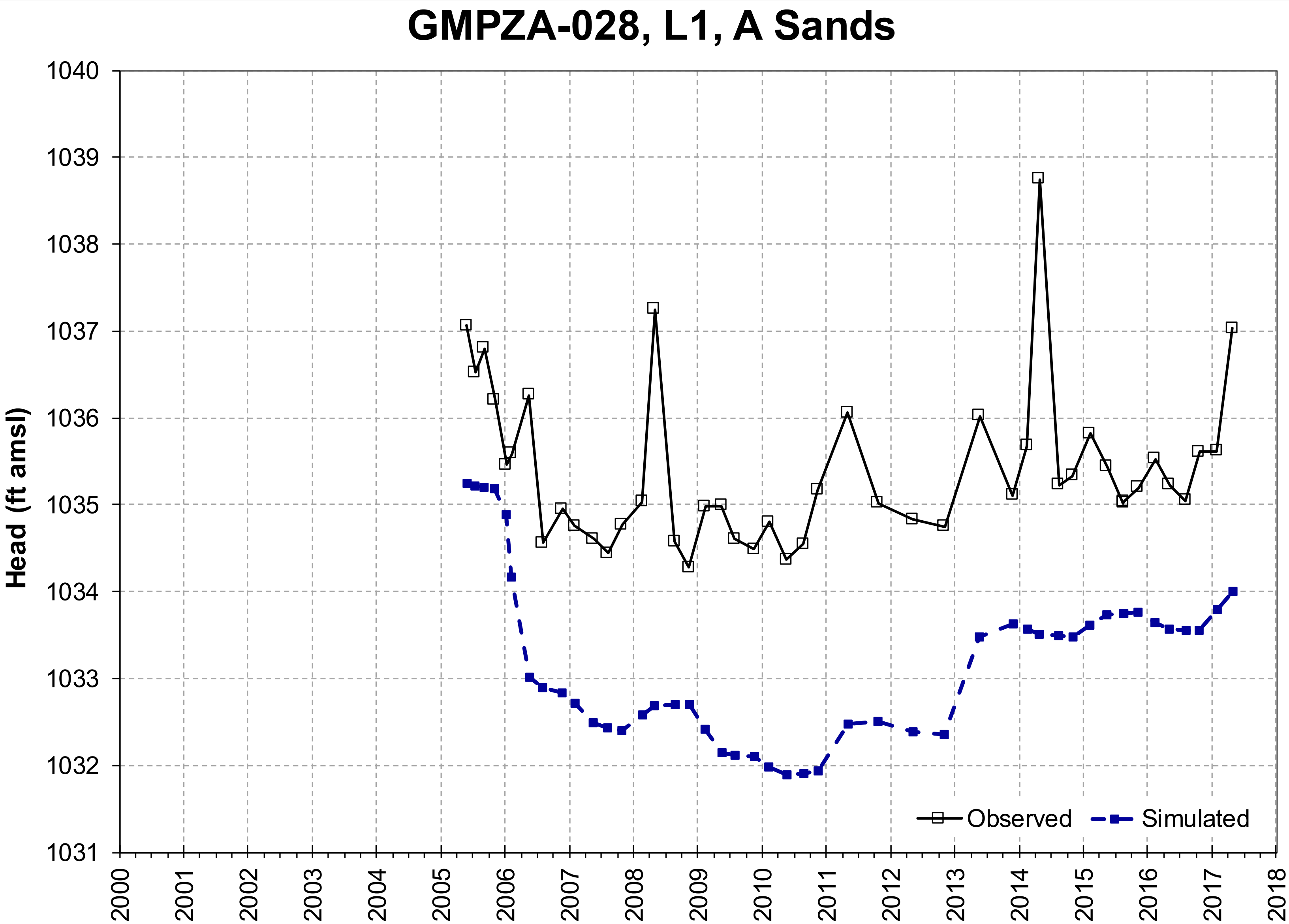


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

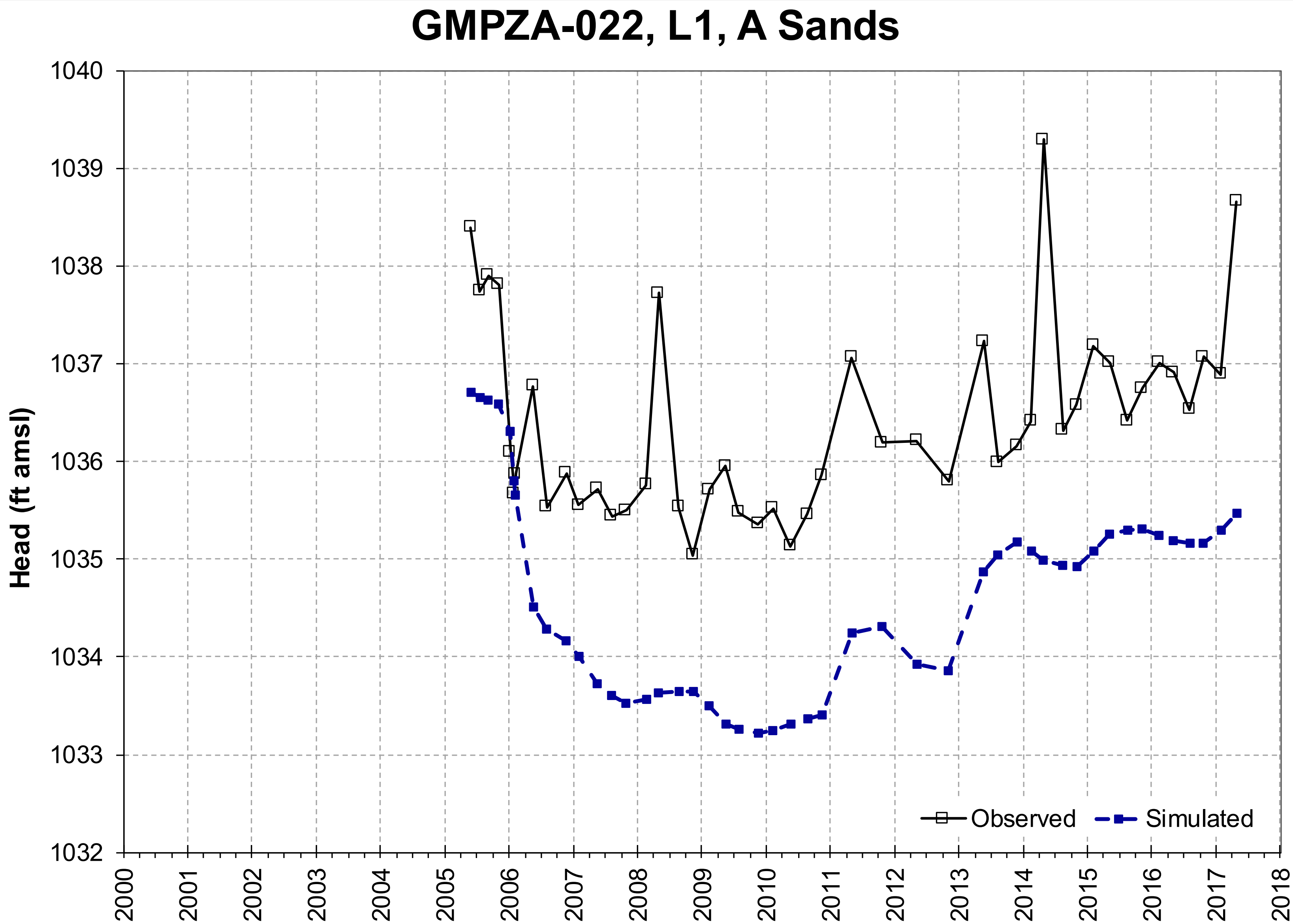


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

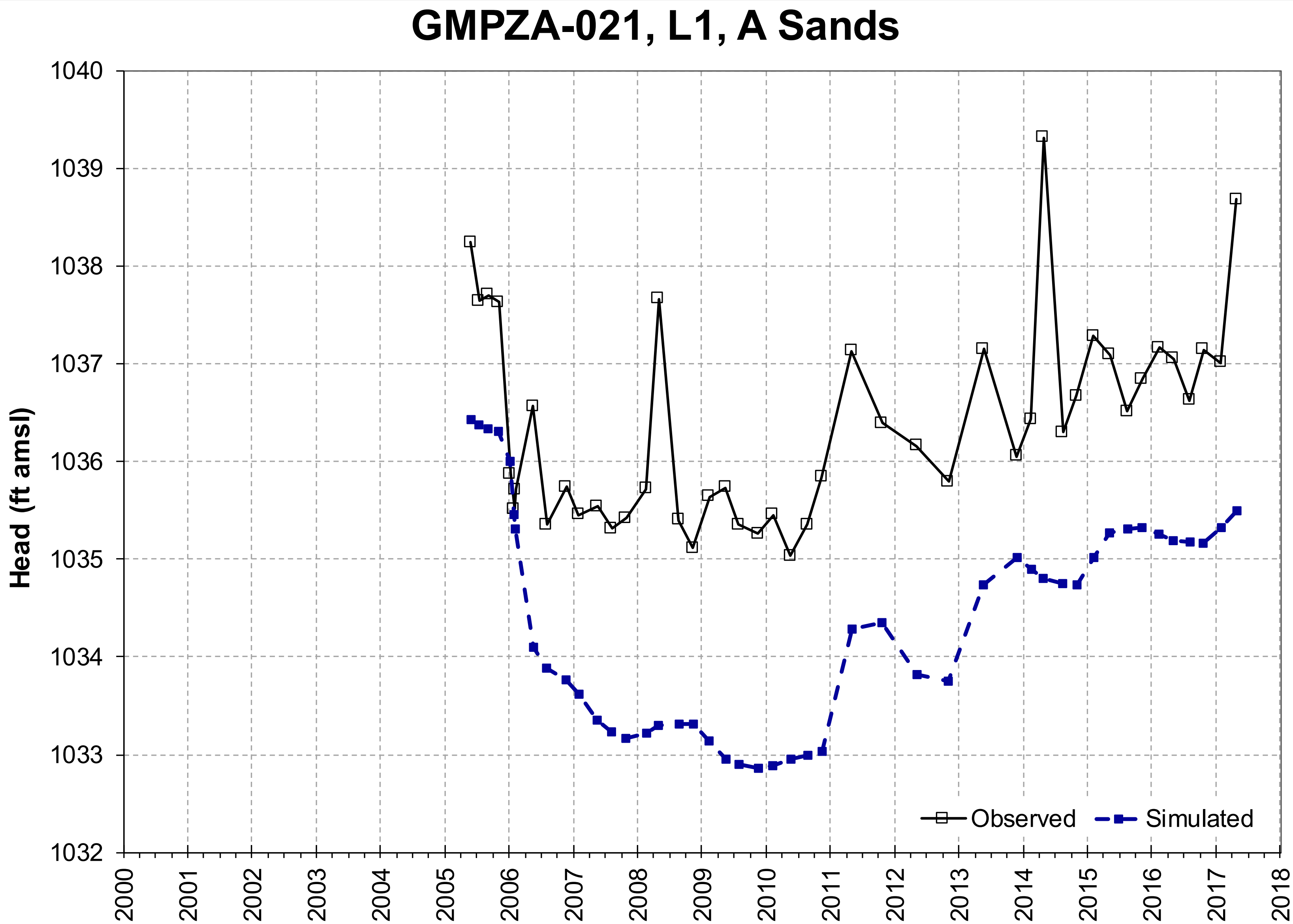


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

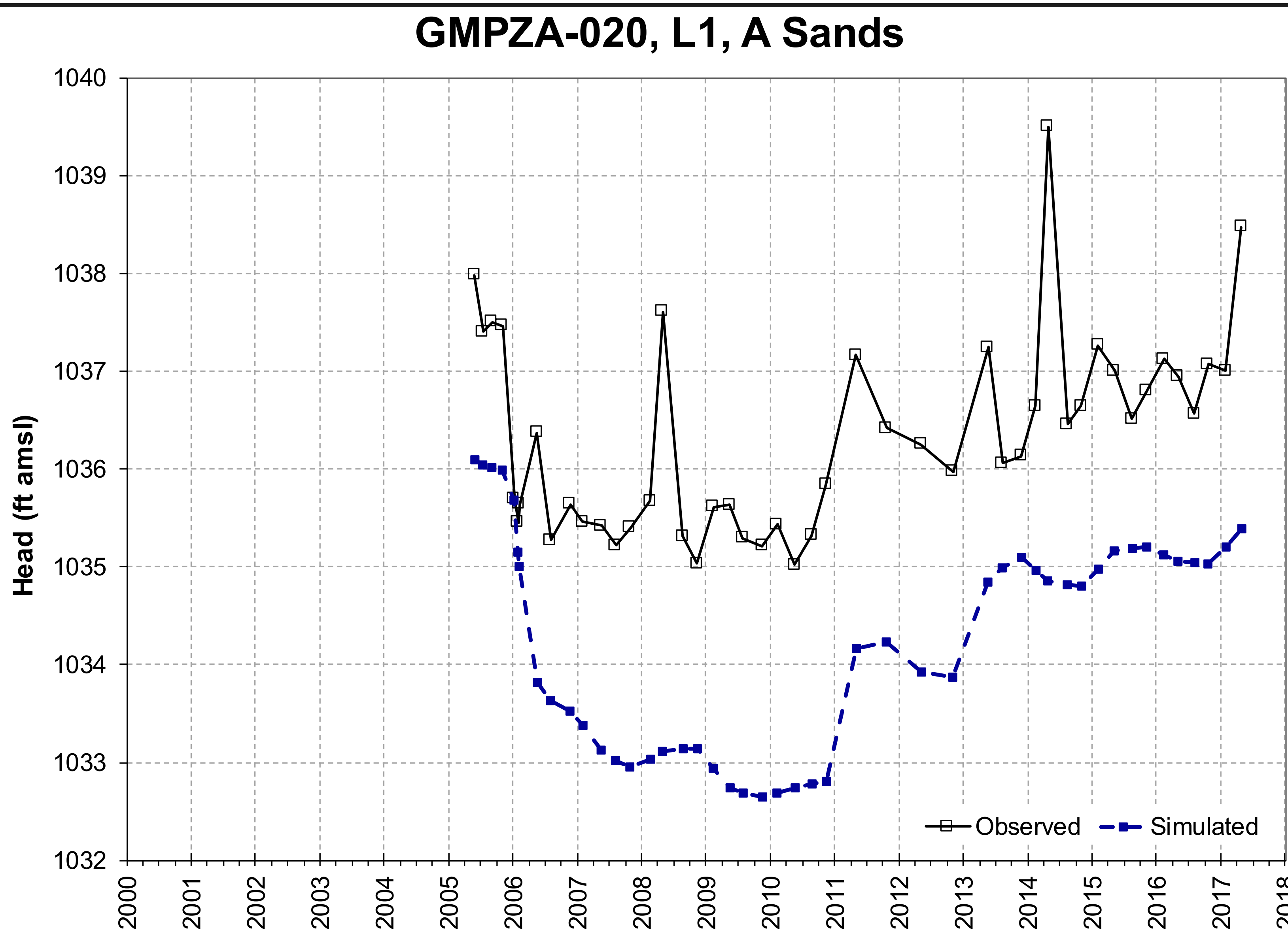


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

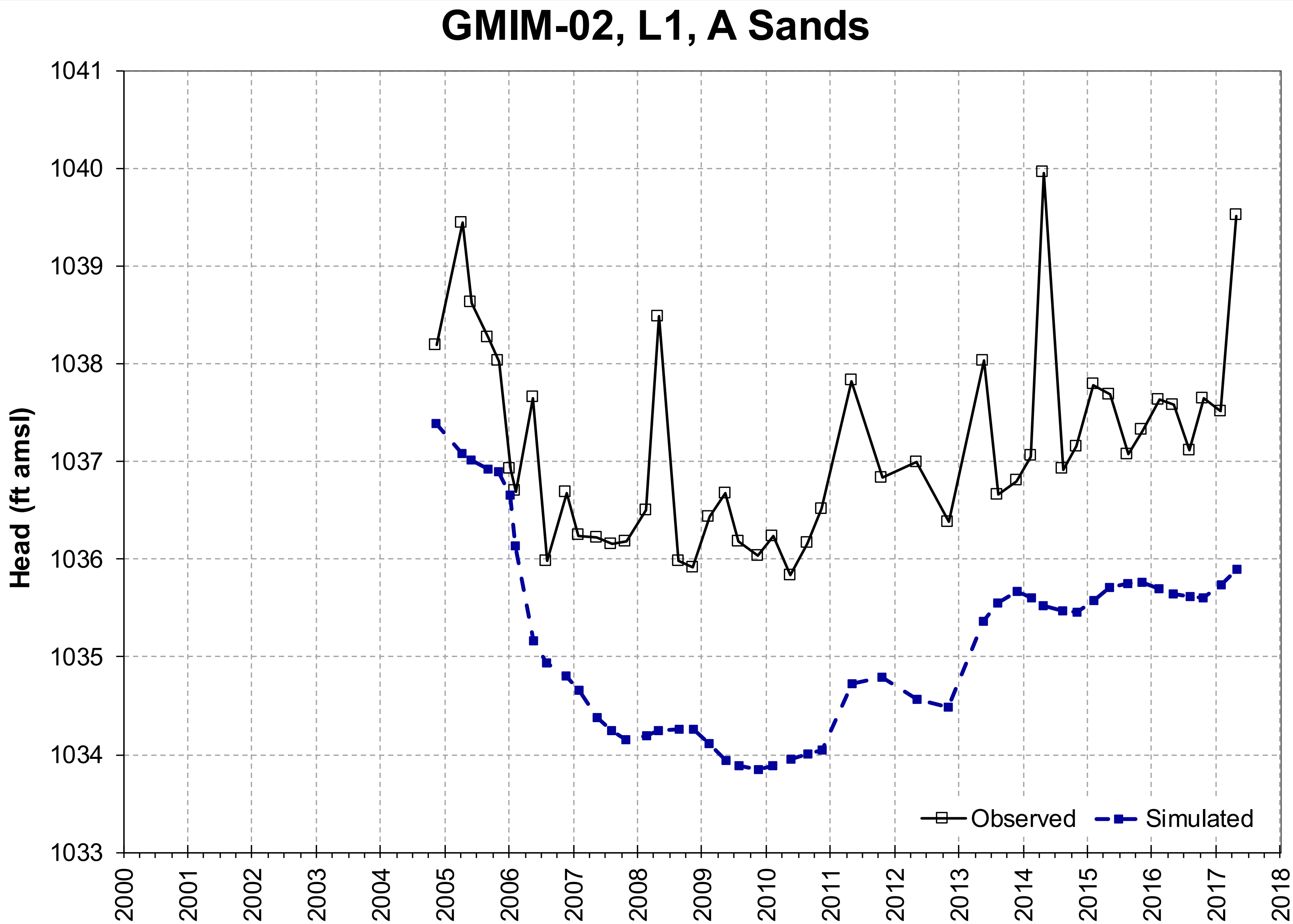


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



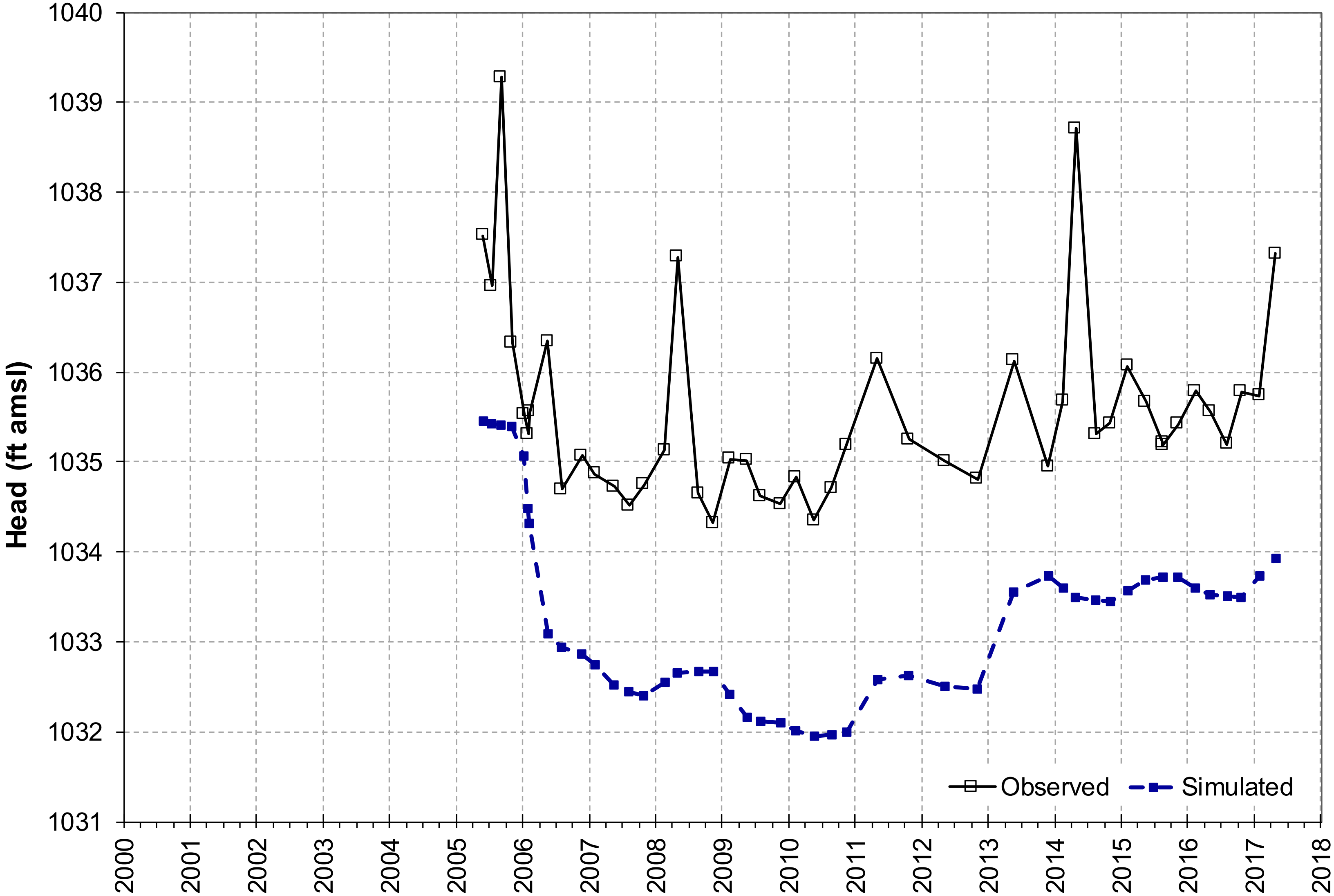
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-008, L1, A Sands



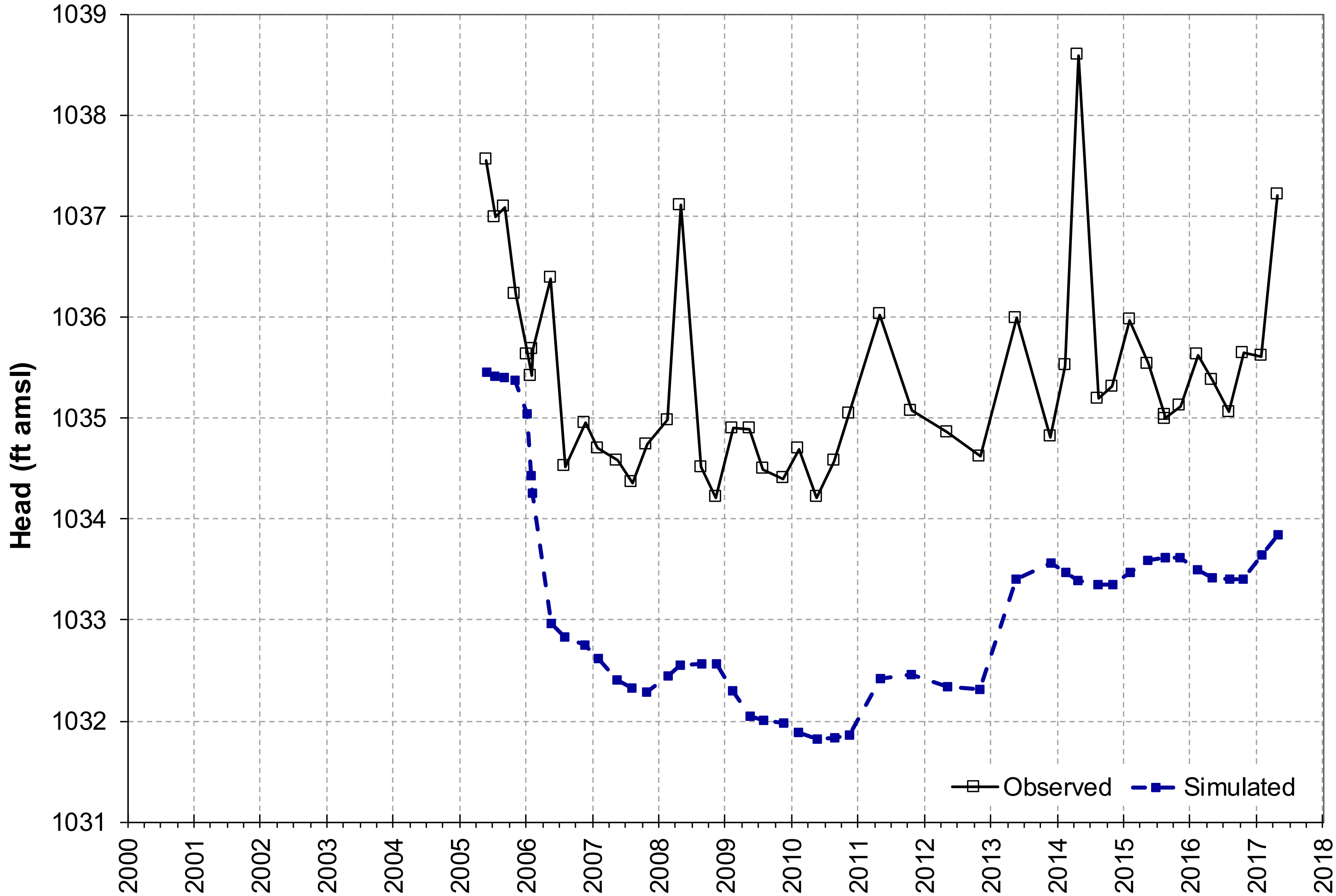
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-007, L1, A Sands

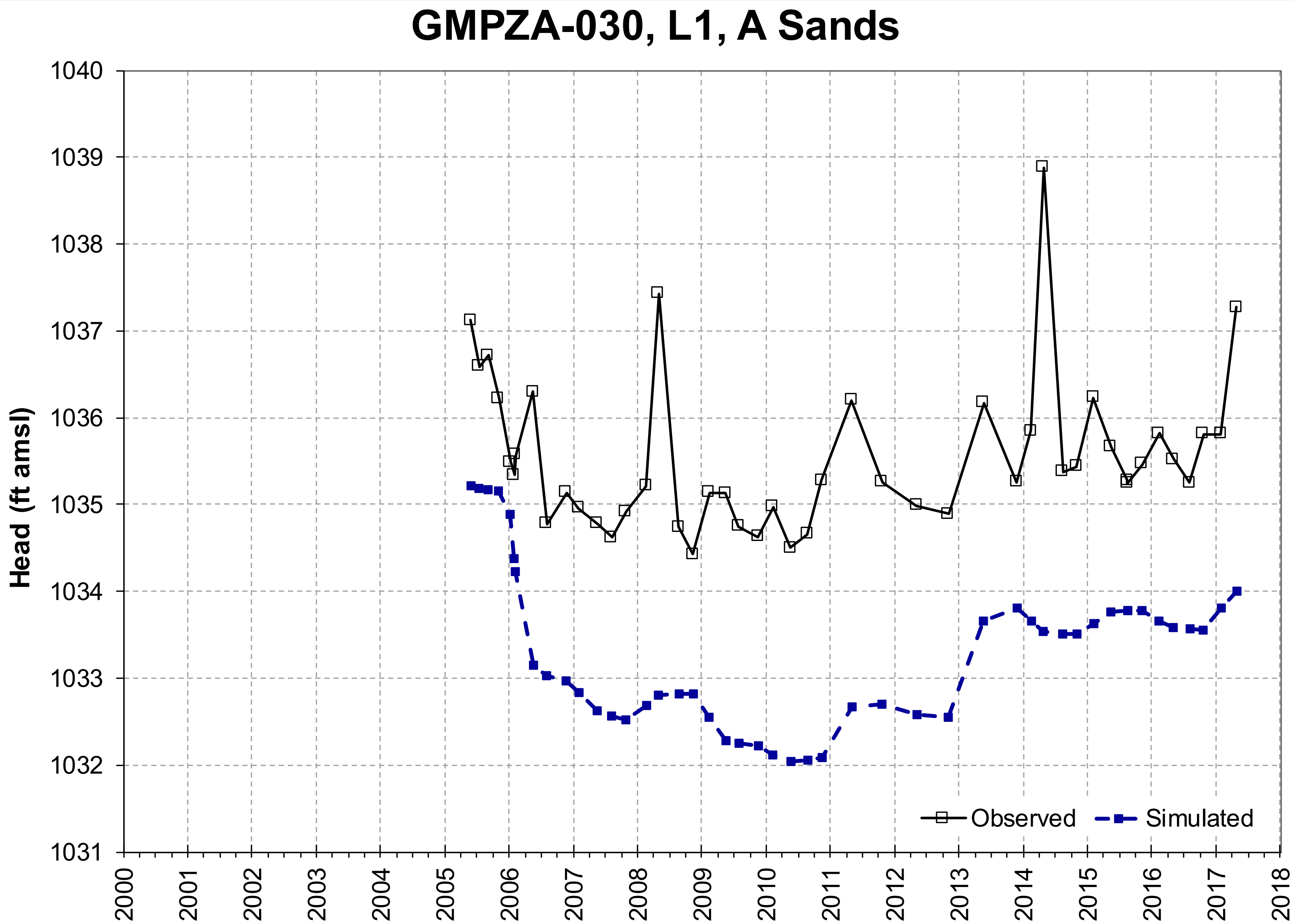


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



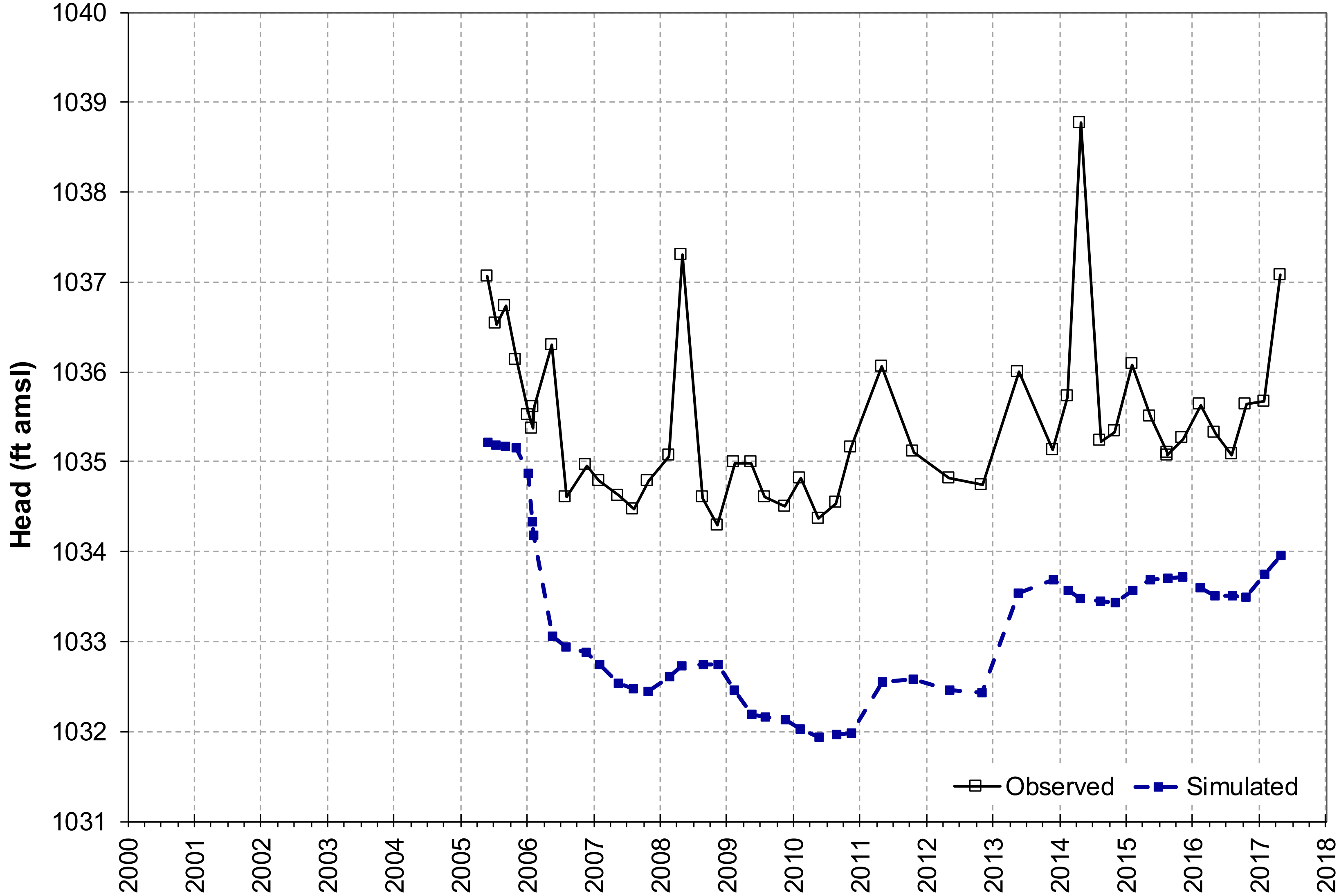
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-029, L1, A Sands



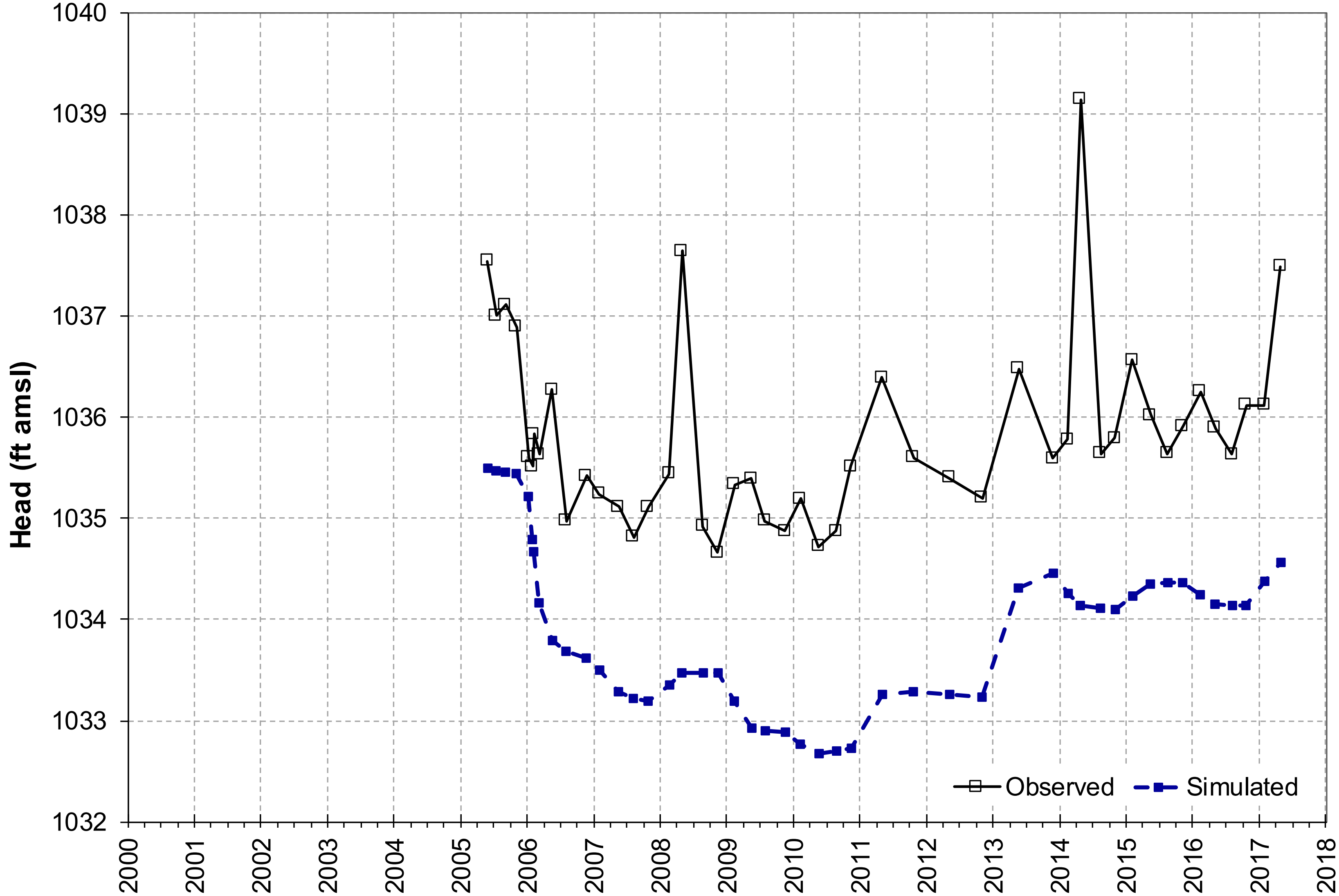
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-025, L1, A Sands



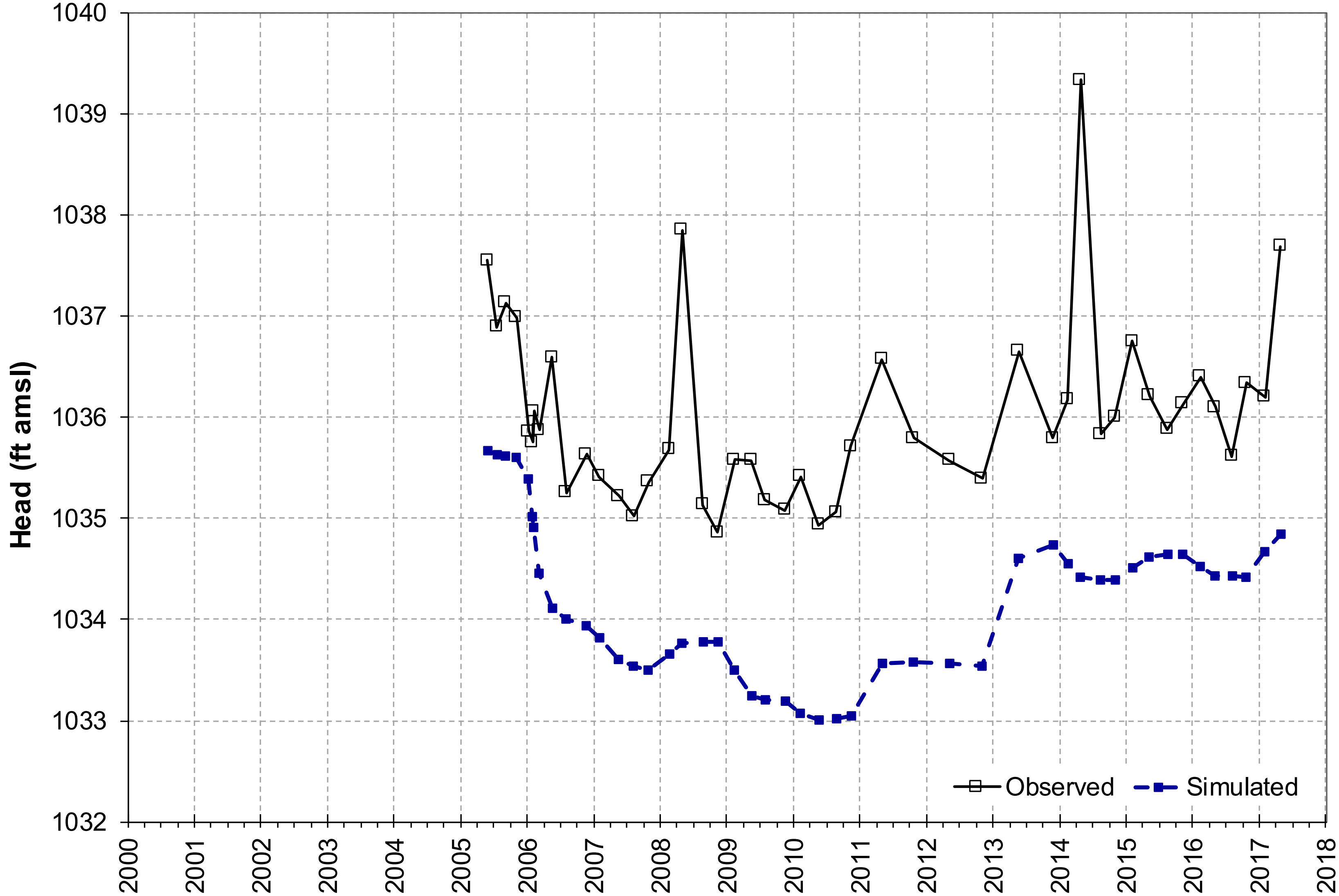
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GMPZA-024, L1, A Sands

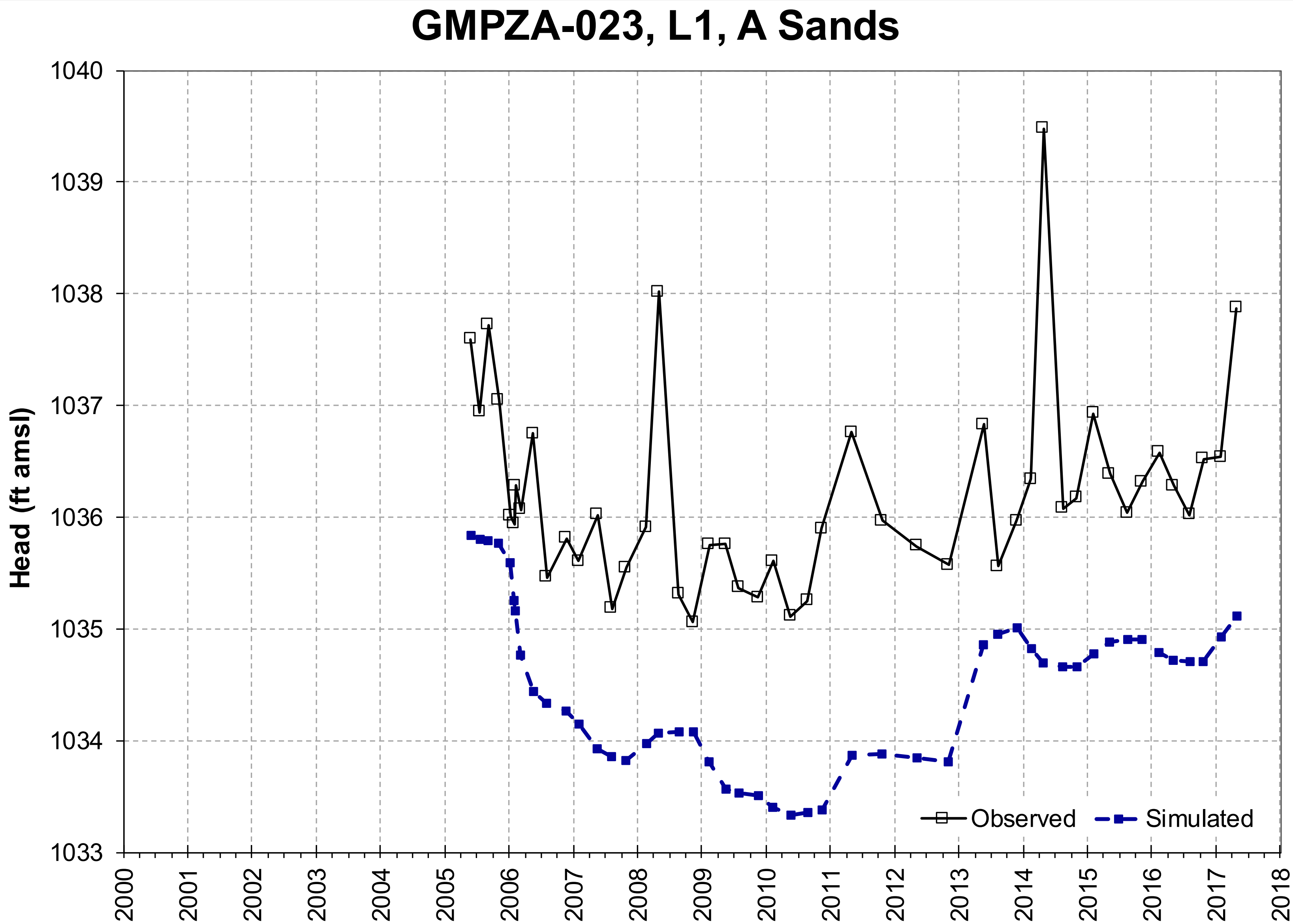


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

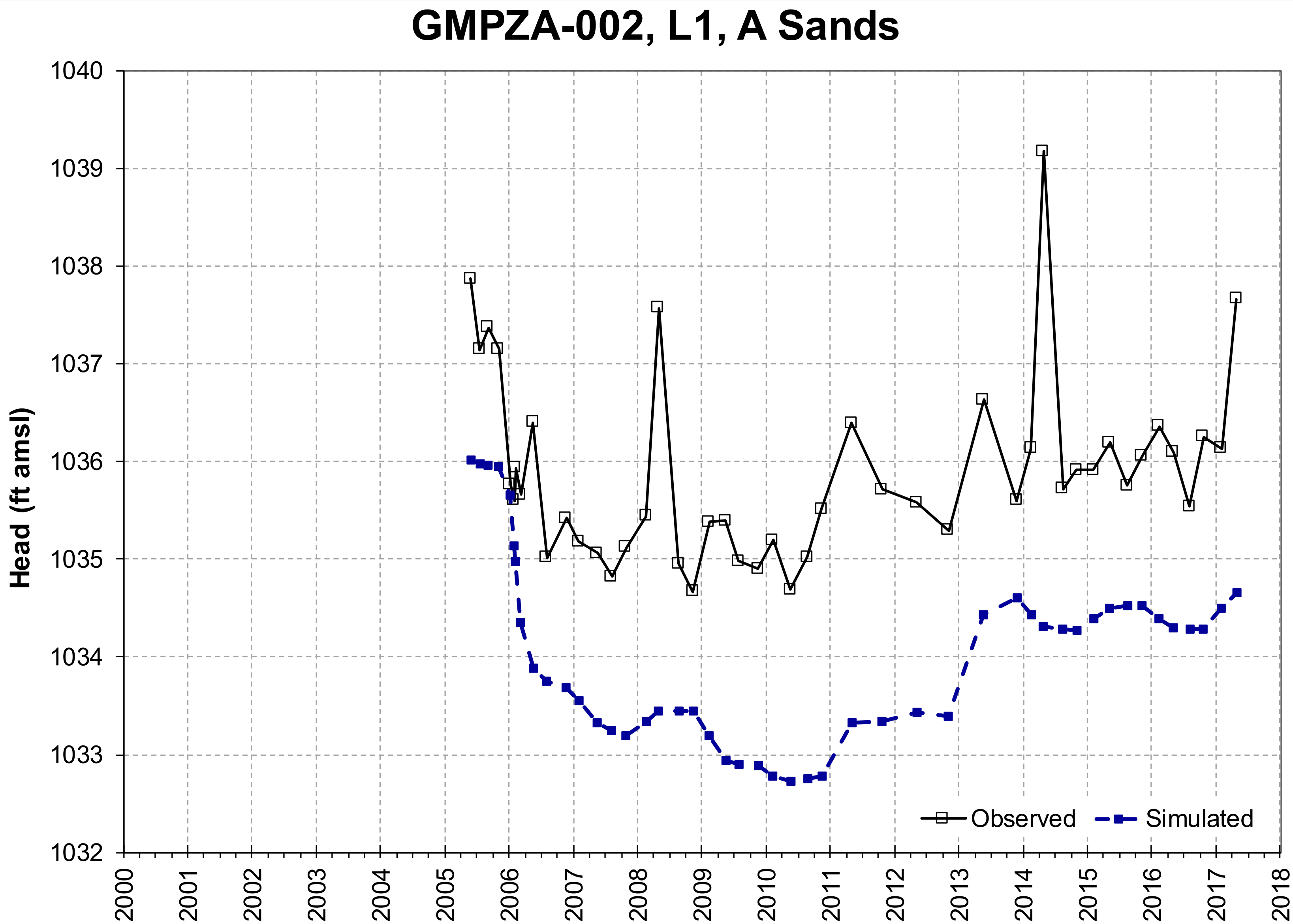


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

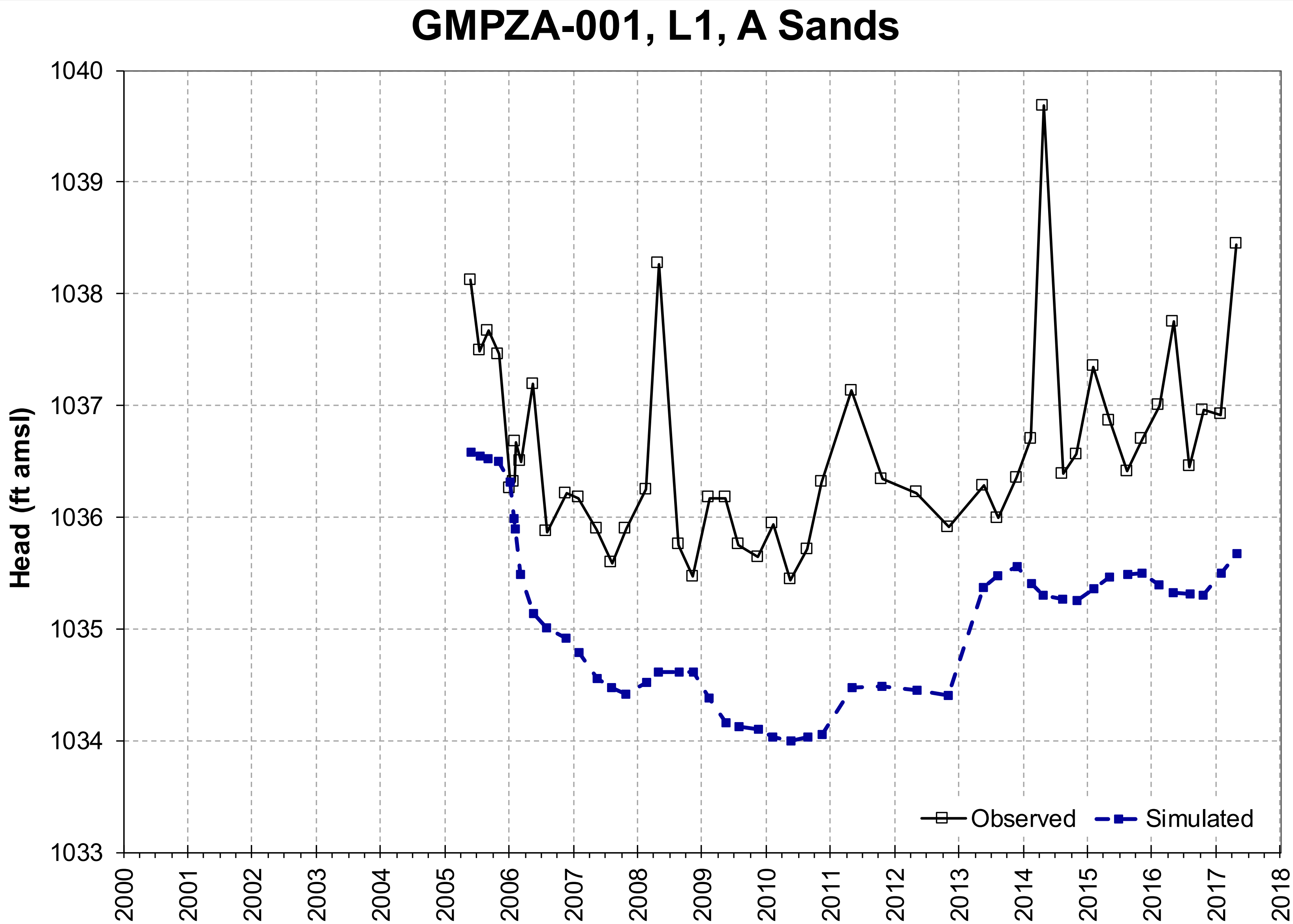


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



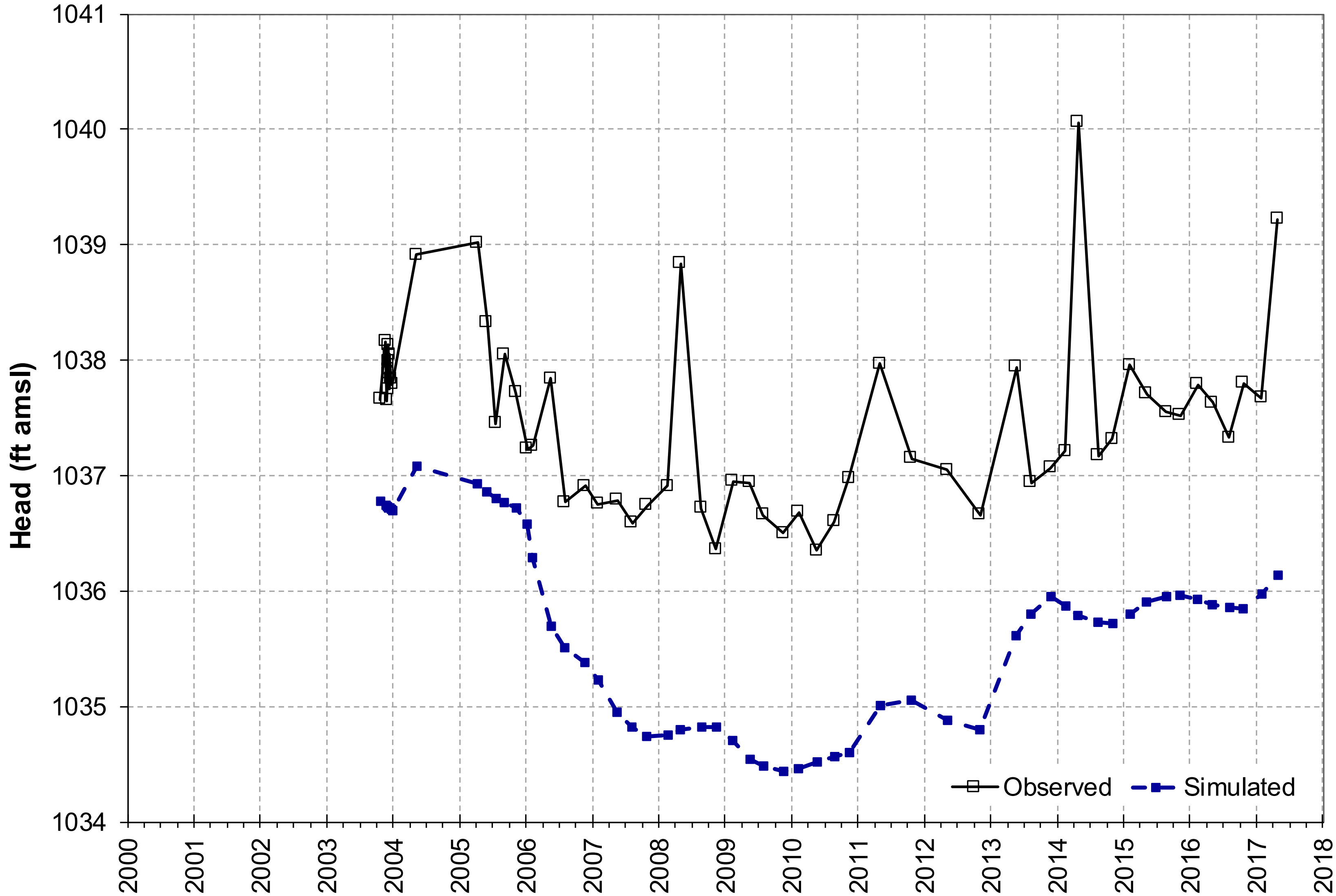
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-079, L1, A Sands

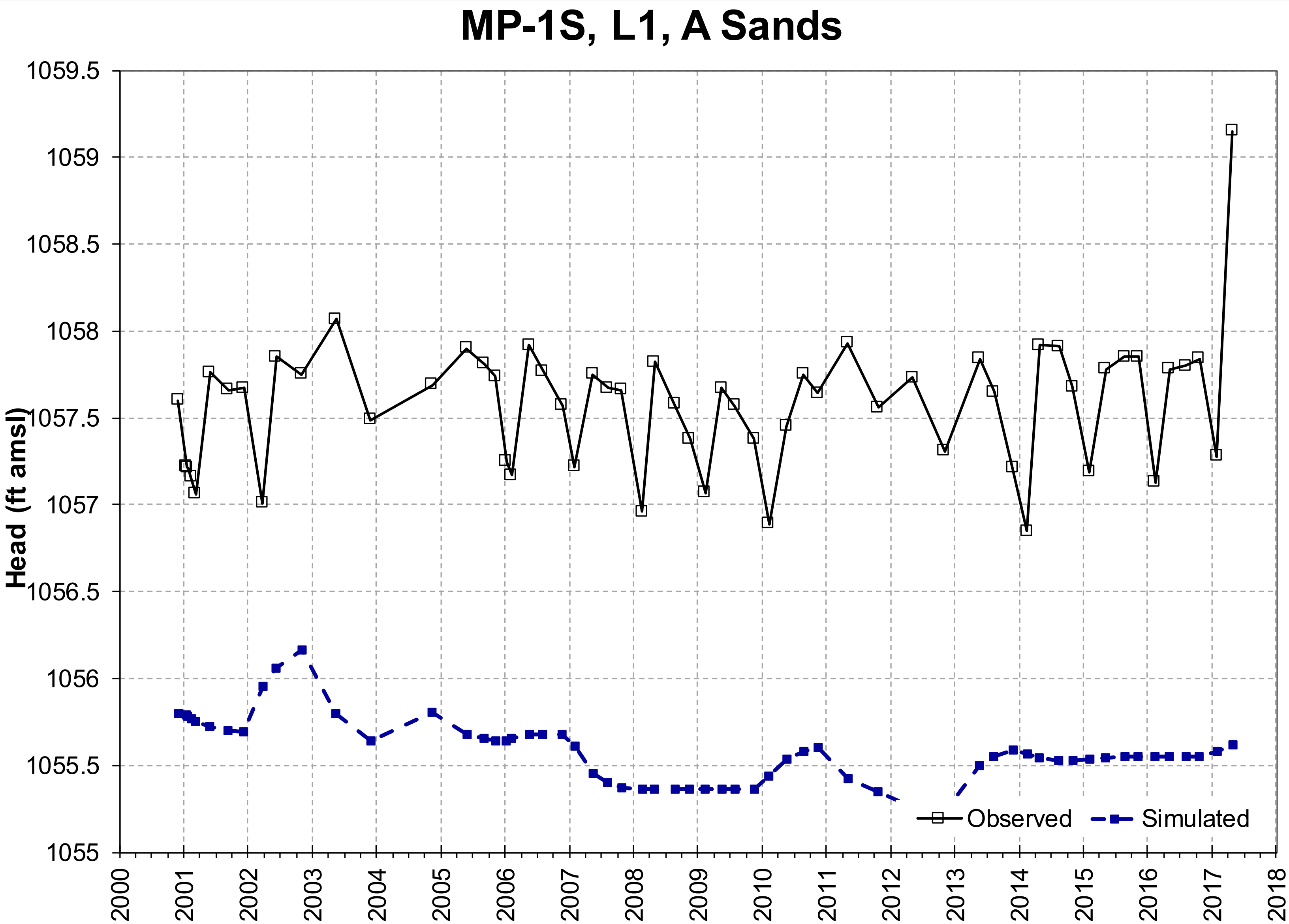


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

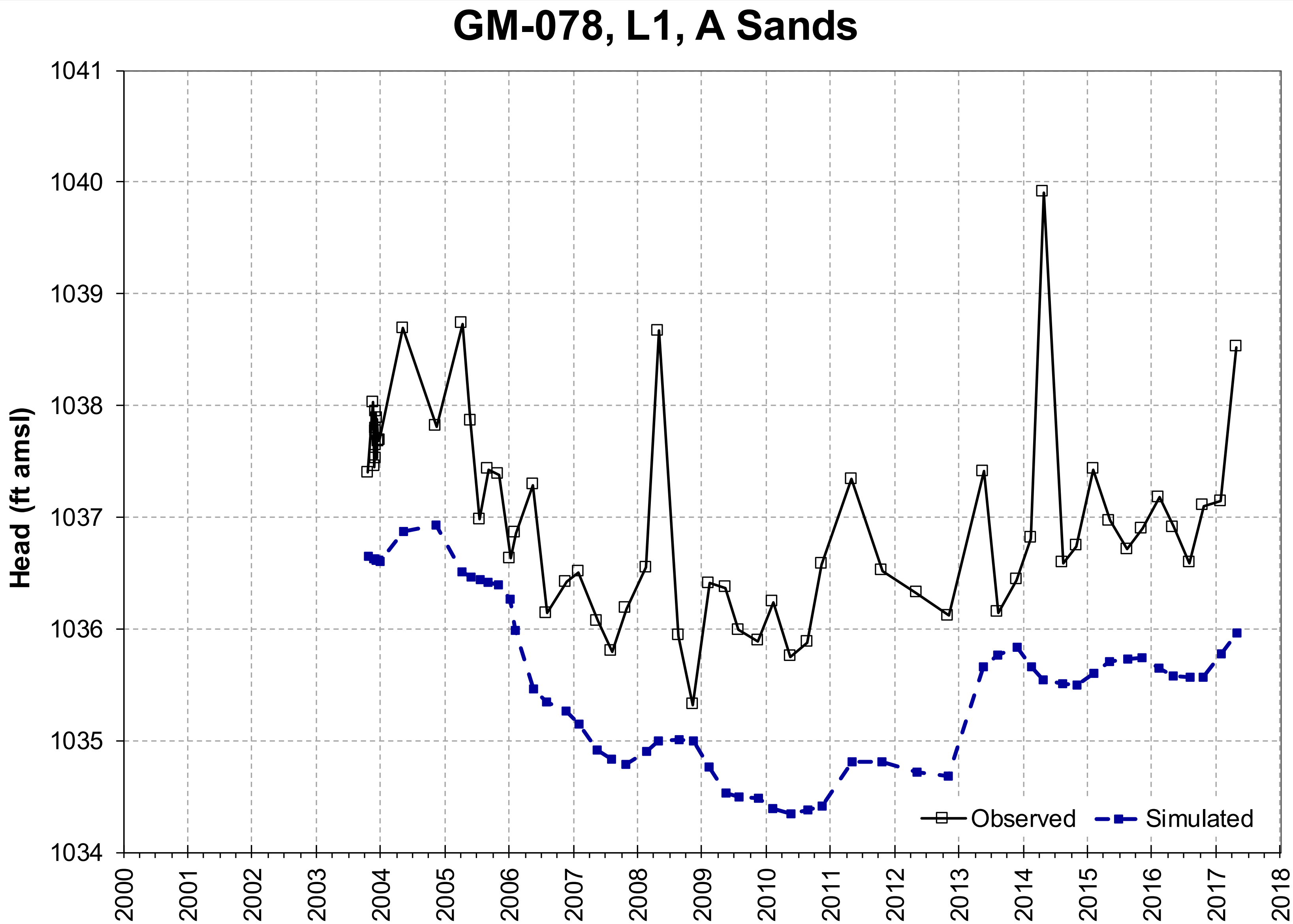


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

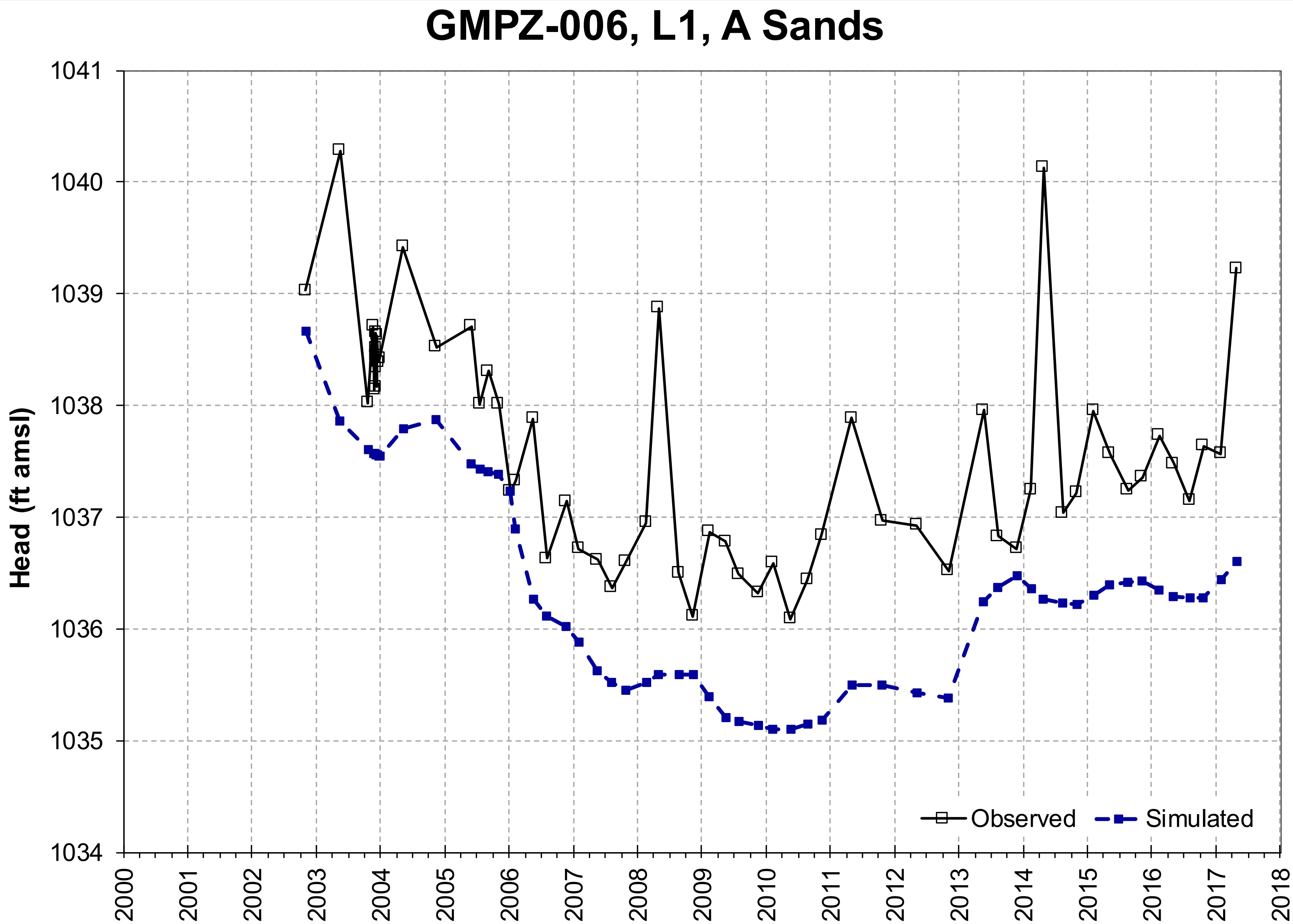


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



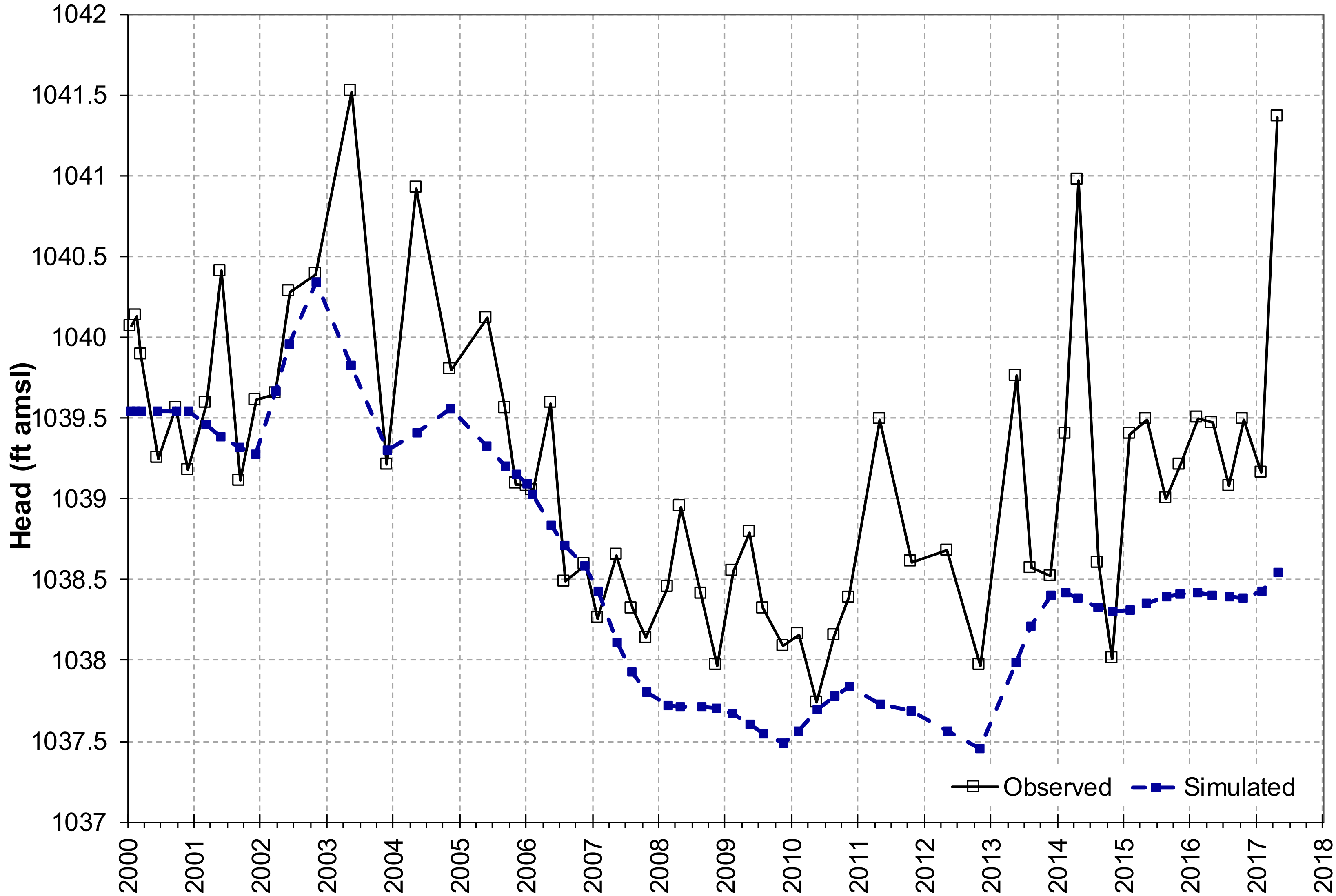
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-053A, L1, A Sands

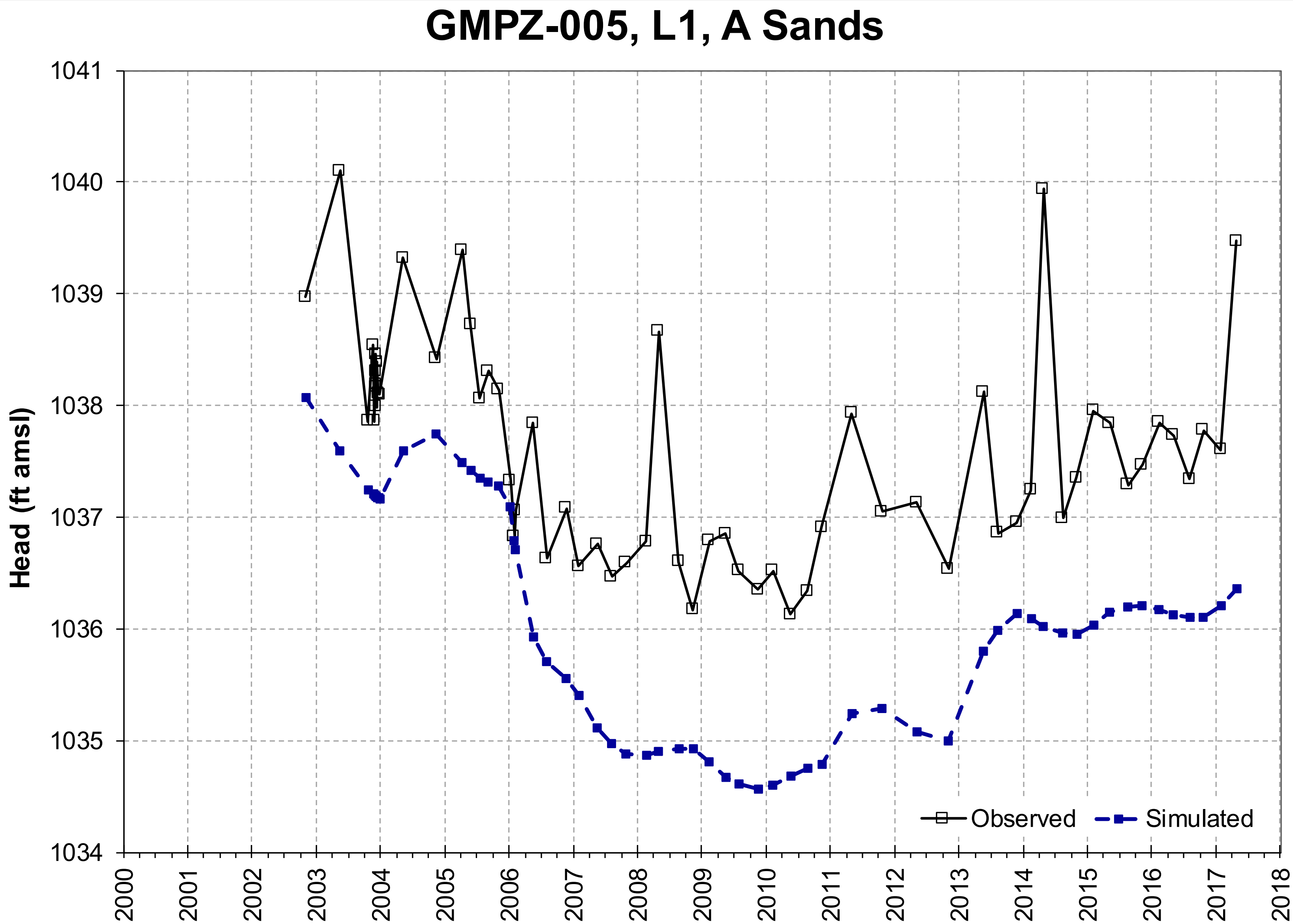


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

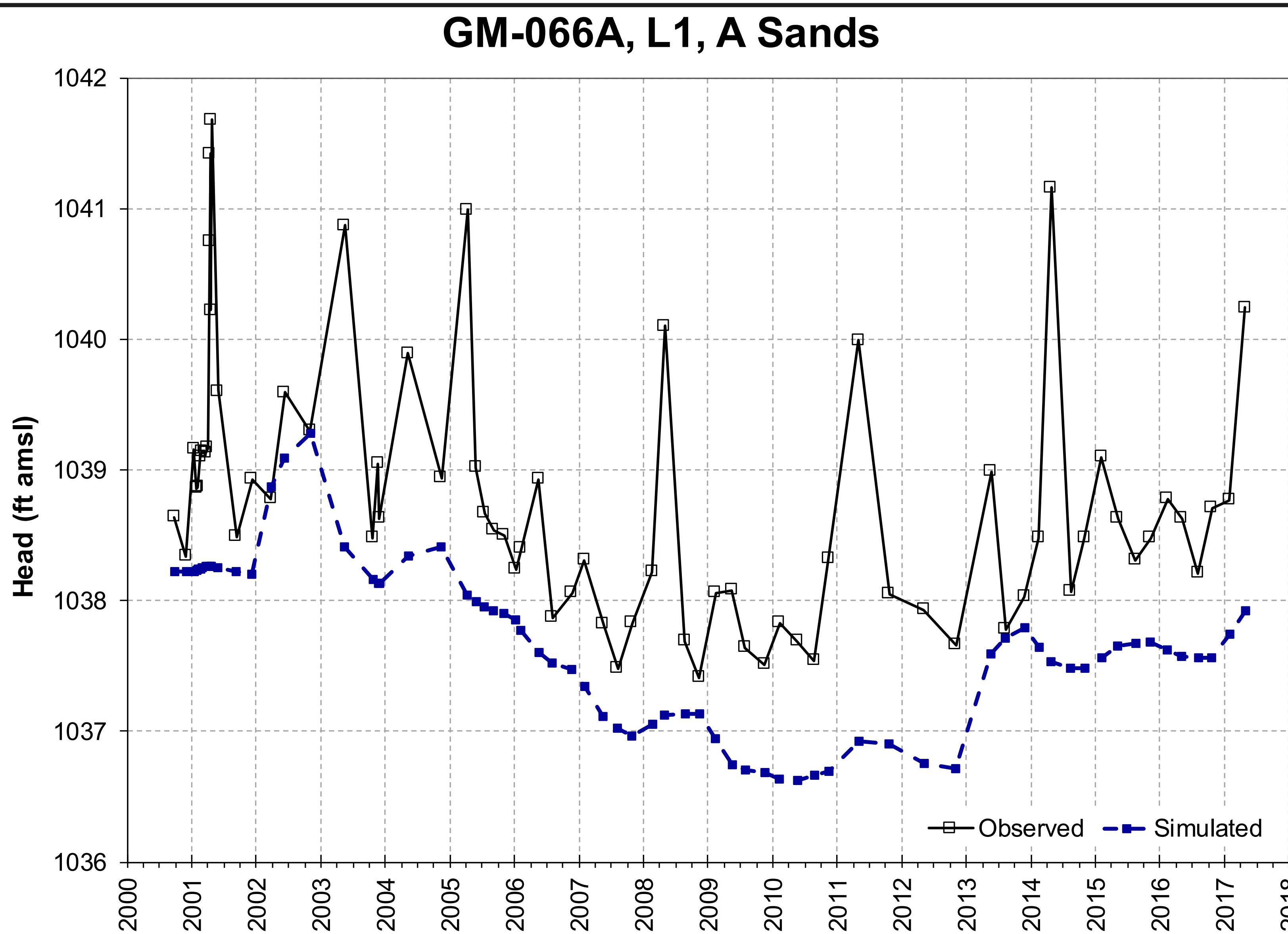


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

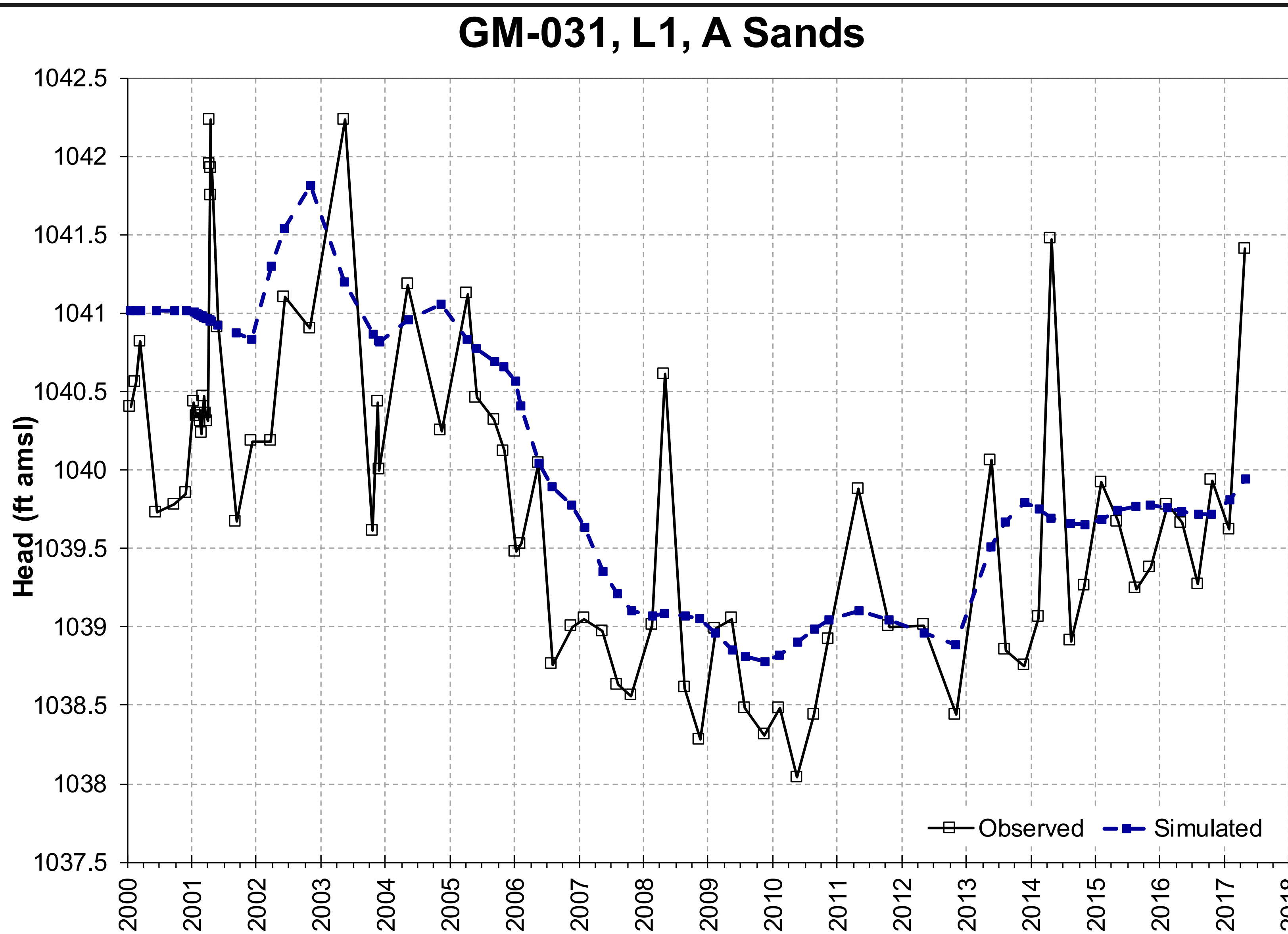


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

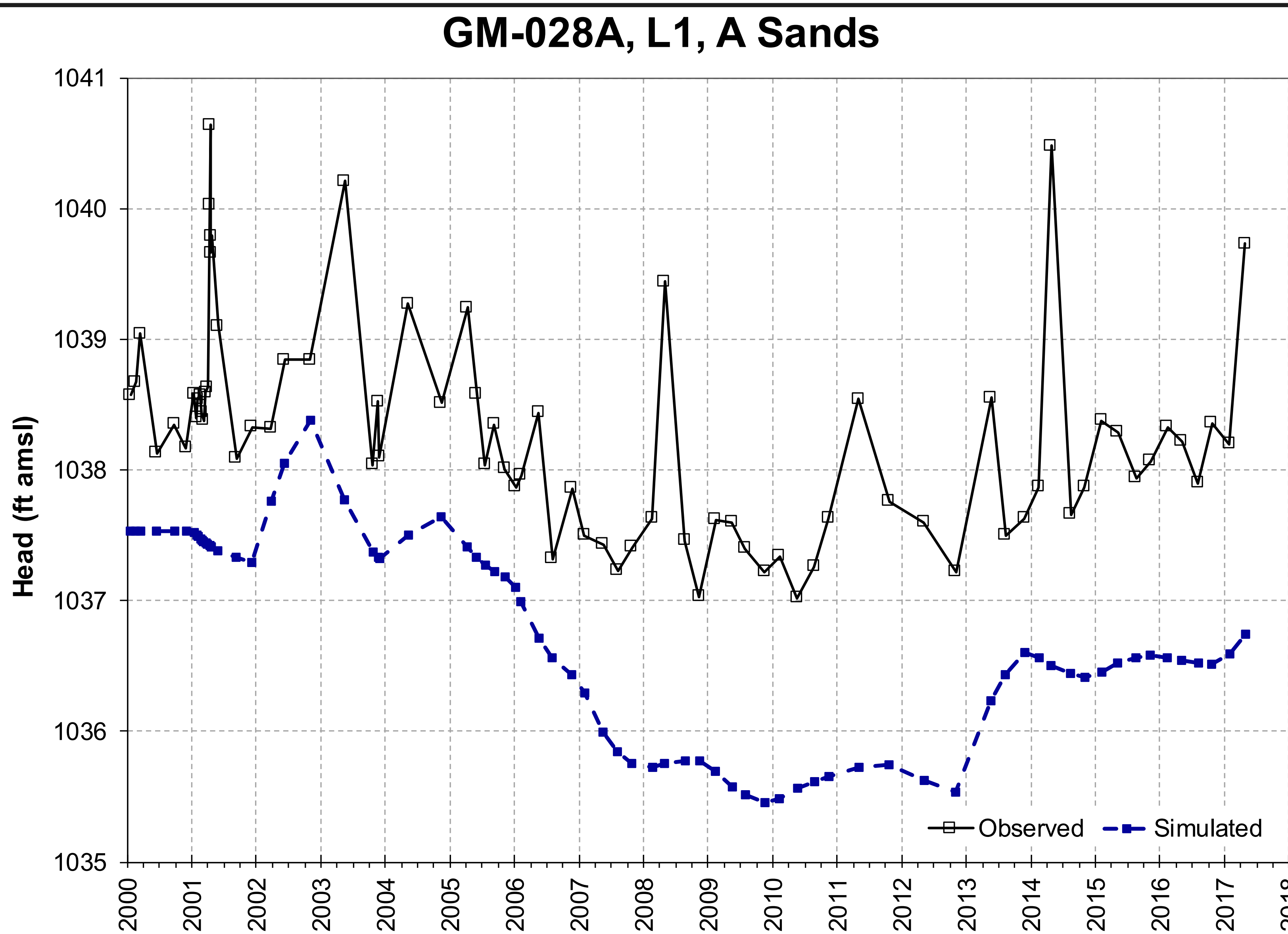


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



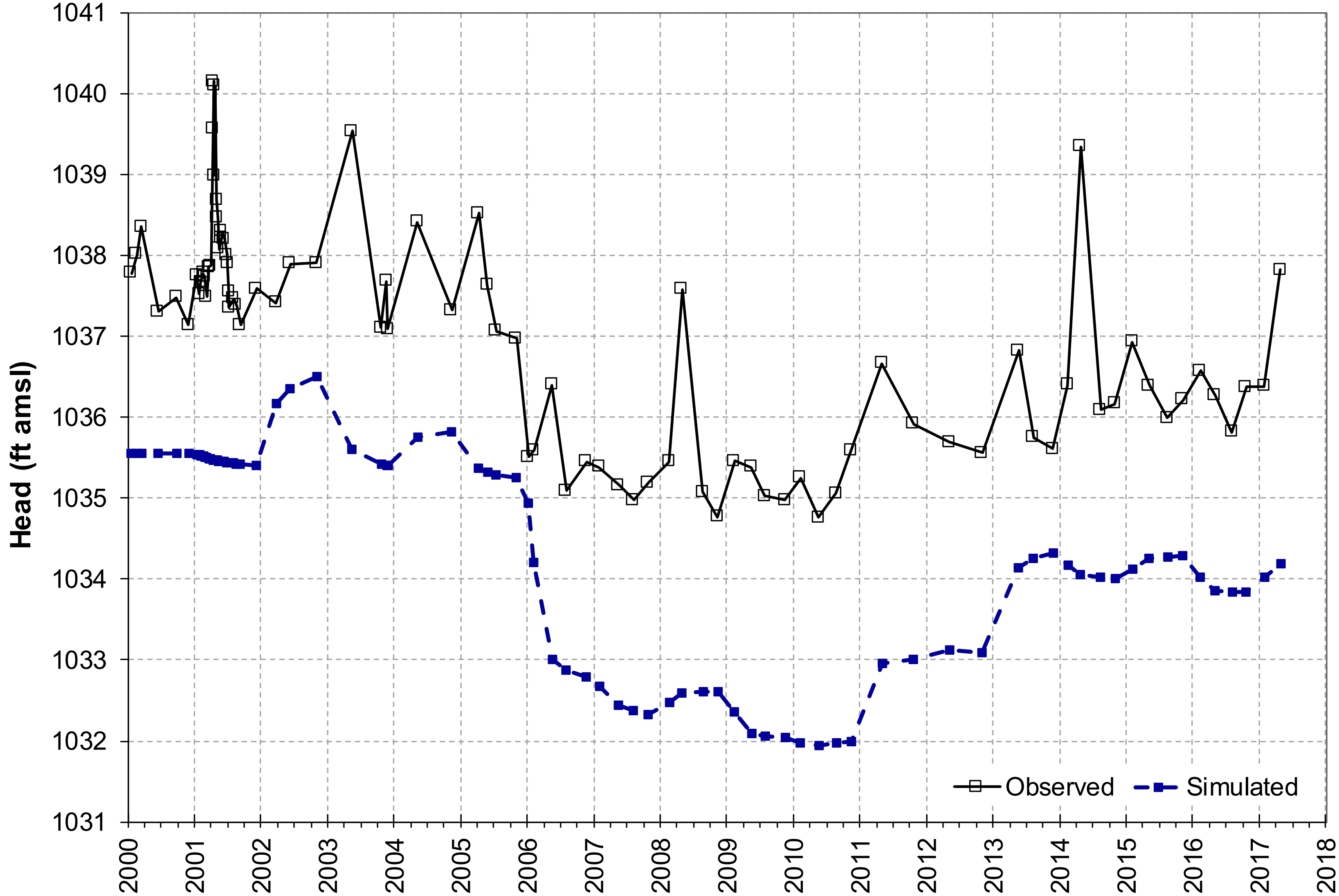
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

