Hydrostratigraphy and Aquifer Hydraulic Properties Update for the Surficial and Intermediate Aquifer Systems, Lower West Coast Planning Area

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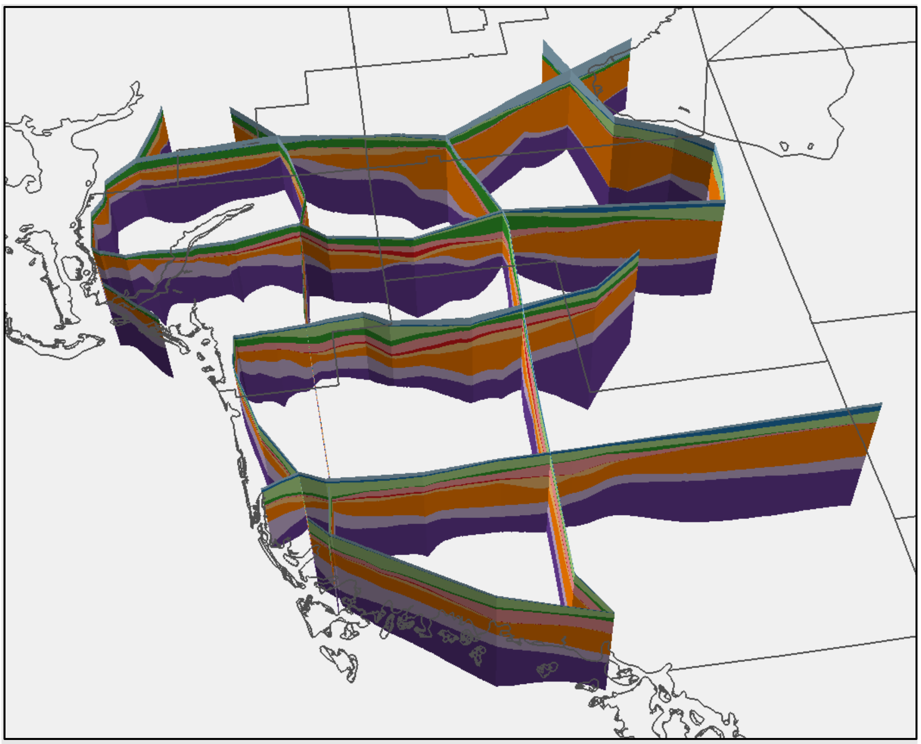

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EXECUTIVE SUMMARY

This document is an update to the hydrostratigraphy and aquifer hydraulic properties of the surficial and intermediate aquifer systems (SAS and IAS) in the South Florida Water Management District's (SFWMD or District) Lower West Coast (LWC) Planning Area. In addition to generally increasing the understanding of these aquifer systems, this study provides a basis for updating the model layers that constitute the Lower West Coast Surficial and Intermediate Aquifer Systems Model (LWCSIM), which the District plans to update to a density-dependent groundwater model in the future. The study area corresponds with the LWCSIM extents.

The objectives of this effort were to create updated hydrostratigraphic surfaces for each aquifer and aquitard within the SAS and IAS and to provide a set of recommended hydraulic parameters for each hydrostratigraphic unit throughout the model domain. As part of the deliverables for this project, new regional hydrostratigraphic surface maps and isopach maps for each hydrostratigraphic unit were created, along with new hydrogeologic cross sections of the SAS and IAS as well as a corresponding 3-dimensional (3-D) digital model of the hydrostratigraphy. Hydrogeologic data sources used during this project included the SFWMD's DBHYDRO and ePermitting databases, various Florida Geological Survey (FGS) and United States Geological Survey (USGS) publications, and historical reports produced by private consulting firms obtained from Florida Gulf Coast University (FGCU).

Hydrostratigraphic surfaces of the SAS included the Water Table aquifer, Tamiami confining unit, and Lower Tamiami aquifer. Hydrostratigraphic surfaces of the IAS included the Upper Hawthorn confining unit, clastic zone of the Sandstone aquifer, interconfining unit of the Sandstone aquifer, carbonate zone of the Sandstone aquifer, Mid-Hawthorn confining unit, Mid-Hawthorn aquifer, and Lower Hawthorn confining unit.

The maps, source data, and metadata used to generate these products have been archived in Geographic Information System (GIS) files for model implementation and regulatory use. The results will be incorporated into the updated LWCSIM, which will evaluate the potential impact of existing and projected groundwater withdrawals in all SAS and IAS aquifers within the region over the next several decades. The most recent regional groundwater model update for the study area was the LWCSIM completed in November 2020 (Bandara et al. 2020).

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ACRONYMS AND ABBREVIATIONS

APT	aquifer performance test
CRDT	constant rate discharge test
DEM	digital elevation model
District	South Florida Water Management District
FGS	Florida Geological Survey
ft	foot or feet
FGCU	Florida Gulf Coast University
GIS	Geographic Information System
H1	Upper Hawthorn confining unit
H2	Mid-Hawthorn confining unit
H3	Lower Hawthorn confining unit
HM	Mid-Hawthorn aquifer
IAS	intermediate aquifer system
LT	Lower Tamiami aquifer
LWC	Lower West Coast
LWCSAS	Lower West Coast Surficial Aquifer System model
LWCSIM	Lower West Coast Surficial and Intermediate Aquifer System Model
NAVD	North American Vertical Datum of 1988
S1	Sandstone aquifer carbonate zone
S2	Sandstone aquifer clastic zone
SAS	surficial aquifer system
SC	Sandstone aquifer interconfining unit
SFWMD	South Florida Water Management District
SJRWMD	St. Johns River Water Management District
SWFWMD	Southwest Florida Water Management District
TC	Tamiami confining unit
TIN	triangular irregular network
USGS	United States Geological Survey
WT	Water Table aquifer

1 INTRODUCTION

The Lower West Coast (LWC) Planning Area hydrostratigraphic update project updates and refines the understanding of the hydrogeology of the surficial and intermediate aquifer systems (SAS and IAS) in the South Florida Water Management District (SFWMD or District) LWC Planning Area and the portions of Lower Kissimmee Basin and Lower East Coast planning areas that fall within the Lower West Coast Surficial and Intermediate Aquifer Systems Model (LWCSIM) boundary. The study area corresponds with the LWCSIM extents. **Figure 1** shows the SFWMD boundary and planning areas, along with the locations of neighboring water management districts. **Figure 2** shows the study area.

The objectives of this study were to update the SAS and IAS hydrostratigraphic surfaces and thickness (isopach) maps for the LWC Planning Area; create new hydrogeologic cross sections based on these surfaces; and review, summarize, and rank all available aquifer performance test (APT) data, resulting in recommended, minimum, and maximum hydraulic parameters for each hydrostratigraphic layer within the SAS and IAS.

The maps, source data, and metadata used to generate these products are archived in Geographic Information System (GIS) files in a manner suitable for groundwater model implementation and regulatory use in a publicly accessible format. The results of the study will be incorporated into the forthcoming update to the 2020 LWCSIM (Bandara et al. 2020), which will evaluate the potential impact of existing and projected groundwater withdrawals in the SAS and IAS aquifers within the LWC Planning Area over the next several decades. This updated LWCSIM will allow the District and various entities in the LWC to better understand the ability of the SAS and IAS to meet future water supply needs.

The original regional Lower West Coast Surficial Aquifer System (LWCSAS) model was completed in 2006 (Marco Water Engineering and Ecology and Environment 2006). For the 2006 LWCSAS model, sources for the hydrogeologic data included files from the SFWMD, Florida Geological Survey (FGS), United States Geological Survey (USGS), Florida Bureau of Oil and Gas, Water Resources Solutions, Inc., and other private consulting firms. SFWMD water use permit data were also utilized on a limited basis. At that time, the SFWMD had data on 2,026 wells in DBHYDRO, a database that stores hydrologic, meteorologic, hydrogeologic, and water quality data for the District. Of these 2,026 wells, 203 had depth information for the tops of aquifers. APT data and hydrogeologic formation selections were subsequently added to DBHYDRO for verified well locations. Additionally, for the 2006 LWCSAS model, lithostratigraphic surfaces (using lithostratigraphy as a surrogate for hydrogeology) were created for the Water Table aquifer, the Bonita Springs Marl and Caloosahatchee Clay confining zones, and the Sandstone aquifer. The 2006 LWCSAS did not include the Mid-Hawthorn aquifer or the Lower Hawthorn confining unit.

Following the 2006 LWCSAS model, the 2020 LWCSIM was completed by the SFWMD using hydrogeologic and hydrostratigraphic data obtained and reviewed by the SFWMD as described in detail in Geddes et al. (2015). In contrast to the LWCSAS model, the 2020 LWCSIM model and the future update to the LWCSIM model are based on hydrogeologic data. For the 2023 hydrostratigraphic update of the SAS and IAS described in this report, data used in Geddes et al. (2015) were reviewed again, and changes were made as needed. The resultant data were incorporated into the 2023 hydrostratigraphic framework if better quality data were not available in the same area/model cell. Additional data that became available since 2015 also were incorporated, including many previously unknown historical APT and hydrogeological reports. Section 3 of this report provides a detailed description of the data sources. The hydrostratigraphic approach is useful for groundwater modeling purposes because hydrostratigraphic zones are not always equivalent to the lithostratigraphic zones. The hydrostratigraphic approach allows for greater precision in defining one or more aquifer units within a given lithostratigraphic zone and identifies where hydrogeologic units cross lithostratigraphic boundaries.

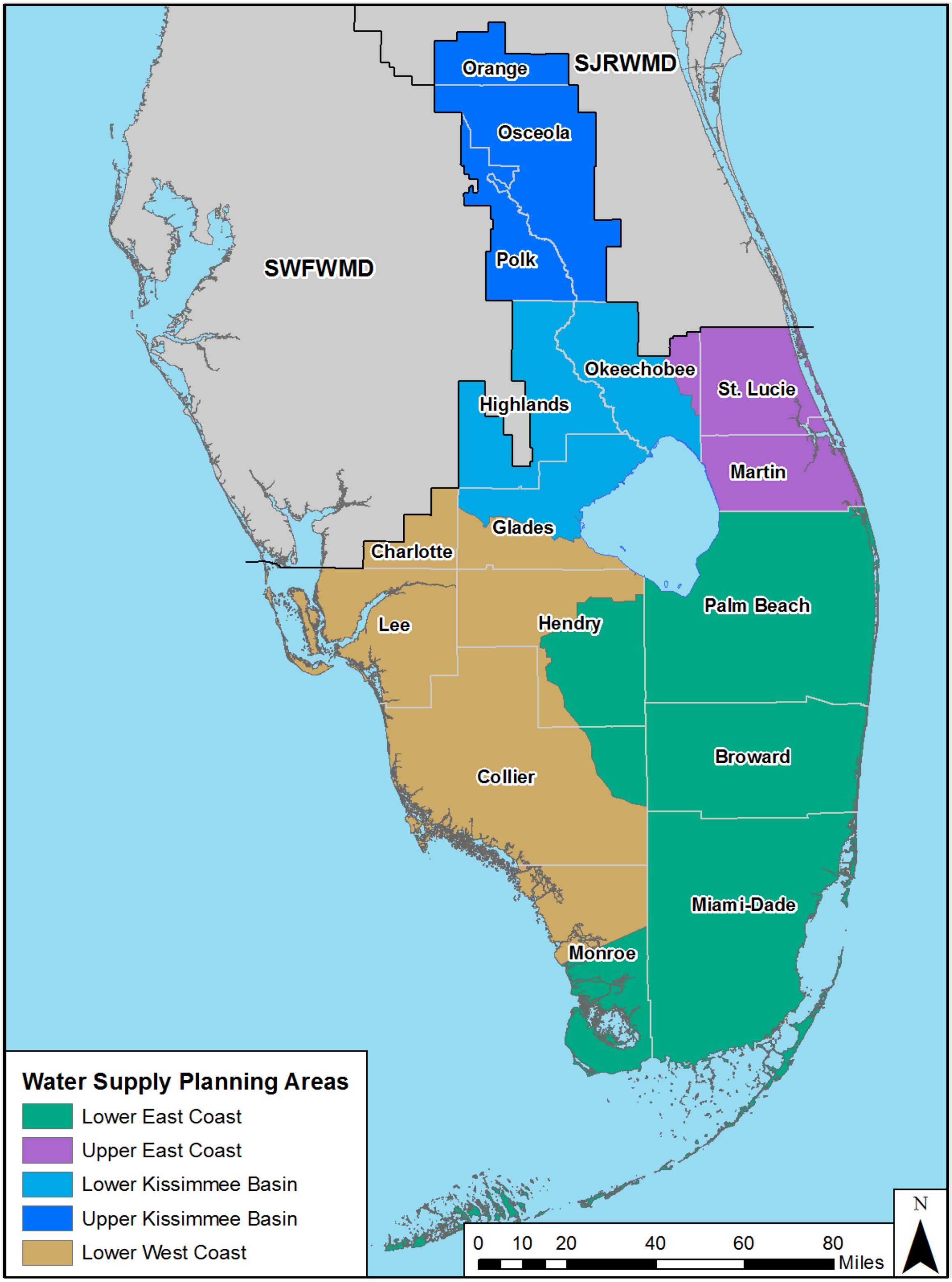

Figure 1. SFWMD water supply planning areas.

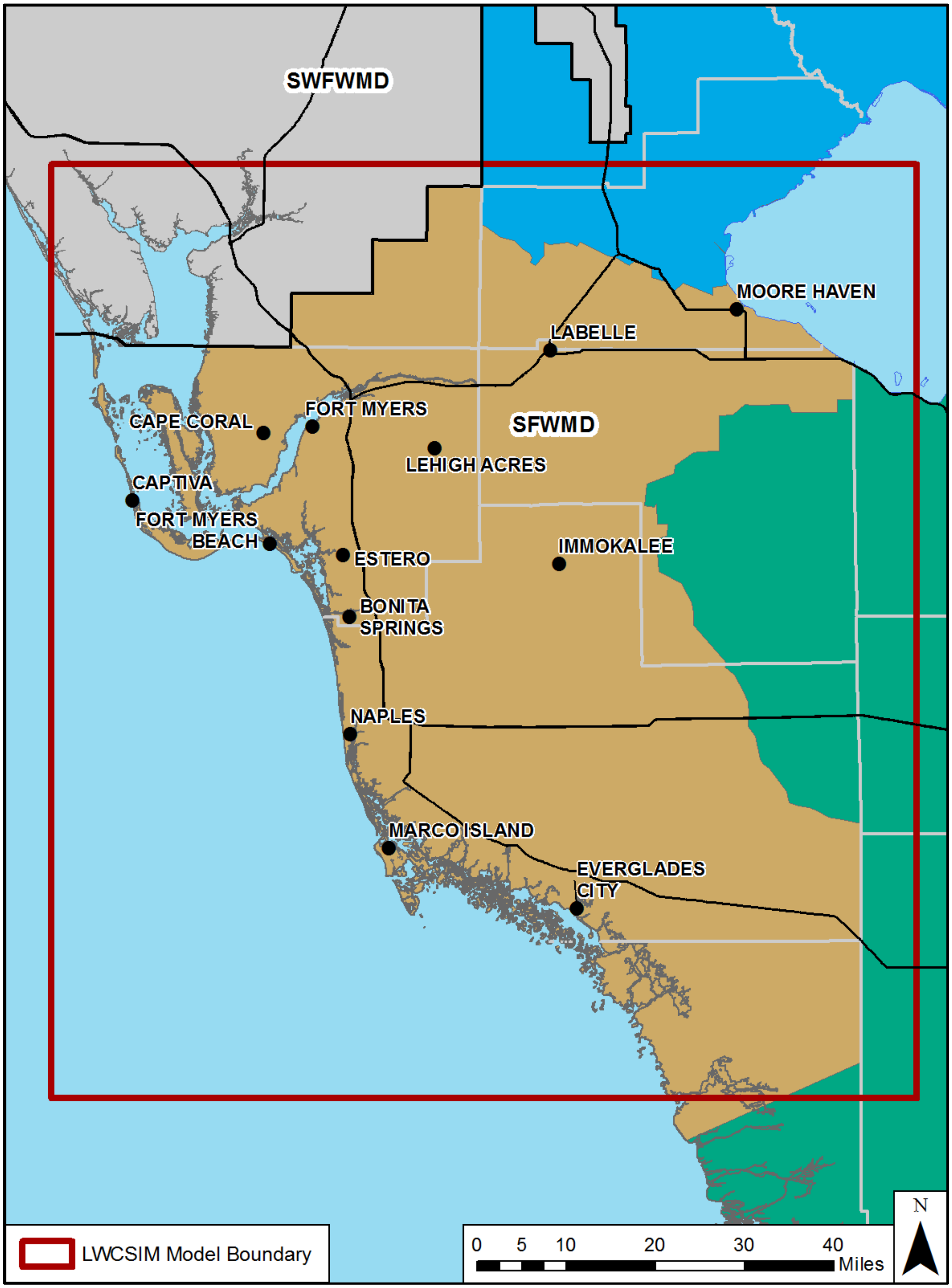

Figure 2. LWCSIM model boundary and study area covered by this report.

2 GEOLOGIC AND HYDROGEOLOGIC FRAMEWORK

Southwest Florida is underlain by three aquifer systems: the SAS, the IAS, and the Floridan aquifer system. In the LWC Planning Area, the SAS consists of the Water Table aquifer and the Lower Tamiami aquifer. The Sandstone and Mid-Hawthorn aquifers comprise the IAS. This study only covers the hydrostratigraphy and lithostratigraphy of the SAS and IAS. The Floridan aquifer system underlies the IAS and was not mapped or reviewed as part of this study. **Figure 3** shows the aquifer systems, hydrogeologic units, and lithostratigraphic units found in the project area.