GM-026A, L1, A Sands

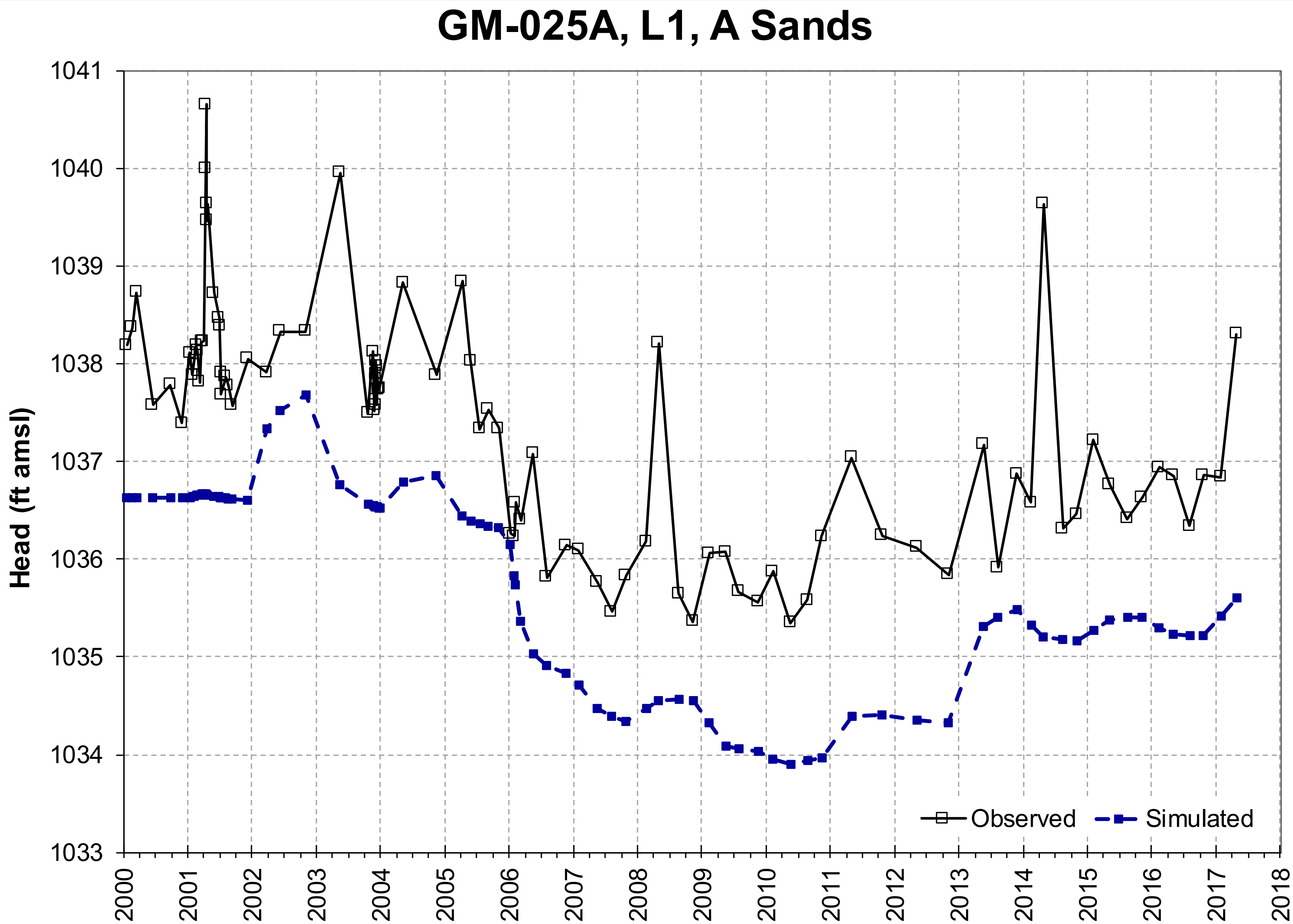


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

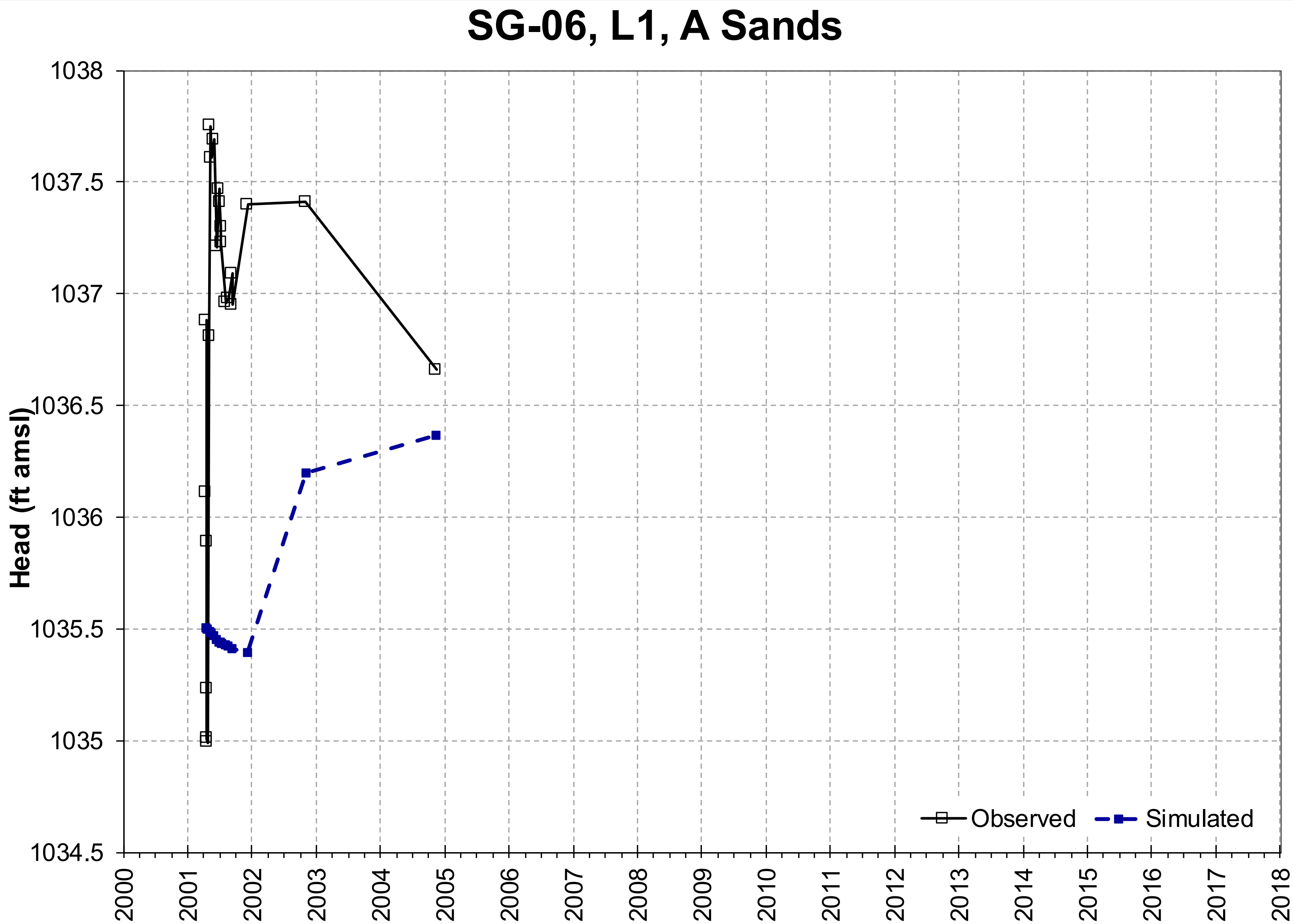


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

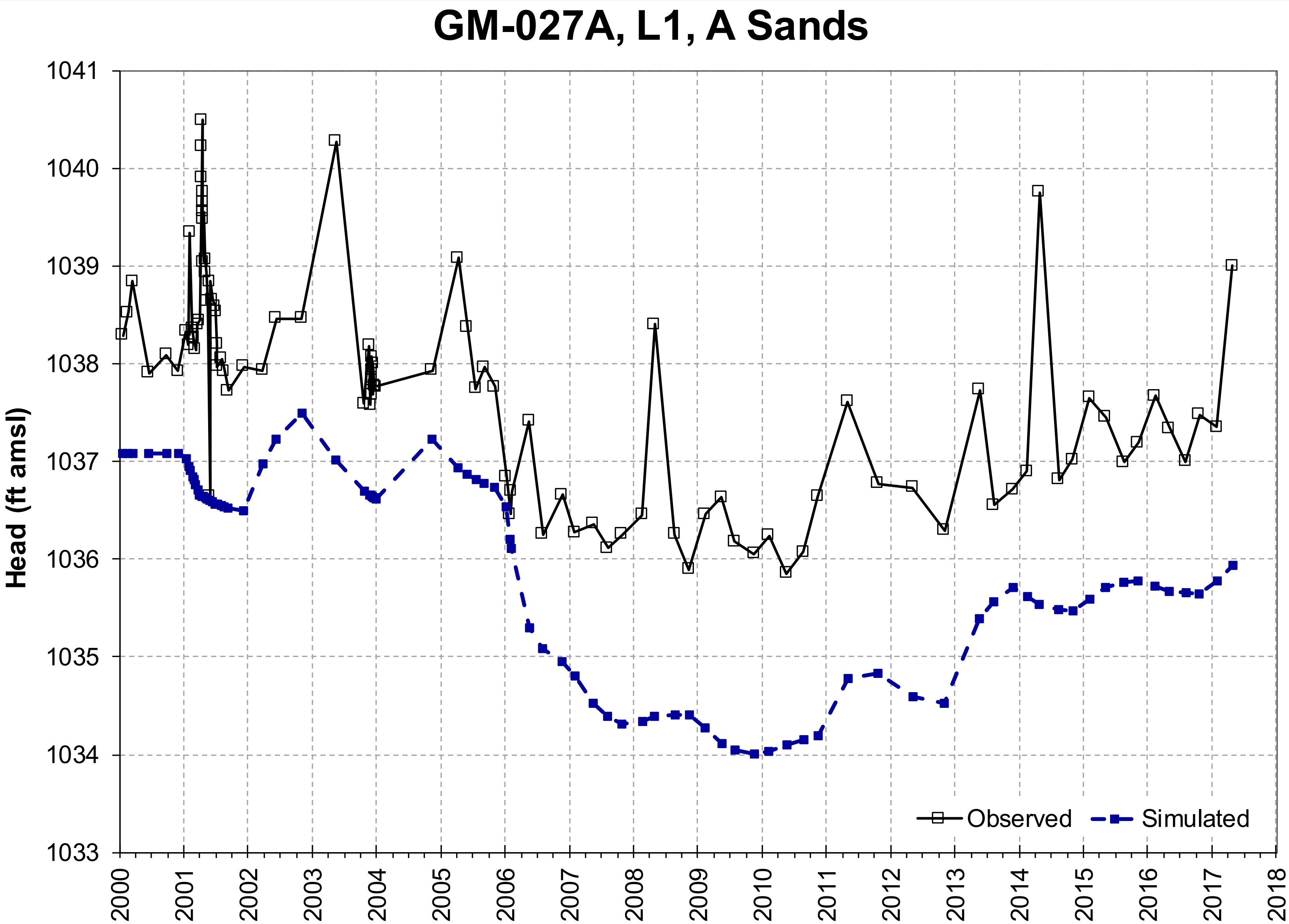


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

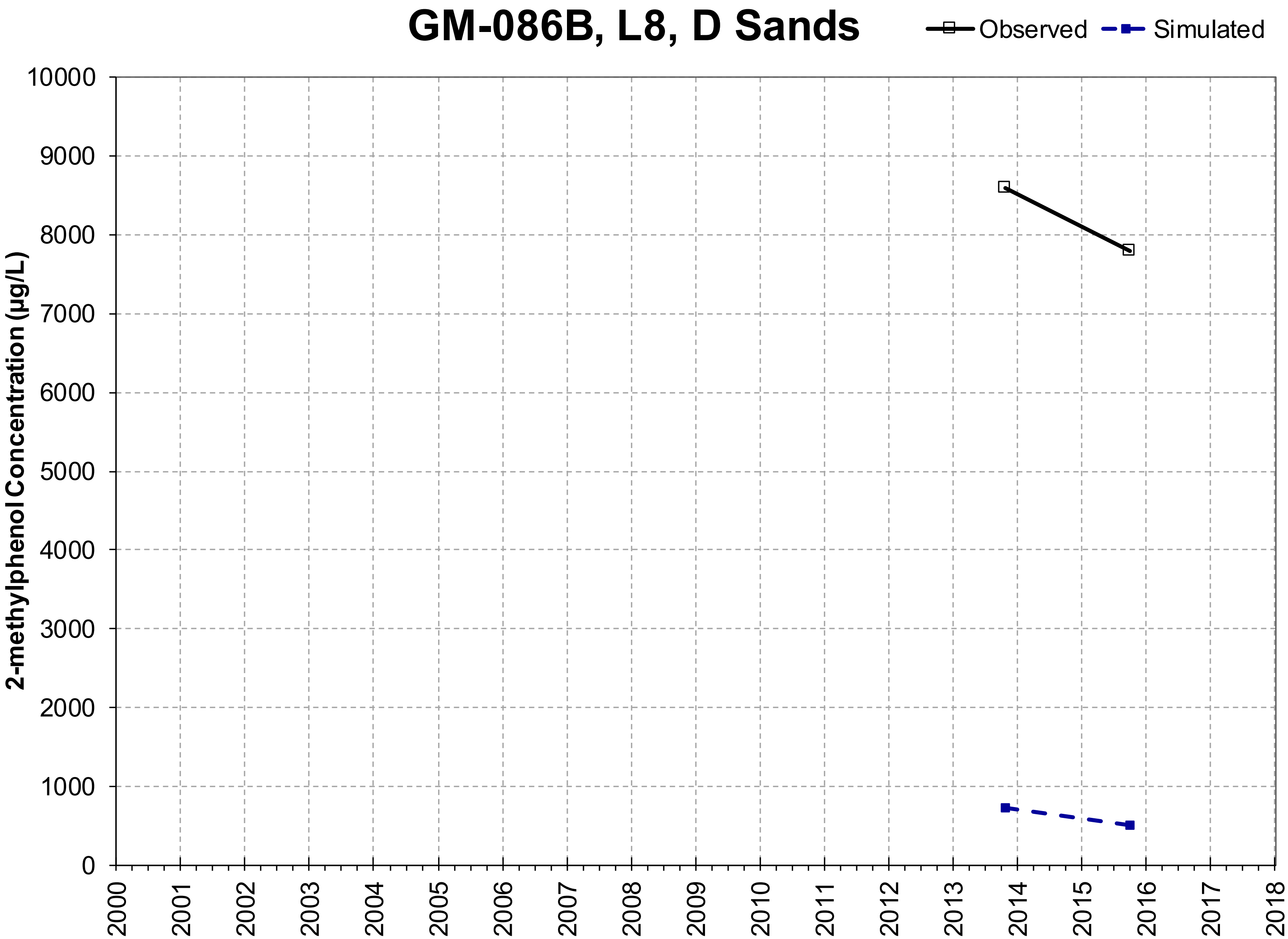
TRANSIENT HYDROGRAPHS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
A

APPENDIX B

Transient m,p-cresol Concentration over time at monitoring/extraction wells

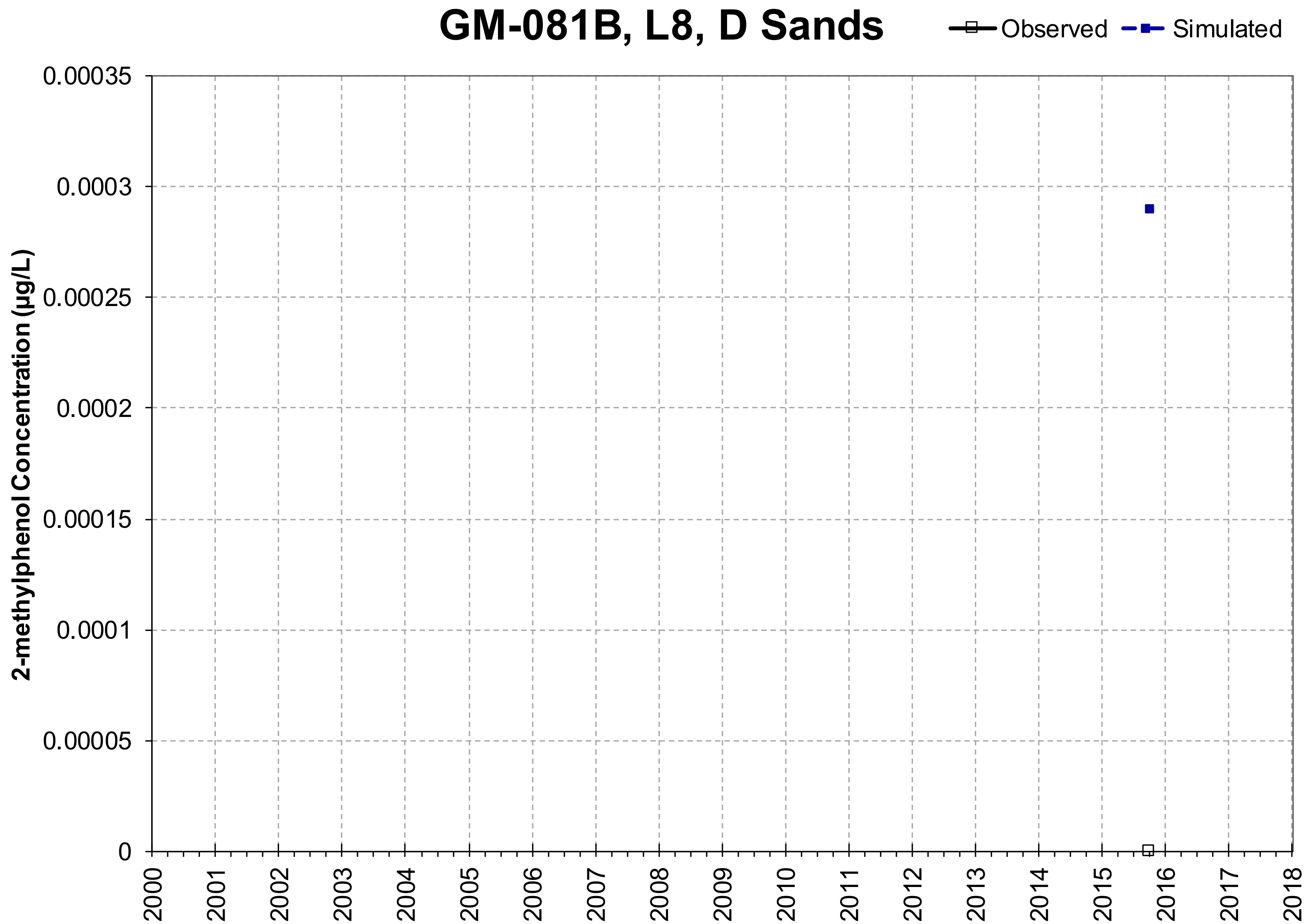


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

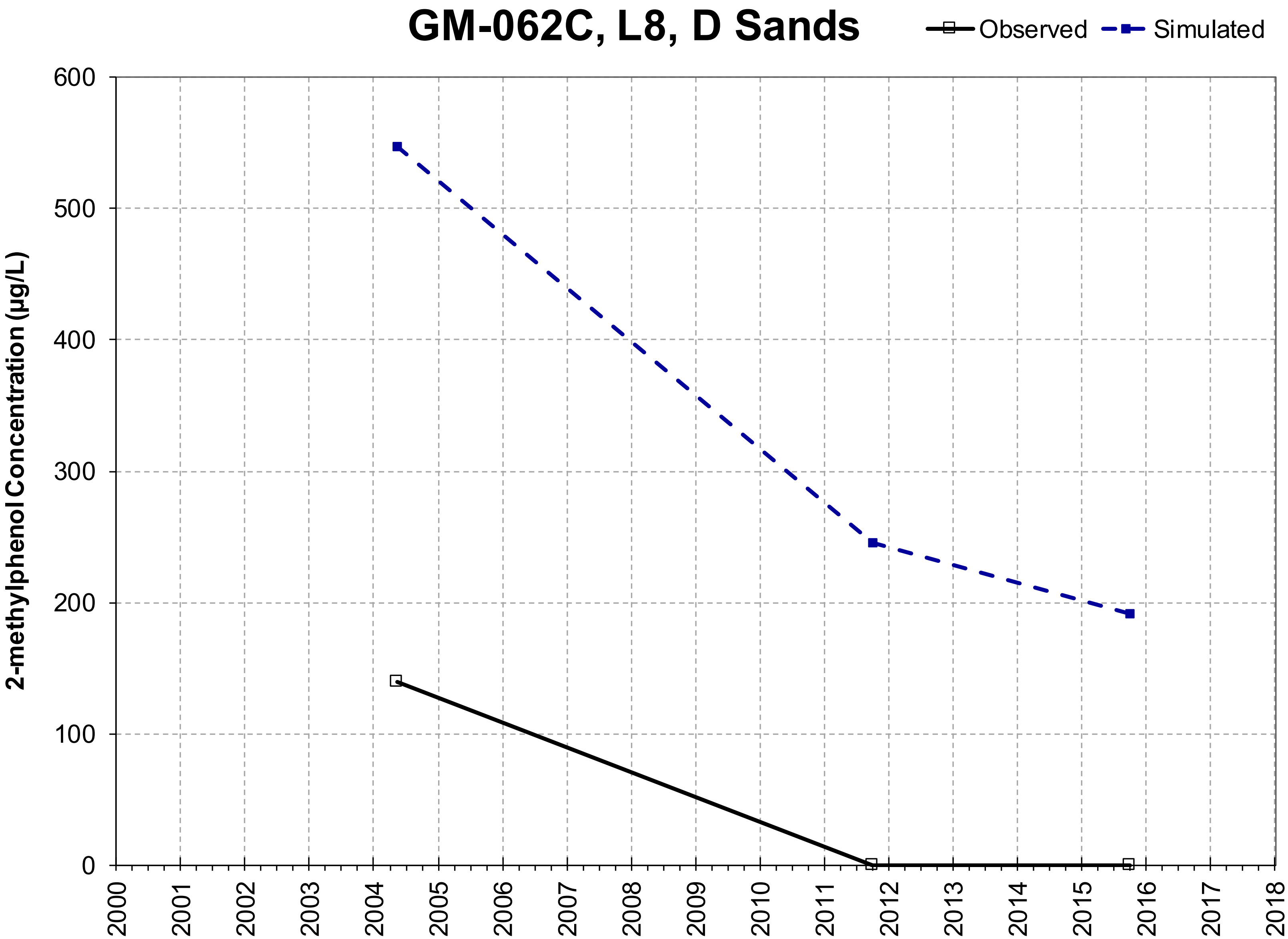


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

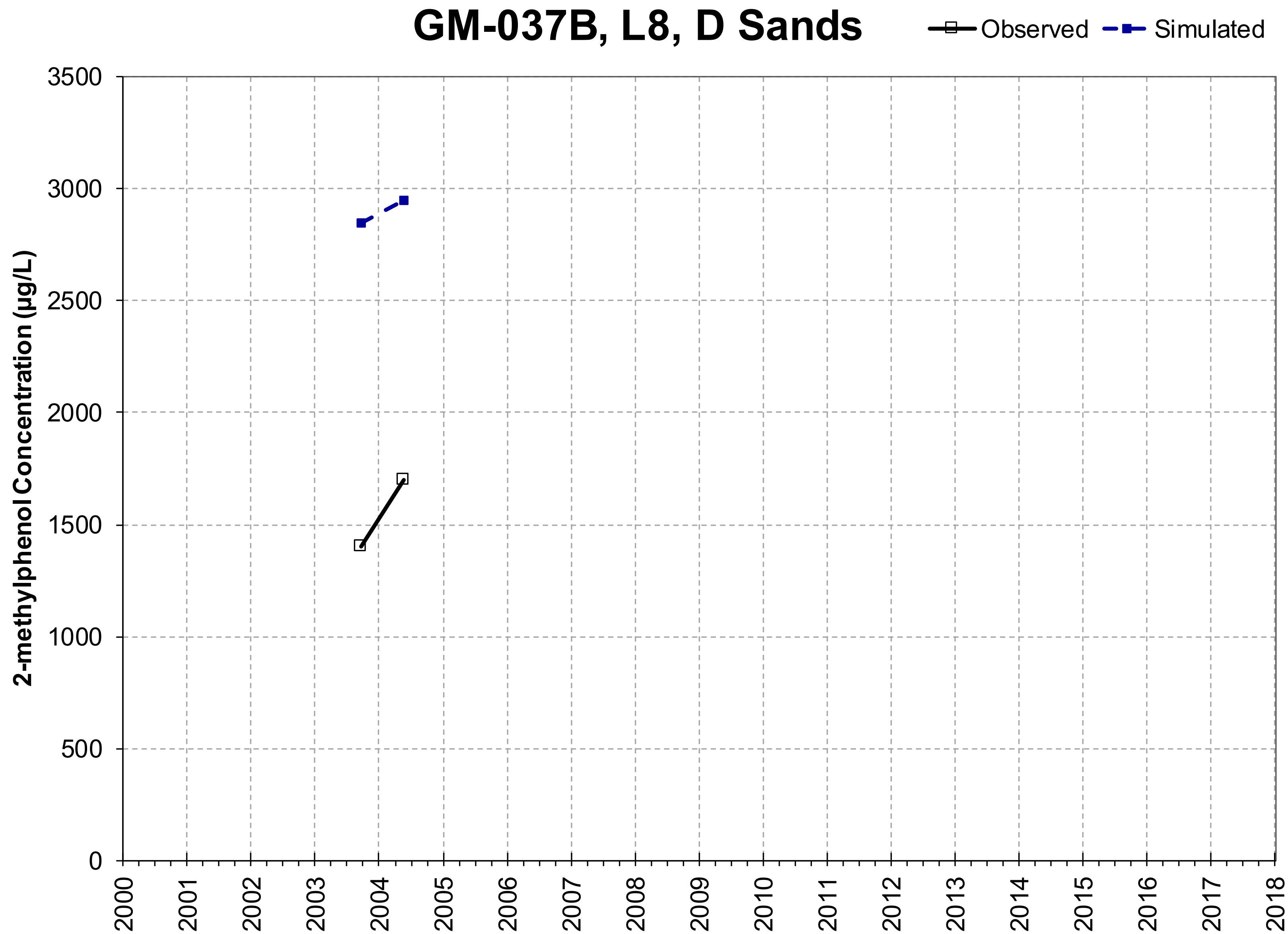


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

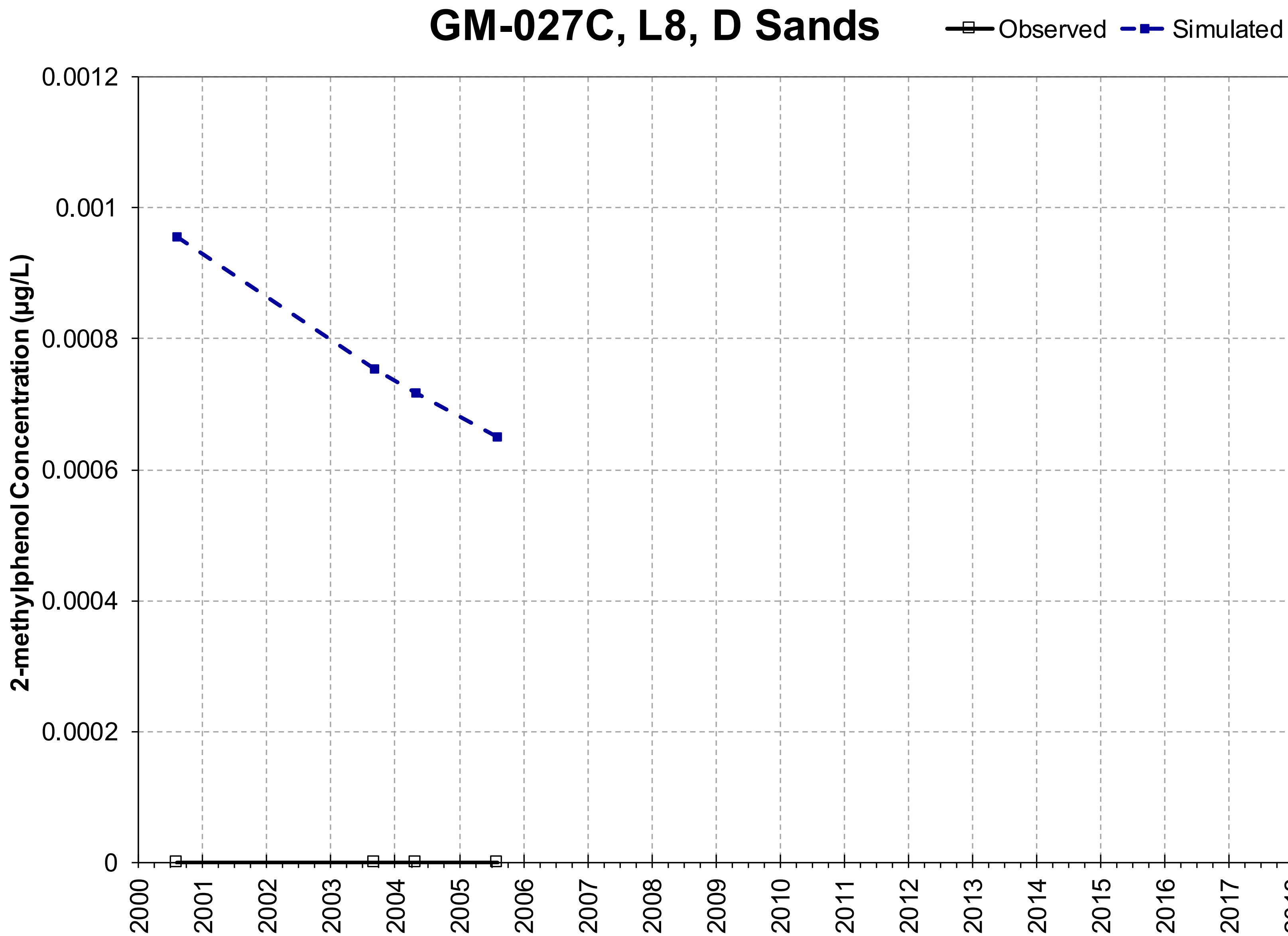


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

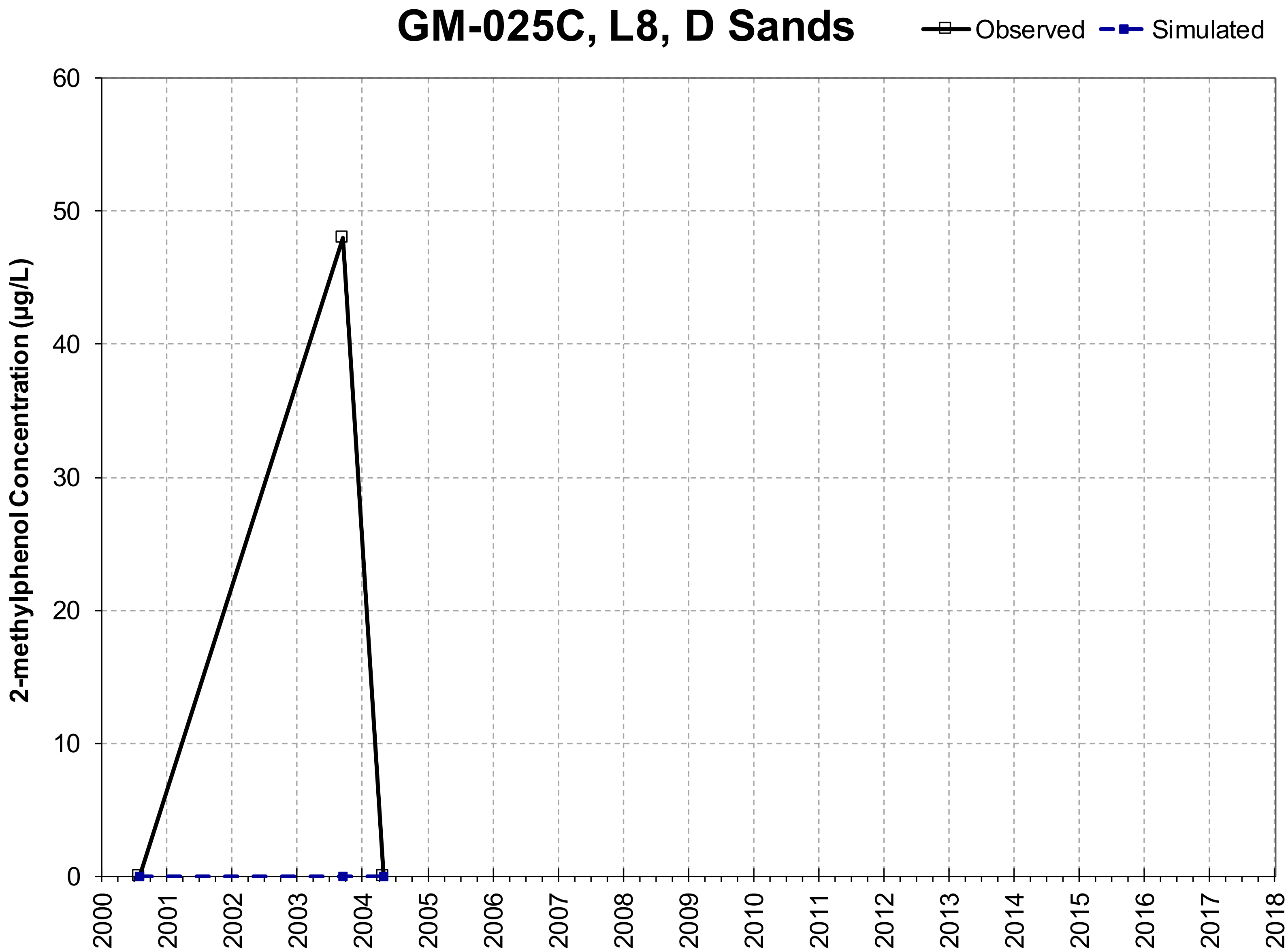


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

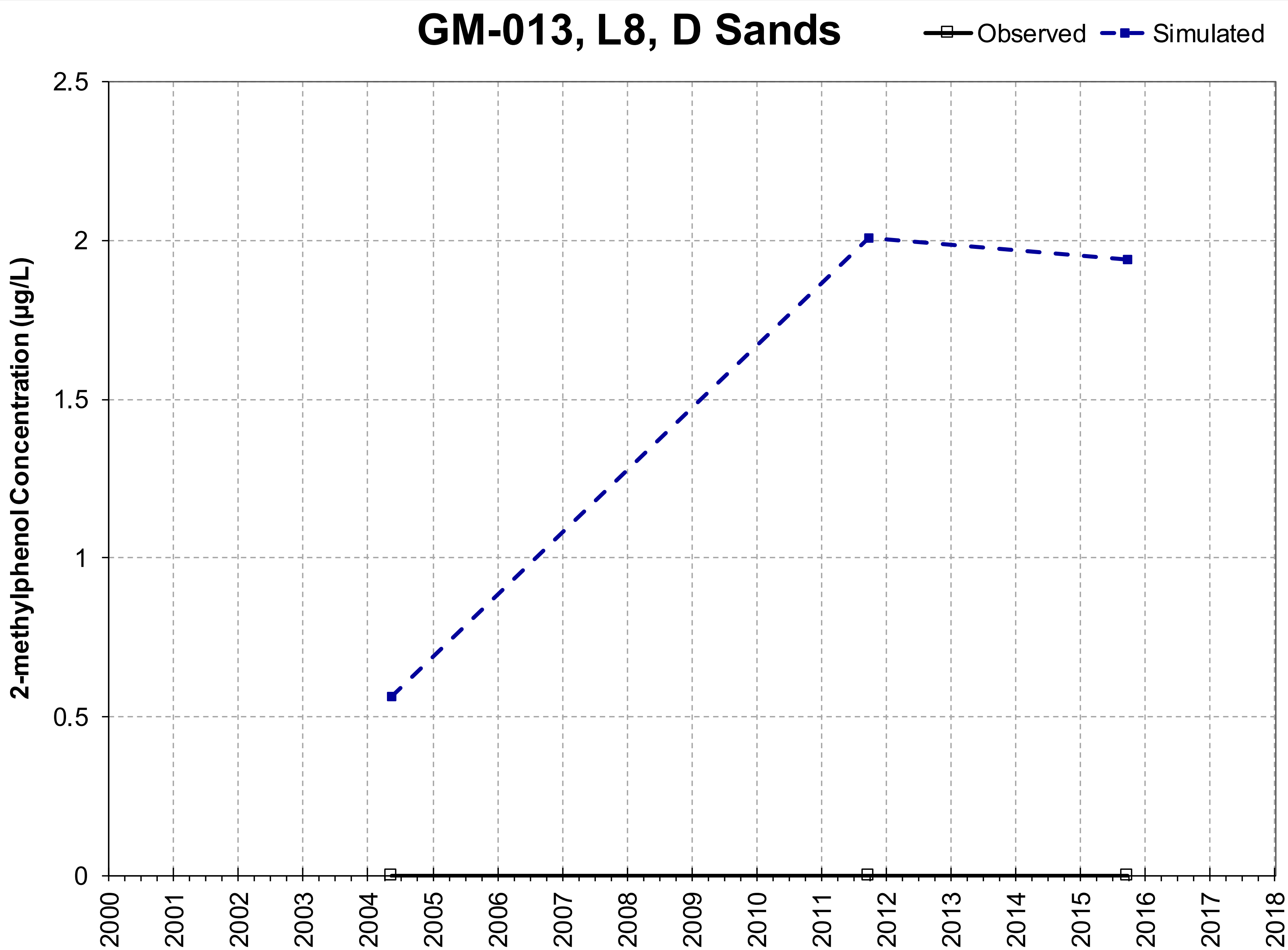


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

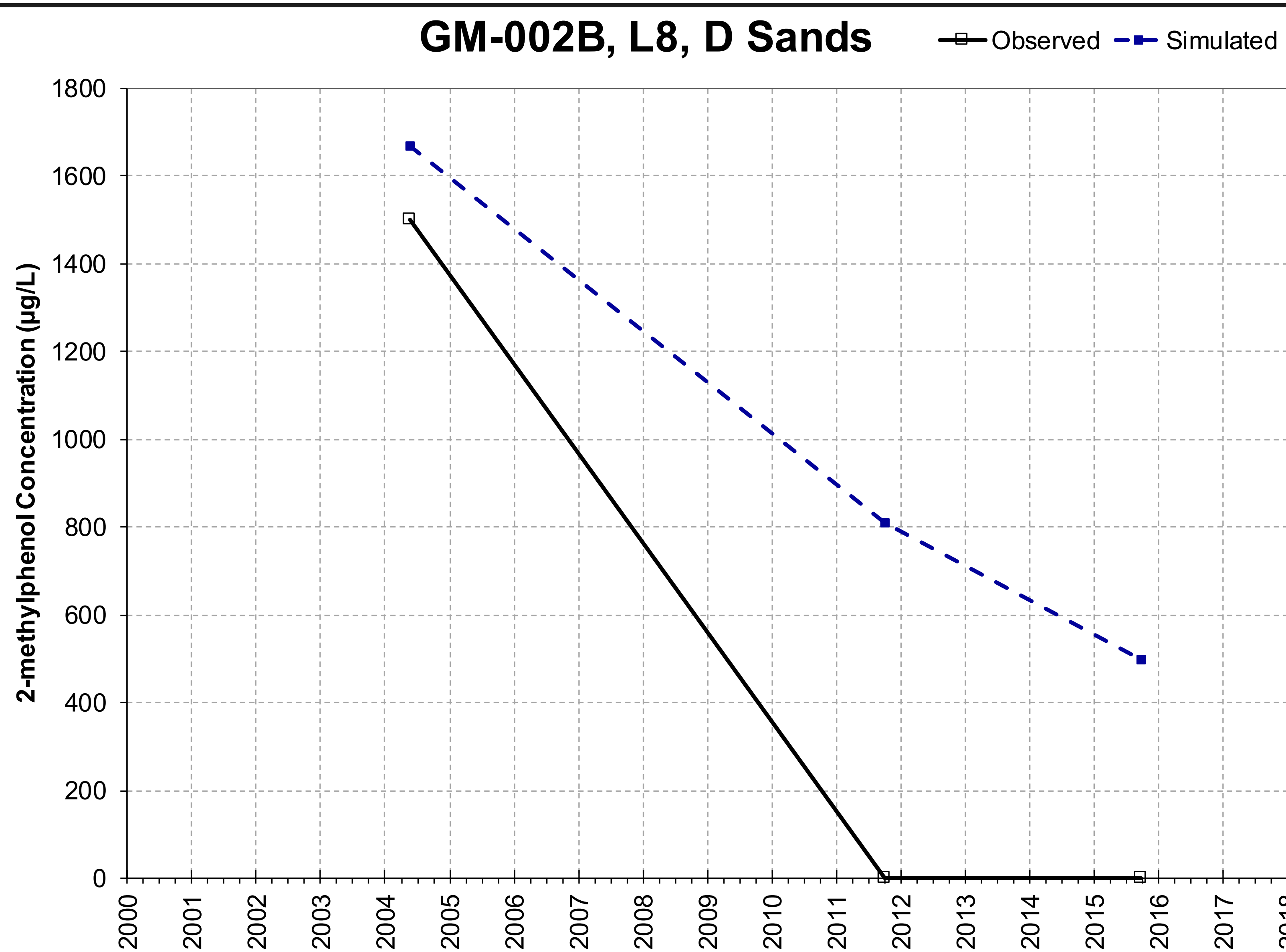


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

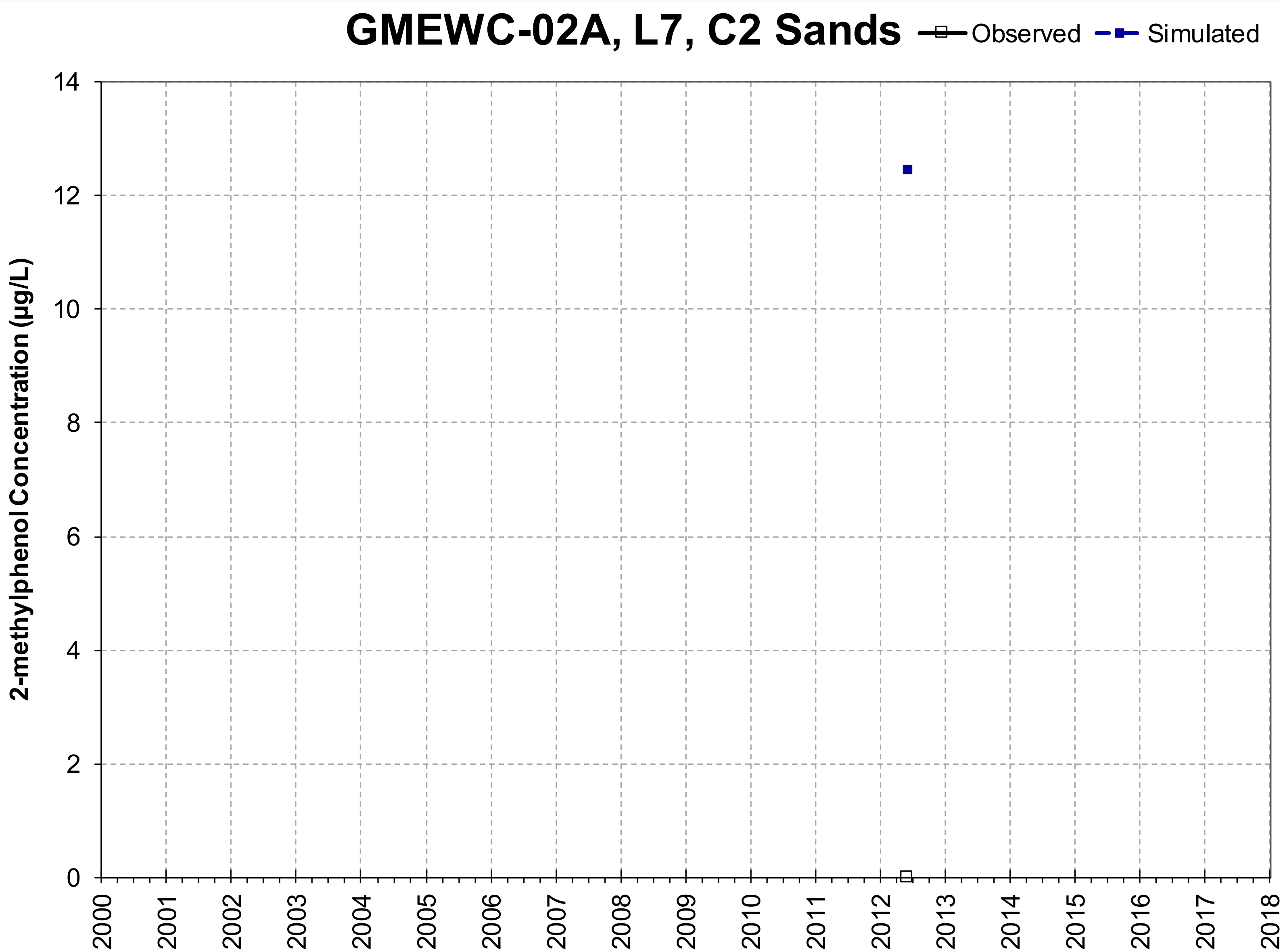


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

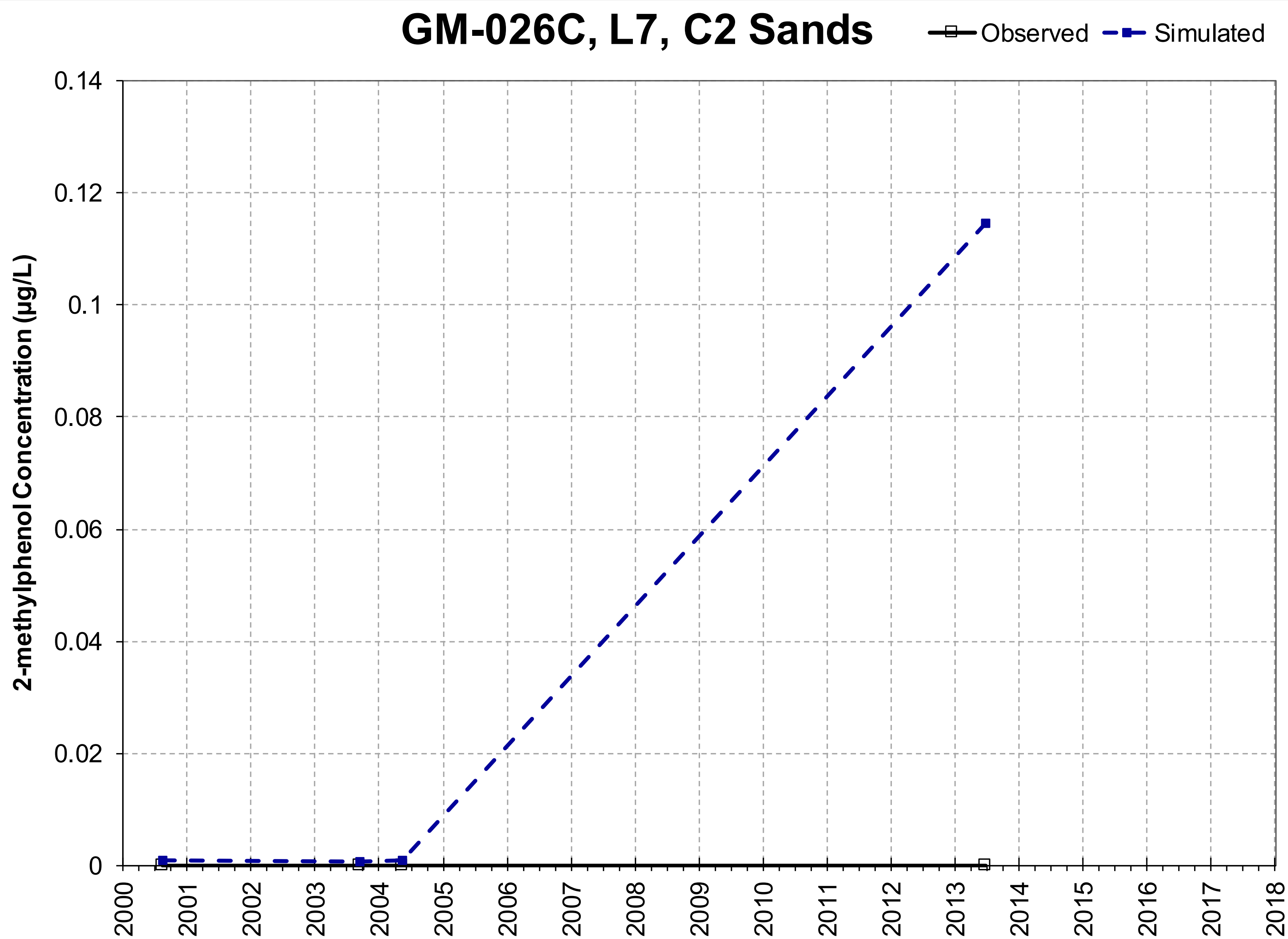


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

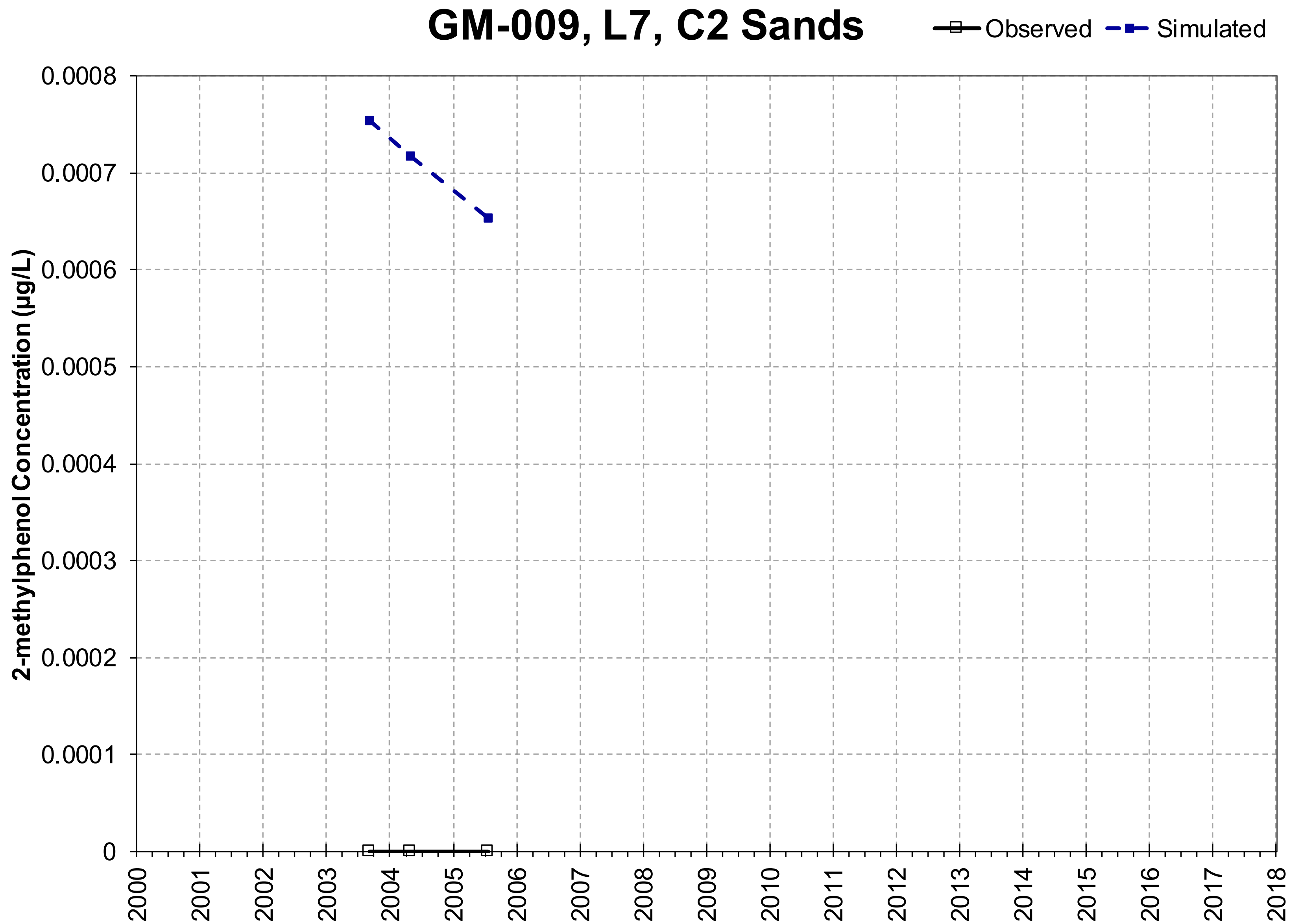


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

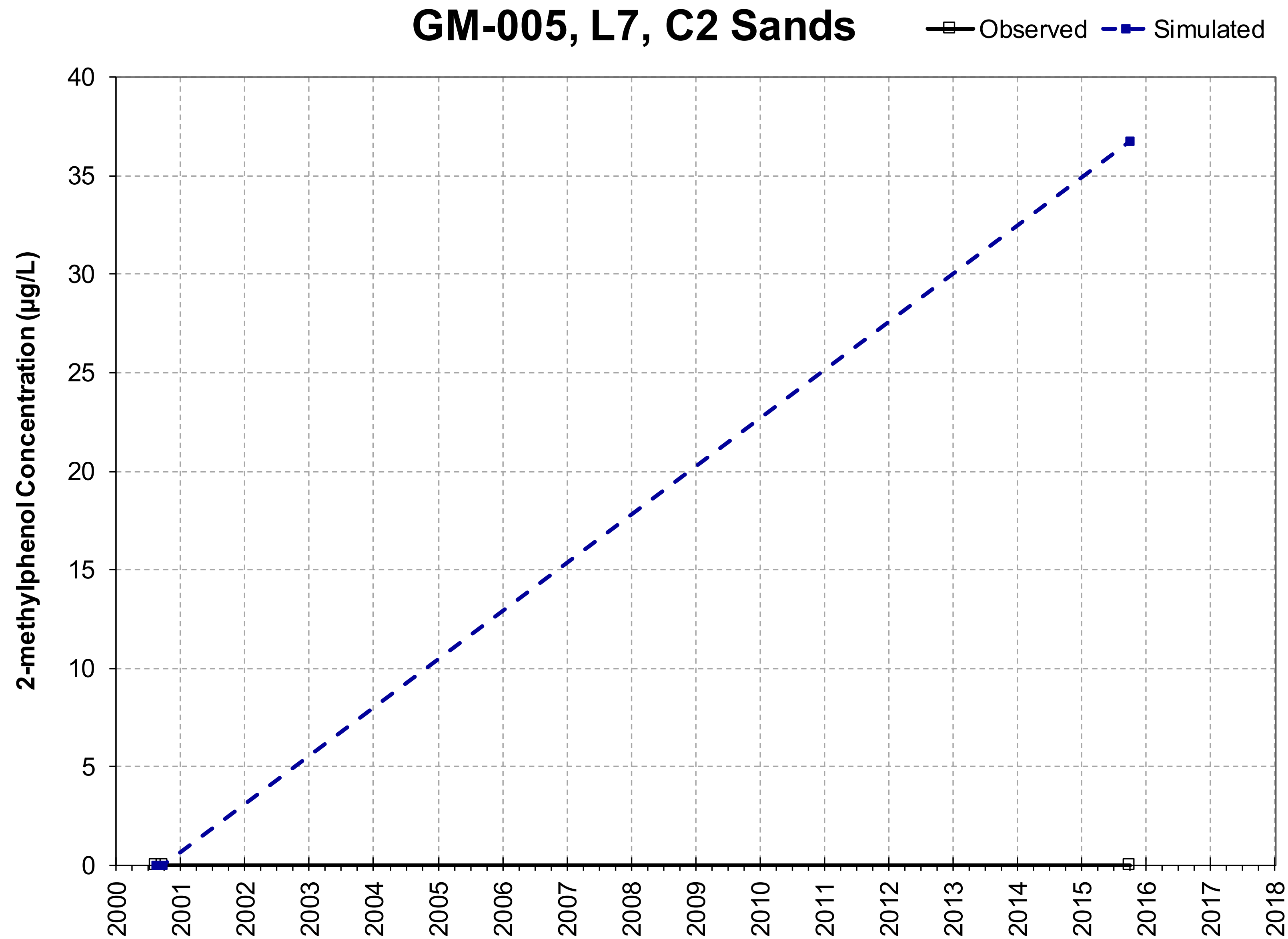


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

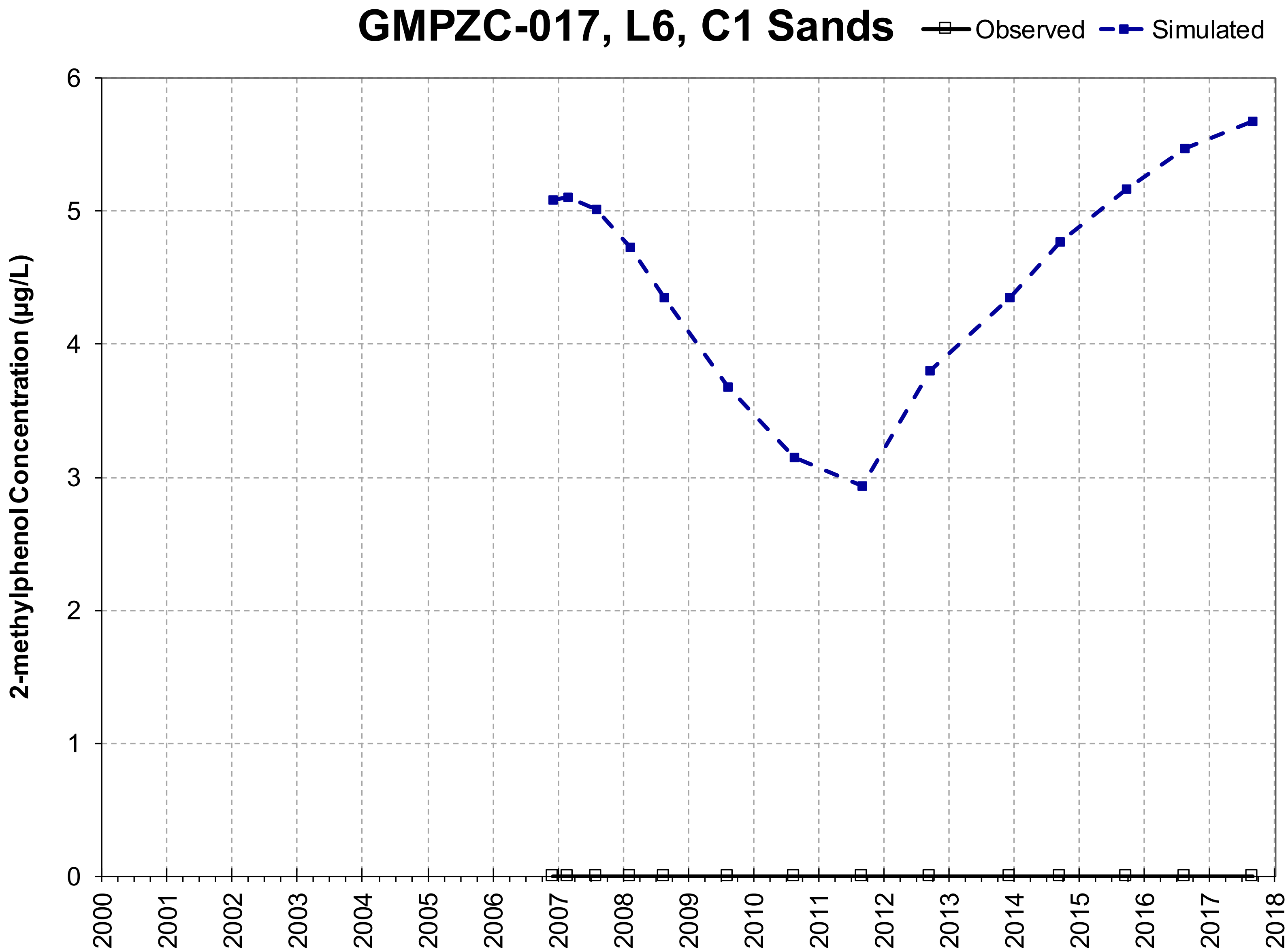


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

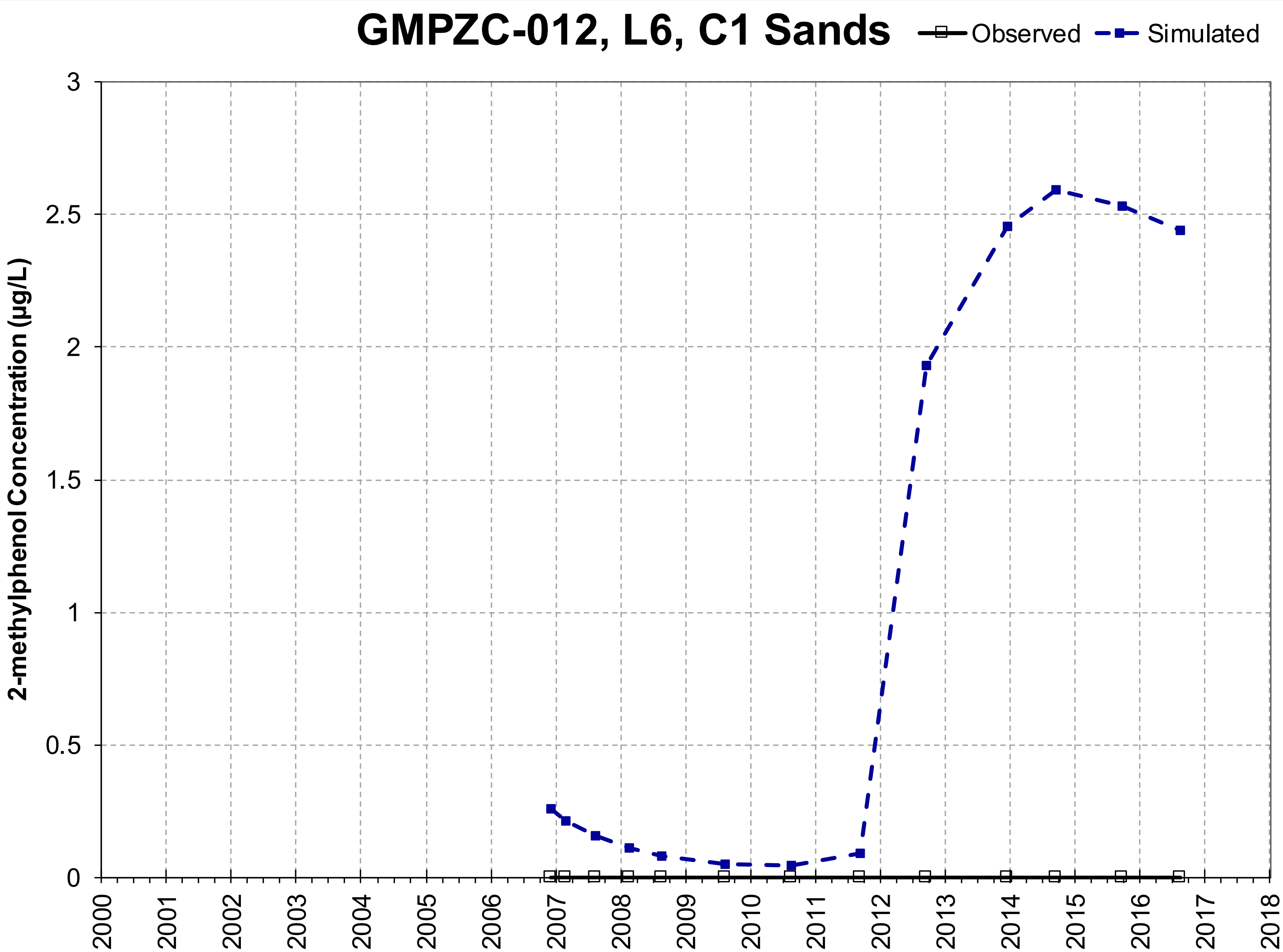


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

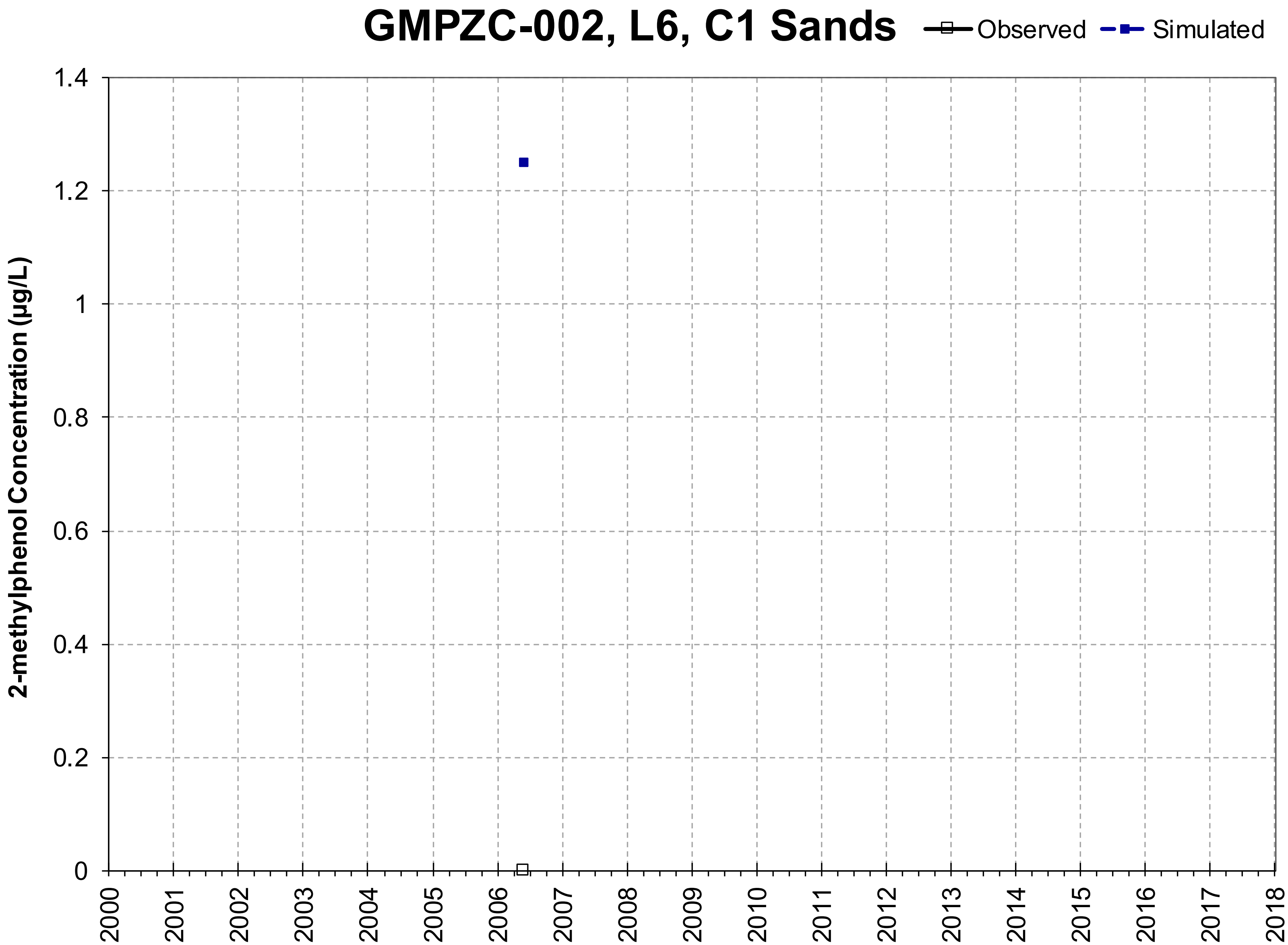


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

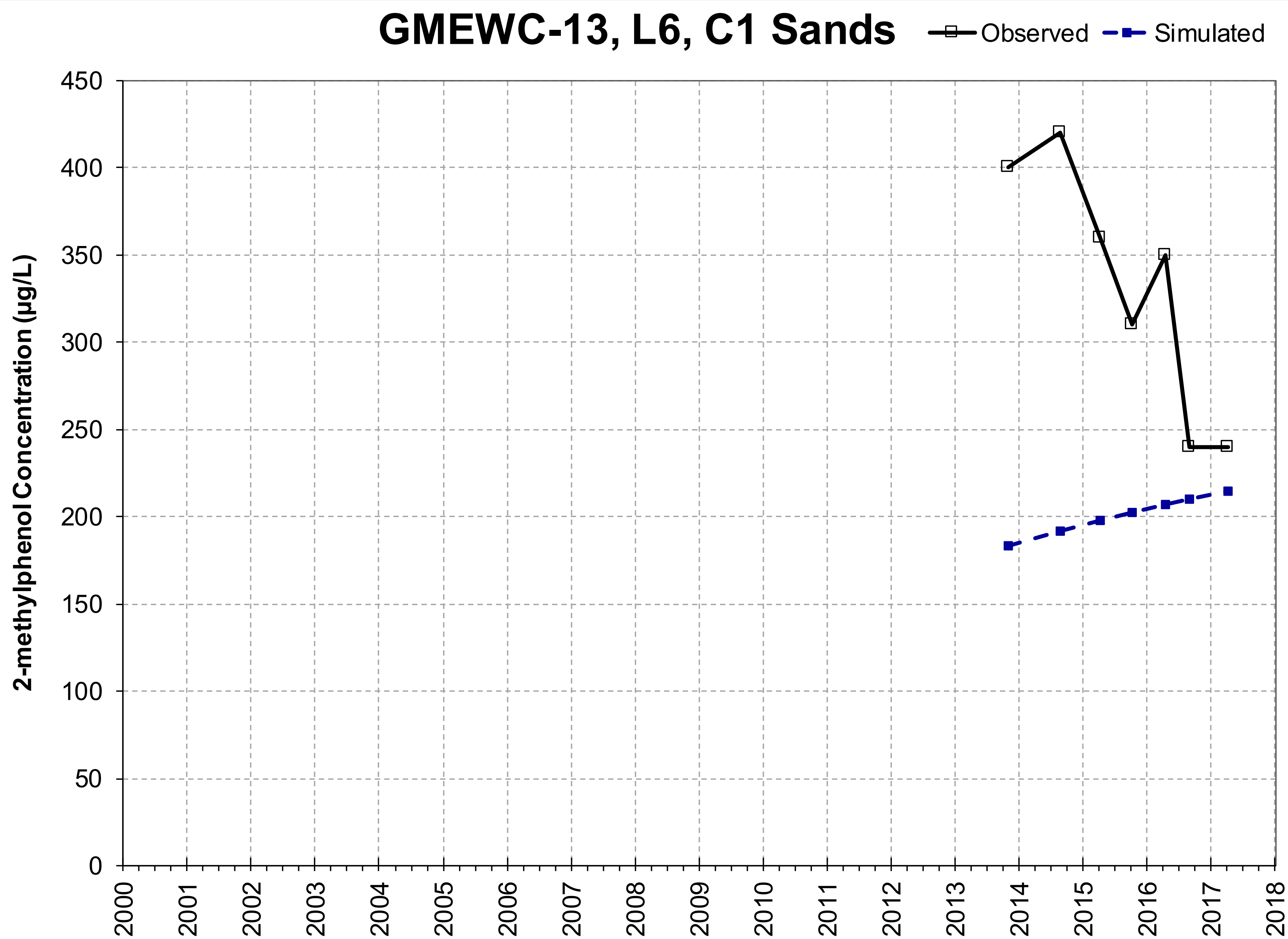


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

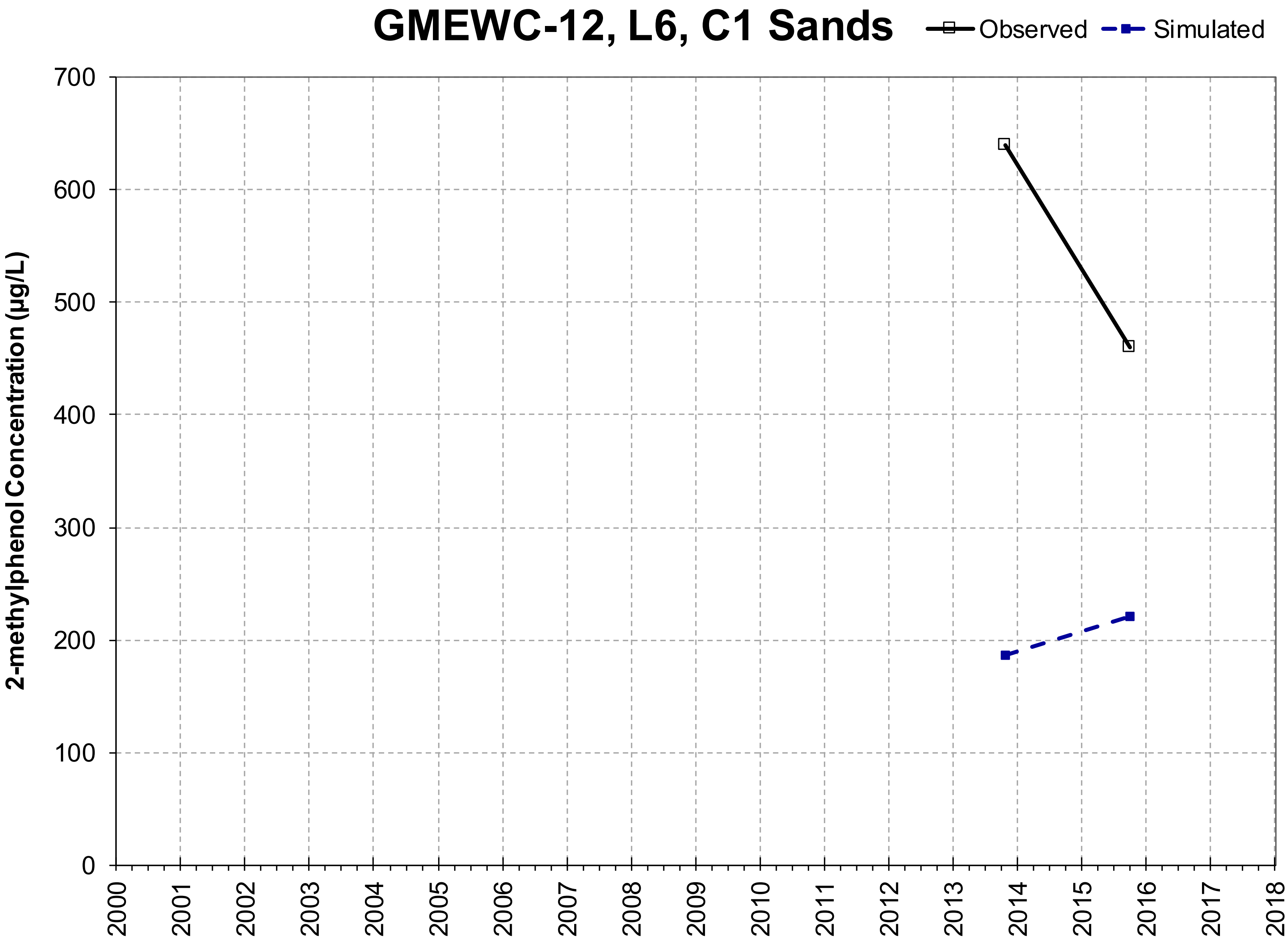


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

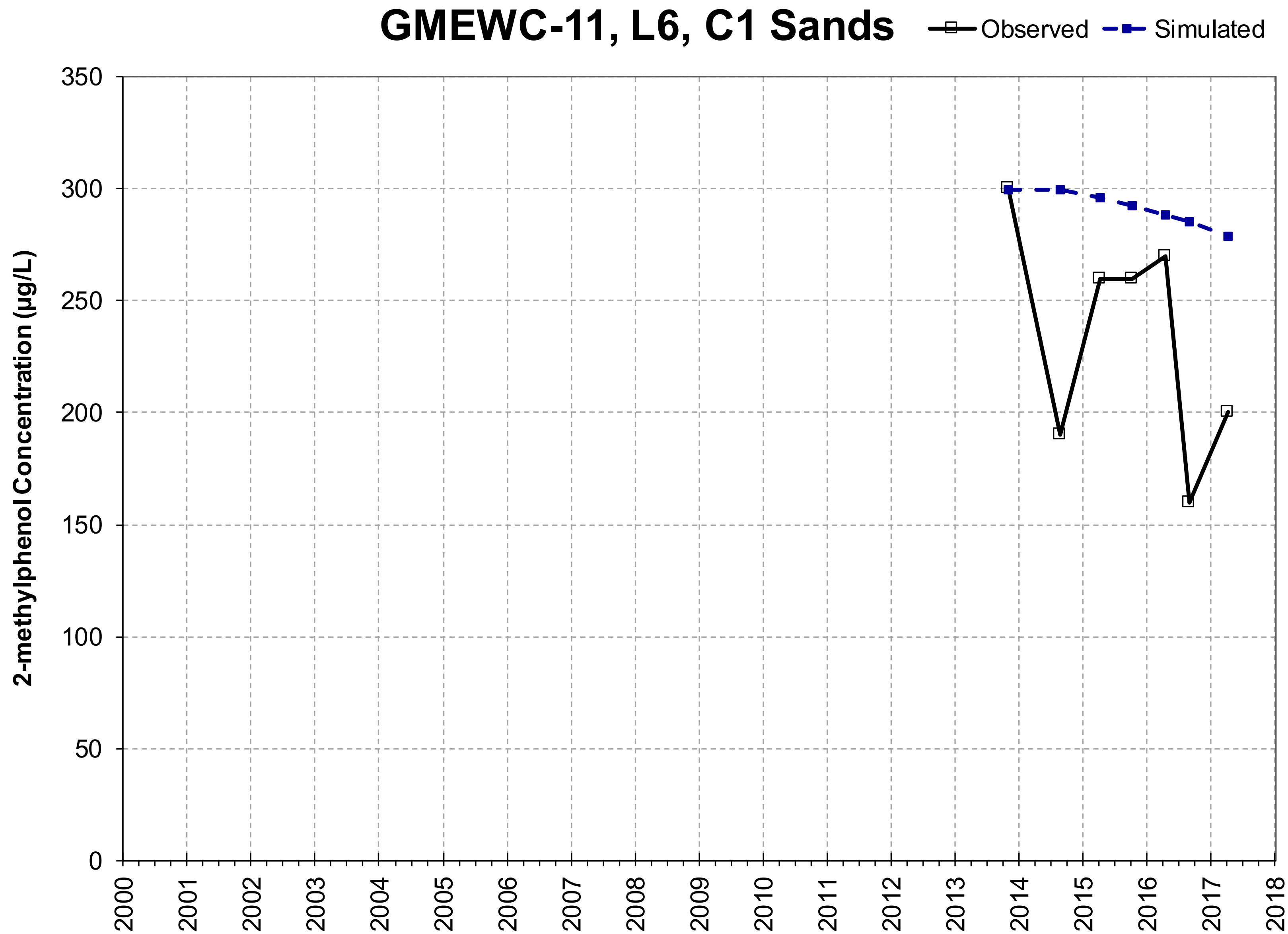


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

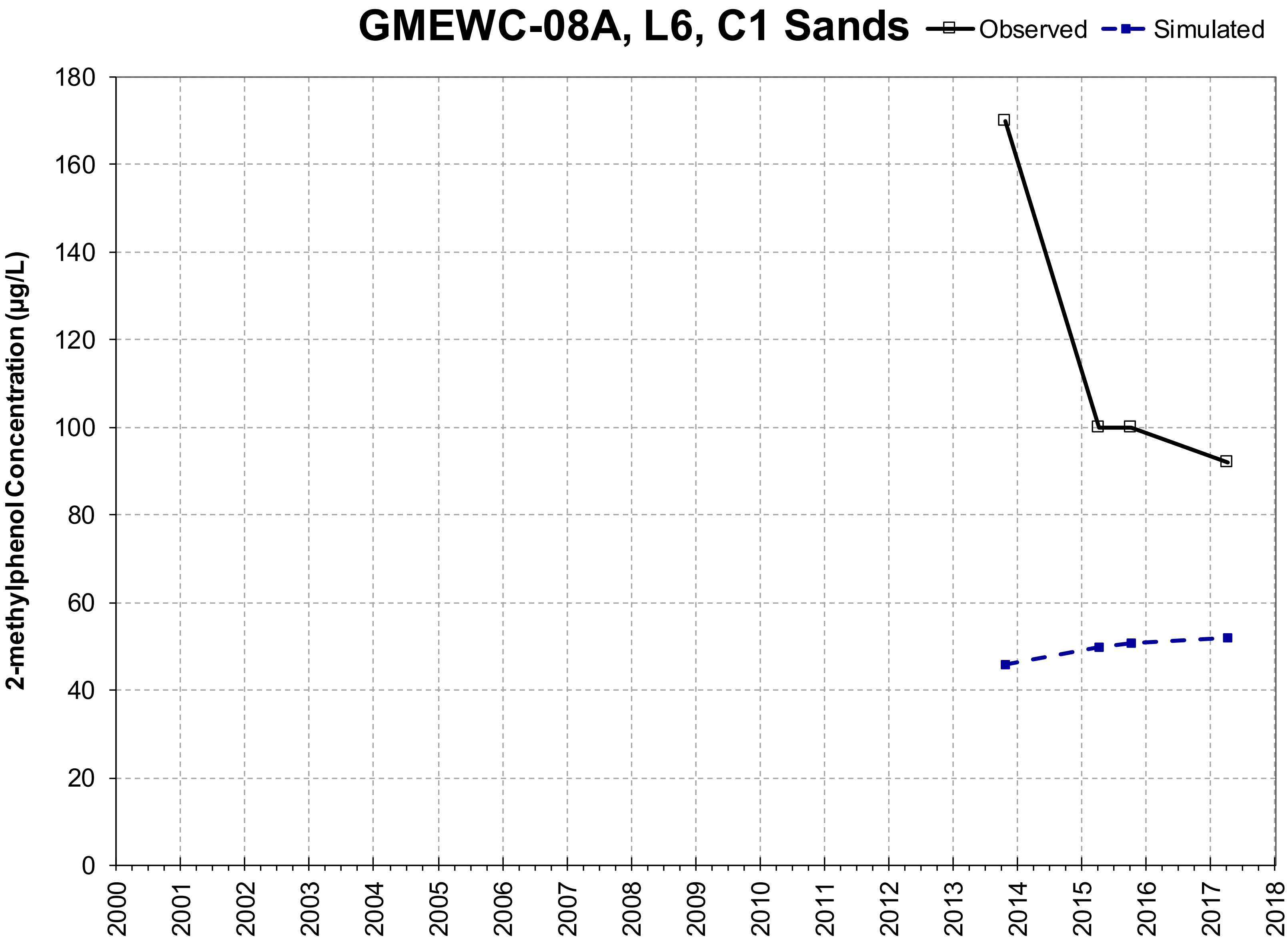


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

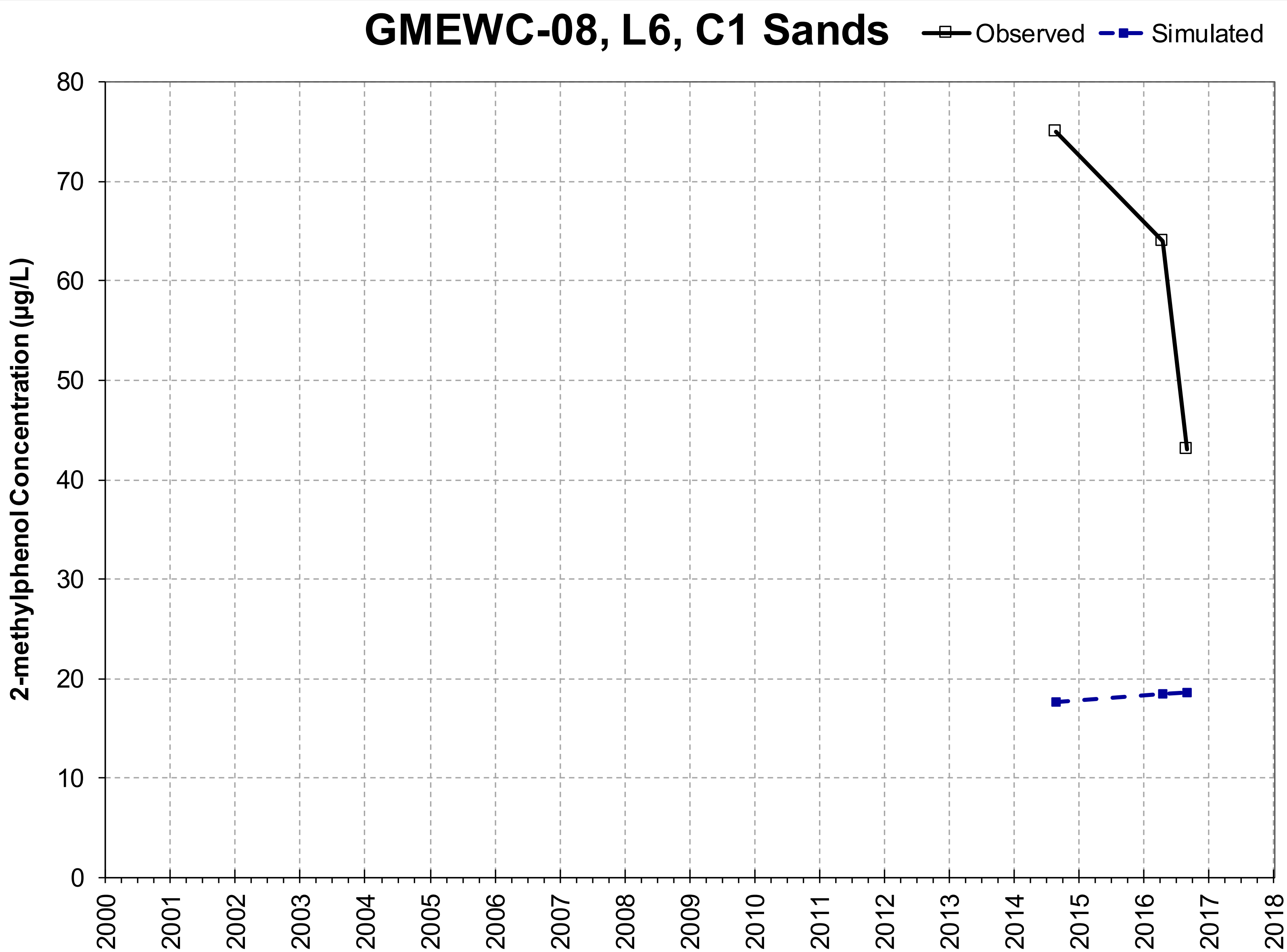


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

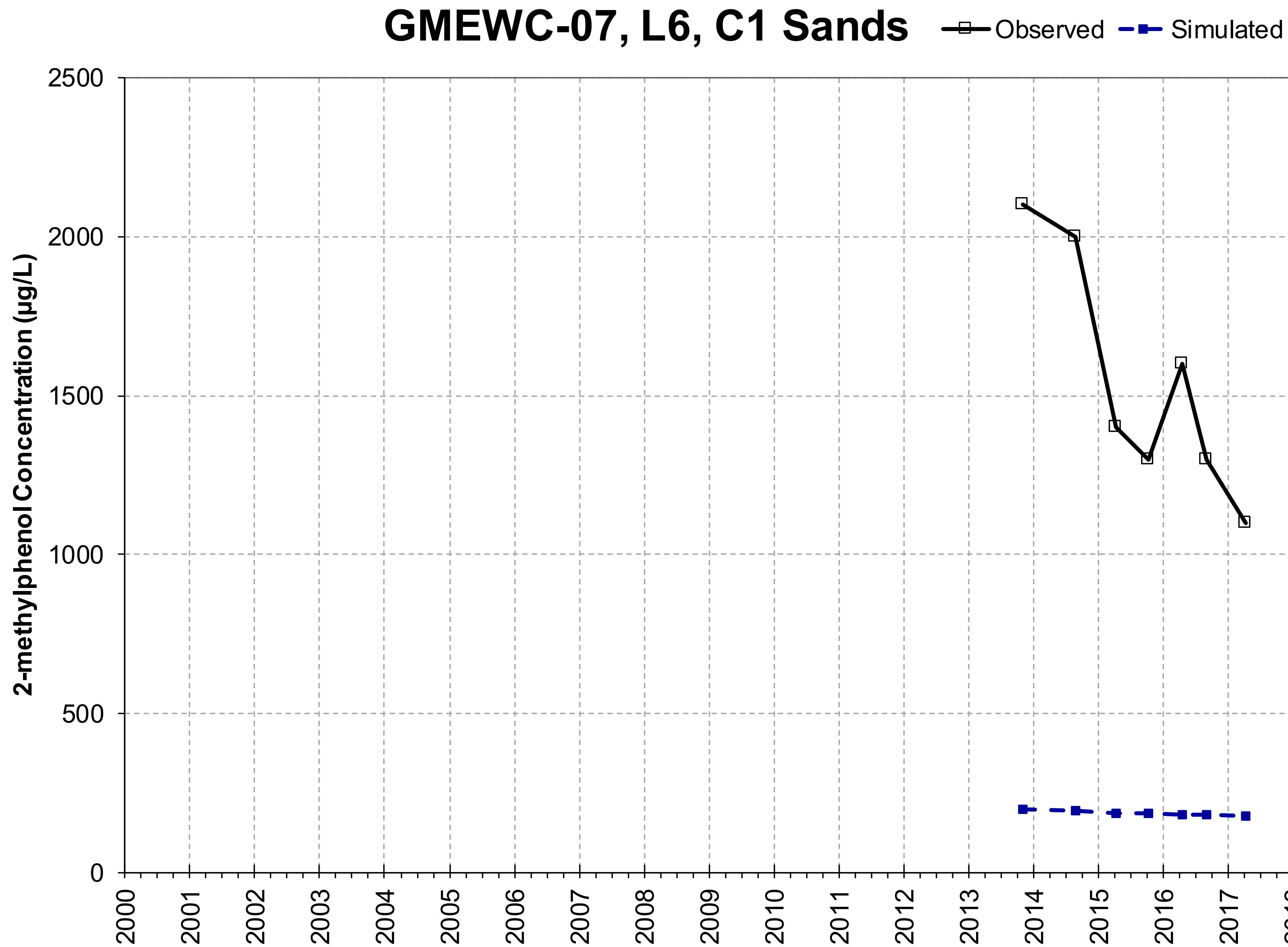


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

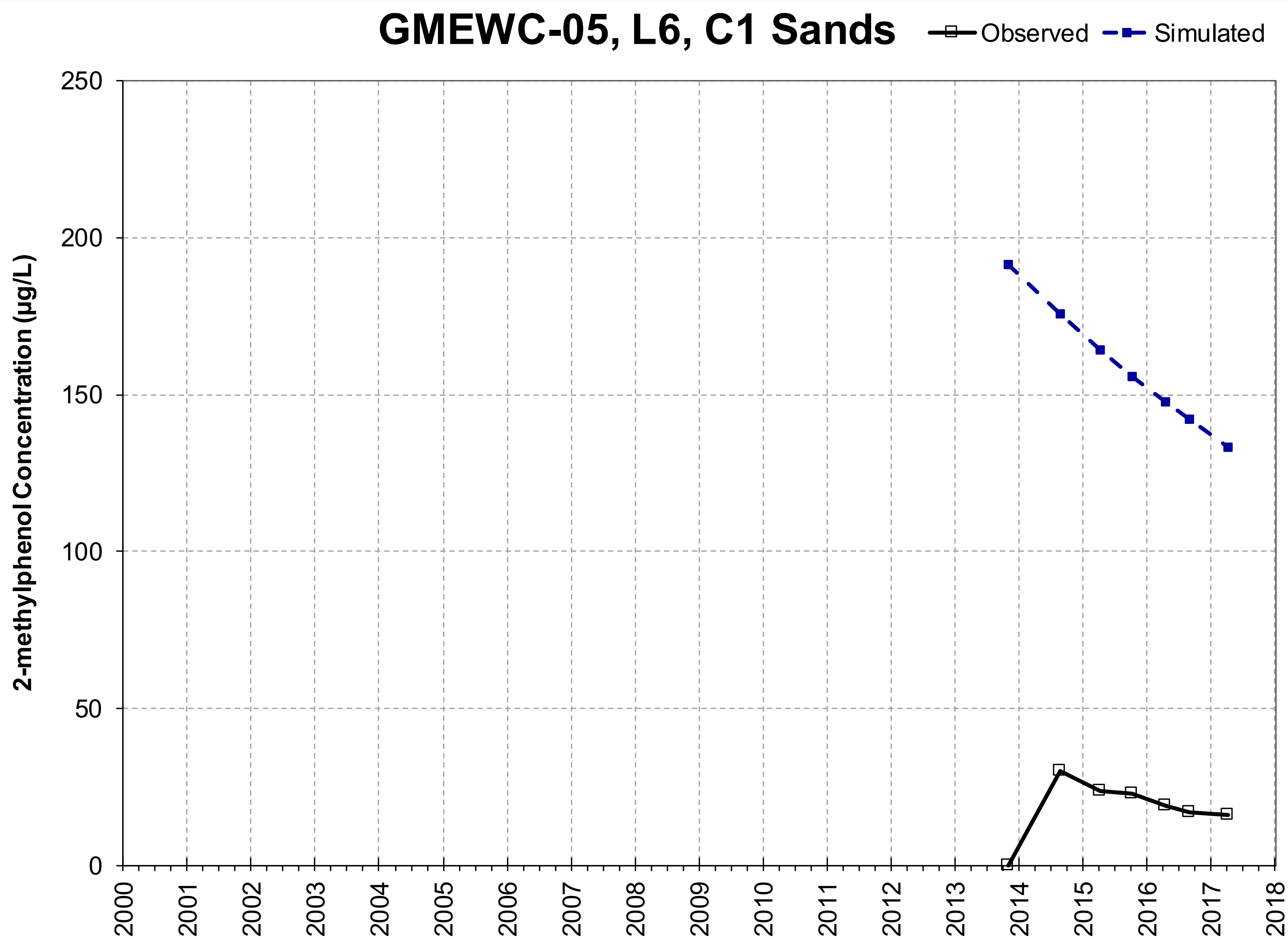


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

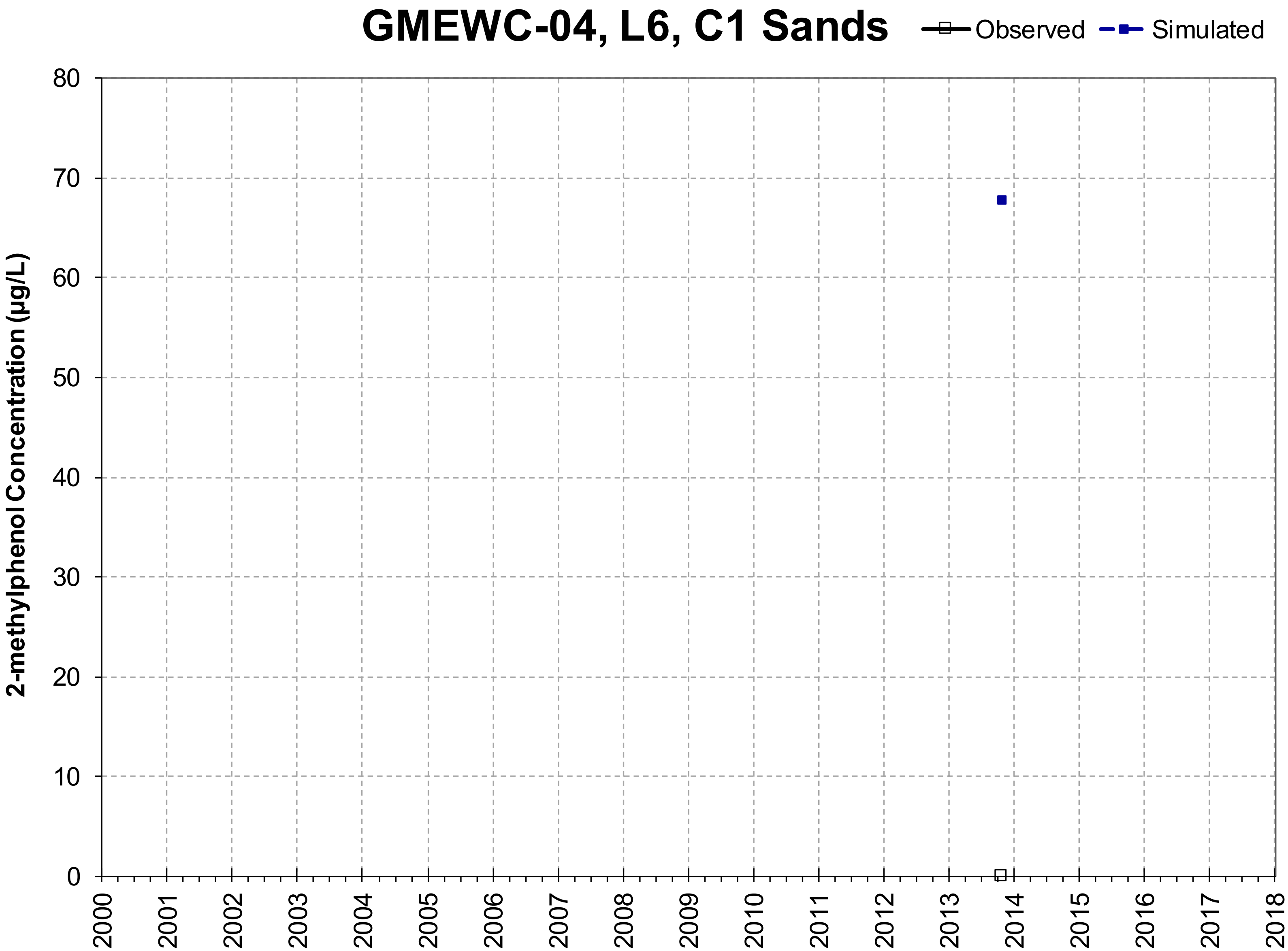


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

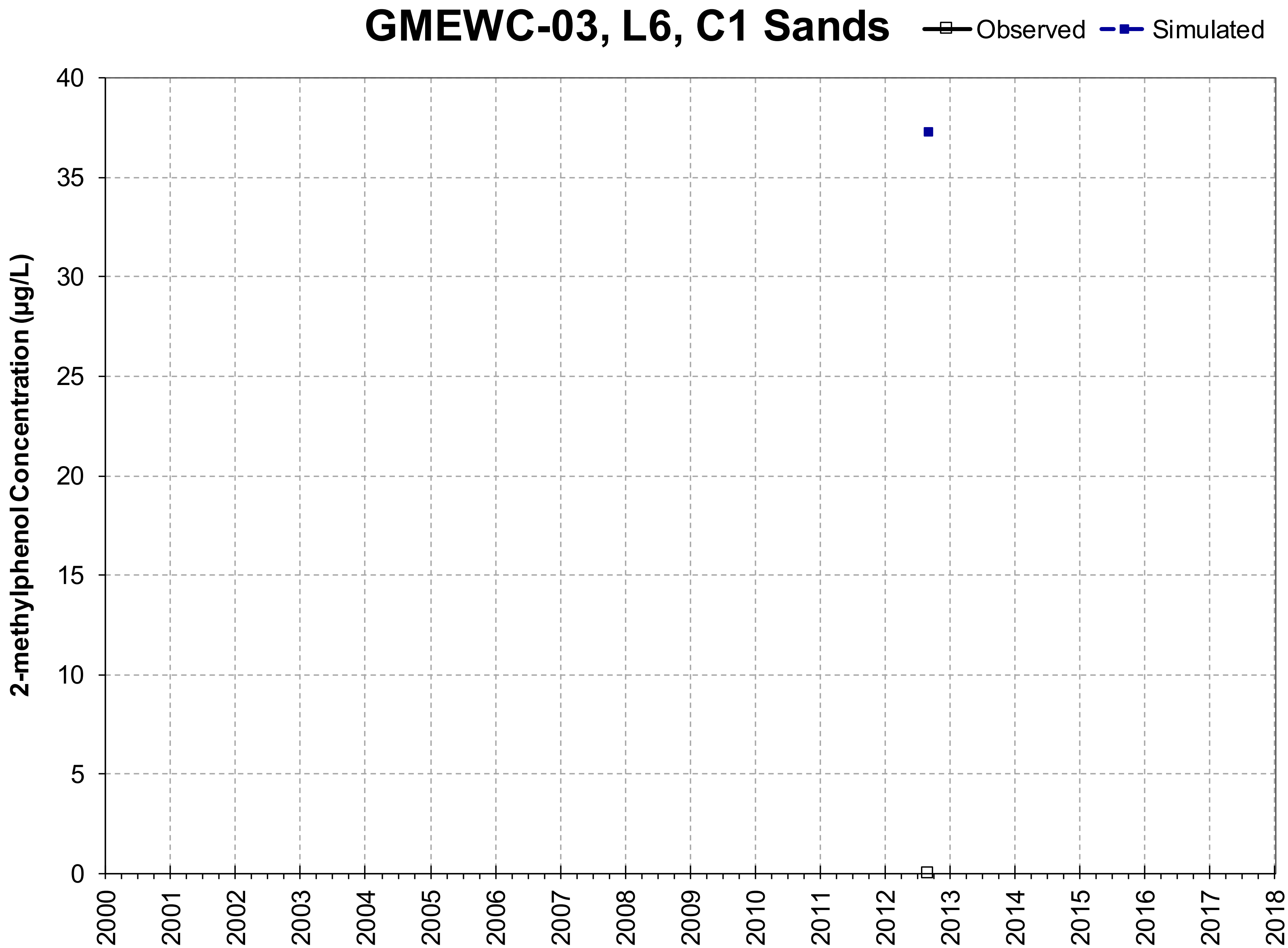


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

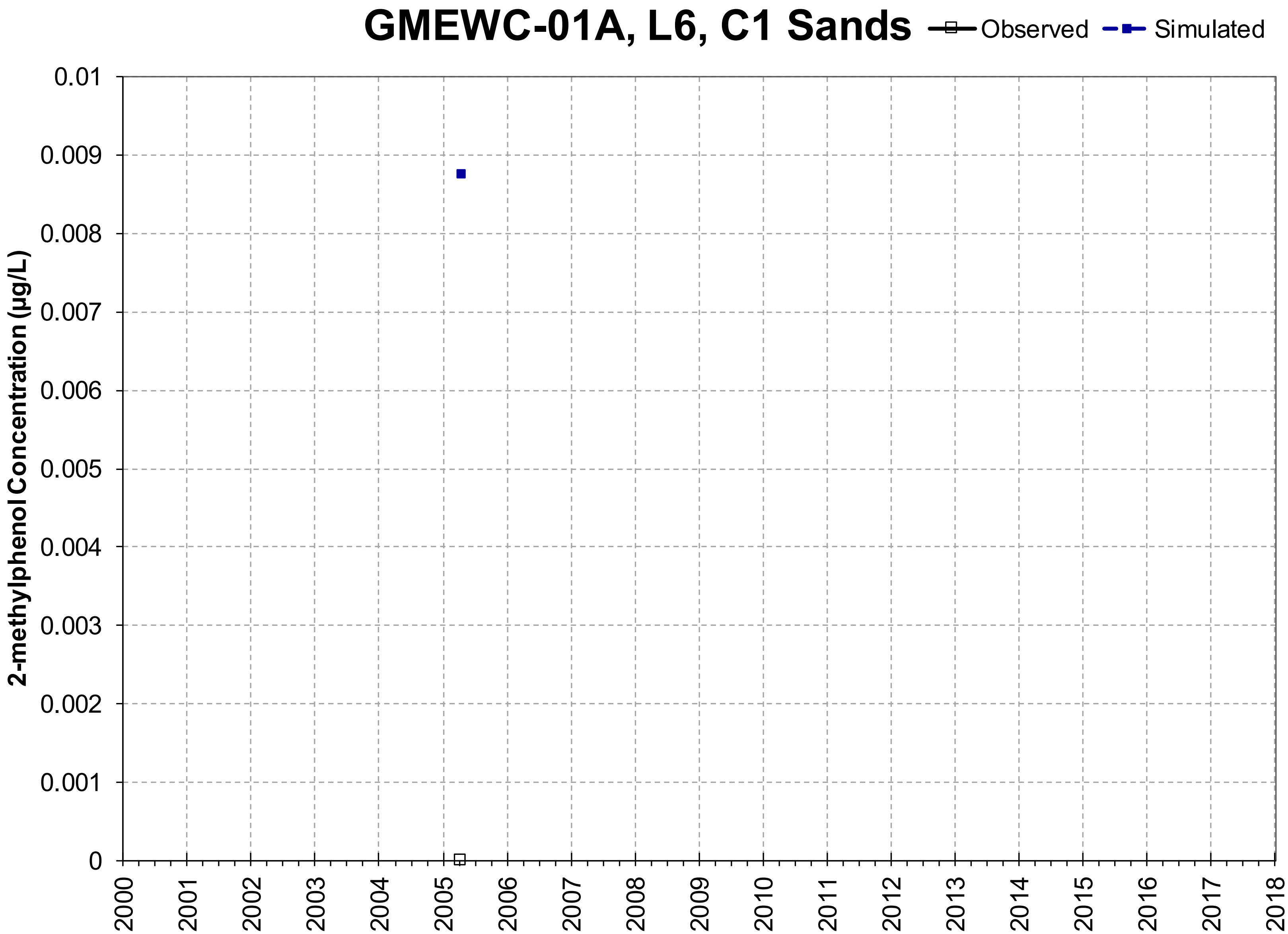


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

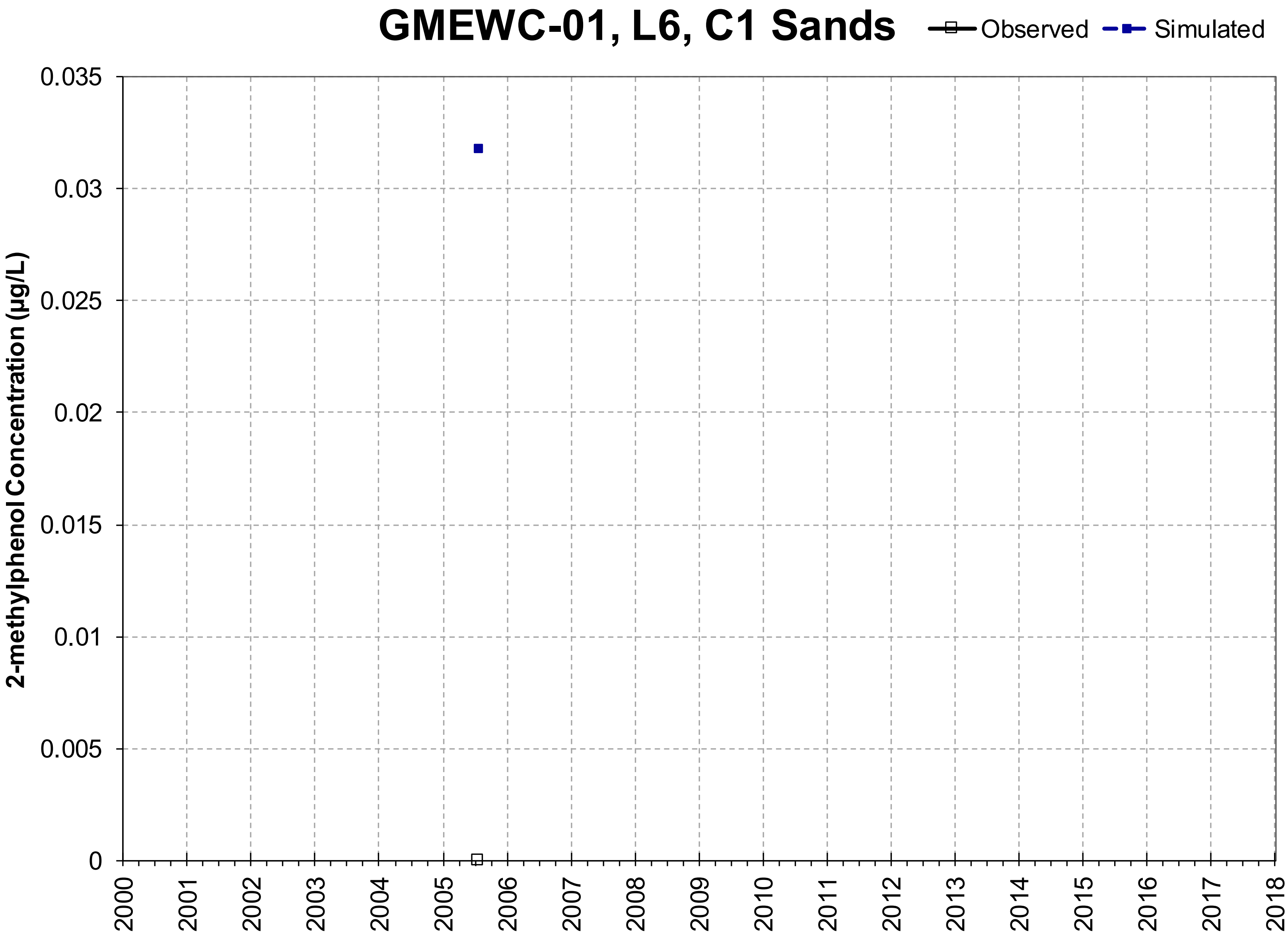


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

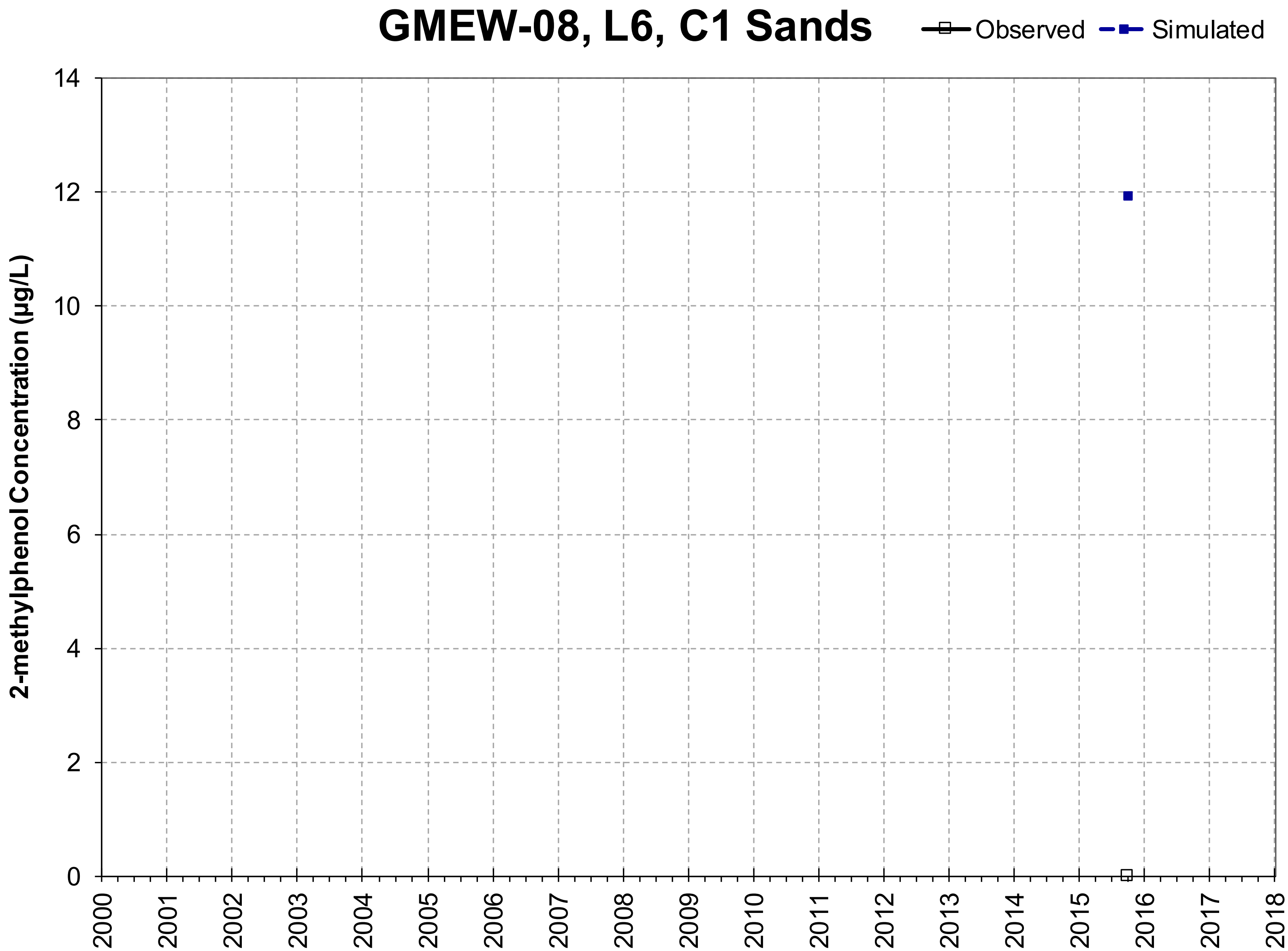


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

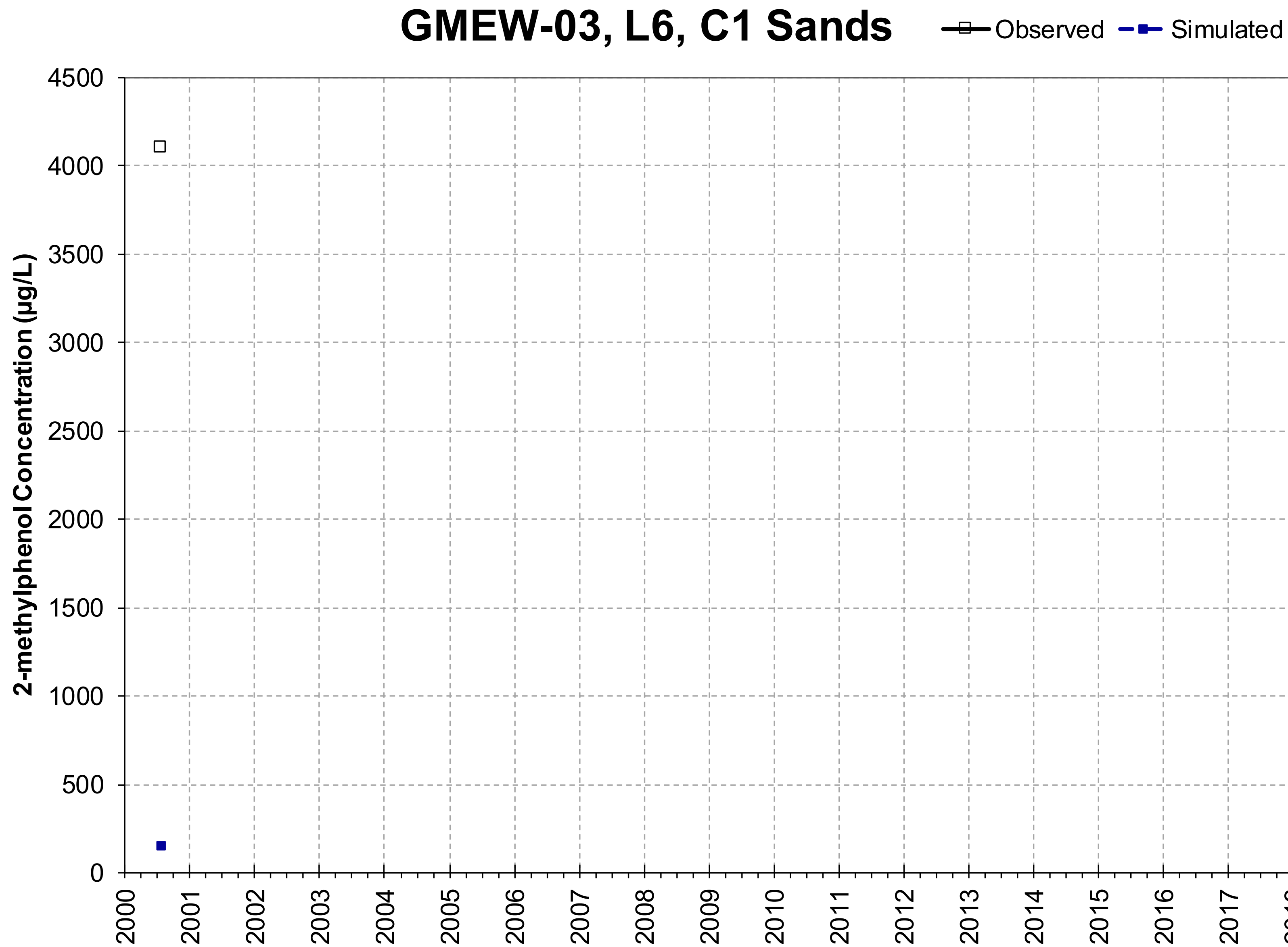


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

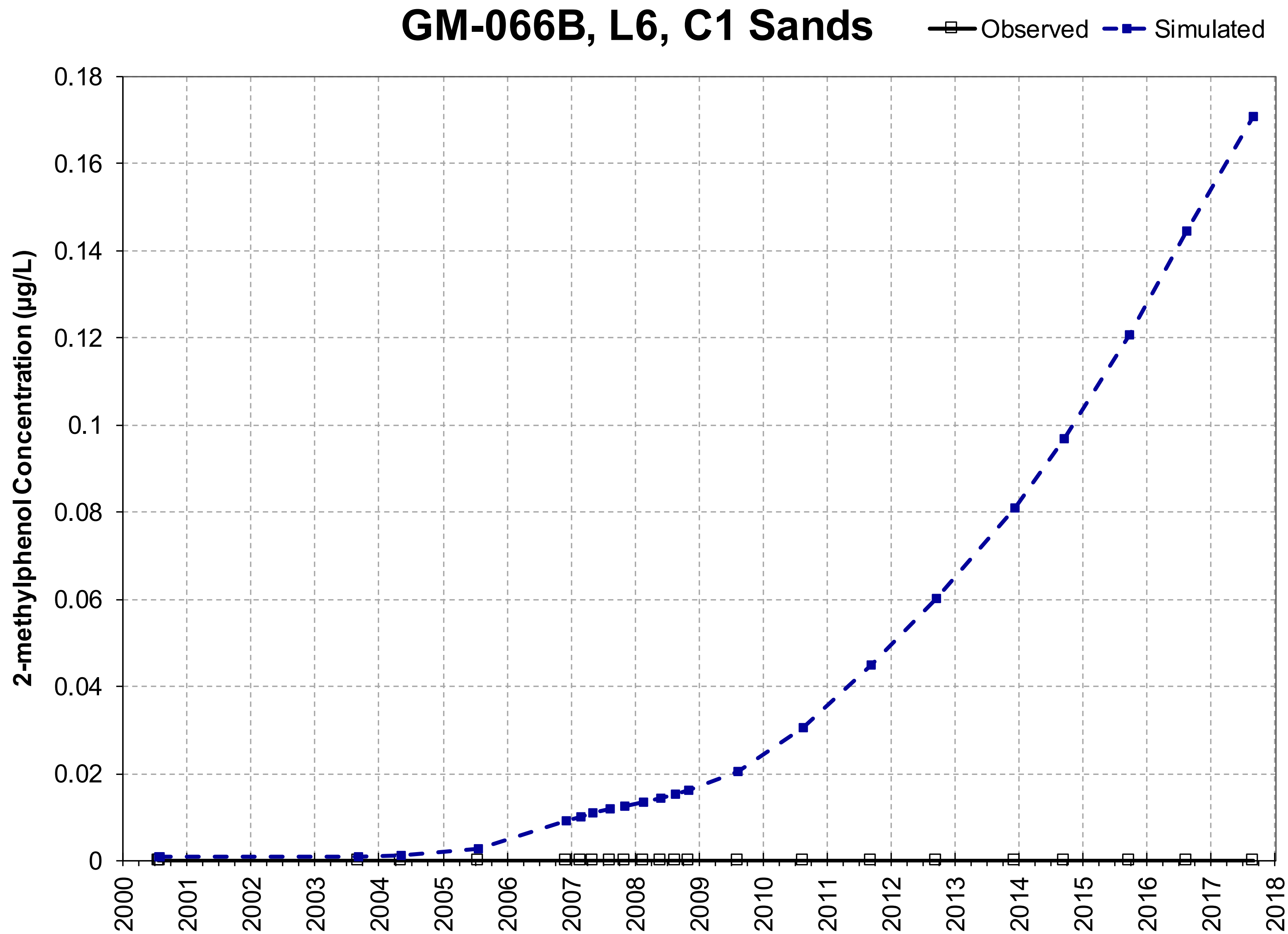


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

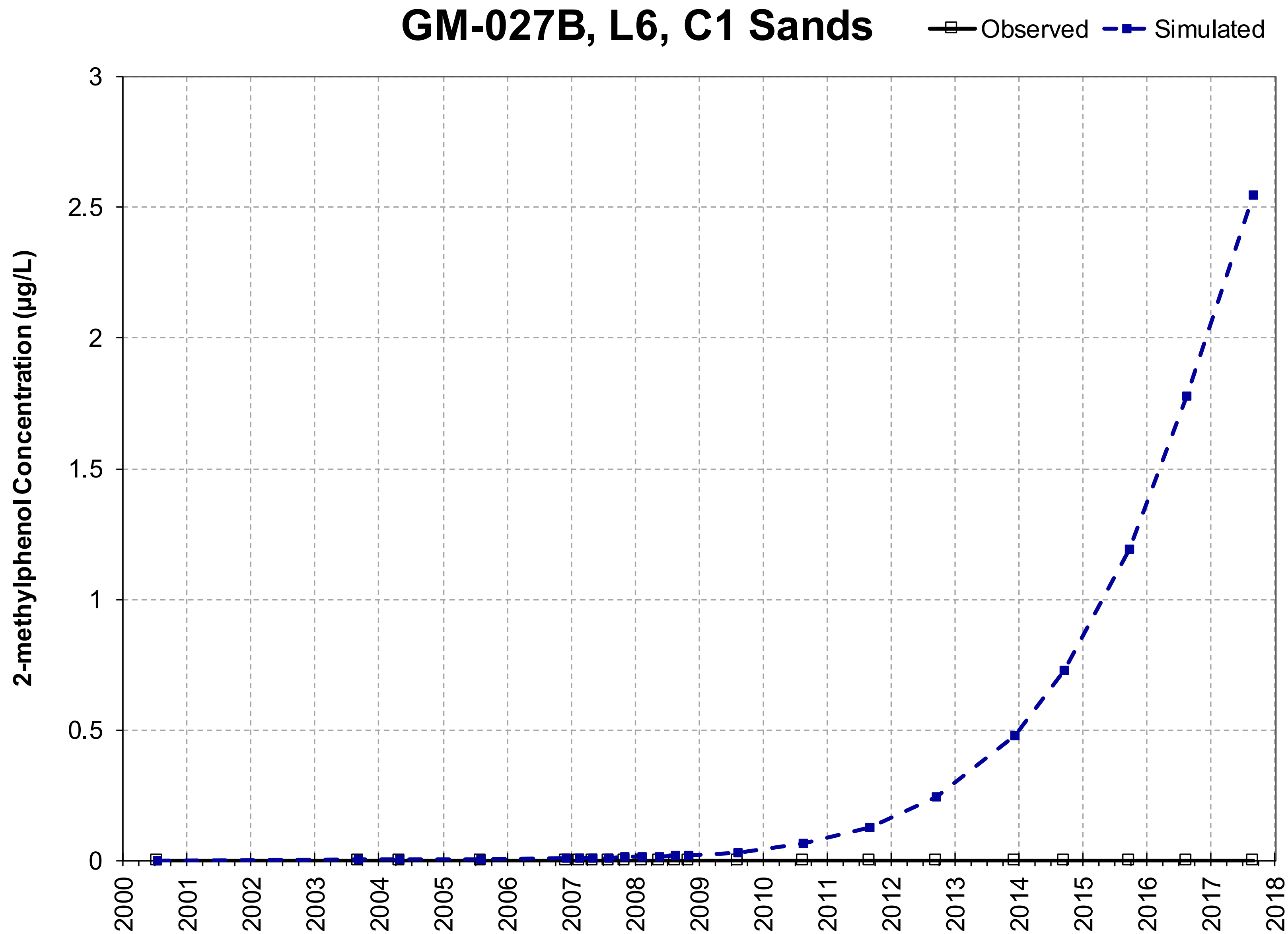


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

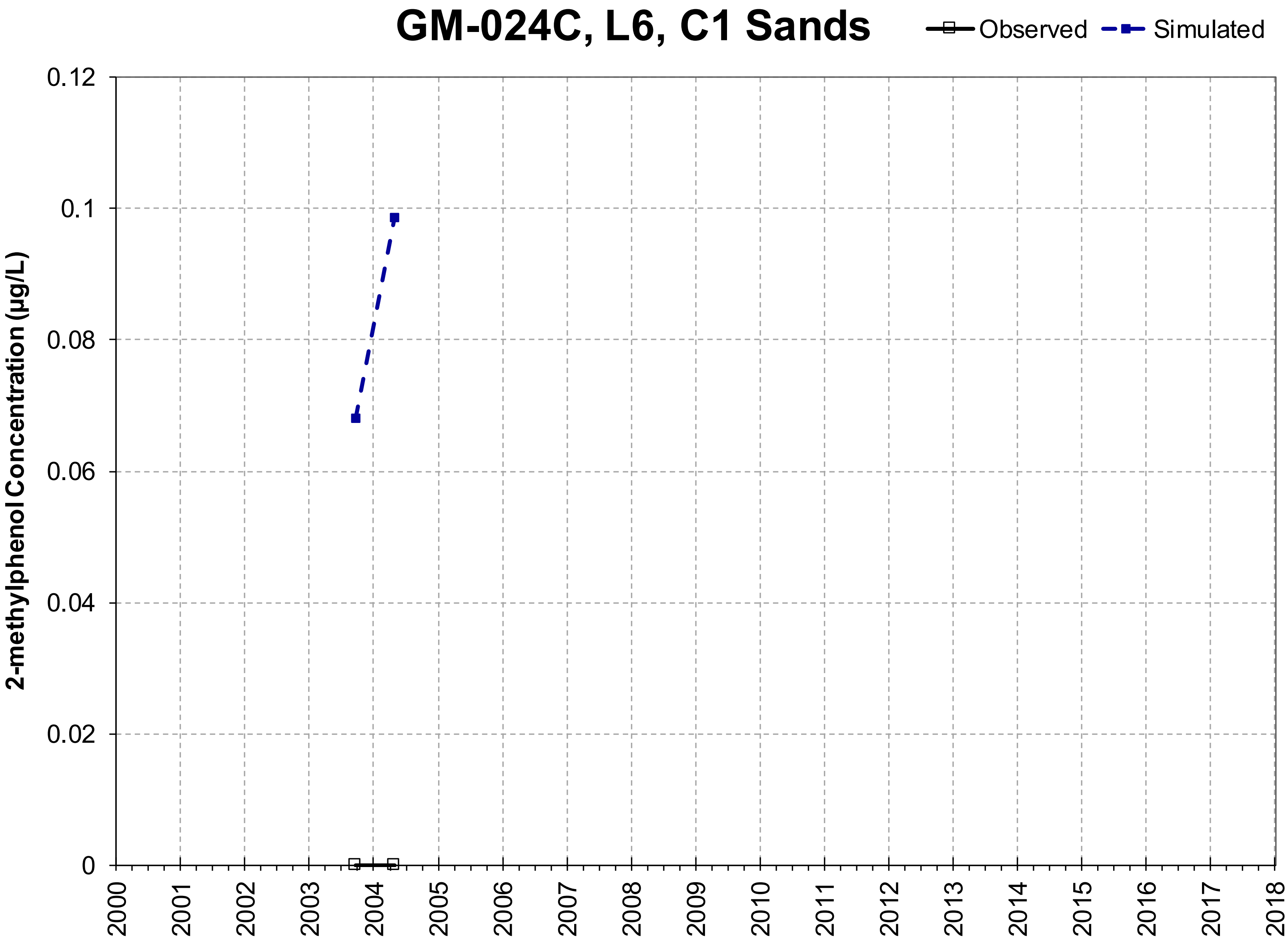