2.1 Lithology and Stratigraphy

In descending order (below and in **Figure 3**), the stratigraphic units reviewed for this project included:

- Undifferentiated Holocene/Pleistocene sediments
- Tamiami Formation
- Peace River Formation and Arcadia Formation of the Hawthorn Group

2.1.1 Undifferentiated Holocene/Pleistocene Sediments

The lithology of the undifferentiated surficial sediments is highly variable. Medium- to fine-grained quartz sand, fossils, clay, and some freshwater limestone and marl are present within this unit. These sediments extend to the top of the Tamiami confining unit, or, where absent, the top of the Ochopee Limestone of the Tamiami Formation. In a few areas, the Tamiami Formation is entirely absent, and the surficial sediments rest directly on top of the Peace River Formation. The undifferentiated surficial sediments grade into the Anastasia Formation to the east and into the Miami Limestone to the south (Bryan et al. 2013).

2.1.2 Tamiami Formation

The Tamiami Formation is composed of two units and nine members: none of which are present throughout the entire project area. The upper confining unit is predominantly marl, and the lower water-bearing member is the Ochopee Limestone. This unit is approximately equivalent to the Gray Limestone aquifer, which is in the eastern-most portion of the study area and in the western portion of the Lower East Coast Planning Area (Reese and Cunningham 2000). Lithology of this unit varies from fine- to coarse-grained sand and fossiliferous limestone (Scott 2001). The presence of these two units varies spatially, and the Ochopee Limestone is absent in much of southwestern Hendry and northeastern Monroe counties. The upper confining unit is thicker in these areas and in portions of southwestern Lee and northwestern Collier counties.

2.1.3 Hawthorn Group

The Miocene-age Peace River Formation underlies the entire project area and consists of clay and carbonate interbedded with quartz sand. Phosphate may be gravel- to sand-sized. Approximately two-thirds of the formation is siliciclastic, and one-third (typically the lower portion) is carbonate.

The underlying Arcadia Formation of the Hawthorn Group is predominately carbonate and underlies the entire project area. The contact between the two formations may be distinct or gradational. The Arcadia Formation is primarily dolostone and limestone with beds of clay, quartz sand, and phosphate grains (Scott 1988). The base of the Arcadia Formation is confining and composed primarily of clay and mud.

System	Hydrogeologic Unit		Lithostratigraphic Unit		
Surficial Aquifer System	Water Table Aquifer (WT)		Undifferentiated Holocene/ Pleistocene		Subject of this Study
			Tamiami Formation	Pinecrest Sand Member	
	Tamiami Confining Unit (TC)			Bonita Springs Marl Member / Caloosahatchee Clay Member	
	Lower Tamiami Aquifer (LT)			Ochopee Limestone Member	
Intermediate Aquifer System / Confining Unit	Upper Hawthorn Confining Unit (H1)		Hawthorn Group	Peace River Formation	
	Sandstone Aquifer	Clastic Zone (S2)			
		Interconfining Unit (SC)			
		Carbonate Zone (S1)			
	Mid-Hawthorn Confining Unit (H2)				
	Mid-Hawthorn Aquifer (HM)			Arcadia Formation	
	Lower Hawthorn Confining Unit (H3)				
Florida Aquifer System	Upper Floridan Aquifer	Lower Hawthorn Producing Zone			
			Suwannee Limestone		
			Ocala Limestone		
	Middle Confining Unit	Avon Park Permeable Zone	Avon Park Formation		
	Lower Floridan Aquifer		Oldsmar Formation		
	Sub-Floridan Confining Unit		Cedar Keys Formation		

Figure 3. Generalized hydrogeologic and geologic units of the LWC Planning Area.

2.2 Hydrostratigraphy

The hydrogeologic units found in the LWC Planning Area and their relation to the lithostratigraphic units are shown in **Figure 3**. Only data from the hydrogeologic units and confining units including and above the Lower Hawthorn confining unit were reviewed as part of this study. The hydrogeology of southwest Florida is complex. Lateral facies changes and variable bed thicknesses lead to large, local variations in hydrogeologic units. The heterogeneous nature of the units combined with sparse geologic data in places poses difficulties for regional-scale mapping. With regional-scale mapping and large grid cell size, local variability in the hydrogeologic units cannot be captured fully in the surface and isopach maps. For the purposes of this project, the following generalized unit criteria/definitions have been used.

2.2.1 Water Table Aquifer

The Water Table aquifer is composed primarily of quartz sand and shell with minor amounts of organic material. A dense limestone cap rock is present at the base of the aquifer in some areas. The Water Table aquifer is absent in places within the LWC Planning Area, and the basal confinement is not always present. Where present, the Bonita Springs Marl and/or low permeability portions of the Pinecrest Sand of the Tamiami confining unit provide confinement at the base of the Water Table aquifer.

In hydrogeology, a "water table aquifer" is defined as an unconfined aquifer extending from the water table to the first persistent confining unit. In the LWC Planning Area, the terminology more specifically refers to the permeable materials that extend from the water table to the top of the underlying Tamiami confining unit. Confinement between the Water Table aquifer and the underlying Lower Tamiami aquifer, however, is not consistent or always present. Where the Tamiami confining unit is absent, the Water Table aquifer, by definition, encompasses any permeable units above the Upper Hawthorn confining unit. However, to facilitate the development of hydraulically correct model layering, where possible, the Ochopee Limestone of the Lower Tamiami aquifer was discretely mapped where the Tamiami confining unit was absent.

2.2.2 Lower Tamiami Aquifer

The Lower Tamiami aquifer is composed predominantly of sandy, biogenic limestone and calcareous sandstone. Throughout most of the study area, the underlying clay and fine-grained sand of the Upper Hawthorn confining unit provides basal confinement to the Lower Tamiami aquifer. However, in some areas, the Lower Tamiami aquifer, or undifferentiated SAS, lies directly on top of the Sandstone aquifer.

2.2.3 Sandstone Aquifer

The Sandstone aquifer is composed of sandstone, sandy limestone, dolostone, and calcareous sand. The Sandstone aquifer, except where absent, is contained entirely within the Peace River Formation of the Hawthorn Group. It typically occurs as two distinct permeable units: an upper clastic zone and a lower carbonate zone. These two hydrogeologic units may be contiguous or separated by varying amounts of low permeability silt and clay. The confining layer between the two aquifer zones is referred to as the Sandstone aquifer interconfining unit in this report.

The Sandstone aquifer is often separated from the overlying Lower Tamiami aquifer by low permeability clay and dolosilt of the Upper Hawthorn confining unit. The Sandstone aquifer is separated from the underlying Mid-Hawthorn aquifer by low permeability clay and marl of the Mid-Hawthorn confining unit, which is present throughout the study area.

2.2.4 Mid-Hawthorn Aquifer

The Mid-Hawthorn aquifer is composed of biomicritic limestone, phosphate, shell, and lime mud, and lies entirely within the Arcadia Formation of the Hawthorn Group. The Mid-Hawthorn aquifer is separated from the overlying Sandstone aquifer by low permeability clay and marl of the Mid-Hawthorn confining unit. Where the Sandstone aquifer is absent, the entire thickness of the Peace River Formation isolates the Mid-Hawthorn aquifer from the overlying SAS. The confinement from the carbonate mud and terrigenous clay of the Lower Hawthorn confining unit is present throughout the study area. Use of the Mid-Hawthorn aquifer for water supply mostly occurs in the western part of the study area.

Although significant local differences in water quality and potentiometric surfaces have been observed within discrete zones of the Mid-Hawthorn aquifer, the aquifer was mapped as a single aquifer for this project because insufficient data are available to map these various water-bearing layers on a regional scale. Additional detailed hydrostratigraphic work would need to be completed across the study area to be able to map the regional extent and hydraulic continuity between permeable zones of the Mid-Hawthorn aquifer.

3 DATA

Numerous hydrogeologic data and publications were obtained and reviewed for hydrostratigraphic data and aquifer hydraulic properties. Internal data sources included data from the SFWMD's DBHYDRO and ePermitting databases, including water use permitting files, as well as historical SFWMD technical reports and publications. The ePermitting database contains data related to environmental resources, consumptive water use, and nutrient source control permit applications. External data sources included historical consultant reports archived at FGCU and various FGS and USGS publications. **Table 1** lists the hydrostratigraphic data sources, and **Table 2** lists the hydraulic parameters data sources that were reviewed.

Table 1. Hydrostratigraphic data reviewed.

Data Source	Data Type/Description
DBHYDRO	963 Wells
ePermitting	2,461 Wells
Geddes et al. 2015	662 Wells and/or Borings
FGCU Library	107 Consultant Reports
FGS	Various Regional Hydrogeologic Studies and Reports
USGS	Various Regional Hydrogeologic Studies and Reports

Table 2. Hydraulic parameter data reviewed.

Data Source	Data Type/Description
DBHYDRO	412 APTs
FGCU Library	77 APTs from 107 Consultant Reports

In addition to SFWMD data, DBHYDRO includes reports and data from the USGS, FGS, and private consulting firms. The DBHYDRO data set was refined by selecting only wells with hydrogeologic data in the counties of interest. The information available in DBHYDRO includes technical publications, well construction data and/or reports, lithologic descriptions, field and laboratory testing data, APT data, downhole geophysical data, and other hydrogeologic data. The lithologic logs and well construction details (if applicable) of 4,086 wells were reviewed as part of this LWC hydrostratigraphic update.

Data for 662 wells from the 2015 LWC hydrostratigraphic update (Geddes et al. 2015) were included and reviewed during the 2023 hydrostratigraphic update. In the 2015 update, a ranking of -1 was assigned to wells where data were sparse, and casing and total depths of production wells were used as a surrogate for aquifer boundaries. Wells with this ranking were filtered out of the data set.

After the first draft of the 2023 hydrostratigraphic surfaces was created, the surfaces were evaluated against data from wells in the ePermitting database. These files were reviewed for lithologic logs, well completion reports, and APT tests that could be incorporated into the data set. To reduce the number of permits to review, only those permits for sites located greater than one mile from the wells in the draft surfaces were reviewed. This allowed the reviewers to focus on areas that lacked data, particularly in rural areas. This filtering resulted in 2,461 wells in the ePermitting database, across 1,252 permits. The lithologic logs gathered from ePermitting were, in general, less detailed than lithologic logs from geological reports and publications, often because the lithologic data consisted of generalized driller's logs rather than detailed lithologic data collected by a geologist. Because of their relatively less detailed nature, the ePermitting data were not used to create the first draft of the hydrostratigraphic surfaces.

4 METHODS

Two separate ranking system methodologies were developed for the data review process and agreed upon by Hydrogeology Unit staff. One ranking system was developed for the hydrostratigraphic data review, and one ranking system was developed for the APT data review.

In addition, an analytical method was developed for the estimation of the hydraulic conductivity of individual hydrostratigraphic layers for APTs that pumped from more than one aquifer separated by an aquitard.

4.1 Hydrostratigraphic Data Review and Ranking

Geophysical logs, lithologic logs, hydrogeologic reports and cross sections, previously published hydrostratigraphic surfaces, and information from USGS reports were all used to estimate the elevations of the tops and bottoms of aquifers ("aquifer picks") and aquitards using the hydrogeologic definitions of each unit established at the start of the project as described earlier in this report. The majority of the hydrostratigraphic data was evaluated during the hydrostratigraphic review phase. During the APT review phase, more hydrogeologic data were found within APT reports and were evaluated, ranked, and added to the data set.

The quality of the available lithologic data was ranked using the following system:

- A default ranking of 0 was assigned to every well in the database to indicate that the data had not yet been reviewed.
- A ranking of 1 was assigned to reviewed data from DBHYDRO and geologic reports once the reviewer was confident that the hydrostratigraphic picks were as accurate as possible. Hydrostratigraphic picks were updated as needed during the review process.
- A ranking of 2 was assigned to reviewed lithologic data that were deemed not acceptable.
- A ranking of 3 was temporarily assigned to lithologic data that needed further review later. Upon further review, each ranking of 3 was changed to either a ranking of 1 or 5 (hydrostratigraphic picks are as accurate as possible), or a ranking of 2 (lithologic data deemed unacceptable). Therefore, no data currently has a ranking of 3.
- A ranking of 4 was assigned to wells not used for creation of hydrostratigraphic surfaces because another well with better quality data was in the same groundwater model cell.
- A ranking of 5 was assigned to quality lithologic data obtained from the ePermitting database. The ePermitting data were obtained and reviewed after all other data had been reviewed. Because of the relatively lower quantity and quality of the ePermitting hydrostratigraphic data, a separate ranking was assigned to the ePermitting data. This enabled the removal of relatively lower quality ePermitting data from the hydrostratigraphic surfaces data set if the ePermitting hydrostratigraphic data were in significant disagreement with surrounding higher quality hydrostratigraphic data.

Only wells with a ranking of 1 or 5 were used to create the hydrostratigraphic surfaces. After the review process, 1,066 wells were determined to have enough data to be used for creation of the hydrostratigraphic surfaces. The data are presented in **Appendix A**. **Figure 4** presents a workflow graphic for the hydrostratigraphic data review and ranking process and shows the total number of data sources (wells and reports) that were reviewed for hydrostratigraphic data.

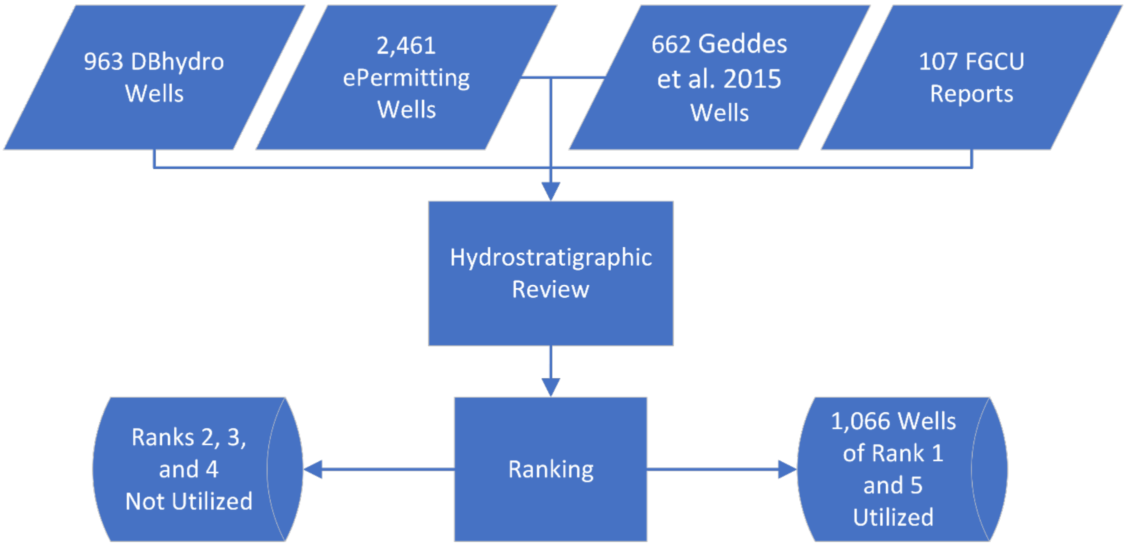

Figure 4. Workflow for hydrostratigraphic data review and ranking.

4.2 Aquifer Performance Test Data Review and Ranking

At the start of the APT review process, a Microsoft Excel spreadsheet was created that contained numerous columns to be populated by each member of the Hydrogeology Unit staff during the APT review process. Included in this spreadsheet were the estimated depths below land surface for each hydrostratigraphic layer. As each APT was reviewed, these depths were revised, as needed, if lithologic logs were included as part of an APT report. These hydrostratigraphic updates were then incorporated into the hydrostratigraphic surfaces if higher quality data were not present in that groundwater model cell.

The APT ranking system used in this study was composed of five categories, each with their own scoring system. As shown in **Table 3** and described below, the APT ranking system was based on the following:

- Data Completeness: APTs with comprehensive reports and data were assigned the highest score, and APT reports with no supporting data or lithologic logs were assigned the lowest score.
- Test Type: Constant rate discharge tests (CRDT) were assigned the highest score, and slug tests were assigned the lowest score.
- Test Zone: The test zone scoring system assigns a score related to the degree of penetration of the tested aquifer by the APT pumping well. Pumping wells that fully penetrate a single aquifer were assigned the highest score, and wells open to multiple aquifers were assigned the lowest score.
- Test Length: APTs with reported pumping durations meeting the recommended pumping duration guidelines presented in Kruseman and de Ridder (1994) were assigned the highest score, and APTs with pumping times significantly lower than the recommended durations were assigned the lowest score. The recommended pumping durations for CRDTs as presented in Kruseman and de Ridder (1994) and used for the APT ranking by Hydrogeology Unit staff are as follows:
    - 15 to 20 hours for a leaky aquifer
    - 24 hours for a confined aquifer
    - 72 hours (3 days) for an unconfined aquifer
- Solution Used: This category was intended to rank the analytical solution that was used to produce the hydraulic parameters for each APT.

First, each of the criteria for each APT category shown in **Table 3** was assigned a numbered score. Each category was assigned a relative weight representing the relative importance of that category. For each APT reviewed, a total weighted score was calculated as the sum of each category's score multiplied by the relative weight assigned to each category as shown in the following example:

$$Weighted\ Score = Data\ Completeness\ Score * 6\ +\ Test\ Type\ Score * 5\ +\ Test\ Zone\ Score * 4\ +\ Test\ Length\ +\ Solution\ Used$$

Using this weighted score ranking system, the highest weighted score possible was 59.

Table 3. APT data ranking criteria.

Category	Criteria	Score	Relative Weight
Data Completeness	APT with comprehensive well completion report and data	4	6
	APT with comprehensive well completion report but no data	3	
	APT with minimal data (i.e., graphs and / or table only)	2	
	No multimedia references in DBHYDRO	1	
Test Type	CRDT	3	5
	Packer / Specific capacity / Step drawdown	2	
	Slug	1	
Test Zone	Full penetration – pumping well open to entire aquifer	4	4
	Partial penetration – pumping well open to more than 50% of the aquifer	3	
	Partial penetration – pumping well open to less than 50% of the aquifer	2	
	Pumping well open to multiple units	1	
Test Length	Appropriate	2	1
	Too short	1	
Solution Used	Appropriate	2	1
	Poor fit	1	

Following the initial ranking of all reviewed APTs, any APTs with a weighted score of 41 or greater were reviewed in greater detail to determine if the test results were reliable. An APT was deemed questionable if notes in the report suggested the results were questionable due to factors such as nearby pumping, recharge from nearby ponds, shortened pumping time due to rainfall or other reasons, or unexplained factors that caused the data to deviate from the analysis type-curve.