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

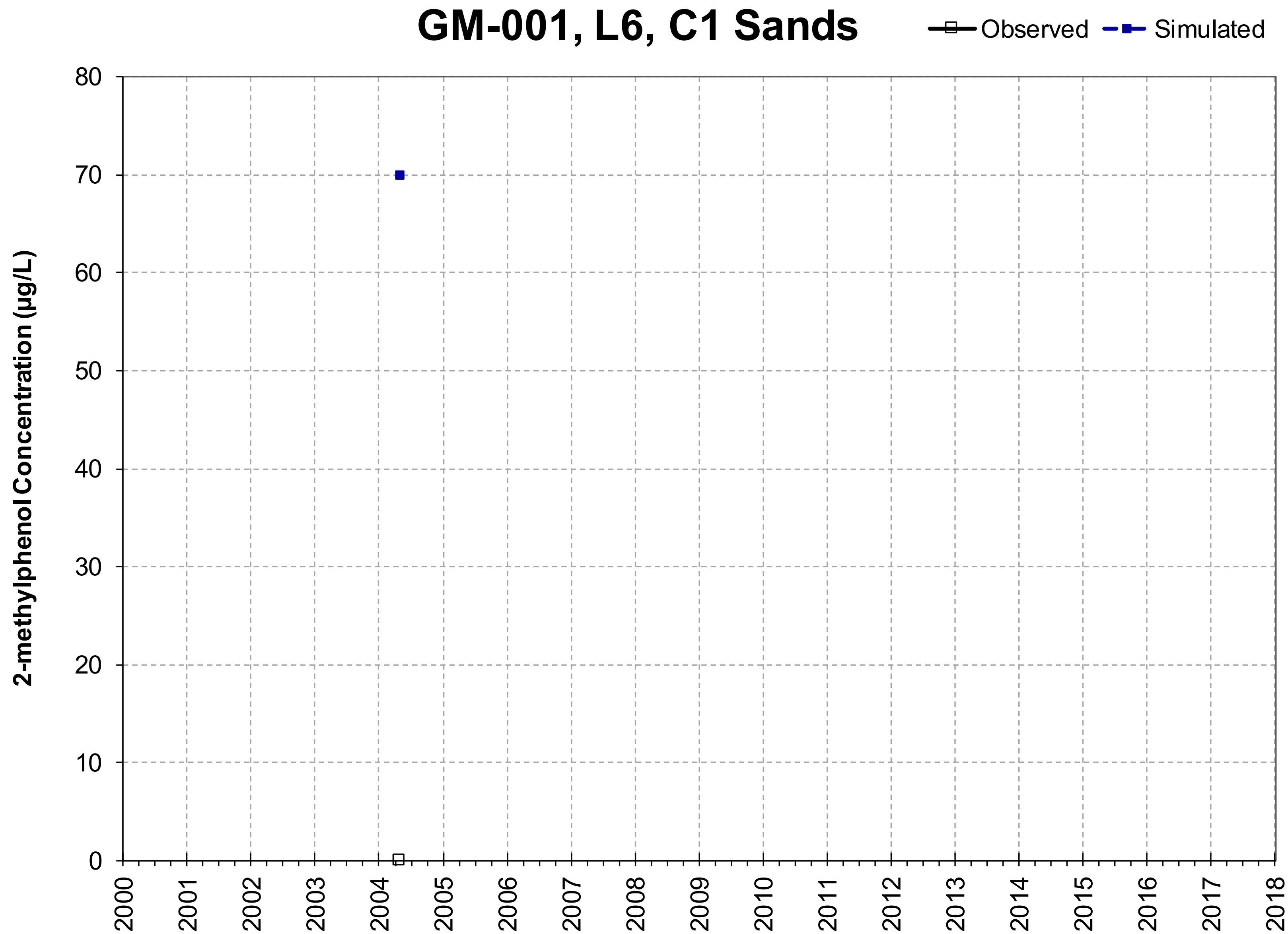


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

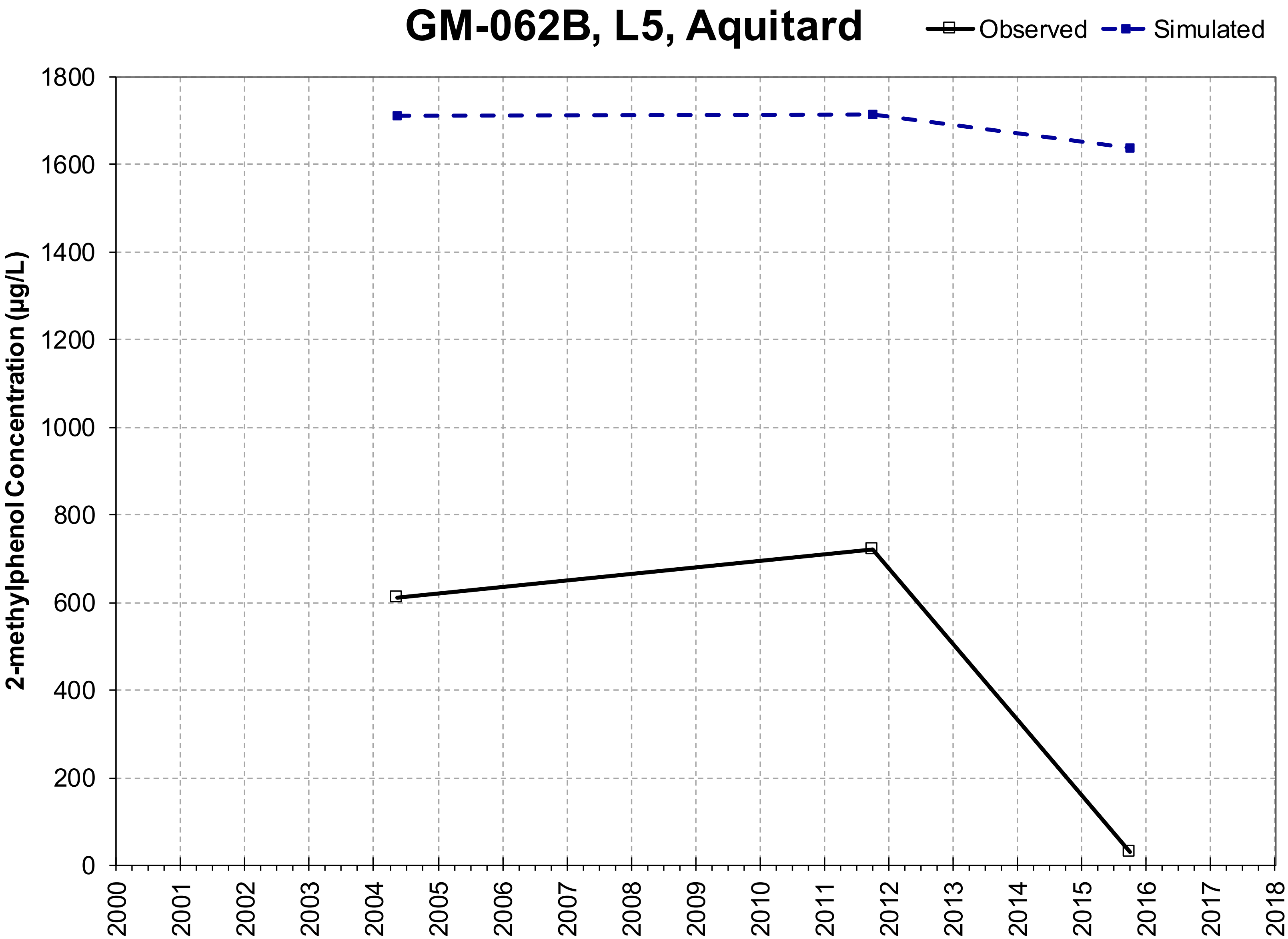


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

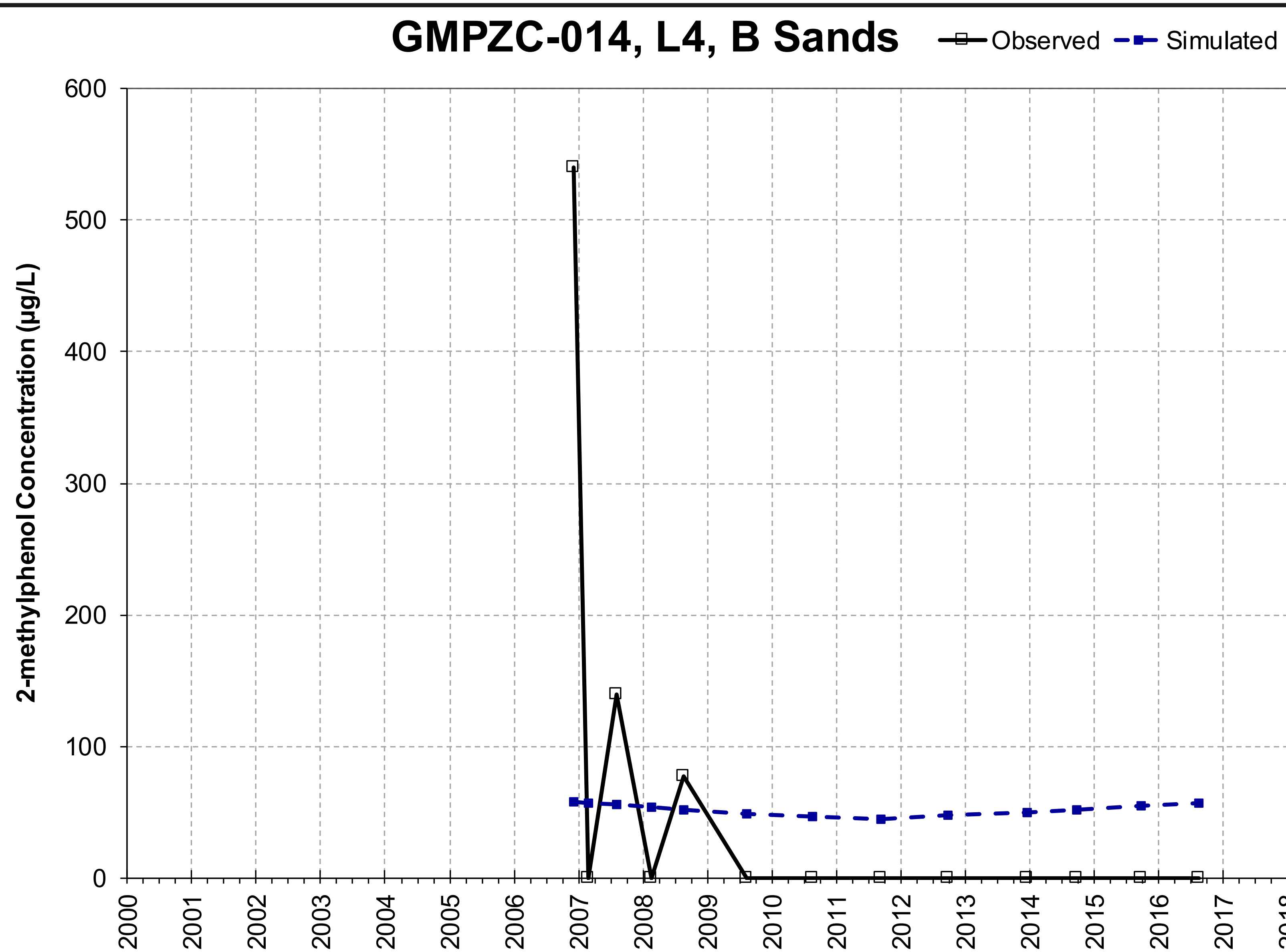


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

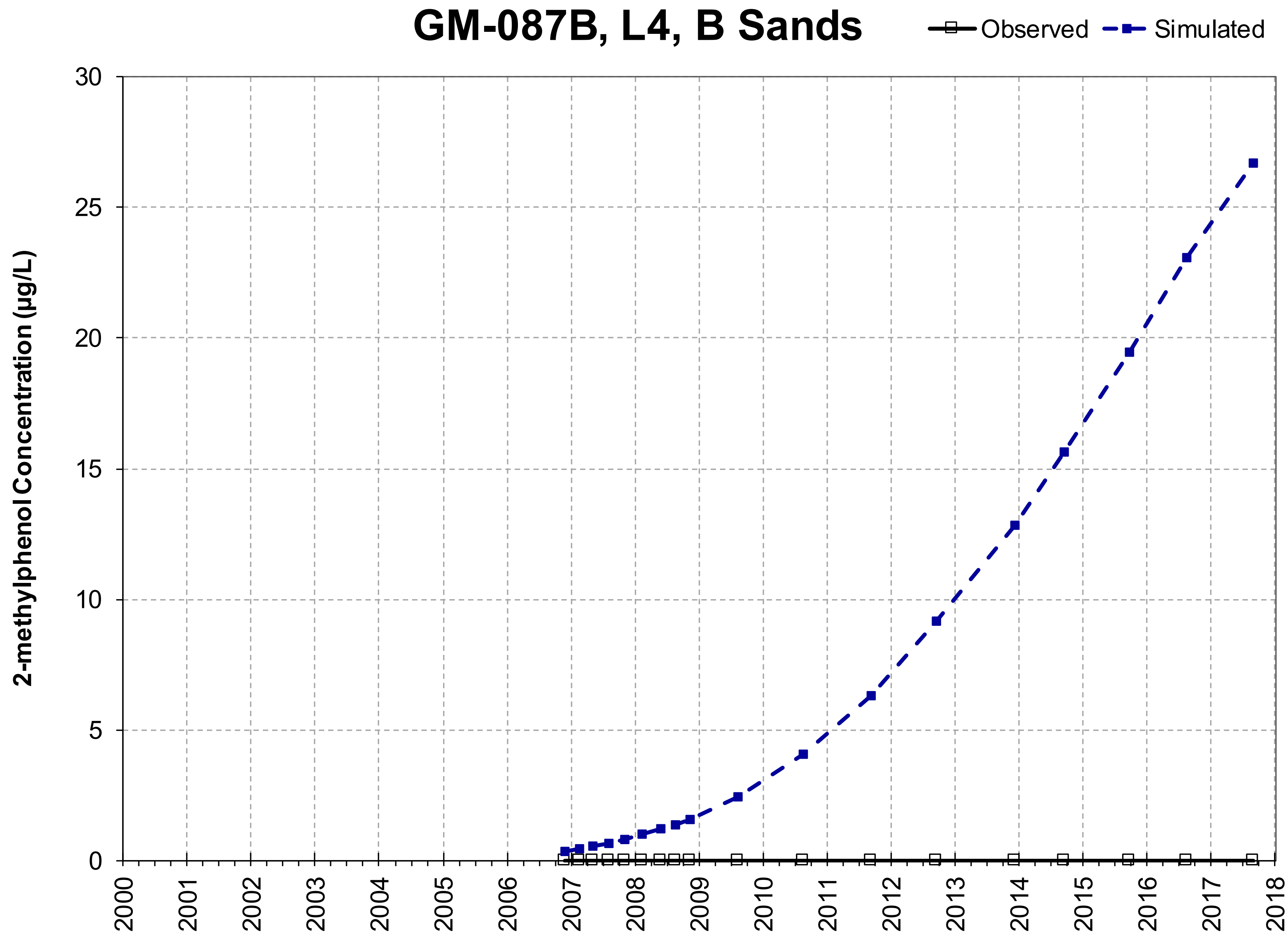


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

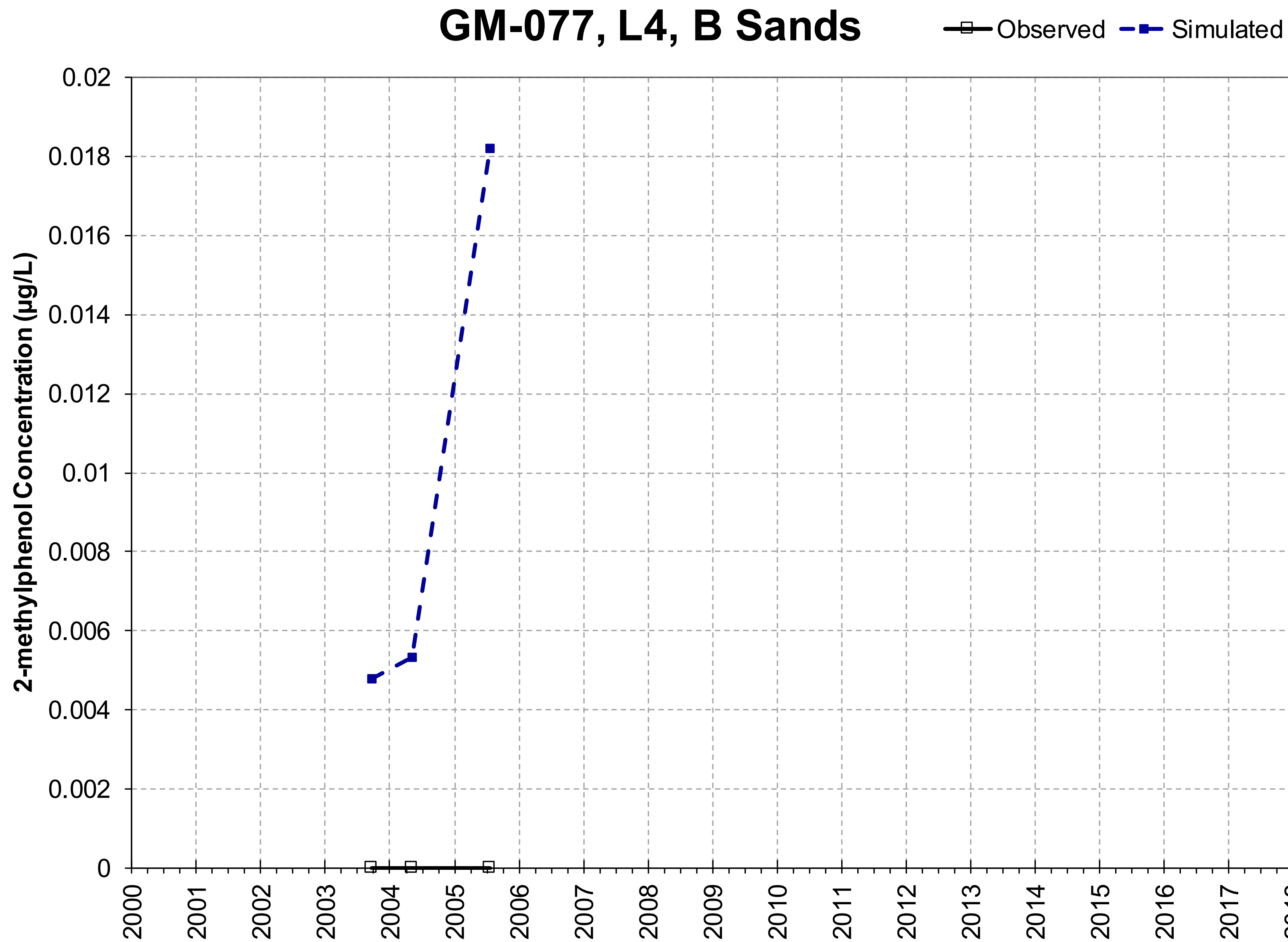


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS

FIGURE
B

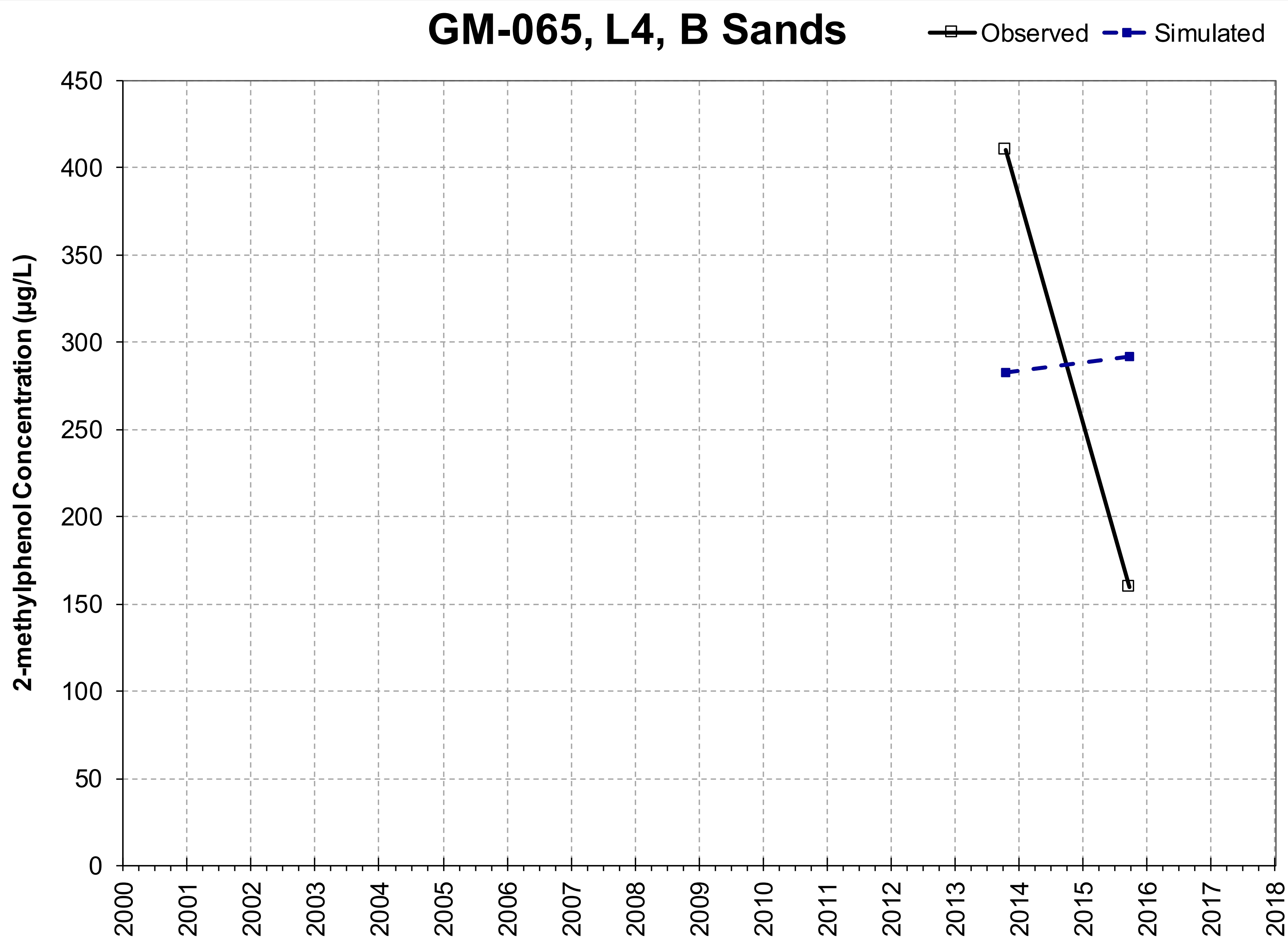


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

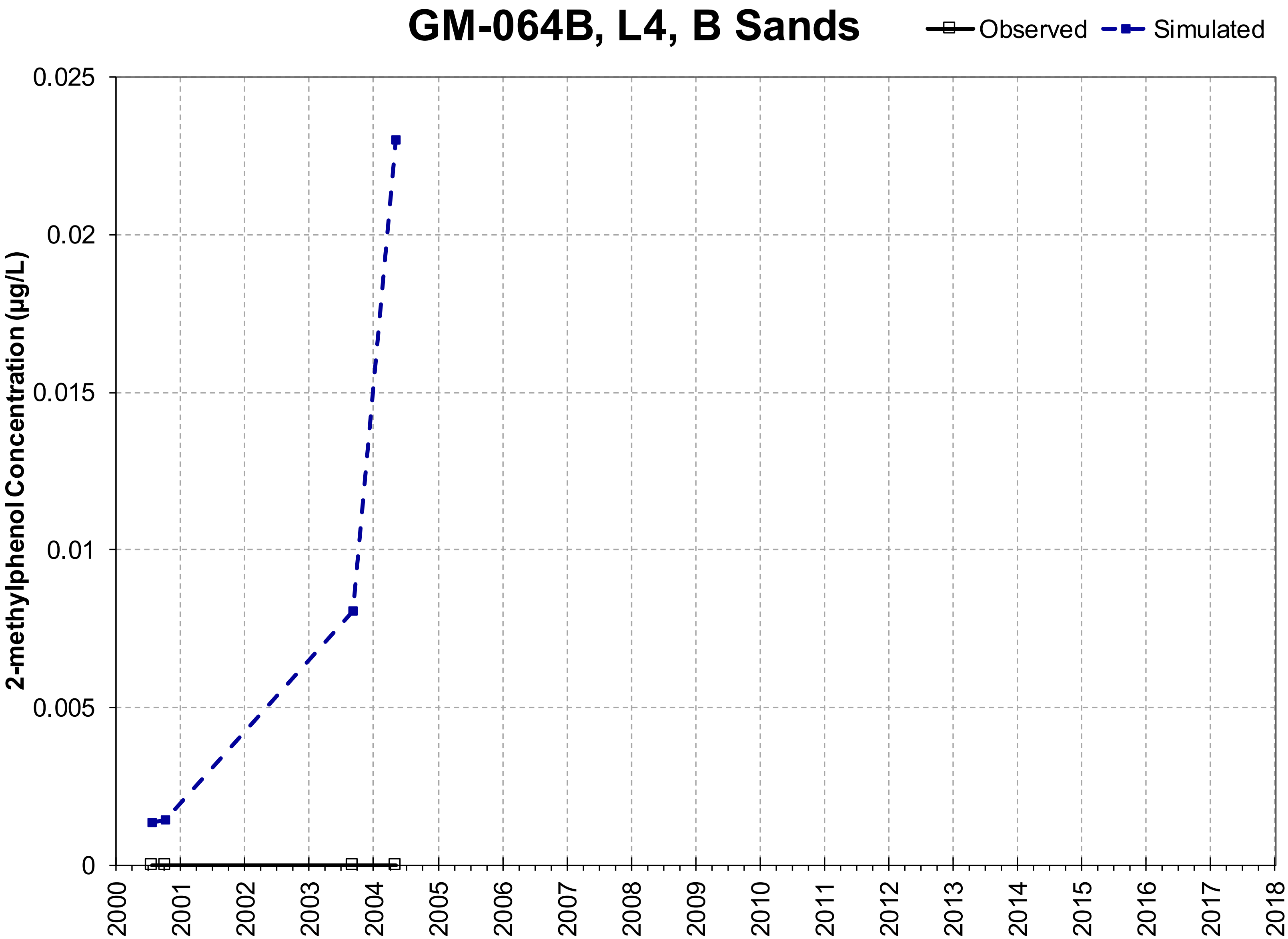


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

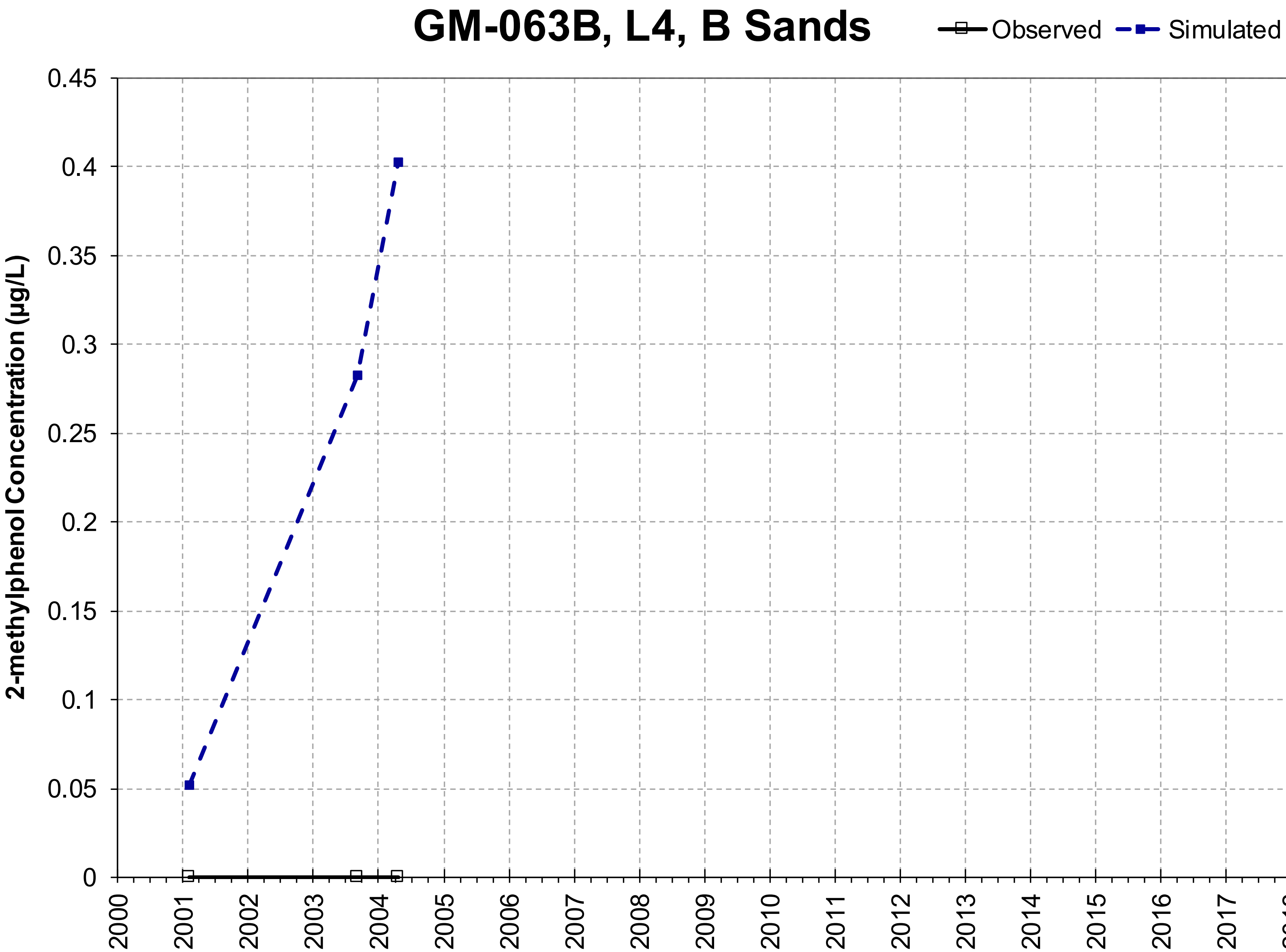


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

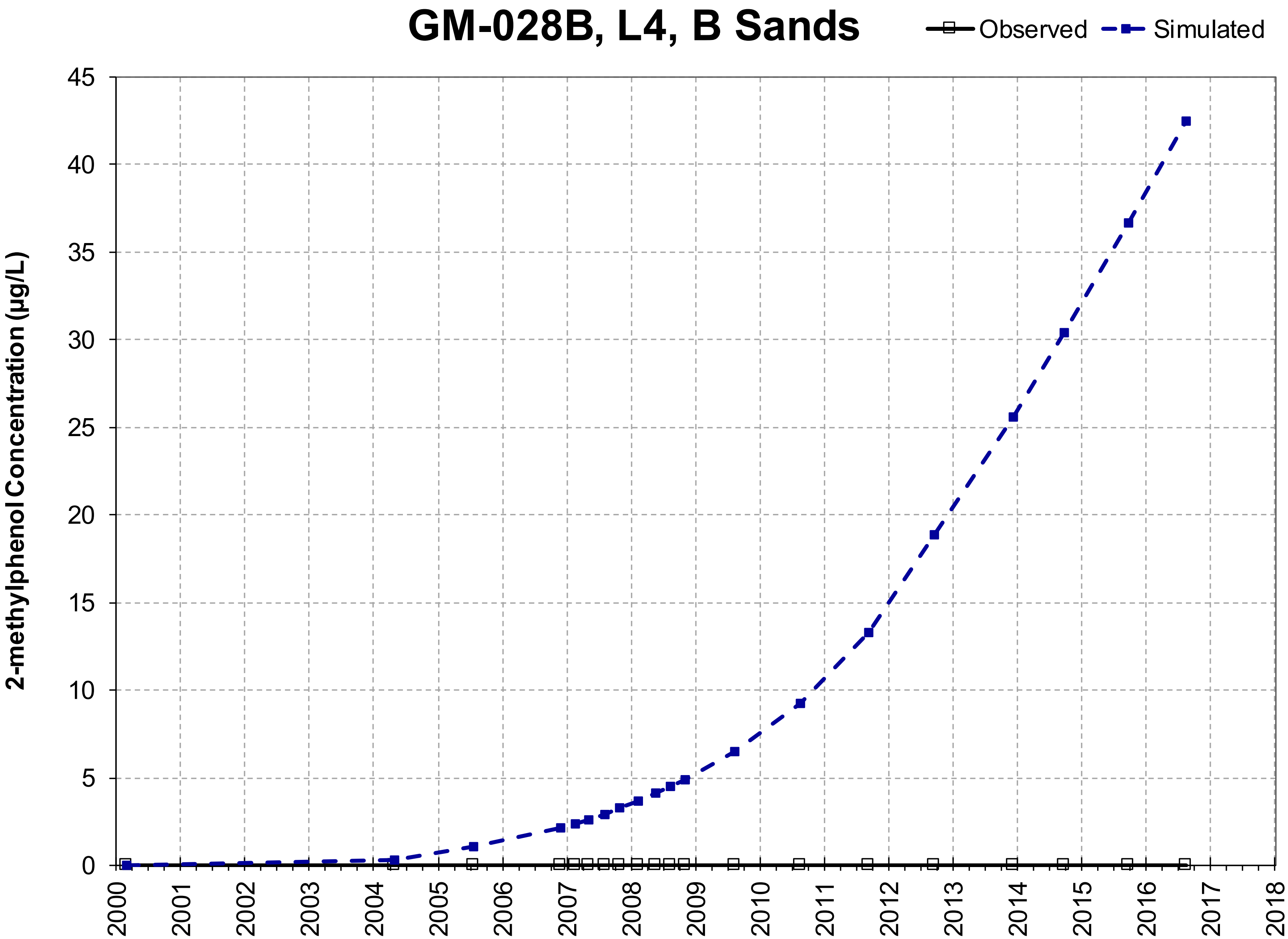


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

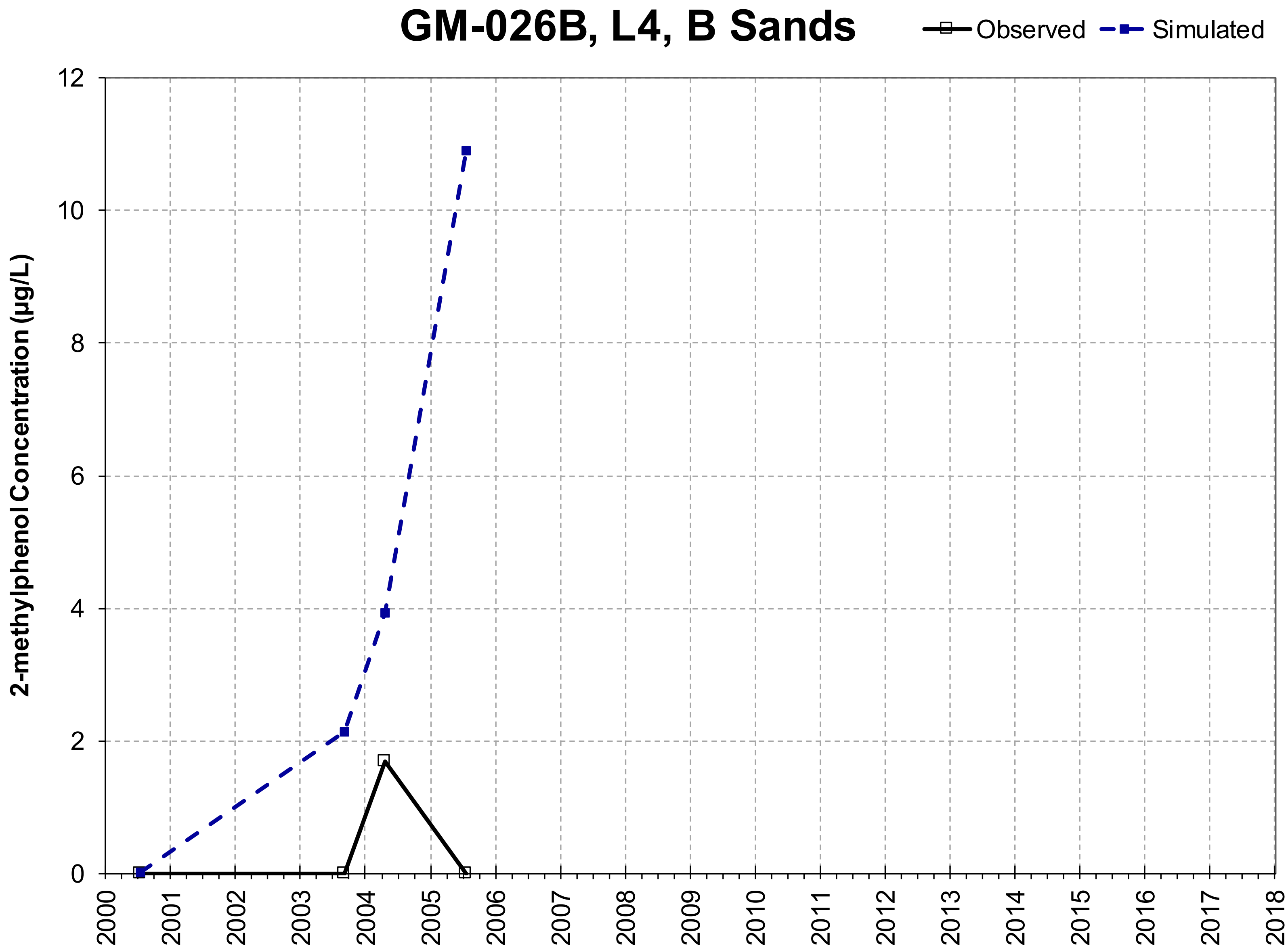


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

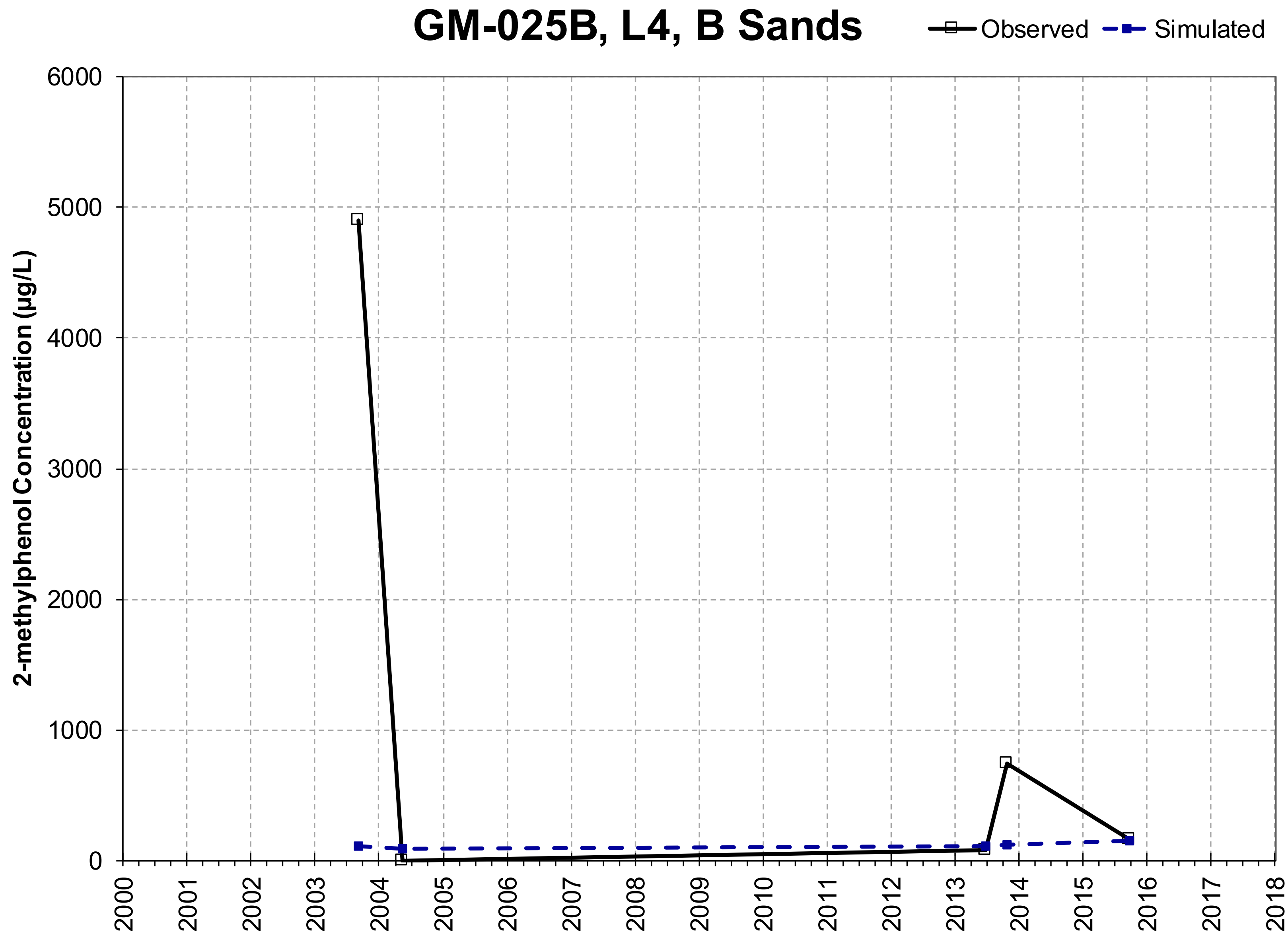


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

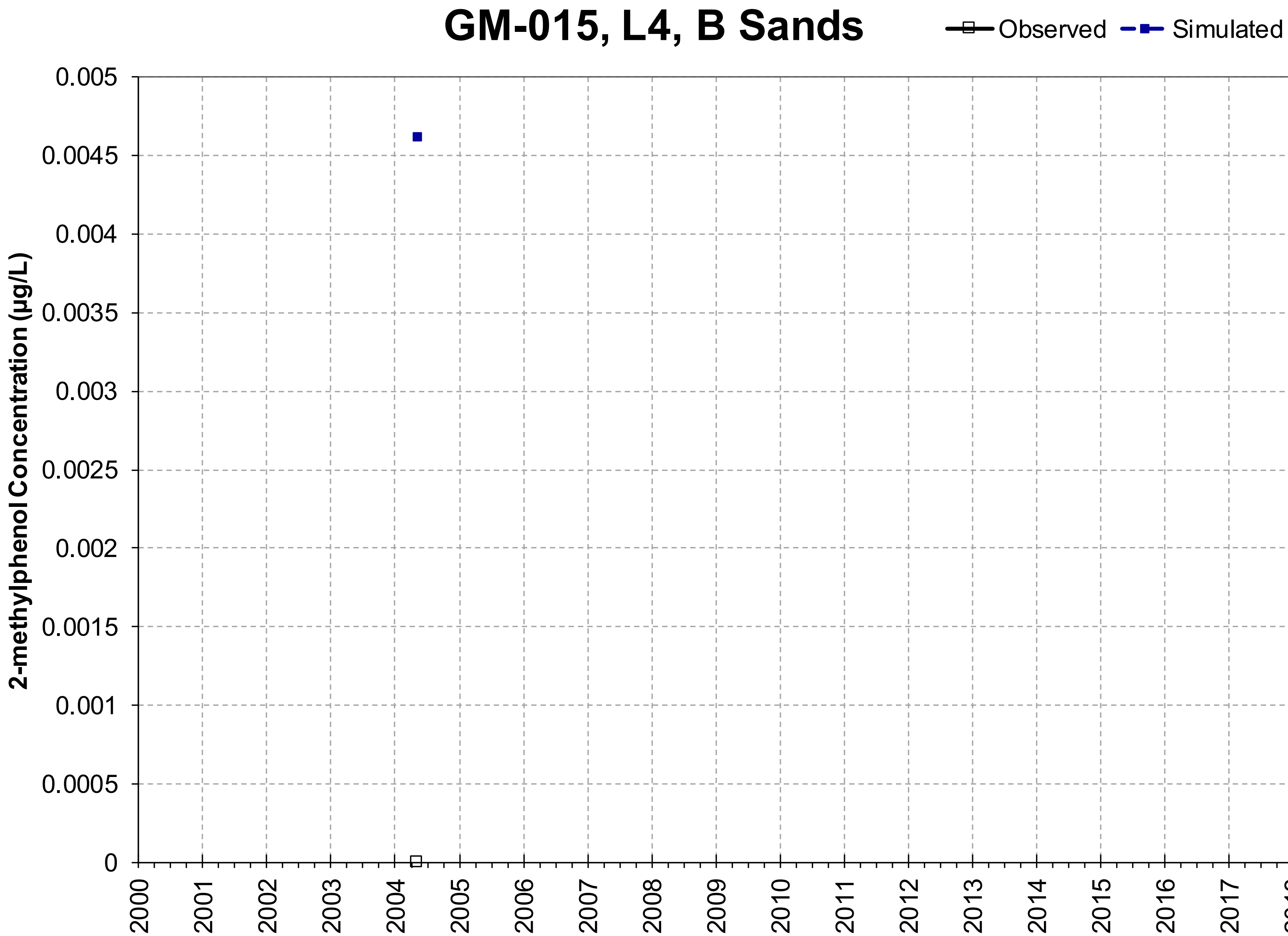


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

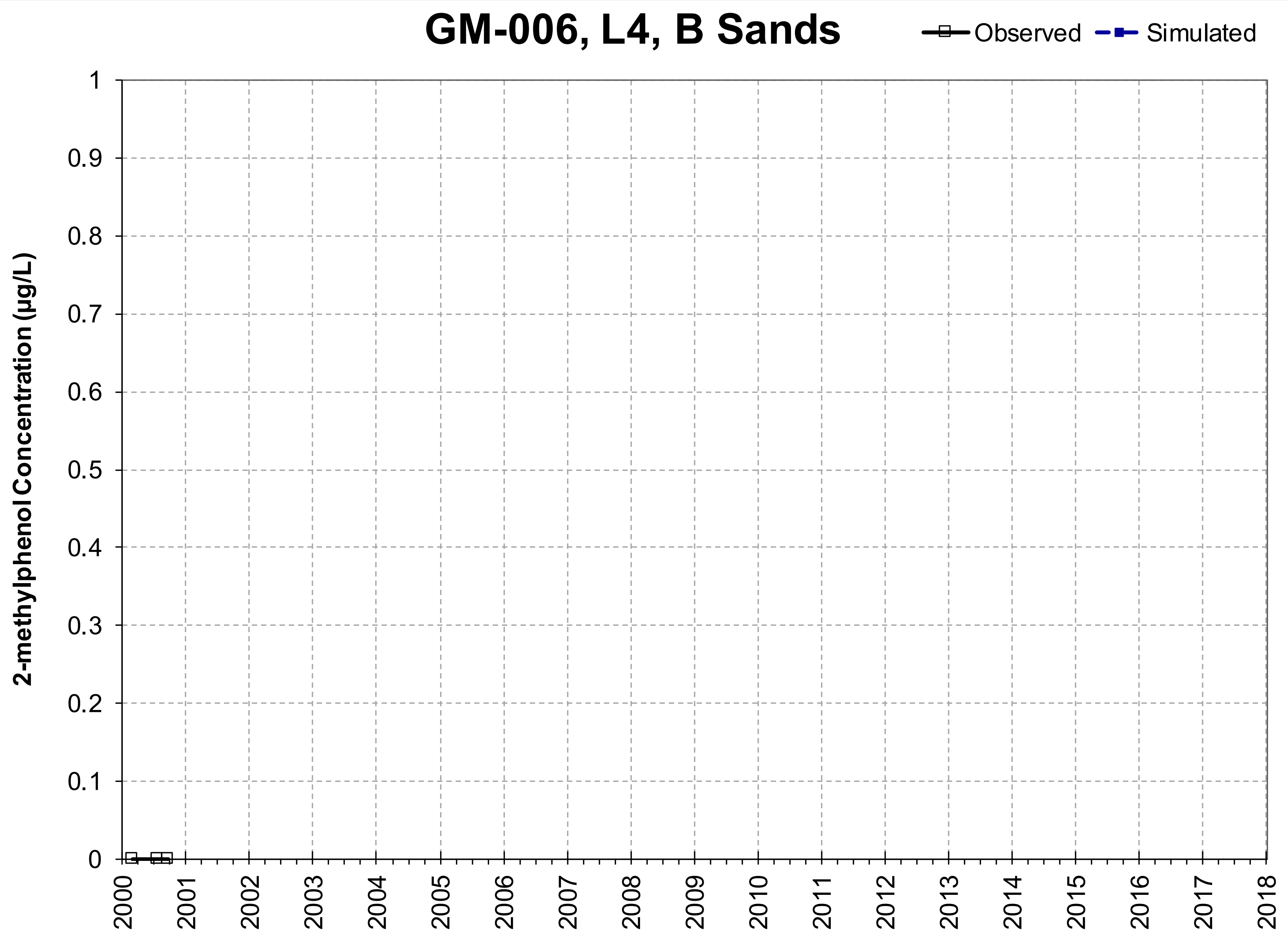


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

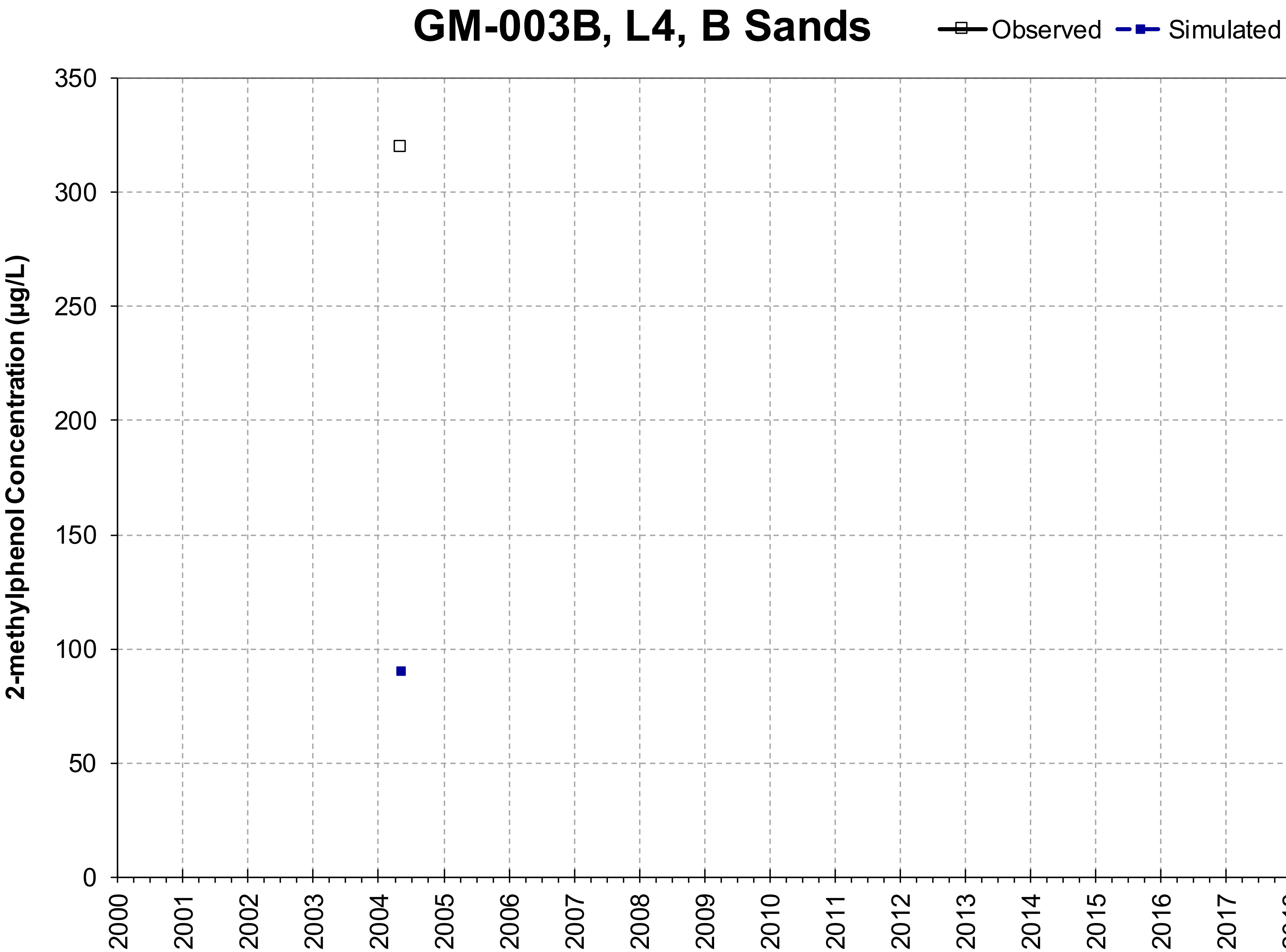


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

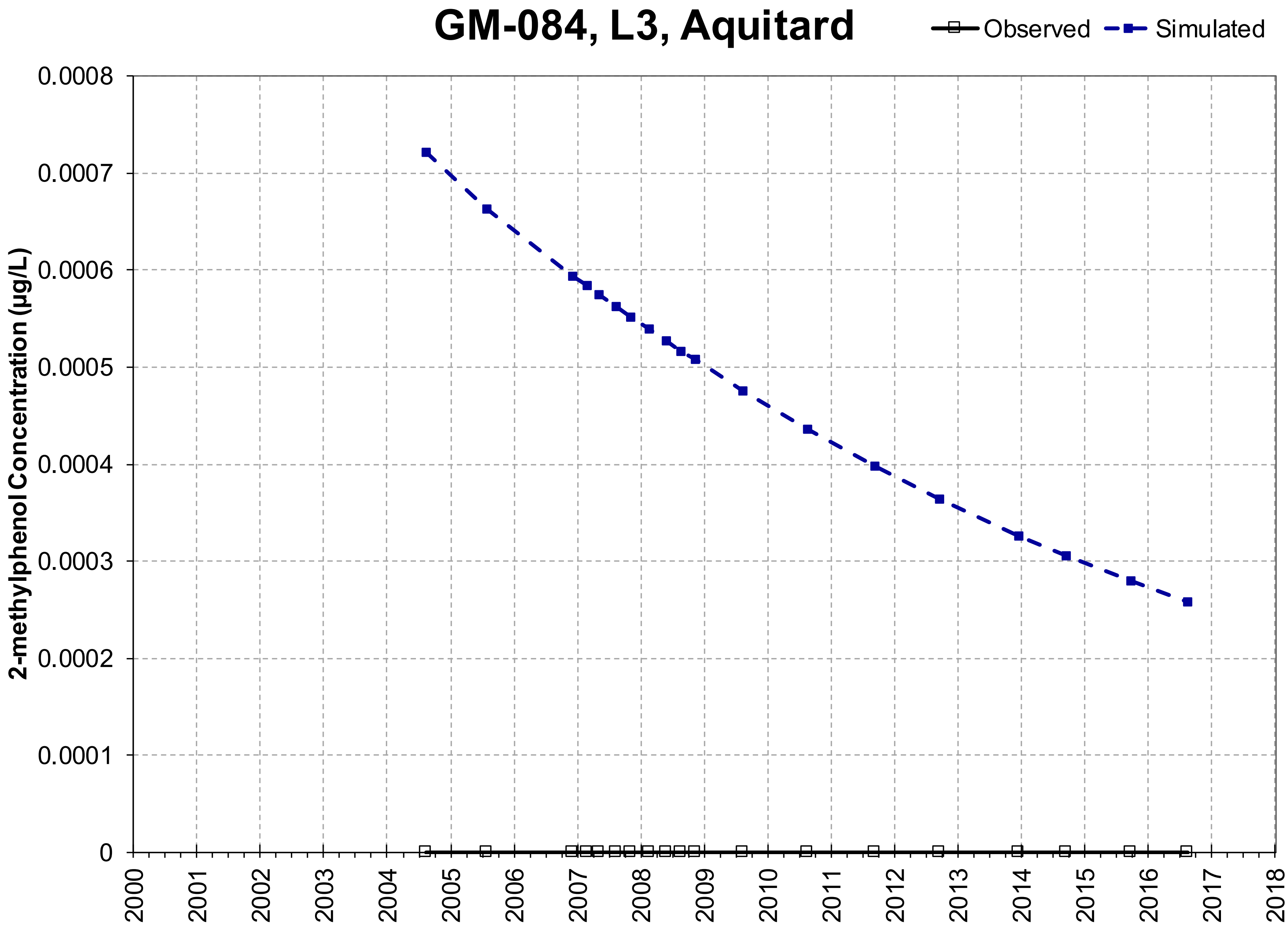


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

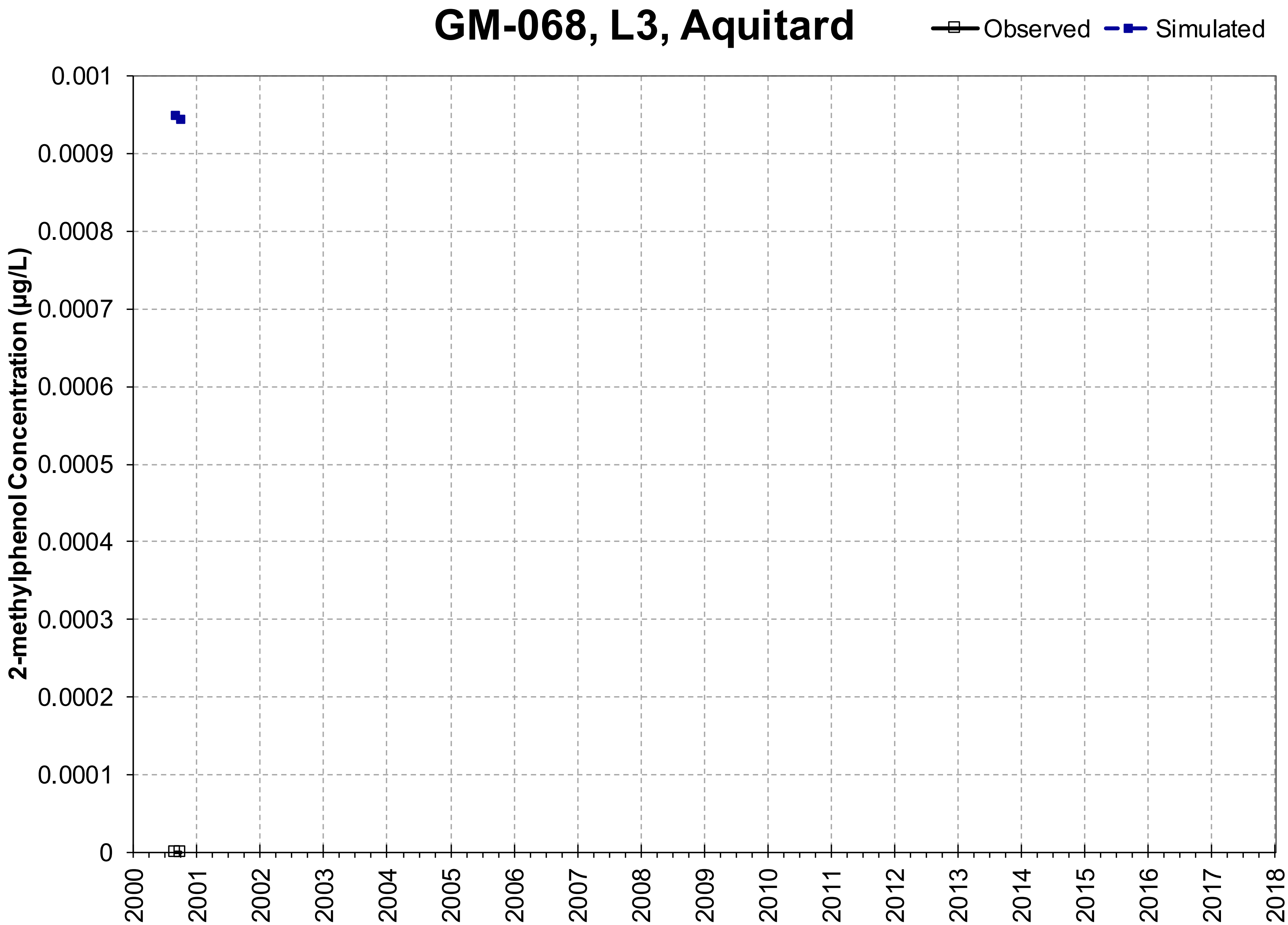


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

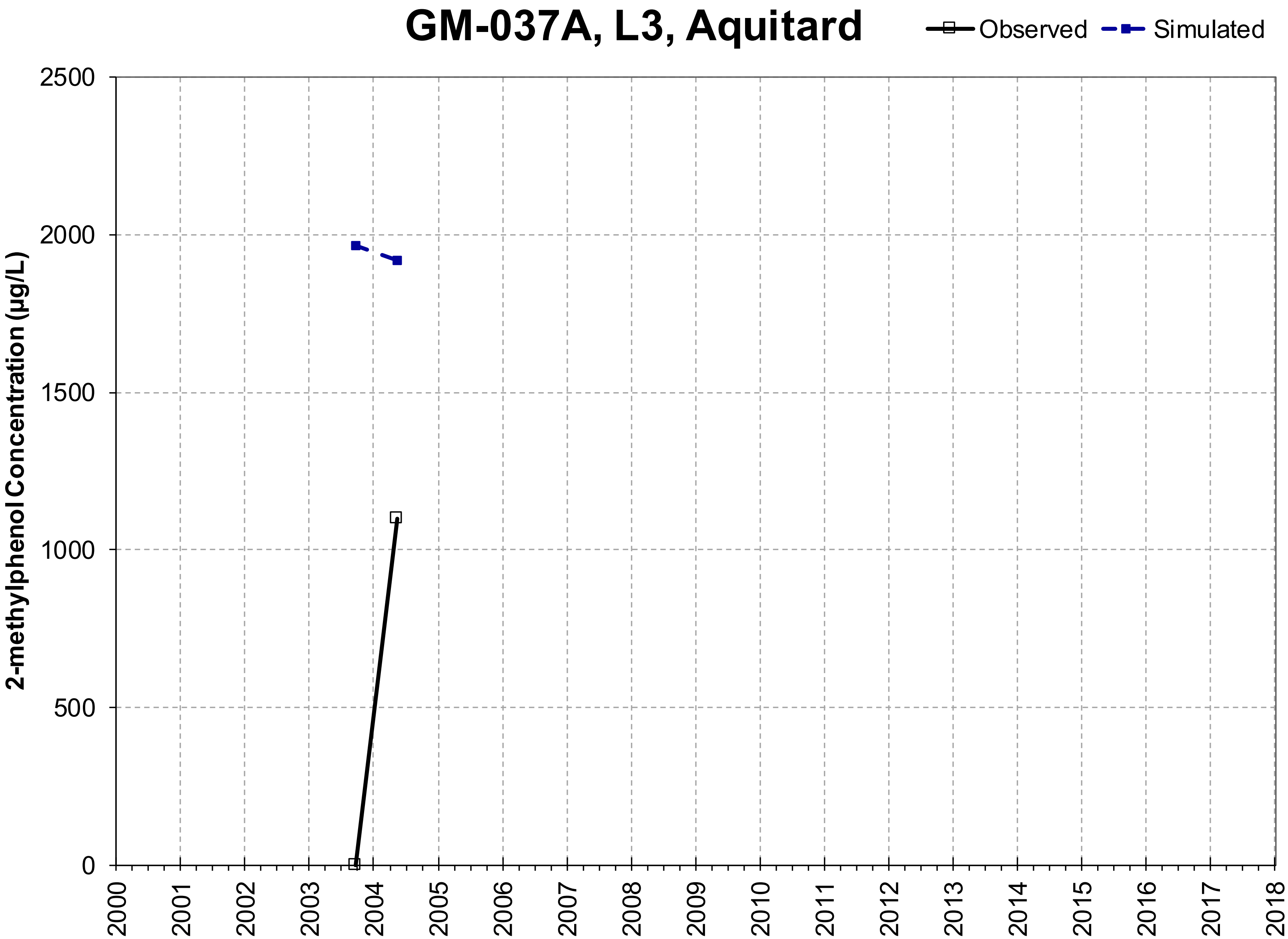


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

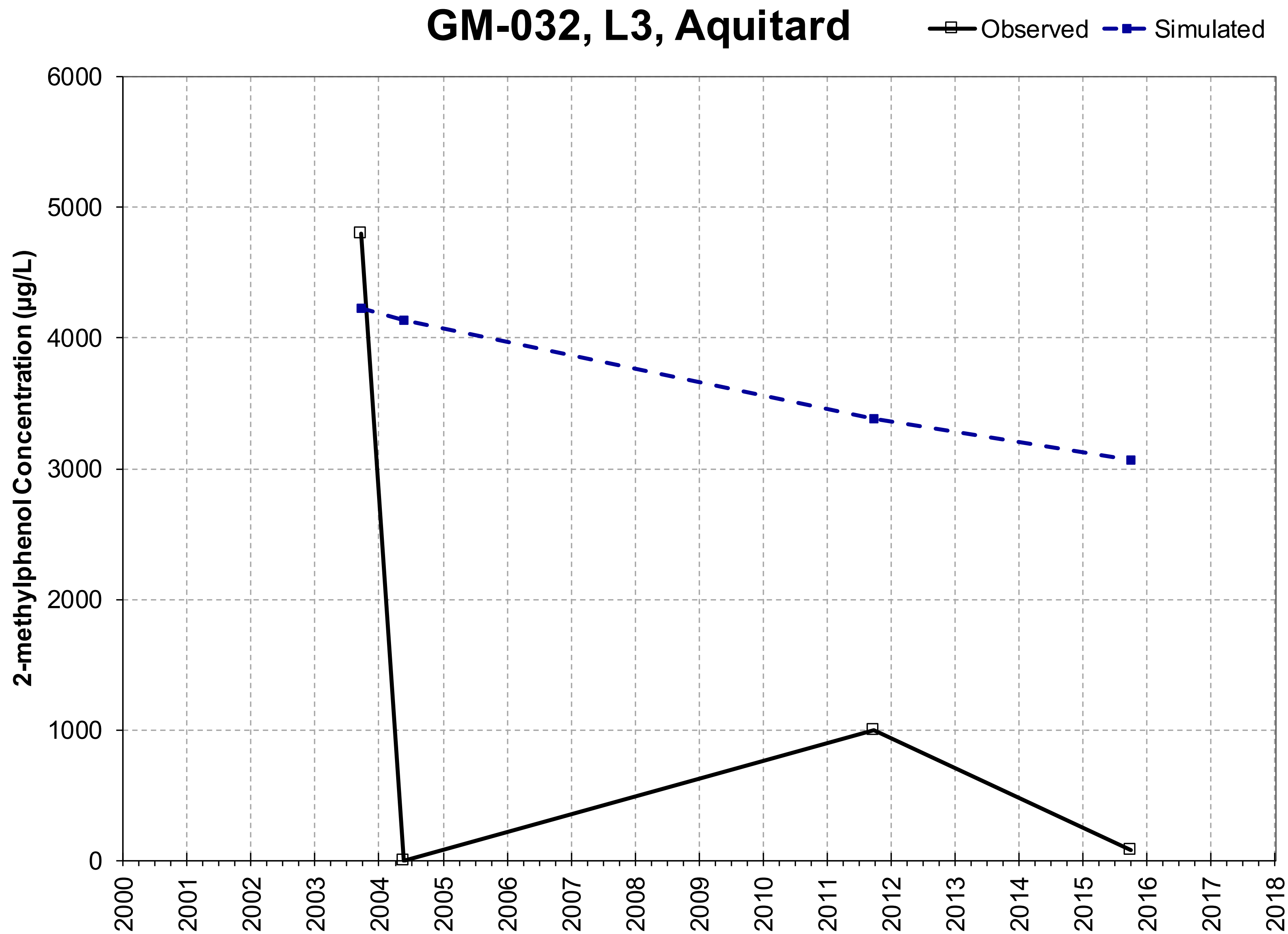


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

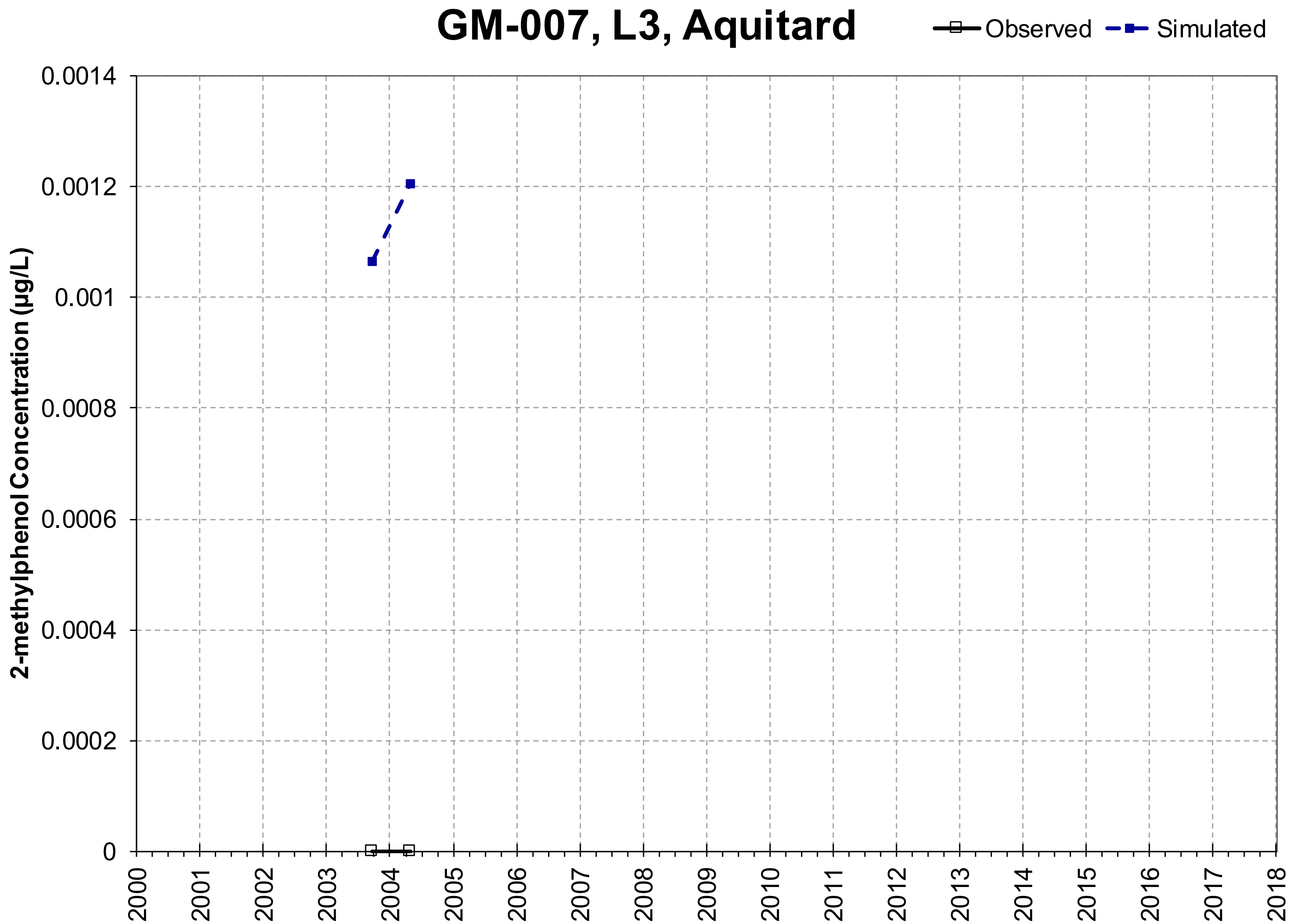


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

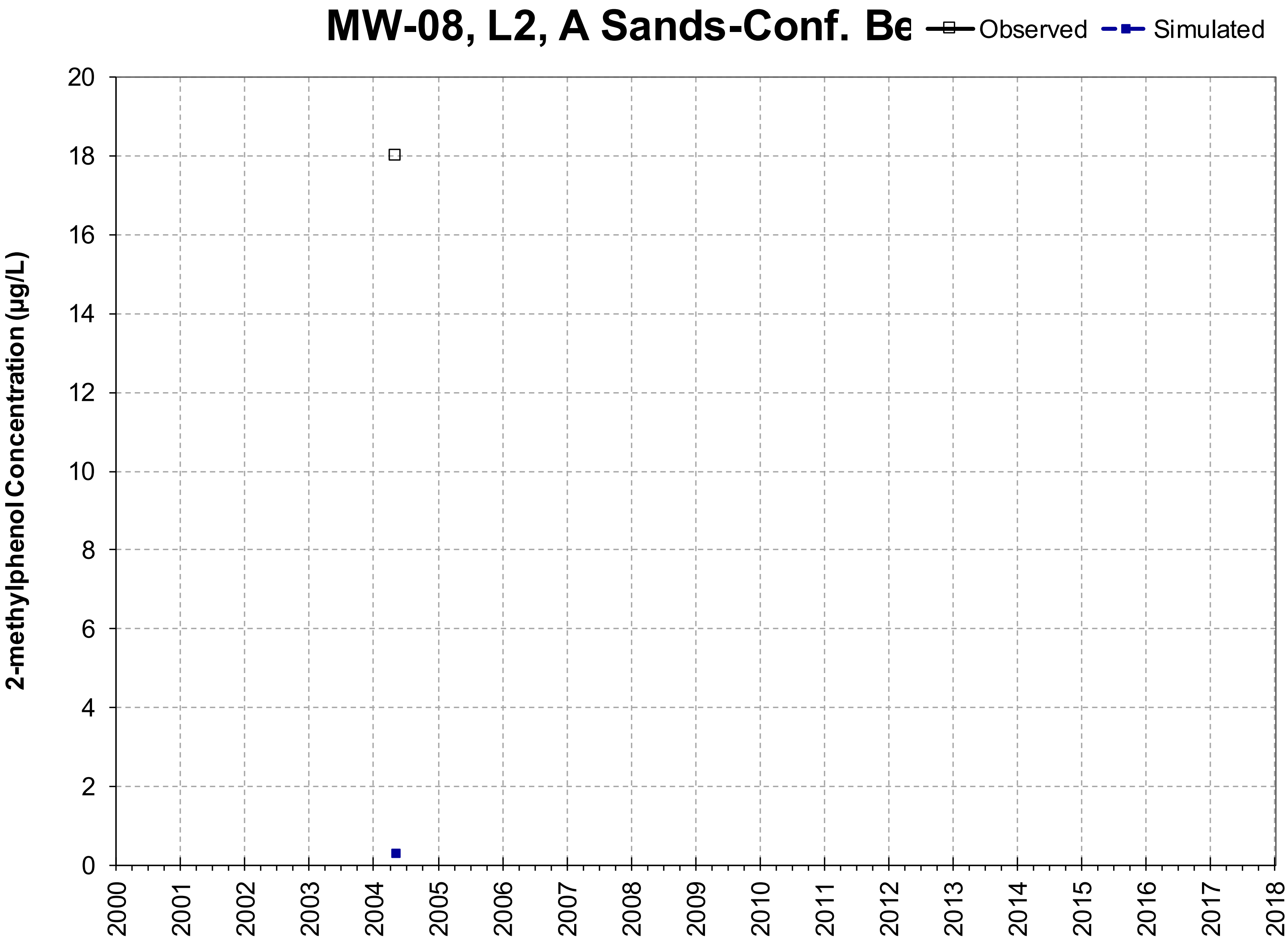


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

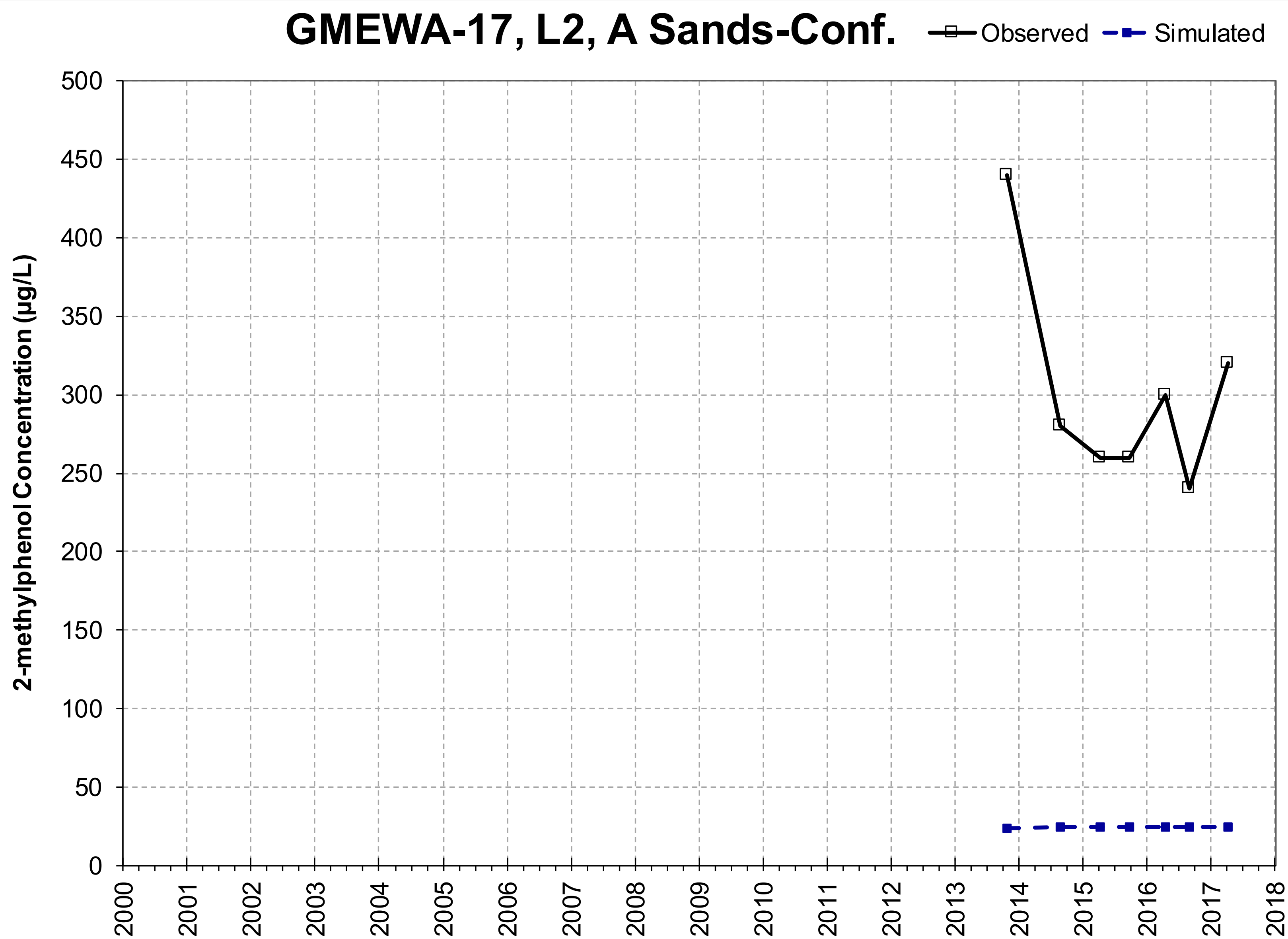


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

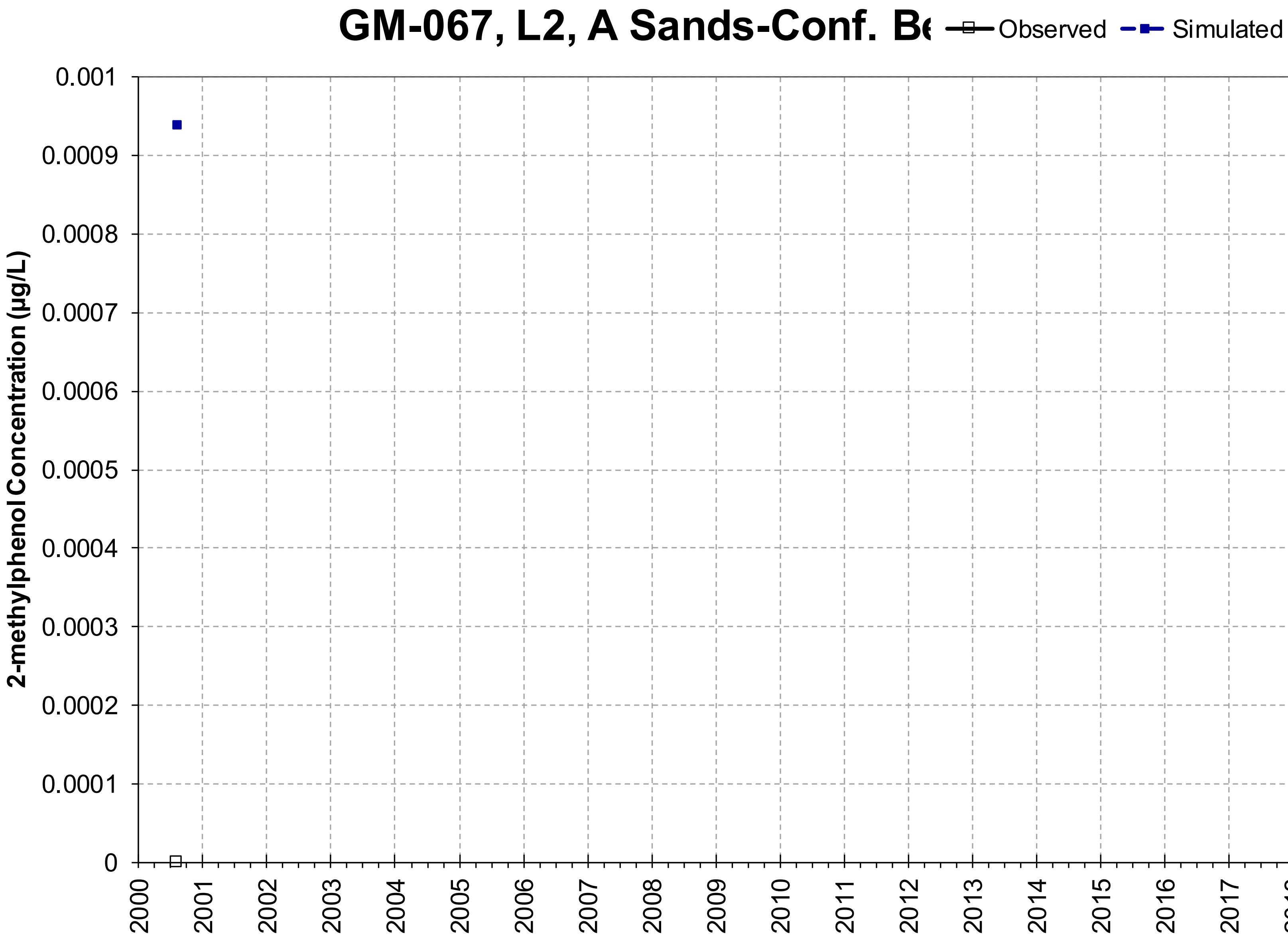


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

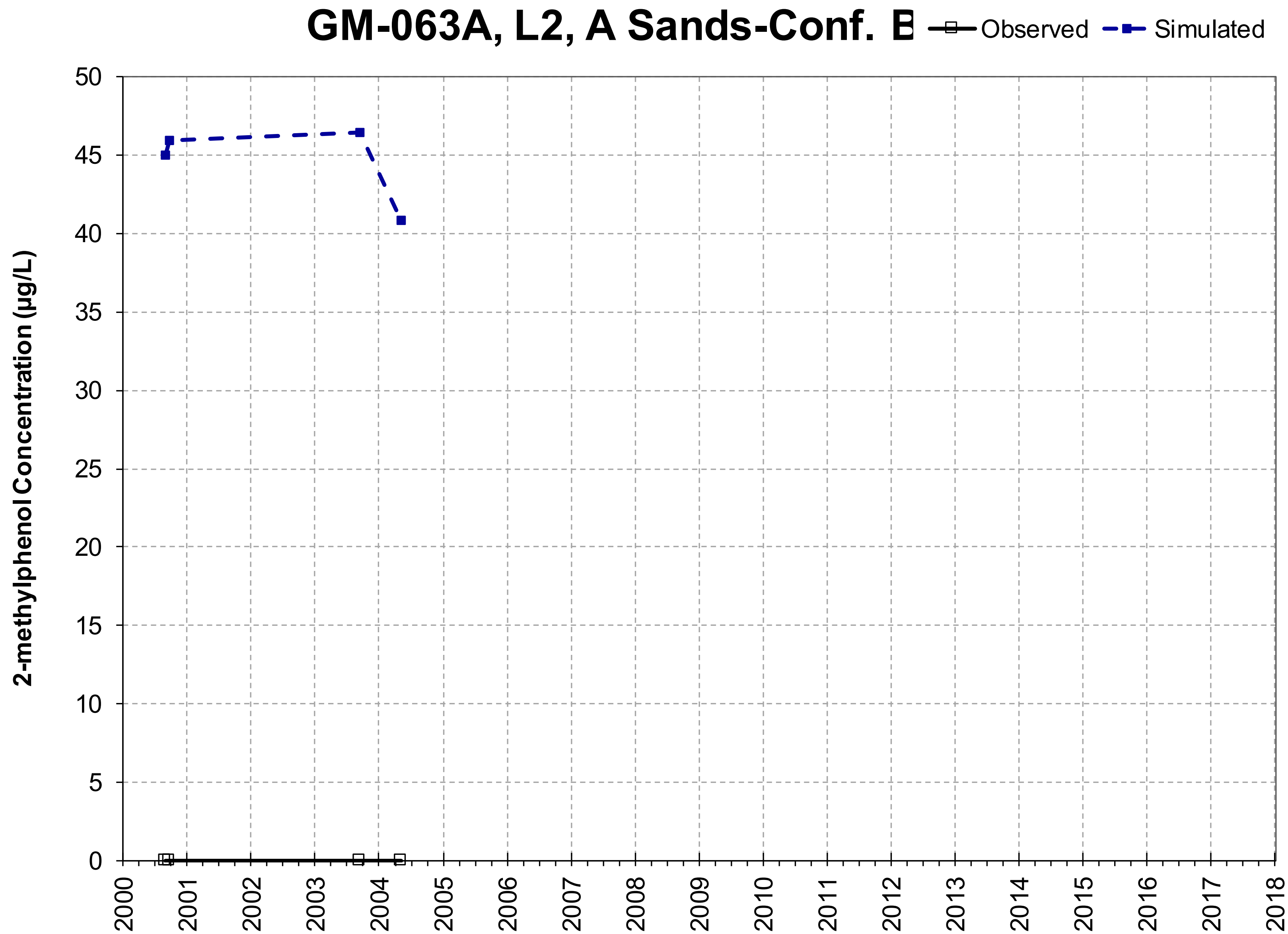


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

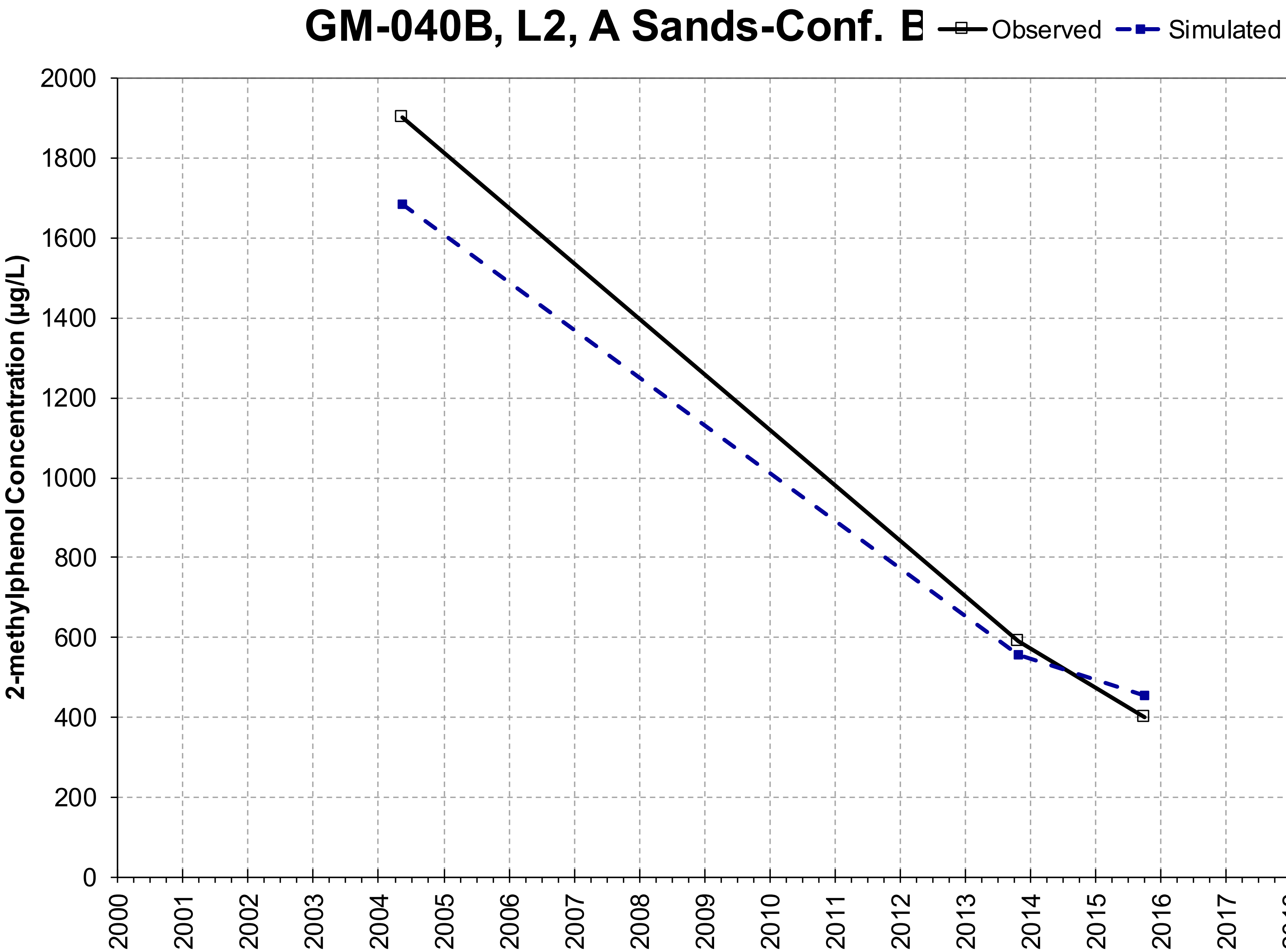


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

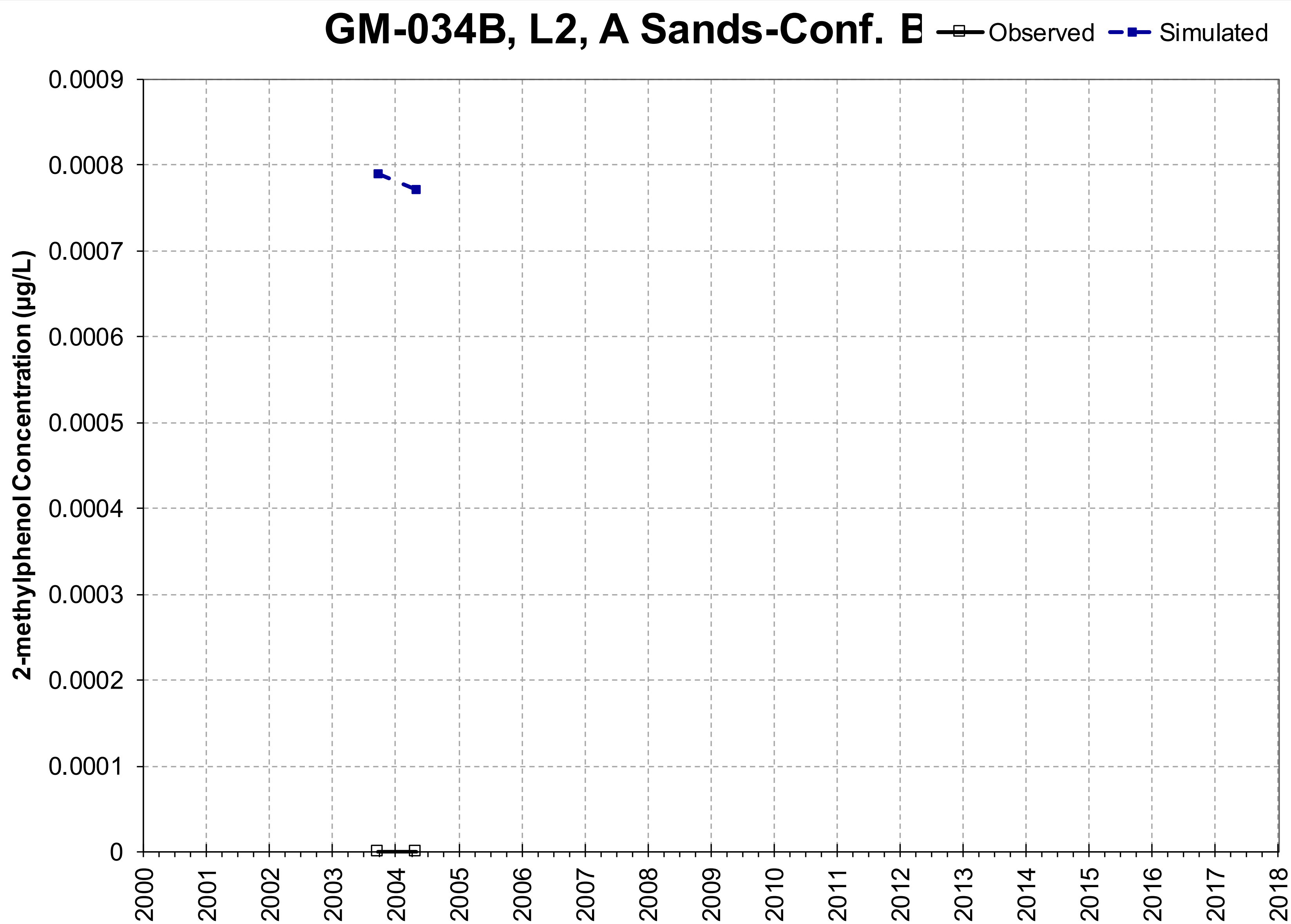


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

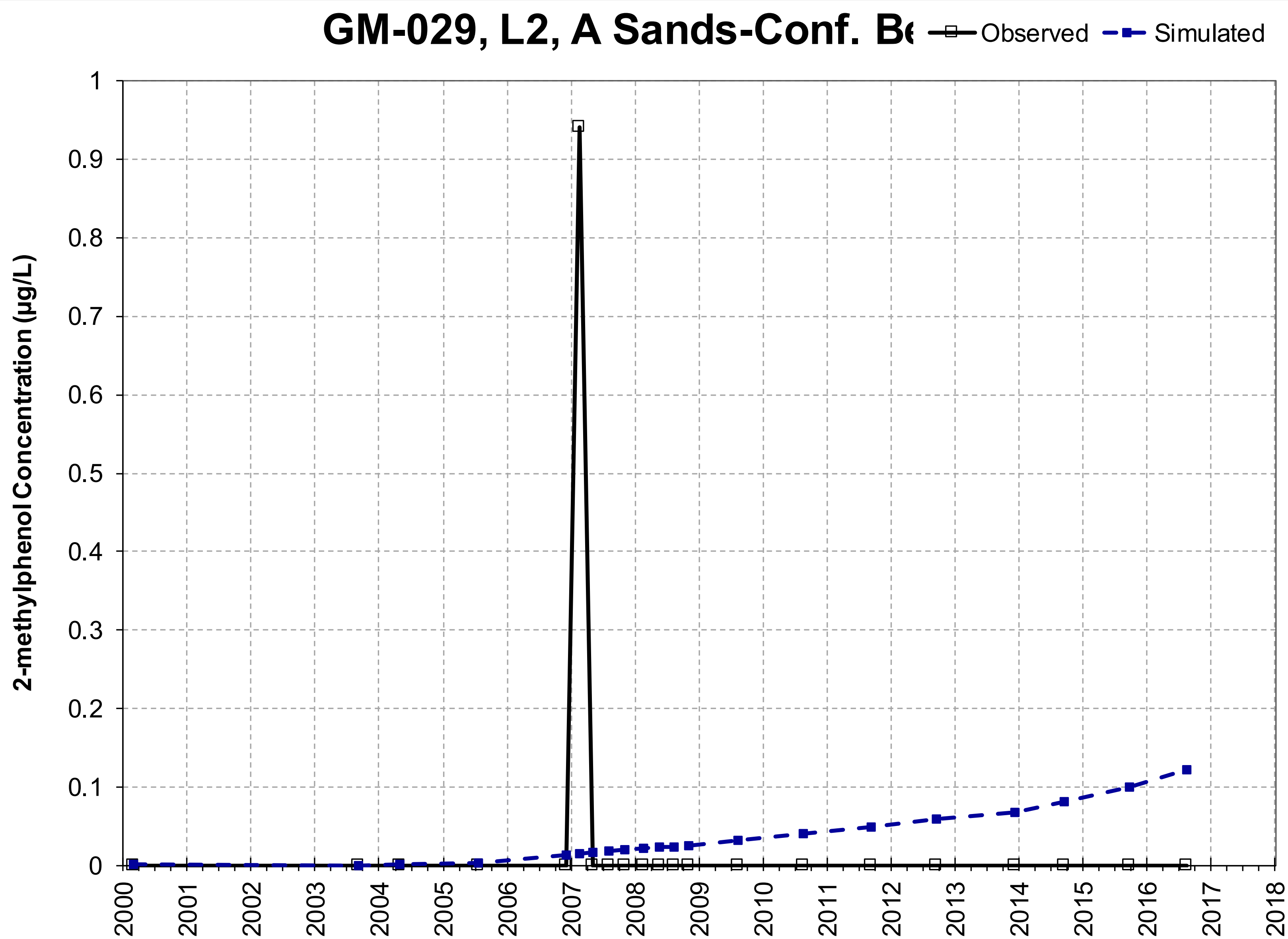


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE B

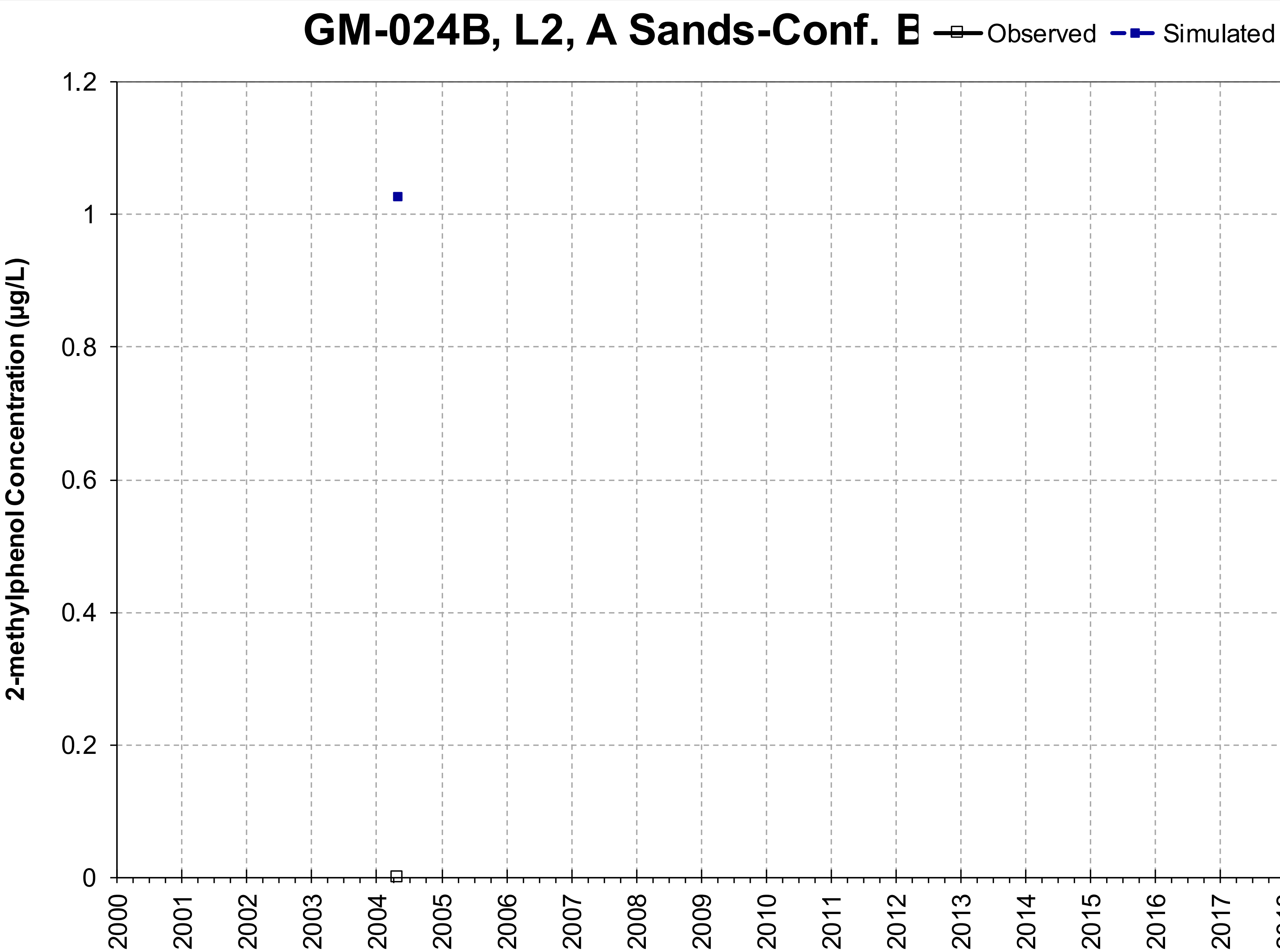


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

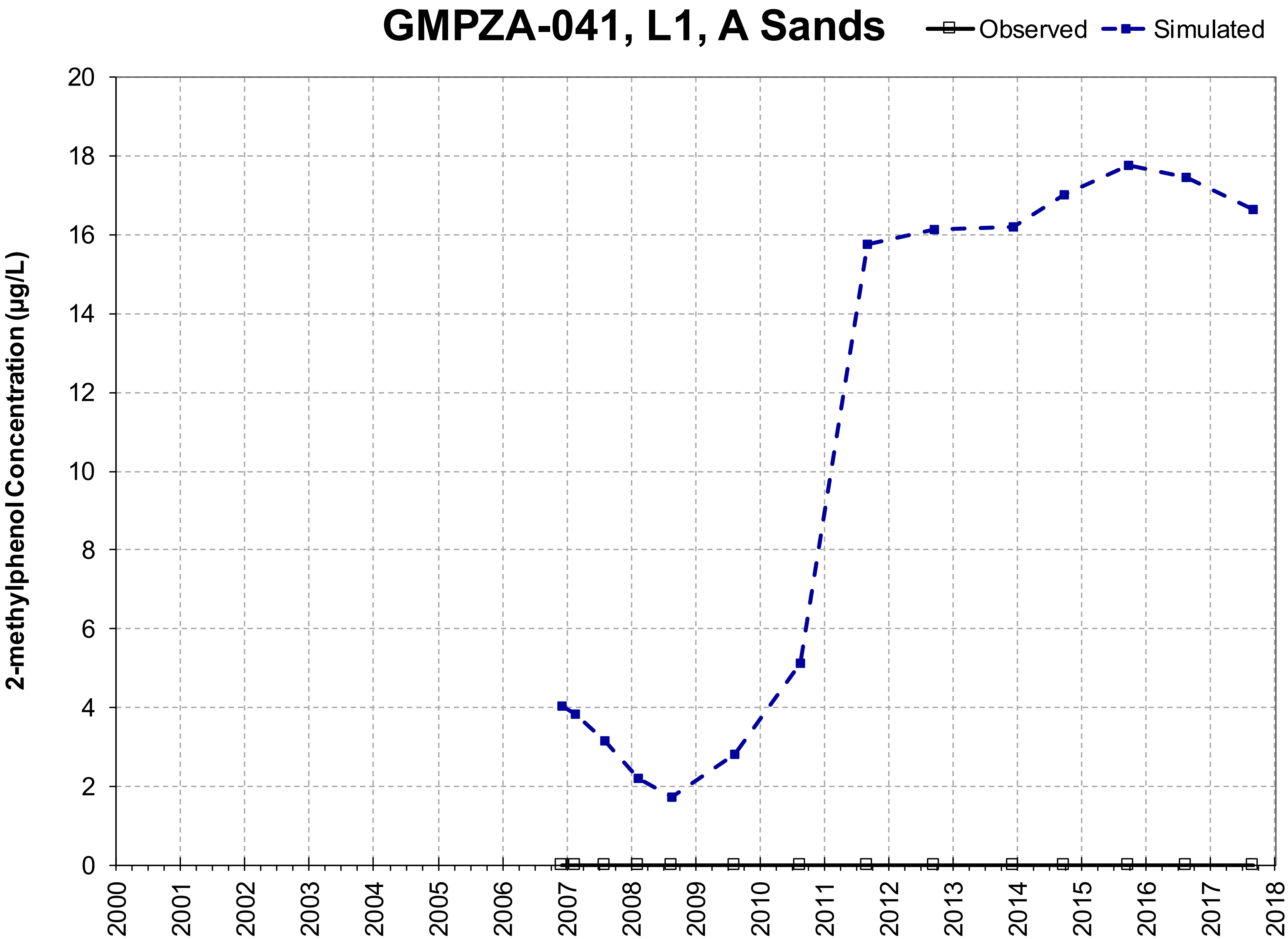


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

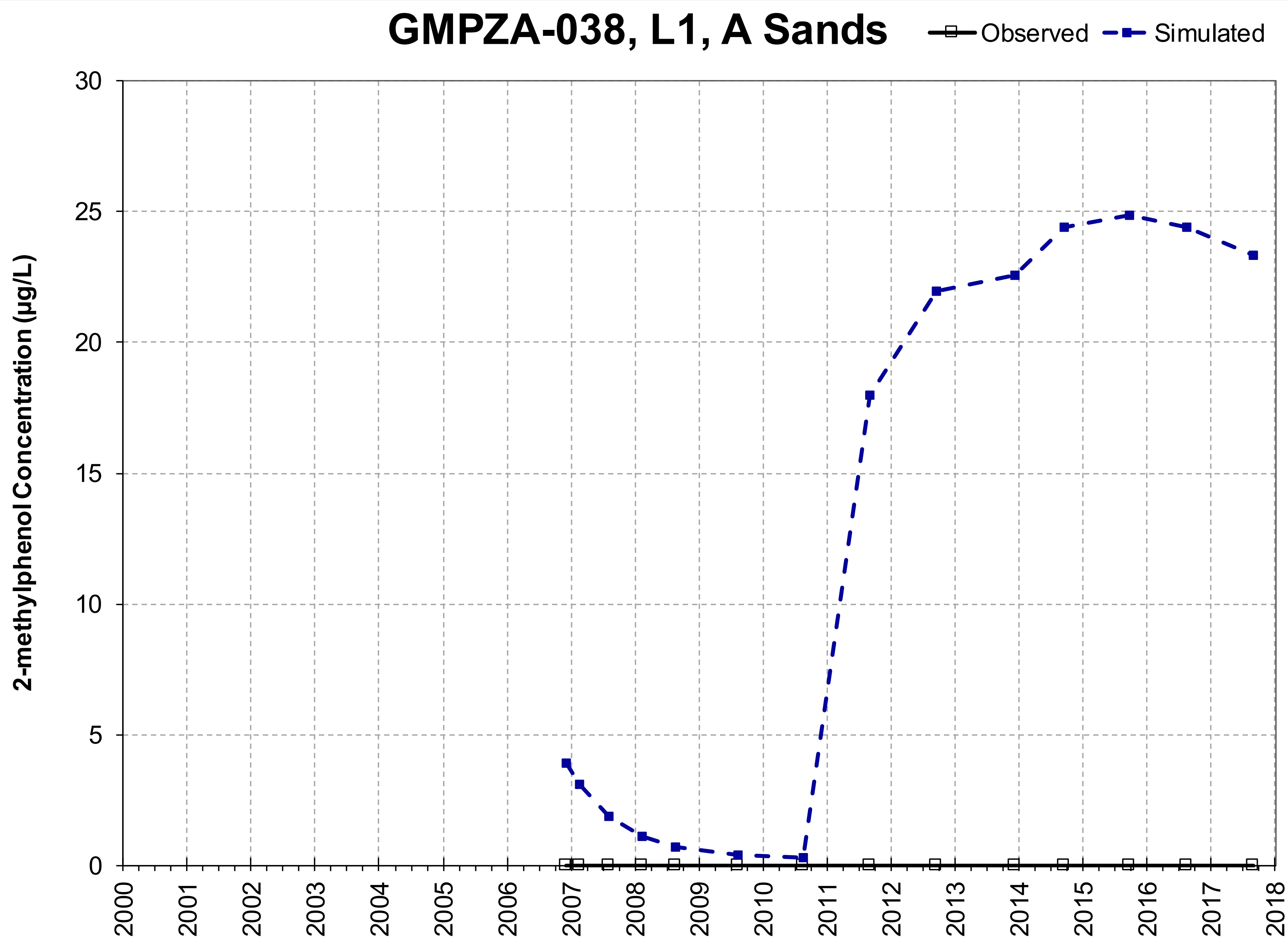


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

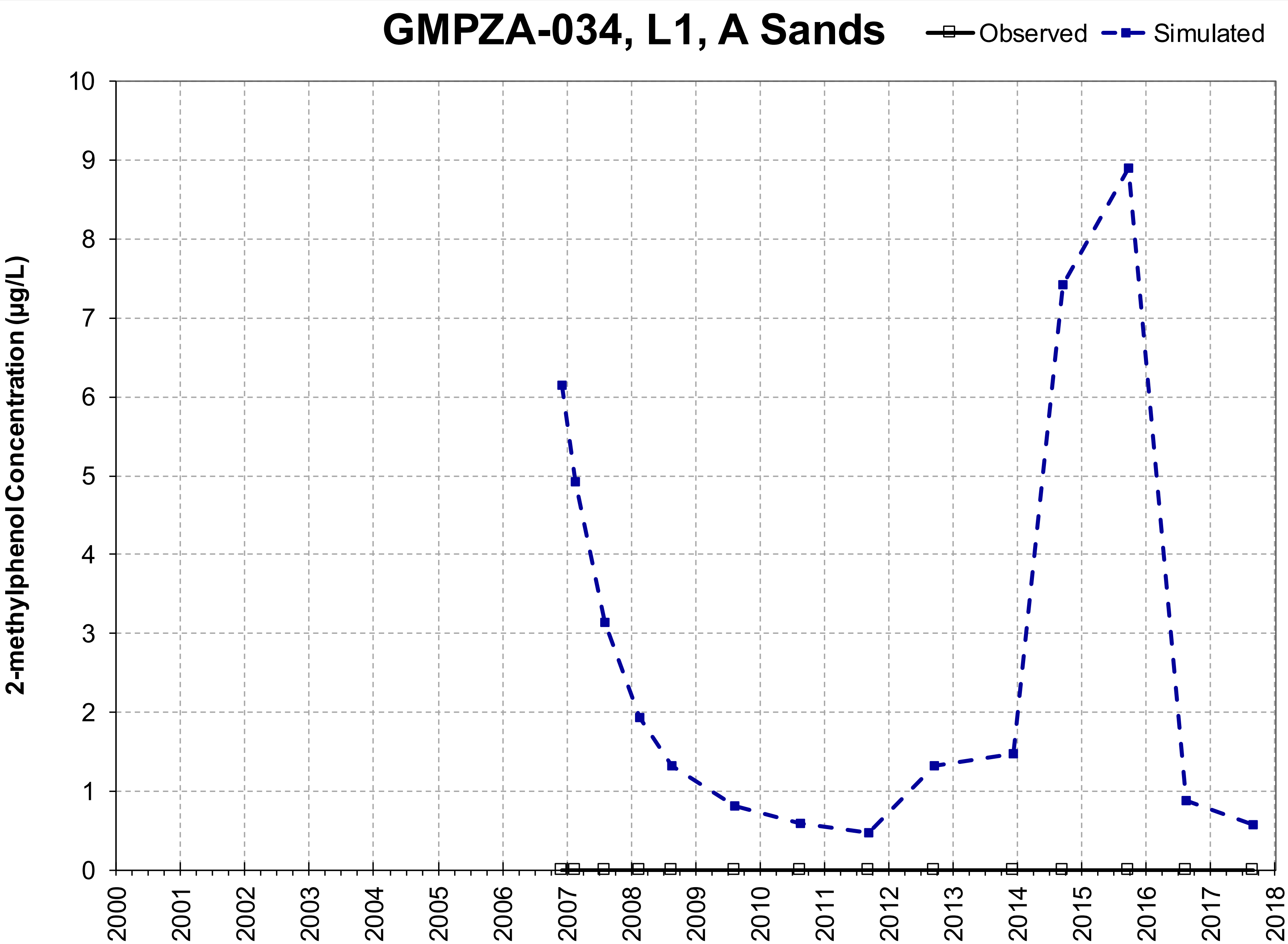


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

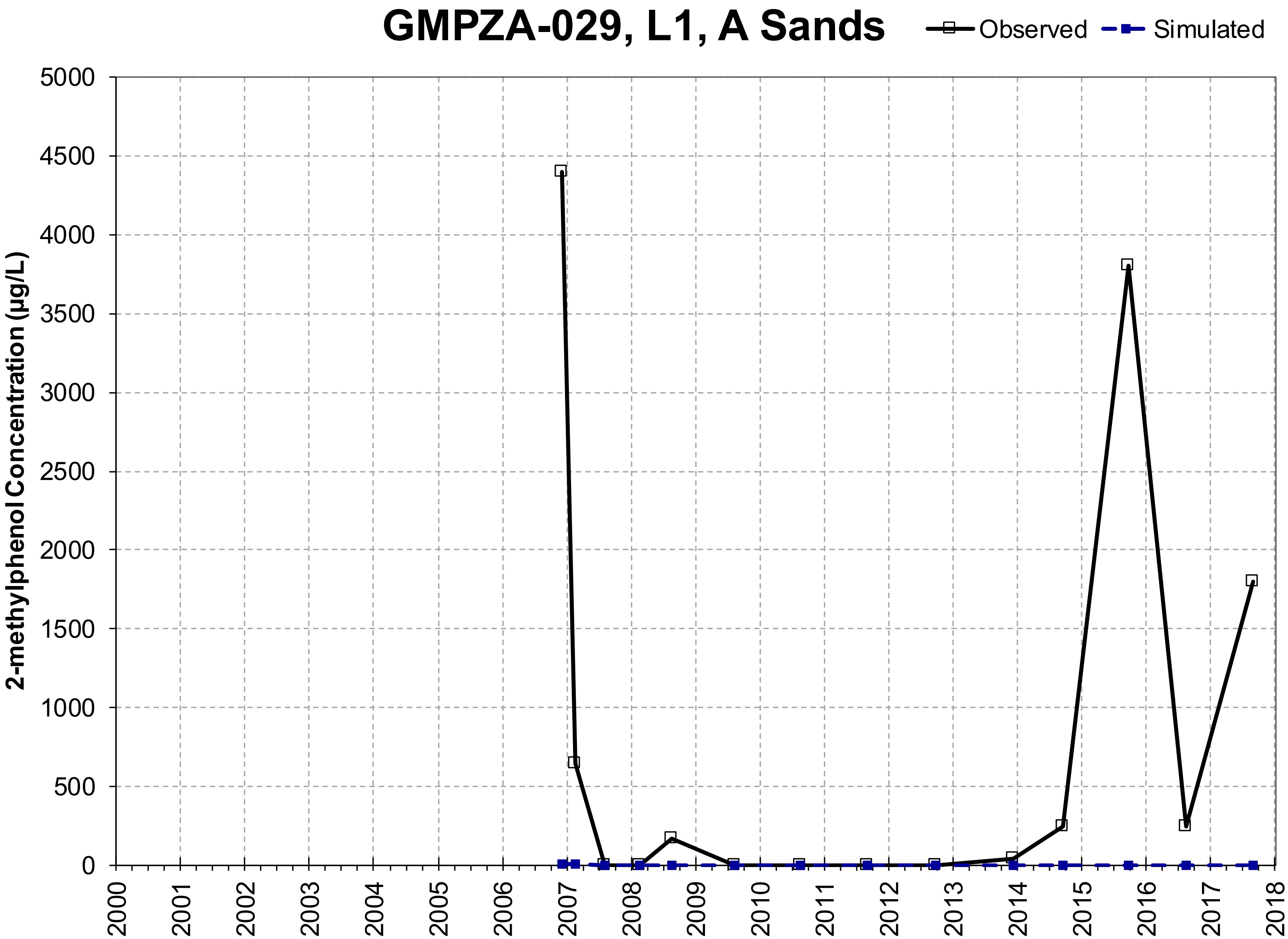


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

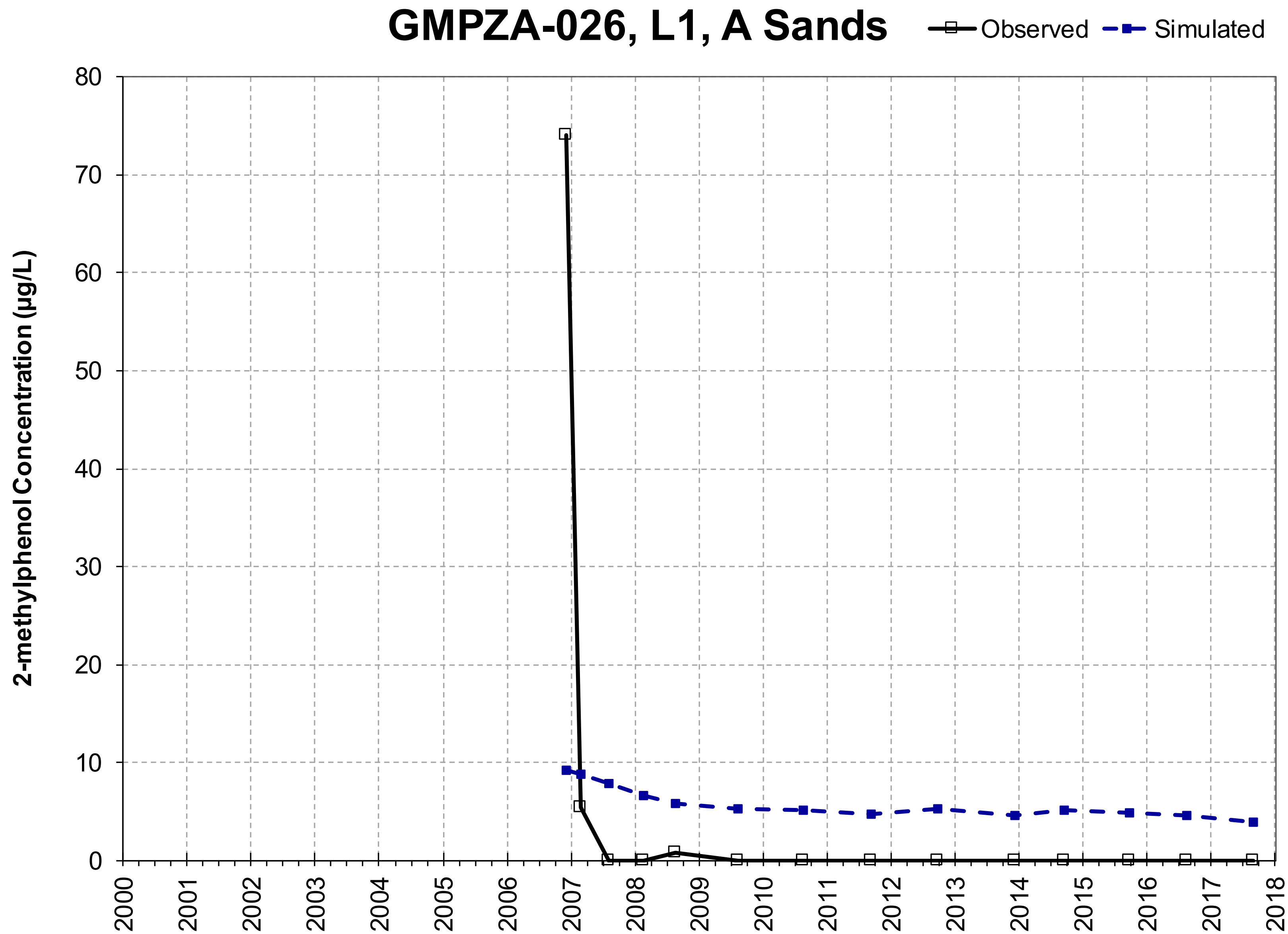


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

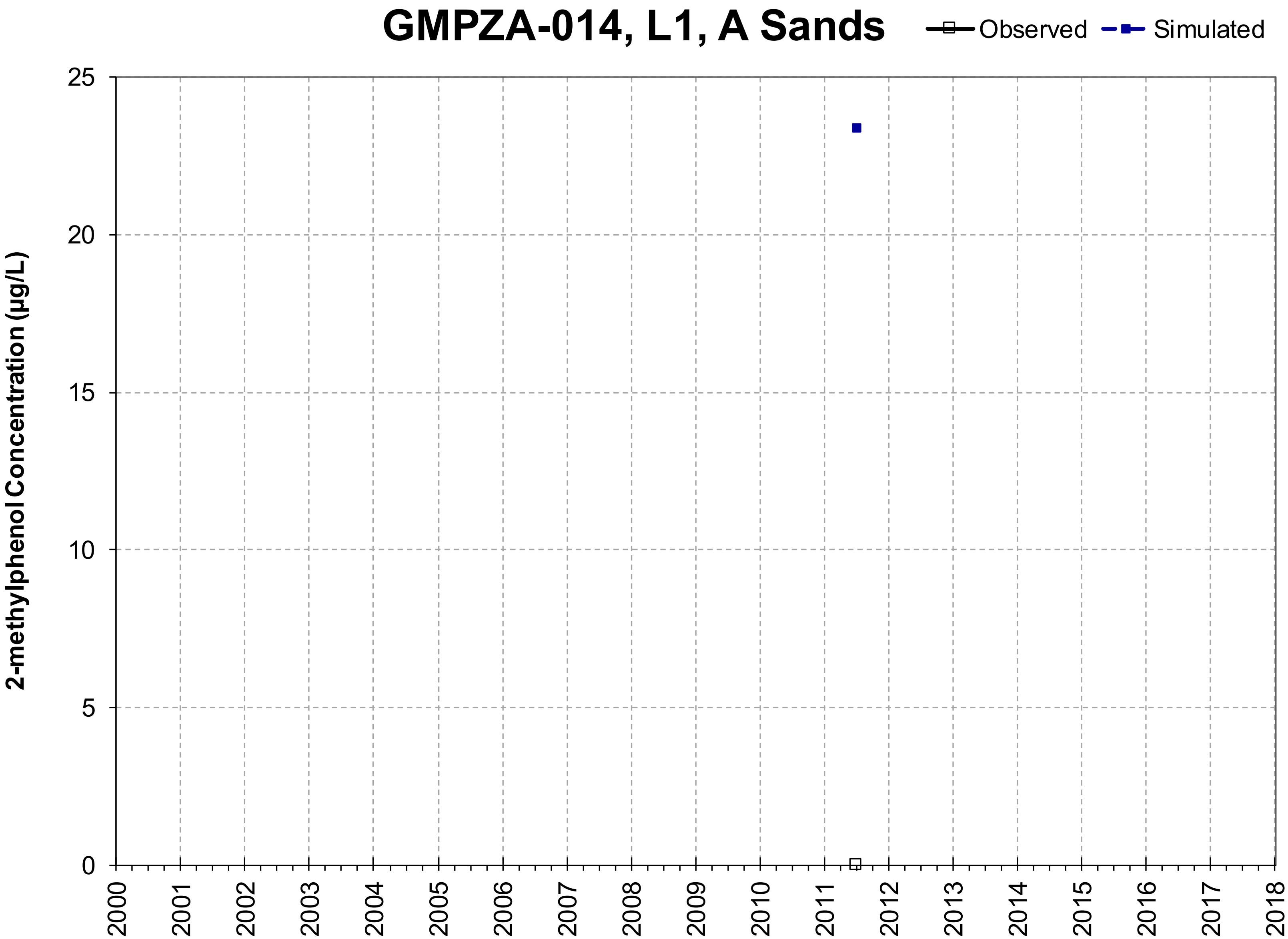


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

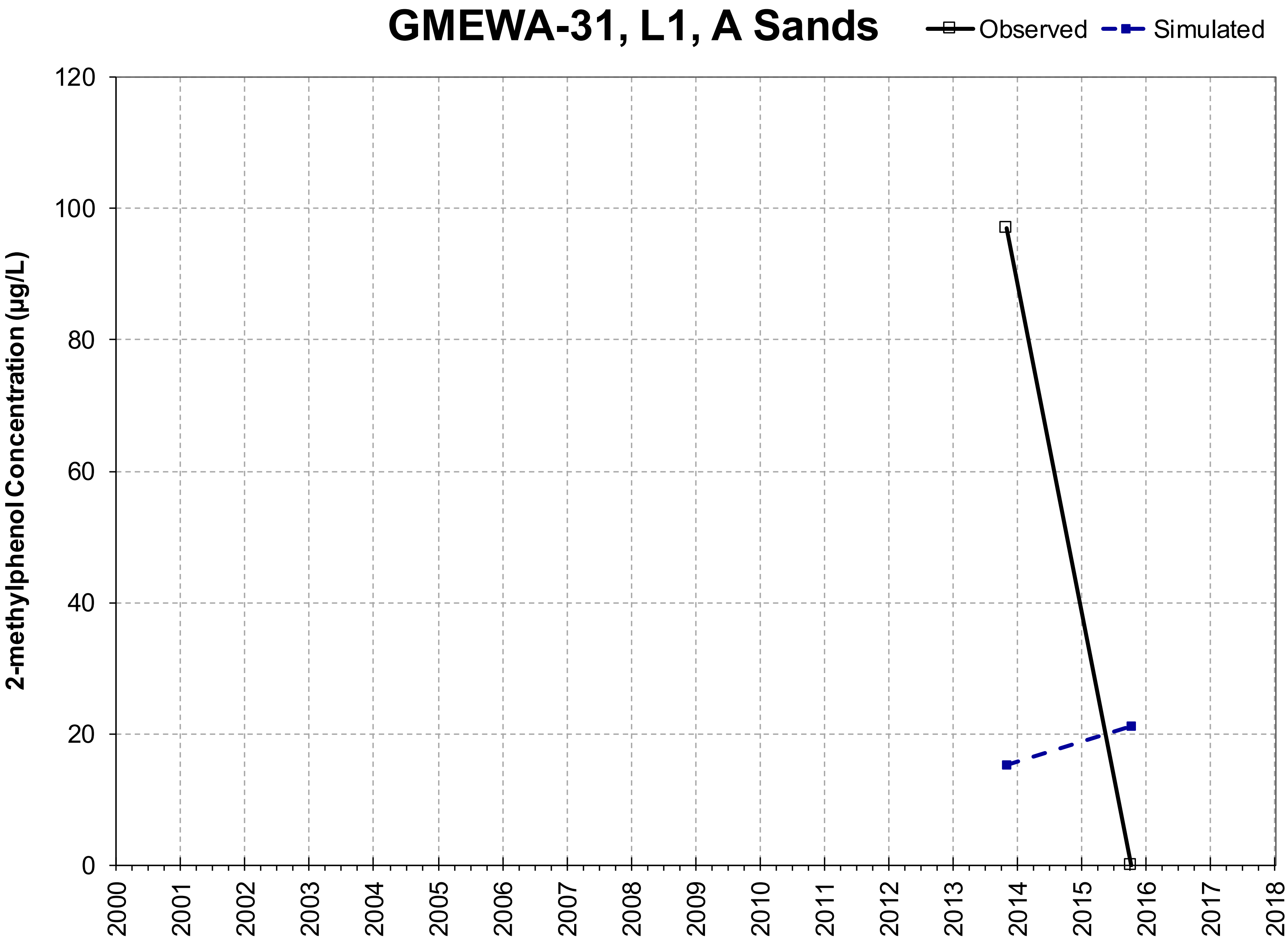


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

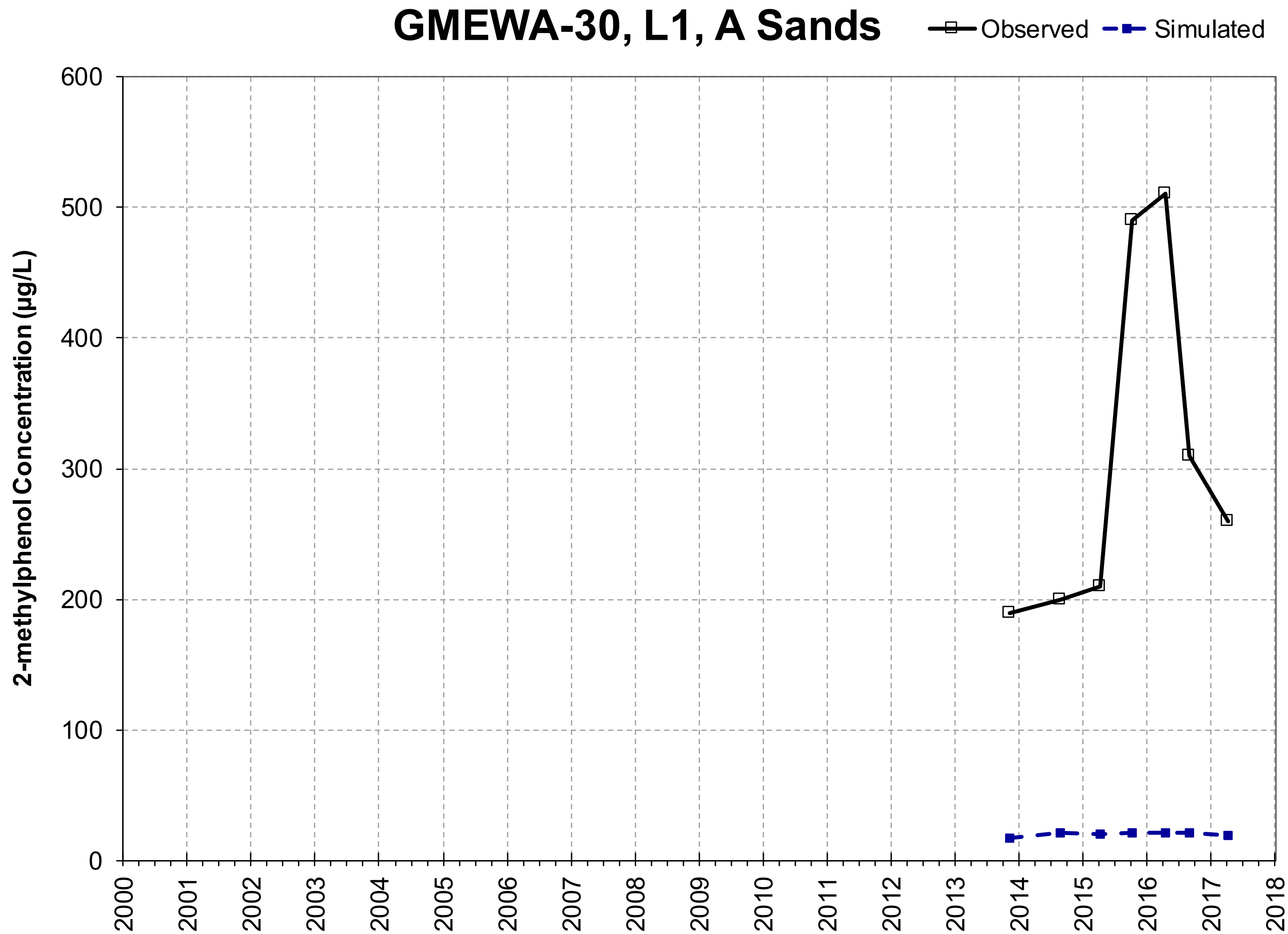


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

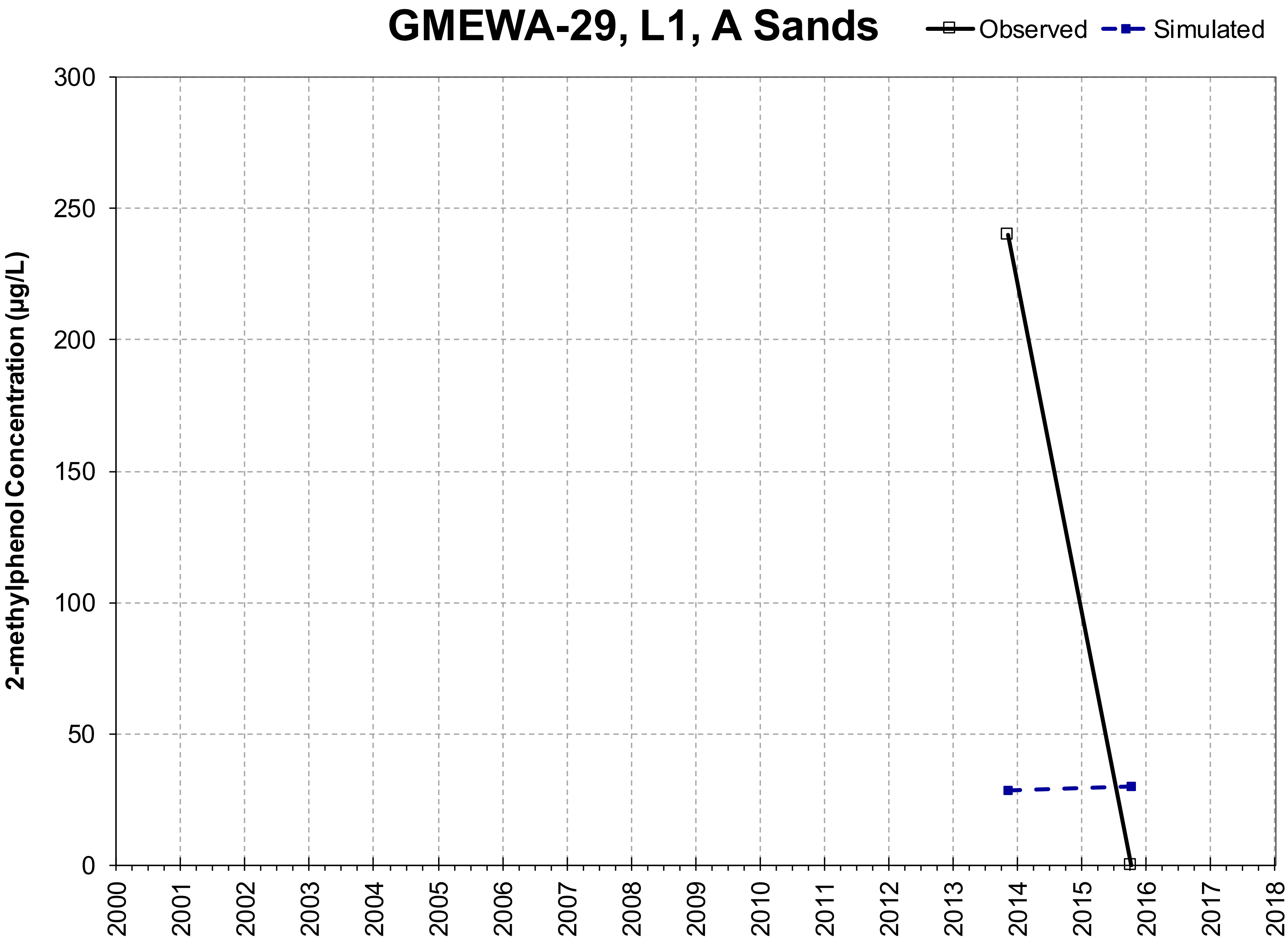


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

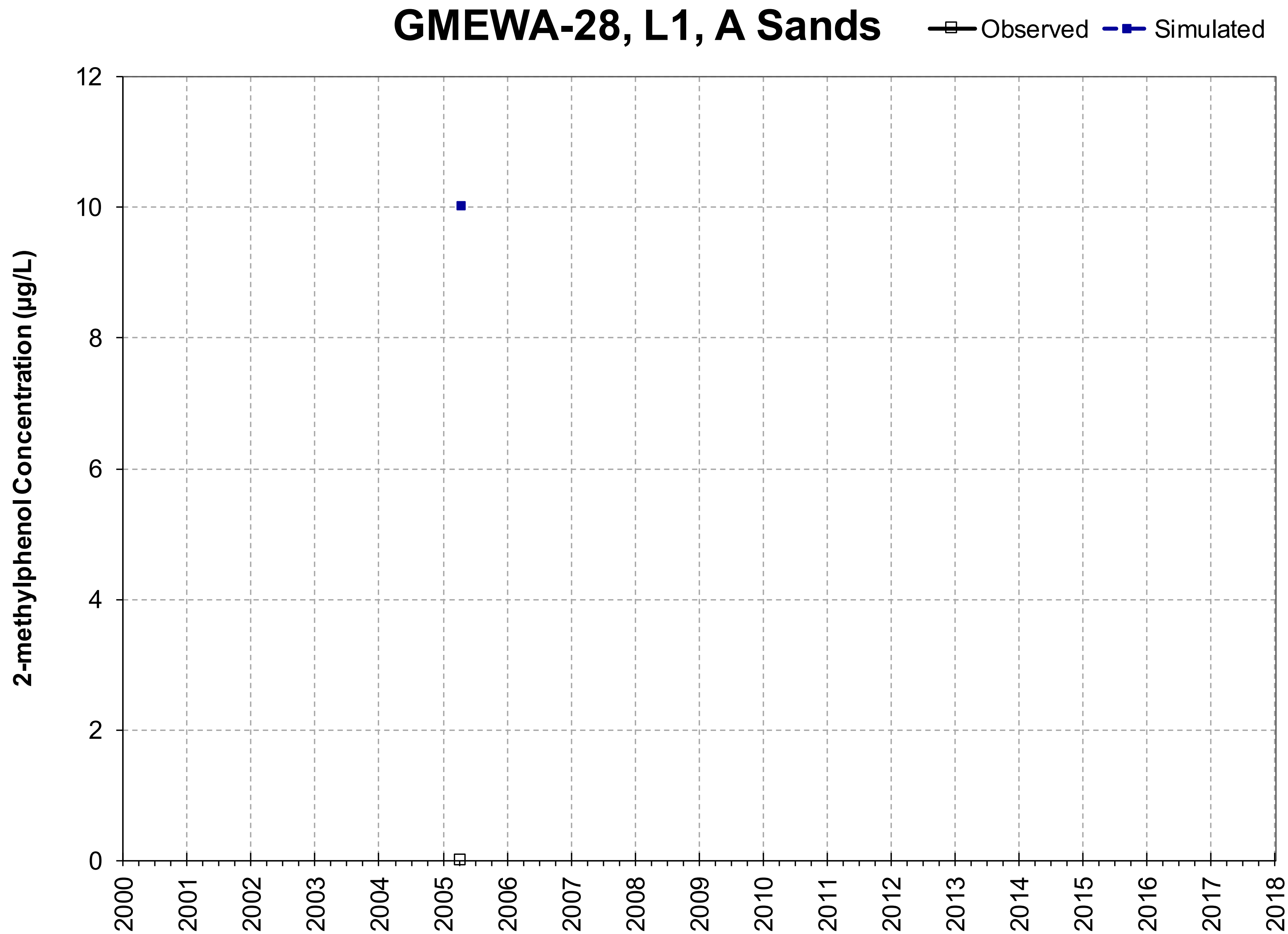


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

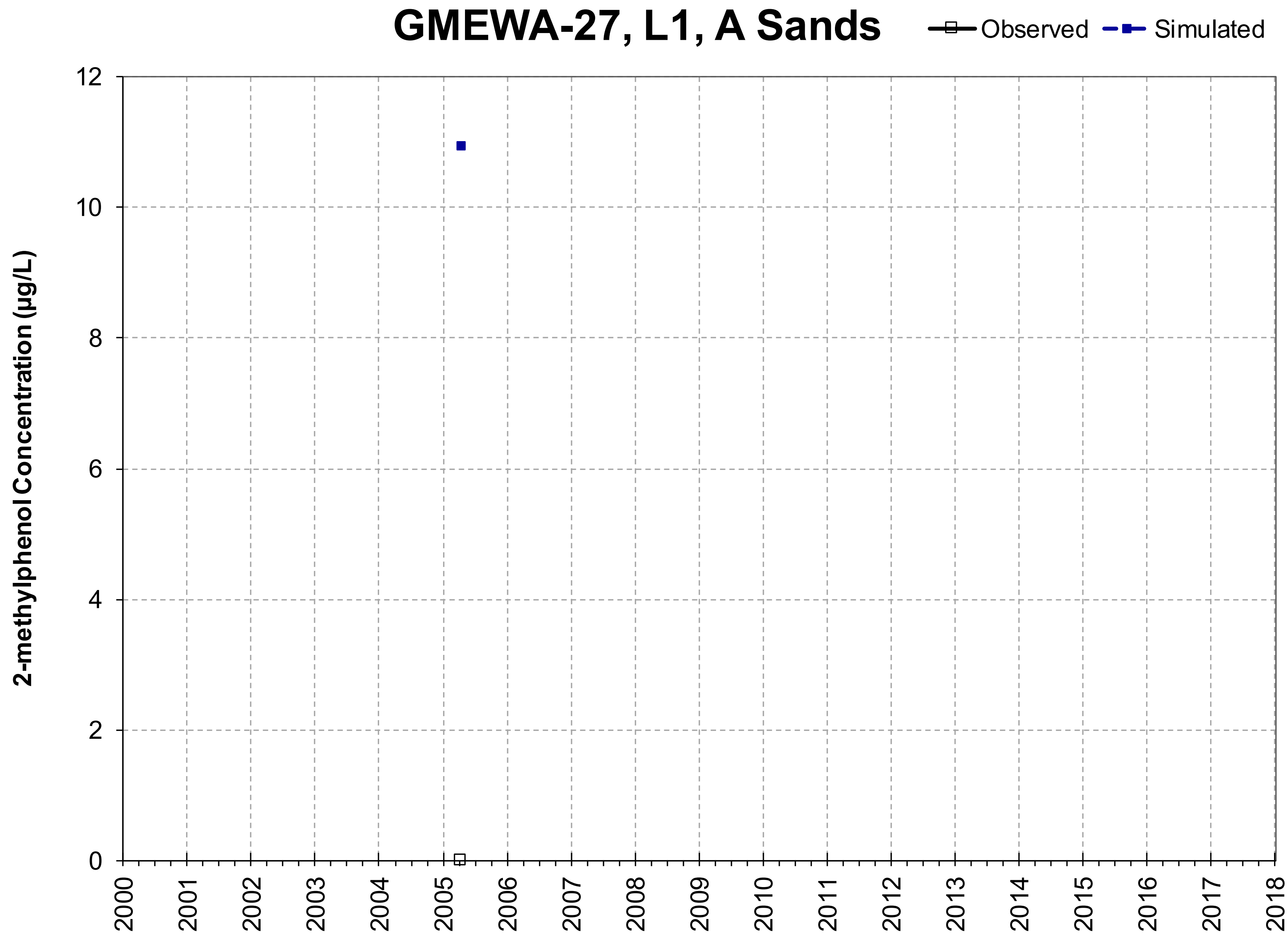


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

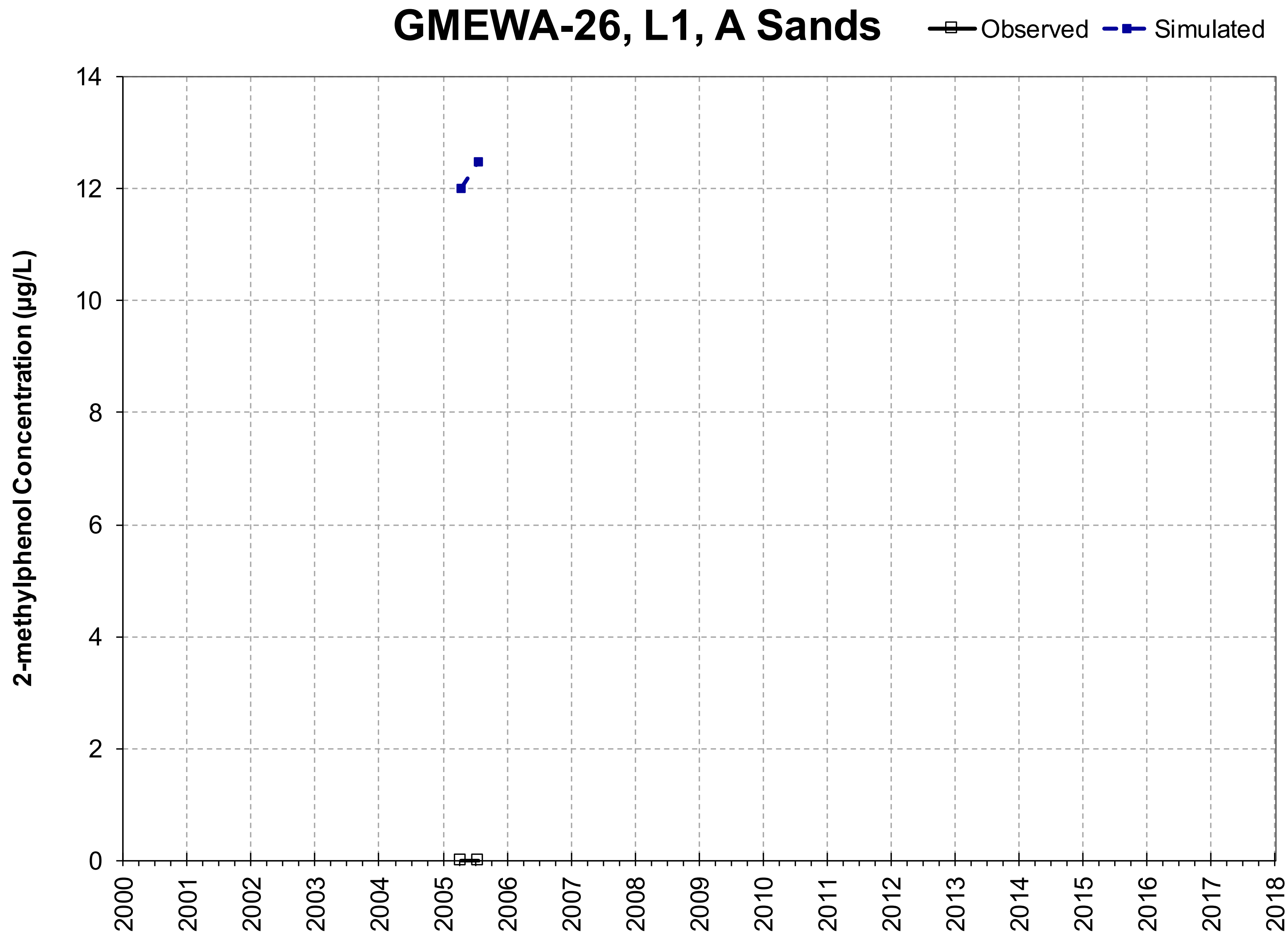


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

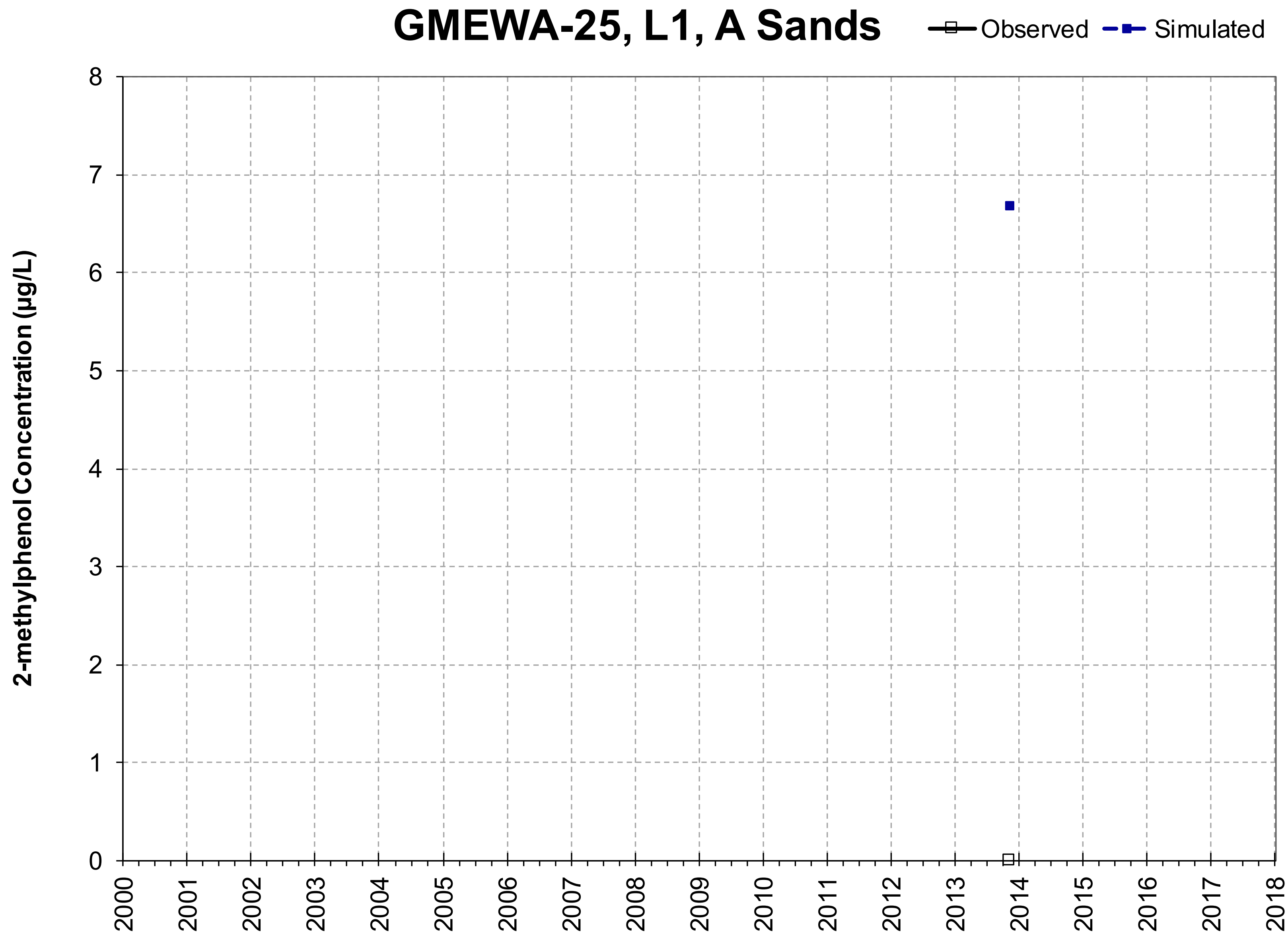


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

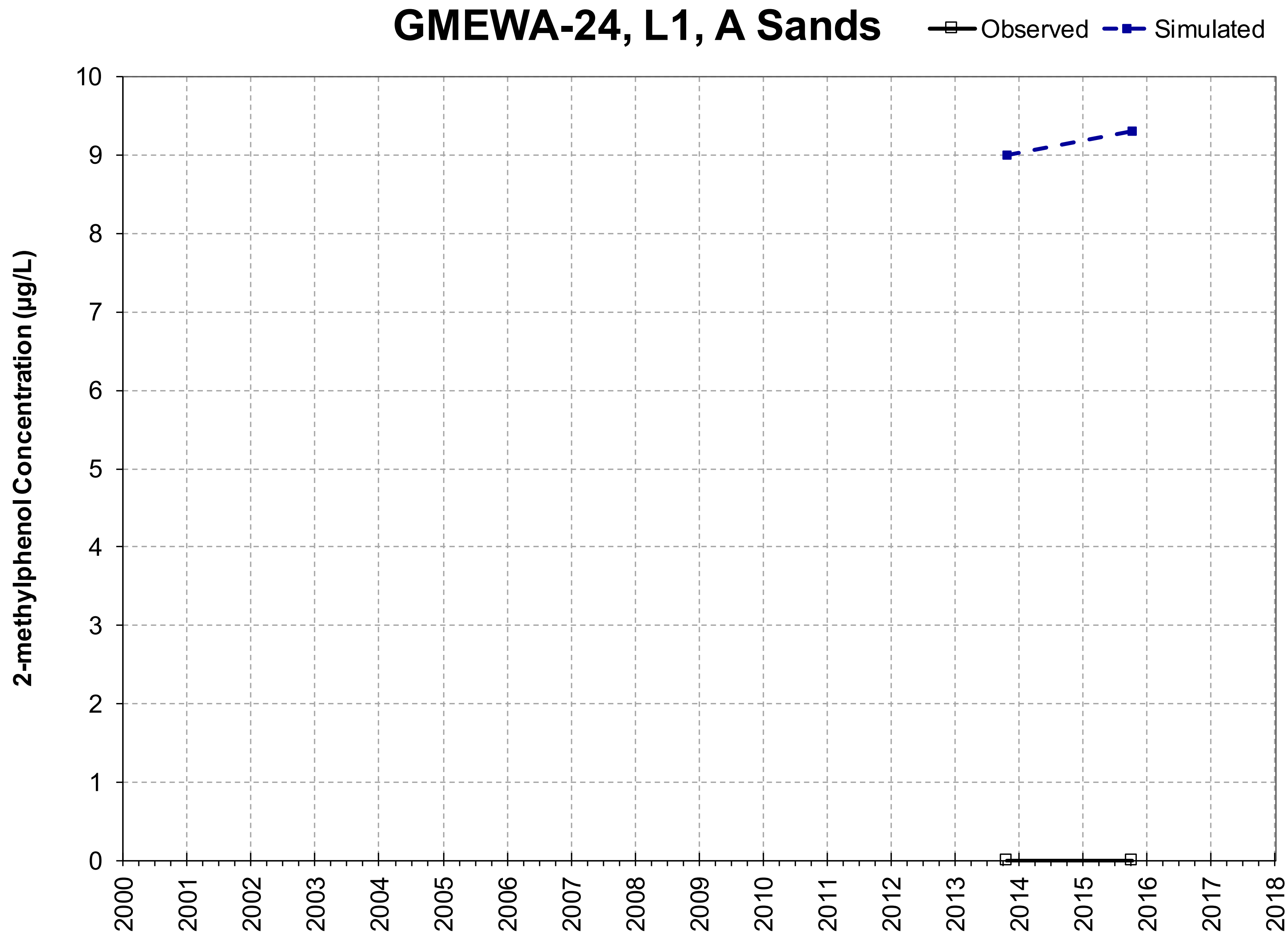


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

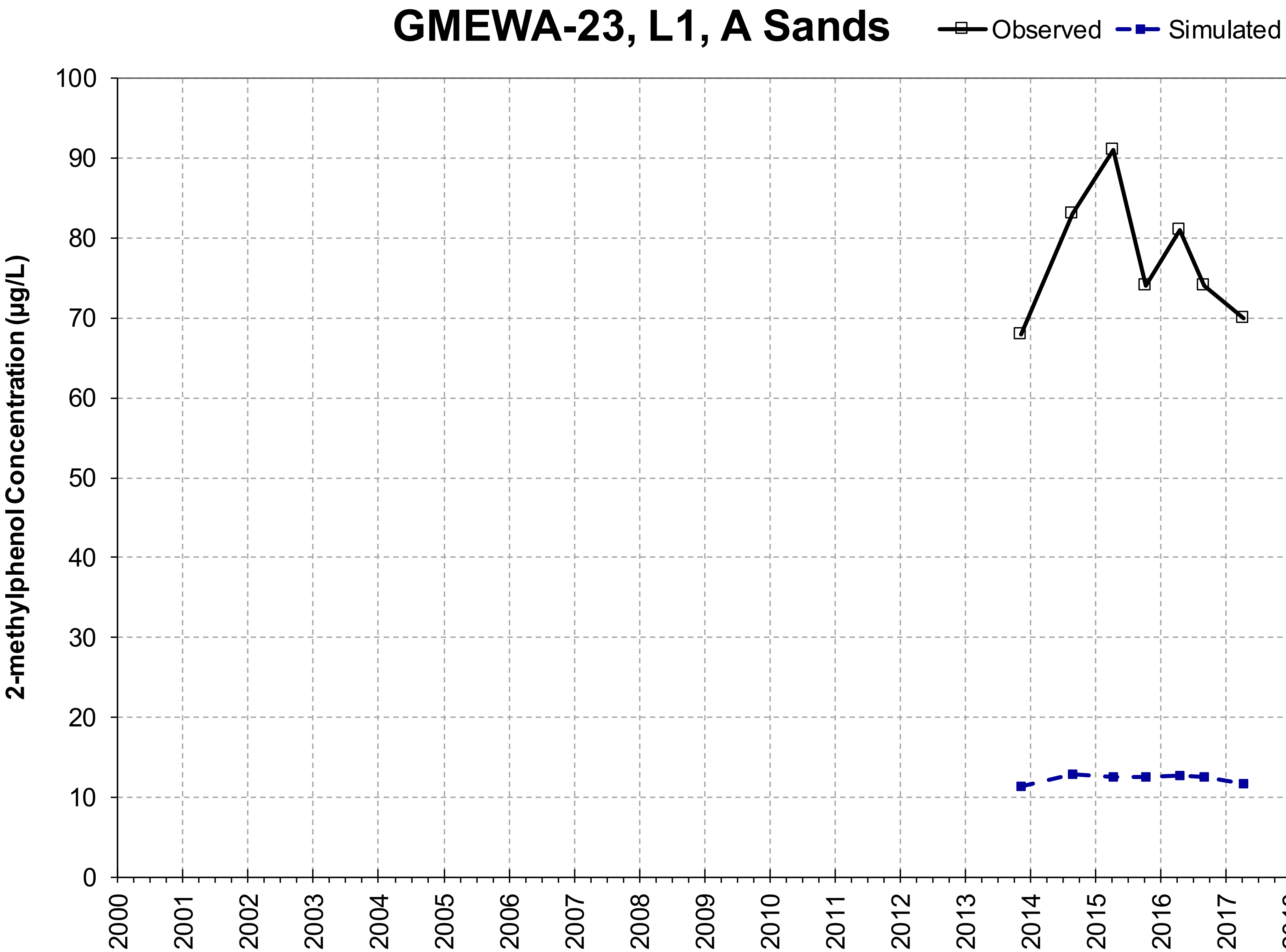


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

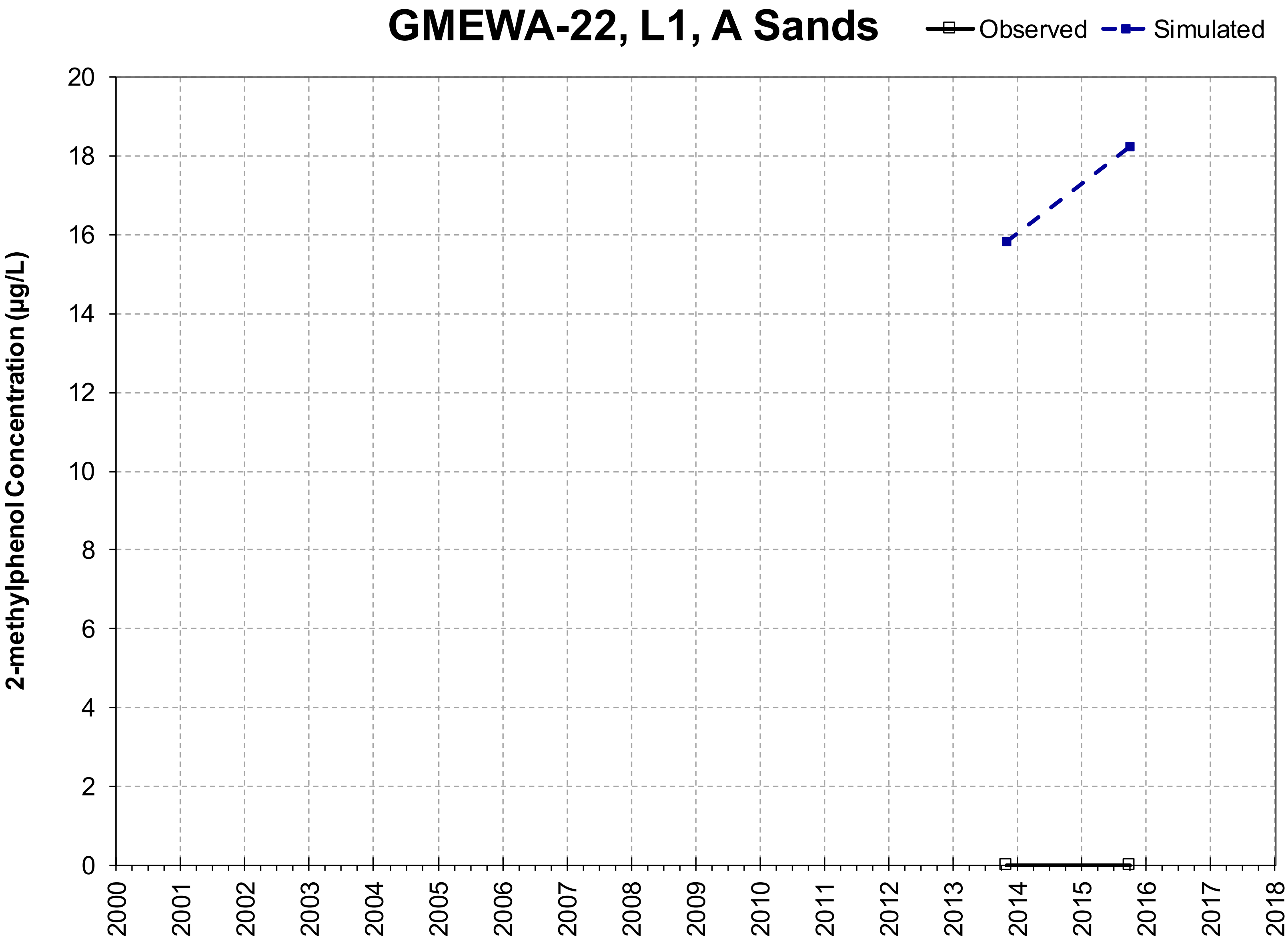


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE B

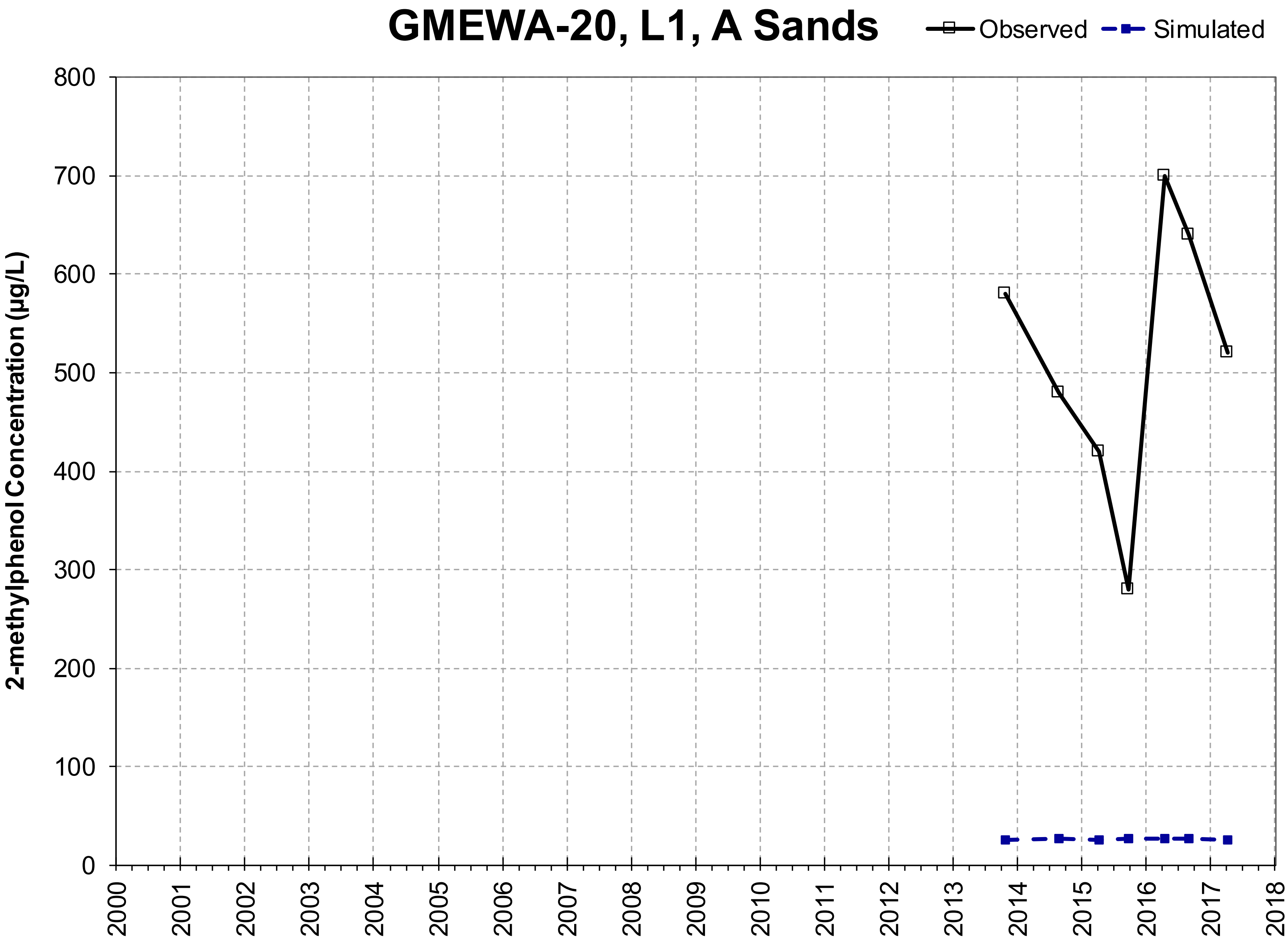


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

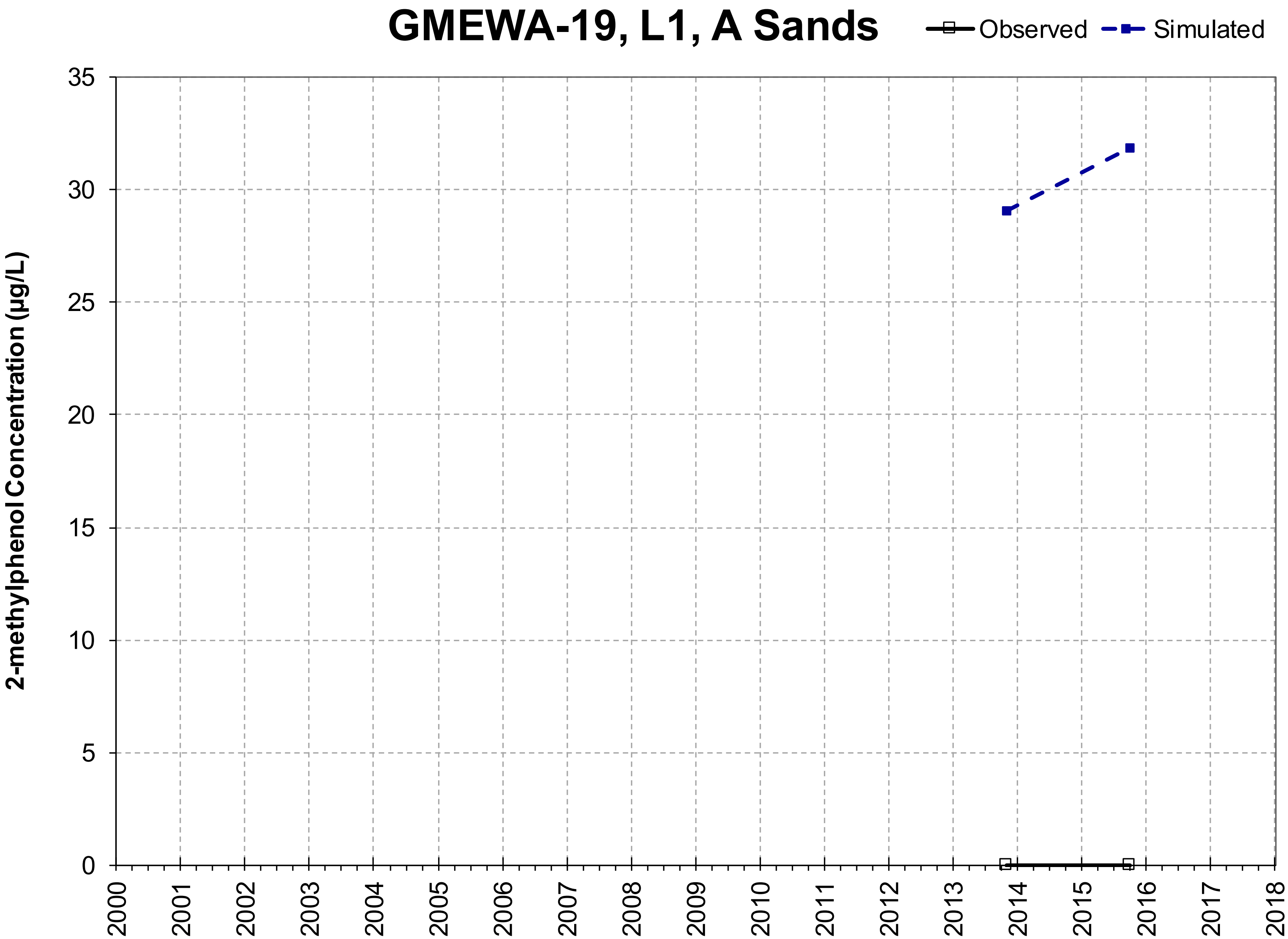


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

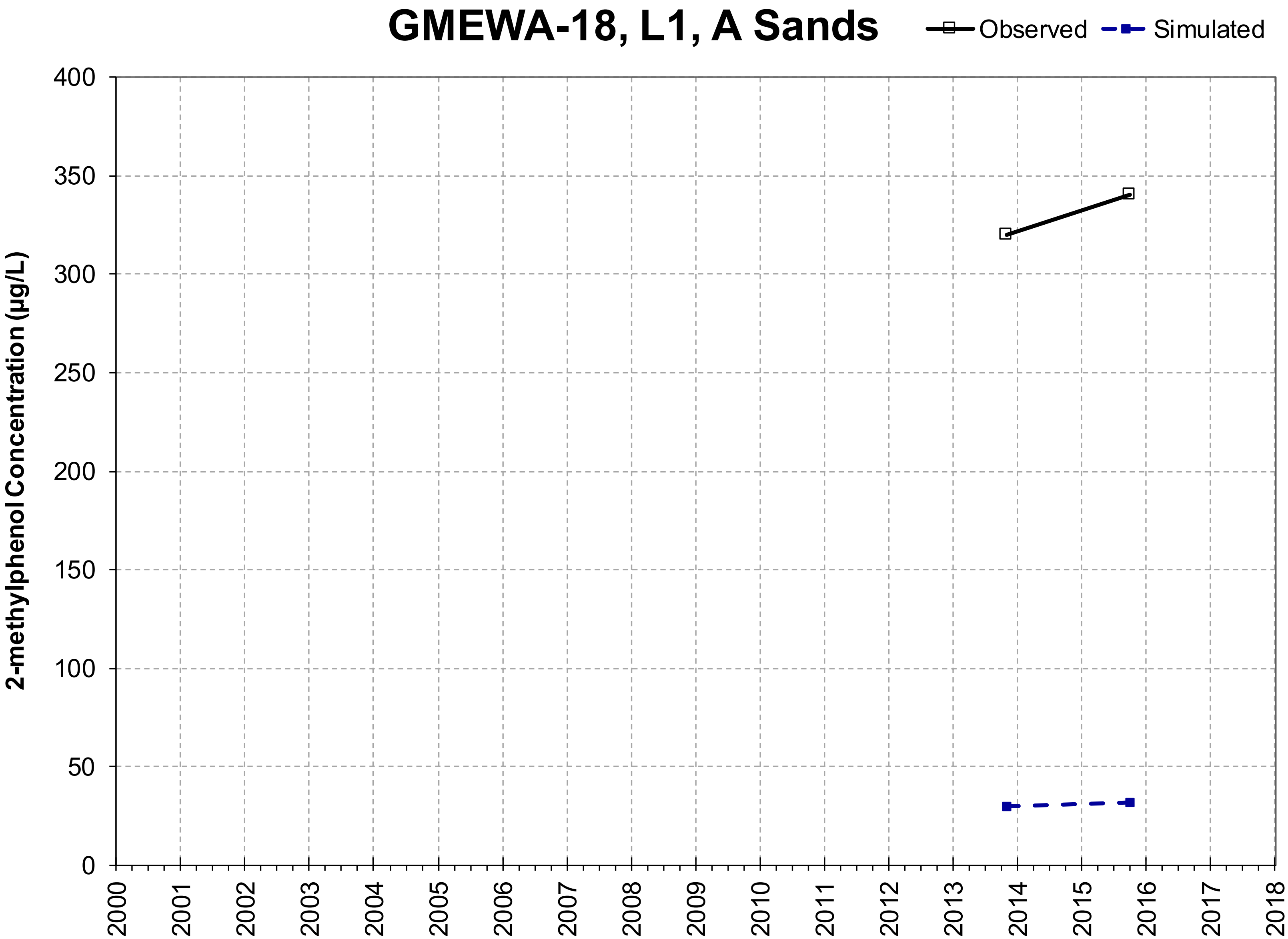


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

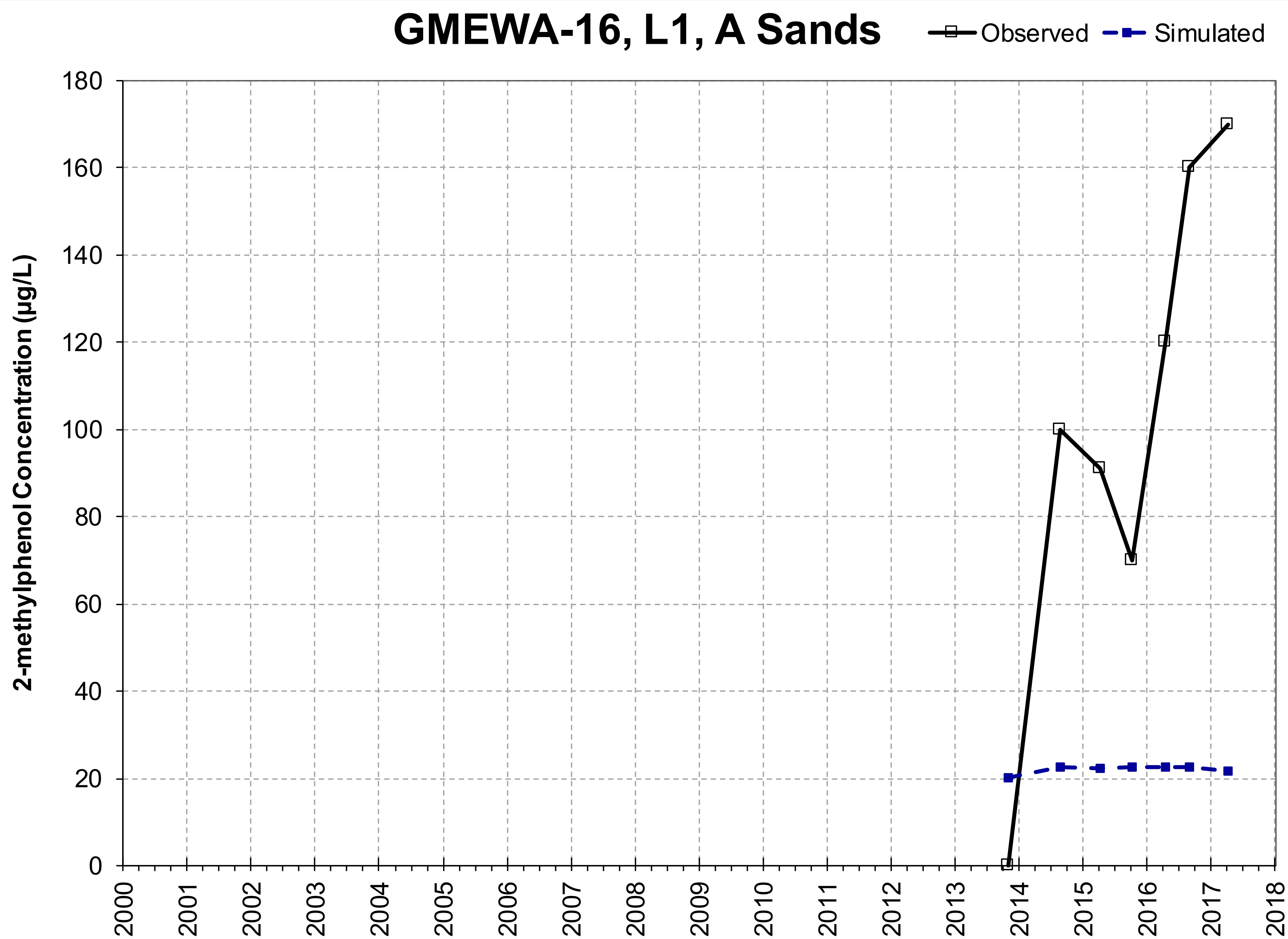


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE B

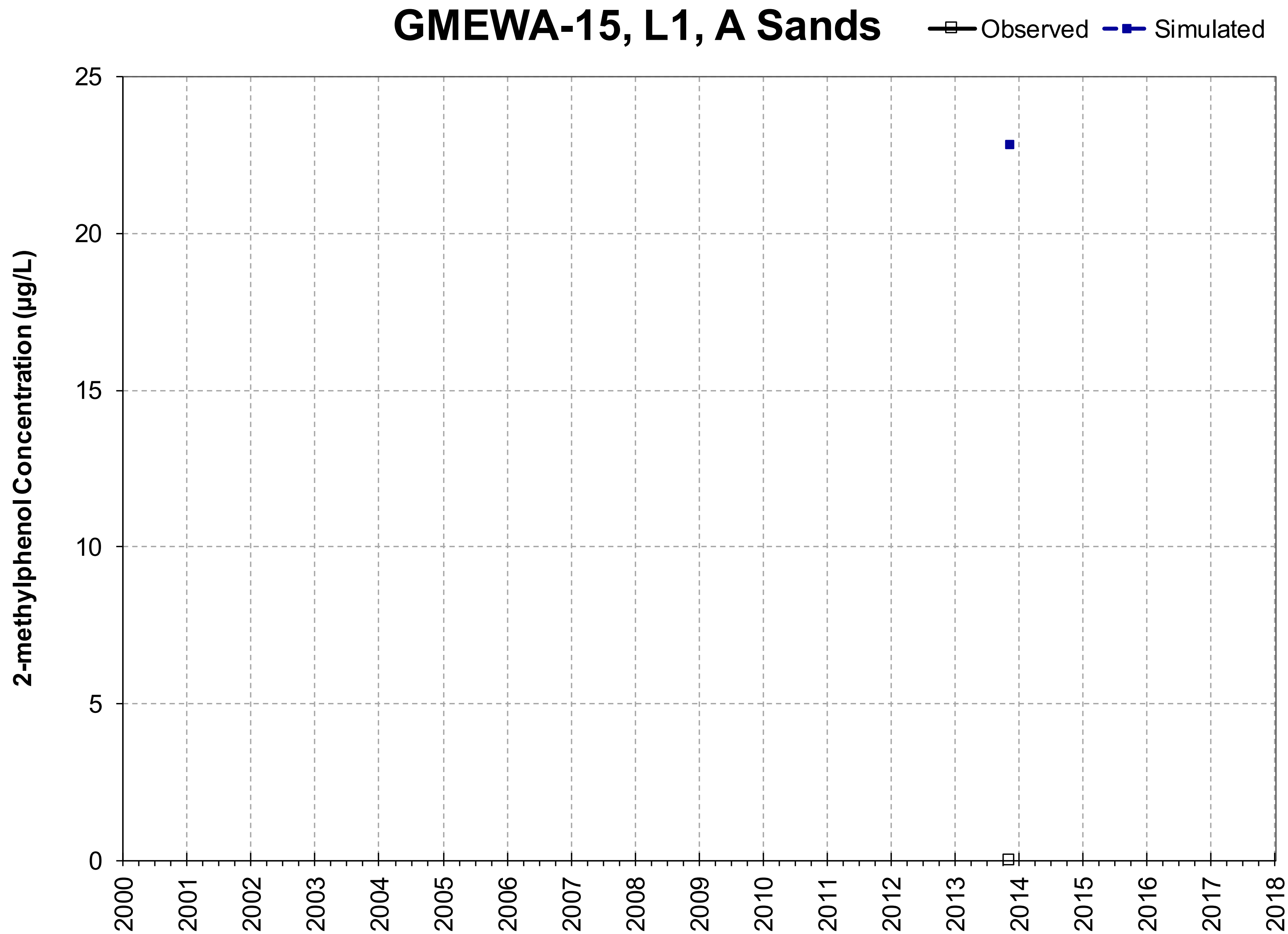


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

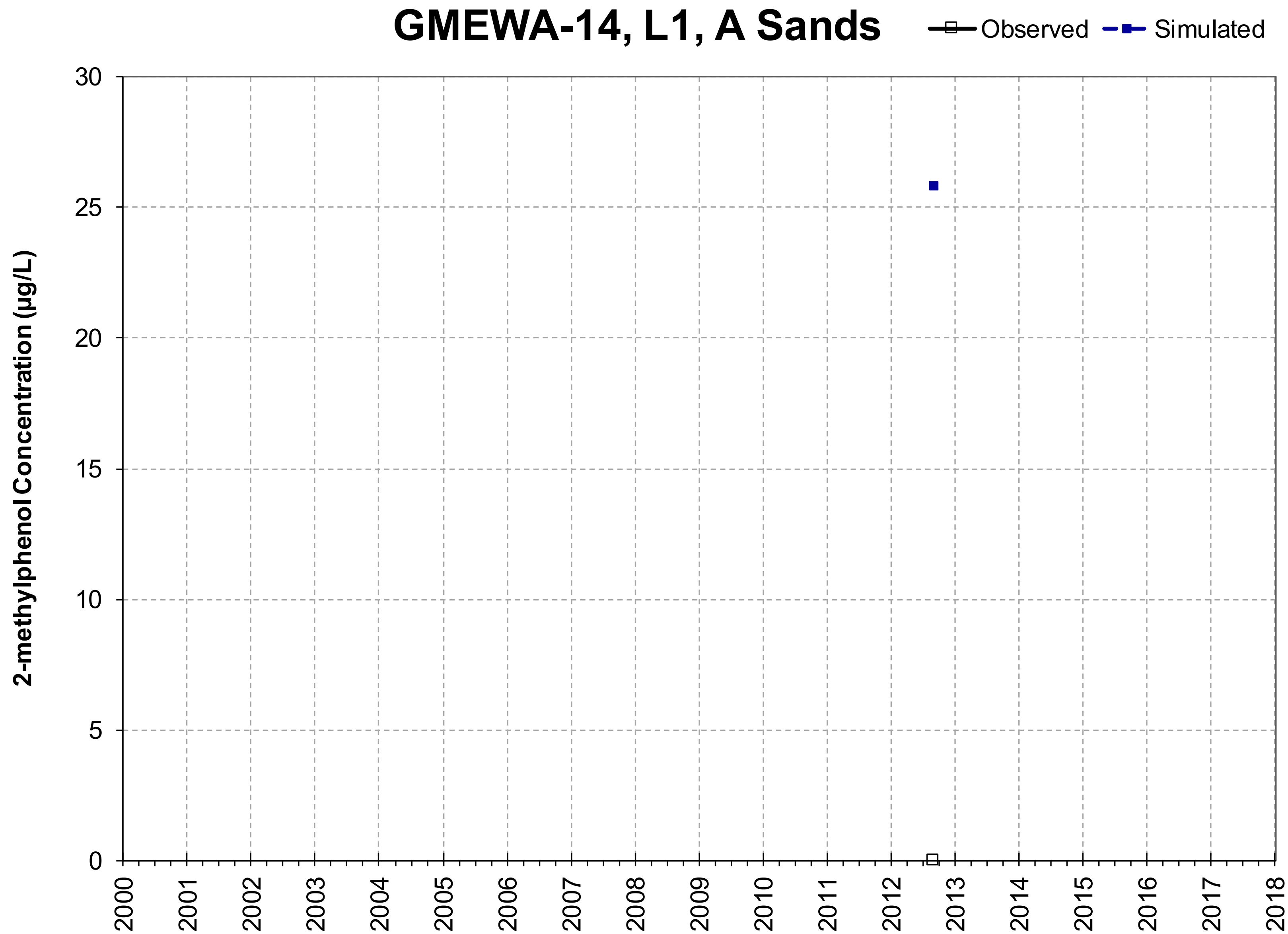


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

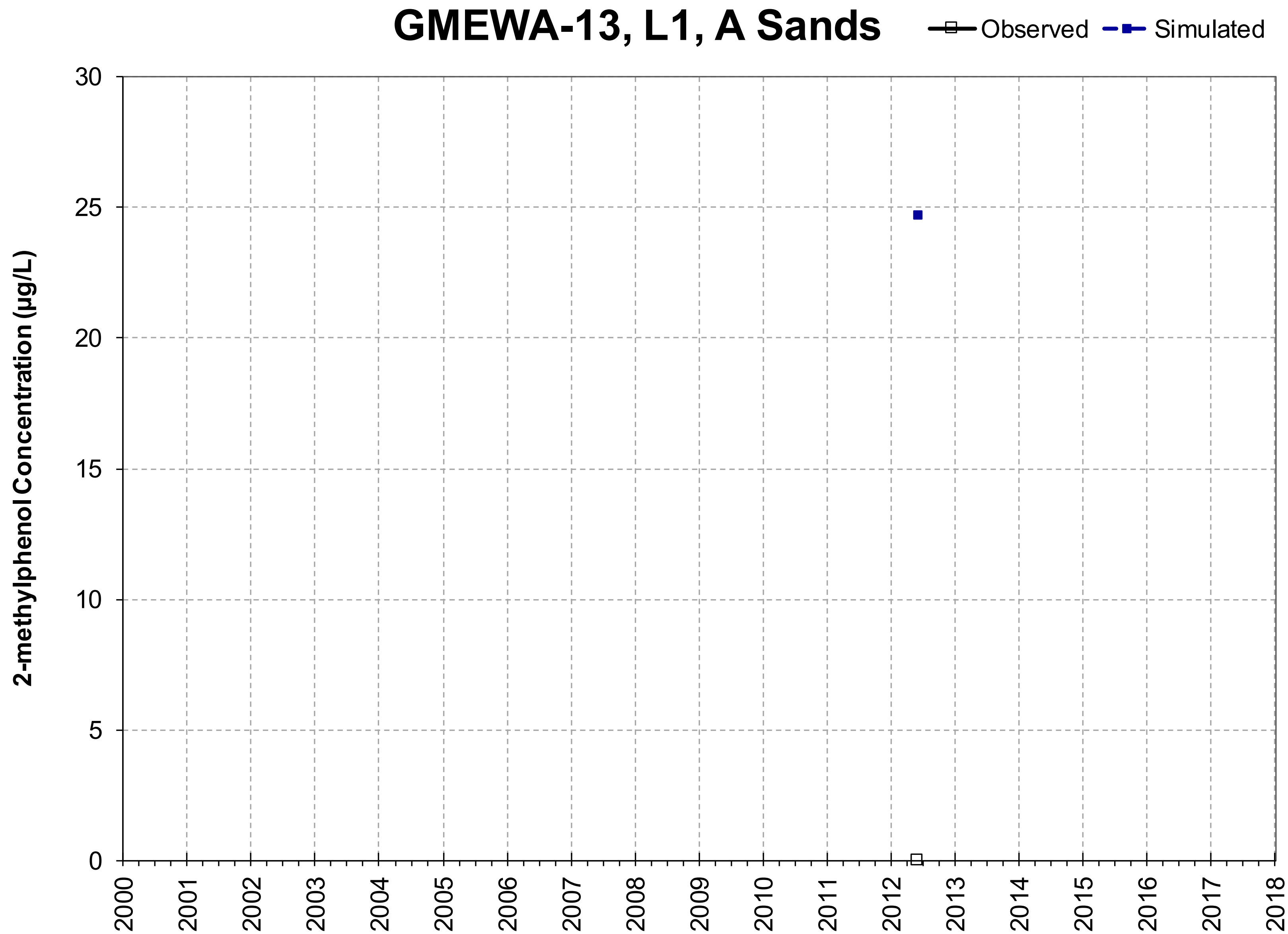


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

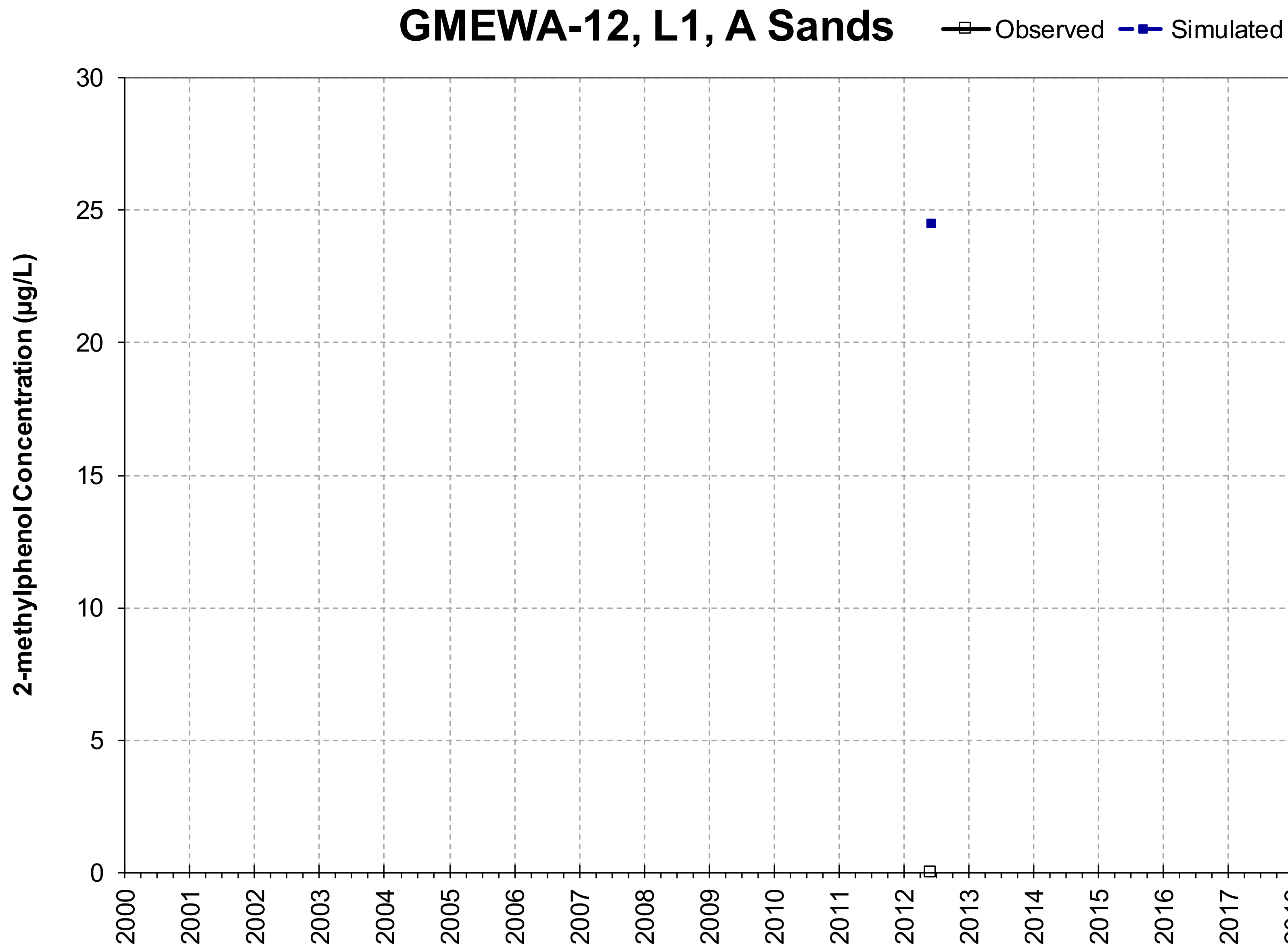


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

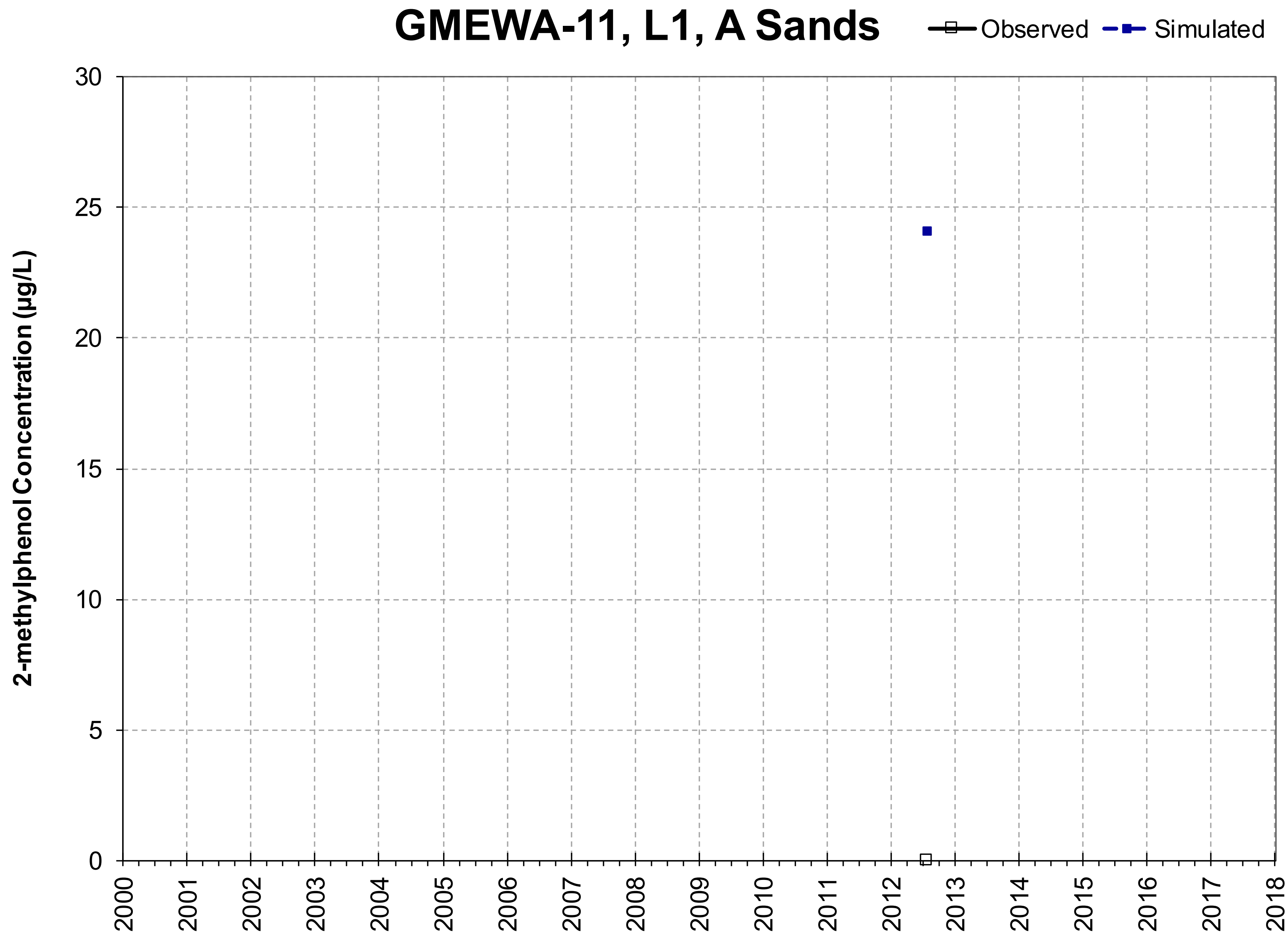


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

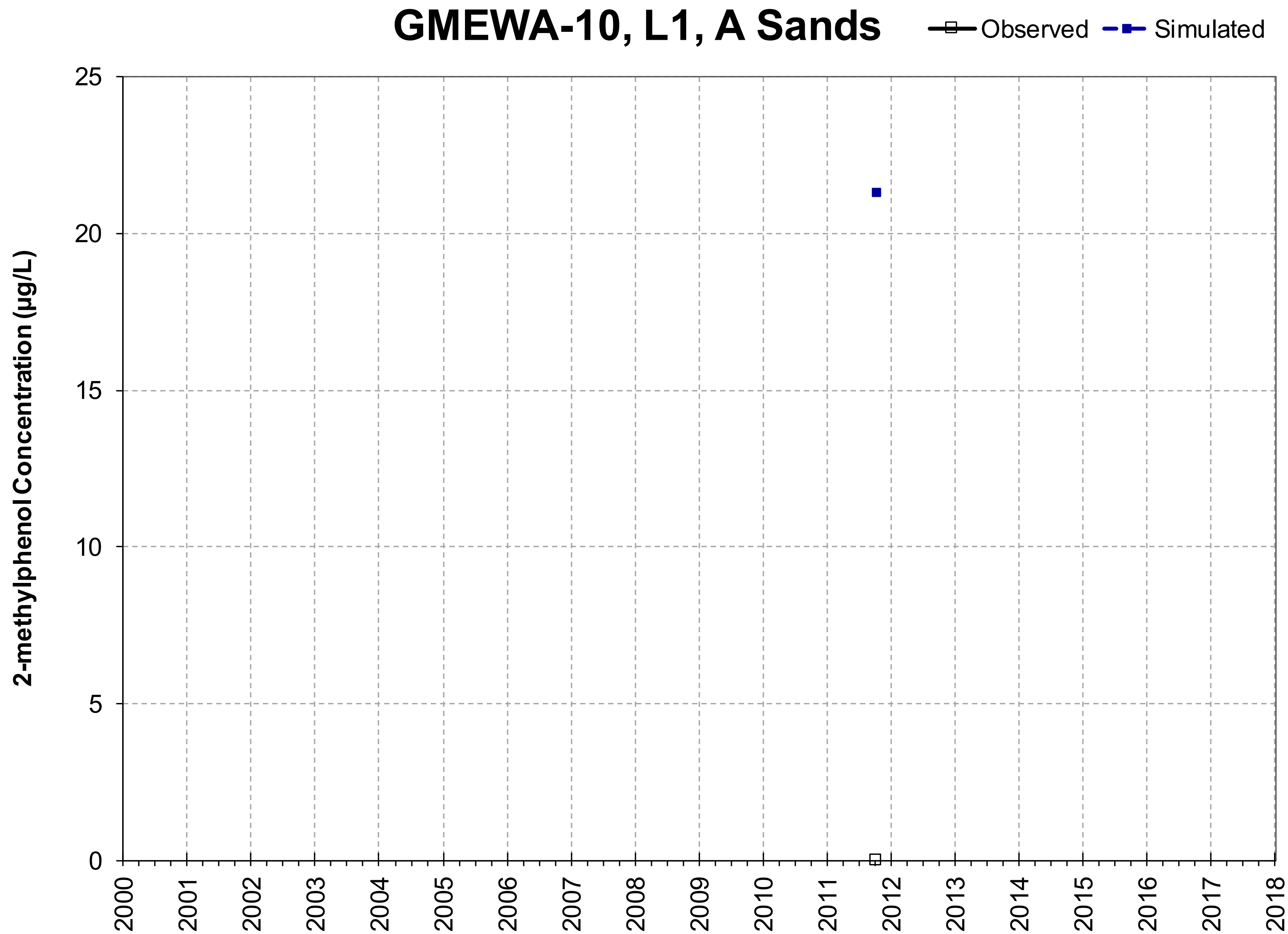


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

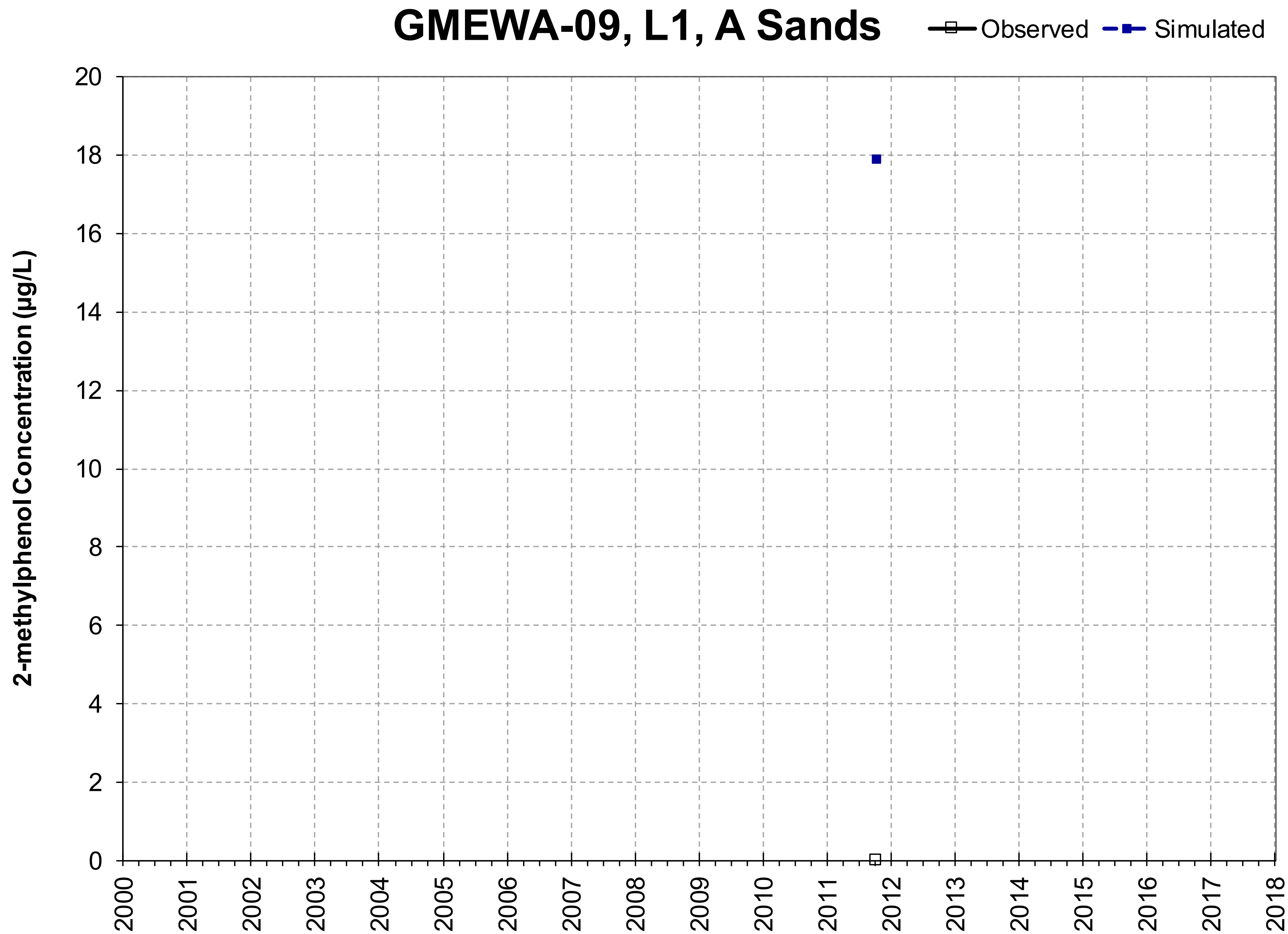


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

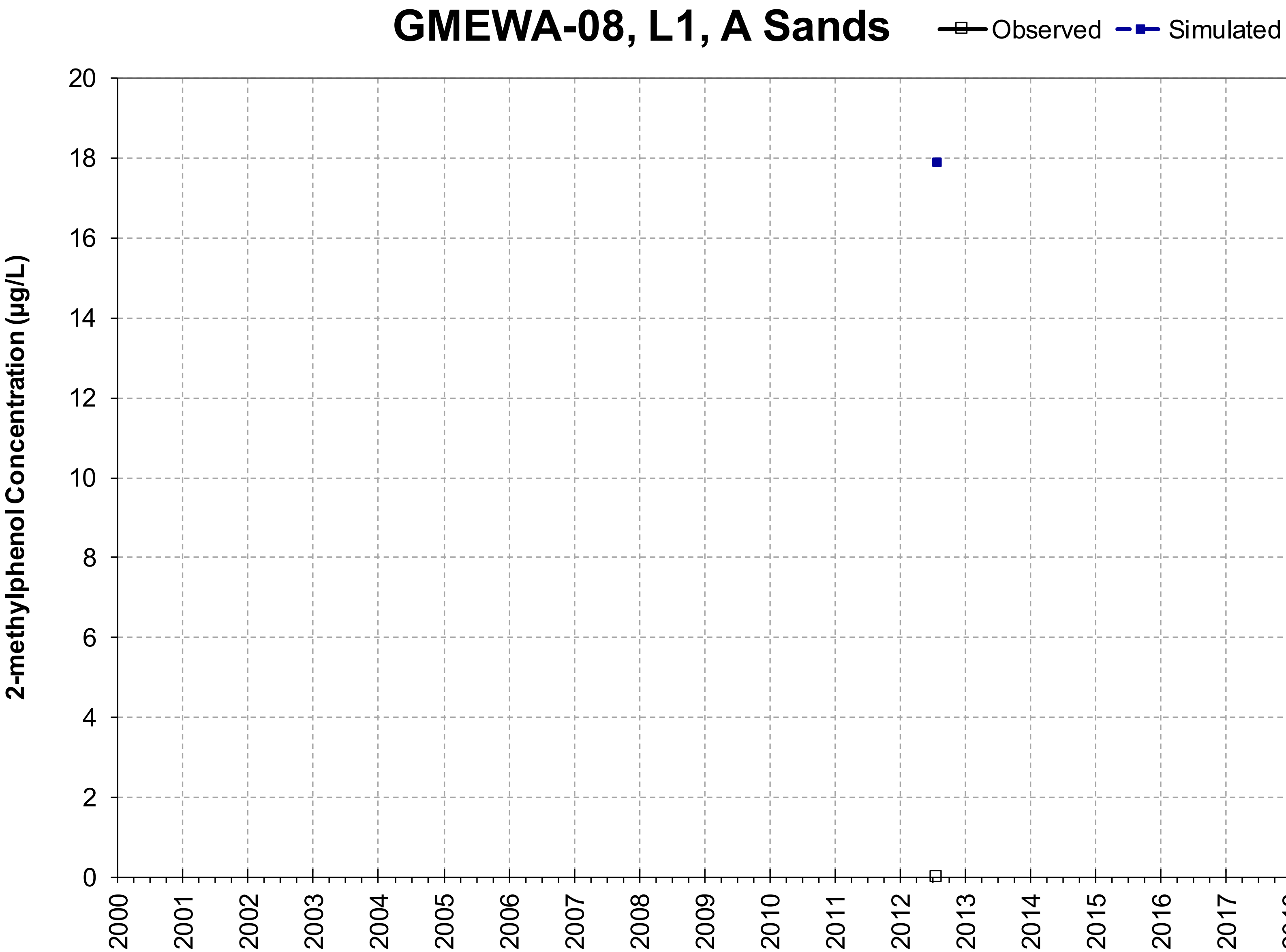


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

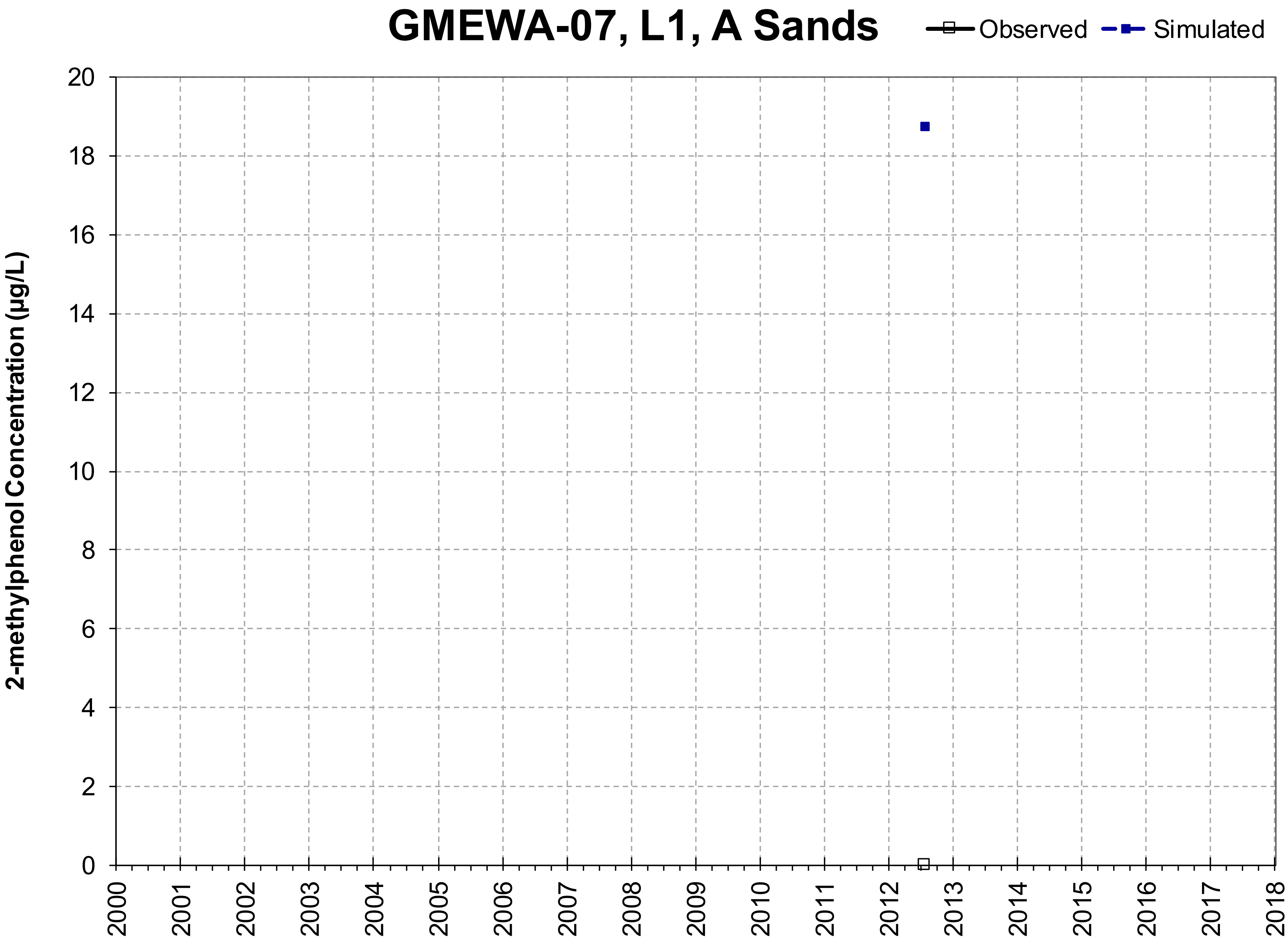


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

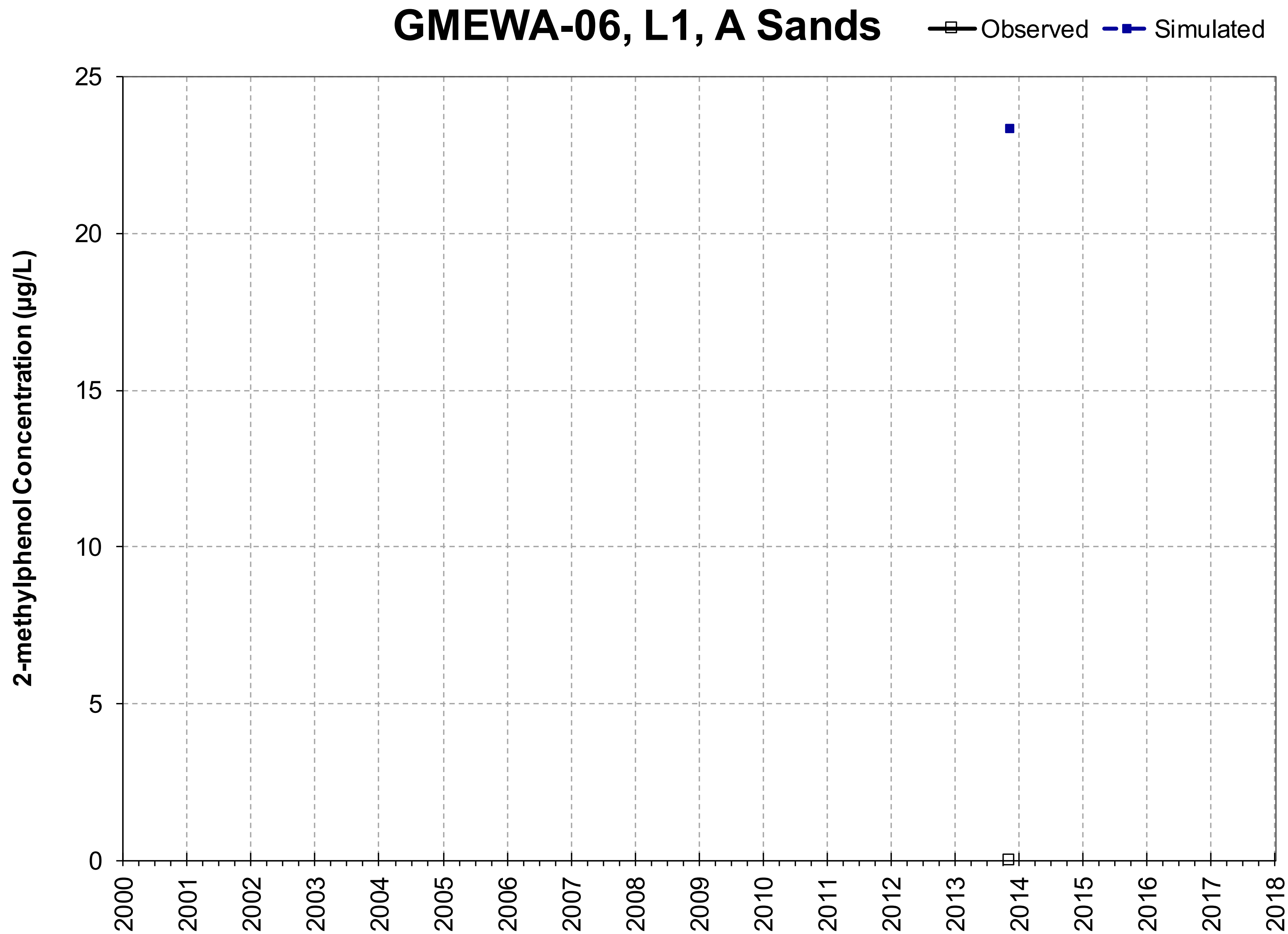


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

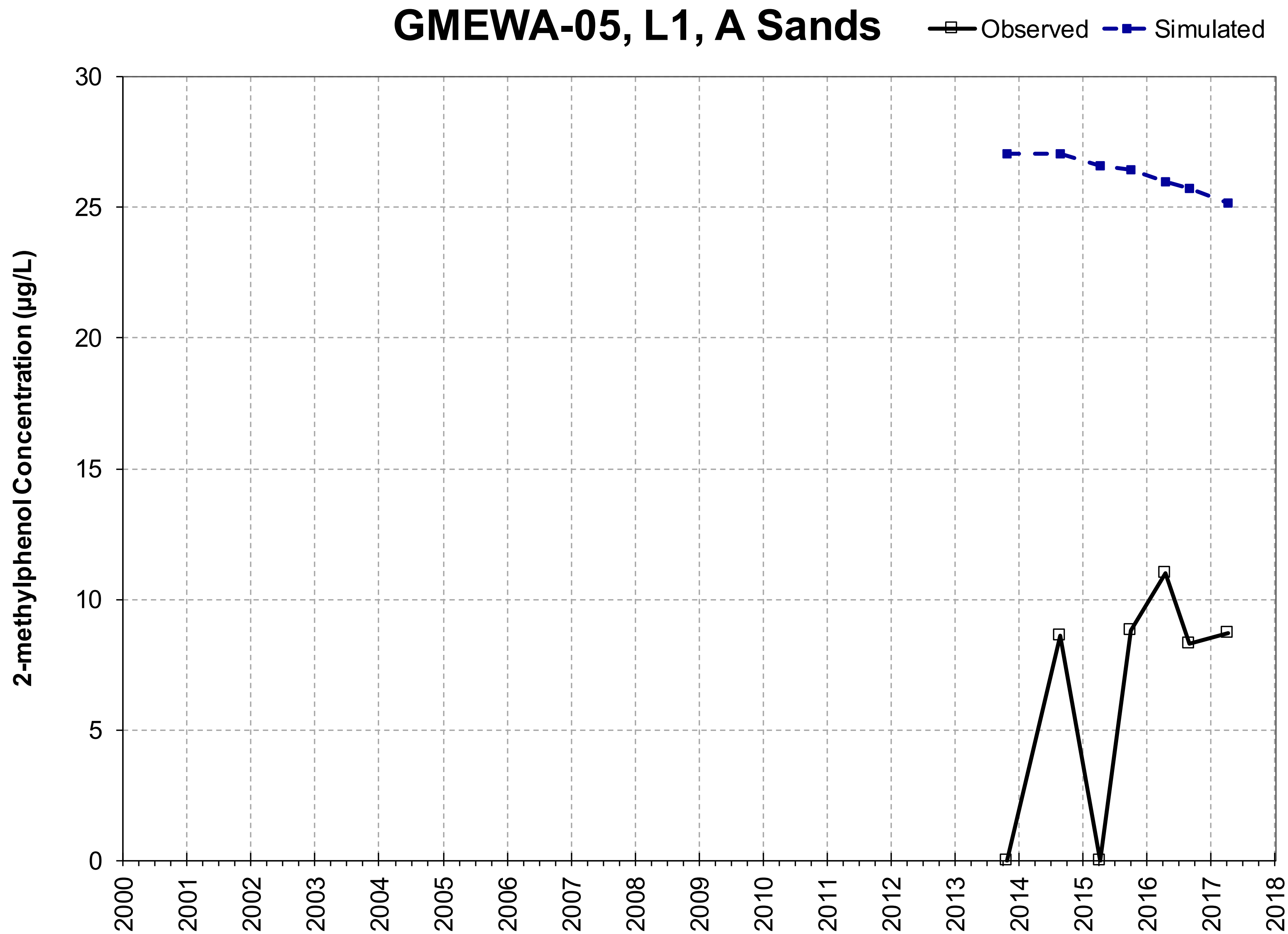


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

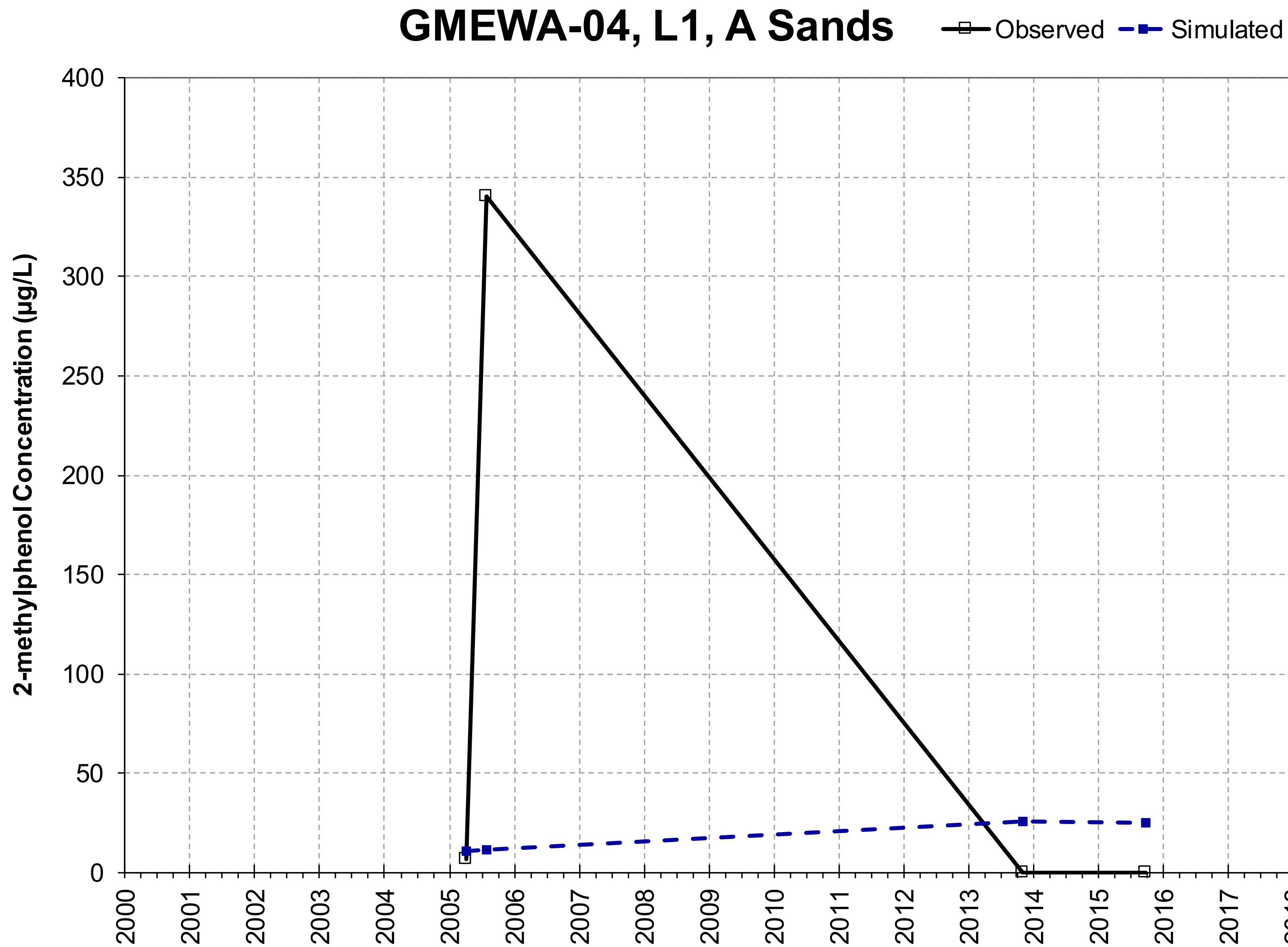


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL
SIMULATED CONCENTRATION PLOTS
(2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