For all the APTs that had a weighted score of 41 or greater and were deemed reliable after the second, more detailed review, the transmissivity recommended by Hydrogeology Unit staff was entered into the APT review spreadsheet, along with recommended values for storativity or specific storage, leakance, and specific yield, if reported. A horizontal hydraulic conductivity was calculated for each APT based on the thickness of the aquifer at that location consistent with the lithologic log for the APT's pumping well, or if a lithologic log was not part of the APT report, the aquifer thickness was based on the kriging of the hydrostratigraphic data. Kriging is a statistical estimation method where unknown values are estimated using a weighted average of nearby known values. For APTs with multiple observation wells, or when the aquifer's hydraulic parameters were calculated using multiple solutions, the lowest result and the highest result were also entered into the spreadsheet, along with notes as to which observation well and analytical solution were used. Providing a range of hydraulic parameters for each APT will allow the groundwater modeling team to bracket the hydraulic parameter values during model calibration.

Finally, the resultant reliable 87 APTs were used to derive 90 recommended hydraulic conductivity values which were then used to create hydraulic conductivity rasters for the nine groundwater model hydrostratigraphic layers. The aquifer parameters from the 87 reliable APTs are presented in **Appendix B**.

4.3 Hydraulic Conductivity Partitioning Method for Multilayer Aquifer Performance Tests

The 87 reliable APTs (**Appendix B**) include APTs that used pumping wells open to multiple aquifers rather than a single aquifer. The hydraulic conductivity calculated from the APTs at these wells represents the overall (or "bulk") horizontal hydraulic conductivity (K_h) of the entire tested interval. For these data to be useful for groundwater modeling purposes, the K_h had to be partitioned into each of the hydrostratigraphic layers that were pumped during the APT. Following the completion of the APT review process, all APTs that were classified as reliable APTs were filtered to show only those reliable APTs that had a pumping well that pumped from more than one aquifer separated by an aquitard. Further review of these APTs revealed only two pumping wells qualified as multilayer APTs with sufficient data for analysis. These two wells, named H-M-82 and HM-177, pumped from the two Sandstone aquifer layers (i.e., carbonate zone and clastic zone) and the intervening Sandstone aquifer interconfining unit.

Based on the lack of analytical methods for partitioning K between multiple hydrostratigraphic layers pumped during an APT, Hydrogeology Unit staff created a Microsoft Excel spreadsheet to perform this task. This spreadsheet method uses the equivalent hydraulic conductivity formula (described in the next section), published K values for various sediment and rock types, and the team's recommended K values for each aquifer based on the APT review.

4.3.1 Equivalent Hydraulic Conductivity Concept

The equivalent hydraulic conductivity formula (**Equation 1**) can be used to estimate the overall hydraulic conductivity for a multilayered aquifer system if the hydraulic conductivity of each geologic layer is known. However, for an APT that pumps from a multilayered geologic system, the hydraulic conductivity of each pumped layer is not known. By using the overall hydraulic conductivity obtained from analysis of a multilayer APT, combined with hydraulic conductivity values from nearby APTs that pumped each hydrostratigraphic layer individually and published hydraulic conductivity values of common sediments and rock types, the overall hydraulic conductivity of a multilayer APT can be partitioned into each of the individual hydrostratigraphic layers pumped by that multilayer APT using the equivalent hydraulic conductivity formula.

To help visualize the equivalent hydraulic conductivity concept and formula, a saturated two-layered hydrogeologic system is represented as a conceptual geologic block diagram in **Figure 5**. The two hydrostratigraphic layers in **Figure 5** are isotropic and homogeneous, and each layer has a different hydraulic conductivity.

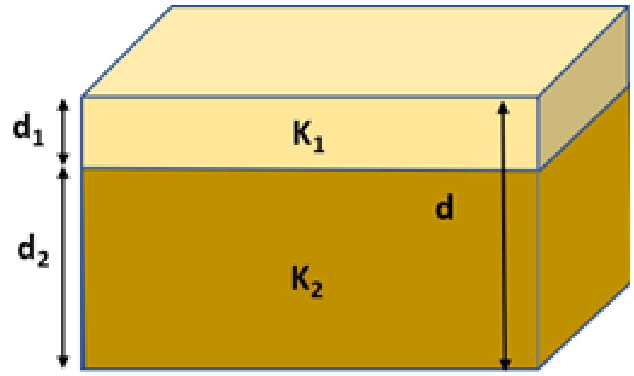

Figure 5. Block diagram representing two isotropic, homogeneous hydrostratigraphic layers.

As shown in **Figure 5**, modified from Woessner and Poeter (2020), the total thickness (d) is the sum of the thicknesses of the two layers: $d = d_1 + d_2$. Layer 1 has a hydraulic conductivity of K_1, and layer 2 has a hydraulic conductivity of K_2. For the two-layered hydrostratigraphic system, the equivalent horizontal hydraulic conductivity (K_h) can be calculated as follows:

$$K_h = \frac{K_1 d_1 + K_2 d_2}{d_1 + d_2}$$

Equation 1

where:

K_h = equivalent horizontal hydraulic conductivity (L/T)

K_1 = hydraulic conductivity of layer 1 (L/T)

K_2 = hydraulic conductivity of layer 2 (L/T)

d_1 and d_2 are thicknesses of layers 1 and 2 (L)

As this equation shows, the equivalent horizontal hydraulic conductivity is a thickness-weighted average.

4.3.2 Description of Hydraulic Conductivity Partitioning Method

For the two reliable multilayer APTs completed at pumping wells H-M-82 and HM-177, Hydrogeology Unit staff calculated an estimated hydraulic conductivity for the clastic zone of the Sandstone aquifer, and the carbonate zone of the Sandstone aquifer, as well as the Sandstone aquifer interconfining unit using the equivalent hydraulic conductivity formula. These were the only two reliable APTs identified during the APT review of a well that pumped from more than one aquifer separated by an aquitard that had sufficient information to perform the partitioning method.

Because the equivalent hydraulic conductivity is a thickness-weighted arithmetic mean, the thicknesses of each layer must be available along with lithologic data and well construction information for the pumping well.

The estimated K_h values for the clastic zone and carbonate zone of the Sandstone aquifer in H-M-82 and HM-177 are based on the transmissivity values recommended by Hydrogeology Unit staff from the spatially closest APTs that had reliable APT results for these zones. The recommended transmissivity values, combined with published K_h values for the lithology reported for each aquitard and the total thicknesses of each of the pumped layers at H-M-82 and HM-177, were then used in the following manner, and as presented in the summary tables in **Appendix C**, to calculate the estimated K_h for each hydrostratigraphic layers pumped in H-M-82 and HM-177.

1. Aquitard K_h values were input into the calculation spreadsheets. These values are the appropriate average K_h values based on the minimum and maximum K_h values for common earth materials as reported by Domenico and Schwartz (1990). The lithology and thickness of each pumped layer were input into the calculation tables, along with the hydrostratigraphic layer names, and recommended transmissivity values for each layer from the spatially closest reliable APT to H-M-82 and HM-177 that was also open to both the clastic zone and carbonate zone of the Sandstone aquifer.

2. The numerator terms of the equivalent horizontal hydraulic conductivity formula ($K_x d_x$ values) were calculated for each layer and summed together.

3. Next, to estimate the relative proportion of groundwater flow contributed by each hydrostratigraphic layer, the $K_x d_x$ values for each layer were divided by the sum of all $K_x d_x$ values.

4. The proportionality percentages calculated in step 3 were then multiplied by the recommended hydraulic conductivity from each well's APT, resulting in recommended, estimated K_h values for each of the hydrostratigraphic layers pumped during the APTs at H-M-82 and HM-177. Minimum and maximum K_h values were also calculated for each hydrostratigraphic layer at H-M-82 and HM-177 using the same process.

4.4 Creation of Hydrostratigraphic Surfaces, a 3-D Hydrogeologic Model, and Hydrogeologic Cross Sections

In the 2015 update of the LWC hydrostratigraphic surfaces (Geddes et al., 2015), Viewlog software was utilized for creation of hydrostratigraphic surfaces and cross sections. A 3-dimensional (3-D) hydrogeologic model was not created in 2015. In the 2023 hydrostratigraphic update, Python, ESRI's Geostatistical Analyst and 3-D Analyst extensions within ArcMap 10.8.1 along with Golden Software's Surfer 23.4.238 and Paraview 5.9.1 were used. The Python script created for this task automated the surface creation process for each step within ArcMap. Python was not used for kriging the isopach rasters in Surfer. The raster grid in Surfer contains 512 columns and 553 rows. Each raster cell is 1,000 feet by 1,000 feet with an origin at the lower left corner of the groundwater model domain in State Planar coordinates (NAD 1983, HARN, Florida East, FIPS_0901, feet) of 218,436, 441,788 (82°19'39.17" W, 25°32'34.85" N).

Some interpolation methods, such as the inverse distance weighted method, bases weights only on the distance from the point being estimated. Kriging calculates a more complex relationship of how weights change with distance. Kriging also accounts for directionality and compensates for effects such as data clustering. This makes it particularly useful when interpolating geologic surfaces that have undergone directional influences, such as wind and water erosion, and for handling the clustering effect of having more wells constructed in higher populated areas. The semivariogram is created by pairing every point in a data set with every other point of that data set. Each point pair is then graphed using the distance between the points and semivariance. Semivariance is the squared difference of the values of the point pairs as shown in **Equation 2**:

$$\frac{1}{2}(v_i - v_j)^2 \qquad \text{Equation 2}$$

where:

v_i = value of the first point in a point pair

v_j = value of the second point in a point pair

The semivariogram works on the principle that data points located close to one another are more related and have a smaller semivariance than points located farther away from one another. Point pairs separated by a short distance are expected to have low semivariance, while point pairs that are far apart are expected to have a larger semivariance. The y-intercept of the semivariogram is known as the nugget, and it accounts for errors and uncertainty in the data. It shows the level of semivariance possible for a point pair at the same location or in the same model cell (Kitanidis 1997). An example of a semivariogram plot is shown in **Figure 6**.

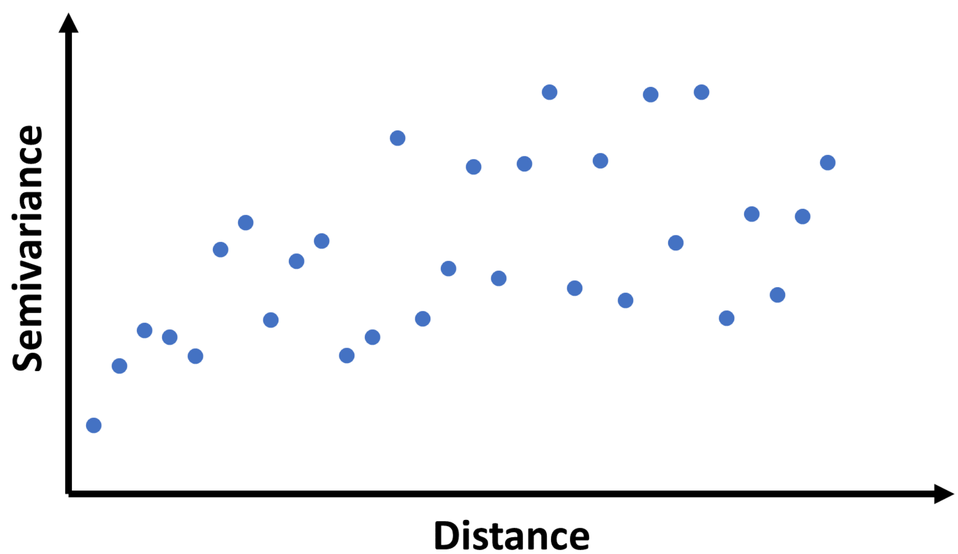

Figure 6. Example of a semivariogram plot.

Using the semivariogram plot, a best-fit model (e.g., spherical, exponential, linear) can then be fit to the semivariogram datapoints. **Figure 7** is an example of the shape of the best-fit lines for different model types. The best-fit model is then used during the kriging process to calculate values in cells without data points.

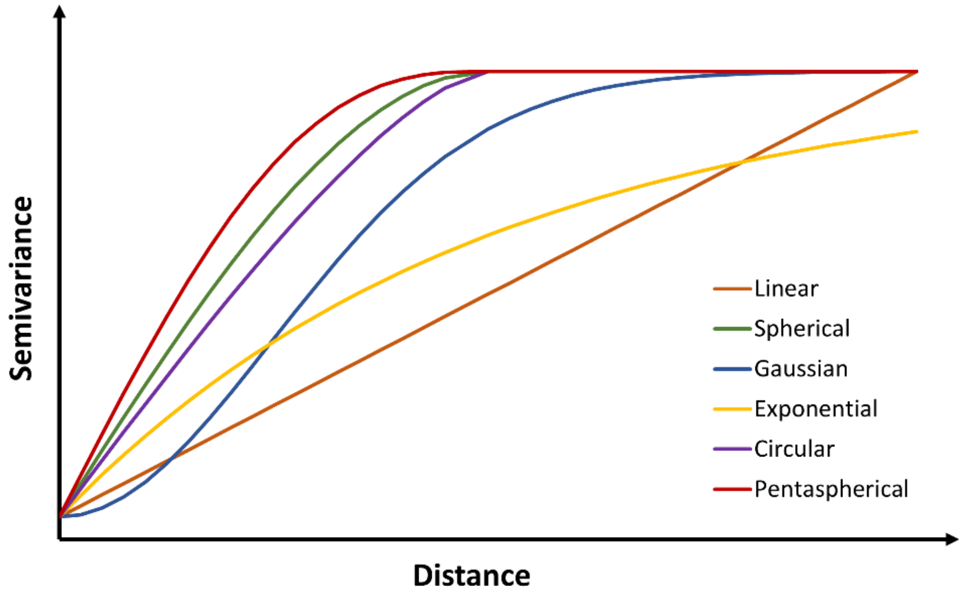

Figure 7. Model fit lines in a semivariogram.

The search neighborhood settings determine which data points will be used when calculating the value of an unknown cell. This can be a minimum number of nearby points or all points within a certain search radius. The search neighborhood allows for calculations to be made using local values rather than using all point pairs in a data set to calculate one cell value. Using local values increases the speed of kriging by only calculating weights for the nearest points. The weighted value of points far away has negligible influence on the estimation and does not need to be calculated.

Cross-validation is important for evaluation of a kriged raster. Cross-validation removes one input data point at a time from the data set and predicts the output values for those locations using the rest of the data set. The predicted and omitted actual value are then compared, and the error is calculated. Cross-validation that shows a small error between the input and predicted values means that the model was well-fit to the data (GISGeography 2022).

The initial kriging effort created surfaces of the top elevations of each layer and the bottom elevation of the deepest layer. The thicknesses of each layer were calculated by subtracting the top elevation of the underlying layer from the top elevation of the layer for which the thickness was being calculated. This method of kriging elevations and then calculating thicknesses sometimes resulted in negative thicknesses, particularly in areas where the aquifers are absent. Because of this, the surface creation process was changed instead to krige the thicknesses of each layer and then calculate the elevations. To prevent the calculation of negative thicknesses, a thickness of 1 foot was assigned to any layer that was absent at a particular well location. This 1-foot minimum thickness was also necessary for the data to be input into the groundwater model. Once the thicknesses were interpolated for each layer, the elevations of each layer were calculated by subtracting the thickness of each layer from the ground surface elevation.

There are several computer programs capable of kriging. The Geostatistical Analyst extension in ArcMap GIS and Surfer were assessed to see which would produce the best outputs. Both software allow for adjustments to the semivariogram and adjustments to the search neighborhoods, and both software provide cross-validation. ArcMap has the benefit of Python automation with the ArcPy library. This library is a Python library that allows for the ArcMap tools to be called and run using Python. Surfer could not be used with Python but allowed the user to set limits for maximum and minimum values of the output isopach maps. These limits prevented the kriging from overestimating or underestimating a value that went beyond the input data set's range. For example, a minimum input thickness of 1-foot resulted in isopachs that were not thinner than 1 foot.

Residuals were then calculated to evaluate the quality of the rasters created by each software. Residuals are calculated by calculating the difference between the observed input values and model prediction values at those same locations. If the residuals are normally distributed, have a small standard deviation, and have a mean of zero, then the model has done a good job of matching the observed values. When evaluating the residuals of the isopachs created in ArcMap using the Geostatistical Analyst extension, there was a large range and standard deviation. The rasters drawn using Surfer with a nugget of zero had nearly zero residuals for all layers but had a "spikey" appearance when viewed in 3-D using ESRI's ArcScene. Cross sections and fence diagrams of the Surfer surfaces showed a bowing effect in areas between wells, which is not consistent with natural sedimentary depositional processes.

Adjusting the nugget was found to be the solution to Surfer's unrealistic, spikey surfaces as well as ArcMap's oversmoothed surfaces. The final rasters were created in Surfer using a larger nugget value. The error and uncertainty incorporated in the nugget can come from well location, data quality (e.g., cuttings interval, level of detail in lithologic logs), and uncertainties in the hydrostratigraphic/aquifer picks (e.g., gradational contacts, differences in professional interpretation).

Table 4. Summary of kriging results for isopach maps.