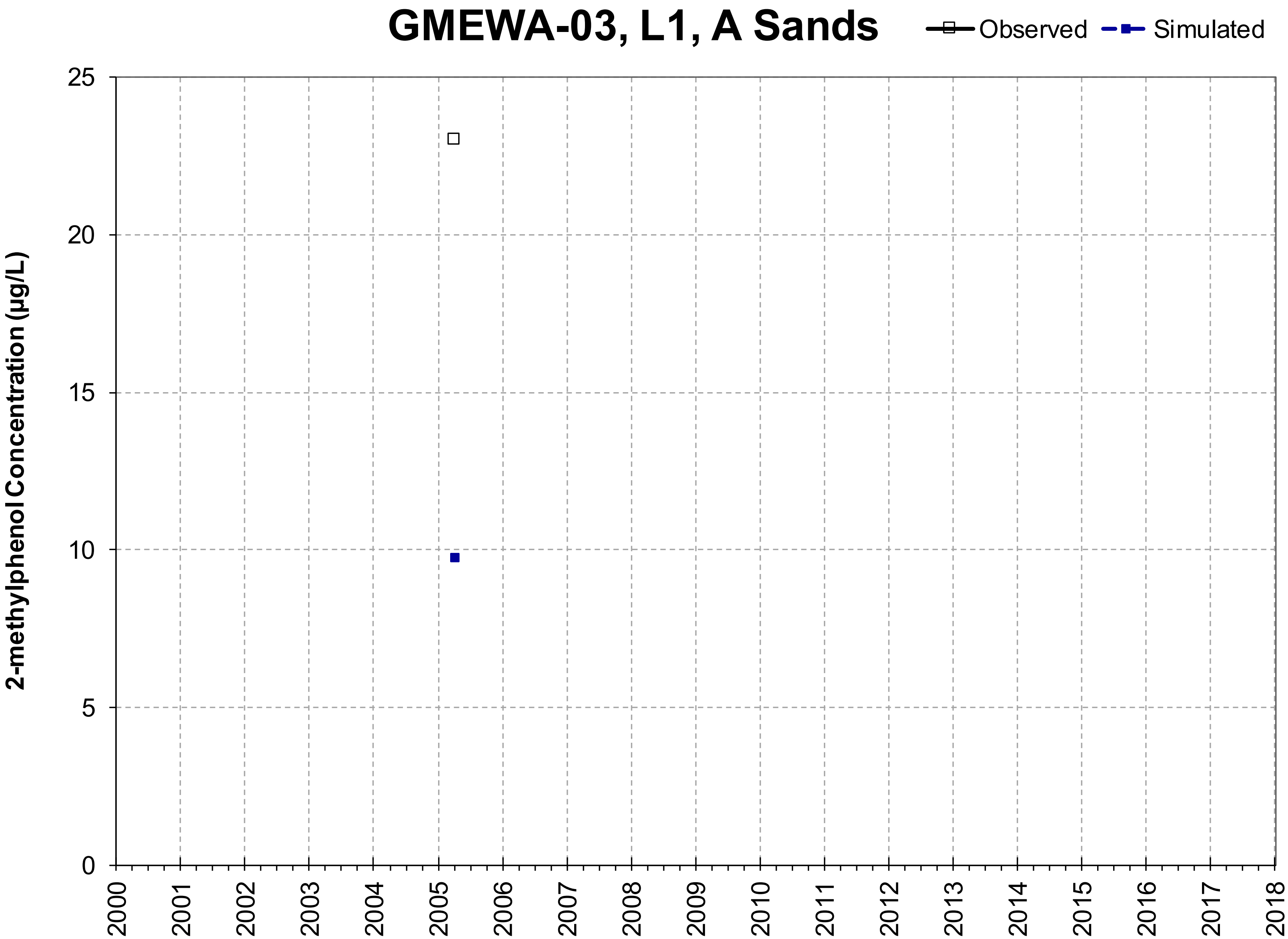


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

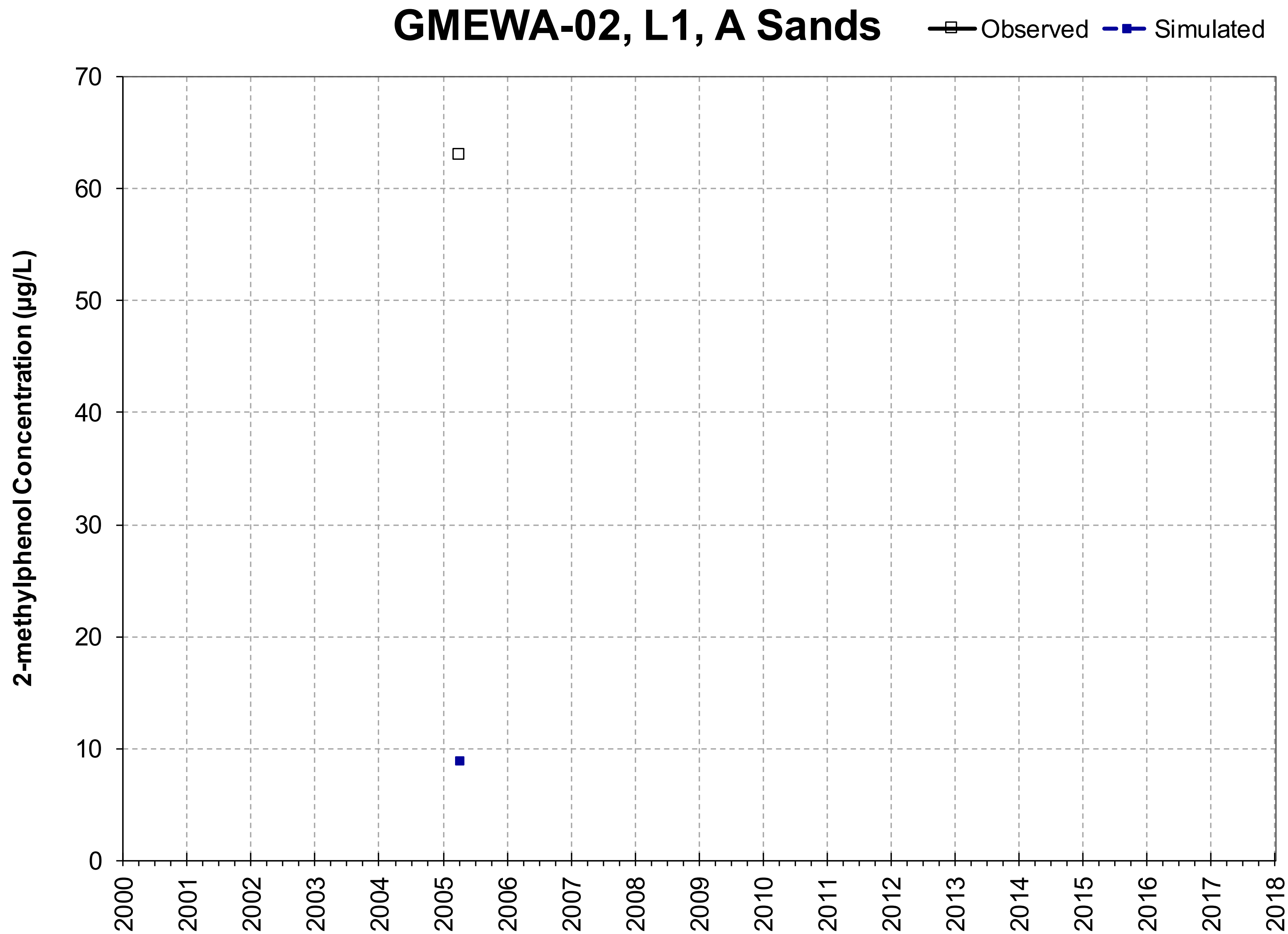


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

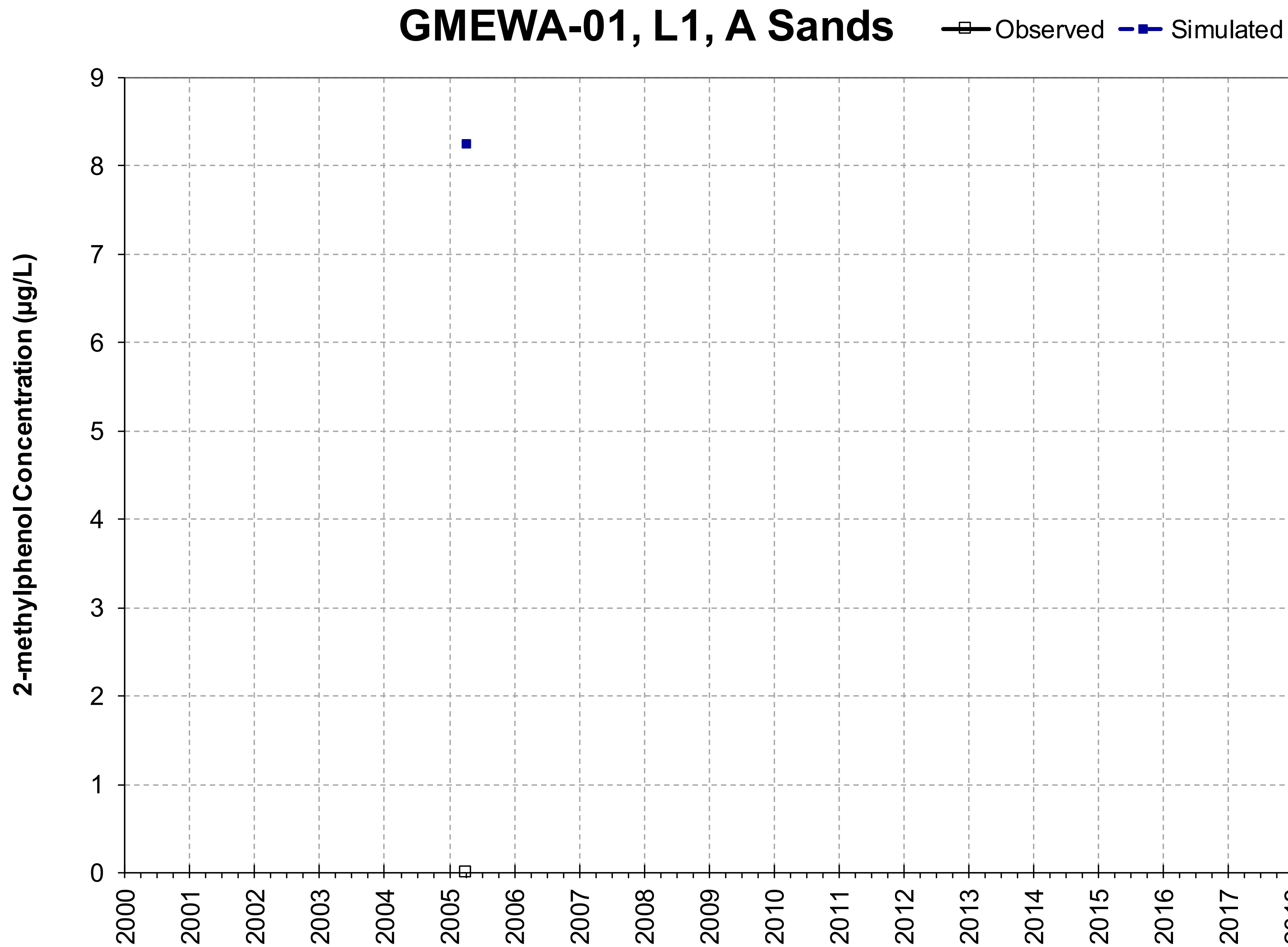


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

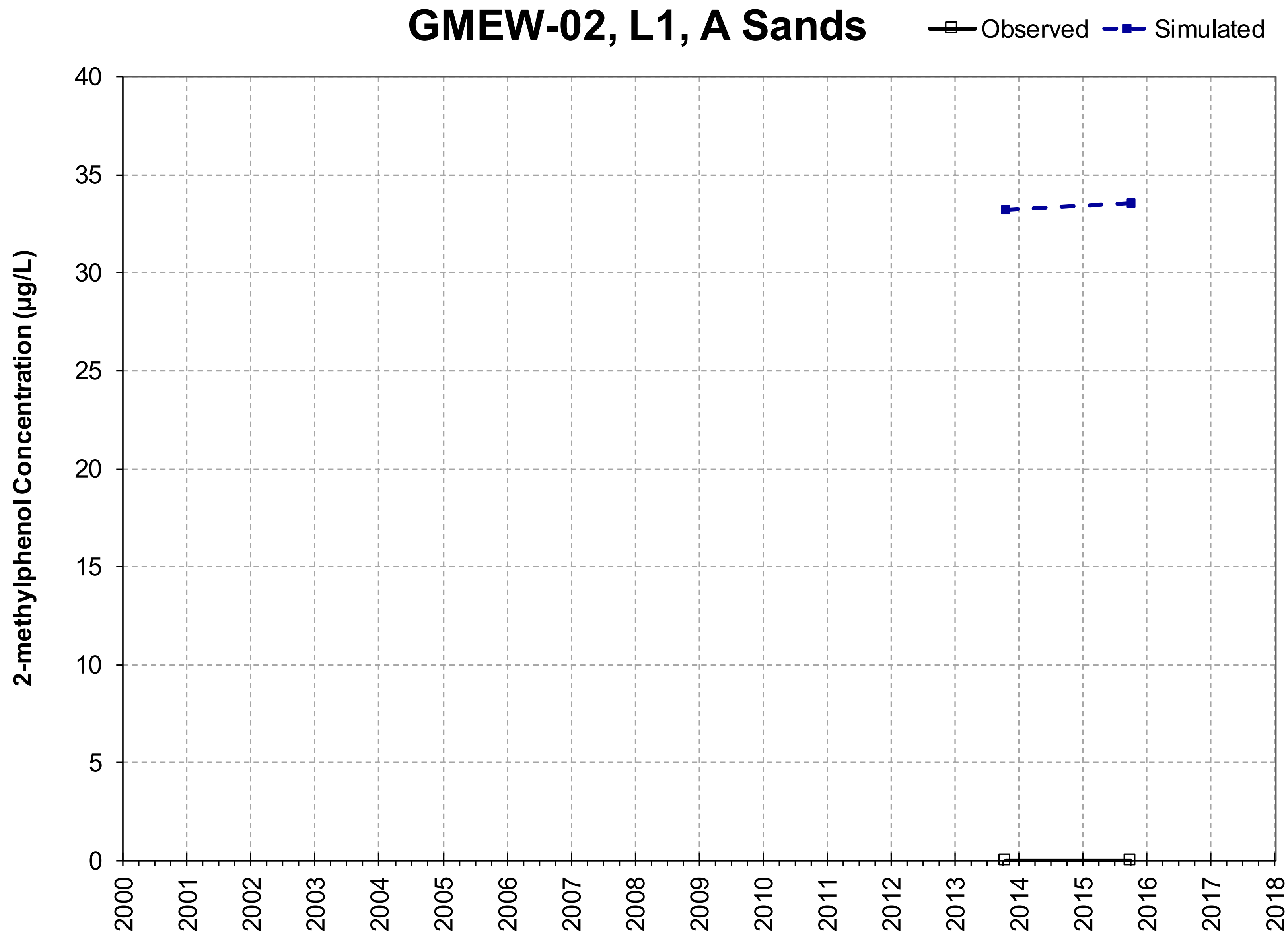


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

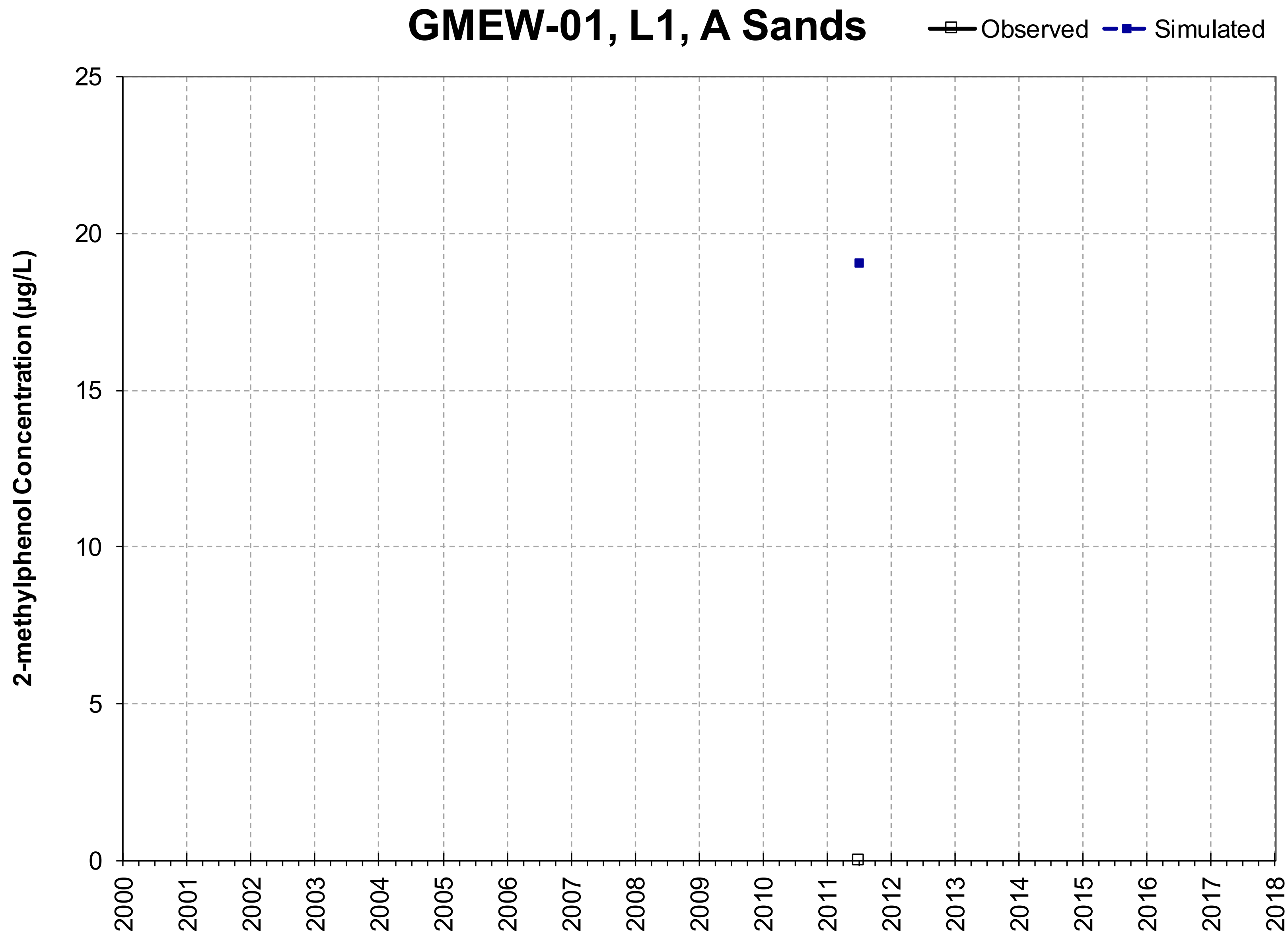


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

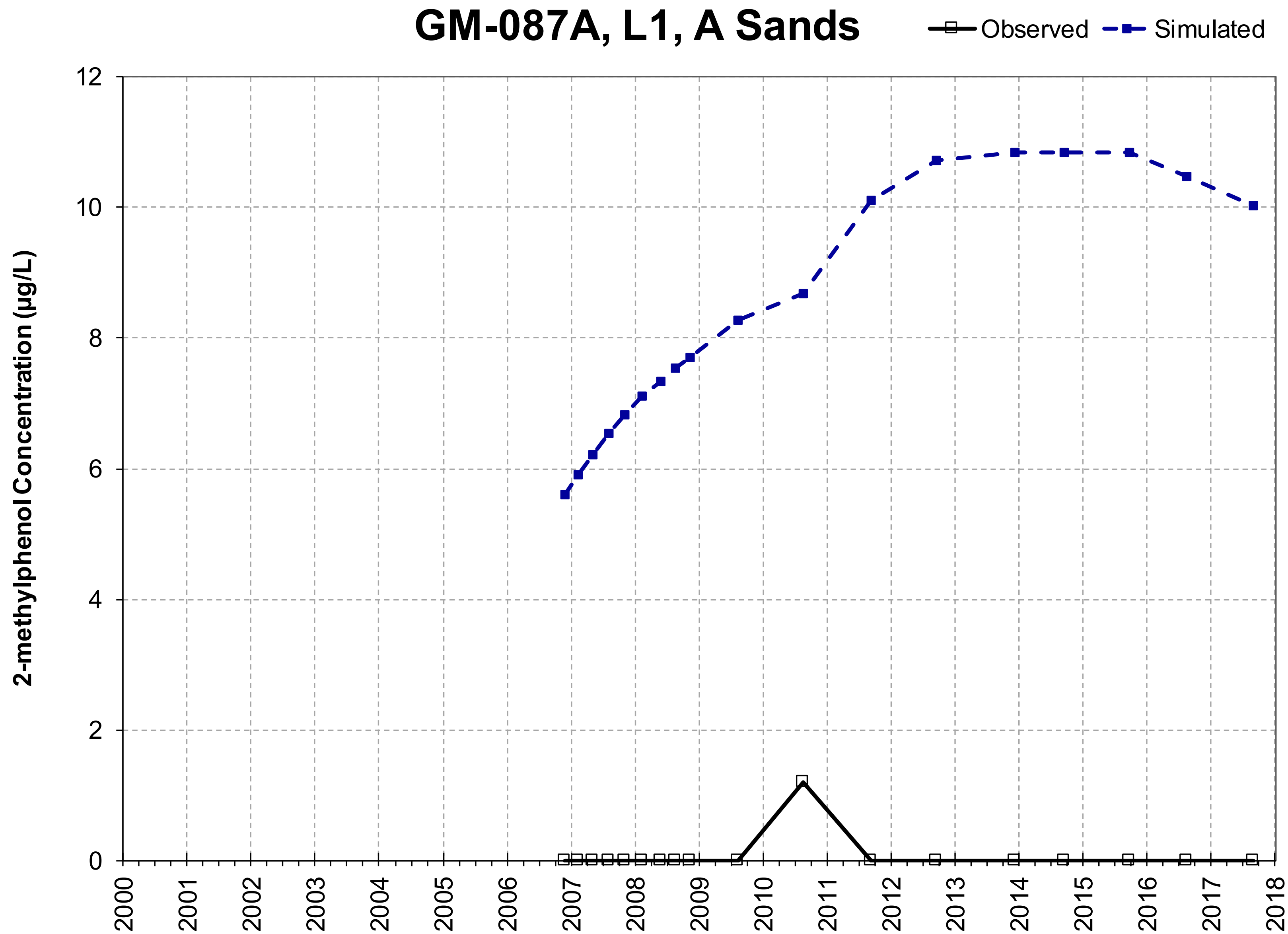


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

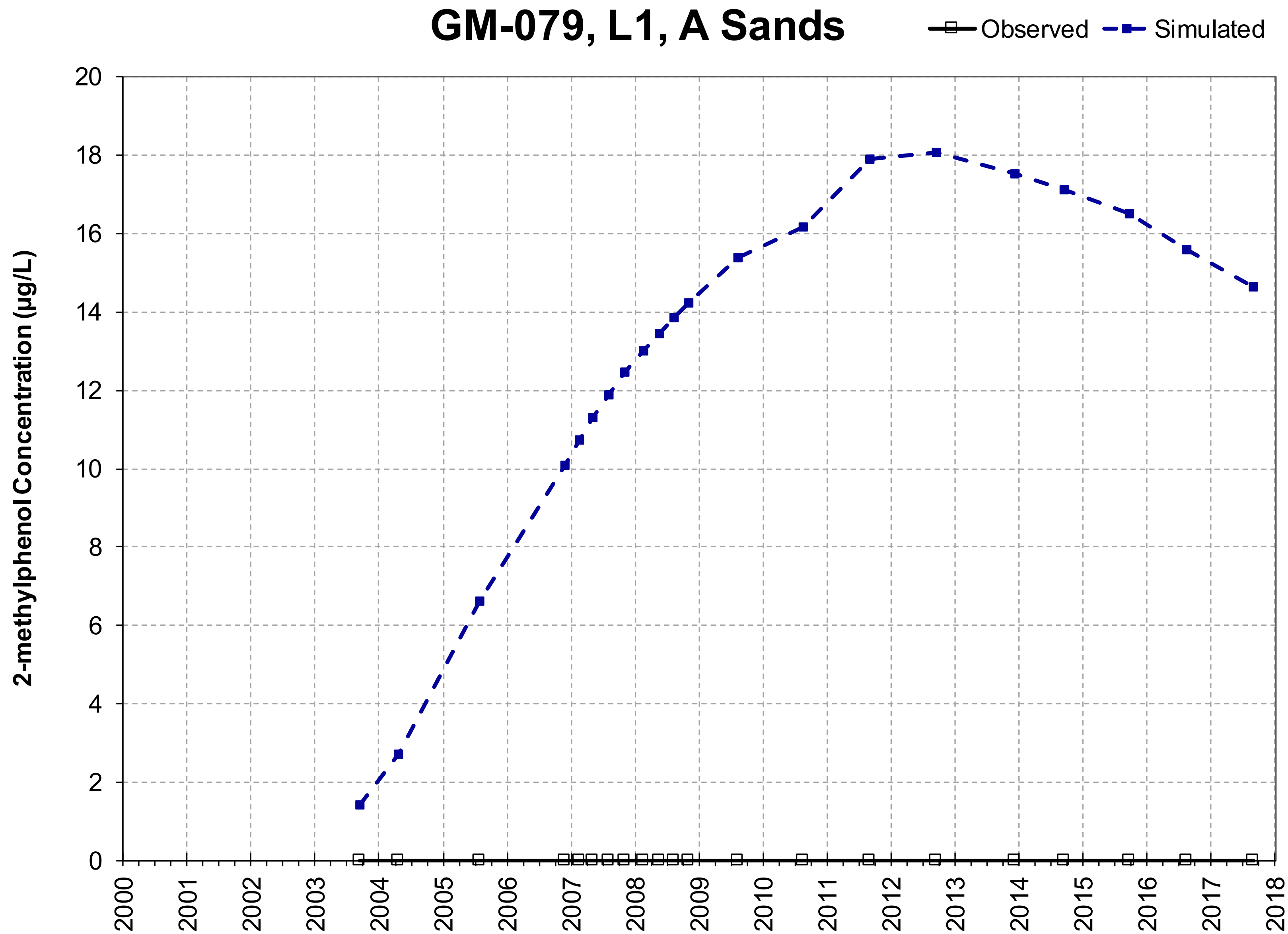


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

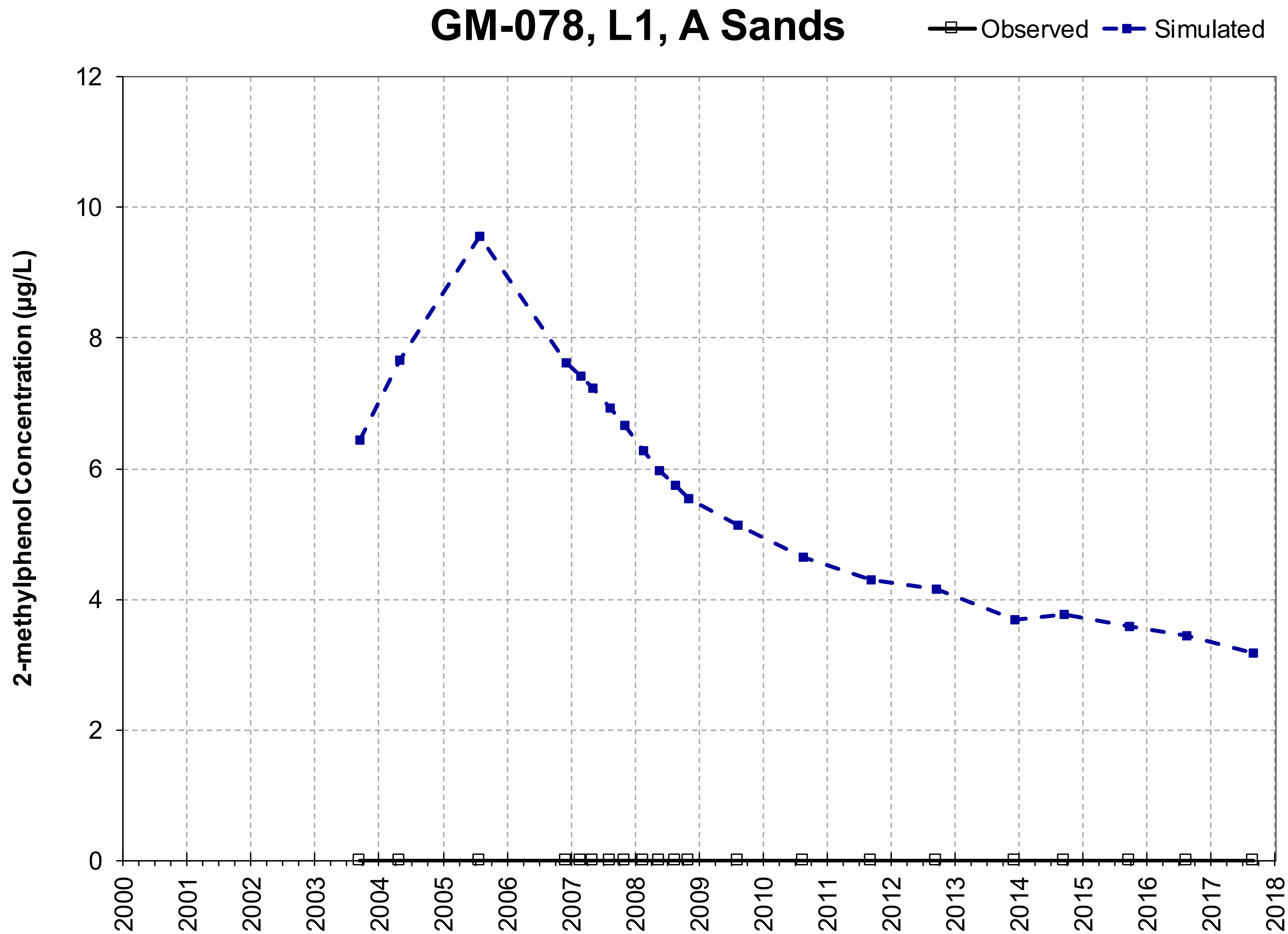


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE B

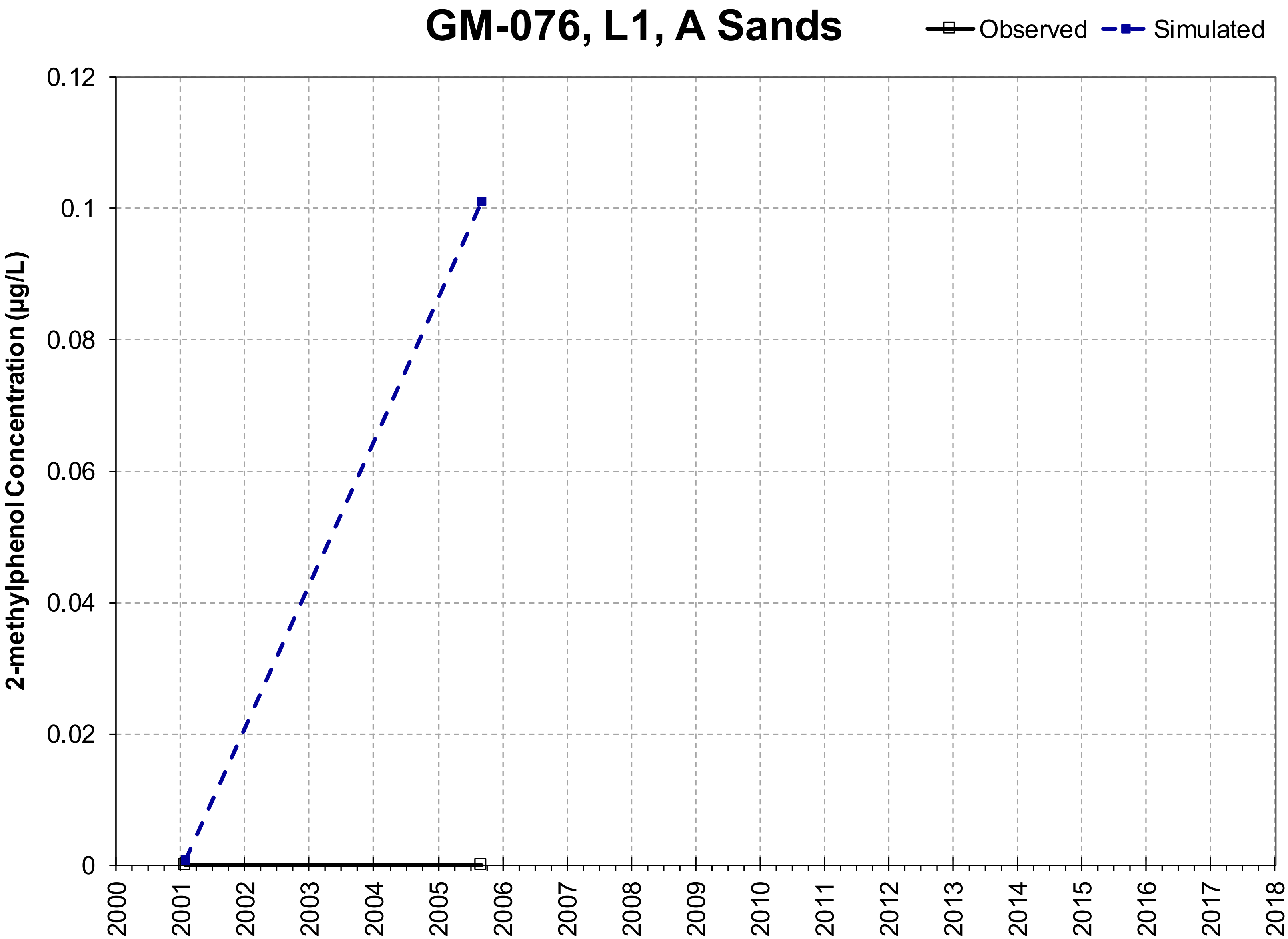


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

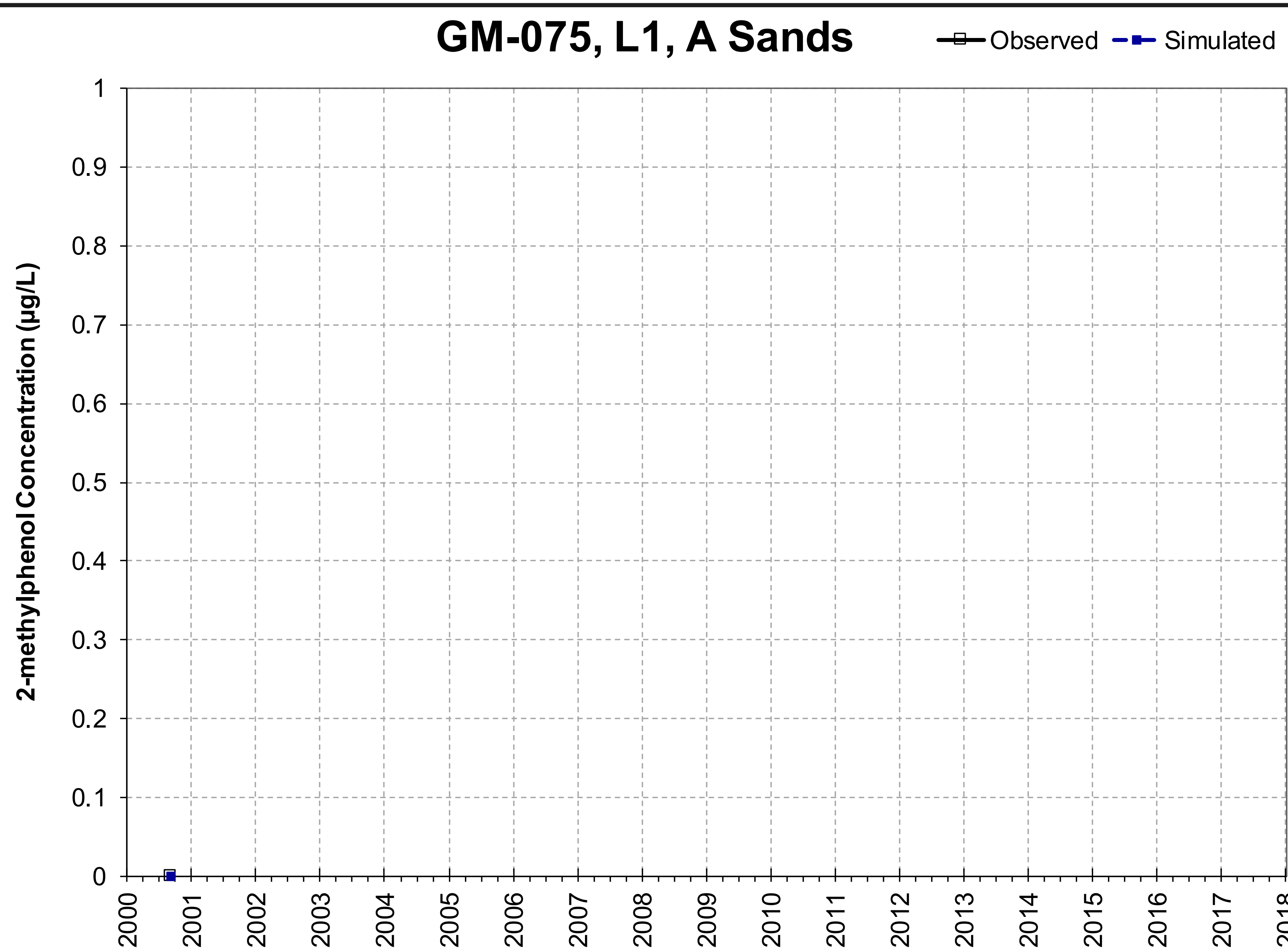


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

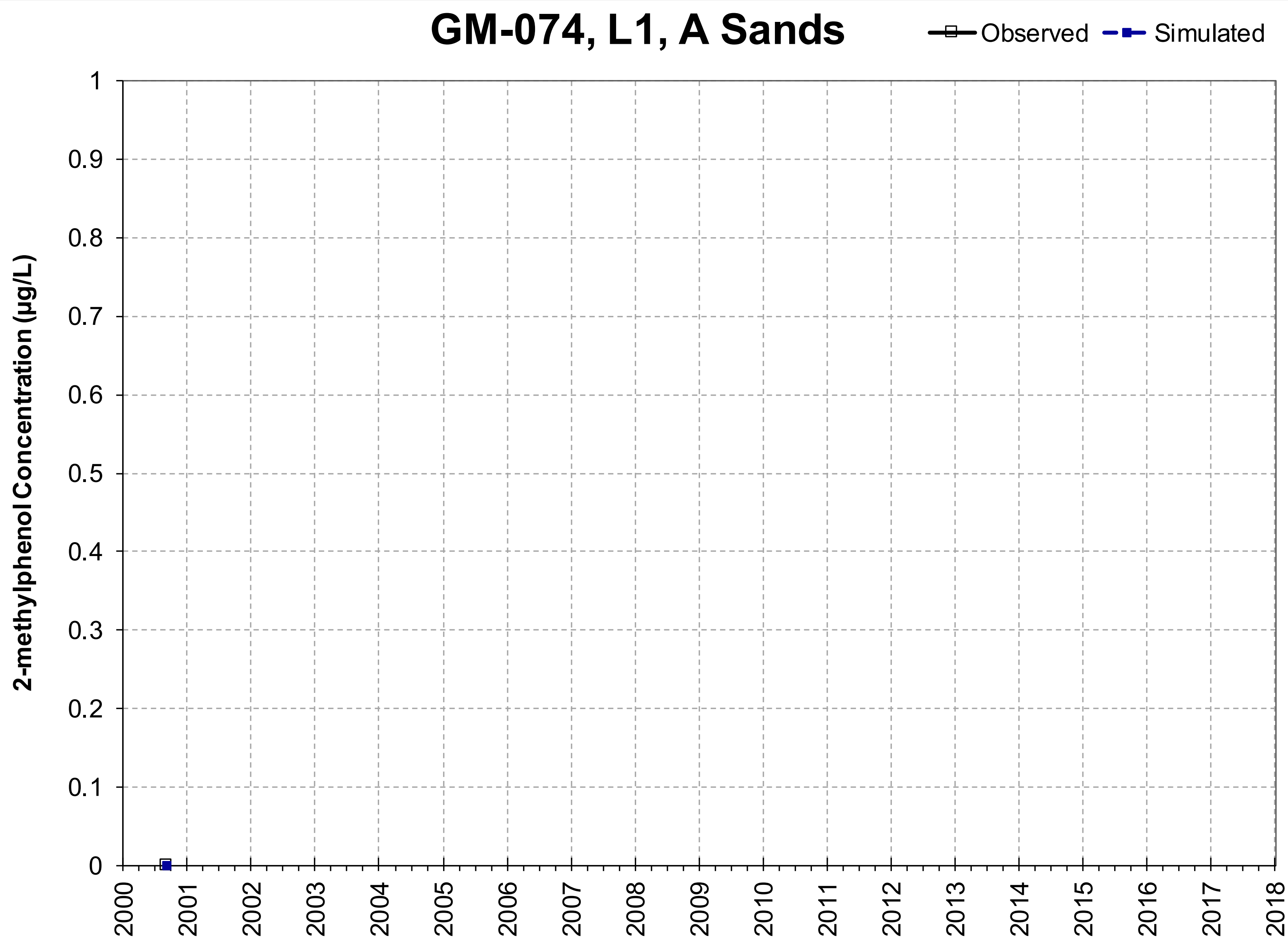


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

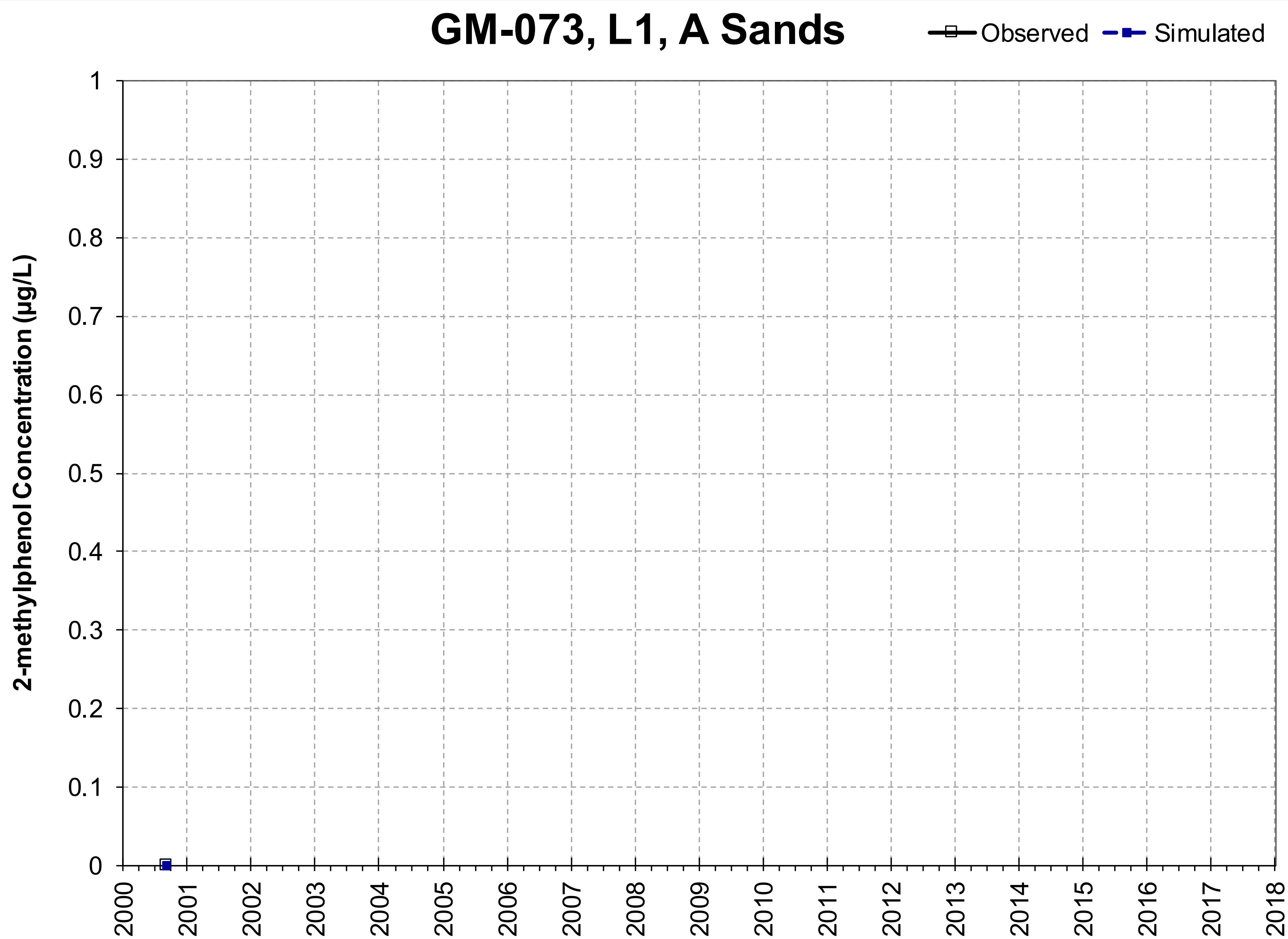


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

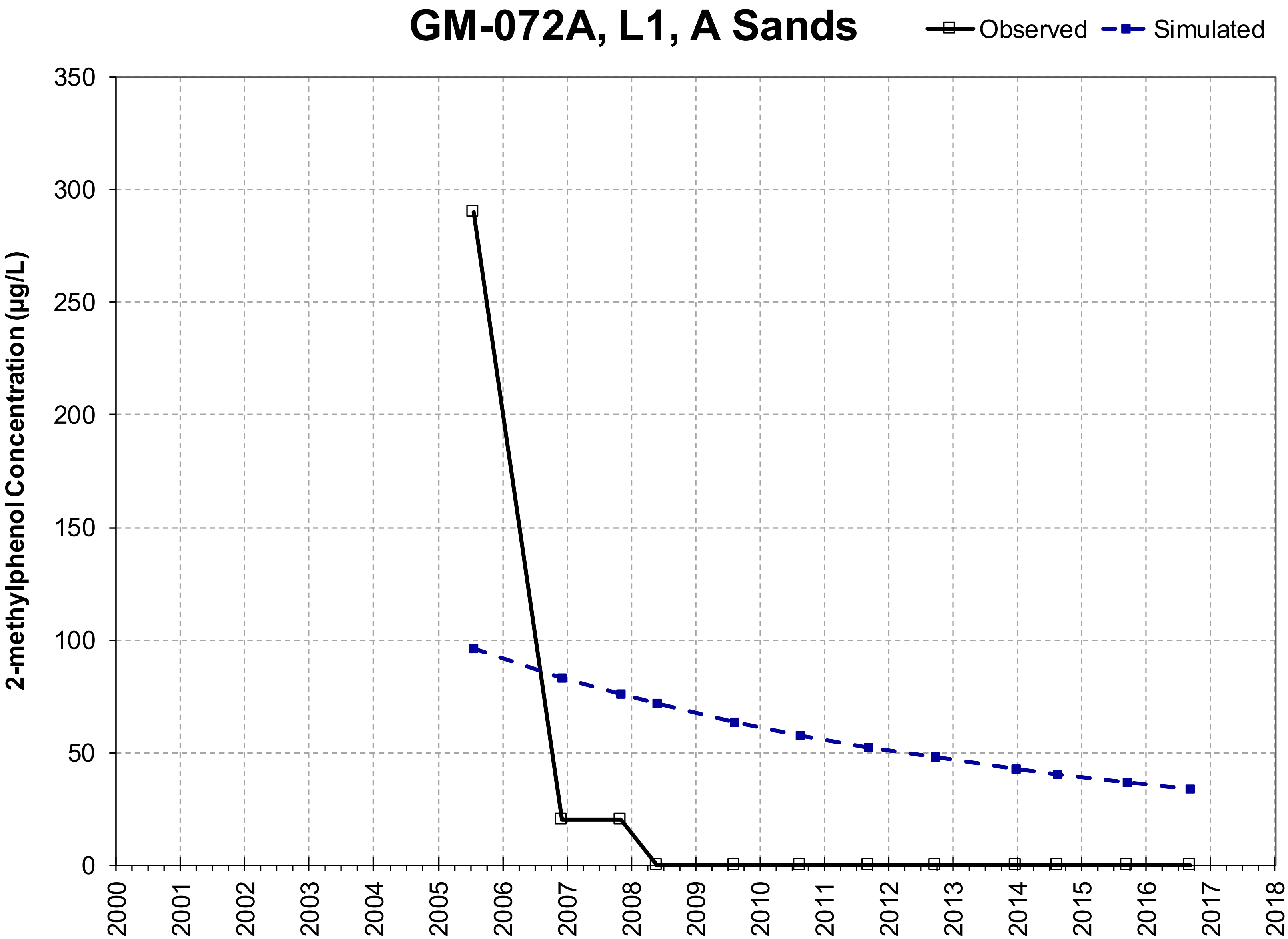


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

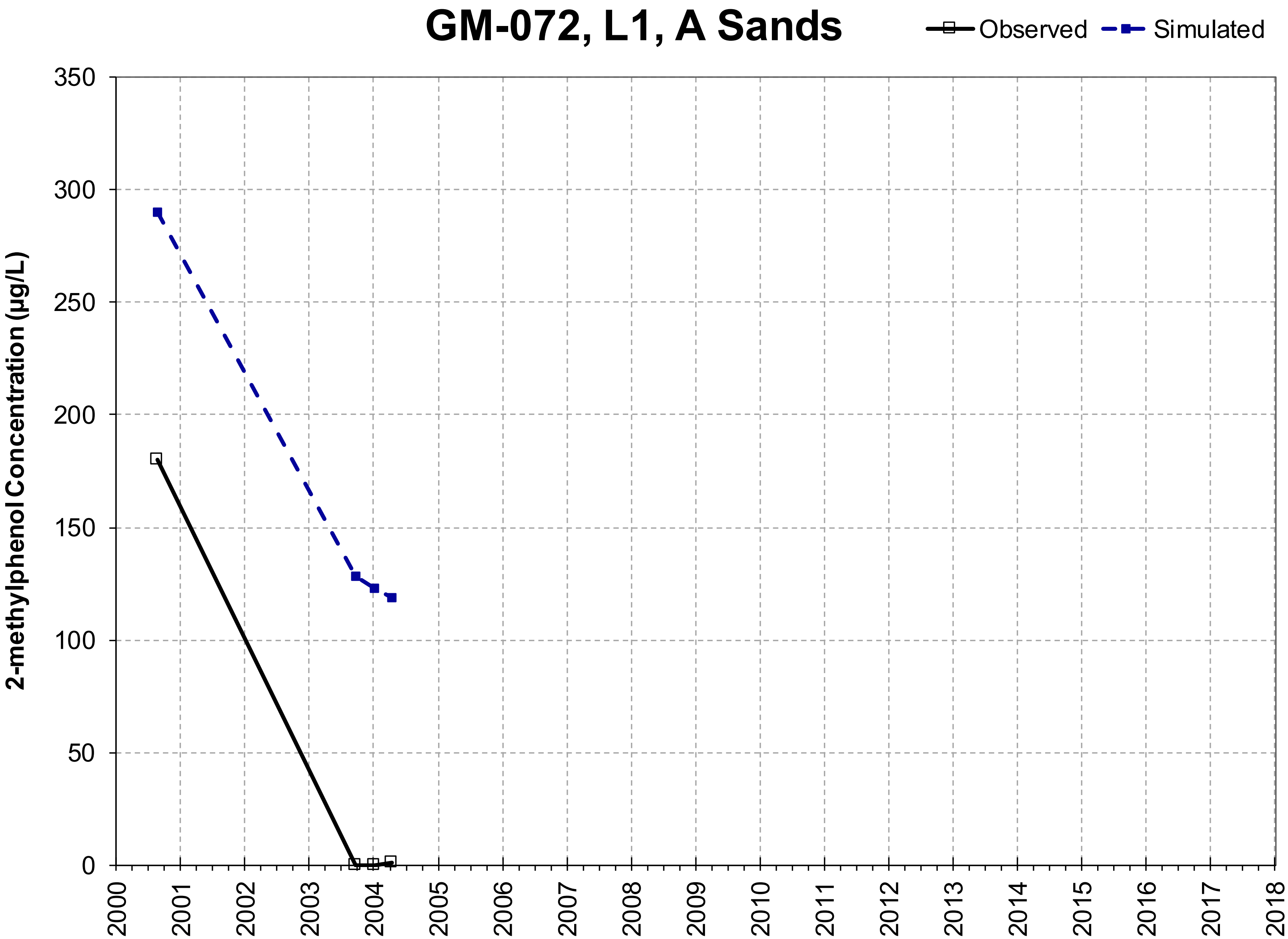


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

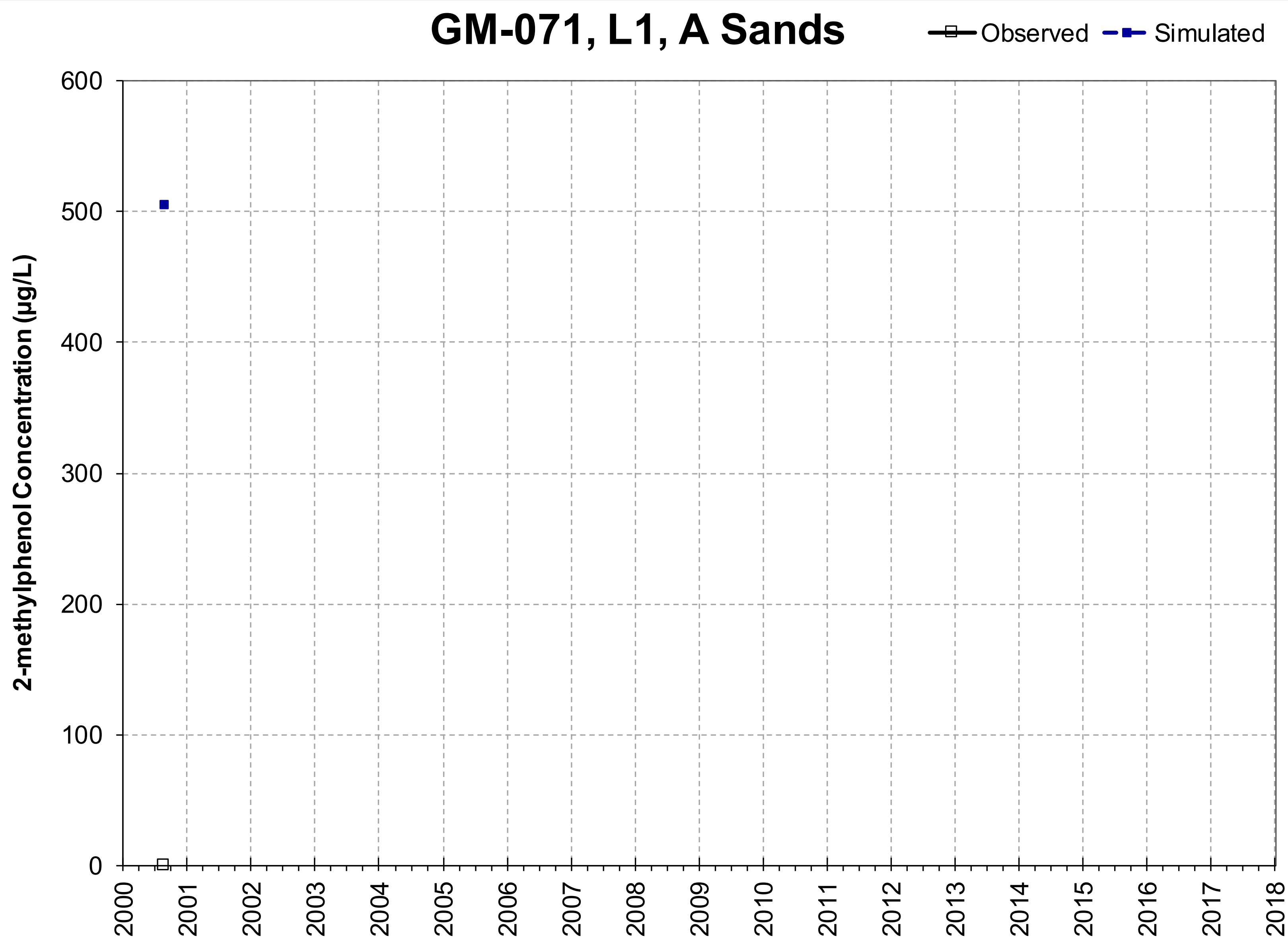


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

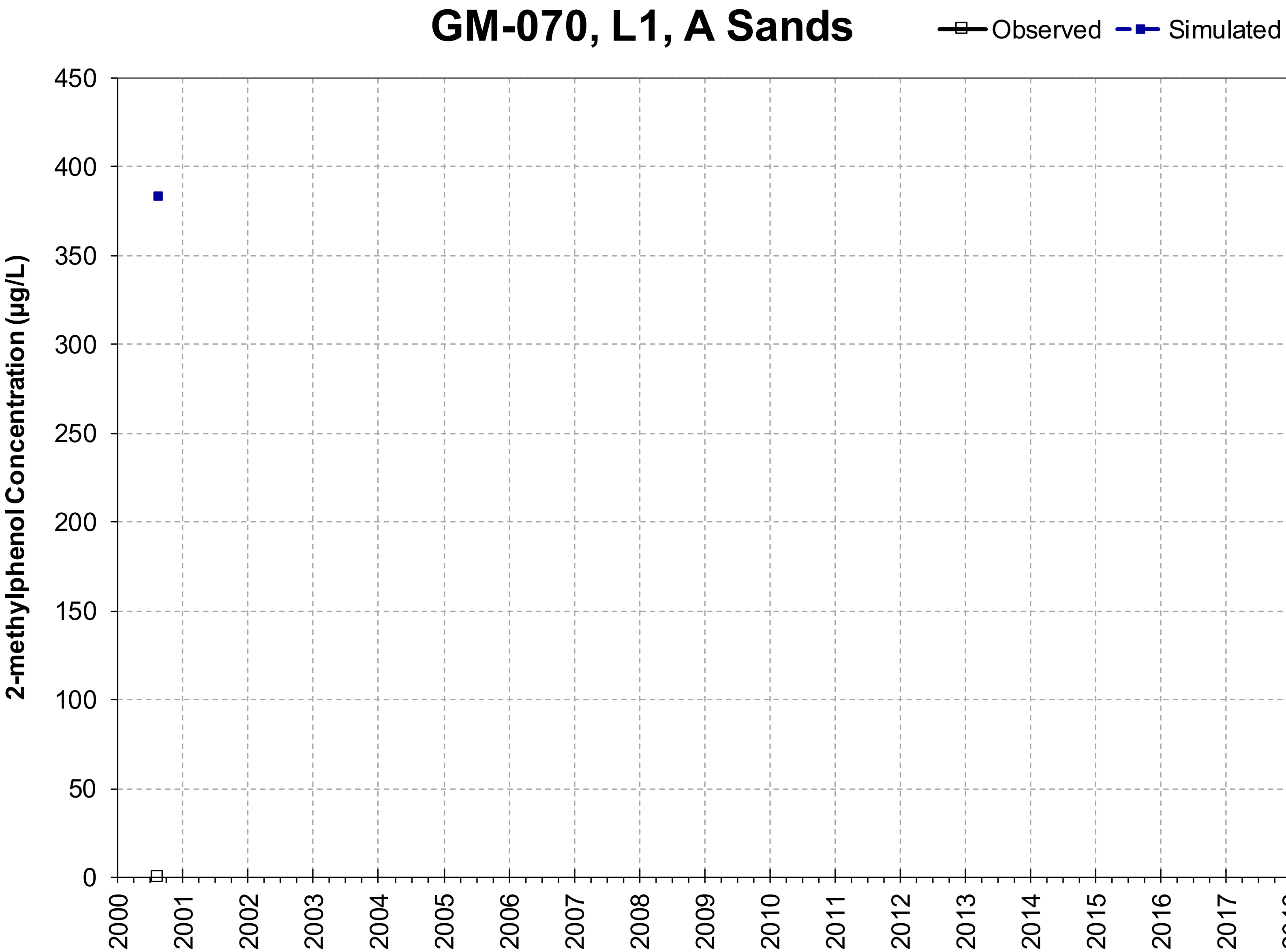


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

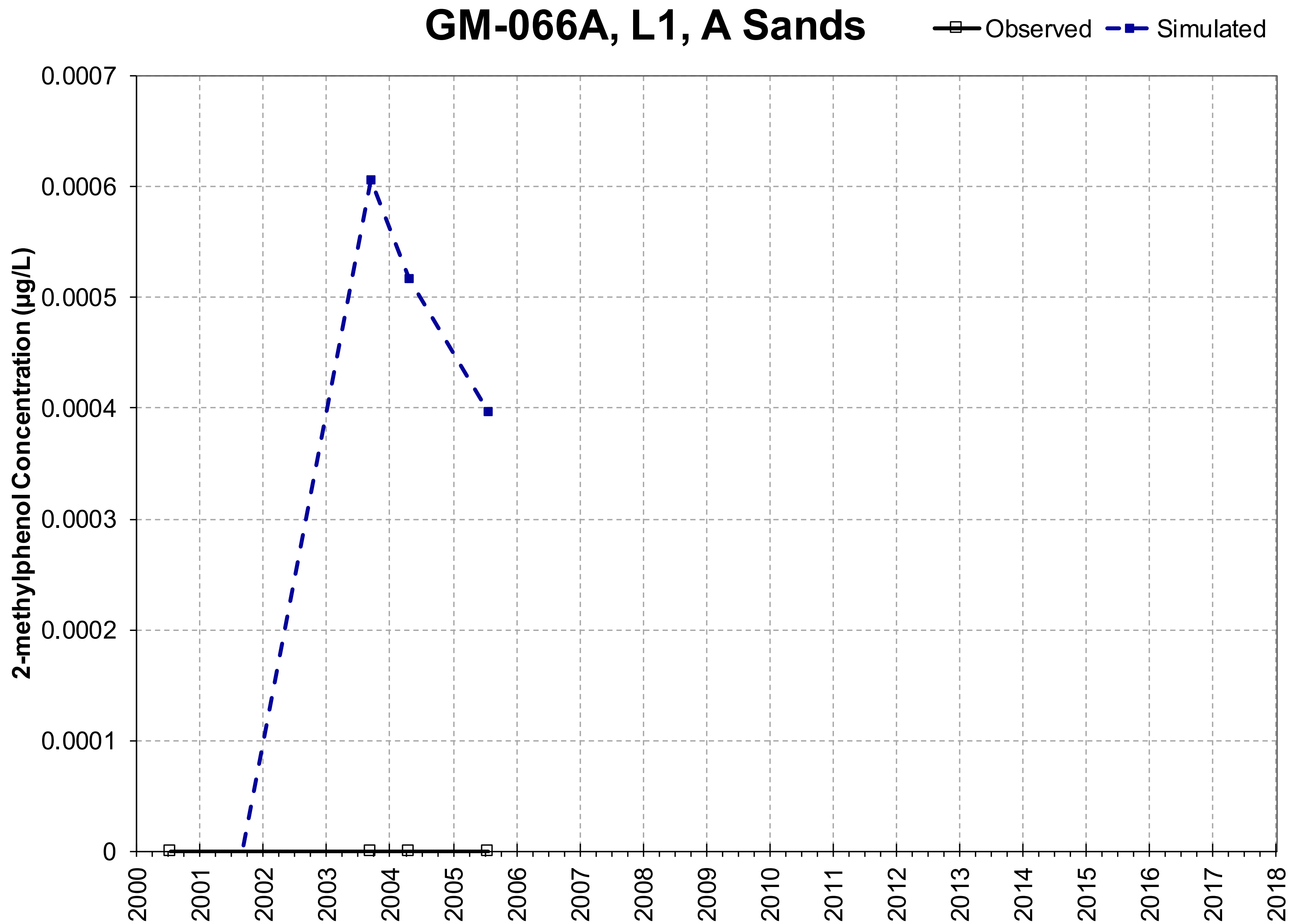


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

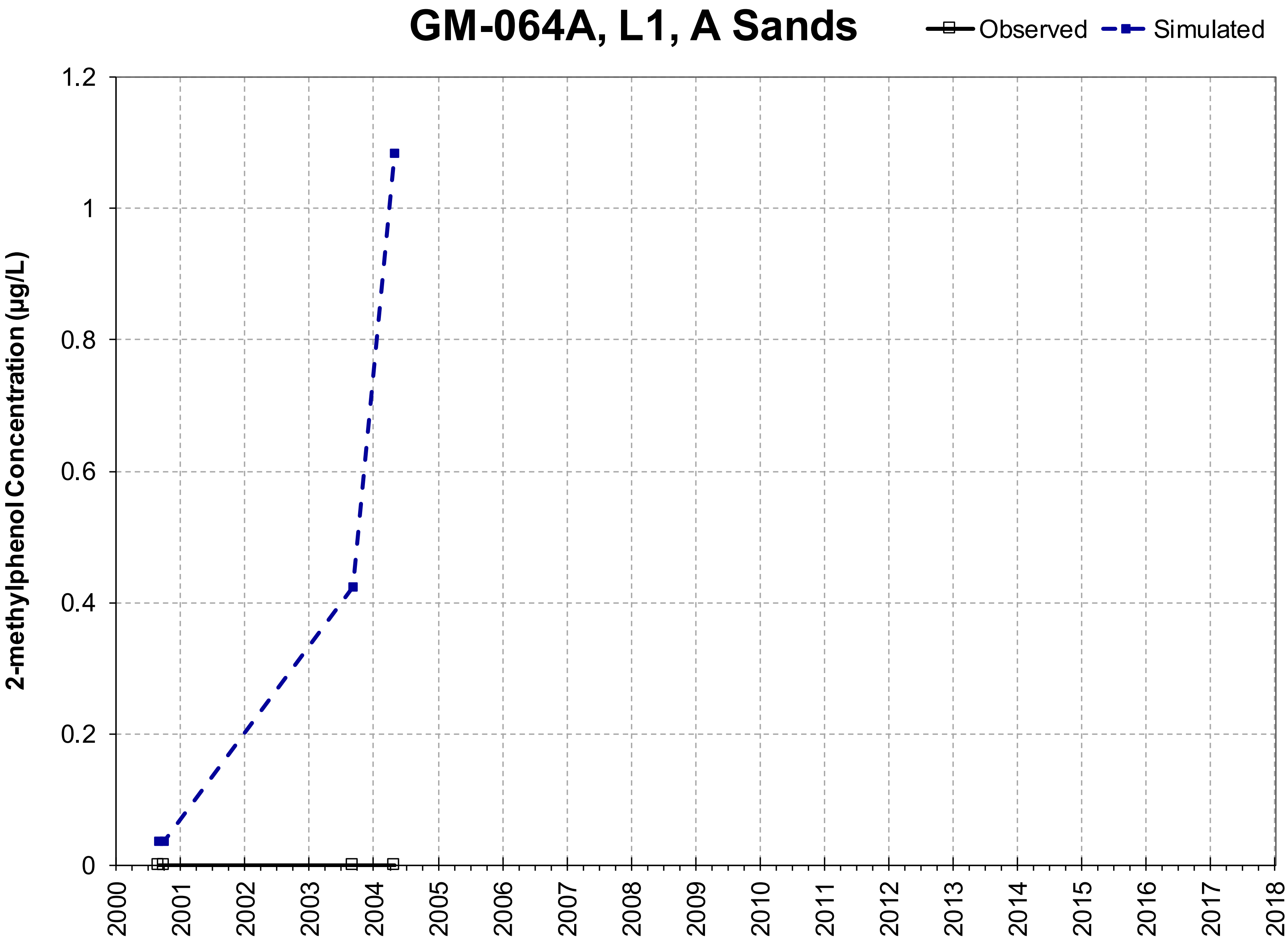


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

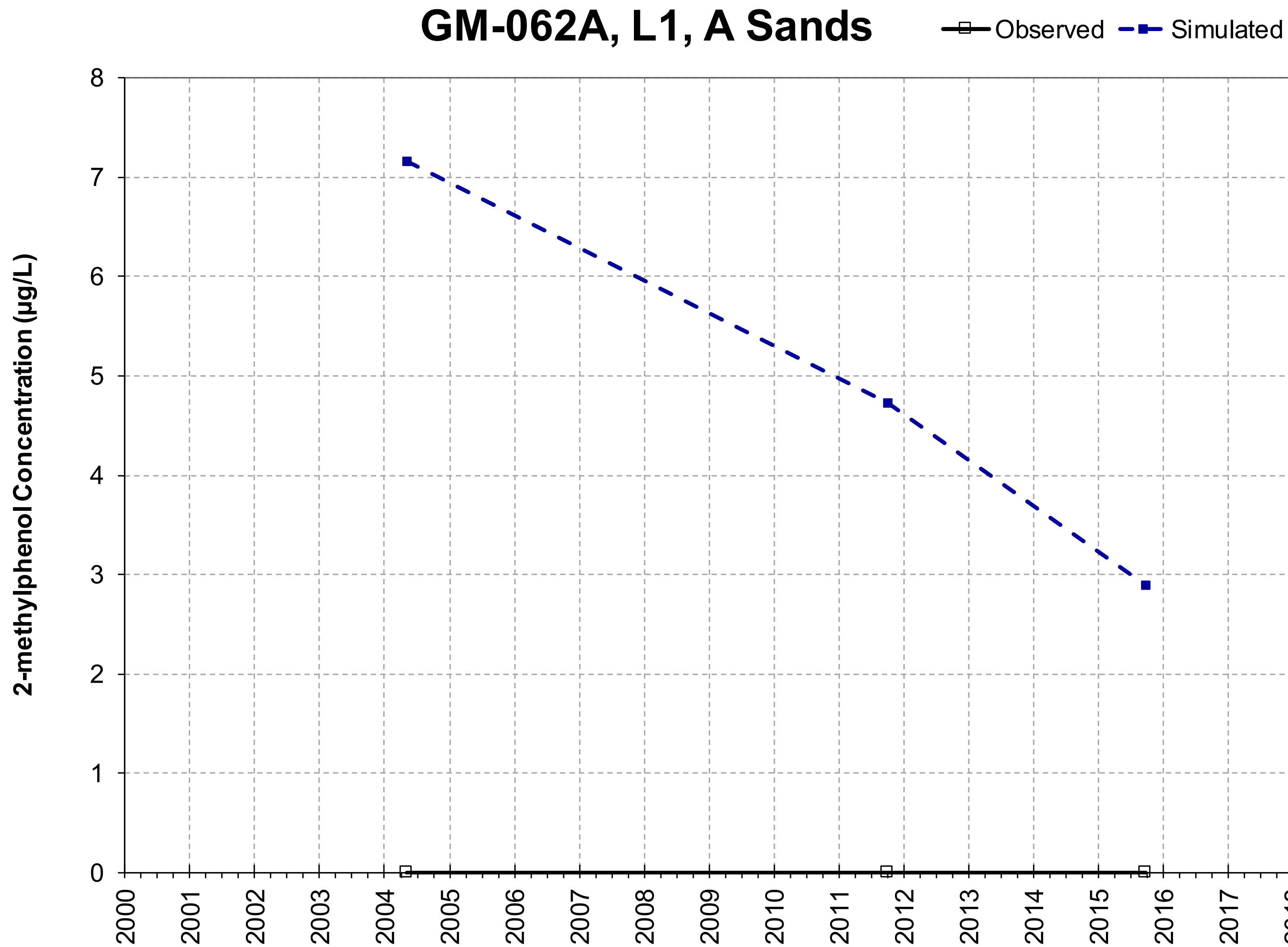


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

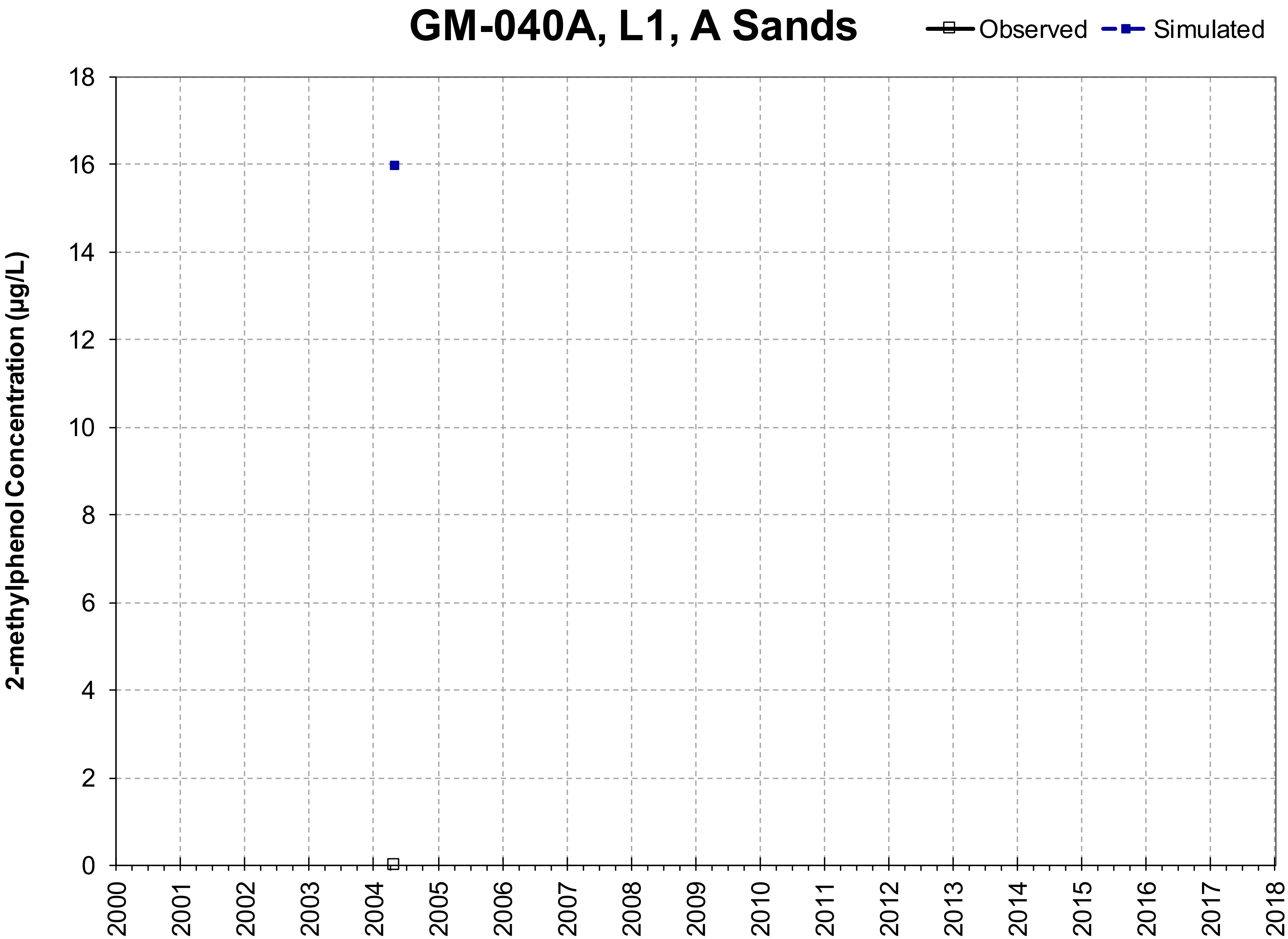


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

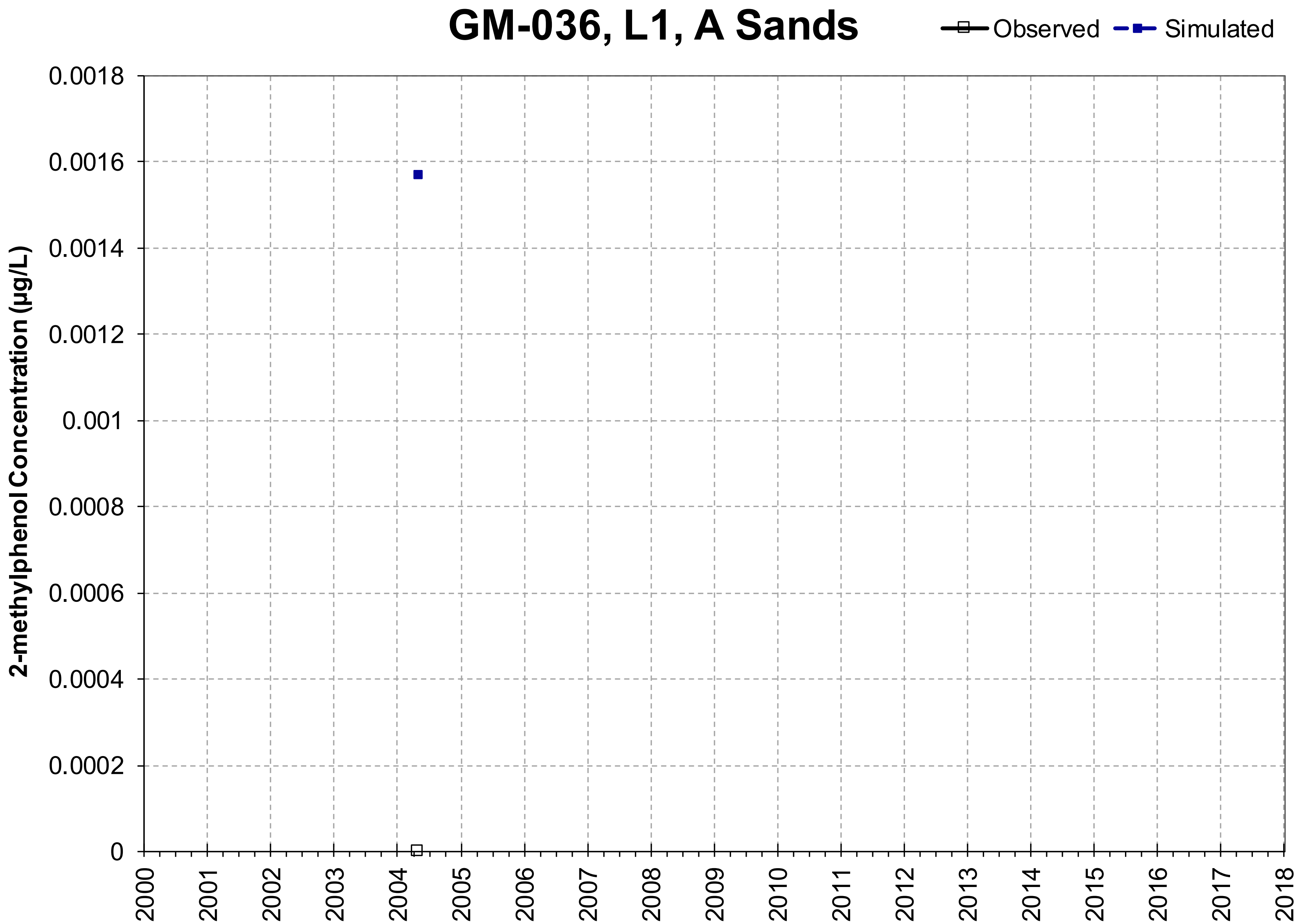


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

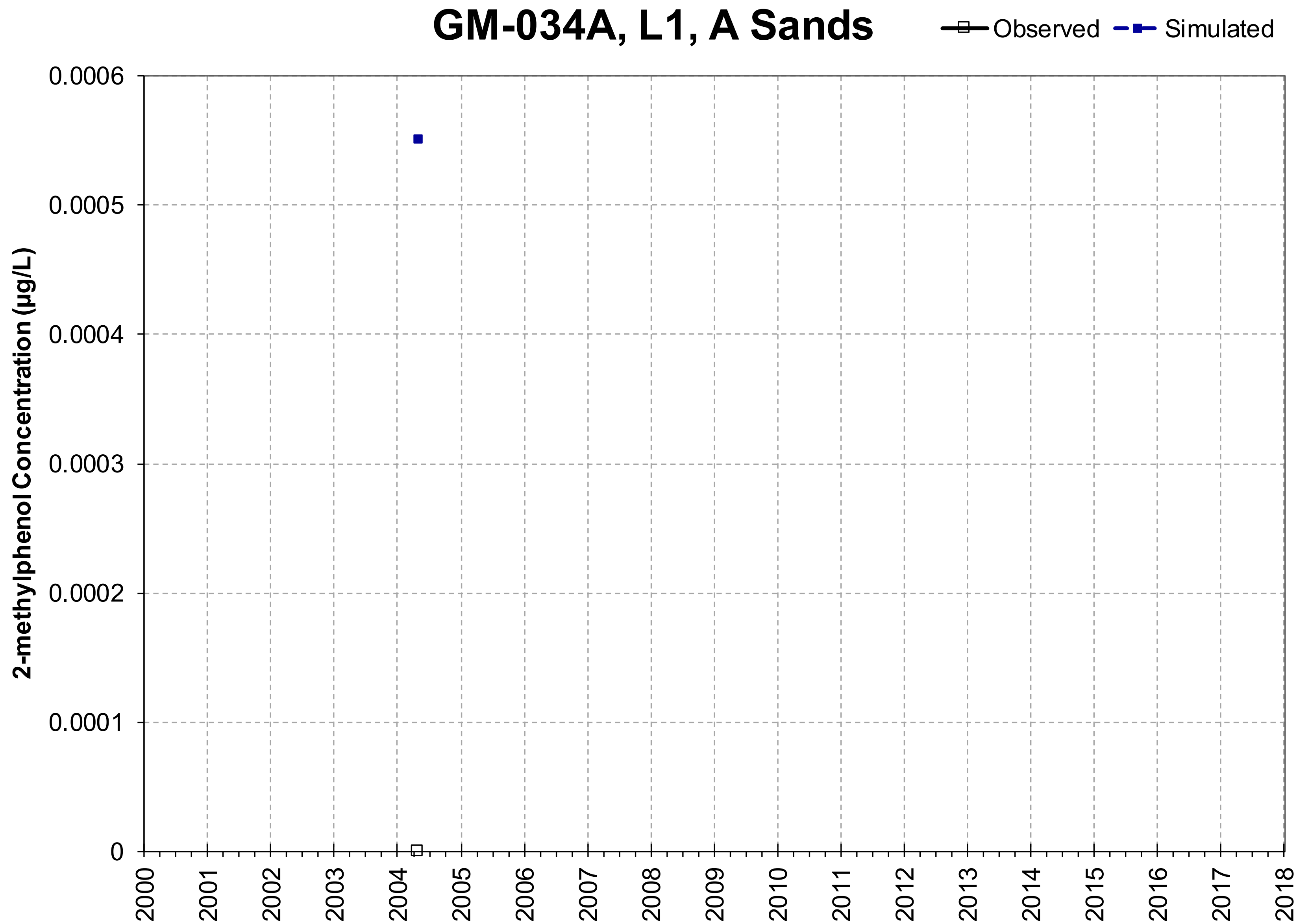


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

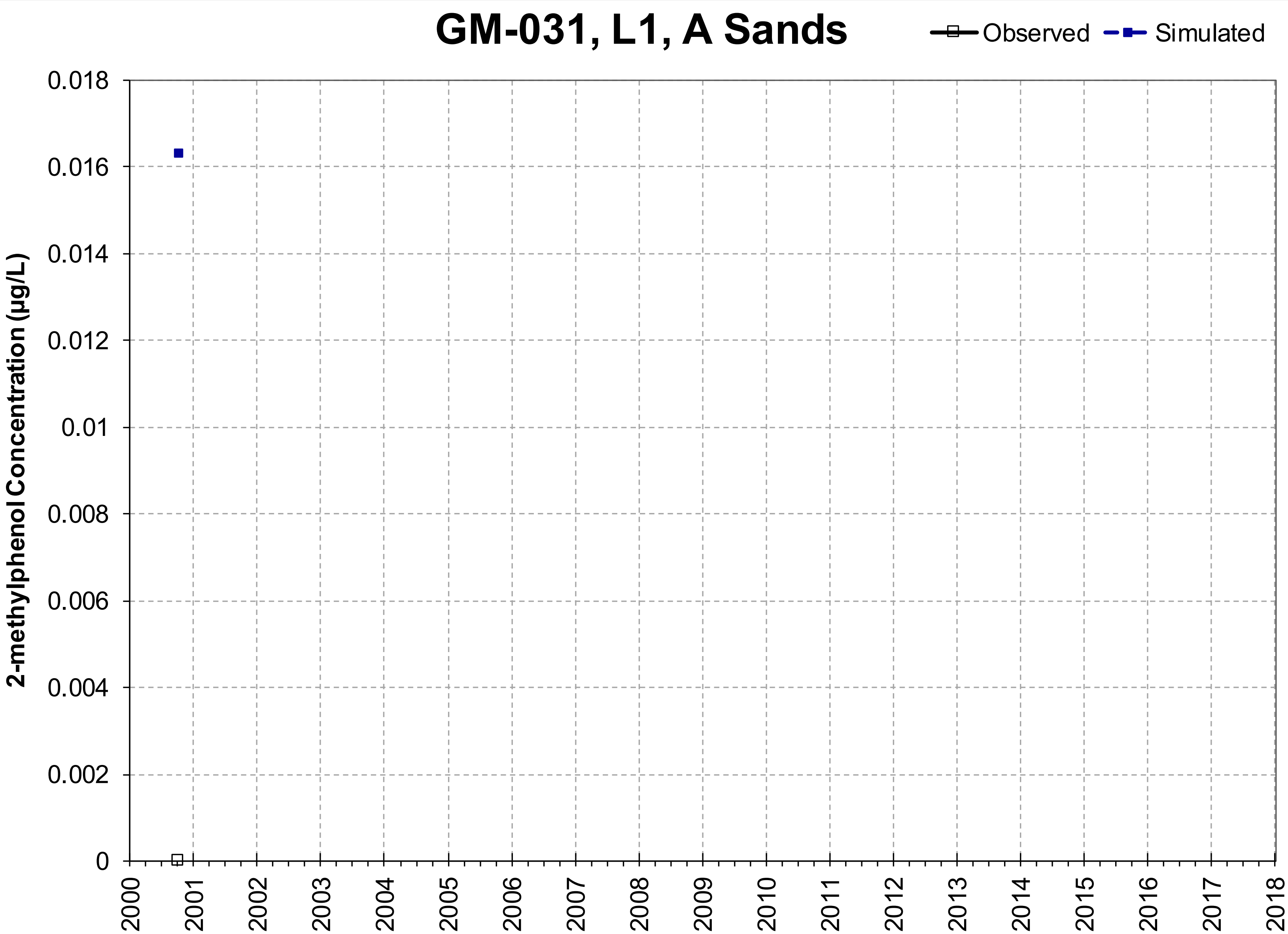


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

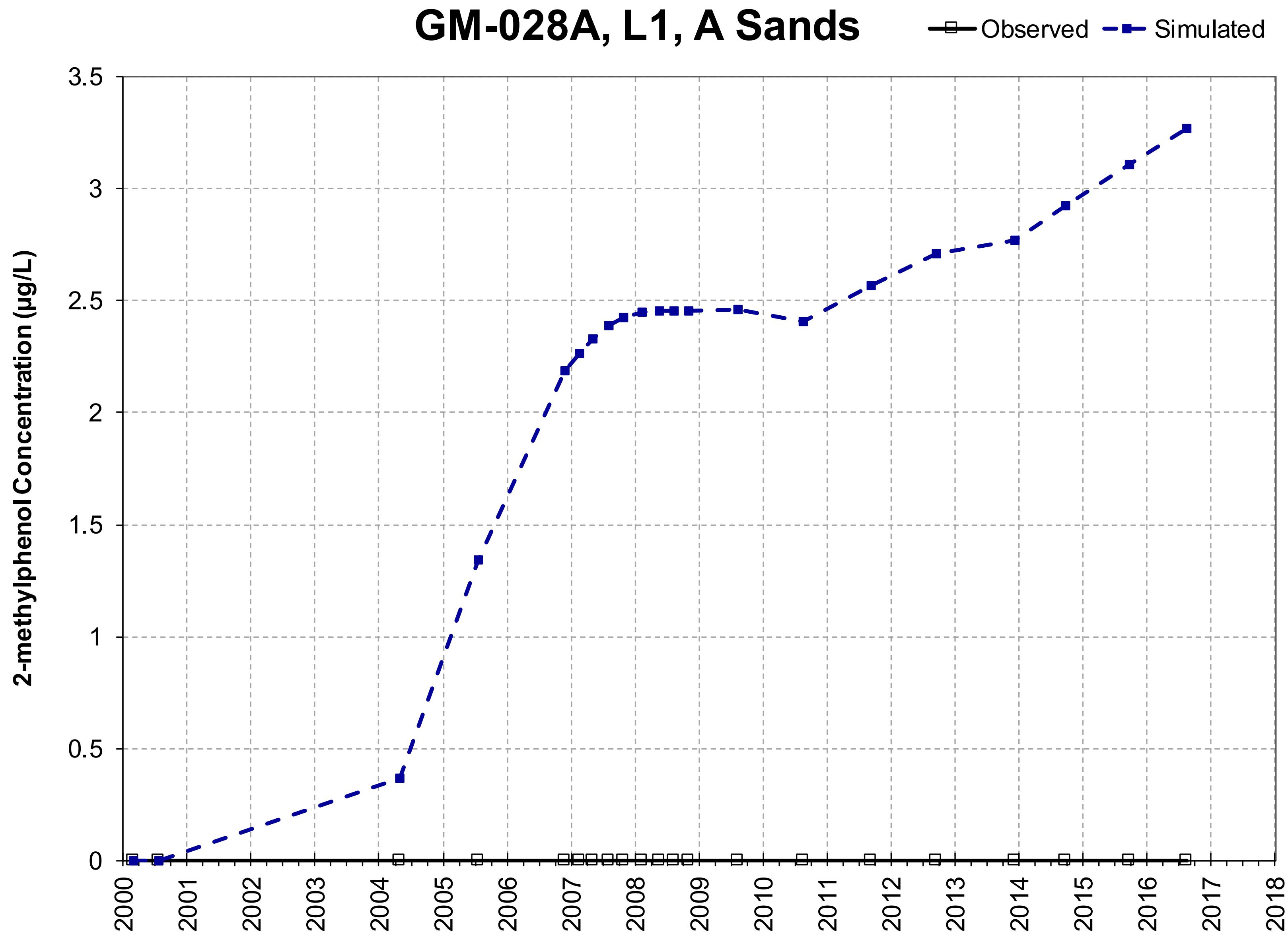


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

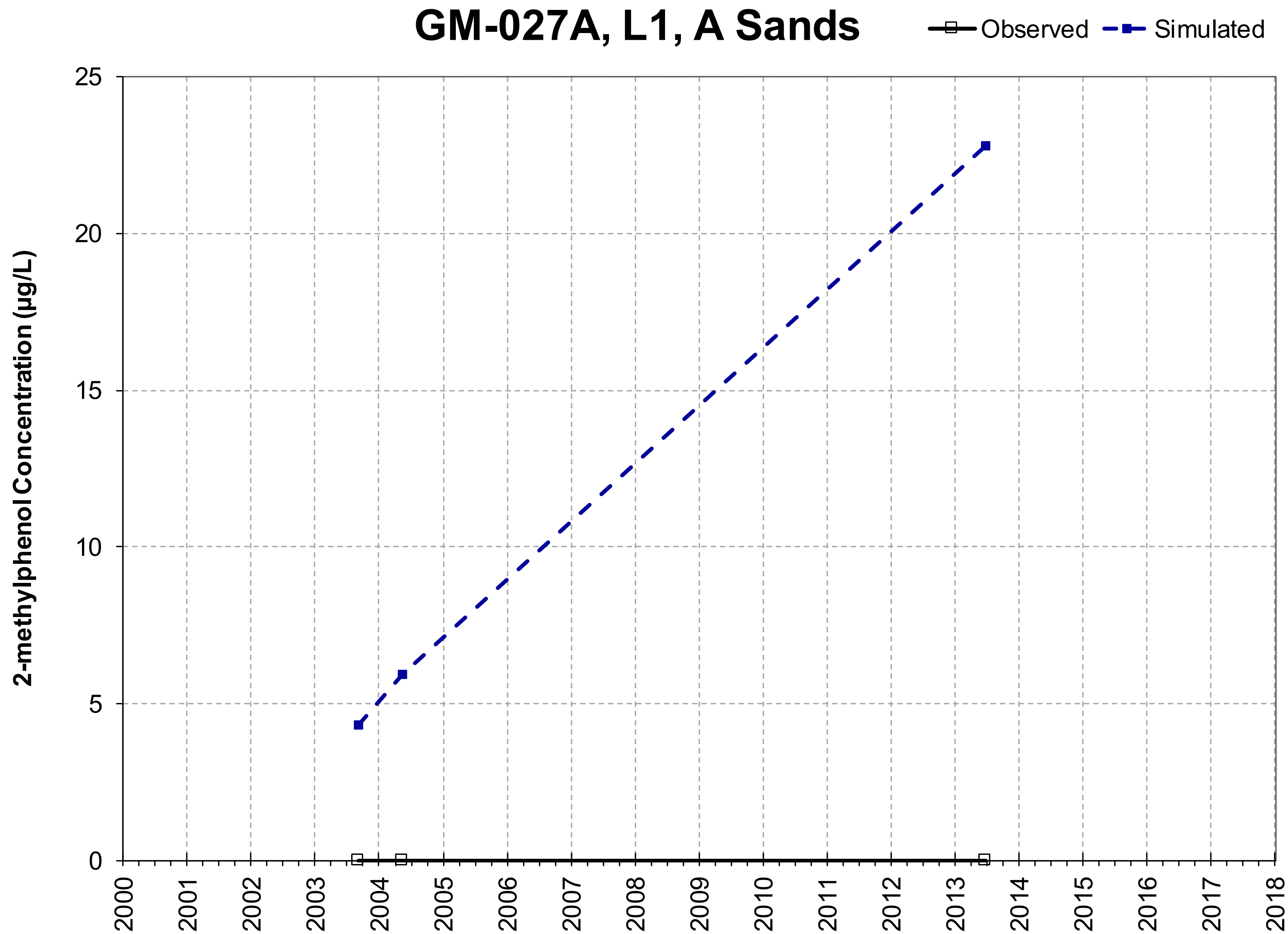


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B



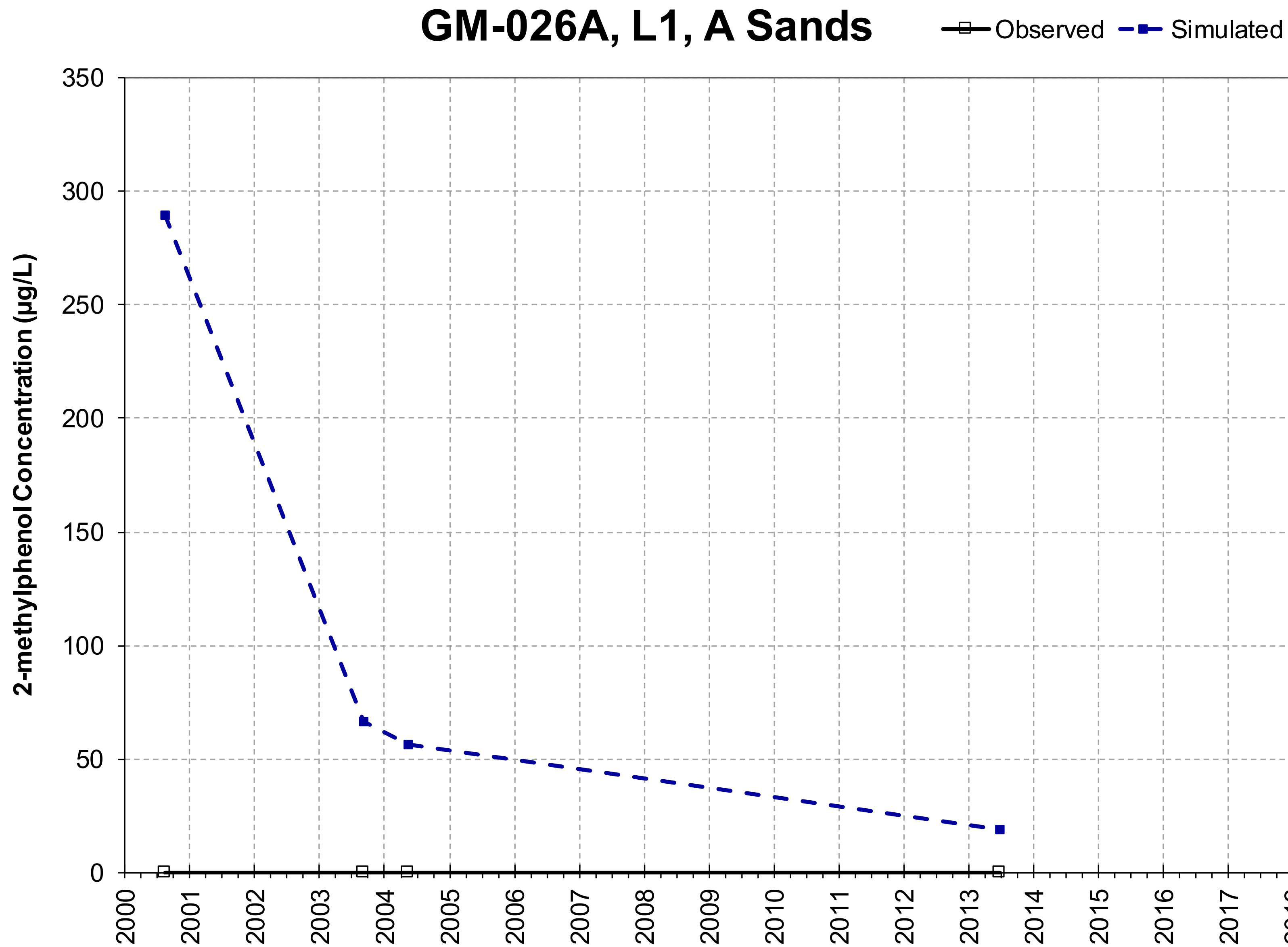
FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN

GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

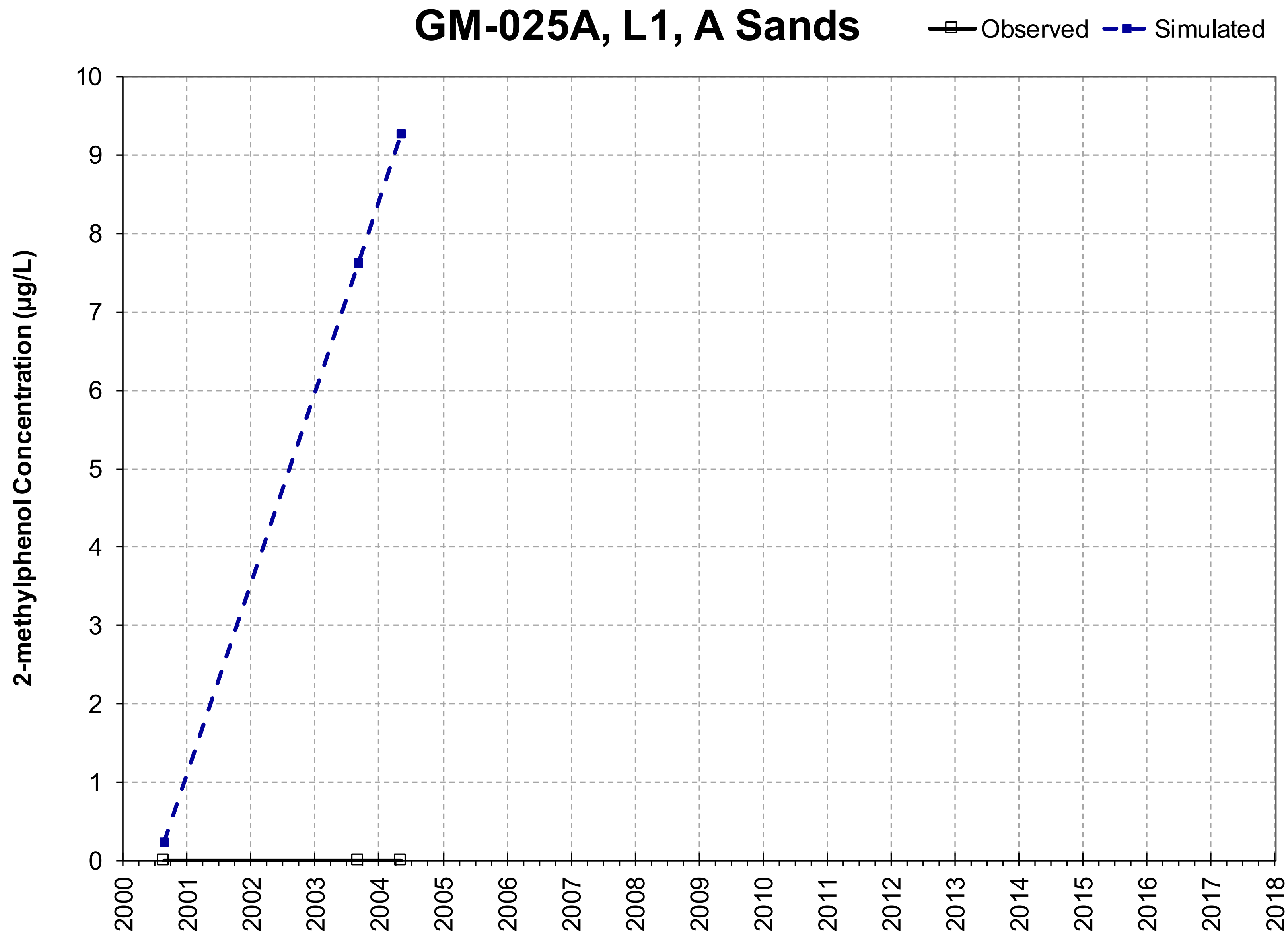


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

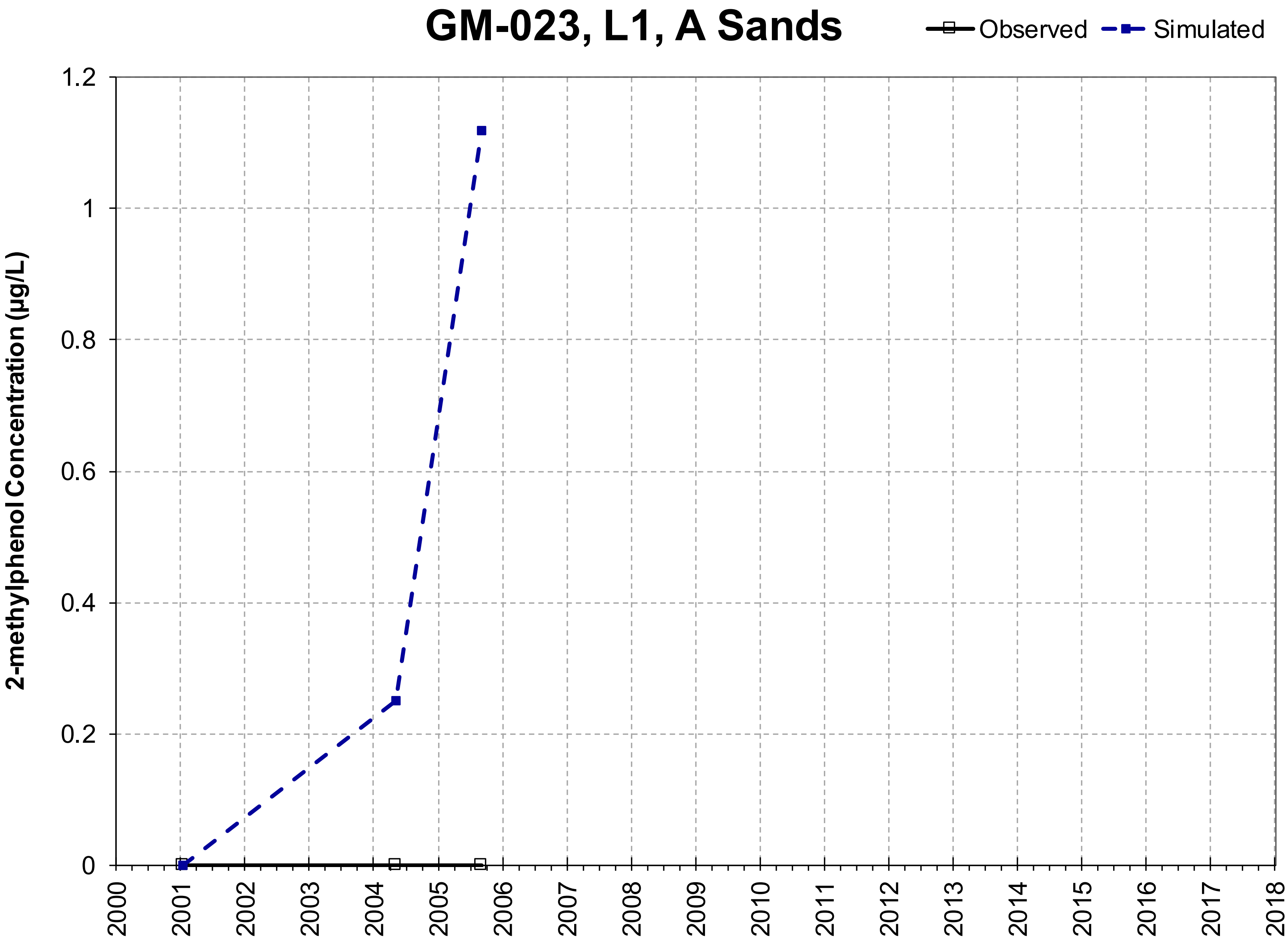


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

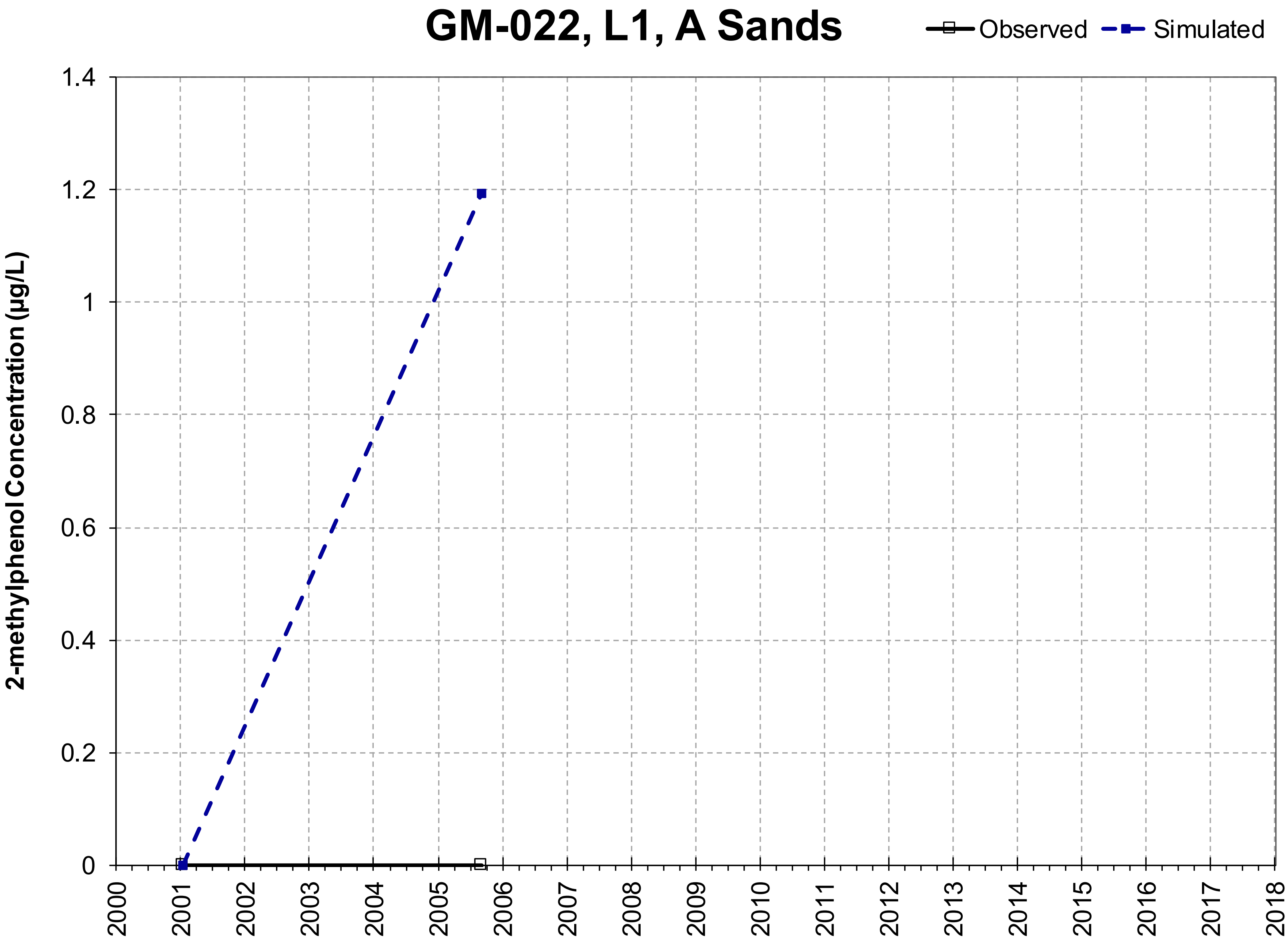


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

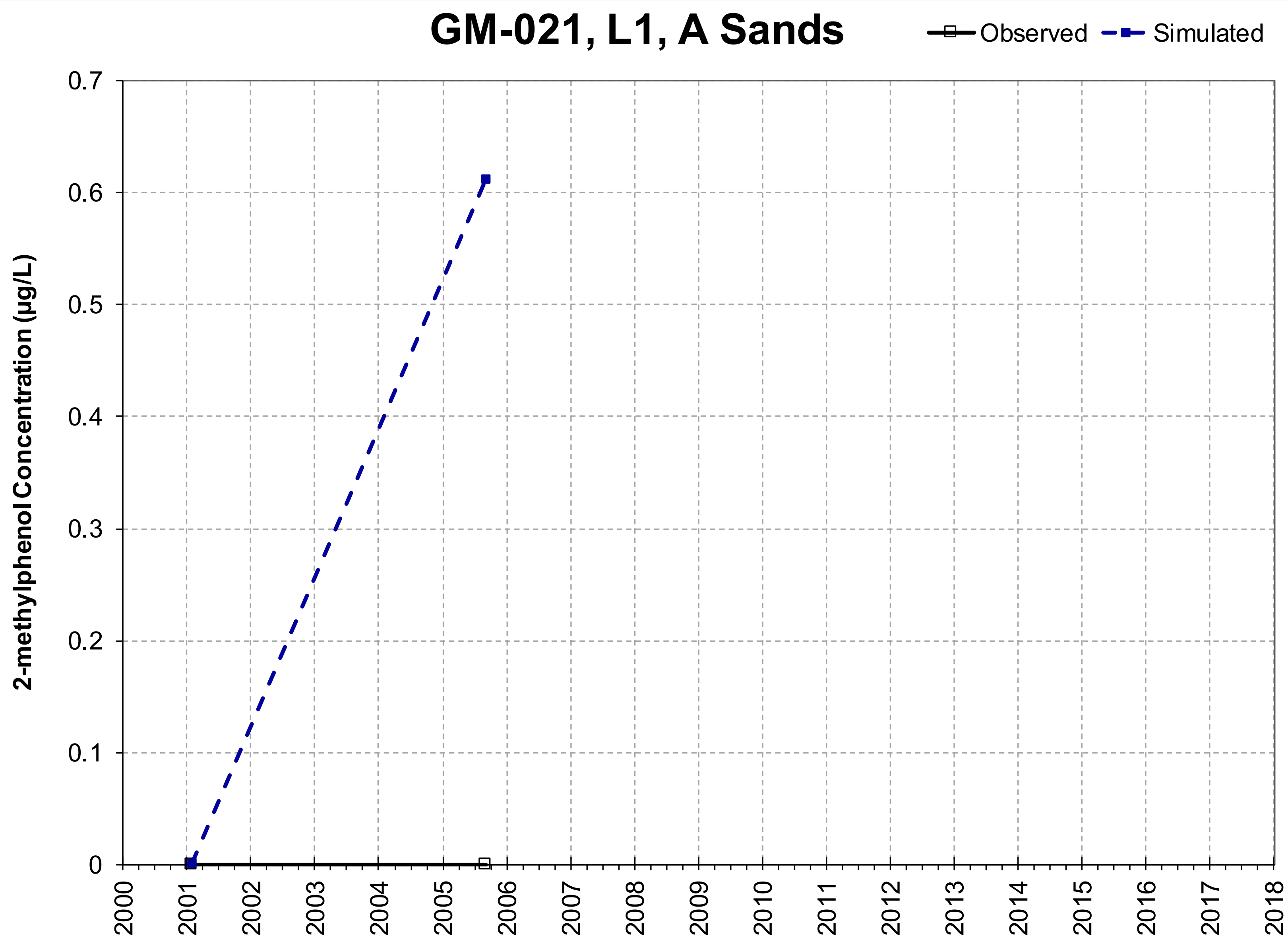


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

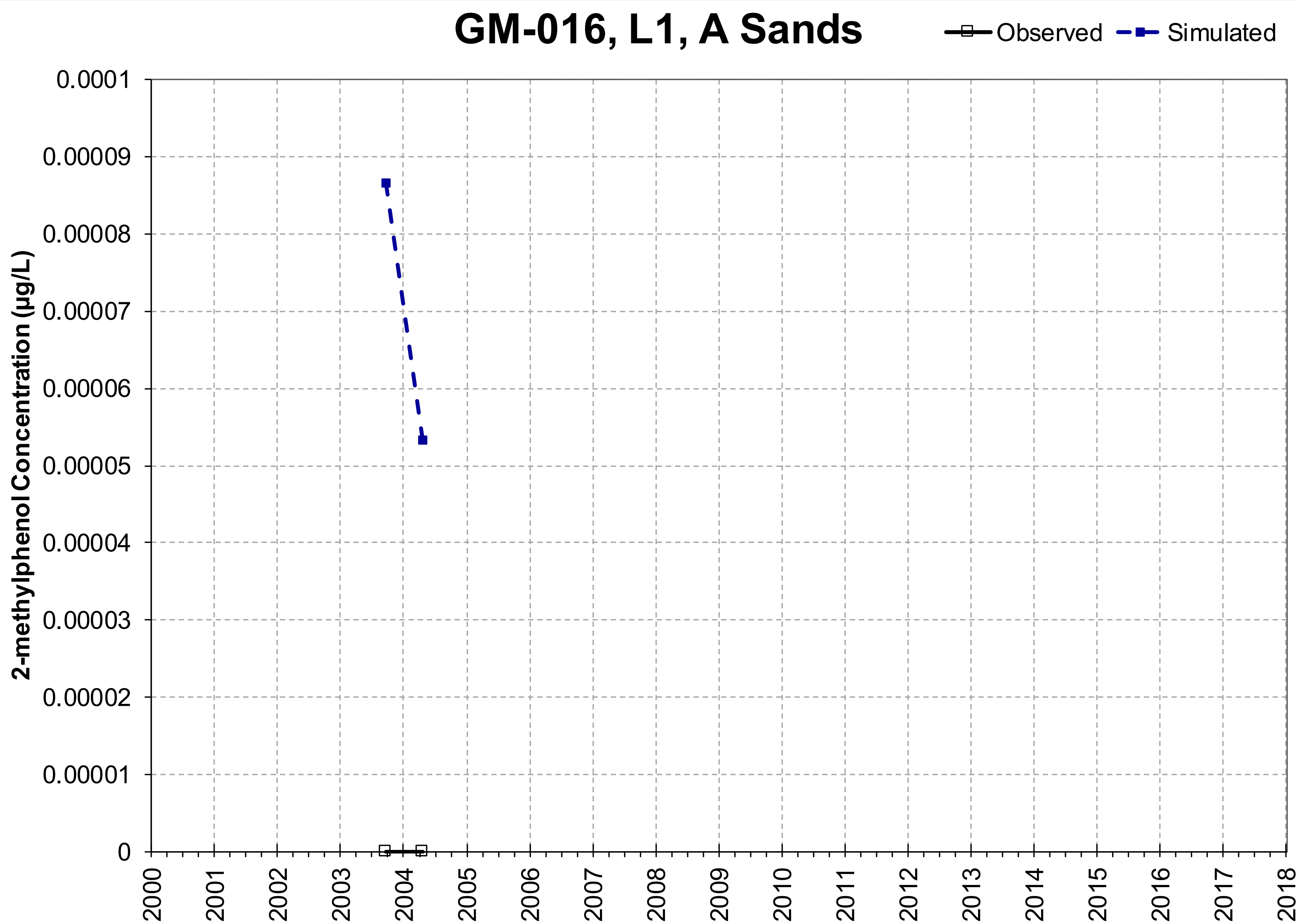


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

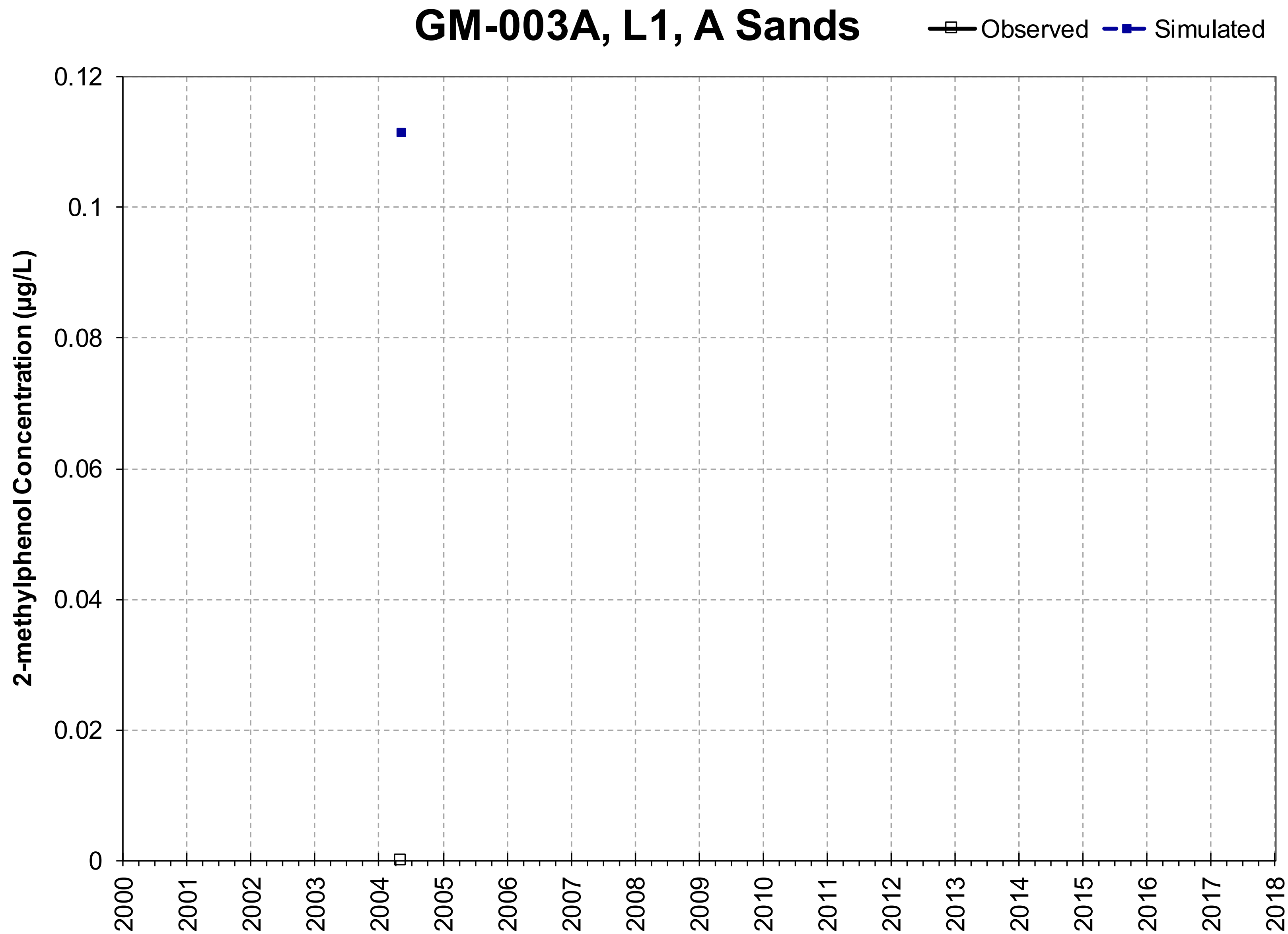


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

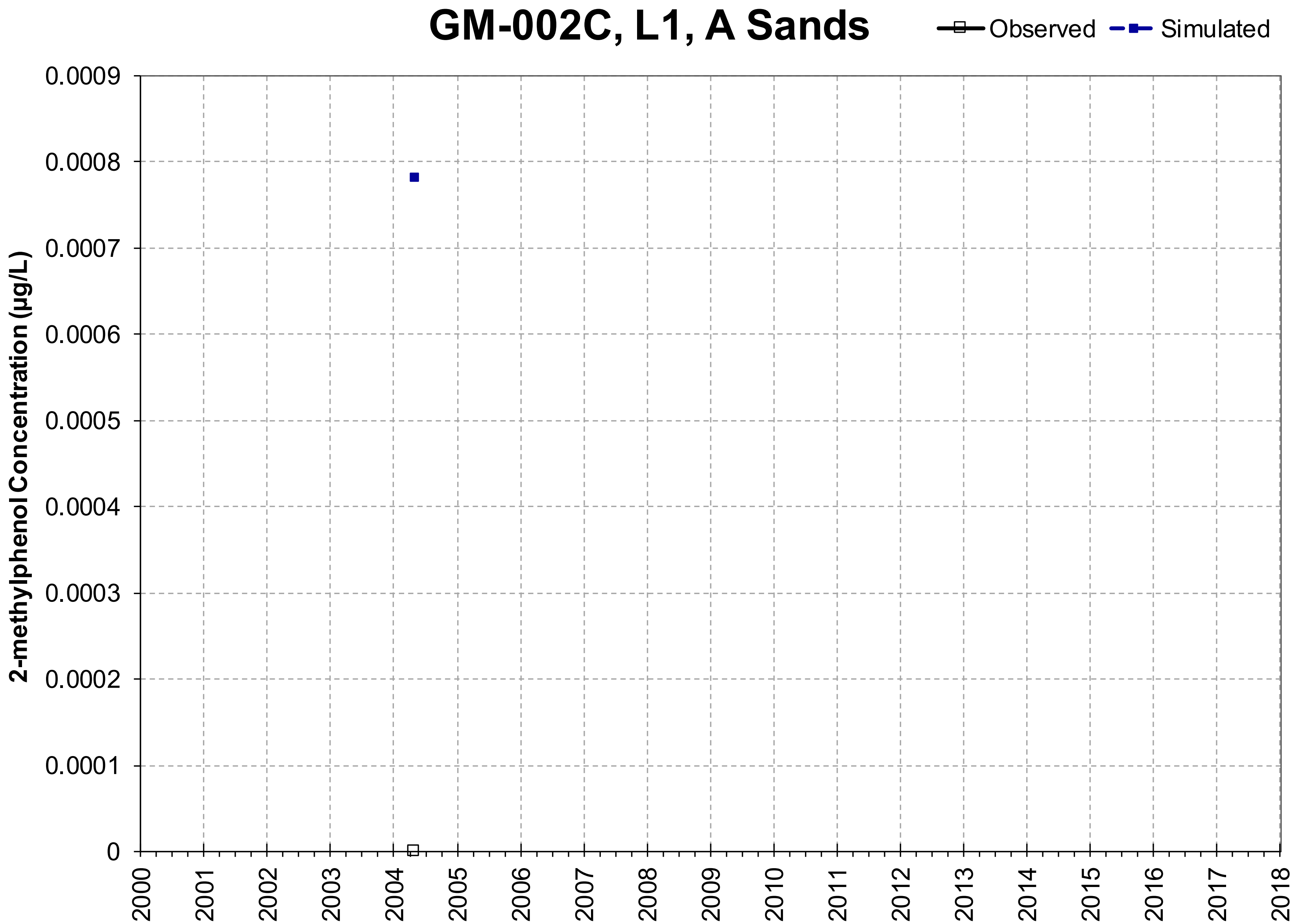


FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B



FORD-KINGSFORD PRODUCTS FACILITY
KINGSFORD, MICHIGAN
GROUNDWATER FATE AND SOLUTE TRANSPORT MODEL UPDATE

TRANSIENT 2-METHYLPHENOL SIMULATED CONCENTRATION PLOTS (2000 – 2017)

ARCADIS Design & Consultancy for natural and built assets

FIGURE
B

Arcadis U.S., Inc.