Layer	Kriging Method	Mean Residual	Standard Deviation Residual
Water Table aquifer (WT)	Exponential	0.52	12.57
Tamiami confining unit (TC)	Exponential	0.45	9.57
Lower Tamiami aquifer (LT)	Exponential	0.41	12.34
Upper Hawthorn confining unit (H1)	Exponential	0.50	21.79
Sandstone aquifer clastic zone (S2)	Exponential	0.52	18.07
Sandstone aquifer interconfining unit (SC)	Pentaspherical	0.25	10.42
Sandstone aquifer carbonate zone (S1)	Pentaspherical	0.34	7.61
Mid-Hawthorn confining unit (H2)	Pentaspherical	0.50	4.80
Mid-Hawthorn aquifer (HM)	Spherical	0.50	14.84
Lower Hawthorn confining unit (H3)	Pentaspherical	0.52	13.70

The isopach maps and elevation rasters were converted to triangular irregular network (TIN) files and reviewed in 3-D using ArcScene. Fence diagrams, as shown in **Figure 8**, were created using these TIN files and the Extrude Between tool in the 3-D Analyst extension. Viewing the data in 3-D allowed the hydrostratigraphic surfaces and isopachs to be further refined and checked in greater detail than the 2-D images allowed.

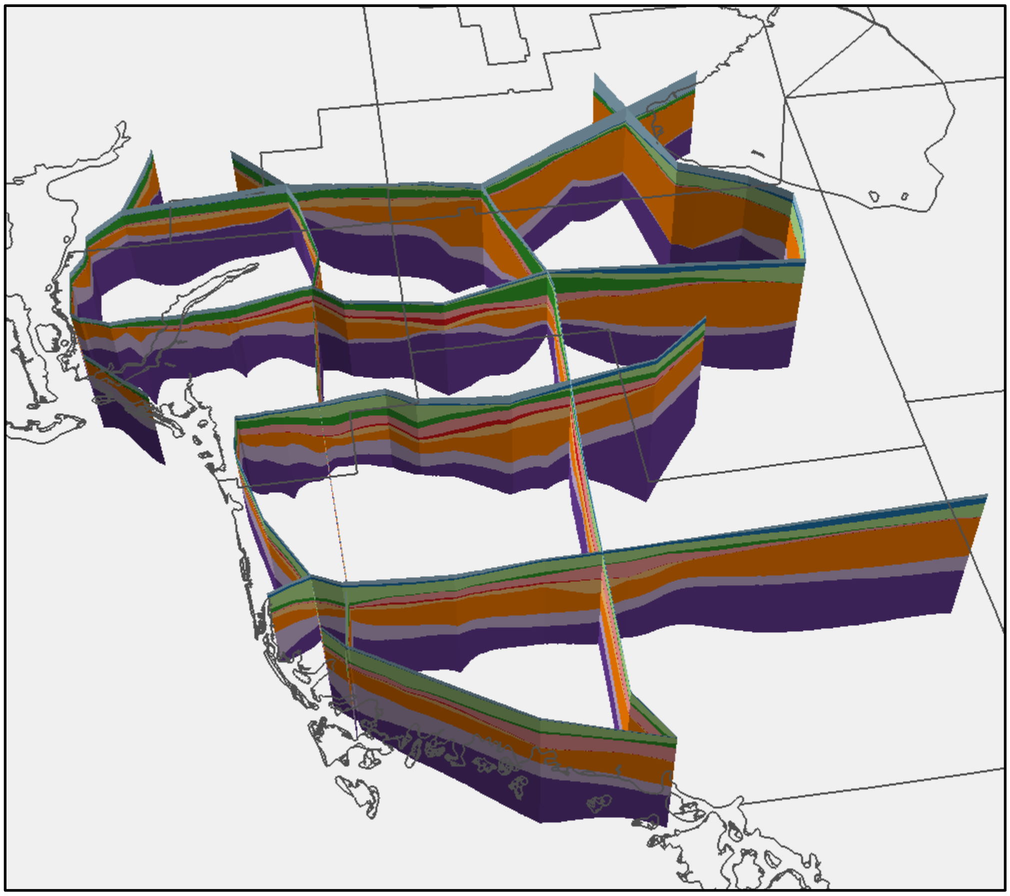

Figure 8. Hydrostratigraphic layer fence diagrams produced using ArcScene (100X vertical exaggeration).

The rasters, 3-D layers, fence diagrams, and residuals were reviewed for anomalous data points. Anomalous data points were re-reviewed, corrected if needed, and reranked. The surfaces were redrawn using these changes. This process was conducted multiple times until the layers were finalized. **Figure 9** shows the workflow and its reiterative nature. The automation process allowed for easy incorporation of new hydrostratigraphic data or changes to existing data as map creation progressed, or when more data (such as data from APT reports) were obtained and reviewed.

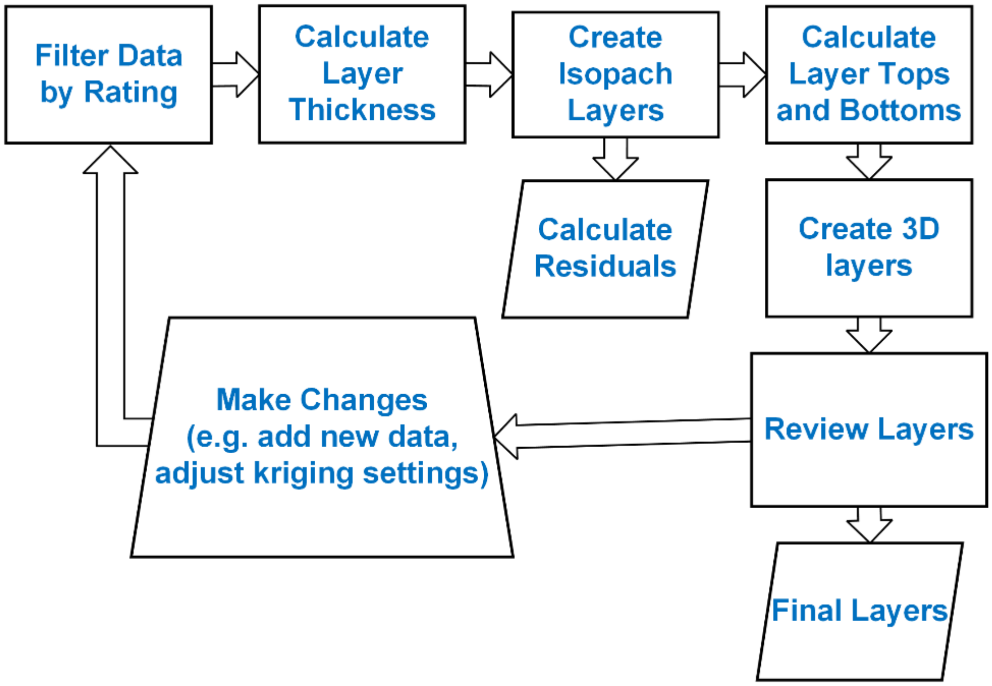

Figure 9. Workflow for hydrostratigraphic surface creation.

The hydrogeologic cross sections were created using the PyVista library of Python. PyVista converted the 2-D rasters into 3-D blocks and sliced them along the cross-section lines. The resulting slices were prepared for publishing using Paraview. A tool was created in ArcScene that can be used to create fence diagrams anywhere in the model domain for hydrogeologic investigation planning purposes.

5 RESULTS

The following sections present the results of the creation of hydrostratigraphic surfaces and isopach maps, hydrogeologic cross sections and fence diagrams, hydraulic conductivity rasters, and hydraulic conductivity partitioning results.

5.1 Hydrostratigraphic Surfaces and Isopach Maps

Isopach maps for each hydrostratigraphic layer were created using Surfer. Surfaces for the tops and bases of each aquifer (except for the Water Table aquifer, where the top was assumed to be land surface) were created using Python by subtracting those layer thicknesses from land surface. A raster of land surface in feet North American Vertical Datum of 1988 (NAVD) was created using ArcMap to resample a 1-foot digital elevation model (DEM) of best-available data for the LWC Planning Area. The original DEM (obtained from SFWMD Geospatial Services) was composited in 2020 from multiple sources. The 1-foot by 1-foot cell size of the DEM was resampled to a grid size of 1,000 feet by 1,000 feet corresponding to the model grid. Statistical summaries of the isopach maps and hydrostratigraphic surfaces are provided in **Tables 5** and **6**, respectively.

Table 5. Isopach statistics.

Layer	Number of Data Points	Points with Absences	Minimum Thickness, feet	Maximum Thickness, feet	Mean Thickness, feet	Standard Deviation
Water Table aquifer (WT)	988	30	1	155	28	21
Tamiami confining unit (TC)	946	522	1	51	15	13
Lower Tamiami aquifer (LT)	836	343	1	135	46	35
Upper Hawthorn confining unit (H1)	632	232	1	126	27	22
Sandstone aquifer clastic zone (S2)	579	224	1	124	30	27
Sandstone aquifer interconfining unit (SC)	497	384	1	80	6	10
Sandstone aquifer carbonate zone (S1)	484	245	1	170	17	21
Mid-Hawthorn confining unit (H2)	364	14	1	436	179	86
Mid-Hawthorn aquifer (HM)	275	15	2	222	84	32
Lower Hawthorn confining unit (H3)	204	0	17	612	252	90

Table 6. Elevation statistics.

Layer	Surface	Minimum Elevation, feet NAVD	Maximum Elevation, feet NAVD	Mean Elevation, feet NAVD	Standard Deviation
Water Table aquifer (WT)	Top	-31	125	17	14
Tamiami confining unit (TC)	Top	-127	67	-11	21
Lower Tamiami aquifer (LT)	Top	-129	66	-26	23
Upper Hawthorn confining unit (H1)	Top	-194	62	-71	48
Sandstone aquifer clastic zone (S2)	Top	-195	11	-98	36
Sandstone aquifer interconfining unit (SC)	Top	-253	-5	-128	44
Sandstone aquifer carbonate zone (S1)	Top	-272	-6	-133	47
Mid-Hawthorn confining unit (H2)	Top	-348	-14	-150	55
Mid-Hawthorn aquifer (HM)	Top	-561	-56	-328	92
Lower Hawthorn confining unit (H3)	Top	-609	-67	-411	103
Lower Hawthorn confining unit (H3)	Base	-1,046	-253	-662	153

The confining units were defined solely on the bases of the aquifer they overlie (i.e., the Tamiami confining unit overlies the Lower Tamiami aquifer; the Upper Hawthorn confining unit overlies the Sandstone aquifer, etc.). When an aquifer is absent, its associated confining unit was undefined and, therefore, absent as well.

For this project, hydrostratigraphic layers that were entirely absent in a particular boring were assigned a minimum thickness of 1 foot for groundwater modeling purposes rather than a thickness of 0 feet. However, these thin hydrostratigraphic layers or portions of layers that would likely not be considered significant aquifers or aquitards were still used in the isopach kriging process. The hydrostratigraphic surface and isopach maps in this section show the areas where hydrostratigraphic units are absent or insignificant based on layer thickness thresholds for each hydrostratigraphic layer. The layer thickness thresholds for each hydrostratigraphic layer are listed in the following sections and are the same as those used in the 2015 LWC hydrostratigraphic update (Geddes et al. 2015).

5.1.1 Water Table Aquifer

The wells used to determine the thickness of the Water Table aquifer are shown in **Figure 10**. The Water Table aquifer isopach map was created from 988 aquifer picks, with 30 of these points being areas where the Water Table aquifer is absent. The thickness of the Water Table aquifer ranges from 1 foot in central and southern Collier County to 155 feet in central Glades County (**Figure 11**). The Water Table aquifer is considered absent or insignificant with a thickness of 5 feet or less. The top of the Water Table aquifer (**Figure 12**) was assumed to be land surface. The elevation of the top of the Water Table aquifer ranges from a maximum of 125 feet NAVD to a minimum of -31 feet NAVD, with the highest elevation in southern Highlands County and the lowest elevation in western Charlotte County.

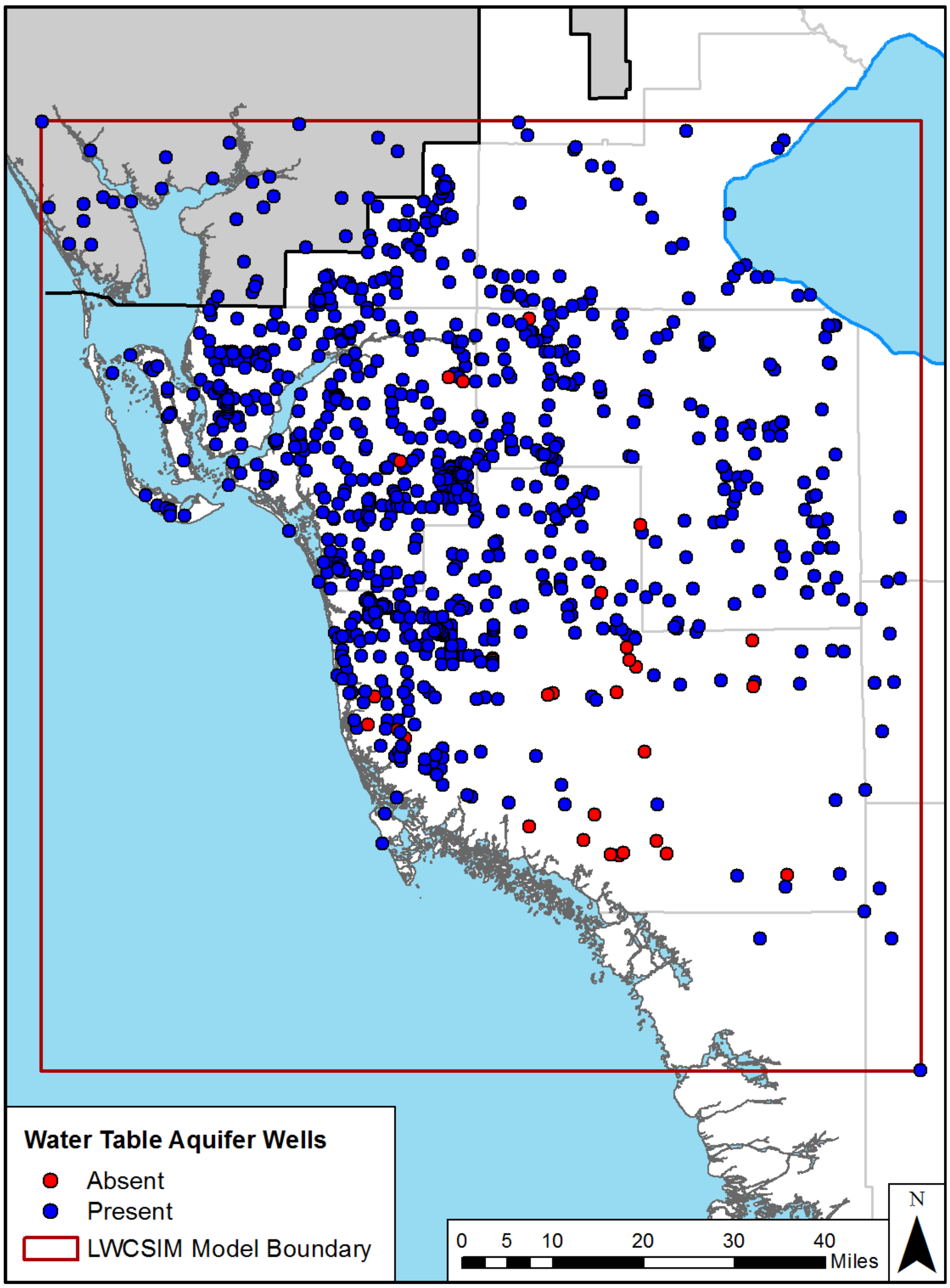

Figure 10. Water Table aquifer well locations.

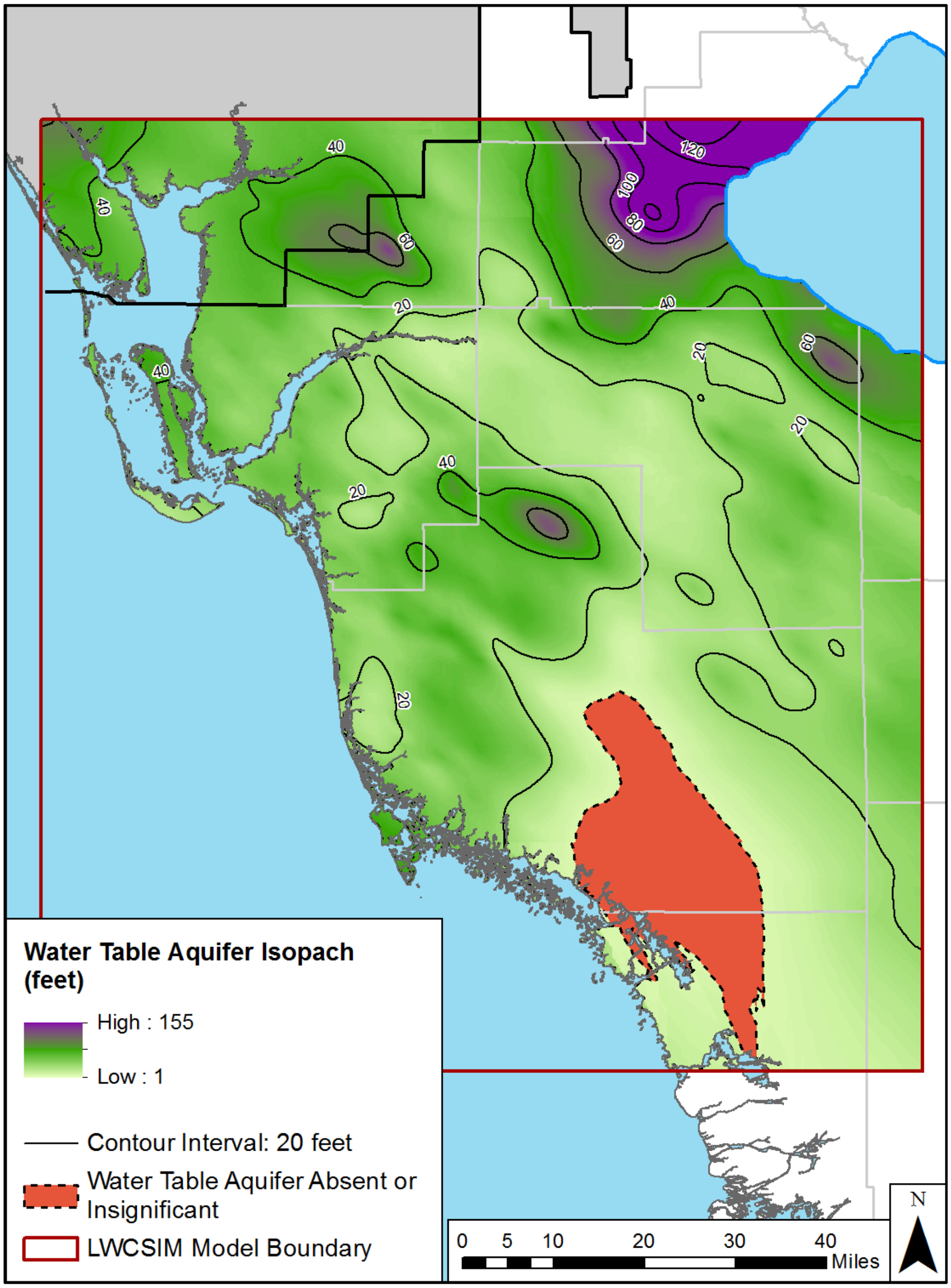

Figure 11. Thickness of the Water Table aquifer.