126 North Jefferson Street

Suite 400

Milwaukee, Wisconsin 53202

Tel 414 276 7742

Fax 414 276 7603

www.arcadis.com

APPENDIX D

Standard Operating Procedure

Groundwater Sampling for Dissolved-Phase Methane

Ford-Kingsford Products Facility

Standard Operating Procedure (SOP)

GROUNDWATER SAMPLING FOR DISSOLVED-PHASE METHANE

August 2019

SOP VERSION CONTROL

Issue	Revision No	Page No	Description	Reviewed by

APPROVAL SIGNATURES

Prepared by: ______________________ 08/29/2019

Kristen Gendron Date:

Technical Expert Reviewed by: ______________________ 08/29/2019

Richard L. Studebaker, Jr. Date:

1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

This Arcadis Standard Operating Procedure (SOP) contains the procedure for collection of groundwater samples for dissolved-phase methane utilizing either the Isoflask technique or the volatile organics analysis (VOA) vial technique. This SOP will be applied to all groundwater samples for dissolved-phase methane conducted at the Ford-Kingsford Products Facility (Site).

Arcadis collects groundwater samples for dissolved-phase methane utilizing one of two techniques, described below:

- Isoflask Technique – This sampling technique utilizes a specialized Isoflask container designed for collection of groundwater samples for dissolved gas analyses by limiting potential gas losses during sample collection through a closed system, connecting the sampling device tubing directly to the Isoflask, to collect the 750 milliliters (mL) of groundwater required for laboratory analysis. A pre-inserted bactericide capsule prevents bacterial degradation of the sample collected.
- VOA Vial Technique – This sampling technique includes the collection of groundwater in three 0 head space 40 mL VOA vials preserved with sodium triphosphate. This technique does not include

a closed system, and therefore the groundwater sample is exposed to the atmosphere during the transfer from the sampling tubing to the VOA vial and minor losses of dissolved gases may occur.

A determination of the appropriate sampling technique to use for specific sampling locations at the Site has been made based on an evaluation and comparison of dissolved-phase methane analytical results from both techniques. Arcadis has performed evaluations which have included a number of groundwater split samples sent to both Pace Analytical and Isotech Laboratories. These analyzed groundwater samples were collected from various points and depths throughout the Site. Based on the results of these samples, it has been concluded that if the dissolved-phase methane concentration is below 28 milligrams per liter (mg/L), the solubility limit of methane at atmospheric pressure (surface of the water table), then minor losses of dissolved gases does not have a significant effect on the result and the VOA vial technique provides a representative sample. However, if dissolved-phase methane concentrations are above the solubility limit, it is more accurate to use the closed system (Isoflask technique) to eliminate gas losses due to the exposure of the sample to the atmosphere. Although the solubility limit for methane is 28 mg/L, we believe that a dissolved-phase concentration of 2.8 mg/L (one order of magnitude less than the solubility limit) is a conservative criteria for selecting the appropriate sampling technique, while resulting in accurate data for dissolved-phase methane concentrations throughout the Site.

Groundwater sampling for dissolved-phase methane will be conducted in accordance with the following:

1. If a groundwater monitoring well has not been sampled for dissolved-phase methane in the last two years, a baseline sample will be collected using the Isoflask technique.
2. If a groundwater monitoring well has been sampled in the last two years and contains a dissolved-phase methane concentration less than 2.8 mg/L, then future sampling will be completed using the VOA vial technique.
3. If a groundwater monitoring well has been sampled in the last two years and contains a dissolved-phase methane concentration greater than 2.8 mg/L, then future sampling events will be completed using the Isoflask technique.

The remainder of this SOP will provide additional information and equipment required for collection of dissolved-phase methane samples at the Ford-Kingsford Products Facility (Site).

3 PERSONNEL QUALIFICATIONS

All personnel working at the Site must have the necessary training based on the hazards present. In addition, personnel should be familiar with the operation of the treatment system in relation to water chemistry.

4 EQUIPMENT LIST

- Grundfos (400’) 2” pump (rental from Pine Environmental or other current vendor)
- Grundfos controller and associated power cords (rent with pump)
- Power inverter
- In-Situ AquaTroll (AT) 600 (rental from In-Situ, Inc. or other current vendor)
- In-house tablet (or rental with AT600)
- Quick Cal solution
- Buckets
- Isoflask sampling device
- Water level meter
- Tubing
  - Tubing for the Grundfos is on a reel located in the south pumphouse
  - Purge tubing is 3/8” x ½” polyvinyl (cut to the appropriate length to deliver water to buckets from the pump).
- Scissors for cutting tubing, if necessary
- Appropriate field book (Groundwater Sampling)
- Pen
- List of wells with screened intervals
- Sample bottles
- Labels
- Chain of custody
- Ice (in warm weather conditions)
- Cooler
- Decontamination supplies (Micro-90, paper towels, water, two clean buckets)
- Nitrile gloves
- Safety glasses
- Well opening tools (e.g., socket wrench or 2035 key).

5 HEALTH AND SAFETY CONSIDERATIONS

Employees must abide by the policies and procedures in the current Site-Specific Health and Safety Plan in addition to all Corporate Health and Safety procedures.

6 PROCEDURE

1. Review equipment list (Section 4) to confirm that all the appropriate equipment is available. Determine which sampling technique is appropriate based on historical methane concentration data.
2. Gather necessary supplies.
3. Mobilize to monitoring well.
4. Refer to the *Low Flow Sampling with Water Quality Parameters SOP* for guidance on low flow sampling procedure.

5. Ensure all bottles are labelled and the chain of custody is filled out appropriately.
6. Samples are to be held on ice or shipped the same day (Note: samples collected with the VOA vial method have a 14 day hold time, samples collected with the Isoflask method do not need to be refrigerated and have a 6 month hold time.)
7. Once sampling round is complete, secure samples in a cooler with packing material and ice to maintain a 4-degree Celsius temperature while samples are transported to the laboratory.

7 WASTE MANAGEMENT

Purge water can be processed through the groundwater treatment plant.

8 DATA RECORDING AND MANAGEMENT

All applicable notes should be recorded in the appropriate groundwater sampling field book. Final parameters are stored in a Site-specific database for later use in calculations, reporting, and historical tracking.

9 QUALITY ASSURANCE

Trip blank, temperature blank, duplicate, and matrix spike/matrix spike duplicate samples will be analyzed to assess the quality of the data resulting from the field sampling program. The general frequency of quality control samples, in accordance with the Quality Assurance and Project Plan, will be one field duplicate for every 10 investigative samples. Laboratory procedures should be followed as written to achieve accurate and consistent results.

10 REFERENCES

Not applicable.

APPENDIX E

Proposed Study Area Description

Proposed Study Area Description

Beginning at a point approximately 353 feet west of the centerline intersection of North Pyle Drive with Woodward Avenue; thence south to the intersection with the Menominee River; thence southeasterly, south, southeasterly, east and northeasterly meandering along the northerly shoreline of the Menominee River until an intersection with Highway M-95 (Carpenter Road); thence approximately 1,200 feet northeast along the west side of Highway M-95 until the intersection with the centerline of Roseland street projected to the Menominee River; thence north along the projected centerline and thence the centerline of Roseland Street to the intersection of Roseland Street and East Boulevard; thence west along the centerline of East Boulevard to the intersection of East Boulevard with North Boulevard; thence north along the centerline of North Boulevard to the intersection of North Boulevard with Pyle Drive; thence west along the centerline of Pyle Drive to the intersection of Pyle Drive with Balsam Street; thence north along the centerline of Balsam Street to the intersection of Balsam Street with Woodward Avenue, thence west along the centerline of Woodward Avenue to a point approximately 500 feet east from the intersection of the centerline of Westwood Avenue with Woodward Avenue; thence north approximately 350 feet; thence west approximately 1,000 feet along a line parallel with Woodward Avenue; thence south approximately 350 feet to the centerline of Woodward Avenue; thence west along the centerline of Woodward Avenue to the beginning point.

APPENDIX F

Soil Boring and Well Construction Logs

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG

Boring/Well GM-7 Project/No. Ford Kingsford Page 1 of 4

Site Location Kingsford, Michigar Drilling Started 16:57 6/9/97 Drilling Completed 17:45 6/11/97

Total Depth Drilled 228 feet Hole Diameter 6 inches Type of Sample/ Coring Device Rotasonic Core Barre

Length and Diameter of Coring Device 10 ft x 4 in Sampling Interval Continuous

Land-Surface Elev. 1107.63 feet msl [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used Water Drilling Method Rotasonic

Drilling Contractor Boart Longyear Driller Kale Helper Arlo/Ken

Prepared By Pat Bartnik and Bruce Evans

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
0	5	5	10/0.2	0-1': Topsoil. Dark brown (7.5 YR 3/4), silty and sandy with rootlets, moist.
				1-5': Sand. Strong brown (7.5 YR 5/6), medium with coarse to fine gravel (angular to rounded), trace pebbles to 2" diameter, dry to moist.
5	10	5	8/0.1	0-1': Sand. As above.
				1-4': Sand. Reddish yellow (7.5 YR 6/6), medium to well sorted, trace gravel (rounded to subrounded approximately 0.1 to 1").
				4-5': Sand. Strong brown (7.5 YR 5/6), fine to very fine, trace gravel, trace silt dry to moist.
10	15	5	10/1.1	0-2': Sand. Strong brown (7.5 YR 5/6), same as above.
				2-5': Sand. Strong brown (7.5 YR 5/6). Dry to moist.
15	20	5	50/5.1	0-5': Sand. Strong brown (7.5 YR 5/8), medium to fine, trace gravel (0.1-1") dry to moist.
20	25	5	50/11.7	0-1': Sand. As above.
				1-4.5': Sand. Strong brown (7.5 YR 5/6), medium to fine, trace gravel ((0.1-0.5") angular to rounded). Dry.
				4.5-5': Sand. Light brown (7.5 YR 6/4), medium to fine, trace silt, color difference results form rotation, of core barrel and dissociation and pulverizing of sample.
25	30	5	100/3	0-5': Sand. Reddish brown (5 YR 4/3), as above with trace gravel ((0.1 to 0.5 ") subrounded), dry to moist.
30	35	0		Sample lost during extrusion from core barrel.
35	40	5	90/4.1	0-5': Sand. As above.
40	45	5	30/7.2	0-1': Sand. As above.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-7

Prepared by P. Bartnik/B. Evans

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
				1-5': Sand. Reddish brown (5 YR 5/4), medium to fine, silty, trace gravel (0.1 to 1"), subrounded, moist.
45	50	5	22/0.0	0-1.5': Sand. As above, moist.
				1.5-1.6': Sand. As above, but with gravel (0.1 to 1"), subrounded, wet.
				1.6-4.5': Sand. Reddish brown (5 YR 5/4), medium to fine moist to wet.
				4.5-4.8': Sand. Reddish brown (5 YR 5/4), very fine, silty, moist.
				4.8-5': Silt. Reddish brown (5 YR 5/4), wet, trace clay.
50	55	5	50/16.8	0-1': Silt. As above.
				1-1.5': Sand. Reddish brown (5 YR 5/4), medium to fine, trace gravel, wet.
				1.5-4': Sand. Reddish-brown (5 YR 5/4), interbeds 2-4" in thickness of very fine gravel to silty and medium sand, well sorted, trace silt, trace gravel, wet.
				4-5': Sand. Strong brown (7.5 YR 4/6), medium, well sorted from 4.5-5 poorly sorted from 4-4.5' with gravel (0.5 to 1") subrounded, wet.
55	60	4	17/0.0	Sand. Brown (7.5 YR 4/4), medium to fine, trace gravel ((0.1 to 1") subrounded), wet.
60	65	5	13/0	0-2.5': Sand. Brown (7.5 YR 4/4), medium, trace gravel.
				2.5-3': Sand. Gravelly and poorly sorted, wet.
				3-5': Sand. Strong brown (7.5 YR 4/6), medium to fine, wet.
65	70	5	12/0	0-1': Sand. As above, wet.
				1-3': Sand. Brown (7.5 YR 4/4), coarse to fine, gravelly, poorly sorted, wet.
				3-5': Sand. Brown (7.5 YR 4/4), medium to fine, trace gravel.
70	75	5	19/20.5	0-2': Sand. As above.
				2-2.5': Sand. Brown (7.5 YR 4/4), coarse to fine, gravelly, poorly sorted.
				2.5-3.5': Sand. Brown (7.5 YR 4/4), fine to very fine, silty, wet, trace gravel.
				3.5-5': Sand. Brown (7.5 YR 4/4), medium to very fine, silty, trace gravel, wet.
75	80	5	9/0.0	0-1.5': Sand. As above.
				1.5-2.3': Sand. Brown (7.5 YR 4/4), coarse to fine gravelly, wet.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-7

Prepared by P. Bartnik/B. Evans

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
				2.3-5': Sand. Brown (7.5 YR 4/4), medium to fine, wet.
80	85	5	18/0	0-1': Sand. As above.
				1-1.5': Sand. Brown (7.5 YR 4/4), fine to very fine, silty, wet.
				1.5-3': Sand. Medium to fine, silty, brown (7.5 YR 4/4), wet.
				3-4.5': Sand. Brown (7.5 YR 4/4), medium to fine. Gravelly at base, wet.
				4.5-5': Sand. Brown (7.5 YR 4/4), fine to very fine, silty, wet.
85	90	0	--	No recovery.
90	95	4	9/0	Sand. Brown (7.5 YR 4/4), coarse to fine, silty, poorly sorted, wet.
95	100	0	--	No recovery.
100	105	1.5	0/0	Sand. Brown (7.5 YR 4/4), medium to fine, trace silt, wet.
105	110	0	--	No recovery, even with a (used) retainer.
110	115	0	--	No recovery.
105	110	0	--	No recovery.
110	115	3	5/1.1	Sand. Brown (7.5 YR 4/6), medium to fine, trace silt, wet.
115	120	3	50/4.8	0-1.5': Sand. Brown (7.5 YR 4/2), medium to fine, trace silt, wet.
				1.5-3': Sand. Brown (7.5 YR 4/2), coarse to fine, trace silt, gravelly, wet (0.1 to 1"), subangular to rounded.
120	125	4	50/4.8	0-4': Sand. Brown (7.5 YR 4/4), medium to fine, trace silt, wet.
125	130	5	3/1.1	0-2': Sand. Reddish brown (5 YR 4/4), fine to very fine, silty, wet.
				2-5': Silt. Reddish brown (5 YR 4/4), wet.
130	135	5	4/1.2	0-5': Silt. Reddish brown (5 YR 4/4), trace very fine sand, wet.
135	140	5	10/0.9	0-1': Silt. As above.
				1-5': Clay. Dark reddish brown (5 YR 4/4), dry, hard, silt as irregular laminae and patches.
140	145	5	6/0.5	0-1.5': Clay. As above.
				1.5-4.5': Silt. Reddish brown (5 YR 4/4), trace sand, wet.
				4.5-5': Sand. Reddish brown (5 YR 4/4), silty, wet, very fine grained, well sorted.
145	150	5	>10,000/2.4	0-2.5': Sand. Strong brown (7.5 YR 4/6), coarse to medium, trace gravel, wet.
				2.5-5': Sand. Reddish brown (5 YR 4/4), medium to fine, trace silt, wet.
150	155	5	10,000/0	Sand. Reddish brown (5 YR 4/4), fine to very fine, silty, wet.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

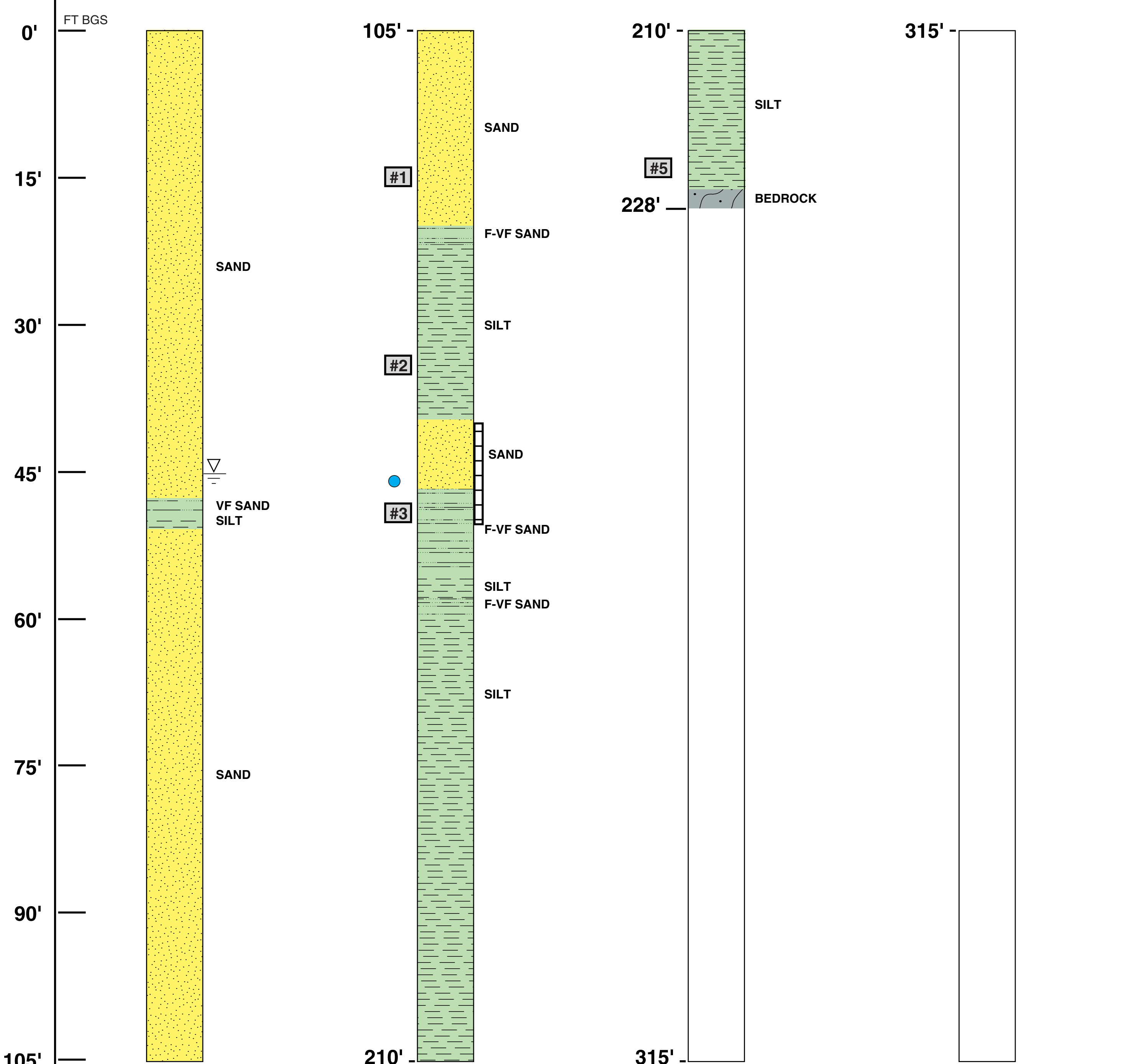
Boring/Well GM-7

Prepared by P. Bartnik/B. Evans

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
155	160	5	>10,000/0.0	Sand. As above.
160	165	5	>10,000/0.4	0-1.5': Sand. As above.
				1.5-2.5': Silt. Reddish brown (5 YR 4/4), sandy (very fine), wet.
				2.5-4.5': Sand. Reddish brown (5 YR 4/4), very fine, silty, wet.
				4.5-5': Silt. Reddish brown (5 YR 4/4), trace sand (very fine grained), moist.
165	170	0		No recovery.
170	175	5	5,000/2.2	Silt. Reddish brown (5 YR 4/3), sandy (very fine), wet.
175	180	5	1,000/2.2	Silt. As above.
180	185	5	600/2.5	Silt. As above, trace of clay inclusions, reddish brown (5 YR 4/4), wet.
185	190	5	200/0.4	Silt. Reddish brown (5 YR 4/3), trace matrix clay and with some irregular incisions (patches) and laminee of (clay, reddish brown (5 YR 4/4), fissile appearance yet plastic, wet).
190	195	5	150/0.0	Silt. As above, wet.
195	200	5	10/0.0	Silt. As above, trace clay as above, wet.
200	205	5	4/0.0	Silt. As above, trace clay as above, wet.
205	210	5	8/1	Silt. Brown (7.5 YR 4/4), trace clay in matrix, (reddish brown (5 YR 4/4), as irregular inclusions (patches) and fine laminae, fissile appearance, plastic). Wet.
210	215	5	3/0.4	Silt. As above with clay, wet.
215	220	5	3/0.4	Silt. As above, trace very fine grain sand, trace clay, wet.
220	225	5	3/1.6	Silt. As above (215-220), wet.
225	230	3	18/3.4	0.5': Clay. Dark blue grey, (Gley2 4/1 5B), plastic, wet, with broken bedrock fragments (angular (1-2")).
				0.5-3': Slate/Phyllite. Quartz veins, pyrite veins greenish to grey, foliation, cleavage approximately 25 to 30 degrees from vertical.
				End drilling a 228' bls. Bedrock reached at 225.5' bls, borehole secured by screening drill head into casing.
				Well screen set at 145 to 155' bgs.

ARCADIS GERAGHTY & MILLER	BOREHOLE STRATIGRAPHIC LOG	OBSERVATION WELL NO. GM-7
		PROJECT FORD/KINGSFORD WI000637.0001

LOCATION			LAND SURFACE ELEVATION
Kingsford, Michigan			1107.63 Feet MSL
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLING DEVICE**	**TOTAL DEPTH DRILLED**
B. Evans / P. Bartnik	Continuous	Rotasonic Core Barrel	228 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Kale	Boart Longyear	Rotasonic	6/11/97



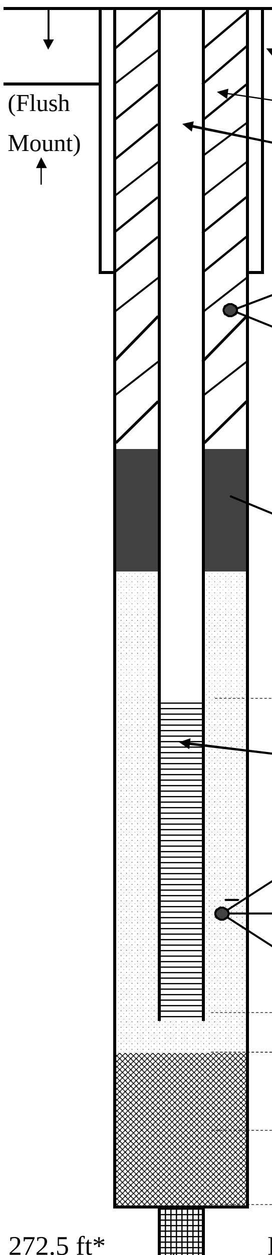
VERTICAL SCALE ~1"= 15'

20DEC99\FORD\WI0637\KINGSFOR\GRAPHICS\REV_ECA\DRAWING: GM_7.AI

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

PRIVILEGED & CONFIDENTIAL
ATTORNEY WORK PRODUCT
FOR SETTLEMENT ONLY

WELL CONSTRUCTION LOG
(FLUSH MOUNTED WELL)



LAND SURFACE

(Flush Mount)

8 inch diameter to 125

6 inch diameter

Well Casing,
2 inch diameter,
SCH 80 PVC

☐ Backfill
☒ BENTONITE/ CEMENT

211 ft*

Bentonite ☐ slurry
221.5 ft* ☒ pellets

224.3 ft*

Well Screen.
2 inch diameter
SCH 80 PVC, 0.010 slot

☐ Gravel Pack
☒ Sand Pack Red Flint #30
☐ Formation Collapse

234.3 ft*
239 ft*

Bentonite Chips

255 ft*

272.5 ft*

formation collapse

Measuring Point is Top of Well Casing Unless Otherwise Noted.
* Depth Below Land Surface

Project FORD/WI0637.001 Well GM-17
Town/City KINGSFORD
County DICKINSON State MICHIGAN

Land-Surface Elevation and Datum ______ feet MSL ☐ Surveyed ☐ Estimated

Installation Date(s) 10/20/97 TO 10/23/97
Drilling Method ROTASONIC
Drilling Contractor BOART LONGYEAR
Drilling Fluid NONE

Development Technique(s) and Date(s).
PUMP WITH SUBMERSIBLE PUMP ON 10/25/97

Water Removed During Development 600 gallons
Static Depth to Water 57.14 feet below M.P.
Pumping Depth to Water 64.66 feet below M.P.
Pump Duration 2 hours
Date 10/25/1997
Specific Capacity 0.53 gpm/ft

Well Purpose DEEP MONITORING WELL.
SYSTEM HYDRAULIC INFORMATION.

Remarks

Prepared by TED POWELL

ford/wi0631/datamngt/tables/GM17.xls

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG

Boring/Well GM-17 Project/No. Ford Kingsford

Site Location Kingsford, Michigar Drilling Started 10/20/97 14:25 Drilling Completed 10/22/97 16:20

Total Depth Drilled 272.5 feet Hole Diameter 6 inches Type of Sample/ Coring Device Rotasonic Core Barrel

Length and Diameter of Coring Device 10 ft x 4 in Sampling Interval Continuous

Land-Surface Elev. 1111.84 feet [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used Water Drilling Method Rotasonic

Drilling Contractor Boart Longyear Driller Perry Helper Gabe

Prepared By Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
0	5	5	2.50-10/0	0-1.5': Sand. With gravel, sand very fine to coarse, some very coarse, some silty, poorly sorted, loose, slight moist, roots, gravel 1/8 to 1/2 inch subrounded to angular, brown (7.5 YR 4/4).
				1.5-3': Silt. Trace fine to coarse sand, soft, wet, trace clay, yellow brown (10 YR 5/6) fairly homogenous, moderately well sorted.
				3-5': Sand. Fine to medium, trace very fine, trace silt, loose, moist, trace gravel 1/4 to 1/8 inch subround, moderately well sorted, red yellow (7.5 YR 6/6).
5	10	5	2.5-5/.1-.5	0-2': Sand. Medium to coarse, trace fine, trace very coarse, trace silt, loose, light brown (7.5 YR 6/4), trace gravel 1/8 to 1/4 inch subround to subangular.
				2-2.3': Sand. Very fine to fine, some silt, loose, light olive brown (2.5 Y 5/4) trace gravel 1/8 to 1/2 inch, subrounded to subangular.
				2.3-3': Gravel. With silt, gravel 1/8 to 1.5 inch, subround to subangular, silt has trace clay, brown (7.5 YR 4/4).
				3-3.7': Sand. Very coarse, trace fine, trace silt, moderately well sorted, some gravel 1/8 to 1/2 inch subround to subangular, strong brown (7.5 YR 5/6) loose, slight moist.
				3.7-5': Sand. Fine with very fine, trace silt, moderately well sorted, loose, pink (7.5 YR 7/4). At base of section, there is some gravel, 1/4 to 1/2 inch, subround to subangular.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
10	15	5	5-40/1.5-3	0-2.5': Slough.
				2.5-4': Sand. As above.
				4-5': Sand. Fine to very coarse, some very fine, trace silt, poorly sorted, loose, dry, some gravel 1/8 to 1/4 inch, subround to subangular, brown (7.5 YR 5/4).
15	20	2	2.5-7/1-1.4	0-1.5': Sand. Fine to medium, some coarse to very coarse, some silt, poorly sorted, some 1/8 to 1/4 inch gravel, possible slough.
				1.5-2': Sand. Very fine to fine, with silt, strong brown (7.5 YR 5/6) some coarse and very coarse sand, some 1/8 to 1/4 inch gravel, subround, poorly sorted, loose to medium dense, slightly moist, begin running casing.
20	25	3	2-4.5/0-1.0	0-2.5': Sand. Fine to medium, some coarse, trace very coarse, trace silt, some gravel, 1/8 to 1-1/4 inch, subangular to subrounded, poorly sorted, loose, brown (7.5 YR 5/4) slightly moist.
				2.5-3': Sand and Gravel. Sand is very fine to fine, with silt, loose, strong brown, (7.5 YR 5/6) some 1/8 to 1/4 inch gravel, subround to subangular, one large cobble (>4 inch) gabbro glacial erratic.
25	30	2	2.5-9/0-.8	Silt. Brown (7.5 YR 4/4) trace fine sand, trace coarse sand, stiff to very stiff, poor recovery, some sand and gravel mixed in, likely slough.
30	35	5	2.5-9/0-.5	Sand. Very fine, trace medium, trace silt, moderately well sorted, trace gravel 1/8 to 1/2 inch, subrounded to subangular, loose, pink (7.5 YR 7/4), wet to very moist.
35	40	5	2.5-4/0	0-1.5': Sand with Gravel. Sand fine to medium, some coarse, trace very coarse, trace silt, moderate to poor sorting, loose to medium dense, gravel 1/8 to 3/4 inch, round to subangular, wet.
				1.5-2': Sand. Very fine, silty, trace fine grain, medium dense to dense, brown (7.5 YR 4/4) trace gravel 1/4 inch subangular to subrounded.
				2-5': Sand. Medium to coarse, some fine, trace very fine, trace very coarse, trace silt, poorly sorted, trace gravel (approximately 10 percent) 1/8 to 1 inch, subround to subangular from 4 to 5 feet,

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
				proportion of coarse and very coarse grain increases, brown (7.5 YR 5/4).
40	45	5	3-7/.1-.8	Sand. Fine to coarse, trace very fine, trace very coarse, moderately sorted, medium dense, trace gravel, 1/8 to 3 inch, subround to subangular, color as above.
45	50	5	2-5.5/0-.1	0-2.5': Sand. Fine to medium with coarse, trace very coarse, some very fine, trace silt, medium dense, moderately sorted, trace gravel, 1/8 to 1/4 inches, subround to subangular, brown (7.5 YR 5/4).
				2.5-5': Sand. Fine to medium, some coarse, trace very coarse, trace silt and very fine, trace gravel 1/8 to 1/4 inch subround to subangular, medium dense, moderately sorted, brown (7.5 YR 5/4).
50	55	5	3-6/0-.4	0-3': Sand. As above.
				3-4': Sand with Gravel. Sand coarse to very coarse, some fine, trace very fine, trace silt, gravel 1/8 to 1/2 inch, subround to subangular, poorly sorted, dark brown (7.5 YR 4/2) medium dense.
				4-5': Sand. Fine to medium, some coarse and very coarse, trace very fine and silt, trace gravel, 1/8 to 1/4 inch, angular and subround, medium dense, moderately sorted.
55	60	5	2-4/0-.1	0-5': Sand. Fine to coarse, some very coarse, some very fine, trace silt, brown (7.5 YR 4/4), some gravel (approximately 15 percent) 1/8 to 1 inch, subround to subangular, moderately to poorly sorted, medium dense.
60	65	5	2-8/0-.2	0-2': Sand. As above.
				2-5': Sand. Fine to medium, some very fine, some coarse, trace very coarse, trace silt, trace gravel 1/8 to 1/4 inch subangular to subround, moderately sorted, medium dense, brown (7.5 YR 4/4).
65	70	5	2-3.5/0	0-3': Sand. As above.
				3-5': Sand. As above, with several silt lenses, interspersed throughout, silt is brown (7.5 YR 4/4) sample is very disturbed, silt apparently in lense approximately 2 inch thick, soft, trace clay and very fine sand.
70	75	5	2-6.5/0-.3	0-3': Sand. Very fine, silty, medium dense to dense, moderately well sorted. From 0 to 1 foot, very fine silty sand to very fine sandy silt, red brown (5 YR 4/4).

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
				3-3.5': Silt. Some very fine sand, trace fine, medium stiff, red brown (5 YR 4/4).
				3.5-5': Sand. Fine to medium, trace coarse to very coarse, some very fine, trace silt, medium dense, trace gravel 1/4 inch, subround, moderately to poorly sorted.
75	80	5	2-3.5/0-.1	Sand. Fine to medium, some very fine, some coarse, trace silt, trace very coarse, trace gravel 1/8 to 1/4 inch, subround, moderately sorted, medium dense.
80	85	5	2-6/0-0.3	0-2': Sand. As above.
				2-2.5': Sand. Very fine to fine, some silt, medium dense to dense, moderately well sorted, brown (7.5 YR 4/4).
				2.5-5': Sand. Medium to coarse, some fine, trace very coarse, trace silt (10 percent), trace gravel 1/8 to 1/2 inch, subangular to subround, medium dense, brown (7.5 YR 4/4), moderately sorted.
85	90	5	2-7/0	0-2': Sand. Fine to coarse, some very coarse, trace very fine, trace silt, moderately well sorted, medium dense, trace gravel 1/8 inch dark brown (7.5 YR 4/4).
				2-5': Sand. Fine with medium, some coarse, trace very coarse, some very fine, trace silt, moderately well sorted, medium dense, trace gravel 1/4 to 1/2", subround to subangular, color as above.
90	95	5	3.5-9/0-0.3	Sand. Fine to medium, some coarse, trace very coarse, some very fine, trace silt, trace gravel 1/4 to 1 inch, subround, medium dense, moderately well sorted.
95	100	5	2-7/0	0-2.5': Sand. Fine to medium, some coarse, some very fine, trace silt, trace 1/4 inch gravel, subround, moderately well sorted, dense, dark brown (7.5 YR 4/4).
				2.5-5': Sand. Fine to medium, with coarse, trace very coarse, trace silt, trace very fine, moderately well sorted, medium dense.
100	105	5	3-6/0-.2	0-2': Sand. As above, at 2 feet there is a 1/4 inch clay seam, red brown (2.5 YR 4/3) soft, slightly platy, moderately plastic, directly below the clay seam very fine silty sand. Approximately 2 inch thick, dense, red brown (5 YR 4/3).
				2-5': Sand. Fine with medium, trace coarse, some silt, moderately well sorted, medium dense, brown (7.5 YR 4/4), trace gravel 1/8 inch subround.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
105	110	5	1.5/0	Sand. Very fine to silty, trace to some fine as progressing down through section, well sorted, medium dense to dense, strong brown (7.5 YR 4/6).
110	115	5	1.5/0	Sand. As above.
115	120	5	1.5/0	0-3': Sand. Very fine silty, trace fine and medium, trace very coarse, dense, strong brown (7.5 YR 4/6) moderately well sorted.
				3-5': Sand. Very fine, very silty (approximately 45 percent) trace fine, dense, well sorted, color as above.
120	125	5	1.5-4.5/0	0-2': Sand. Very fine silty, to very fine sandy silt, gradational along section, dense, trace clay, some clay inclusions. Red (2.5 YR 5/6) plastic, soft, platy to blocky in part.
				2-5': Silt. With very fine sand and small (.5 to 1 inch) pockets/lenses very fine to medium sand, silt soft to medium stiff, strong brown (7.5 YR 5/6) no reaction to acid, trace clay.
				Set up to purge temp well and collect groundwater grab sample GBGM-17/105.
125	130	5	2.0/0	0-2': Sand. Very fine silty, trace fine, medium dense, trace clay, grades to very fine sandy silt in part, moderately well sorted.
				2-3': Silt. With very fine sand, trace clay brown (7.5 Yr 5/4) moderately stiff inclusions/lenses approximately 1/4 inch thick, red (2.5 YR 5/8) soft moderately plastic.
				3-5': Silt. Very clayee in part, some very fine sand, where clayee soft, moderately plastic to plastic, brown (7.5 YR 5/4), abundant red clay inclusions, medium stiff, fissile, slight reaction in HCL.
130	135	5	1.75 -2/0	0-1': Silt. As above.
				1-4': Sand. Very fine silty, trace clay, dense, moderately well sorted.
				4-4.5': Silt with very fine sand, dense to medium stiff, very clayee in part, moderate plastic where clayee, brown (7.5 YR 5/4).
				4.5-4.8': Sand. Very fine, trace fine, with silt, medium dense, well sorted, color as above.
				4.8-.5': Silt. With very fine sand, trace clay, medium stiff, brown (7.5 YR 5/4).

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
130	140	5	1.75-2/0	0-2.5': Silt. With very fine sand, trace clay, soft, trace fine sand, trace red clay inclusions approximately 1/4 inch thick, fissile, medium stiff, moderately plastic, moderate reaction in HCL, silt brown (7.5 YR 5/4).
				2.5-3.5': Sand. Silty very fine, some fine, moderately well sorted, medium dense, color, as above.
				3.5-5.': Silt. With clay (variable) moderately plastic, medium stiff to soft. Occasional red clay inclusions, red (2.5 YR 5/8) fissile and small very fine to fine sand lenses throughout.
140	145	5	1.75-3/0	0-3': Silt. As above.
				3-3.3': Silt. Sandy very fine grain, dark brown (7.5 YR 3/2) variegated, brown (7.5 YR 5/4) medium stiff.
				3.3-5': Silt. With very fine sand, grading to silt with very fine sand in part, trace fine sand, medium stiff to medium dense, brown (7.5 YR 5/4).
145	150	5	1.25/0	0-2.5': Silt. Some very fine sand, well sorted, soft, trace clay, brown (7.5 YR 5/4).
				2.5-3.5': Clay. Silty, trace very fine sand, hard to very stiff, nonplastic, red brown (2.5 YR 4/3).
				3.5-5': Silt. Trace very fine sand, trace to some clay, soft to medium stiff, slight to moderately plastic, brown (7.5 YR 5/3).
150	155	5	1.25/0	0-2.5': Silt. Very fine sandy, trace to some clay, soft to medium stiff, slight to moderately plastic depending on clay content, brown (7.5 YR 5/4).
				2.5-5': Clay. Silty to clayee silt, trace very fine sand at 3 to 4 feet occasional red clay inclusions, red (2.5 YR) soft, plastic, slightly platy. At 3.5 feet a 1/4 to 1/2 inch sand and gravel lense, sand coarse to very coarse, gravel to 1/2 inch subround to subangular from 3.5 feet to 5 feet trace gravel throughout, matrix grades to silty clay, medium stiff to stiff, moderately plastic, red (5 YR 5/6).
155	160	5	1.25-2/0	0-.5': Silt. Clayee with trace 1/2 inch gravel, as above.
				.5-5': Silt. Some clay, very well sorted, homogenous, yellow red (5 YR 4/6) stiff to very stiff, slightly plastic.

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
160	165	5	1.25-1.5/0	Silt. As above, at 4 feet a sand lense approximately 2 inches thick, very fine to fine, some silt, dense, moderately well sorted, red brown (5 YR 5/4).
165	170	5	0-2.5/0	0-1.5': Sand. Fine to medium, some very fine trace very coarse, trace silt, moderately well sorted, medium dense, light brown brown (2.5 YR 6/4).
				1.5-3.5': Clay. Silty, strong brown (7.5 YR 5/6) stiff, non plastic to slightly plastic.
				3.5-5': Silt. Some clay and sand, predominately more sand as progress down through section, sand fine with very fine, trace to some silt, trace medium and coarse, very pale brown (10 YR 7/4), loose to medium dense, non effervescent, moderately sorted.
170	175	5	2.5-5.5/0	0-1': Sand. Fine to coarse, some very coarse some very fine, trace silt, some gravel 1/8 to 1/2 inch subround to subangular, light yellow brown (2.5 YR 6/32) loose to medium dense, poorly sorted.
				1-3': Sand. Fine to medium, some coarse, trace very fine to trace silt, trace 1/8 inch gravel, subangular to subround, poorly sorted color as above.
				3-4': Sand. Very fine, silty, dense, moderately well sorted, very pale brown (10 YR 7/3).
				4-5': Sand. Medium to coarse, some fine and very coarse, trace very fine, trace silt, loose to medium dense, color as above.
175	180	5	3.5-6.5/0	0-2.5': Sand. Fine with very fine, some medium to coarse, moderately well sorted, loose to medium dense.
				2.5-5': Sand. Medium to coarse, some fine, trace very fine, trace silt, trace very coarse, trace gravel 1/8 to 1/4 inch, subround to subangular, pale yellow (2.5 Y 7/3).
180	185	5	3.5-5.5/0	0-.5': Sand. As above.
				.5-1': Sand. Very fine with silt, trace fine, moderately well sorted, medium dense to dense, pale yellow (2.5 Y 7/3).
				1-5': Sand. Fine to medium, some very fine, trace coarse moderately well sorted, medium dense, very pale brown (10 YR 7/4).

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
185	190	5	3-7.5/0.1	0-1.5': Sand. As above.
				1.5-5': Sand. Medium with fine and coarse, some very coarse, trace very fine, trace silt, moderately sorted, medium dense, light yellow brown (10 YR 6/4).
190	195	5	2.5-7.5/0	0-2': Sand. As above.
				2-5': Sand. Medium to coarse with very coarse, coarsens downward, trace very fine and silt, trace gravel 1/8 to 1/2 inch subround to subangular, moderately sorted, color as above.
195	200	5	2.5-4/0	0-2.5': Sand. As above.
				2.5-5': Sand. Medium and coarse with gravel, trace fine and silt, gravel 1/8 to 1/2 inch subangular to subround, poorly sorted, loose to medium dense.
200	205	5	2.5/0	Sand. Coarse with medium and very coarse, trace fine, trace silt and gravel, grey brown (2.5 Y 5/2) gravel 1/8 to 3/4 inch angular to round, poorly sorted, loose to medium dense, the section from 185 to 205' coarsens downward.
205	210	5	4-6.5/0	0-2': Sand. Fine to medium with coarse, some very fine, trace silt, trace gravel (10 percent) 1/8 to 3/4 inch subround to subangular, poorly sorted, medium dense, light yellow brown (2.5 Y 6/3).
				2-2.5': Gravel. With sand, gravel 1/8 to 2.5 inches, round to angular, sand medium to coarse, some fine and very fine, very poorly sorted, loose to medium dense, grey brown (2.5 Y 5/2).
				2.5-5': Sand. Fine to medium, some coarse and very coarse, some gravel 1/8 to 2.5 inch, subangular to subround, poorly sorted, medium dense, light yellow brown (2.5 Y 6/3).
210	215	5	4-17/0	Sand. Fine to medium, some coarse and very coarse, trace silt, some gravel 1/4 to 1.5 inch, subangular to subround, poorly sorted, medium dense.
215	220	3	0/5-12	Sand. Fine to medium with coarse, some very coarse, trace very fine and silt, trace gravel (1 to 3.5 inch cobble, subround) medium dense, poorly sorted to moderately sorted.
220	225	0	-/-	Lost recovery.
225	230	5	20-2,000/0	0-2': Sand. Medium to coarse some very coarse, with fine, and some very fine, trace silt, moderately sorted, medium dense, grey brown (10 YR 5/2).

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Boring/Well GM-17

Prepared by Ted Powell

From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
				2-5': Sand. As above, although slightly more coarse and very coarse grey brown (10 YR 5/2).
230	235	5	400-5,500/0	Sand. Coarse with medium and very coarse, some fine, trace very fine and silt, medium dense, angular to subround, poorly sorted, trace gravel 1/8 inch, grey (10 YR 6/1).
235	240	5	250-900/0-.2	Sand. As above.
240	245	5	15-105/.1-.7	Sand. Coarse some medium , with very coarse, some fine, trace very fine and silt, medium dense, trace gravel 1/8 inch subangular to subround, moderately to poorly sorted, grey (10 YR 6/1).
245	250	5	8-30/0-0.1	0-4': Sand. Medium with coarse and fine, some very coarse, some fine, trace silt, moderately to poorly sorted, medium dense to dense, grey brown (10 YR 5/2).
				4-5': Sand. Fine to very coarse, some very fine, trace silt, some gravel 1/8 to 1/2 inch subround to subangular, medium dense brown (10 YR 5/3) poorly sorted.
250	255	5	15-40/0-.4	Sand. Fine to coarse, with very coarse, some fine, trace silt, with gravel 1/8 to 1.5 inch subround to subangular, very poorly sorted, gravel is predominately slate/phylite, brown (10 YR 5/3).
255	260	5	9-50/0-.1	Sand. Fine to coarse some very coarse, some very fine, trace silt, some gravel 1/8 to 1 inch subround to subangular, very poorly sorted, pink greyish brown (10 YR 4/2) dense.
260	265	5	12-42/0-.3	Sand and Gravel. Sand fine to coarse, some very fine, trace silt, gravel 1/8 to 3 inch, round to angular, very poorly sorted, medium dense to dense, very dark greyish brown (10 YR 3/2).
265	270	5	29-175/.3-12.6	0-2': Gravel. Some sand, sand is very fine to very coarse, trace silt gravel 1/8 to 1.5 inch, subround to subangular, poorly sorted, loose to medium dense, greyish brown (10 YR 5/2).
				2-4.5': Sand. Very coarse with coarse, trace very fine to fine, some gravel 1/8 to 3/4 inch, round to subangular, poorly sorted, medium dense, dark greyish brown (2.5 Y 4/2).
				4.5-5': Sand. Medium with coarse and very coarse, some fine, trace very fine, medium dense, moderately to poorly sorted, trace gravel 1/8" subround to subangular, dark grey (10 YR 4/1).

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij company

SAMPLE/CORE LOG (Cont.d)

Prepared by Ted Powell

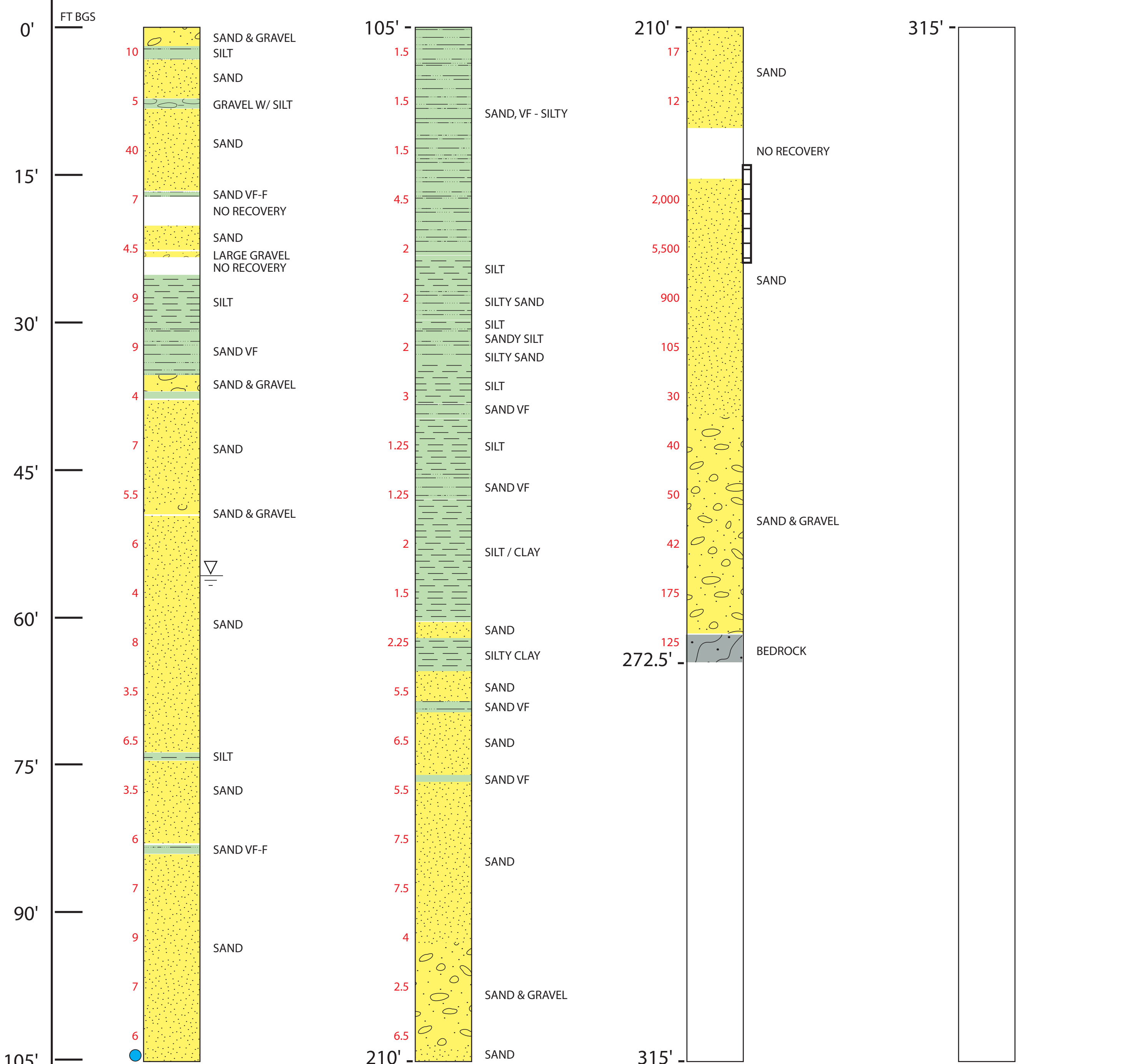
From (feet)	To (feet)	Core Recovery (feet)	OVA/OVM (ppm)	Sample/Core Description
270	272.5	2.5	45-125/13-17	0-1': Diamict, matrix is sandy silt, some clay, sand fine to medium, some coarse, matrix supports gravel and fractured weather bedrock (slate) at base, gravel 1/4 to 4 inch subround to angular, medium stiff, grey (10 YR 5/1).
				1-2.5': Slate. Phylitic impart, subvertical slaty cleavage, hardness 2.5, 1 GLEY dark greyish green (2.5/56/3/2). Slate mildly weathered at top. Competent bedrock at 271 ft bgs.

ARCADIS

BOREHOLE STRATIGRAPHIC LOG

OBSERVATION WELL NO.	GM-17
PROJECT	FORD/KINGSFORD WI000637.0001

LOCATION			LAND SURFACE ELEVATION
Kingsford, Michigan			1111.84 Feet MSL
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLING DEVICE**	**TOTAL DEPTH DRILLED**
T. Powell	Continuous	Rotasonic Core Barrel	272.5 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Perry	Boart Longyear	Rotasonic	10/22/97

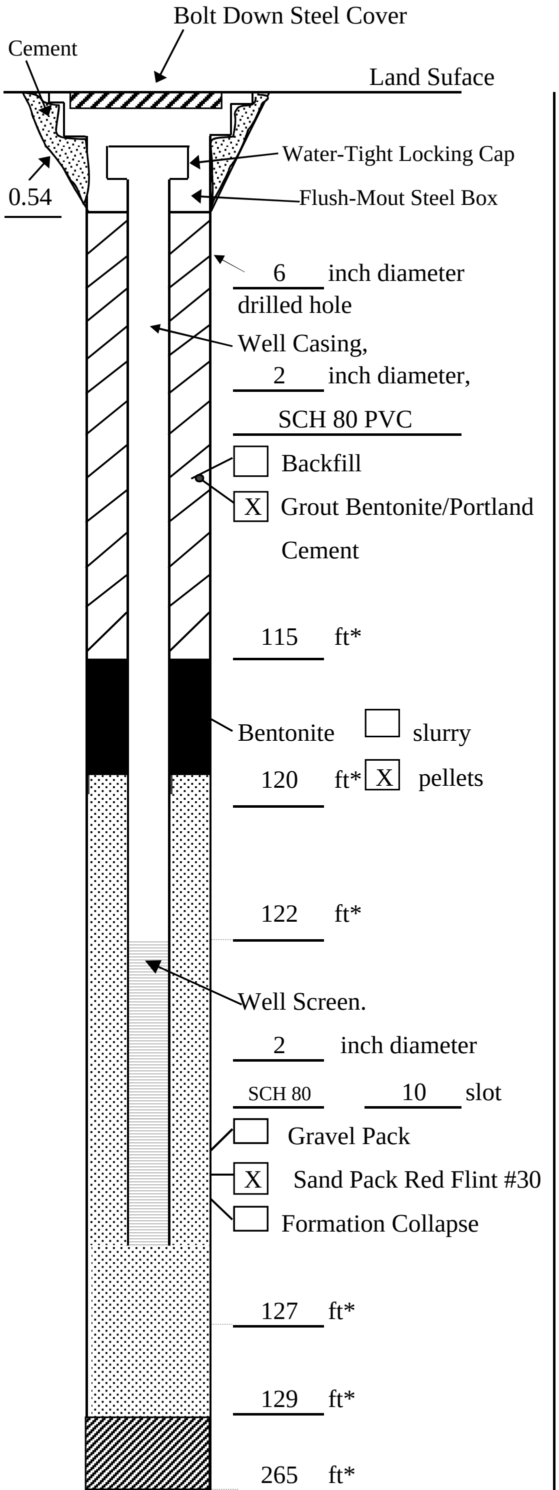


VERTICAL SCALE ~1"= 15'

22MAR05\FORD\WI0637\CJ2005\GRAPHICS\STRAT LOGS\DRAWING: GM_17.AI

ARCADIS GERAGHTY & MILLER

WELL CONSTRUCTION LOG
(Flush Mounted Well)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

* Depth Below Land Surface (bls)

Project: Ford/Kingsford — Probe: GM-67

Town/City: Kingsford

County: Dickinson — State: Michigan

Land-Surface Elevation and Datum: 1115.9 feet — [X] Surveyed [ ] Estimated

Installation Date(s): 6/15/00 - 6/16/00

Drilling Method: Rotasonic

Drilling Contractor: Boart Longyear

Drilling Fluid: Water

Development Technique(s) and Date(s):
Surge well with 2" submersible pump.

Fluid Loss During Drilling ______ gallons

Water Removed During Development: approximately 200 gallons

Static Depth to Water: 63.0 feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration: 4.5 hours

Yield ______ gpm — Date: 6/30/2000

Specific Capacity ______ gpm/ft

Well Purpose: Monitoring groundwater levels and water quality.

Remarks: Depth to water (after development) = 70.0' BTOC.

Prepared by: John Keller

ford/wi0637/kingsford/tables/wcl_gm67.xls
3/15/2018 3:24 PM

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/We	GM-67	Project/No.	Ford/Kingsford Wi000804.0001		Page	1 of 6	
Site Location	Kingsford, Michigan	Drilling Started	6/13/00	Drilling Completed	6/15/00		
Total Depth Drilled	265 Feet	Hole Diameter	6 inches	Type of Sample/ Coring Device	Rotasonic Core Barrel		
Length and Diameter of Coring Device	10' x 4"			Sampling Interval	Continuous feet		
Land-Surface Elev.	1115.90 feet	X Surveyed	Estimated	Datum	Mean Sea Level		
Drilling Fluid Used	Water			Drilling Method	Rotasonic		
Drilling Contractor	Boart Longyear			Driller	Mike Hansen	Helper	Jerry and Ryan
Prepared By	John Keller/Bill Schulz			Hammer Weight	NA	Hammer Drop	NA ins.

Sample/Core Depth (feet below land surface)

From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
0	5	5	1.1-2.1/	0-1.5': Silt, reddish brown (5 YR 4/4), some clay to clayey, trace to some
			0.0-0.2	rock fragments in upper 0.5' interval, trace rootlets.
				1.5-2.5': Sand, yellowish red (5 YR 4/6), medium, some gravel (2 mm to
				45 mm), subrounded to subangular, trace very fine to fine, trace silt, trace
				coarse, poorly sorted, loose, dry.
				2.5-3.5': Sand, strong brown (7.5 YR 4/6), fine to medium, trace very fine,
				trace silt, trace gravel (2 mm to 30 mm), subrounded, moderately to well
				sorted, loose, dry.
				3.5-5': Sand, brown (7.5 YR 4/4), medium, trace coarse, trace very fine to
				fine, trace silt, some gravel (2 mm to 50 mm), subrounded to subangular,
				poorly to moderately sorted, loose, dry.
5	10	2.5	2.2-10/	0-2': Sand, very dark grayish brown (10 YR 3/2), medium, trace very fine to
			0.0-1.8	fine, small clay modules throughout (clay may be slough?), trace to some
				fine gravel (2 mm to <10 mm), subrounded to subangular loose, poorly
				to moderately sorted.
				2-2.5': Sand, brown (10 YR 4/3), medium to coarse, trace very coarse, trace
				very fine to fine, trace very fine gravel (<5 mm), poorly to moderately sorted,
				loose, damp.
10	15	2.5	1.9-3/	0-2': Sand, as above.
			0.0-0.0	2-2.5': Sand, dark brown (10 YR 3/3), fine to medium, some very fine,
				some silt, gravelly (2 mm to 35 mm), subrounded to subangular, loose, dry.
15	20	3	12-100/	0-2.5': Sand, as above with gravel (2 mm to 20 mm).
			0.0-20.9	2.5-3': Sand, dark brown (7.5 YR 3/4), medium to coarse, trace very coarse,
				some gravel (2 mm to 50 mm), subrounded to subangular, poorly to
				moderately sorted, loose, damp.
20	25	3	3.4-8.8/	0-1.5': Sand, dark brown (7.5 YR 3/4), medium to very coarse, trace very
			0.0-1.0	fine to fine, gravelly (2 mm to 50 mm), trace silt, trace clay.
				1.5-2.2': Sand, brown (7.5 YR 4/4), medium, trace very fine to fine, some
				silt to silty, trace fine gravel (<5 mm), well sorted, loose, damp.
				2.2-3': Sand, brown (7.5 YR 5/4), very fine to fine, silty, trace gravel (2 mm to
				40 mm), large boulder (60 mm) at bottom of section.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-67

Prepared by John Keller/Bill Schulz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
25	30	2	7-14/	0-2': Sand, brown (10 YR 4/3), medium, trace very fine to fine, trace silt,
			0.0-2.9	trace clay, gravelly (2 mm to 50 mm), subrounded to angular, poorly to
				moderately sorted, loose, dry.
30	35	5	1.1-42/	0-5': Sand, brown (7.5 YR 5/4), very fine to fine, trace to some medium,
			0.0-5.4	trace to some silt, well sorted, loose, dry.
35	40	2.5	1.2-2.2/	0-1.5': Silt, brown (7.5 YR 4/3), with clay layers/laminations throughout
			0.0-0.6	[clay, dark brown (7.5 YR 3/2) H.P. = 1.75], H.P. of silt = 0.75, moderately
				well compacted, dry to damp.
				1.5-2.5': Silt, brown (7.5 YR 5/4) very sandy (very fine to fine), loose, dry.
40	45	2.5	1.8-4.7/	0-2': Silt, as above.
			0.0-0.9	2-2.5': Silt, brown (7.5 YR 4/3) with clay layers/laminations throughout
				clay, dark brown (7.5 YR 3/2), moderately well compacted, dry to damp.
45	50	5	4.6-13/	0-1': Sand, brown (7.5 YR 4/3) medium, trace very fine to fine, trace coarse,
			0.0-2.4	trace coarse, trace silt, well sorted, loose, damp.
				1-5': Sand, brown (7.5 YR 4/4), fine to medium, trace to some very fine,
				trace to some silt, well sorted, loose, damp.
50	55	3	8.5-23/	0-1.5': Sand, as above.
			0.0-3.0	1.5-3': Sand, brown (10 RY 4/3), very fine, trace to some fine, silty, trace
				clay, loose to slightly compacted, dry to damp, well sorted.
55	60	5	2.2-4.0/	0-3': Silt, brown (7.5 YR 4/3) with clay layers/laminations throughout, (clay,
			0.0-2.4	dark red (2.5 YR 3/6)) (H.P. silt = 2.25 H.P. clay = 2.5), tight, well compacted,
				damp to wet.
				3-5': Sand, brown (7.5 YR 4/3), very fine to fine, trace clay, trace to some
				silt, well sorted, loose, damp.
60	65	5	2.2-3.9/	0-1.5': Sand as above.
			0.0-1.6	1.5-5': Silt, dark brown (7.5 YR 3/2) with clay layers/laminations through-
				out, (clay, brown (7.5 YR 4/3)) (H.P. silt = 2.5 H.P. clay = 1.25), dense, well
				compacted, damp to wet.
65	70	5	2.2-2.4/	0-5': Silt with clay layers/laminations as above. H.P. silt = 2.8 H.P. clay = 3.
			0.0-1.0	
70	75	5	2.2-2.5/	0-5': Silt with clay layers/laminations as above, H.P. silt = 1.8, H.P. clay >4.
			0.0-0.6	
75	80	5	2.2-2.4/	0-5': Silt with clay layers/laminations, as above (clay layers much less
			0.0-0.6	abundant as before), H.P. clay >4, H.P. silt = 1.8.
80	85	5	2.2-2.3/	0-5': Silt with clay layers/laminations as above (again clay layers much less
			0.1-0.6	abundant).
85	90	5	2.1-2.5/	0-5': Silt with sparse clay layers/laminations, as above.
			0.3-0.6	
90	95	5	2.2-2.6/	0-5': Silt with sparse clay layers/laminations, as above.
			0.2-0.7	

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-67

Prepared by John Keller/Bill Schulz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
95	100	5	2.3-2.6/	0-5': Silt, dark brown (7.5 YR 3/3), with abundant clay layers/laminations
			0.0-0.0	throughout (clay: dark reddish brown (5 YR 3/4)), both silt and clay are very
				dense, clay very hard (driller had difficulty drilling through it) H.P. > 4 for
				both, silt displays small patches with color of dark gray (7.5 YR 4/1), well
				compacted, damp.
100	105	5	2.3-3.1/	0-5': Silt with clay layers/laminations as above.
			0.0-0.0	
105	110	5	2.1/	0-5': Clay, dark reddish brown (5 YR 3/4), trace to some silt (H.P. >4), very
			0.0-0.0	hard (drillers had difficulty drilling through it), slight HCI reaction with clay,
				extremely vigorous HCI reaction with $CaCO_3$ laminaes contained through-
				out clay, very well compacted.
110	115	5	2.1-14/	0-3': Clay, as above.
			0.0-0.0	3-4.5': Silt, dark reddish gray (5 YR 4/2), very dense, well compacted, H.P. =
				3.7.
				4.5-5': Clay, dark reddish gray (5 YR 4/2) to reddish brown (5 YR 4/3),
				slight HCI reaction, trace silt (H.P. >4), very hard, very well compacted.
115	120	5	5.5-850/	0-4': Silt, dark reddish brown (5 YR 3/4), very clayey (clay, brown (7.5 YR
			0.0-0.0	4/3), trace very fine to fine sand, well compacted, clay hard, silt moderately
				dense.
				4-5': Sand, brown (7.5 YR 4/3), fine to medium trace to some very fine,
				trace to some silt, well sorted, loose, damp to wet.
120	125	5	250-750/	0-1': Sand, as above.
			0.0-0.0	1-5': Sand, brown (7.5 YR 4/2), medium to very coarse, trace very fine to
				fine, gravelly (2 mm to 40 mm), trace clay, very poorly sorted, loose, damp.
125	130	5	150-310/	0-4': Sand and gravel, as above.
			0.0-0.0	4-5': Silt, brown (7.5 YR 3/3), very sandy (very fine to fine), trace clay, loose,
				damp.
130	135	5	33-130/	0-1.5': Silt, brown (7.5 YR 3/3), very sandy (very fine to fine), trace clay, loose,
			0.0-0.0	damp.
				1.5-5': Sand, brown (7.5 4/3), medium, trace to some very fine to fine,
				trace very coarse, well sorted, loose, damp.
135	140	5	180-850/	0-5': Sand, reddish brown (5 YR 4/3), very fine to fine, gravelly (10 mm to
			0.0-0.2	60 mm) interval from 3.5 to 4', gravel subangular to subrounded, some silt
				to silty, very well sorted (except for gravel interval), loose, wet.
140	145	5	850-2,200/	0-5': Sand, as above.
			0.0-0.5	
145	150	5	280-850/	0-2': Sand, as above.
			0.0-0.0	2-5': Silt, dark reddish brown (5 YR 3/3), sandy (very fine to fine), loose,
				dry to damp.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-67

Prepared by John Keller/Bill Schulz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
150	155	5	110-440/	0-5': Silt as above, with last 2' of the silt being dry and crumbly.
			0.0-0.1	
155	160	5	12-21/	0-5': Silt, dark reddish brown (5 YR 3/3), sandy (very fine to fine), loose,
			0.0-0.0	saturated.
160	165	5	1.8-55/	0-5': Silt as above, but sand content increases as you go down section
			0.0-0.0	(last 0.5' interval is borderline of a sandy silt/silty sand).
165	170	5	20-120/	0-5': Sand, reddish brown (5 YR 4/3), very fine to fine, silty, well sorted,
			0.0-0.0	loose, damp, to saturated.
170	175	5	1.2-35/	0-2': Sand, as above.
			0.0-0.1	2-3': Silt, dark reddish brown (5 YR 3/3) some clay to clayey, trace to some
				very fine to fine sand, loose, saturated.
				3-4': Silt, dark reddish brown (5 YR 3/3), very sandy (very fine to fine), trace
				clay, loose, damp to saturated.
				4-5': Silt, dark reddish brown (5 YR 3/3), trace to some very fine to fine
				sand, trace clay, loose to moderately compacted, damp.
175	180	5	1.0-1.8/	0-1': Silt, dark reddish brown (5 YR 3/3), some clay to clayey, trace very fine
			0.0-0.0	to fine sand, moderately compacted, saturated.
				1-3': Sand, reddish brown (5 YR 4/3), very fine to fine, some silt to silty,
				well sorted, moderately compacted, damp to wet.
				3-5': Silt, reddish brown (5 YR 5/3), some sand to sandy (very fine to fine)
				moderately compacted (H.P. = 2.0), damp to wet.
180	185	5	1.3-1.5/	0-4.5': Silt, reddish brown (5 YR 4/3), with some clay (clay present both in
			0.0-0.1	silt matrix and as layers) clay, dark reddish brown (5 YR 3/3), trace sand
				(very fine to fine).
				4.5-5': Silt, reddish brown (5 YR 4/3), sandy (very fine to fine), moderately
				compacted, wet, trace, clay.
185	190	5	1.1-1.8/	0-1': Silt. As above.
			0.0-0.0	1-3.75': Silt, reddish brown (5 YR 4/3), trace to some sand (very fine to
				fine), trace to some clay, moderately compacted, damp to wet.
				3.75-4': Sand, reddish brown (5 YR 4/3), very fine to fine, silty, well sorted,
				loose, damp.
				4-5': Silt, reddish brown (5 YR 4/3), trace to some sand (very fine to fine),
				trace to some clay, moderately compacted, damp.
190	195	5	1.1-2.8/	0-5': Silt, as above.
			0.0-0.1	
195	200	5	1.0-2.3/	0-5': Silt, reddish brown (5 YR 4/3), some sand (very fine to fine), trace clay,
			0.0-0.0	loose to moderately compacted, saturated.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-67

Prepared by John Keller/Bill Schulz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
200	205	5	1.0-2.3/	0-5': Silt. As above.
			0.0-0.0	
205	210		<1-1.3/	0-5': Silt, reddish brown (5 YR 4/3), interbedded with clay, dark brown
			0.0-0.0	(7.5 YR 3/2), (H.P silt = 1.5; H.P. clay = 1.0), trace to some sand (very fine
				to fine), moderately compacted, saturated.
210	215	5	<1-2.2/	0-5': Silt and clay, as above with the last 2' interval having equal
			0.0-0.0	amounts of clay and silt or slightly more clay than silt.
215	220	5	<1-1/NA	0-5': Silt, dark reddish gray (5 YR 4/2) with abundant clay layers/
				laminations (clay, dark reddish brown (5 YR 3/3), moderately to well
				compacted, damp to wet.
220	225	5	<1-1.2/NA	0-5': Silt with clay layers/laminations as above.
225	230	5	<1-2/NA	0-5': Silt, dark reddish gray (5 4/2), trace clay, trace very fine sand,
				moderately to well compacted, damp.
230	235	5	<1-2.5/	0-5': Silt as above.
			NA	
235	240	5	<1-1.2/	0-4.5': Clay, dark reddish brown (5 YR 3/4) to reddish brown 5 YR 4/3),
			0.0-0.0	gravelly (2 mm to 90 mm), gravel is subrounded to subangular, silty,
				trace to some sand (very fine to fine), firm to hard (H.P. = 2.75 - >4), dry
				to damp.
				4.5-5': Clay, dark reddish gray (5 YR 4/2) to dark gray (10 YR 4/1),
				gravelly (2 mm - 80 mm), sandy to very sandy (very fine to fine), silty,
				gravel is subrounded to subangular, soft to moderately stiff, (H.P. = 1.4-
				2.6). Till?
240	245	5	<1-2.0/	0-5': Clay as above, sandy/silty/gravelly, (till?).
			0.0-0.4	
245	250		<1-4.5/	0-5': Clay. Dark gray (10 YR 4/1), very sandy (very fine to fine), silty,
			0.0-0.0	gravelly (2 mm to 100 mm), soft, (H.P. = 0.6), gravel rounded to
				subangular, some gravel pieces appear to be weathered bedrock (slate/
				phyllite).
250	255	5	2.4-8.0/	0-1": Clay as above.
			0.0-0.0	1-5': Sand, grayish brown (10 YR 5/2), very fine to fine, silty, some clay
				(may be slough from above?), trace fine gravel (<5 mm), very dense,
				poorly sorted, damp.
255	260	5	1.5-26/	0-2.5': Sand, dark grayish brown (10 YR 4/2), very fine to fine, trace to
			0.0-5.4	some medium, silty, trace fine gravel (<5 mm), subrounded, trace clay.
				2.5-5': Silt, dark grayish brown (10 YR 4/2), very sandy (very fine to fine),
				some clay, trace to some fine gravel (<5 mm), subrounded, moderately
				compacted, damp.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

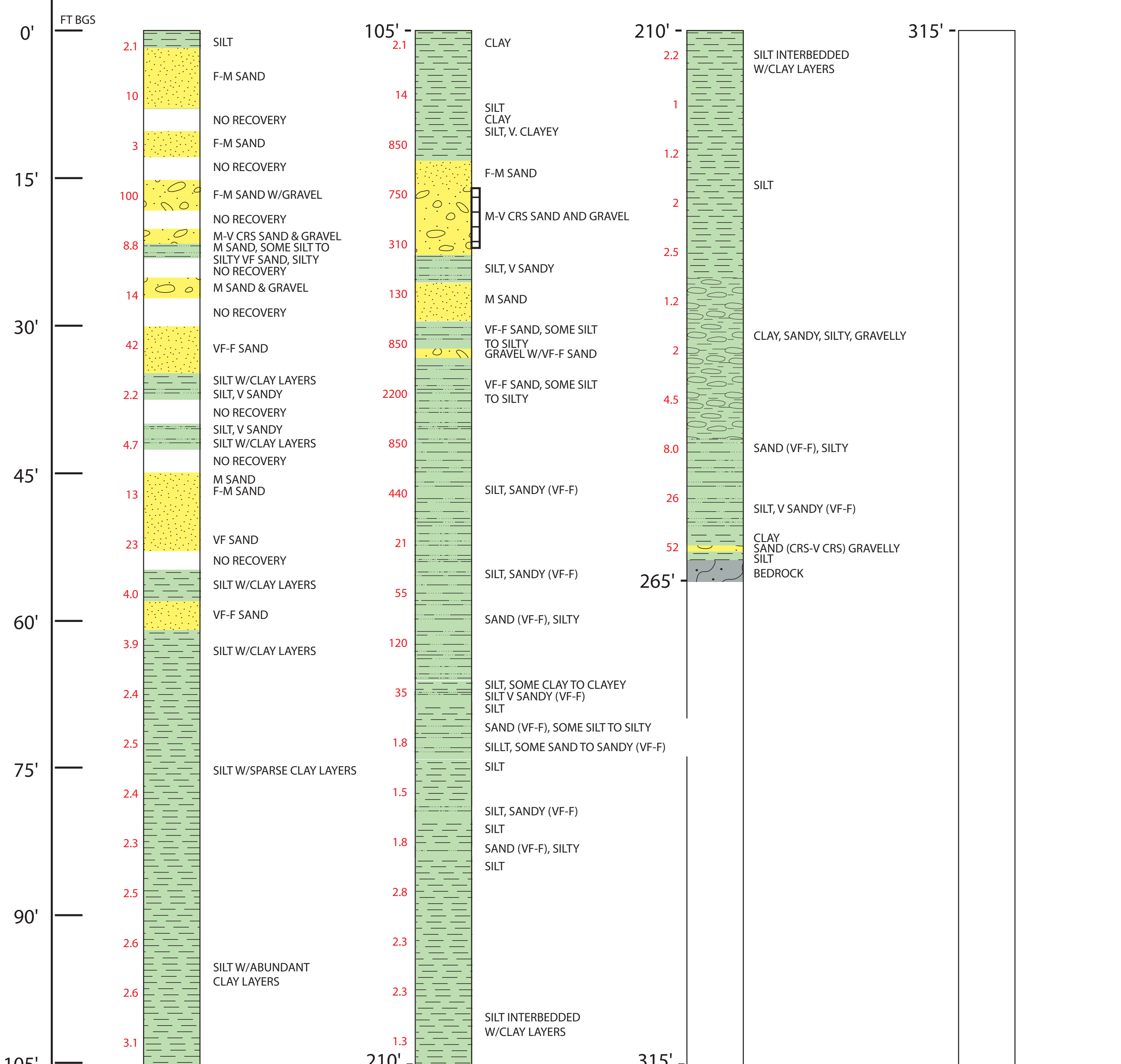
Boring/Well GM-67

Prepared by John Keller/Bill Schulz

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
260	263	3	18-52/	0-1.6': Clay, dark bluish gray (Gley 5B 4/1), to dark grayish brown
			1.2-31.5	(10 YR 4/2), sandy (very fine to fine), silty some gravel (2mm to 80 mm),
				subrounded to subangular.
				1.6-2': Sand, dark bluish gray (Gley 5B 4/1), coarse to very coarse, gravelly
				(2 mm to <10 mm), some silt, some very fine to fine sand, trace clay.
				2-3': Silt, dark bluish gray (Gley 5B 4/1), some sand to sandy (very fine
				to fine), trace clay abundant rock fragments (zone of weathered
				bedrock?).
263	265			Competent bedrock, greenish/bluish gray. Abundant metamorphic (Schist/
				Gneiss) with subvertical foliations (- 80^{o}), abundant pyrite deposits
				along foliation planes, near vertical quartzite layering.
				EOB @ 265 feet.

ARCADIS	BOREHOLE STRATIGRAPHIC LOG	OBSERVATION WELL NO. GM-67
		PROJECT FORD/KINGSFORD WI000804.0001

LOCATION			LAND SURFACE ELEVATION
Kingsford, Michigan			1115.90 Feet MSL
GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
John Keller	Continuous	Rotasonic Core Barrel	265 Feet BLS
DRILLER	DRILLING CONTRACTOR	DRILLING METHOD	DATE BORING COMPLETED
Mike Hansen	Boart Longyear	Rotasonic	6/19/00

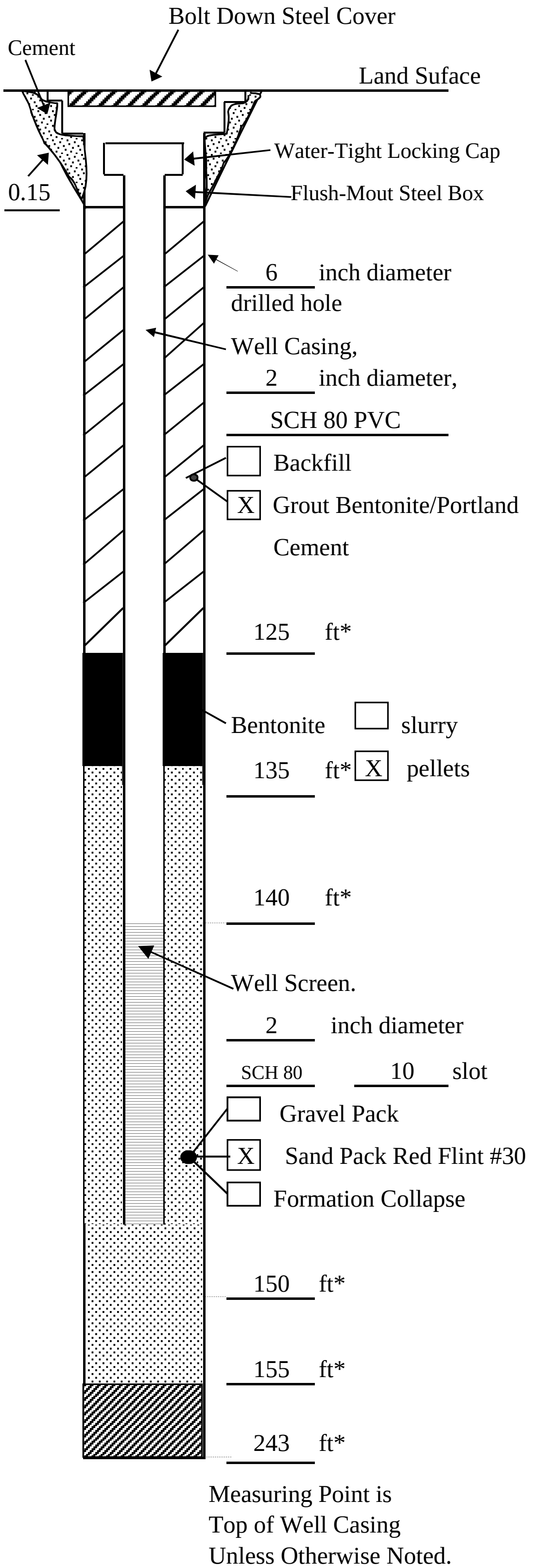


VERTICAL SCALE ~1"= 15'

30MAR05\FORD\WI0637\CJ2005\GRAPHICS\STRAT LOGS\DRAWING: GM_67.AI

ARCADIS GERAGHTY & MILLER

WELL CONSTRUCTION LOG
(Flush Mounted Well)



Project	Ford/Kingsford
Probe	GM-68
Town/City	Kingsford
County	Dickinson
State	Michigan
Land-Surface Elevation and Datum	1105.72 feet
[X] Surveyed / [ ] Estimated	
Installation Date(s)	6/29/2000
Drilling Method	Rotasonic
Drilling Contractor	Boart Longyear
Drilling Fluid	Water
Development Technique(s) and Date(s)	Surged well with 2" submersible pump.
Fluid Loss During Drilling	gallons
Water Removed During Development	approximately 350 gallons
Static Depth to Water	37.35 feet below M.P.
Pumping Depth to Water	feet below M.P.
Pumping Duration	2.5 hours
Yield	gpm
Date	8/7/2000
Specific Capacity	gpm/ft
Well Purpose	Monitoring groundwater levels and water quality.
Remarks	
Prepared by	John Keller

* Depth Below Land Surface (bls)

ARCADIS GERAGHTY & MILLER
Sample/Core Log

Boring/Well: GM-68 | Project/No.: Ford/Kingsford Wi000804.0001

Site Location: Kingsford, Michigan | Drilling Started: 6/28/00 | Drilling Completed: 6/29/00

Total Depth Drilled: 243 Feet | Hole Diameter: 6 inches | Type of Sample/ Coring Device: Rotasonic Core Barrel

Length and Diameter of Coring Device: 10' x 4" | Sampling Interval: Continuous feet

Land-Surface Elev.: 1105.72 feet | [X] Surveyed | [ ] Estimated | Datum: Mean Sea Level

Drilling Fluid Used: Water | Drilling Method: Rotasonic

Drilling Contractor: Boart Longyear | Driller: Mike Hansen | Helper: Jerry and Ryan

Prepared By: John Keller/Dawn Gabardi | Hammer Weight: NA | Hammer Drop: NA ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
0	5	5	8/0.1-1.0	0-0.5': Silt very dark grayish brown (10 YR 3/2), rich organic layer, trace to
				some sand (very fine to fine), some gravel (approximately 20 mm), some
				rootlets and grass clippings, loose.
				0.5-2': Sand reddish brown (5 YR 4/4), medium, some very fine to fine,
				gravelly (2 mm - 50 mm), subrounded. Trace silt, trace clay, poorly sorted,
				dry.
				2-5': Sand, yellowish brown (10 YR 5/6), medium, trace very fine to
				fine, very well sorted, loose, dry.
5	10	3	8-15/	0-0.5': Sand, as above.
			0.2-1.0	0.5-1.5': Sand, yellowish brown (10 YR 5/6), medium, trace very fine to fine,
				abundant small pieces of ground-up rock fragments and rock flour present
				(rock is bluish-gray), fragments are subangular to subrounded.
				1.5-3': Sand, light brown (7.5 YR 6/4), medium, some coarse, trace very
				fine to fine, gravelly (2 mm - 60 mm), very poorly sorted, loose, dry.
10	15	3	8-17.5/	0-3': Sand, strong brown (7.5 YR 5/6), medium to very coarse, trace very fine
			0.3-1.0	to fine, gravelly (2mm - 80 mm), poorly sorted, loose, dry.
15	20	2.5	11-80/	0-2.5': Sand and gravel, as above.
			0.2-1.2	
20	25	2.5	15-70/	0-2.5': Sand and gravel, as above.
			0.0-1.0	
25	30	5	10-130/	0-1': Sandy very dark grayish brown (10 YR 3/2), coarse to very coarse,
			0.2-5.4	some medium, trace very fine to fine, gravelly (2 mm - 20 mm),
				subangular to subrounded, very poorly sorted, loose, dry.
				1-2': Sand, brown (10 YR 4/3), medium, some very fine to fine, trace coarse
				gravel (50-70 mm), some finer gravel also present (10-30 mm), moderately
				to well sorted, loose, damp (due to water added by drillers).
				2-3': Clay, reddish brown (5 YR 4/3), some silt, trace sand, (very fine to
				fine), soft, plastic (HP = 0.75).

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-68

Prepared by John Keller/Dawn Gabardi

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
				3-4.5': Silt, brown (10 YR 4/3), trace very fine sand, trace of clay (may be
				slough from above?), loose, dry.
				4.5-5': Sand, light reddish brown (5 YR 6/4), very fine, silty , very well
				sorted, loose, some clay, dry.
30	35	0		No recovery.
35	40	5	0-6.5/	0-5': Sand, brown (7.5 YR 4/3), fine to medium, trace to some very fine
			0.0-1.2	sand, trace silt, several clay layers throughout the sand, (clay : reddish
				brown (5 YR 4/3) clay is soft, plastic, damp to wet), sand also has some
				clay content besides layers.
40	45	5	6-12/	0-3': Sand, brown (7.5 YR 4/3), fine to medium, trace to some silt, trace
			0.0-2.0	very fine, trace gravel (2 mm - 15 mm), subangular, well sorted, loose,
				damp.
				3-5': Sand, brown (10 YR 4/3), medium to very coarse, trace very fine to
				fine, trace silt, gravelly (2 mm - 50 mm), subangular to subrounded,
				poorly sorted, loose, damp.
45	50	5	7-10/	0-5': Sand and gravel. As above.
			0.0-2.5	
50	55	0		No recovery.
55	60	5	7-14/	0-1.5': Sand, brown (7.5 YR 5/3), medium to very coarse, trace to some
			0.2-1.1	very fine to fine, gravelly (2 mm to 10 mm), subangular to subrounded,
				trace silt, loose, damp, very poorly sorted.
				1.5-5': Sand, brown (7.5 YR 5/3), medium to very coarse, trace to some
				very fine to fine, trace silt, loose, moderately sorted to poorly sorted, damp,
				trace gravel (< 10 mm), subrounded.
60	65	5	7-9/	0-5': Sand, as above.
			0.0-0.7	
65	70	5	8-12/	0-1.5': Sand as above.
			0.0-0.6	1.5-5': Sand, brown (7.5 YR 5/3), medium, trace coarse, trace to some very fine
				to fine, trace silt, well sorted, trace gravel (<10mm), subrounded, loose, damp.
70	75	5	7-9/	0-5': Sand as above.
			0.0-1.2	
75	80	5	6-10/	0-5': Sand, brown (7.5 YR 5/4), medium to coarse, trace very coarse, some very
			0.0-2.0	fine to fine, trace silt, some gravel (2 mm - 15 mm), subrounded, moderately
				to poorly sorted, loose, damp.
80	85	3	6-12/	0-3': Sand as above.
			0.0-0.2	

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-68

Prepared by John Keller/Dawn Gabardi

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
85	90	5	7-11/	0-5': Sand as above.
			0.0-0.1	
90	95	5	7-13/	0-3.5': Sand as above.
			0.0-1.3	3.5-5': Sand, brown (7.5 YR 5/4), medium to coarse, trace very coarse, some
				very fine to fine, trace silt, trace to some gravel (20 - 70 mm), subrounded to
				subangular, loose, moderately to poorly sorted, damp.
95	100	5	7-9/	0-5': Sand, brown (7.5 YR 5/4) medium, some very fine to fine, trace silt,
			0.0-0.3	well sorted, damp, loose.
100	105	3	7-9/	0-2': Sand as above.
			0.0-0.5	2-3': Silt, brown (7.5 YR 4/3), very sandy (very fine to fine), trace to some clay,
				loose to moderately compacted, wet to saturated.
105	110	5	7-8/	0-4.5': Sand, brown (7.5 YR 5/3), medium, some coarse, trace very coarse,
			0.0-0.6	trace very fine to fine, trace silt, moderately to well sorted, loose, damp.
				4.5-5': Silt, brown (7.5 YR 4/4), very sandy (very fine to fine), trace clay, loose
				to moderately compacted, wet.
110	115	5	7-8/	0-3': Silt, brown (7.5 YR 4/4), very sandy (very fine to fine), trace clay, loose
			0.0-0.2	to moderately compacted, damp to wet.
				3-5': Sand, brown (7.5 YR 4/4), very fine to fine, very silty, very well sorted,
				loose, damp to wet.
115	120	5	10-11/	0-5': Silty sand as above.
			0.0-0.3	
120	125	5	10-12/	0-2': Silty sand as above.
			0.0-1.0	2-5': Sand, brown (7.5 YR 4/3), fine to medium, trace to some very fine, trace
				to some silt, well sorted, loose damp.
125	130	5	10-12/	0-5': Sand as above.
			0.0-0.5	
130	135	0		No recovery.
135	140	5	7-21/	0-5': Sand, brown (7.5 YR 5/4), medium, trace fines, trace silt, very well sorted,
			0.0-0.01	loose, damp.
140	145	5	7-18/	0-5': Sand as above.
			0.0-0.0	
145	150	5	7-21/	0-5': Sand as above, with very minor trace gravel, subangular.
			0.0-0.1	
150	155	1	7-18/	0-1': Sand as above.
			0.0-0.1	

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GM-68

Prepared by John Keller/Dawn Gabardi

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
155	160	5	4.5-9.5/	0-1': Sand. Brown (7.5 YR 5/4), medium, some fines, trace silt, very well sorted,
			NA	wet.
				1-5': Silt. Brown (7.5 YR 5/3), sandy (fine to very fine), well sorted, wet.
160	165	5	4-8/	0-3': Silt, same as above, but damp.
			NA	3-5': Silt, brown (7.5 YR 4/2), some very fine sand, thin seams of clay (reddish
				brown 2.5 YR 4/3), clay is thinly laminated, damp.
165	170	5	4.5-7/	0-2': Silt. Dark reddish brown (2.5 YR 3/4), some clay, trace very fine sand, wet.
			NA	2-5': Silt, color as above, more clay, trace very fine sand, damp.
170	175	5	4.5-5.75/	0-5': Clay, reddish brown (2.5 YR 4/3), (HP = 4), very silty, well compacted,
			NA	trace gravel (0.5-1 mm), subangular, dry to slightly damp.
175	180	5	5.75-7/	0-5': Clay, reddish brown (5 YR 5/3), and reddish brown (5 YR 4/4), silty,
			0.0-0.0	trace sand, coarse and fine to very fine, clay alternates from soft to well
				compacted (0.7-2.0 (soft)) (HP >4 hard), moist to wet.
180	185	5	5.5-6.5/	0-3.5': Clay. Same as above.
			0.0-0.0	3.5-5': Clay (color same as above), thin silt seams, some fine to coarse sand,
				(HP 0.5-1.0), moist to wet.
185	190	5	5.5-6.25/	0-0.5': Clay, same as above.
			0.0-0.2	0.5-1': Sand, dark reddish brown (2.5 YR 3/4), fine to medium, clayey
				(HP = 1-2.0), wet.
				1-5': Clay dark reddish brown, (2.5 YR 3/4), silty, trace very fine sand, moist
				to wet.
190	195	4	5.25-6.75/	0-5': Silt, reddish-brown (5 YR 4/3), sandy, very fine to fine, trace clay, moist
			0.0-0.0	to wet.
195	200	5	5.25-6.5/	0-1': Clay, reddish brown (5 YR 4/3), (HP 2.2-3), silty, trace fine sand, wet.
			0.0-0.0	1-1.5': Sand, dark reddish gray (5 YR 4/2), fine to medium, some clay
				(HP = 1.5), wet.
				1.5-5': Sand, color as above, very fine to fine, trace medium, well sorted,
				trace silt and clay, wet.
200	205	5	5.25-12/	0-5': Sand, as above, wet.
			0.0-0.0	
205	210	5	5.5-8/	0-5': Sand, as above, wet.
			0.0-0.0	
210	215	5	5.5-12.5/	0-2': Sand, as above, wet.
			0.0-0.0	2-2.5': Clay, reddish brown (2.5 YR 4/3), (HP = 1.5), very silty, some fine sand,
				damp.

ARCADIS GERAGHTY & MILLER
Sample/Core Log (Cont.d)

Boring/Well GM-68

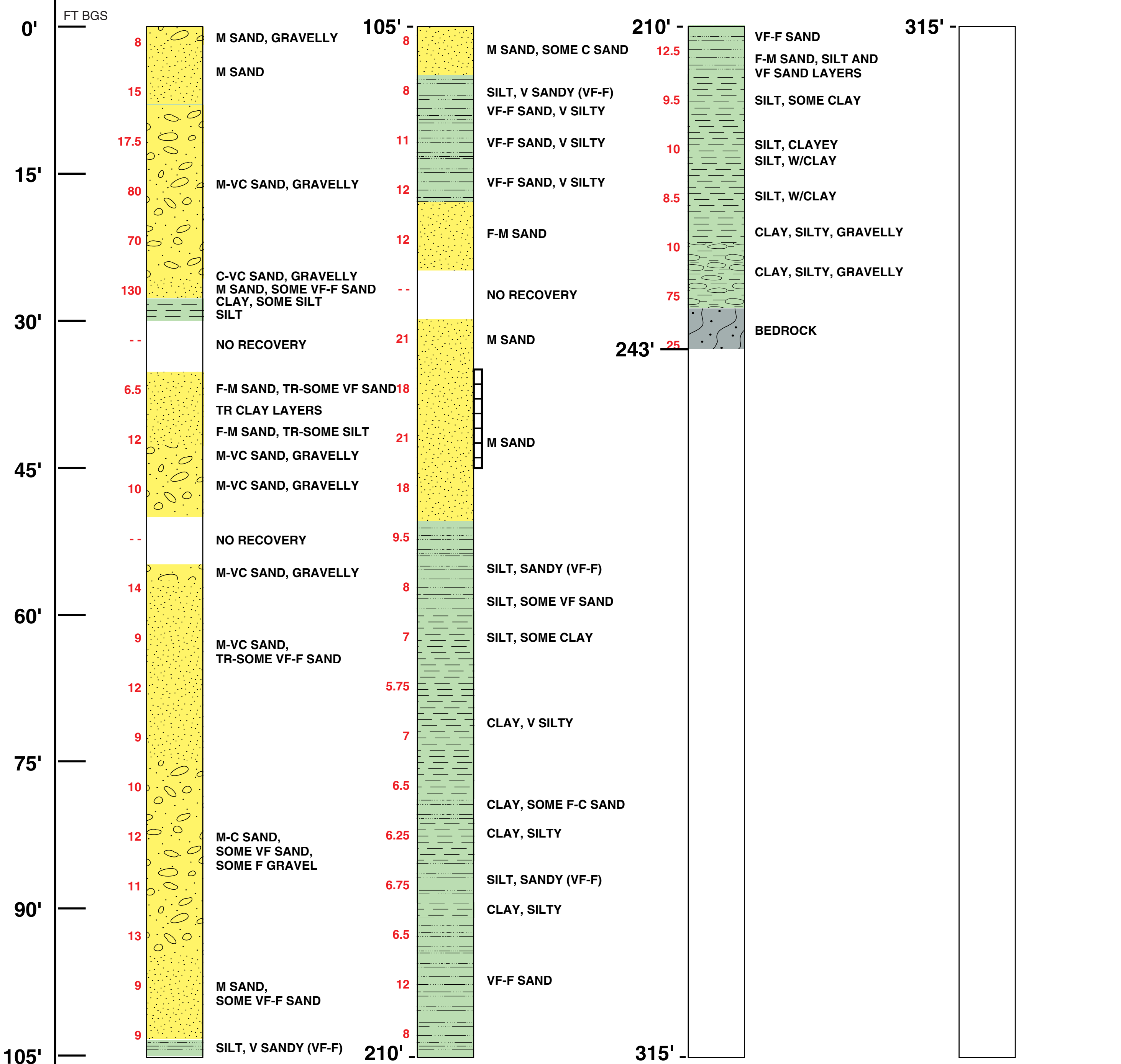
Prepared by John Keller/Dawn Gabardi

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
				2.5-5': Sand, brown (11.5 YR 5/3), fine to medium, well sorted, interbedded with
				silt and very fine sand, damp.
215	220	5	8-9.5/	0-5': Silt, reddish-brown (5 YR 5/3), with somne clay (reddish brown
			0.0-0.2	(2.5 YR 4/4), (HP on clay 1.0), trace veryfine sand, moist to wet.
220	225	5	8-10/	0-3.5': Silt, reddish brown (2.5 YR 4/4), clayey (reddish brown (2.5 YR 4/4)), trace
			0.0-0.2	sand, very fine, wet.
				3.5-4': clay (same color as above), HP >4, silty, trace gravel (1-2 mm), well
				compacted, dry.
				4-5': Silt, (same color as above), abundant clay, compacted, (clay HP = 2.5), dry to
				damp.
225	230	5	8-8.5/	0-4.5': Silt, color as above, abundant clay (color as above), trace sand, fine
			0.0-0.3	to very fine, moist to wet.
				4.5-5': Clay, reddish brown (2.5 YR 4/4), HP >4, compacted, silty, trace sand,
				fine to very fine, dry.
230	235	5	8-10/	0-2': Clay, dark bluish gray (Gley 10 B 4/1) to reddish brown (2.5 YR 4/4), HP >4,
			0.0-0.3	silty, gravelly (2-30 mm), subrounded to angular, very fine sand, very poorly
				sorted, very well compacted (dense), damp to dry, Till?
				2-5': Clay, dark bluish gray (Gley 10 B 4/1), silty, gravelly (2 mm - 80 mm),
				subrounded to angular, layer gravel possibly bedrock fragments (slate or phyllite),
				trace sand, fine to very fine, very poorly sorted, well compacted, dense, dry,
				HP >4, till?
235	240	5	8-75/	0-1': Clay, as above, till?
			0.0-2.1	1-4': Clay, as above, except slightly less gravel, (Gley 10 BG 5/1), till?
				4-5': Bedrock, greenish gray (Gley 10 BG 5/1), to greenish gray (Gley 5 BG 6/1),
				weathered, foliated, loose, friable.
240	243	3	8-25/	0-2.5': Bedrock, weathered, as above.
			0.0-0.3	2.5-3': Bedrock, competent, foliated, phyllite or slate.
				EOB @ 243' bgs.

ARCADIS GERAGHTY & MILLER	BOREHOLE STRATIGRAPHIC LOG	OBSERVATION WELL NO. GM-68
		PROJECT FORD/KINGSFORD WI000804.0001

LOCATION	LAND SURFACE ELEVATION
Kingsford, Michigan	1105.72 Feet MSL

GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
John Keller	Continuous	Rotasonic Core Barrel	243 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Mike Hansen	Boart Longyear	Rotasonic	7/7/00

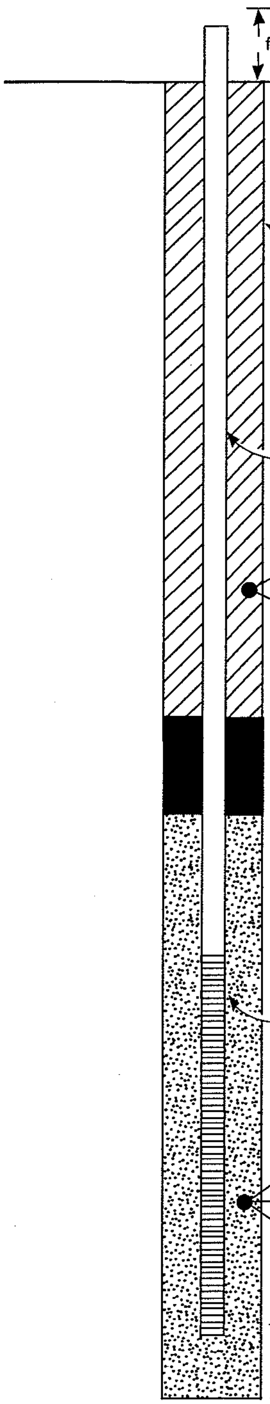


VERTICAL SCALE ~1"= 15'

16OCT00\FORD\WI0637\KINGSFOR\GRAPHICS\POST600\DRAWING: GM_68.AI

ARCADIS

Well Construction Log
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted

*Depth Below Land Surface

Project **Kingsford** Well **GM-81A**

Town/City **Kingsford**

County **Dickinson** State **Michigan**

Permit No. ______

Land-Surface Elevation **1110.84** feet

and Datum ______ ☒ surveyed

Mean Sea Level ☐ estimated

Installation Date(s) **5/25/04 - 5/26/04**

Drilling Method **Rotasonic**

Drilling Contractor **Boart Longyear**

Drilling Fluid **Water**

Development Technique(s) and Date(s) ______

Fluid Loss During Drilling ______ gallons

Water Removed During Development ______ gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm

Specific Capacity ______ gpm/ft Date **5/26/04**

Specific Capacity ______ gpm/ft

Well Purpose **RI monitoring well**

Remarks ______

Prepared by **Paul Lenaker**

ford/wi0637/2004/graphic/logs/gm81a.ai

Sample/Core Log

Boring/Well GM-81A Project/No. Ford/Kingsford WI001075.0015 Page 1 of 2

Site Location Kingsford, Michigan

Drilling Started 5/25/04 Drilling Completed 5/26/04

Total Depth Drilled 185 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Core barrel

Length and Diameter of Coring Device 10-20' x 4" Sampling Interval continuous feet

Land-Surface Elev. 1110.84 feet [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used Drilling Method Rotasonic

Drilling Contractor Boart Longyear Driller Bill Helper Jessie/Jo

Prepared By Paul Lenaker Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	145	0		Blind drill.
145	150	5	0.10-1.56/	0-0.3' Silt and Clay: Reddish brown (5 YR 4/4), firm and hard, HP >4.0, crumbly
			285-1100	at first, but cohesive and plastic when worked, moist, slight odor.
				0.3-1.0' Sand: Brown (7.5 YR 5/4), trace medium, trace subround to subangular
				gravel to 1.0", fine grained, grading into 1-3', well sorted, loose, wet, odor.
				1.0-3.0' Sand: Color as above, trace coarse, trace subround to subangular gravel
				to 2-5", trace fine, medium grained, loose, somewhat sorted, wet, odor.
				3.0-5.0' Sand: Brown (7.5 YR 4/4), some silt, trace coarse and medium sand,
				subround to subangular gravel to 1", very fine to fine, somewhat loose, wet,
				strong odor.
150	155	5	6.51-1.62/	0-4.0' Sand: Brown (7.5 YR 4/4) some to much silt, brown (7.5 YR 4/3), mainly
			2400-3100	in lenses up to 1" thick, silt is smooth, crumbly, at times has trace to some clay
				making it somewhat cohesive and somewhat plastic, very fine to fine, somewhat
				well sorted, some black staining starting at 3', wet, odor.
				4.0-5.0' Silt: Brown (7.5 YR 4/4), smooth very slight cohesive to crumbly, grainy
				in places, clay laminations layered with silt yellowish red (5 YR 4/6), some black
				staining, cohesive and plastic, platy appearance.
155	160	5	2.27-2.62/	0-5.0' Silt: Dark brown (7.5 YR 3/3), smooth, noncohesive and nonplastic, grainy
			5090-14500	in places, at 4.8' some clay lenses give it a somewhat cohesive/plastic texture,
				some dark gray to black staining throughout, wet, odor.
160	165	5	3.79-4.56/	0-5.0' Silt: Overall grainy and crumbly, smooth in places, some clay lenses
			12700-16000	(<mm's in thickens) give it a more red appearance/color, noncohesive,
				nonplastic, wet, odor.
165	175	5	.97-1.11/	0-5.0' Silt: Brown (7.5 YR 4/4), trace to some clayey silt to silty clay lenses reddish
			18300-30030	brown (5 YR 4/4), grainy to smooth, somewhat crumbly, trace dark grayish
				staining, has appearance of popped vesicles throughout, wet, slight odor.

Sample/Core Log (continued)

Boring/Well GM-81A

Prepared by Paul Lenaker

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
175	185	5	2.87-3.36/	0-5.0' Silt: As above, becoming somewhat less grainy down section.
			30200-40000	

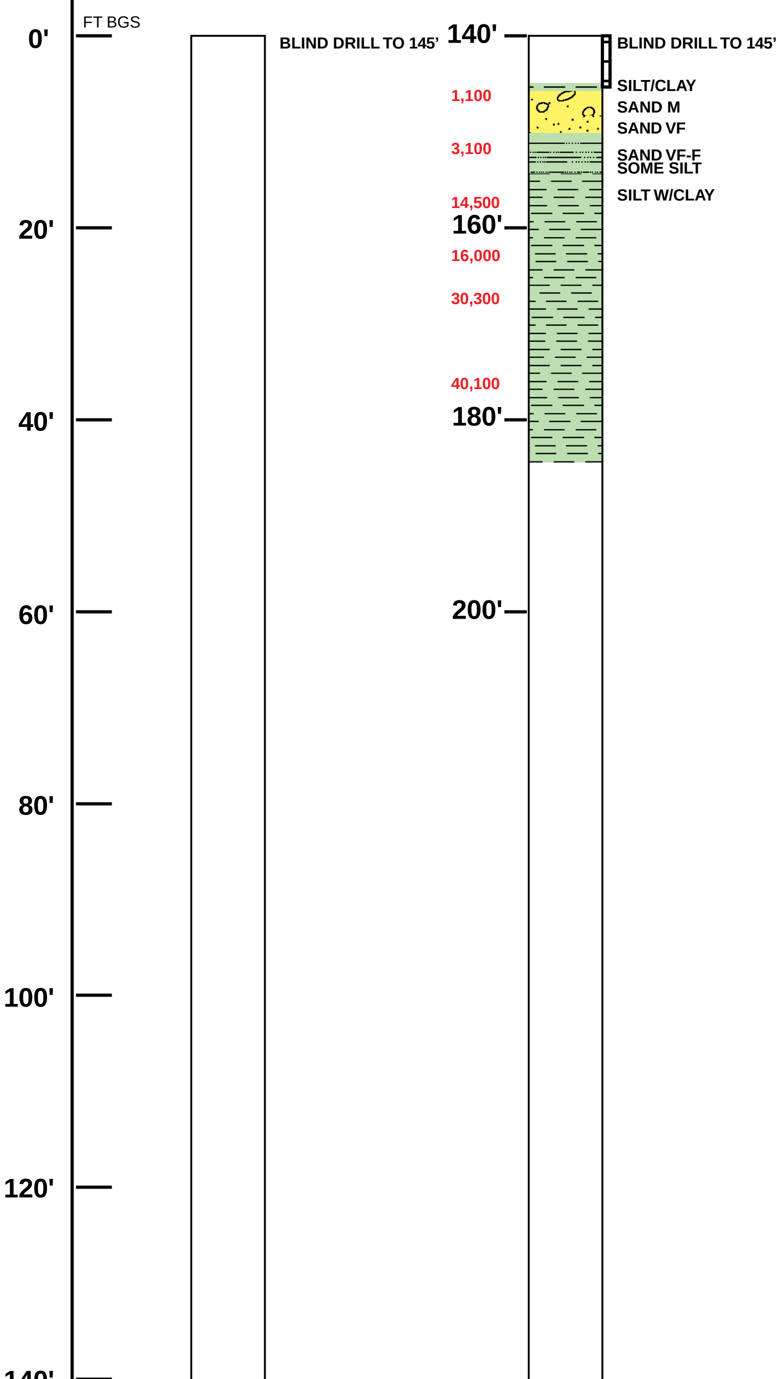
ARCADIS

BOREHOLE STRATIGRAPHIC LOG

OBSERVATION WELL NO.	GM-81A
PROJECT	FORD/KINGSFORD WI001025.0003

LOCATION	LAND SURFACE ELEVATION
Kingsford, Michigan	1111.06 Feet MSL

GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
P. Lenaker	Continuous	Rotasonic Core Barrel	185 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Bill	Boart Longyear	Rotasonic	5/26/04

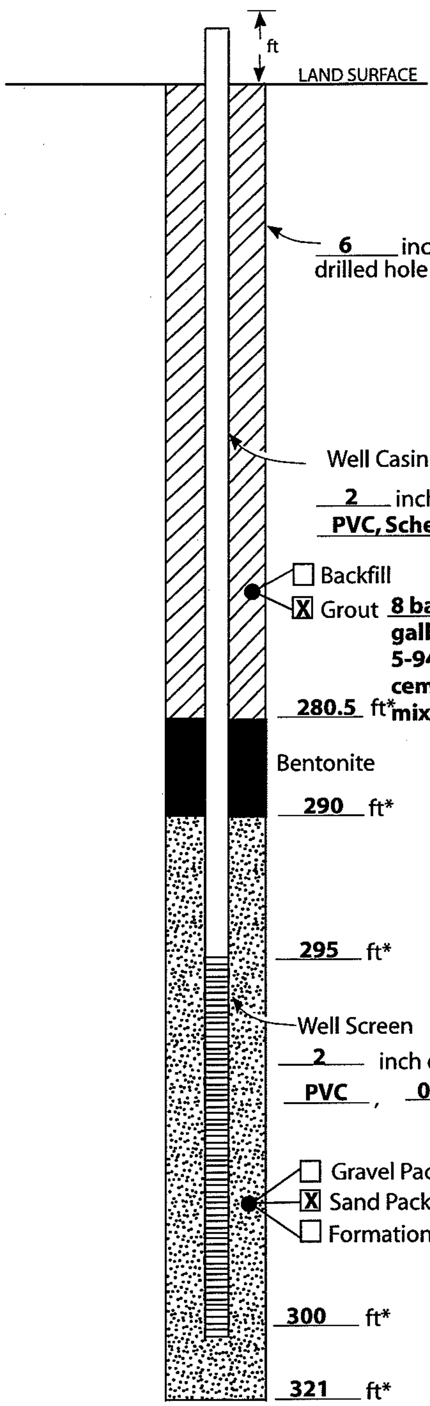


VERTICAL SCALE ~1"= 20'

29JUN05\FORD\WI0637\CJ2005\GRAPHICS\STRAT LOGS\DRAWING: GM-81A.AI

ARCADIS

Well Construction Log
(UNCONSOLIDATED)



6 inch diameter drilled hole

Well Casing,
2 inch diameter,
PVC, Schedule 80

☐ Backfill
☒ Grout **8 batches of 30 gallons water, 5-94 lb bags Portland cement, 1/4 Aquagel mix**

280.5 ft*

Bentonite ☐ Slurry ☒ Pellets 1-1/2 bag 3/8" chips Holeplug by Baroid

290 ft*

295 ft*

Well Screen
2 inch diameter
PVC, **0.010"** slot

☐ Gravel Pack
☒ Sand Pack #40 Red Flint
☐ Formation Collapse

300 ft*

321 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted

*Depth Below Land Surface

Project **Kingsford** Well **GM-81B**

Town/City **Kingsford**

County **Dickinson** State **Michigan**

Permit No. **1115.60**

Land-Surface Elevation **1111.32** feet

and Datum ______ ☒ surveyed

above mean sea level ☐ estimated

Installation Date(s) **5/20 - 5/25/04**

Drilling Method **Rotasonic**

Drilling Contractor **Boart Longyear**

Drilling Fluid **Water/Bentonite Aquagel gold seal (to approximately 100').**

Development Technique(s) and Date(s) ______

Fluid Loss During Drilling ______ gallons

Water Removed During Development ______ gallons

Static Depth to Water ______ feet below M.P.

Pumping Depth to Water ______ feet below M.P.

Pumping Duration ______ hours

Yield ______ gpm

Specific Capacity ______ gpm/ft Date **5/25/04**

Specific Capacity ______ gpm/ft

Well Purpose **RI monitoring well**

Remarks **Grout: 8 batches**

Prepared by **Paul Lenaker**

Sample/Core Log

Boring/Well GM-81B Project/No. Ford/Kingsford WI001075.0015 Page 1 of 8

Site Location Kingsford, Michigan Drilling Started 5/20/04 Drilling Completed 5/24/04

Total Depth Drilled 321 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Core barrel

Length and Diameter of Coring Device 10-20' x 4" Sampling Interval continuous feet

Land-Surface Elev. 1111.32 feet [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used Drilling Method Rotasonic

Drilling Contractor Boart Longyear Driller Alvin Helper Jessie/Jo

Prepared By Paul Lenaker/Lori Schmidt Hammer Weight NA Hammer Drop NA ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	5	5	-1.89-2.86/	0-1.0' Topsoil: Very dark brown (7.5 YR 2.5/2), silt and very fine sand, organic rich
			8.49-14.02	(rootlets), somewhat loose, trace subround to subangular gravel to 3/4", grades
				into section below, moist, no odor.
				1.0-2.0' Sand: Strong brown (7.5 YR 4/6), trace round to subround gravel to 1.5",
				some to much very fine to fine sand, somewhat loose when picked at, staining in
				layers, moist, no odor.
				2.0-5.0' Sand: Strong brown (7.5 YR 5/8), trace medium to coarse, trace
				subround to subangular gravel to 2", predominately fine, loose, moist, no odor.
5	10	5	-1.44- -1.95/	0-0.8' Slough: Grass/topsoil.
			26-29	0.8-1.5' Sand: As above, rounded gravel to 3", predominately medium grain.
				1.5-2.0' Sand: Strong brown (7.5 YR 5/6), trace medium, trace gravel to 1/4"
				fine grain, fairly well sorted, loose, moist, no odor.
				2.0-4.0' Sand: Dark brown (7.5 YR 3/4), some fine to coarse, trace silt, trace round
				to subangular trace gravel to 2", medium grain, loose, moist, no odor.
				4.0-5.0' Silty Sand: Color as above, trace medium to coarse, trace angular to
				subround gravel to 3/4", very fine to fine grain, loose to crumbly in
				places, moist, no odor.
10	15	5	0.2-6.2/	0-1.0' Sand: Dark brown (10 YR 3/4), some medium grain, trace coarse grain,
			17.99-27.72	trace round to subangular gravel to 1.5", trace silt in small pods, fine grain, loose,
				somewhat sorted, moist, no odor.
				1.0-3.0' Silty Sand: As above.
				3.0-5.0' Silty Sand: As above, dark brown (10 YR 3/3), increasing round to
				subangular gravel content (some) to 3", medium grain.
15	20	4	0.83-1.87/	0-1.0' Silty Sand: As above.
			10.63-11.5	1.0-2.0' Sand: Dark brown (10 YR 3/3), trace coarse, trace round to subangular
				gravel to 1-3/4", fine to medium, somewhat poorly sorted,

Sample/Core Log (continued)

Boring/Well GM-81B

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				loose, wet, no odor.
				2.0-4.0' Sand: Dark yellowish brown (10 YR 3/6), some fine, trace coarse, trace
				subround to subangular gravel to 1", medium grain, somewhat sorted, loose,
				moist, no odor.
20	25	0	--	No recovery.
25	30	5	-0.35- -0.88/	0-5.0' Sand: Brown (7.5 YR 4/4), trace medium to coarse, trace very fine, trace
			3.17-9.64	silt lenses, strong brown (7.5 YR 4/6), trace subround to subangular gravel to 1",
				fine grain, loose, fairly well sorted, smooth, moist, dryer at 4-5', no odor.
30	35	0	--	No recovery.
35	40	5	1.2-2.04/	0-1.0' Sand: Dark yellow brown (10 YR 3/4), some very fine, trace medium to
			7.27-15.6	coarse, trace subround to subangular gravel to 1/2", fine grain, loose, moist, no
				odor.
				1.0-5.0' Sand: Color as above, trace very fine to coarse, trace angular to
				subrounded gravel to 1", fine to medium grain, loose, somewhat sorted, moist,
				no odor.
40	45	5	2.19-3.86/	0-0.5' Sand: As above.
			9.7-21.1	0.5-4.0' Sand: Brown (7.5 YR 4/4), trace medium and very fine, trace fine to
				coarse, fine to medium grain, alternating layers up to 4" thick of fine grain, fairly
				well sorted, trace gravel in medium grain layers, fine grain layers, well sorted,
				loose, no odor.
				4.0-5.0' Sand: Color as above, trace coarse, trace subround to subangular gravel
				to 1", fine to medium grain, somewhat sorted, loose, moist, no odor.
45	50	5	10.06-11.20/	0-1.0' Sand: Dark brown (7.5 YR 3/4), some very fine, fine grain, well sorted, loose,
			10.27-18.8	wet, no odor, grades over 2" into section below.
				1.0-2.5' Sand: Color as above, some fine, medium grain, well sorted, loose,
				at 2-2.5' progressively more coarse grain to some coarse at 2.5, moist.
				2.5-4.0' Sand: Dark brown (7.5 YR 3/4), some medium, trace coarse, fine grain,
				loose, moist, no odor.
				4.0-4.2' Sand: Medium grain as above.
				4.2-5.0' Sand: As above (2.5-4).
50	55	5	10.4-11.2/	0-5.0' Sand: Brown (7.5 YR 4/4), some very fine, trace round to subangular gravel
			5.3-14.4	to 1", interbedded layers up from 4-6" with sand medium grain as above, fine
				grain, well sorted, loose, moist.
55	60	5	-2.39- -1.36/	0-3.5' Sand: Brown (7.5 YR 4/4), trace medium to coarse, trace subround to
			2.41-3.03	subangular gravel to 1.25" (mainly 1/2" pieces), layer of some medium to
				coarse sand from 2.2-2.4', fine grain, well sorted, loose, wet, no odor.

Sample/Core Log (continued)

Boring/Well GM-81B

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				3.5-5.0' Sand: Color as above, some to much medium grain, trace coarse,
				fine grain.
60	65	5	-0.66- -.58/	0-5.0' Sand: Color as above, trace coarse, trace to no subround
			1.51-5.96	gravel to 1/2", fine to medium grain, well sorted, loose, wet, no odor.
65	70	5	0.11-0.26/	0-1.0' Sand: As above, fine to medium grain.
			0.61-7.92	1.0-1.5' Silt: Color as above, smooth to somewhat grainy, intertwined up to 2"
				thick with very fine sand, grainy silt, loose, wet, no odor, grading over 0.3" into
				section below.
				1.5-5.0' Sand: Color as above, fine to medium grain, very well sorted, loose, wet,
				no odor.
70	75	5	0.45-1.72/	0-2.0' Sand: As above, with trace coarse sand.
			6.90-18.1	2.0-2.8' Silt: Very fine sand interbeds color as above, smooth to somewhat grainy,
				loose to crumbly, wet, no odor.
				2.8-5.0': Interbeds of fine to coarse sand, predominately very fine silt, grainy up to
				2" thick, loose, wet, no odor.
75	80	5.0	-0.26-7.24/	0-2.0' Sand: Brown (7.5 YR 4/4) trace medium to coarse, very fine to fine, very
			3.01-3.33	well sorted, loose, wet, no odor.
				2.0-4.8' Sand: Color as above, trace medium, fine grain, well sorted, loose, wet,
				no odor.
				4.8-5.0' Silty Sand: Color as above, very fine to fine, silt is grainy, loose, wet,
				no odor.
80	85	5	0.29-1.13/	0-5.0' Sand: Brown (7.5 YR 4/4), some silt in places, very fine to fine, very well
			3.61-4.56	sorted, loose, wet, no odor, grading into predominate fine grain from 4.8-5.0'.
85	90	5	-0.18-0.12/	0-5.0' Sand: Brown (7.5 YR 4/4), trace to some very fine in places, fine grain,
			3.01-3.83	very well sorted, loose, wet, no odor.
90	95	5	-4.26- -4.24/	0-0.2' Sand: Fine grain as above.
			1.58-1.65	0.2-0.9' Sand: Fine to medium grain, grading into predominately medium with
				trace coarse from 0.6-0.9', sorted, loose, wet, no odor.
				0.9-2.5' Sand: Color as above, from 0.9-1.5: fine grain, well sorted, loose, wet, no
				odor, grading over 3" into sand same color, sharp contact, trace to some
				coarse, fine to medium grain, loose wet, no odor.
				2.5-5.0' Silt and very fine sand: Brown (7.5 YR 4/4), trace to some fine, grainy,
				somewhat loose in places, wet, slight odor.
95	100	5	-3.09- -3.29/	0-2.0' Sand: Brown (7.5 YR 4/4), silt (smooth grainy) lenses, fine grain, well sorted,
			2.97-13.60	loose, wet, very slight odor.
				2.0-5.0' Sand: Color as above, some very fine, fine, very well sorted, somewhat

Sample/Core Log (continued)

Boring/Well GM-81B

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				loose, wet, slight odor.
100	105	5	0.52-0.68/	0-5.0' Sand: Color as above, from 3-3.7 silty sand, silt smooth to grainy, sand very
			128-137	fine to fine, color as above, trace very fine, trace silt lenses (hard silt up to 5 mm
				thick), fine, very well sorted, wet, some odor.
105	110	5	0.79-1.29/	0-5.0' Sand: Brown (7.5 YR 4/4), some areas of some silt, grainy, progressively
			927-1038	grades to mainly very fine at 4-5', trace black staining, very fine to fine grain, very
				well sorted, loose, wet, odor,
110	115	5.0	0.08-4.83/	0-4.0' Silt: Dark brown (10 YR 3/3), clay inclusions/beds up to 1.75" thick, brown
			158-1662	(7.5 YR 3/4), some to trace grayish staining at 4.0', smooth to somewhat grainy,
				somewhat firm, fissile/platey in appearance, slight cohesive/plastic, wet, odor.
				4.0-5.0' Silt: Dark brown (10 YR 2/3), grainy, hard to crumbly, moist to wet, odor.
115	120	5	2.82-3.95/	0-3.0' Silt: Brown (7.5 YR 4/3), smooth to slightly grainy, crumbly, wet, slight odor.
			282-418	3.0-5.0' Silt: as above but less grainy, with clay conclusions/lenses up to 1" thick,
				platy/fissile in appearance, not very cohesive but somewhat plastic, wet, slight
				odor.
120	125	5.0	4.02-5.47/	0-2.0' Silt: As above (3-5), HP = 2.5.
			552-771	2.0-3.5' Silty Clay: Dark brown (7.5 YR 3/4), very hard and firm, cohesive and
				plastic when worked, brittle at first, moist, no odor. HP >4.0.
				3.5-5.0' Silty Clay: Trace coarse to fine, gravel to 1/4" (possible drop stones), soft,
				cohesive and plastic, smooth moist, no odor.
125	130	5	4.57-7.89/	0-3.0' Silty Clay: As above (2-3.5), very hard and firm.
			641-1407	3.0-5.0' Silt: Brown (7.5 YR 4/3), trace to some clay, smooth to somewhat grainy,
				in spaces soft to crumbly to sticky dependent on water and clay content,
				wet, some odor.
130	135	5	4.78-7.11/	0-5.0' Silt: Brown (7.5 YR 4/3), trace to some clay inclusions, clay hard cohesive/
			804-1900	plastic when worked, varies from smooth to grainy, crumbly to somewhat loose.
135	140	5	-3.81-4.65/	0-1.0' Sand: Brown (7.5 YR 5/4), some to much silt, silty clay lenses at 1',
			16-176	cohesive and plastic, fine, somewhat sorted, wet, slight odor.
				1.0-5.0' Sand: Brown (7.5 YR 5/4), trace silty clay lenses as above, fine, very well
				sorted, loose, wet, no odor.
140	145	5	-4.29- -2.87/	0-3.0' Sand: Color as above, fine, very well sorted, loose, wet, slight odor.
			196-442	3.0-5.0' Sand: As above with trace medium to coarse sand.
145	150	5	-3.38- -4.40/	0-2.5' Sand: Brown (7.5 YR 5/3), trace coarse, fine to medium, somewhat
			95-189	loose, grading into section below, wet.
				2.5-3.5' Sand: Color as above, some fine, trace coarse grain, trace round to
				subangular gravel to 2.5", medium, loose, wet, slight odor.
				3.5-5.0' Silty Sand: Brown (7.5 YR 4/4), very fine to fine, well sorted,

Sample/Core Log (continued)

Boring/Well: GM-81B

Prepared by: Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				somewhat loose to crumbly, wet, odor.
150	155	5	4.22- -2.57/	0-0.8' Silt: Brown (7.5 YR 4/3), some very fine sand, crumbly, some dark staining
			638-2500	smooth, slightly grainy, wet, odor.
				0.8-3.0' Sand: Brown (7.5 YR 4/4), some silt in lenses, very fine to fine, grading
				into section below, well sorted, loose to somewhat loose, wet, odor.
				3.0-4.6' Sand: As above, some to much silt, very fine, wet, odor.
				4.6-5.0' Silt: Dark brown (7.5 YR 3/3), some very fine sand, black staining,
				crumbly, smooth to somewhat grainy, wet, strong odor.
155	160	2.5	1.03-2.05/	0-2.5' Silty Clay: Silt dark brown (7.5 YR 3/4), clay reddish brown (5 YR 4/4), clay
			2900-4600	is hard and crumbly, silt is smooth, both somewhat cohesive and somewhat
				plastic when worked, saturated, strong odor.
160	165			No recovery.
165	170			No recovery.
170	175			No recovery.
175	180	5	4.2-5.3/	0-5.0' Silt: Dark brown (7.5 YR 3/4), to clay silt or silt in some to much clay, clay
			2600-5200	in lenses reddish brown (5 YR 4/4), overall somewhat cohesive/platy, somewhat
				sticky, predominately platy to fissile in appearance, cohesive to plastic when
				worked, wet, strong odor, HP <0.5.
180	155	5.0	4.8-6.03/	0-5.0' Silt: As above, color dark reddish gray (5 YR 4/2) and dark reddish brown
			7010-7100	(5 YR 4/3), color banding between throughout (varving or smeared by drilling),
				becomes somewhat crumbly when worked at 184.6-185.2, very much clay
				lenses/pods.
185	190	5	3.95-4.99/	0-5.0' Silt: As above, Intervals of very much clay lenses from 188.5 - 190', very
			6900-11300	crumbly at first becoming somewhat cohesive/plastic when worked, some grayish
				black staining in layers.
190	195	5	3.76-4.15/	0-5.0' Silt: As above, clay lenses becoming more crumbly when worked. HP = 1.5.
			2350-2600	
195	200	5	2.41-3.22/	0-5.0' Silt: Dark reddish brown (5 YR 3/3), some to much clay, somewhat cohesive
			117-130	and somewhat plastic, smooth, HP 1-1.5, somewhat firm, lenses clay, hard, fissile
				toplaty in appearance, dark reddish brown (5 YR 3/4) in lenses or pods up to 4"
				thick, very hard/firm HP >4.0 (thicker clays from 1.5-2 and 2.5-3.2'), wet, slight
				odor.
200	205	5	2.55-3.6/	0-5.0' Silt: As above, with clay lenses/pods at 0.2-0.8 as above (very hard HP
			27.1-74	>4.0) silt progressively changing from somewhat cohesive and somewhat plastic
				to crumbly down section, also less clay lenses down section.
205	210	5	4.27-4.34/	0-2.0' Silt: As above.
			42.3-66.6	2.0-3.0' Clay: Dark reddish brown (5 YR 3/4), some silt, very hard HP = >4.0, firm,

Sample/Core Log (continued)

Boring/Well GM-81B

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				mostly crumbly to slightly cohesive.
				3.0-5.0' Silt: As above, less clay and more crumbly, more organic-like.
210	215	5	3.84-3.93/	0-3.0' Silt: As above, less clay but still some in lenses.
			17.7-18.2	3.0-4.8' Silt: Reddish brown (5 YR 4/3), trace to no clay, smooth, crumbly,
				moist to wet, no odor.
				4.8-5.0' Clay: See below
215	220	5	2.13-2.25/	0-1.0' Clay: As above (205-210/2-3'), some thin lenses silt layers within.
			1.76-2.19	1.0-5.0' Silt: Brown (7.5 YR 4/3), trace to some clay, clay also in lenses/pods
				reddish brown (5 YR 4/4), smooth, somewhat cohesive/plastic.
220	225	5	2.48-2.60/	0-1.5' Silt: As above.
			71.7-272	1.5-5.0' Silt: Reddish brown (7.5 YR 4/3), trace clay, slight cohesive/slight plastic
				clay lenses not observed, somewhat grainy but smooth, HP <1.0, wet, no odor.
225	230	5	2.50-3.14/	0-3.0' Silt: As above, clay lenses/pods from 0.8-1.4'.
			1.81-370	3.0-3.5' Sand: Brown (7.5 YR 4/3), fine to very fine, well sorted, loose, wet, no
				odor.
				3.5-5.0' Silt: As above with clay lenses, color banding of reddish brown (5 YR 4/3)
				and brown (7.5 YR 4/2).
230	235	5	2.84-4.25/	0-5.0' Interbeds of silt: As above, with color banding, crumbly, nonplastic/non-
			6.97-7.92	cohesive clay lenses (only from 3-5') as above, HP 3.5, sand brown (7.5 YR 5/3),
				very fine grain to grainy silt, interbeds up to 2" thick and twisted likely due to
				drilling.
235	240	5	2.65-2.75/	0-5.0' Silt: As above, with clay lenses at 1.5' from 3.8-4.7', very fine silty sand/
			8.01-26.38	very fine sandy silt lenses at 0.5' trace throughout, sandy silt is grainy,
				very moist, slight organic odor.
240	245	5	2.16-4.06/	0-5.0' Silt and Sand: Interbeds, silt reddish brown (5 YR 4/3), grainy to smooth
			3.38-4.81	somewhat cohesive/plastic, sand brown (7.5 YR 4/3), very fine to fine, well sorted,
				sand interbeds up to 6" thick, silt interbeds up to 2' thick, somewhat loose, wet,
				no odor.
245	250	5	2.88-3.25/	0-5.0' Silt and Sand: Interbeds as above, but silt includes trace clay nodules
			3.10-3.88	reddish brown (5 YR 4/4) crumbly and fissile, very slight cohesive when worked,
				sand beds progressively becoming finer grained down section to very fine to fine
				to very fine with grainy silt.
250	255	5	2.90-4.15/	0-5.0' Silt and Sand: Interbeds, as above (245-250/0-5), layer of clay interbed
			1.5-9.01	between 3.5-4.0', as above.
255	260	5	-0.08- -0.20/	0-5.0' Silt and Sand: Interbeds as above, but primarily silt, interbeds of very fine
			0.64-2.3	sand up to 1" thick, also some interbeds of clay as above up to 1/4-1/2" thick.
260	265	5	-0.05-0/	0-5.0' Silt and Sand: Interbeds as above, some fine sand interbeds up to

Sample/Core Log (continued)

Boring/Well GM-81B

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
			.61-1.3	4" thick from 2.5-2.9'.
265	270	5	0.5-0.73/	0-2.0' As above.
			77-132	2.0-3.0' Sand: Brown (7.5 YR 4/3), some medium, fine, well sorted, loose, wet,
				no odor.
				3.0-4.0' Silt and Sand and Clay: Interbeds as above, only trace sand.
				4.0-5.0' Sand: Brown (7.5 YR 4/3), trace to some silt, very fine to fine, well sorted,
				somewhat loose, wet, no odor.
270	275	5	1.57-2.39/	0-2.5' Sand: Very fine to fine, as above.
			172-278	2.5-3.2' Silt: Reddish brown (5 YR 4/3), slightly firm, somewhat grainy,
				nonchoesive and nonplastic, grading into next unit (becomes more grainy).
				3.2-4.0' Sand: Color as above, some to much silt in lenses, very fine to fine,
				somewhat loose, wet, no odor.
				4.0-5.0' Silt and Gravel: Reddish brown (5 YR 4/3), much phylite pieces, some
				coarse sand, silt smooth to grainy, overall hard and firm, crumbly, round to
				subangular gravel to 3", some wet color staining, dry, no odor.
275	280	5	0.40-6.62/	0-2.5' Silt and Gravel: Wet color as above, loose, much medium to coarse sand,
			780-6500	round to subangular gravel to 4" diameter, poorly sorted, wet, odor.
				2.5-2.8' Sand: Dark reddish gray (5 YR 4/2), some medium, grades over 2" into
				section below, coarse, loose, wet, odor.
				2.8-3.2' Sand: Color as above, trace to some coarse, trace to some silt, medium,
				loose, wet, odor.
				3.2-5.0' Sand and Gravel: Color as above, trace to some silt, poorly sorted sand,
				fine to coarse predominately medium to coarse, round to subangular gravel to
				2.5", wet, odor.
280	285	5	3.3-3.38/	0-1.5' Sand and Gravel: As above.
			7310-12000	1.5-3.5' Interbedded to interlaminated sand and silt, brown (7.5 YR 4/4), sand
				very fine to fine grain, silt grainy to smooth, somewhat loose, well sorted,
				wet, odor.
				3.5-5.0' Sand: Dark reddish brown (5 YR 3/3), trace coarse, trace subround to
				subangular gravel 1/2", medium, sorted, loose, wet, odor.
285	290	5	4.36-4.5/	0-1.0' Sand: As above, medium grain.
			13500-21500	1.0-5.0' Sand: Brown (7.5 YR 4/4), some interbed up to 4" thick of only very fine
				to fine, some of only medium grain, fine to medium, all loose, sorted to well
				sorted, wet, strong odor.
290	295	5	5.8-5.92/	0-2.5' Sand: Reddish brown (5 YR 4/3), trace coarse, fine to medium, somewhat
			24400-24600	well sorted, loose, wet, odor.
				2.5-2.8' Silt: Reddish brown (5 YR 4/4), smooth, noncohesive/nonplastic,

Sample/Core Log (continued)

Boring/Well GM-81B

Page 8 of 8

Prepared by Paul Lenaker/Lori Schmidt

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				somewhat loose to crumbly, wet, odor.
				2.8-5.0' Sand and Gravel: Dark reddish gray (5 YR 4/2), trace silt, sand medium to
				coarse predominately coarse, angular to subangular gravel to 3.5", loose, wet,
				odor.
295	300	5	-2.62-2.91/	0-2.0' Sand and Gravel: Brown (7.5 YR 4/3), some silt, sand fine to very fine
			14500-38000	predominately fine to medium, subround to subangular gravel to 2.5",
				loose, wet, odor.
				2.0-5.0' Sand: Reddish brown (5 YR 5/4), trace to some very fine, trace silt
				(grainy), fine, very well sorted, loose, wet, odor.
300	305	5	3.05-3.60/	0-1.0' Sand: As above, grading over 2" into section below.
			15600-19400	1.0-5.0' Sand: Color as above, trace to some silt, very fine to fine grained
				predominately very fine, very well sorted, loose, wet, odor.
305	310	5	4.55-4.22/	0-1.0' Sand: As above, grading down section.
			23000-29700	1.0-5.0' Sand: Color as above, trace to some silt, predominately very fine, trace
				black staining, loose, wet, odor.
310	315	5	5.6-5.73/	0-2.0' Sand: As above.
			14700-23600	2.0-4.0' Sand: As above with silt, reddish brown (5 YR 5/4), interbedded (up to 2"
				thick), silt is somewhat loose, smooth to slight grainy, moist, odor.
				4.0-4.5' Sand: Color as above, fine to medium predominately fine, grades to next
				section, well sorted, loose, wet, odor.
				4.5-5.0' Sand: Color as above, fine to very fine, loose, wet, odor.
315	321	4	3.41-8.25/	0-1.0' Sand: Reddish brown (5 YR 4/4), fine grain, well sorted, loose, wet, some
			480-5400	odor.
				1.0-3.5' Silt/Clay: Very dark gray (1 Gley 3/N), some to much angular to subround
				gravel to 1.5", very hard, firm, HP >4.0, moist, no apparent odor.
				3.5-4.0' Crushed rock from angular to powder, Phyllite pieces finely laminated,
				sheen on surface, platy (bedrock).
				EOB @ 321'.

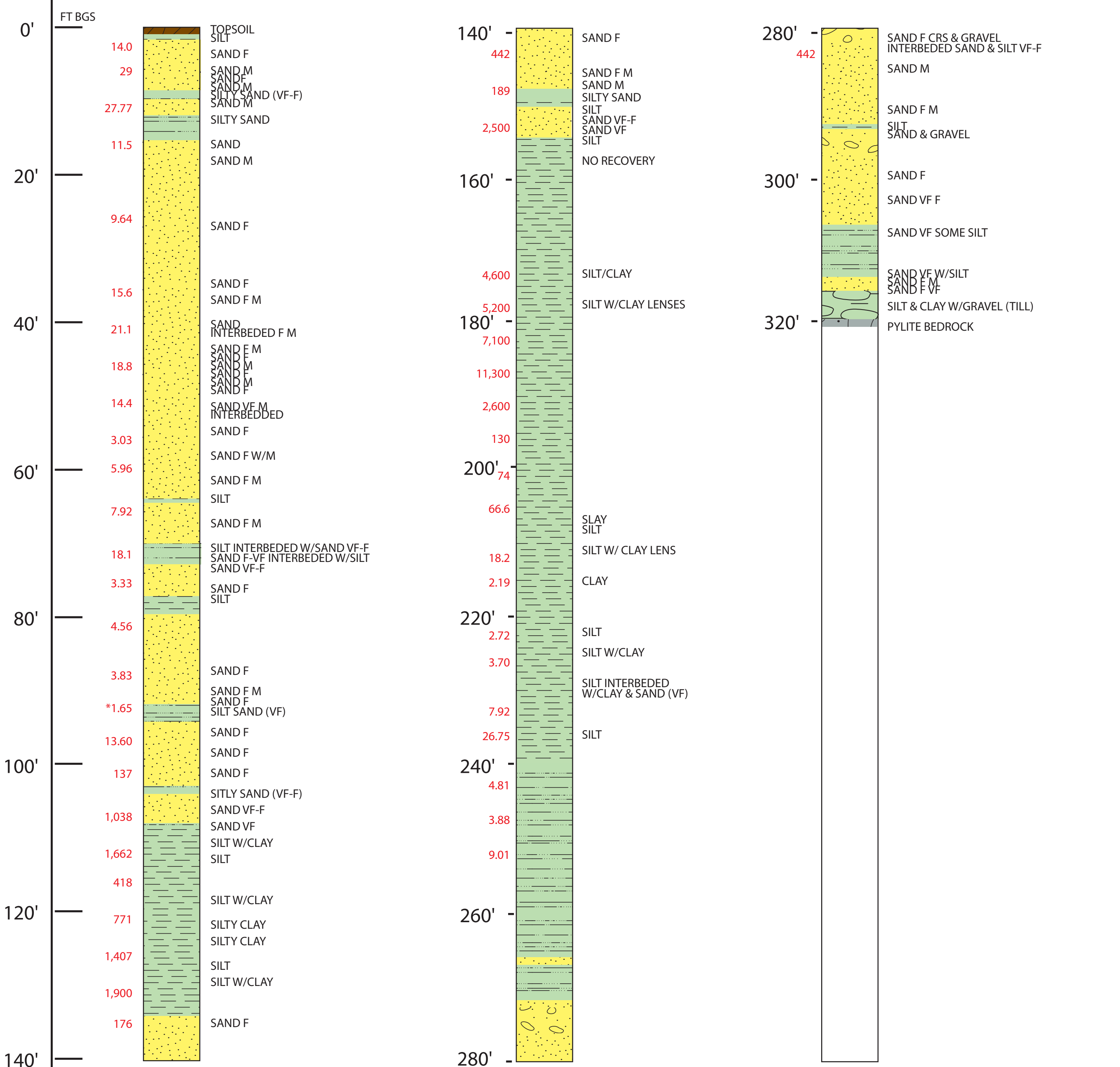
ARCADIS

BOREHOLE STRATIGRAPHIC LOG

OBSERVATION WELL NO.	GM-81B
PROJECT	FORD/KINGSFORD WI001075.0015

LOCATION	LAND SURFACE ELEVATION
Kingsford, Michigan	_________ Feet MSL

GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
P. Lenaker	Continuous	Rotasonic Core Barrel	321 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Alvin Anderson	Boart Longyear	Rotasonic	5/24/04



VERTICAL SCALE ~1"= 20'

15SEP04\FORD\WI0637\2004\GRAPHICS\STRAT LOGS\DRAWING: GM_81B.AI

Sample/Core Log

Boring/Well GM-85 Project/No. Ford/Kingsford WI001075.0015 Page 1 of 5

Site Location Kingsford, Michigan Drilling Started 8/6/04 Drilling Completed 8/7/04

Total Depth Drilled 215 Feet Hole Diameter 6 inches Type of Sample/ Coring Device Core Barrel

Length and Diameter of Coring Device 10' x 4" Sampling Interval continuous feet

Land-Surface Elev. 1070.49 feet ☐ Surveyed ☐ Estimated Datum

Drilling Fluid Used Water Drilling Method Rotqsonic

Drilling Contractor Boart Longyear Driller Jason Helper Scott Schultz Royce Brown

Prepared By Andy Mumpy/Toni Schoen Hammer Weight Hammer Drop ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	5	5	0.36-7.06/	0-0.5' Asphalt core with hematite/iron road base fill material.
			1.78-19.41	0.5-1.5' Silt: Dark brown (10 YR 3/3), trace medium to coarse sand, little very fine
				sand, some rootlets, organics, loose, silt smooth, damp, crumbly, no odor.
				1.5-2.5' Silt: Dark yellowish brown (10 YR 4/6), trace medium to coarse sand,
				some very fine to fine sand, trace organics, silt grainy to smooth, loose, damp,
				crumbly, no odor.
				2.5-5.0' Sandy Silt: Dark yellowish brown as above, sand very fine to very coarse,
				some gravel angular to subround up to 2", poorly sorted mixture, loose, damp,
				crumbly, no odor.
5	10	5	10.88-37.87/	0-1.0' Silt: Brown (10 YR 5/3), grainy to smooth, very powdery, loose, dry, dusty,
			2.24-7.25	no odor.
				1.0-5.0' Silt/Sand: Yellowish brown (10YR 5/6), very very fine sand/borderline grain
				silt, very well sorted, uniform, loose, damp, no odor, one 2" thick layer of smooth
				silt with clay varves, yellowish red (5 YR 5/6) at 3.5', smooth silt is dark yellowish
				brown (10 YR 4/4), somewhat cohesive and clayey, no odor.
10	15	5	13.08-21.61/	0-3.0' Slough: From above.
			9.17-28.19	3.0-5.0' Silt/Sand: As above, possibly a few interbedded smooth silt layers as
				above, but destroyed from drilling/intermixed, moist, no odor.
15	20	5	2.11-3.41/	0-5.0' Silt: Brown (7.5 YR 5/4), grainy-smooth, predominately grainy, uniform, trace
			1.21-34.97	black staining and oily odor, but probably from asphalt above, somewhat
				cohesive somewhat loose, saturated (not drilling fluid), no odor.
20	25	5	0.21-3.92/	0-5.0-Silt: Brown, as above, but one clay layer at 3-5', 2" thick, yellowish red
			1.22-13.93	(5 YR 4/6), firm, HP = 2.5, platy appearance on broken surface, plastic, cohesive,
				possibly confining layer causing perched water above, silt somewhat cohesive, as
				above, saturated above clay, moist to wet below clay, no odor.
25	30	5	3.51-7.40/	0-5.0' Silt: As above, brown (7.5 YR 5/4), predominately some smooth grainy, trace
			12-34	sporadic clay varves/layers up to 0.2", clay description as above, silt somewhat

Sample/Core Log (continued)

Boring/Well GM-85 Page 2 of 5

Prepared by Andy Mumpy/Toni Schoen

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				cohesive and firm, somewhat loose and crumbly when worked, wet -
				saturated, no odor.
30	35	5	2.11-9.04/	0-5.0' Silt: As above, smooth to grainy, trace well sorted very fine sand in a few
			7.75-24.51	places, possibly layers, uniform, trace clay varving/layers as above, wet to saturate
				no odor.
35	40	5	-0.23-2.60/	0-5.0' Silt: As above, slightly more clay content, saturated, no odor.
			5.36-15.7	
40	45	5	1.32-2.79/	0-5.0' Silt: As above, brown (7.5 YR 5/4), grainy to smooth but predominately
			1.82-9.34	smooth, trace clay varving/layers, clay description as above, somewhat cohesive ar
				firm, somewhat loose and crumbly when worked, wet to saturated, no odor.
45	50	5	0.50-3.02/	0-5.0' Silt: As above, slightly moderate clay content, one 1.5" thick clay layer at
			2.02-7.53	2.5', also trace varving/layers as above, wet to saturated, no odor.
50	55	5	0.5-7.70/	0-5.0' Silt: As above, possible minor trace black staining, trace vesicles, very slight
			7.35-24	odor?
55	60	5	0.79-5.24/	0-0.7' Silt/Clay Interbeds: Silt grayish brown (10 YR 4/2) clay, dark brown (7.5 YR
			6.06-19.57	3/4) fine interbedding, vared to 0.2" thick, clay is hard, HP >4.0, plastic when
				worked, appears fissile on broken surface, moderately uniform interbeds, silt is
				smooth, overall cohesive, firm, moist, no odor.
				0.7-5.0' Clay: Dark brown (7.5 YR 3/4), some fine silt interbed, but 90 percent clay,
				silt description as above, clay description as above, uniform clay, plastic, hard, HP
				>4.0, moist, no odor.
60	65	5	2.83-5.82/	0-3.0' Silt/Clay: Interbeds silt and clay descriptions as above, predominately clay,
			5-18	clay beds vared to 4", silt layer 0.5" or less, very hard, stiff, cohesive, moist, no
				odor.
				3.0-4.5' Sand: Brown (7.5 YR 5/4), very fine to fine grain, predominately fine, trace
				medium to coarse moderately sorted, trace silt, but probably washed in from
				above, loose, saturated, no odor.
				4.5-5.0' Sand: Color, as above, very fine grain, approaching grainy silt size, trace
				fine to medium, well sorted, loose, saturated, no odor.
65	70	5	0.70-4.76/	0-5.0' Sand: Strong brown (7.5 YR 4/6), fine to coarse, predominately fine to
			11-34	medium, little coarse, trace fine gravel, moderately sorted, loose, saturated, no
				odor, a few 2-3" rocks at bottom of sample.
70	75	5	0.07-5.62/	0-1.0' Sand: As above.
			2-48	1.0-3.0' Sand: Brown (7.5 YR 4/4), fine to very coarse grain, predominately
				medium to coarse, little subangualr to subrounded grave lup to 1.5", poorly sorted,
				poorly sorted, loose, saturated, no odor.
				3.0-5.0' Sand: Brown (7.5 YR 4/4), fine to very coarse grain, predominately fine to
				medium, moderately sorted, trace subround gravel to 1", trace silt, but could be

Sample/Core Log (continued)

Boring/Well GM-85

Prepared by Andy Mumpy/Toni Schoen

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				washed in, loose, saturated, no odor.
75	80	4	-0.64-13.47/	0-2.0' Sand: Brown (7.5 YR 4/4), fine to coarse, predominately medium to coarse,
			4.01-104	silty, but probably washed in, moderately well sorted, loose, saturated, slight odor?
				2.0-2.5' Silty Gravel: Brown as above, pea gravel layer, subround fine gravel,
				moderately sorted, loose, saturated.
				2.5-4.0' Sand: Color as above, fine grain, trace medium to coarse, trace subround
				gravel up to 2", moderately well sorted, loose, saturated, slight odor.
80	85	4	1.70-5.09/	0-1.0' Sand: As above.
			24-127	1.0-1.3' Sand: Multi-colored, very fine to very coarse grain, predominately
				fine to medium, silty, little fine subround gravel, gradational contact between
				sand above and silt below, somewhat cemented, loose when broken, saturated,
				slight odor.
				1.3-4.0' Silt: Brown (10 YR 4/3), grainy to smooth, uniform, trace vesicles, some-
				what cohesive to somewhat loose, saturated, odor.
85	90	5	0-0.93/	0-1.5' Silt: As above, brown (7.5 YR 4/3), with trace clay varving/layering, clay is
			12-75	plastic, description as above, grainy to smooth silt, uniform, saturated, slight odor.
				1.5-5.0' Silt: Reddish brown (5 YR 4/4), very grainy, approaching very fine sand
				size, low cohesion, somewhat loose, saturated, slight odor.
90	95	5	0.17-3.59/	0-5.0' Silt: Reddish brown, as above, trace black staining, very grainy, uniform,
			35-84	somewhat crumbly and loose, wet, slight odor.
95	100	5	1.74-2.91/	0-5.0' Sand/Silt: Reddish brown (5 YR 4/4), very grainy silt approaching very fine
			350-1282	sand size, uniform, very well sorted, some black staining, vesicles, somewhat
				loose, saturated, odor.
100	105	5	0.73-2.06/	0-5.0' Sand/Silt: As above, strong odor.
			104-1455	
105	110	5	0-4.16/	0-5.0' Sand/Silt: As above, strong odor.
			120-1361	
110	115	5	0.04-2.41/	0-4.0' Sand/Silt: As above, more black staining, wet, odor 4.0-4.5' interbedded/
			9-178	laminated, smooth silt very grainy silt, one 0.2" thick clay layer at approximately 4.5'
				below silt laminations, clay yellowish red, description as above, moist, slight odor.
				4.5-5.0' Silt: As above, but slightly fine grain, smooth, moist, slight odor, trace
				black staining.
115	120	5	0.20-8.13/	0-5.0' Silt: Brown (7.5 YR 4/4), grainy to smooth trace clay varying/layers as above,
			16-55	uniform, somewhat cohesive, saturated, no odor.
120	125	5	-1.75- -0.9/	0-5.0' Silt: As above.
			4-8	

Sample/Core Log (continued)

Boring/Well GM-85

Prepared by Andy Mumpy/Toni Schoen

Sample/Core Depth (feet below land surface)		Core		
		Recovery	PID/FID	
From	To	(feet)	(ppm)	Sample/Core Description
125	130	5	-0.11-2.20/	0-5.0' Silt/Sand: Brown (7.5 YR 4/4), very grainy, approaches very fine sand in
			3-22	size, uniform, little black stains, crumbly and loose, moist, slight odor in places.
130	135	5	-0.19-0.67/	0-5.0' Silt/Sand: As above.
			9-20	
135	140	5	-2.84- -2.36/	0-5.0' Silt: Brown (7.5 YR 4/4), grainy to smooth, approaching very fine sand in
			2.42-2.92	places, somewhat cohesive to loose and crumbly when worked, trace black staining
				wet to saturated, no odor.
140	145	5	-2.15-0.26/	0-5.0' Silt: As above, but grainy, approaching very fine sand, color as above, no
			4.1-11.15	odor.
145	150	5	-1.63-7.96/	0-3.5' Silt: As above.
			12-48	3.5-5.0' Silt: Color as above, smooth, firm, somewhat cohesive, trace clay varves/
				layers as above, clay yellowish red (5 YR 4/6), plastic, appears fissile/platy on broke
				surface coarse, also trace to little clay in silt matrix, (but could be from drilling),
				moist to wet, no odor.
150	155	5	0.72-5.11/	0-5.0' Silt: Brown (7.5 YR 4/4), grainy to smooth, predominately very grainy,
			17-41	approaching very fine sand in places, somewhat cohesive, but loose and crumbly
				when worked, little black staining, wet to saturated, no odor.
155	160	5	0.2-2.30/	0-5.0' Silt: Brown (7.5 YR 4/4), smooth, somewhat firm, loose to crumbly when
			4-28	worked, black staining, uniform, no odor, saturated, methane vesicles on outside
				core.
160	165	5	0-1.14/	0-5.0' Silt: Brown (7.5 YR 4/4), smooth, uniform, fissily, no odor, crumbly when
			3-15	worked, somewhat firm/cohesiveness, saturated.
165	170	5	0/3-10	0-5.0' Silt: Brown (7.5 YR 4/4), smooth to grainy, uniform, somewhat firm,
				crumbly when worked, no odor, saturated.
170	175	5	0-6.07/2-7	0-5.0' Silt: Brown (7.5 YR 4/4) smooth, trace clay varving in places, trace black
				staining, uniform, smooth silt, somewhat firm to cohesive, but somewhat loose
				and crumbly when worked, possible slight odor.
175	180	5	1.07-2.4/	0-5.0' Silt with Clay Particles: Silt, brown (7.5 YR 4/4), clay, silt is smooth
			4.37-7.78	throughout, uniform, regular clay interbeds with 0.5-1.0" thick layers every foot,
				clay is stiff, HP = 3.5, plastic, cohesive, platy/fissile appearance on broken surface,
				silt somewhat cohesive to cohesive and somewhat plastic, moist to wet, slight
				odor?
180	185	5	1.4-2.17/	0-5.0' Silt: With clay interbeds as above, but less clay content, clay beds destroyed
			2.24-5.38	from drilling, clay appears varved to approximately 0.5" thick, otherwise as above,
				moist to wet, slight odor?
185	190	5	1.56-4.12/	0-5.0' Silt: Brown (7.5 YR 4/4), as above, with very little clay content, no discernable
			5.02-15.34	layers, but traces of yellowish red clay coloring, probably clay varves destroyed

Sample/Core Log (continued)

Boring/Well GM-85

Prepared by Andy Mumpy/Toni Schoen

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
				by drilling, silt smooth, fissle appearance when broken, uniform, somewhat
				cohesive, moist to wet, slight odor?
190	195	5	1.02-3.72/	0-5.0' Silt: As above, smooth, but crumbly due to less moisture, probably not
			3.91-12.73	affected by drilling fluid as above, damp to moist, somewhat cohesive where
				moist, slight odor?
195	200	0	--	No recovery.
200	205	5	0.84-1.34/	0-5.0' Silt: Brown (7.5 YR 4/4), very smooth, uniform, somewhat cohesive,
			2.50-9.87	somewhat firm, somewhat plastic, moist to wet, slight odor?
205	210	5	1.15-2.54/	0-5.0' Silt: As above.
			5.01-11.70	
210	215	5	1.04-2.20/	0-3.0' Silt: Brown (7.5 YR 4/4), little gravel angular to subround fine to 2"
			7.23-17.01	suspended in matrix, trace sand very fine to very coarse, trace to little clay in
				matrix, somewhat plastic in places, poorly sorted mixture, somewhat cohesive,
				somewhat crumbly, moist to wet, where sandy, no odor.
				3.0-4.5' Silt/Sand/Weathered Bedrock Pieces: Greenish gray (1 Gley 5/10Y) sand
				very fine to very coarse, predominately fine, much silt, many broken angular pieces
				of weathered rock with secondary mineralization on surface, some fine to coarse
				gravel, predominately any bedrock pieces, loose, crumbly, moist to wet, no odor.
				4.5-5.0' Bedrock: Very dark gray (1 Gley 3/N), hard, dense, phyllite, vertical
				foliation relative to hole, pyritization on some surfaces, massive.
				EOB @ 215'.

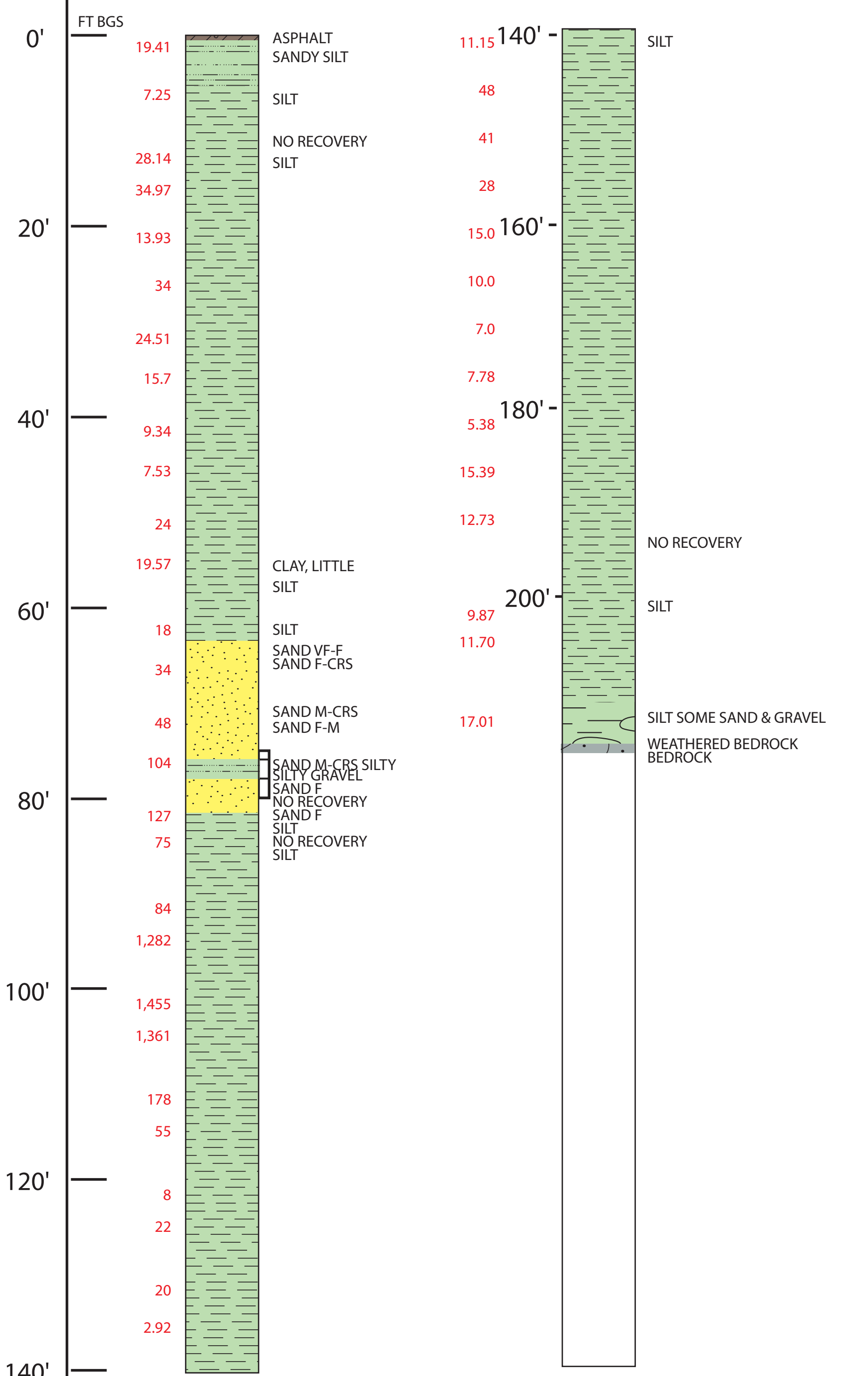
ARCADIS

BOREHOLE STRATIGRAPHIC LOG

OBSERVATION WELL NO.	GM-85
PROJECT	FORD/KINGSFORD WI001075.0015

LOCATION	LAND SURFACE ELEVATION
Kingsford, Michigan	1070.49 Feet MSL

GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
A. Mumpy	Continuous	Rotasonic Core Barrel	215 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Jason	Boart Longyear	Rotasonic	8/06/04



VERTICAL SCALE ~1"= 20'

30MAR05\FORD\WI0637\CJ2005\GRAPHICS\STRAT LOGS\DRAWING: GM_85.AI

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well GMSB-7 Project/No. Ford/Kingsford WI000675.0001 Page 1 of 2

Site Location Kingsford, Michigan

Drilling Started 7/13/98 8:10 Drilling Completed 7/13/98 13:10

Total Depth Drilled 42 Feet Hole Diameter 6 inches Type of Sample/Coring Device Split spoon

Length and Diameter of Coring Device 2" x 2' Sampling Interval continuous feet

Land-Surface Elev. 1109.69 feet [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used none Drilling Method Hollow stem auger

Drilling Contractor Boart Longyear Driller Mike Helper Steve

Prepared By Bruce Evans Hammer Weight 140 Hammer Drop 36 ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet) OVA (ppm)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
0	2	1.4/5.0	2,1,4,5	0-0.3': Silt/Soil. Dark reddish grey (5 YR 4/2) rootlet and organic matter,
				trace clay, sand, loose, moist.
				0.3-1.4': Silt. Yellowish red (5 YR 5/8) trace fine to medium gravel,
				subangular to subrounded, loose, moist.
2	4	1.2/5.5	10,4,6,5	0-0.2': Silt/Gravel. As above.
				0.2-1.2': Sand. Yellowish red (5 YR 5/6) fine grain, well sorted, loose, moist.
4	6	1/5.0	8,7,12,13	0-0.7': Sand. As above, light reddish brown (5 YR 5/4).
				0.7-1.0': Sand. As above, becoming light reddish brown (5 YR 5/4) medium
				to coarse sand, fine to coarse gravel, subangular to subrounded, poorly
				sorted, gravel to 1 inch diameter, loose, moist.
6	8	1/5.0	4,5,7,9	Sand. Reddish brown (5 YR 5/3) medium to very coarse, trace medium gravel,
				poorly sorted, loose, moist.
8	10	1.3/5.0	7-10-9-13	Sand. As above.
10	12	1.1/6.0	7,10,9,12	Sand. Brown (7.5 YR 5/3) medium to coarse with very coarse, trace medium
				gravel, subangular to subrounded, poorly sorted loose, very moist.
12	14	0.8/5.5	2,4,3,2	Gravel. Brown (7.5 YR 5/3) fine to medium gravel, subangular to subrounded,
				trace medium to coarse sand, moderately sorted, loose, very moist.
14	16	1.3/5.0	11,8,7,5	0-0.5': Gravel. As above, sandy.
				0.5-0.9': Sand. Brown (7.5 YR 4/2) coarse to very coarse with medium to
				coarse gravel, trace clay, broken rock fragments, high iron oxidization and
				weathered, loose, very moist.
				0.9-1.3': Sand. Light brown (7.5 YR 6/4) fine grain, well sorted, moist.
16	18	1.3/5.0	12,13,15,26	0-0.5': Slough.
				0.5-1.3': Sand. As above, light brown.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

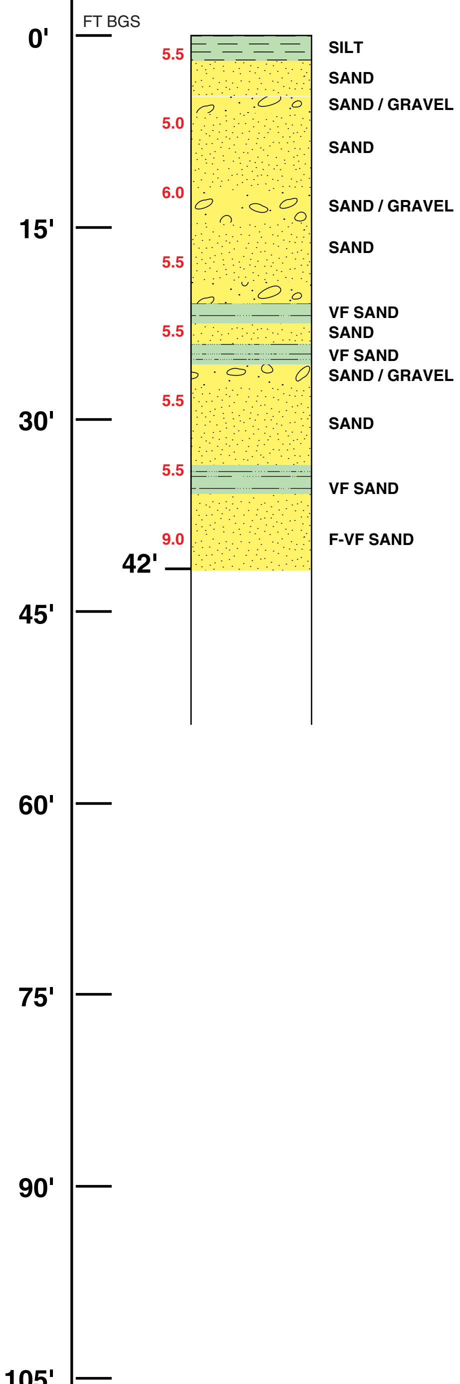
Boring/Well GMSB-7

Prepared by Bruce Evans

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet) OVA (ppm)	Time/Hydraulic Pressure or Blows per 6 Inches	Sample/Core Description
18	20	1.2/5.5	8,9,13,19	0-0.7': Sand. As above, with trace fine gravel.
				0.7-1.2': Sand. Light brown (7.5 YR 6/4) very fine grain, well sorted, moist.
20	22	1.3/5.5	7,6,9,12	0-0.6': Sand. Light brown (7.5 YR 6/4) fine grain with trace coarse sand and
				fine gravel, well sorted, loose.
				0.6-1.3': Sand. Light brown (7.5 YR 6/4) very fine grain, well sorted, loose,
				moist.
22	24	1.3/5.5	8,11,19,35	Sand. Light brown (7.5 YR 6/4) fine grain, well sorted, loose, moist.
24	26	1.2/5.5	8,5,5,11	Sand. Light brown (7.5 YR 6/4) very fine to fine grain, well sorted, coarse,
				moist.
26	28	1.3/5.0	5,2,13,9	Sand. As above, trace fine gravel at 1.0.
28	30	1.3/5.5	7,14,7,14	Sand. Light brown (7.5 YR 6/4) fine grained, well sorted, loose, moist.
30	32	1.2/5.5	8,8,11,16	Sand. As above.
32	34	1.1/5.0	5,5,10,10	Sand. As above.
34	36	1.5/5.0	6,8,13,25	0-0.7': Sand. As above.
				0.7-1.5': Sand. As above, trace fine to medium gravel, subrounded, loose,
				moist.
36	38	1.3/5.5	8,19,22,38	Sand. Light brown (7.5 YR 6/4) very fine grain, well sorted, loose, moist.
38	40	1.3/6.0	4,19,11,25	Sand. Brown (7.5 YR 5/3) very fine to fine grain, well sorted, wet (saturated).
40	42	1.5/9.0	3,3,9,20	Sand. As above, wet.
				Stop drilling at 11:15 to discuss borehole with C. Austin MDEQ.
				13:00 begin abandoning borehole from a depth of 42 feet.
				EOB at 42 feet.

ARCADIS GERAGHTY & MILLER	BOREHOLE STRATIGRAPHIC LOG	OBSERVATION WELL NO. GMSB-7 PROJECT FORD/KINGSFORD WI000675.0001

LOCATION			LAND SURFACE ELEVATION
Kingsford, Michigan			1109.69 Feet MSL
GEOLOGIST	**SAMPLE INTERVAL**	**SAMPLING DEVICE**	**TOTAL DEPTH DRILLED**
Bruce Evans	Continuous	Splitspoon	42 Feet BLS
DRILLER	**DRILLING CONTRACTOR**	**DRILLING METHOD**	**DATE BORING COMPLETED**
Mike	Boart Longyear	Hollow Stem Auger	7/13/98



VERTICAL SCALE ~1"= 15'

22MAY00\FORD\WI0637\KINGSFOR\GRAPHICS\POST798\DRAWING: GMSB_7.AI

ARCADIS GERAGHTY & MILLER

Sample/Core Log

Boring/Well GMSB-22 Project/No. Ford/Kingsford WI000675.0001 Page 1 of 2

Site Location Kingsford, Michigan Drilling Started 9/27/98 Drilling Completed 9/27/98

Total Depth Drilled 65 Feet Hole Diameter 8 inches Type of Sample/Coring Device Rotasonic Core Barrel

Length and Diameter of Coring Device 10' x 4" Sampling Interval Continuous feet

Land-Surface Elev. 1116.58 feet [X] Surveyed [ ] Estimated Datum Mean Sea Level

Drilling Fluid Used Water Drilling Method Rotasonic

Drilling Contractor Boart Longyear Driller Perry Helper Bryan

Prepared By Bruce Evans and Bryan Zinda Hammer Weight Hammer Drop ins.

Sample/Core Depth (feet below land surface)

From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
0	5	2	2.5-4/0-0.3	0-0.5': Concrete.
				0.5-1.0': Gravel/Concrete chips, dry.
				1.0-2.0': Sand/Silt. Yellowish brown (10 YR 5/8), fine grained, clayey, fill mixture, moist.
5	10	2	2.5-3/0.0	No Recovery. Slump material, concrete chips.
10	15	2	2-3/0.0	Sand. Brown (7.5 YR 5/4), fine to medium gravel, trace medium gravel, moderately
				sorted, moist.
15	20	2.5	2-3/0.0	0-1.0': Sand. As above, with some fine to coarse gravel, subangular to subrounded,
				moderately sorted, moist.
				1.0-2.0': Sand. Light brown (7.5 YR 6/3), very fine grained, trace fine gravel, silty, well
				sorted, moist.
20	25	--	--	No Recovery.
25	30	5	2.0/0.0	0-1.0': Sand. Very fine to fine grain, as above.
				1.0-4.0': Sand. Brown (10 YR 4/3), fine to medium grained with fine to coarse gravel,
				subangular to subrounded, poorly sorted, moist.
				4.0-5.0': Sand. Light brown (7.5 YR 6/4), very fine grained, silty, well sorted, 3" diameter
				cobble in sample, dry.
30	35	5	2-8/0-0.2	0-1.0': Sand. Light brown (7.5 YR 6/4), very fine grained silty, well sorted, with trace
				medium gravel and 4 inch diameter cobble, dry.
				1.0-3.5': Sand. Pink (7.5 YR 7/3) fine grain, some very fine grained, well sorted,
				trace fine to medium gravel, subangular to subrounded, moist.
				3.5-4.0': Sand. Pink (7.5 YR 7/3), very fine grained, well sorted, trace fine gravel, moist.
				4.0-5.0': Silt. Light brown (7.5 YR 6/4), grading to very fine grained, silty sand, moist.

ARCADIS GERAGHTY & MILLER

Sample/Core Log (Cont.d)

Boring/Well GMSB-22

Prepared by Bruce Evans and Bryan Zinda

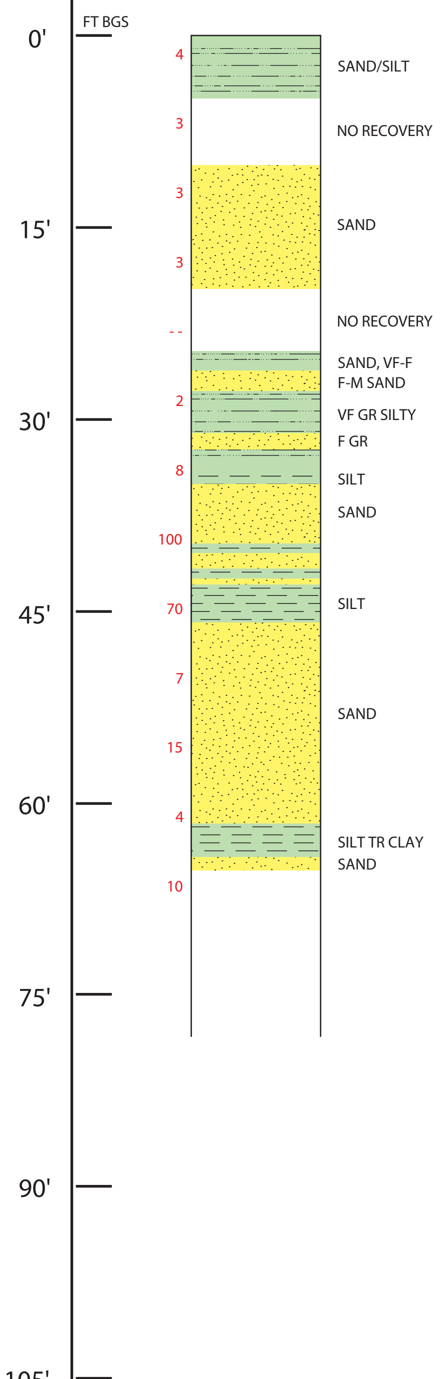
Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	OVA/OVM	Sample/Core Description
35	40	5	3.5-100/	0-2.0': Slump.
			0.2-1.1	2.0-3.0': Sand. Light brown (7.5 YR 6/4), very fine grained, well sorted with some
				fine to coarse gravel, subangular to subrounded, dry.
				3.0-5.0': Sand. Brown (7.5 YR 5/4), very fine to fine grained, well sorted, moist.
40	45	5	9-70/	0-0.5': Silt. Light brown (7.5 YR 6/3), brittle, slight HCI reaction, dry.
			2.2-15.5	0.5-2.0': Sand. Light brown (7.5 YR 6/3), very fine grained, well sorted, moist, loose.
				2.0-2.5': Silt. Brown (7.5 YR 5/4), brittle, petrometer = 1.0, slight HCI reaction,
				very moist.
				2.5-3.0': Sand. Brown (7.5 YR 5/4), fine grained, well sorted, loose, moist.
				3.0-5.0': Silt. Brown (7.5 YR 5/4), as above, trace clay at 5.0 feet, moist to very moist.
45	50	5	1.5-7/0-0.2	0-1.0': Silt. Brown (7.5 YR 5/3), trace clay, petrometer = 2.5 to >4.0, no HCI reaction,
				wet.
				1.0-2.0': Sand. Brown (7.5 YR 5/3), fine to coarse grained, predominately medium
				grained, poorly sorted, loose, wet.
				2.0-5.0': Sand. Brown (7.5 YR 5/3), fine grained, well sorted, trace coarse sand, loose, wet.
50	55	5	6-15/0-1.7	0-2.0': Sand. Brown (7.5 YR 5/3), fine grained, well sorted, some fine to medium gravel,
				subangular mostly, some subrounded, wet.
				2.0-4.5': Sand. Brown (7.5 YR 5/3), fine grained, well sorted, no gravel, wet.
				4.5-5.0': Sand. Brown (7.5 YR 5/3), very fine grained, very silty, well sorted, wet.
55	60	5	2-4/0	Sand. Brown (7.5 RY 5/3), fine grained, well sorted, wet.
60	65	5	5-10/0-1.6	0-1.5': Sand. As above.
				1.5-3.0': Silt. Brown (7.5 YR 5/3), petrometer = 3 to >4, slight HCI reaction, some very
				fine grained sand, wet.
				3.0-4.5': Silt. As above, less sandy, some clay. Clay: reddish brown (5 YR 5/4) in thin
				varves, wet.
				4.5-5.0': Sand. Brown (7.5 YR 5/3), fine grained, well sorted, some silt, wet.
				End borehole at 65 feet.

ARCADIS GERAGHTY & MILLER	BOREHOLE STRATIGRAPHIC LOG	OBSERVATION WELL NO. GMSB-22
		PROJECT FORD/KINGSFORD WI000675.0001

LOCATION	LAND SURFACE ELEVATION
Kingsford, Michigan	1116.58 Feet MSL

GEOLOGIST	SAMPLE INTERVAL	SAMPLING DEVICE	TOTAL DEPTH DRILLED
Bruce Evans	Continuous	Rotasonic Core Barrel	65 Feet BLS

DRILLER	DRILLING CONTRACTOR	DRILLING METHOD	DATE BORING COMPLETED
Perry	Boart Longyear	Rotasonic	9/27/98



VERTICAL SCALE ~1"= 15'

22MAY00\FORD\WI0637\KINGSFOR\GRAPHICS\POST199\DRAWING: GMSB_22.AI

Sample/Core Log

Boring/Well: GMSB-134 | Project/No.: Ford/Kingsford WI001075.0015 | Page 1 of 1

Site Location: Kingsford, Michigan | Drilling Started: 8/6/04 | Drilling Completed: 8/6/04

Total Depth Drilled: 25 Feet | Hole Diameter: 6 inches | Type of Sample/Coring Device: Rotosonic Core Barrel

Length and Diameter of Coring Device: 10' x 4", 10' x 5" | Sampling Interval: continuous feet

Land-Surface Elev.: 1069.16 feet | [X] Surveyed | [ ] Estimated | Datum: Mean Sea Level

Drilling Fluid Used: Water | Drilling Method: Rotasonic

Drilling Contractor: Boart Longyear | Driller: Jason | Helper: Scott Schultz, Royce Brown

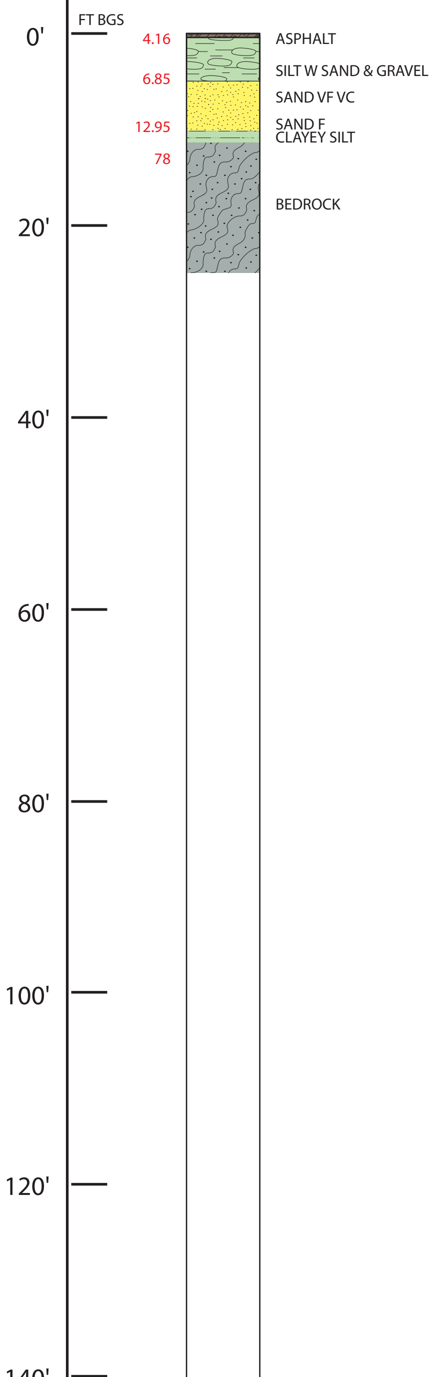
Prepared By: Andy Mumpy | Hammer Weight: | Hammer Drop: ins.

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	PID/FID (ppm)	Sample/Core Description
0	5	5.0	0.65-1.56/	0-0.5' Asphalt Pavement: Black, crushed asphalt and hematite road base.
			0.22-4.16	0.5-5.0' Silt: Dark yellowish brown (10 YR 4/6), grainy to smooth, some gravel
				subangular to subround up to 2" little to some sand in places, very fine to fine, 2"
				thick cohesive silt layer at 2.5 with black laminations, layer could be compacted
				from drilling, overall loose, damp, no odor.
5	10	5	4.39-8.26/	0-3.0' Sand: Strong brown (7.5 YR 5/8), very fine to very coarse grain, little silt,
			1.91-6.85	very poorly sorted, little gravel subangular to subround up to 3" but mostly
				fine, loose, damp, no odor.
				3.0-5.0' Sand: Strong born (7.5 YR 5/6), fine grain, trace very fine, trace medium to
				coarse, little gravel subangular to subround up to 3" as above, but predominately
				fine gravel, moderately well sorted, loose, damp, no odor.
10	12.5	2.5	7.6-115/	0-0.2' Sand: As above.
			3.01-12.95	0.2-1.5' Clayey Silt: Strong brown (7.5 YR 4/6), little to some sand, medium to very
				coarse suspended in matrix (fabric), possibly was interbedded clay varves and silt,
				but also clay in matrix, massive cohesive, somewhat plastic, soft, moist, little fine
				gravel also suspended in matrix, no odor.
				1.5-2.5' Clayey Silt: As above, but broken up and intermixed with angular, broken
				pieces of hard, dense rock, probably bedrock, rock pieces are coated in white
				powdery layer, black (10 YR 4/1) when washed, very hard drilling, crumbly and
				loose overall, dry to damp, no odor.
12.5	15	2.5	10.27-38.5/	0-2.5' Bedrock. Pulvsized, powdery rock with some large pieces, broken from
			24-78	drilling, hard drilling, rock is black (10 YR 4/1), very hard, dense, massive, appears
				to have a near vertical foliation pattern, but not obvious.
15	25	10	--	0-10.0' Bedrock core as above, a few white veins, foliation is vertical relative to
				hole.
				EOB @ 25'.

ARCADIS
GERAGHTY & MILLER

BOREHOLE STRATIGRAPHIC LOG

OBSERVATION WELL NO.	GMSB-134
PROJECT	FORD/KINGSFORD WI001025.0033
LOCATION	Kingsford, Michigan
LAND SURFACE ELEVATION	1069.16 Feet MSL
GEOLOGIST	A. Mumpy
SAMPLE INTERVAL	Continuous
SAMPLING DEVICE	Splitspoon
TOTAL DEPTH DRILLED	25 Feet BLS
DRILLER	Jason
DRILLING CONTRACTOR	Boart Longyear
DRILLING METHOD	Hollow Stem Auger
DATE BORING COMPLETED	8/06/04



VERTICAL SCALE ~1"= 20'

29DEC04\FORD\WI0637\2004\GRAPHICS\STRAT LOGS\DRAWING: GMSB_134.AI

Arcadis U.S., Inc.

126 North Jefferson Street

Suite 400

Milwaukee, Wisconsin 53202

Tel 414 276 7742

Fax 414 276 7603

www.arcadis.com