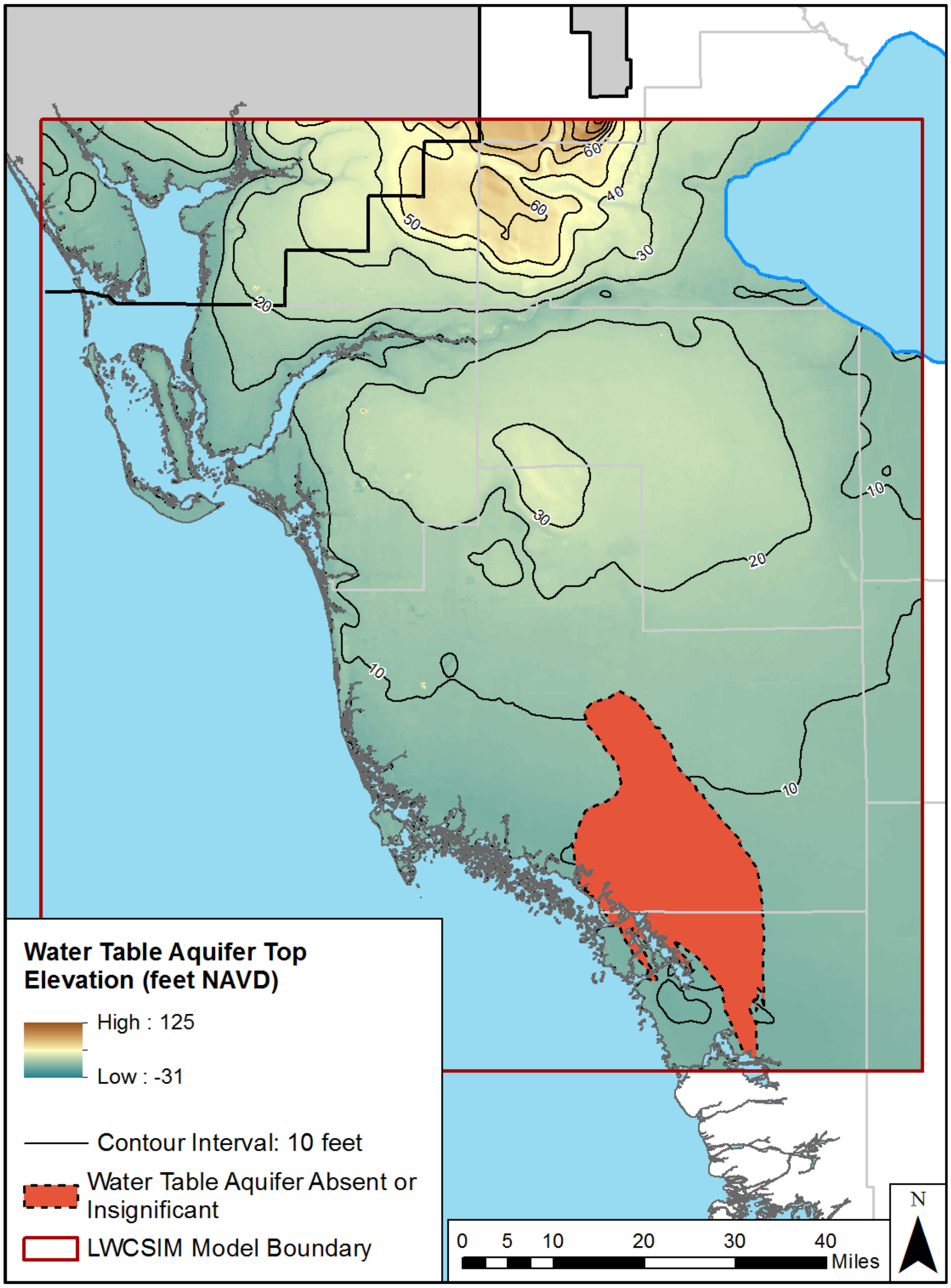

Figure 12. Elevation of the top of the Water Table aquifer.

5.1.2 Tamiami Confining Unit

The wells used to determine the thickness of the Tamiami confining unit are shown in **Figure 13**. The Tamiami confining unit isopach map was interpolated from 946 aquifer picks. Of these 946 picks, there were 522 locations where the Tamiami confining unit was absent and assigned a thickness of 1 foot. The Tamiami confining unit thickness ranges from 1 foot in the northwestern part of the project area to a maximum of 51 feet in eastern Collier County (**Figure 14**). The Tamiami confining unit is considered absent or insignificant with a thickness of 5 feet or less. The elevation of the top of the Tamiami confining unit ranges from a maximum of 67 feet NAVD to a minimum of -127 feet NAVD, with the highest elevation in western Hendry County and the lowest elevation in central Glades County (**Figure 15**).

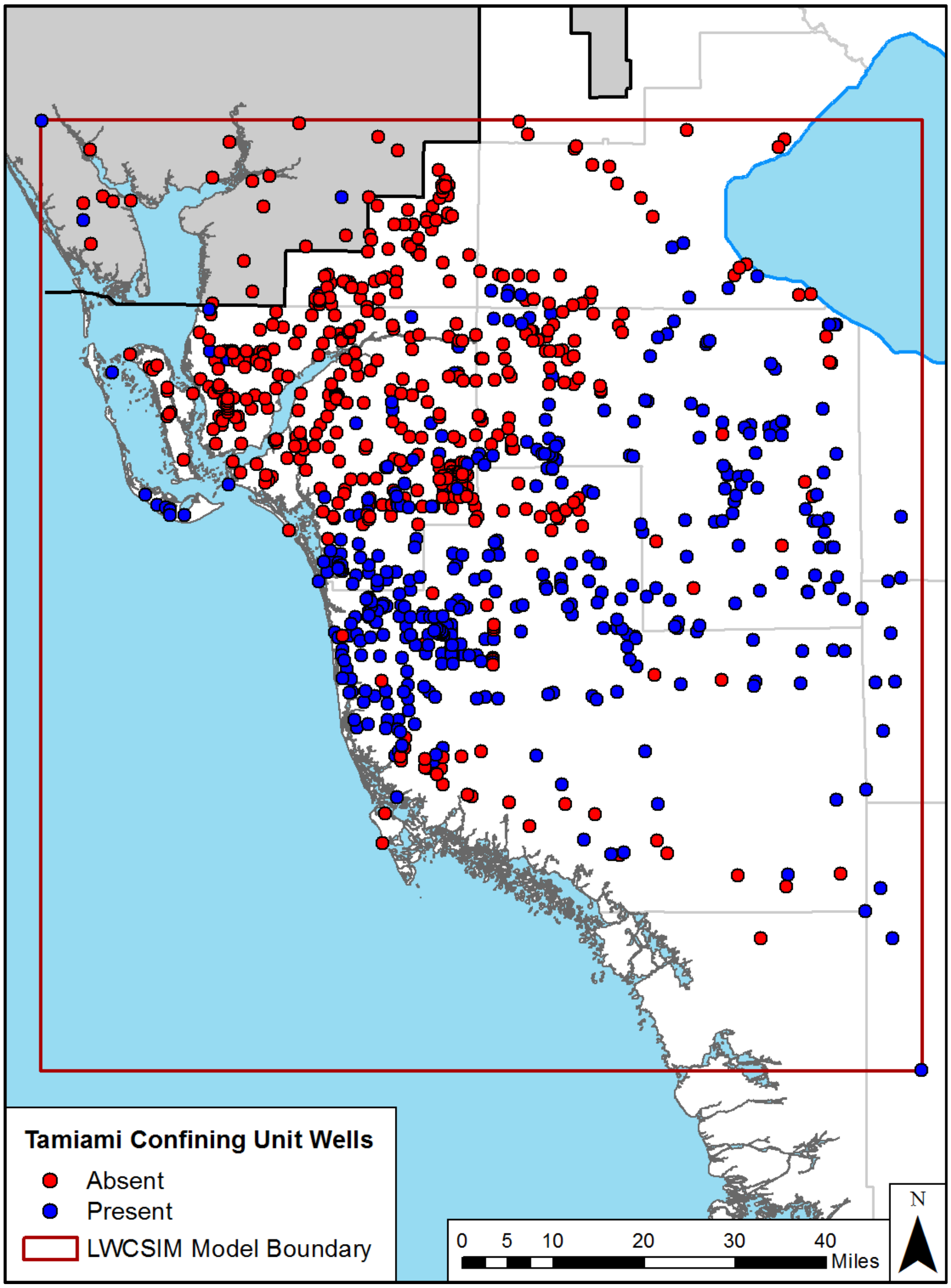

Figure 13. Tamiami confining unit well locations.

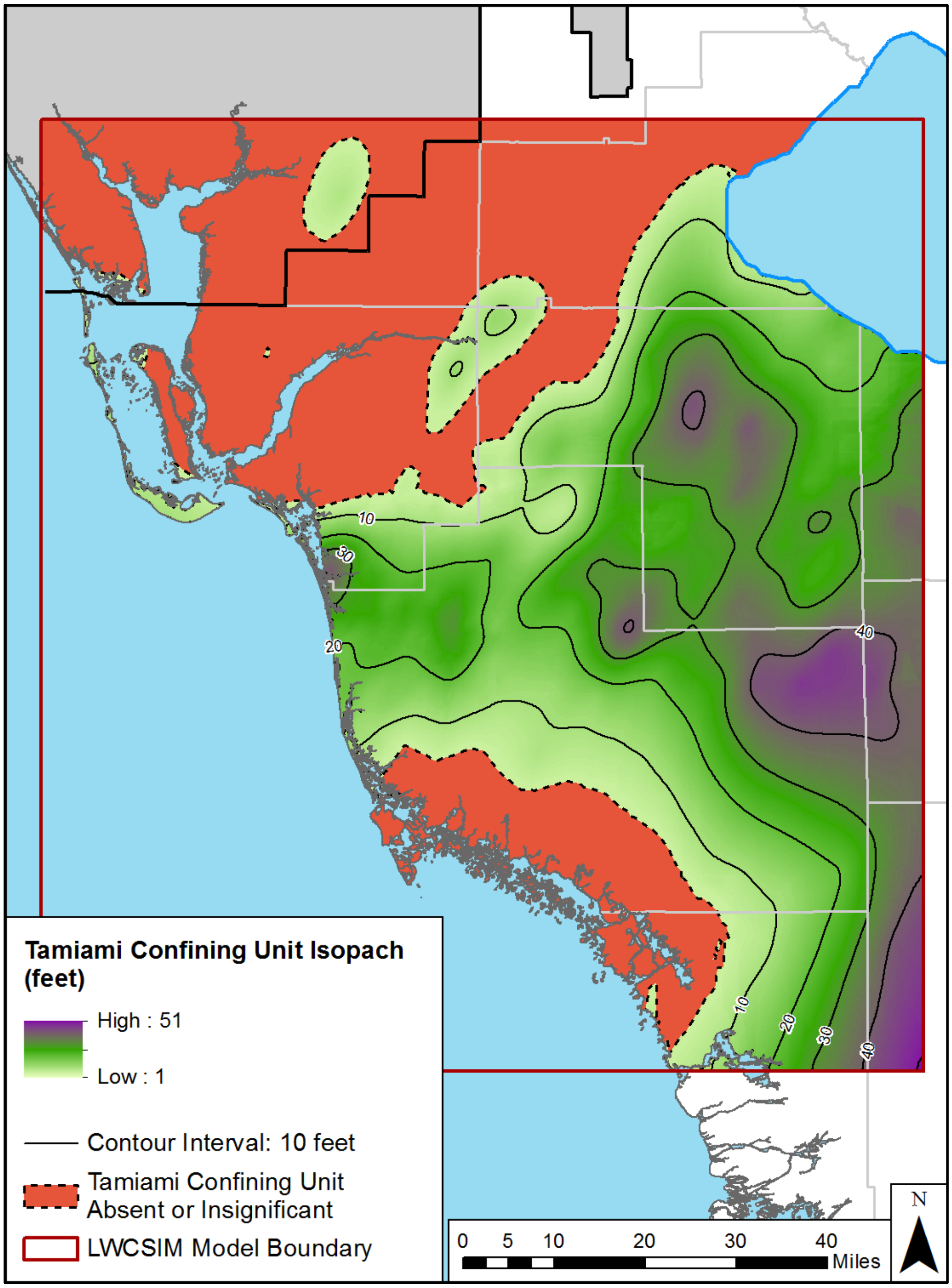

Figure 14. Thickness of the Tamiami confining unit.

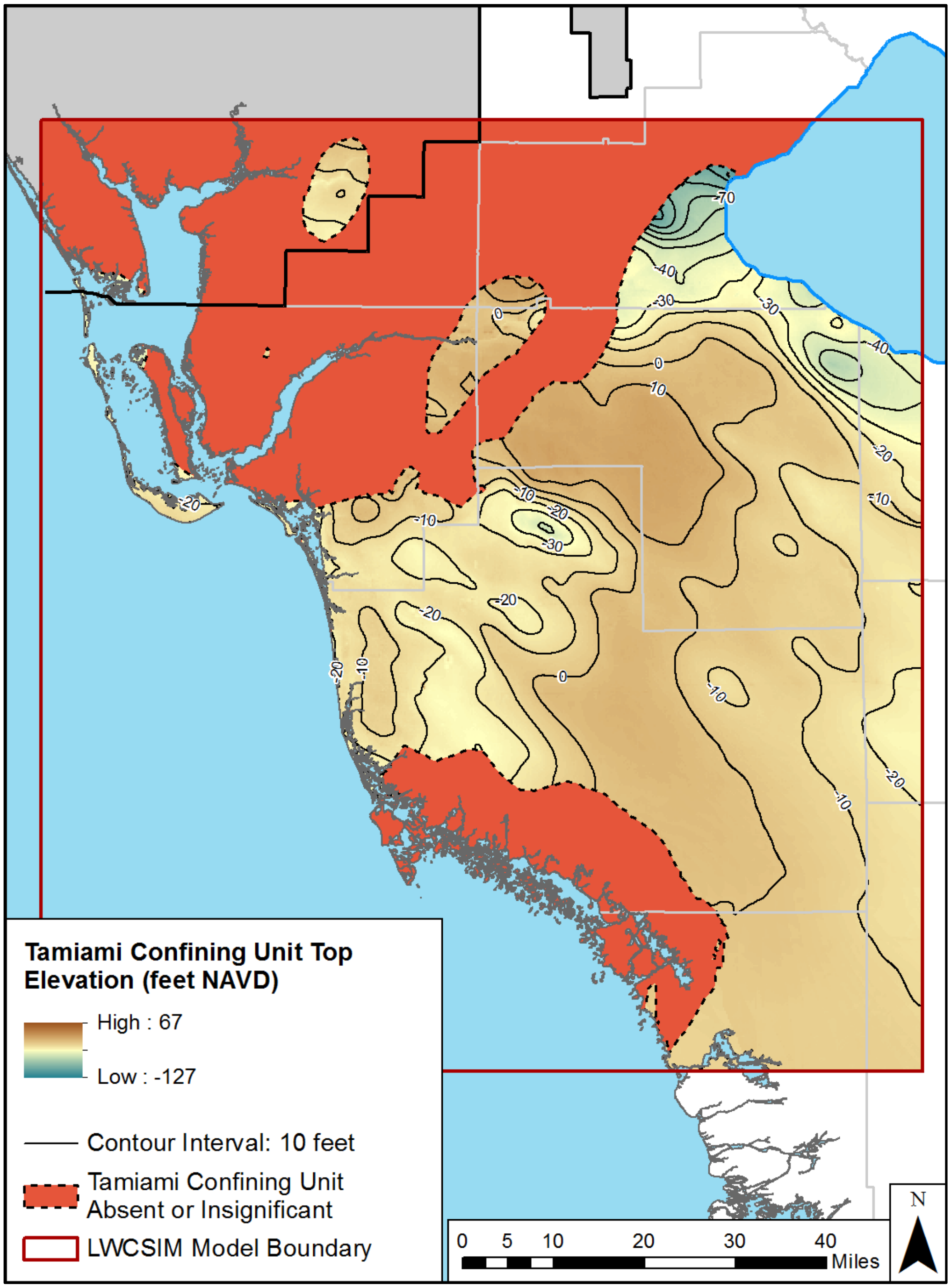

Figure 15. Elevation of the top of the Tamiami confining unit.

5.1.3 Lower Tamiami Aquifer

The wells used to determine the thickness of the Lower Tamiami aquifer are shown in **Figure 16**. The Lower Tamiami aquifer isopach map was interpolated from 836 aquifer picks. Of those 836 aquifer picks, there were 343 locations where the Lower Tamiami aquifer was absent and was assigned a thickness of 1 foot. The thickness of the Lower Tamiami aquifer ranges from 1 foot in the northern portion of the project area to 135 feet in central Hendry County (**Figure 17**). The Lower Tamiami aquifer is considered absent or insignificant with a thickness of 5 feet or less. The elevation of the top of the Lower Tamiami aquifer ranges from 66 feet NAVD to -129 feet NAVD, with the highest elevation in western Glades County and the lowest elevation in central Glades County **(Figure 18)**.

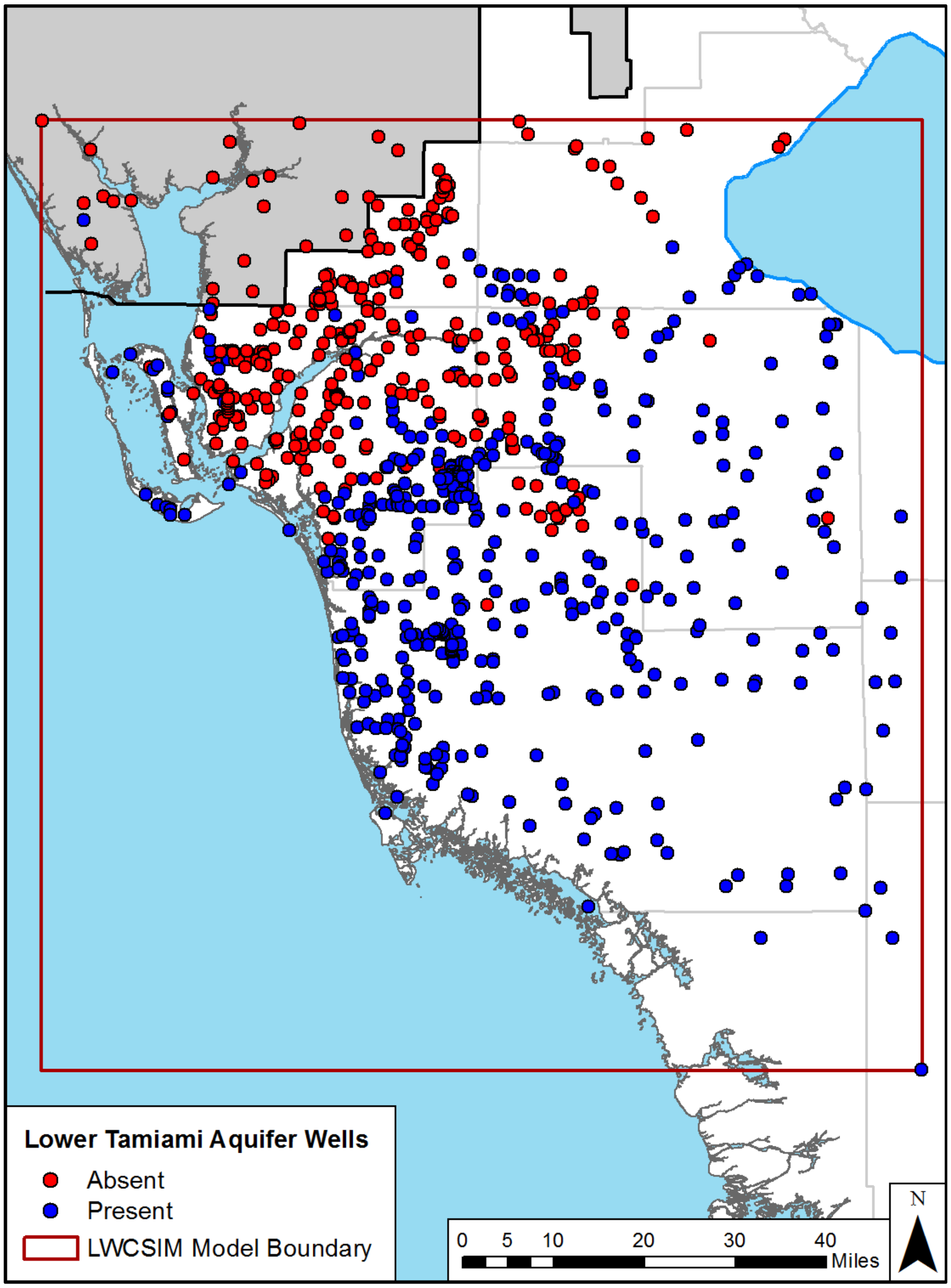

Figure 16. Lower Tamiami aquifer well locations.

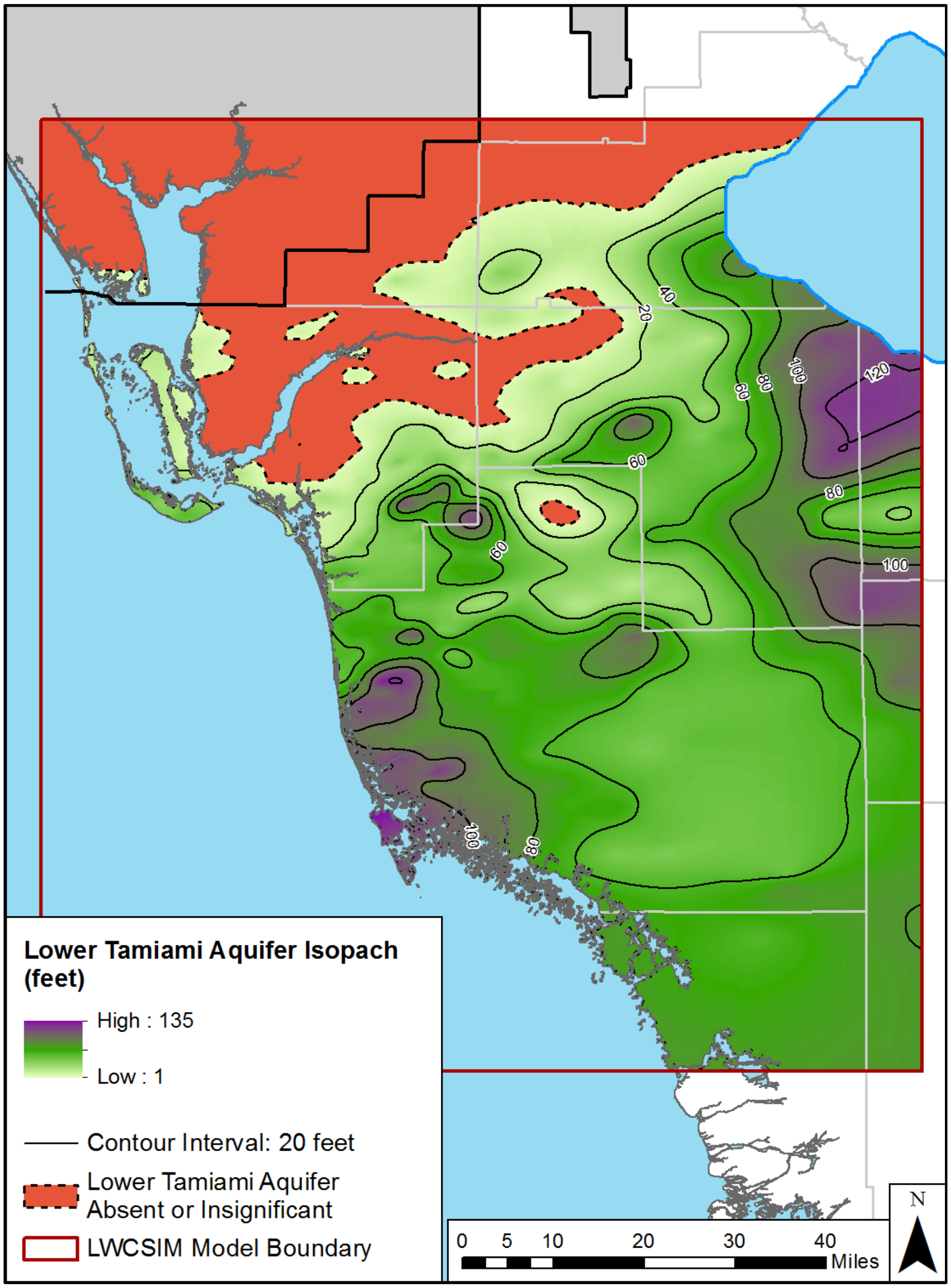

Figure 17. Thickness of the Lower Tamiami aquifer.

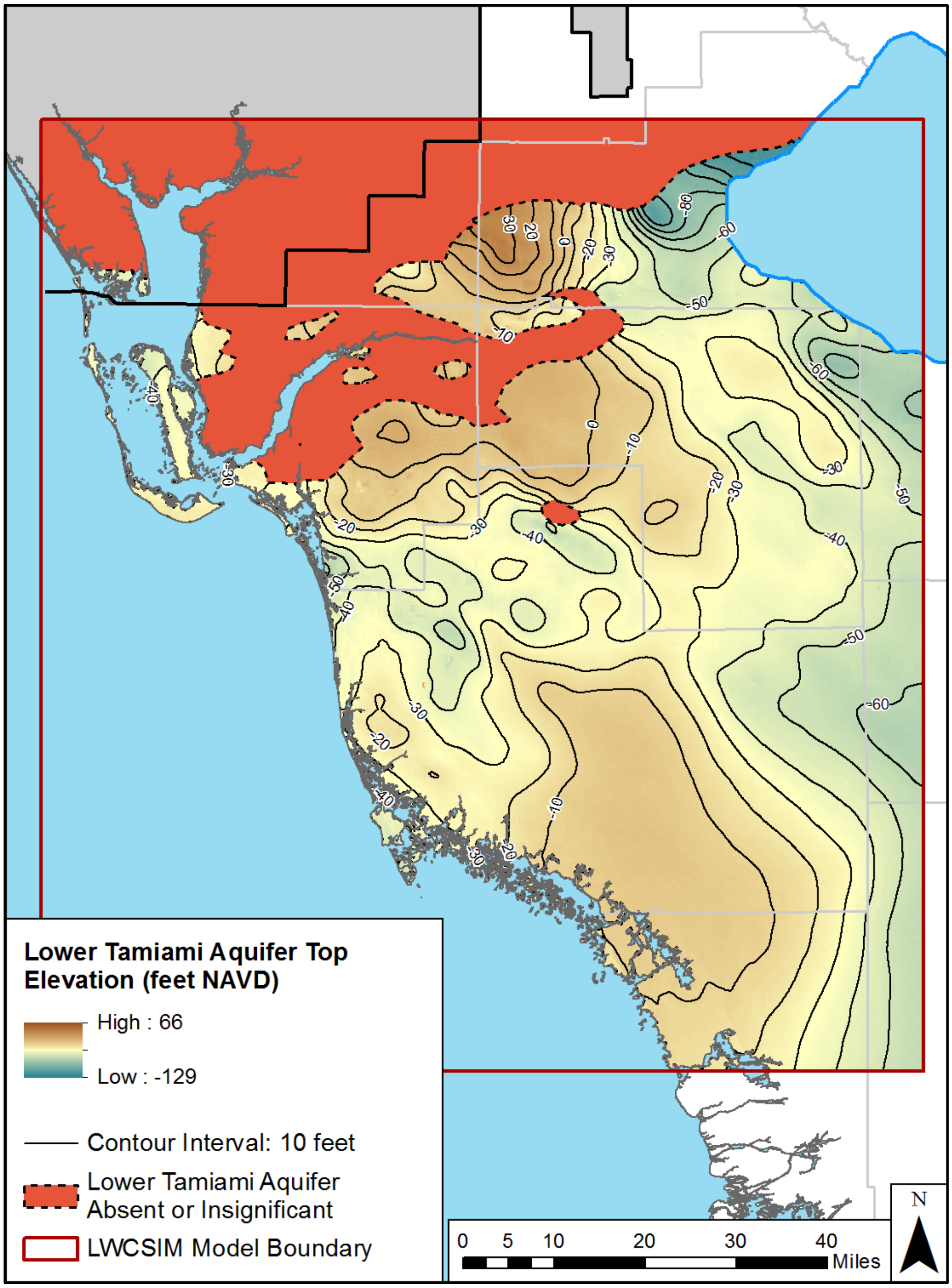

Figure 18. Elevation of the top of the Lower Tamiami aquifer.

5.1.4 Upper Hawthorn Confining Unit

The wells used to determine the thickness of the Upper Hawthorn confining unit are shown in **Figure 19**. The Upper Hawthorn confining unit isopach map was interpolated from 632 aquifer picks. Of those 632 aquifer picks, there were 232 locations where the layer was absent and was assigned a thickness of 1 foot. The thickness of the Upper Hawthorn confining unit ranges from 1 foot in eastern Hendry County to 126 feet in north central Hendry County (**Figure 20**). The Upper Hawthorn confining unit is considered absent or insignificant with a thickness of 10 feet or less. The elevation of the top of the Upper Hawthorn confining unit ranges from a maximum of 62 feet NAVD in northern Lee County and western Glades County to a minimum of -194 feet NAVD in western Collier County (**Figure 21**).

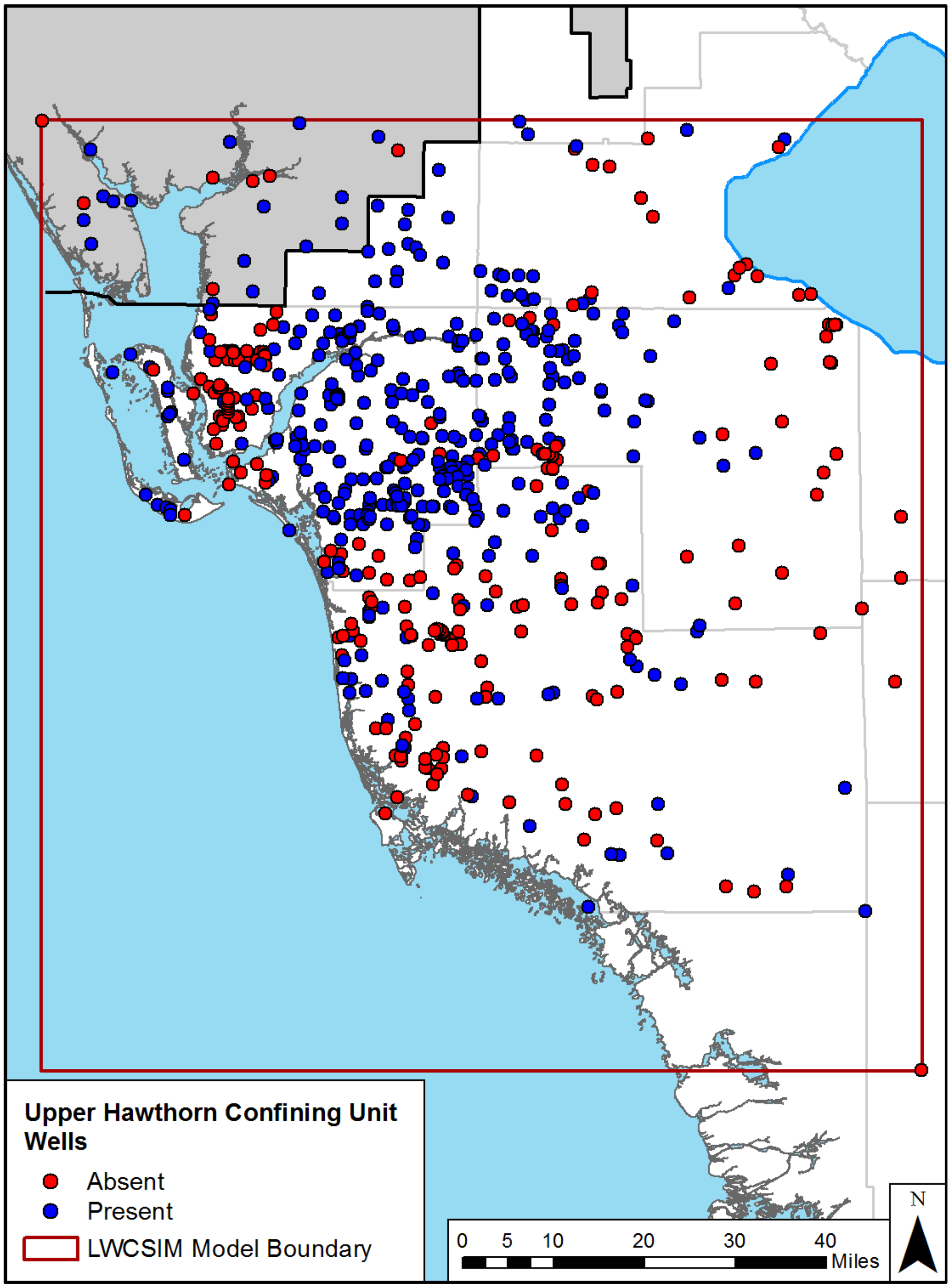

Figure 19. Upper Hawthorn confining unit well locations.

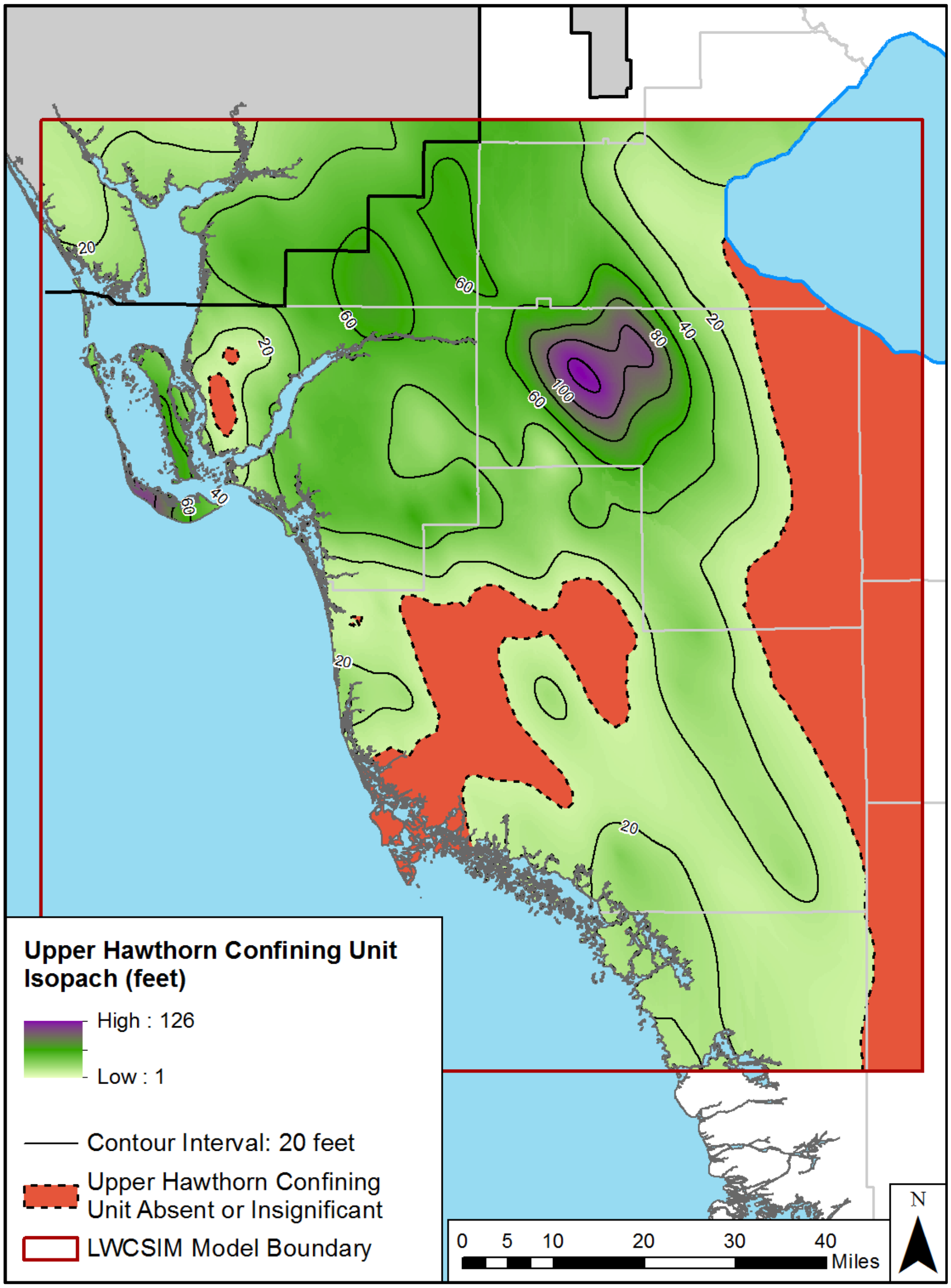

Figure 20. Thickness of the Upper Hawthorn confining unit.

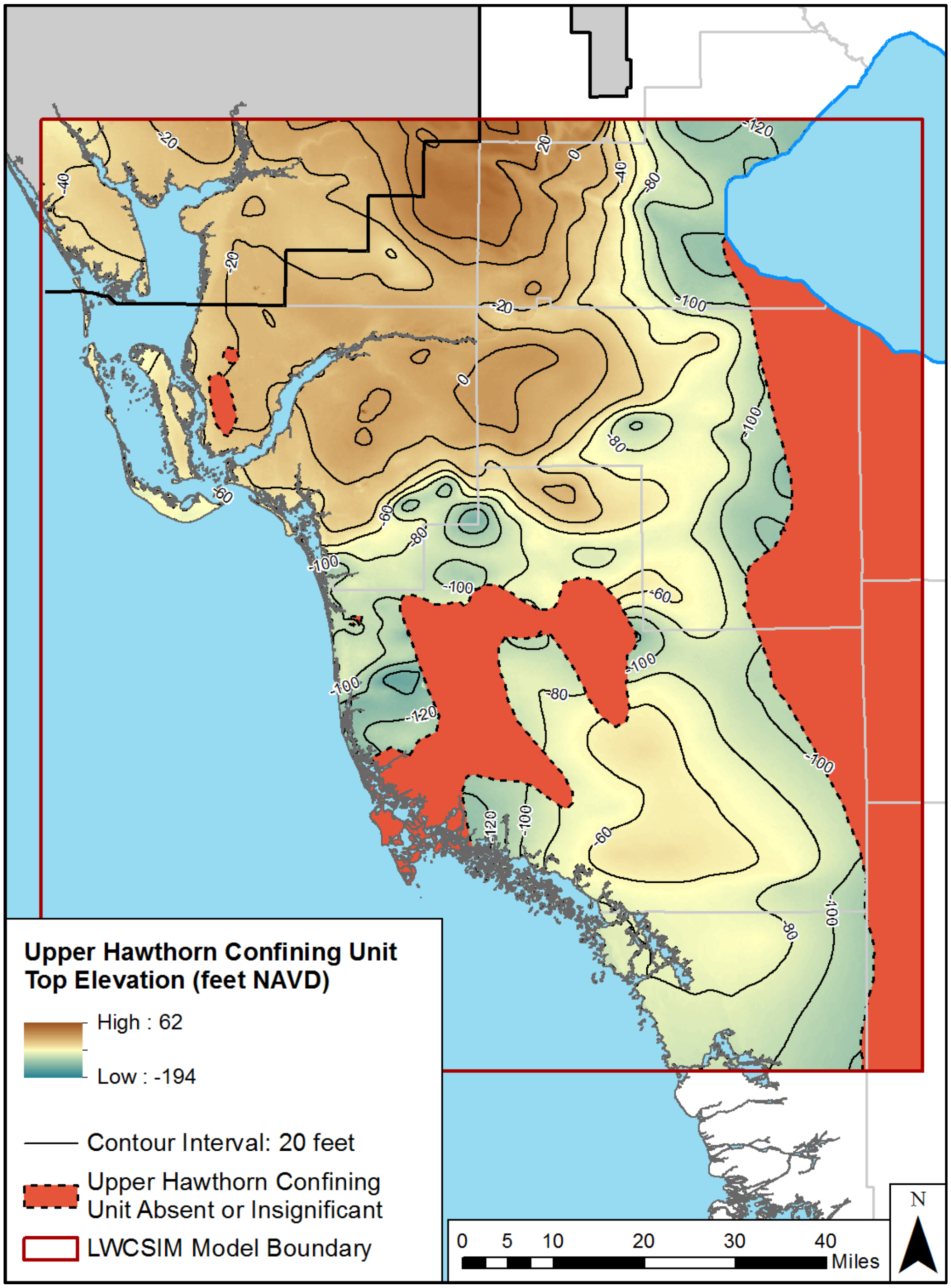

Figure 21. Elevation of the top of the Upper Hawthorn confining unit.

5.1.5 Sandstone Aquifer

The Sandstone aquifer was not mapped as a single aquifer. Instead, individual maps were prepared for the clastic zone, the interconfining unit, and the carbonate zone.

5.1.5.1 Clastic Zone of the Sandstone Aquifer

The wells used to determine the thickness of the clastic zone of the Sandstone aquifer are shown in **Figure 22**. The clastic zone isopach map was interpolated from 579 aquifer picks. Of those 579 picks, there were 224 locations where the zone was absent and was assigned a thickness of 1 foot. The thickness of the clastic zone ranges from 1 foot in central to north Charlotte, central to north Glades, and eastern Hendry counties to a maximum thickness of 124 feet in central Collier County (**Figure 23)**. The clastic zone of the Sandstone aquifer is considered absent or insignificant with a thickness of 10 feet or less. The elevation of the top of the clastic zone ranges from a maximum of 11 feet NAVD in the western Glades and southern Highlands counties to a minimum elevation of -195 feet NAVD in central Hendry County (**Figure 24**).

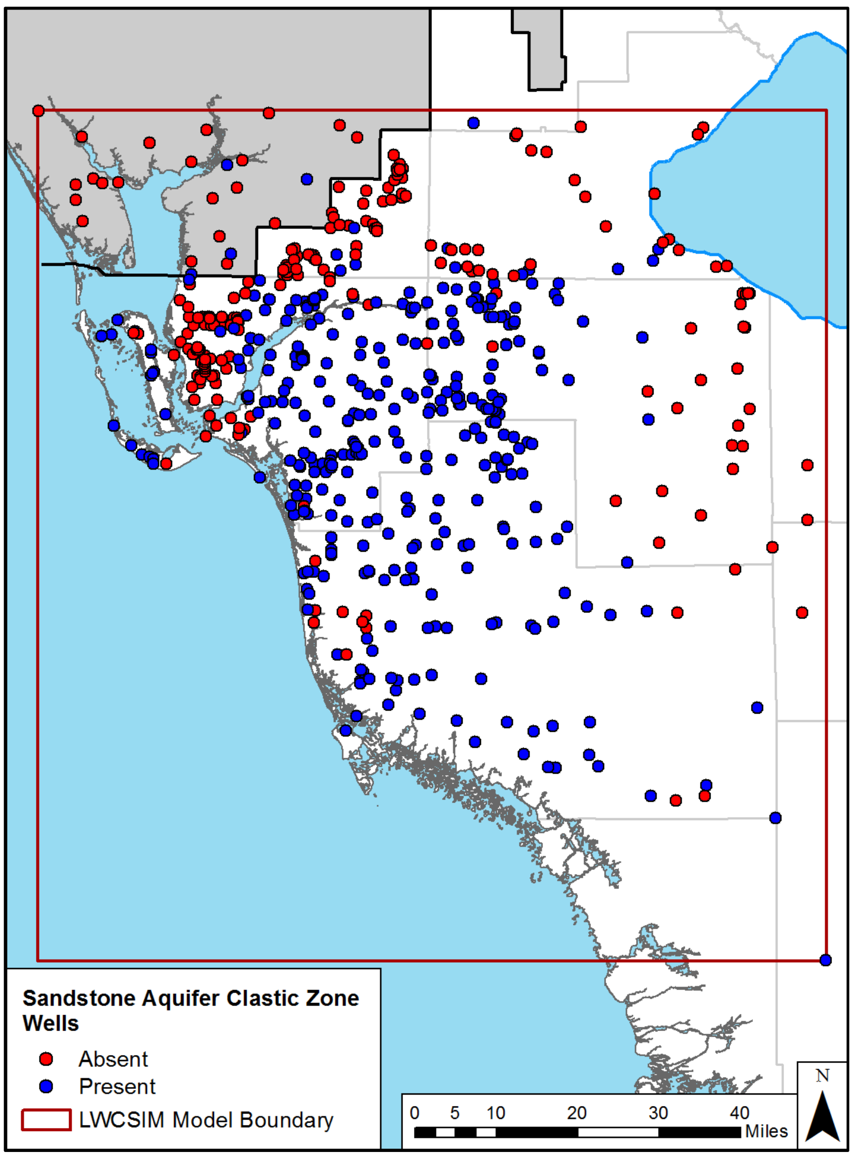

Figure 22. Well locations for the clastic zone of the Sandstone aquifer.

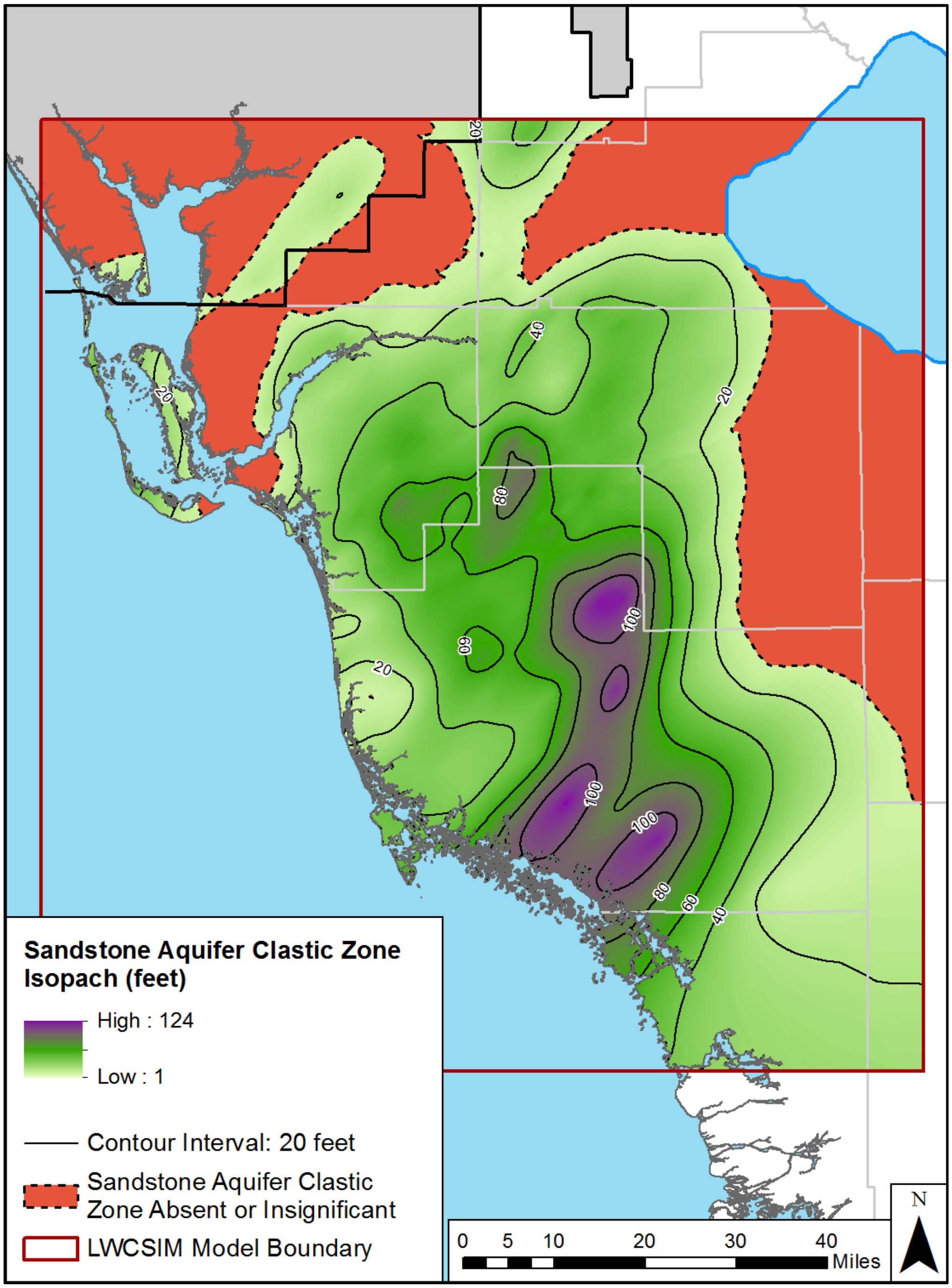

Figure 23. Thickness of the clastic zone of the Sandstone aquifer.

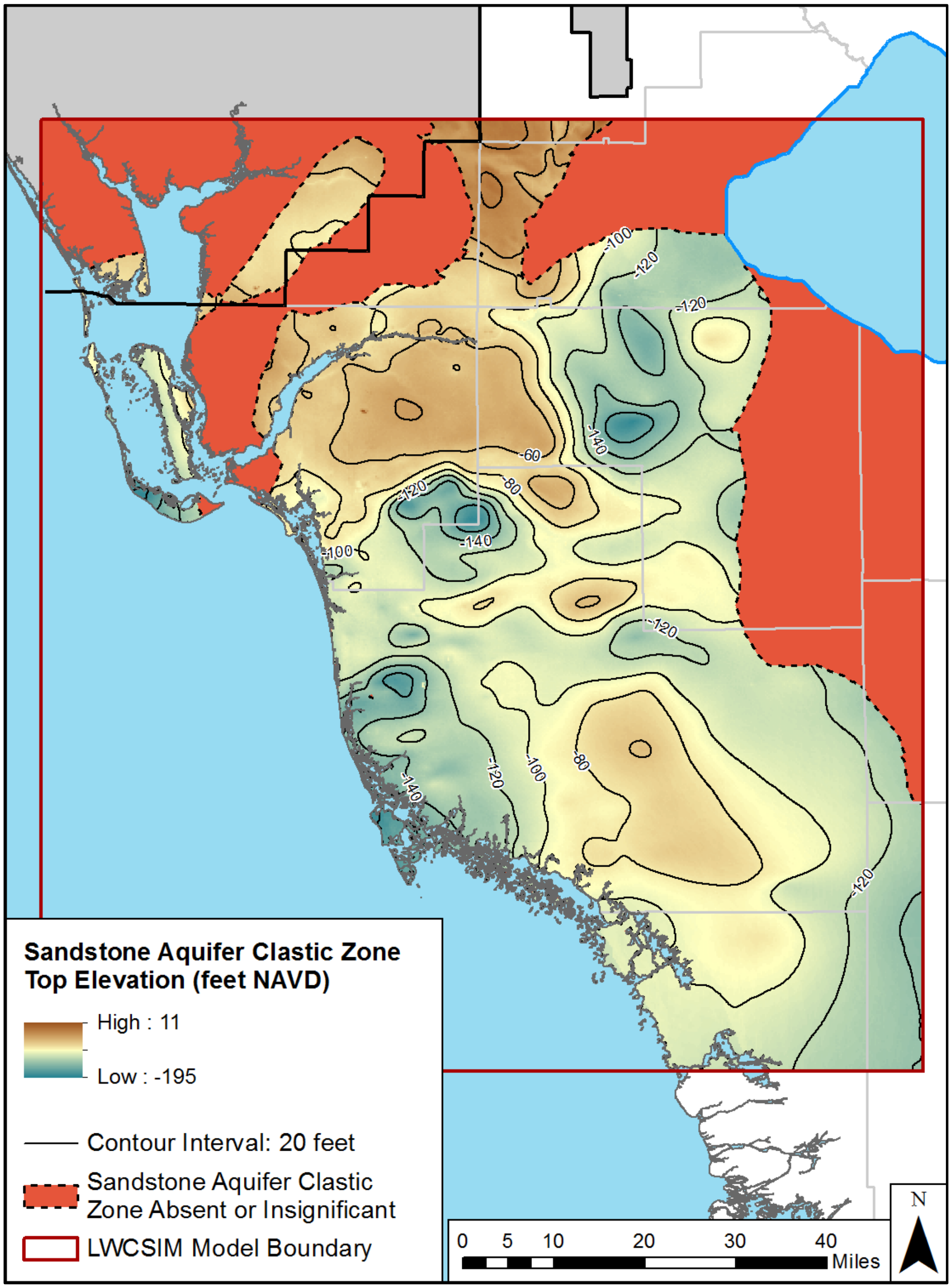

Figure 24. Elevation of the top of the clastic zone of the Sandstone aquifer.

5.1.5.2 Sandstone Aquifer Interconfining Unit

The wells used to determine the thickness of the Sandstone aquifer interconfining unit are shown in **Figure 25**. The Sandstone aquifer interconfining unit isopach map was interpolated from 497 aquifer picks. Of these 497 picks, there were 384 locations where the layer was absent and was assigned a thickness of 1 foot. The thickness of the Sandstone aquifer interconfining unit ranges from 1 foot in Charlotte, Glades, western Lee, eastern Hendry, eastern Collier, and Monroe counties to a maximum thickness of 80 feet in north central Collier County (**Figure 26**). The Sandstone aquifer interconfining unit is considered absent or insignificant with a thickness of 10 feet or less. The elevation of the top of the Sandstone aquifer interconfining unit ranges from -5 feet NAVD in eastern Lee County to -253 feet NAVD in central Collier County (**Figure 27**).

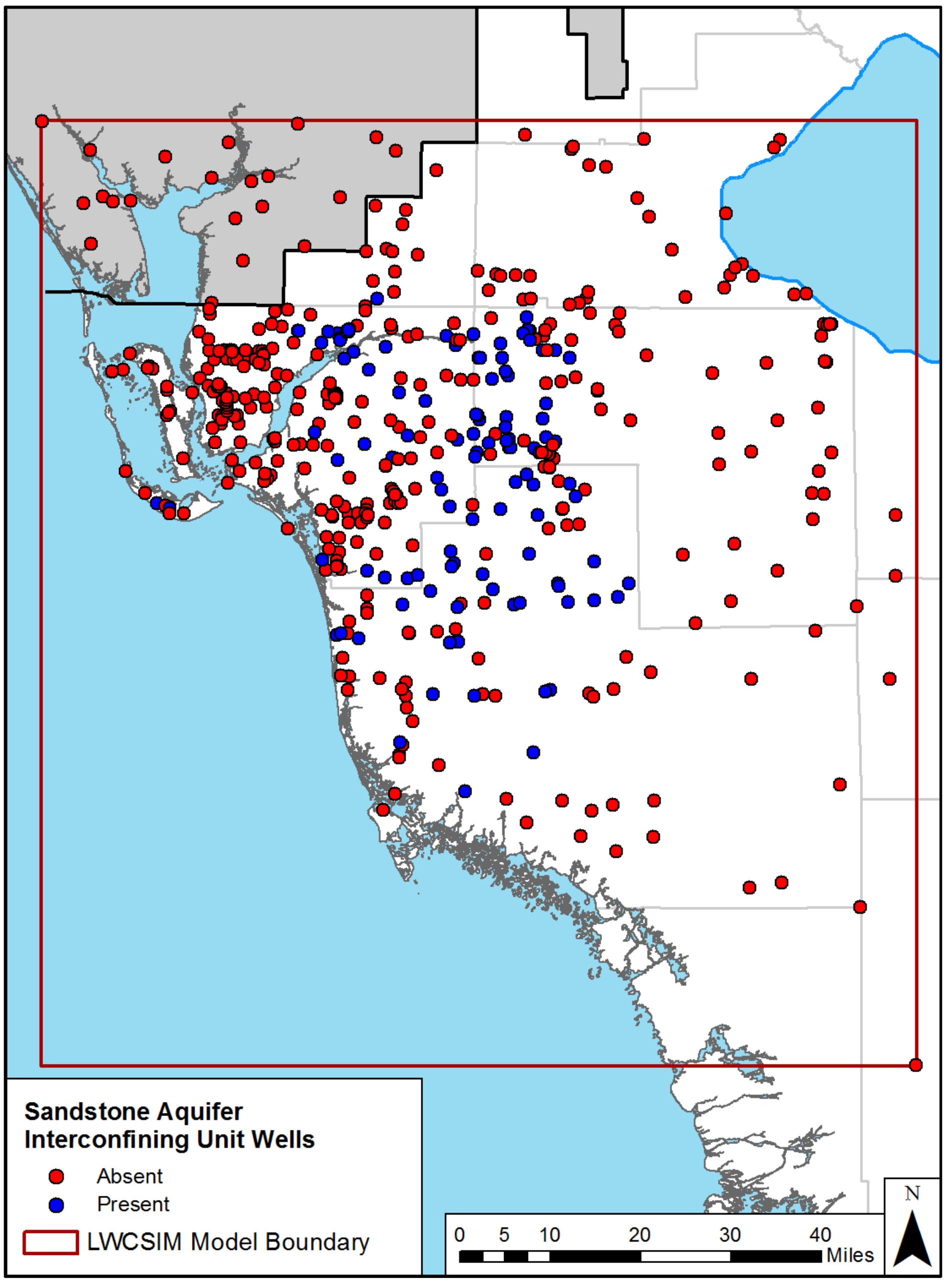

Figure 25. Sandstone aquifer interconfining unit well locations.

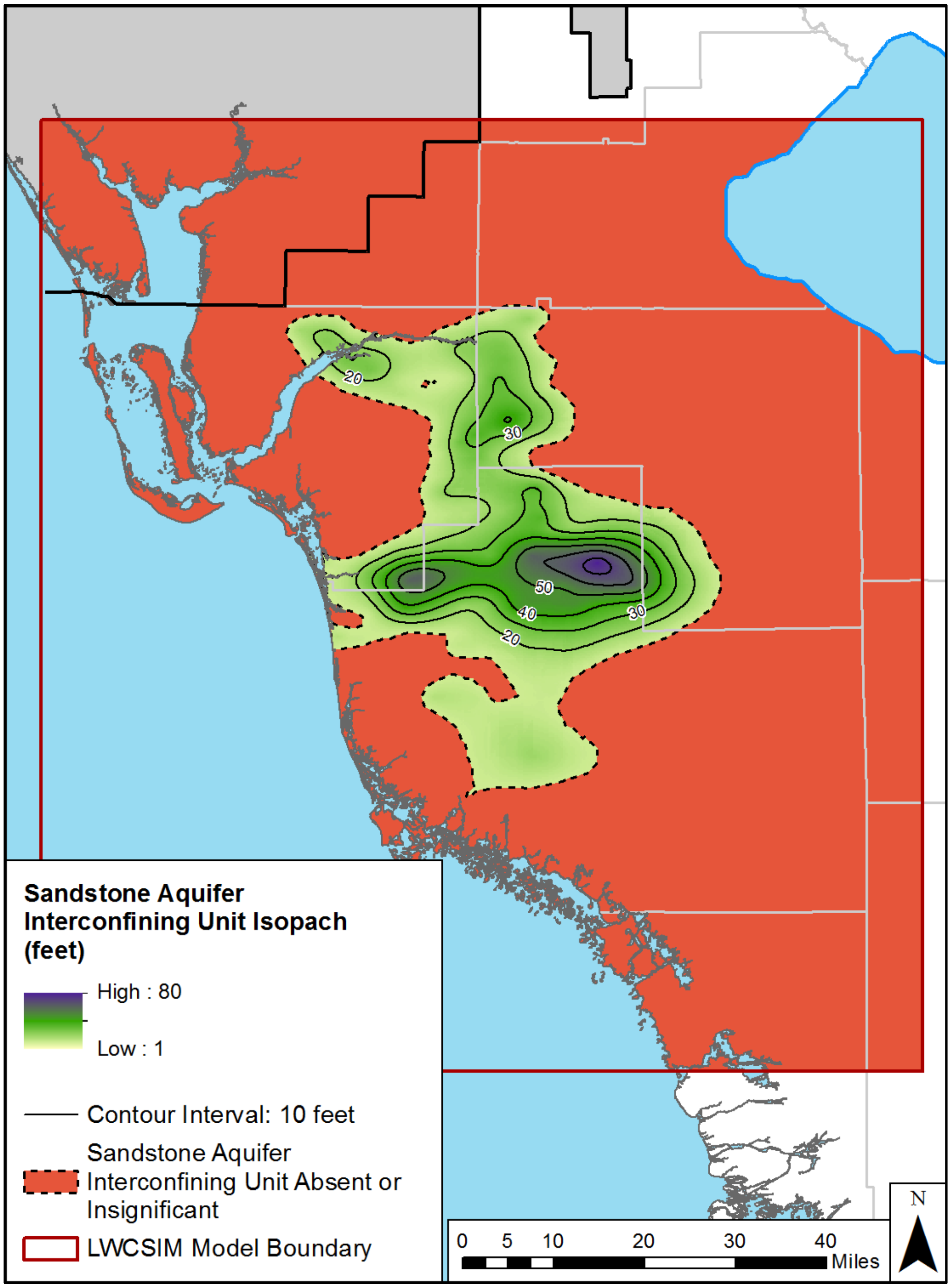

Figure 26. Thickness of the Sandstone aquifer interconfining unit.

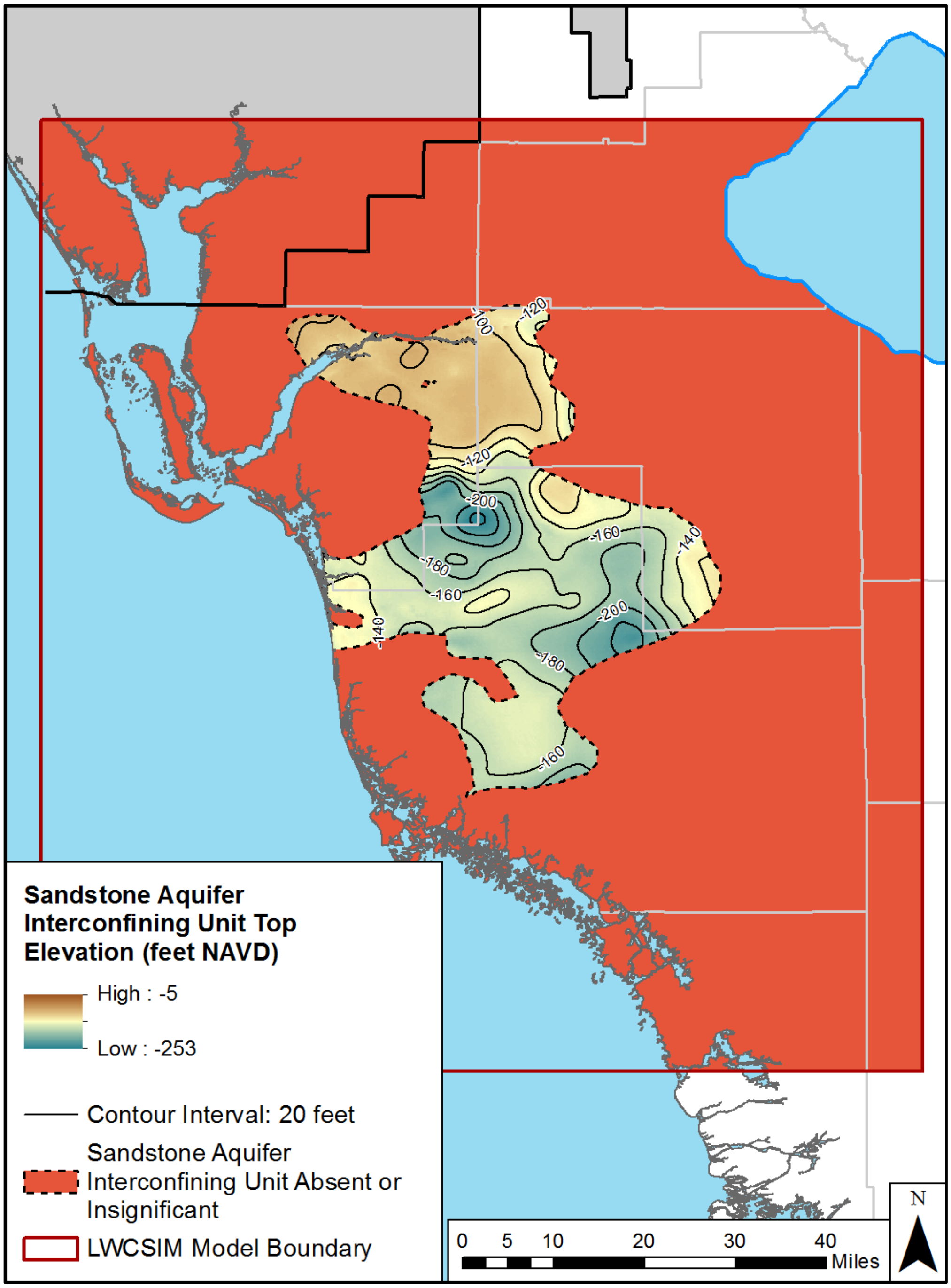

Figure 27. Elevation of the top of the Sandstone aquifer interconfining unit.

5.1.5.3 Carbonate Zone of the Sandstone Aquifer

The wells used to determine the thickness of the carbonate zone of the Sandstone aquifer are shown in **Figure 28**. The carbonate zone isopach map was interpolated from 484 aquifer picks. Of these 484 picks, there were 245 locations where the carbonate zone was absent and assigned a thickness of 1 foot. The thickness of the carbonate zone ranges from 1 foot in central to western Lee and eastern Glades, Hendry, and Collier counties to a maximum thickness of 170 feet in central Collier County (**Figure 29**). The carbonate zone is considered absent or insignificant with a thickness of 10 feet or less. The elevation of the top of the carbonate zone ranges from -6 feet NAVD to -272 feet NAVD, with the highest elevation in western Glades County and the lowest elevation in central Collier County (**Figure 30**).

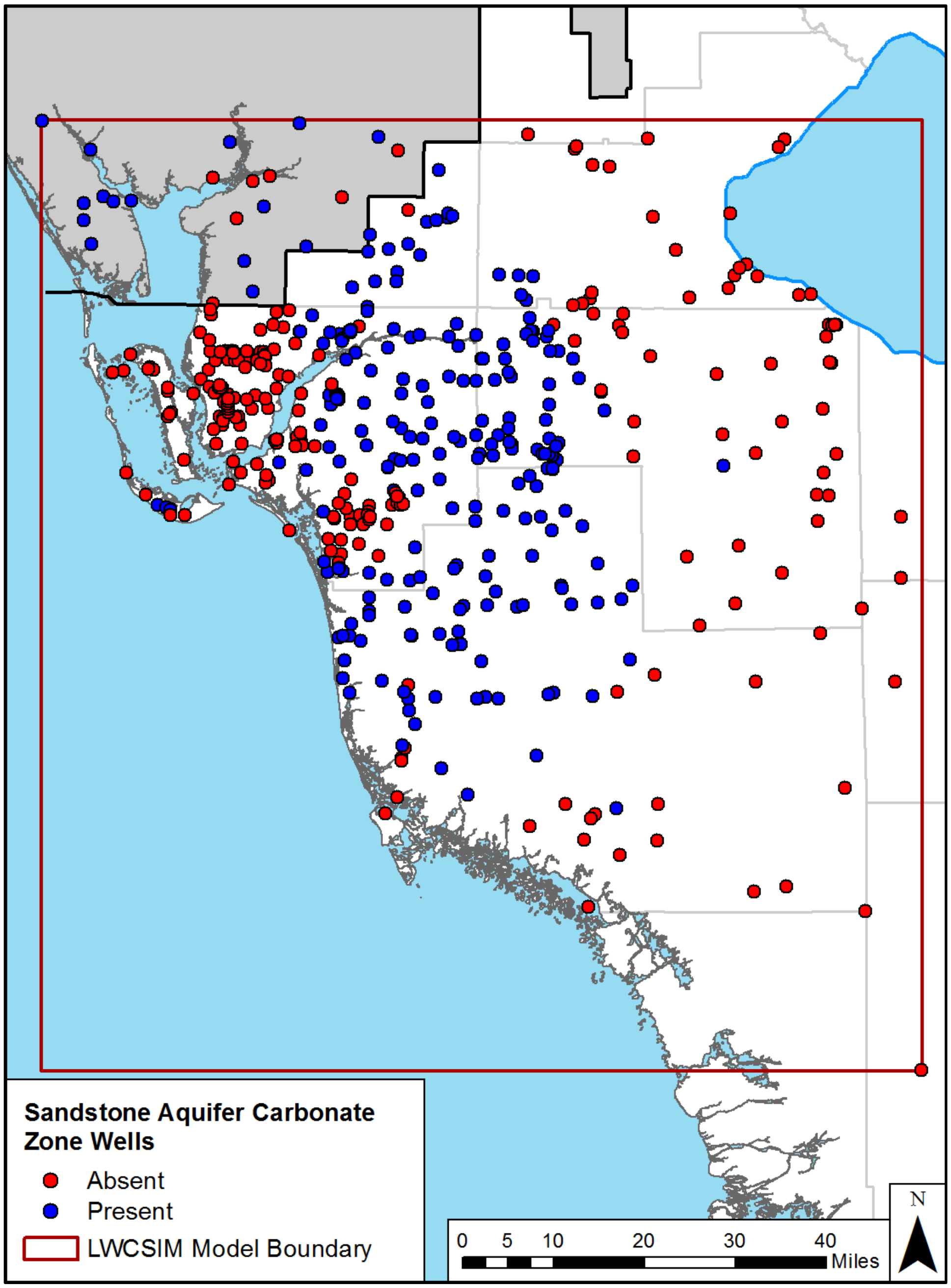

Figure 28. Well locations of the carbonate zone of the Sandstone aquifer.

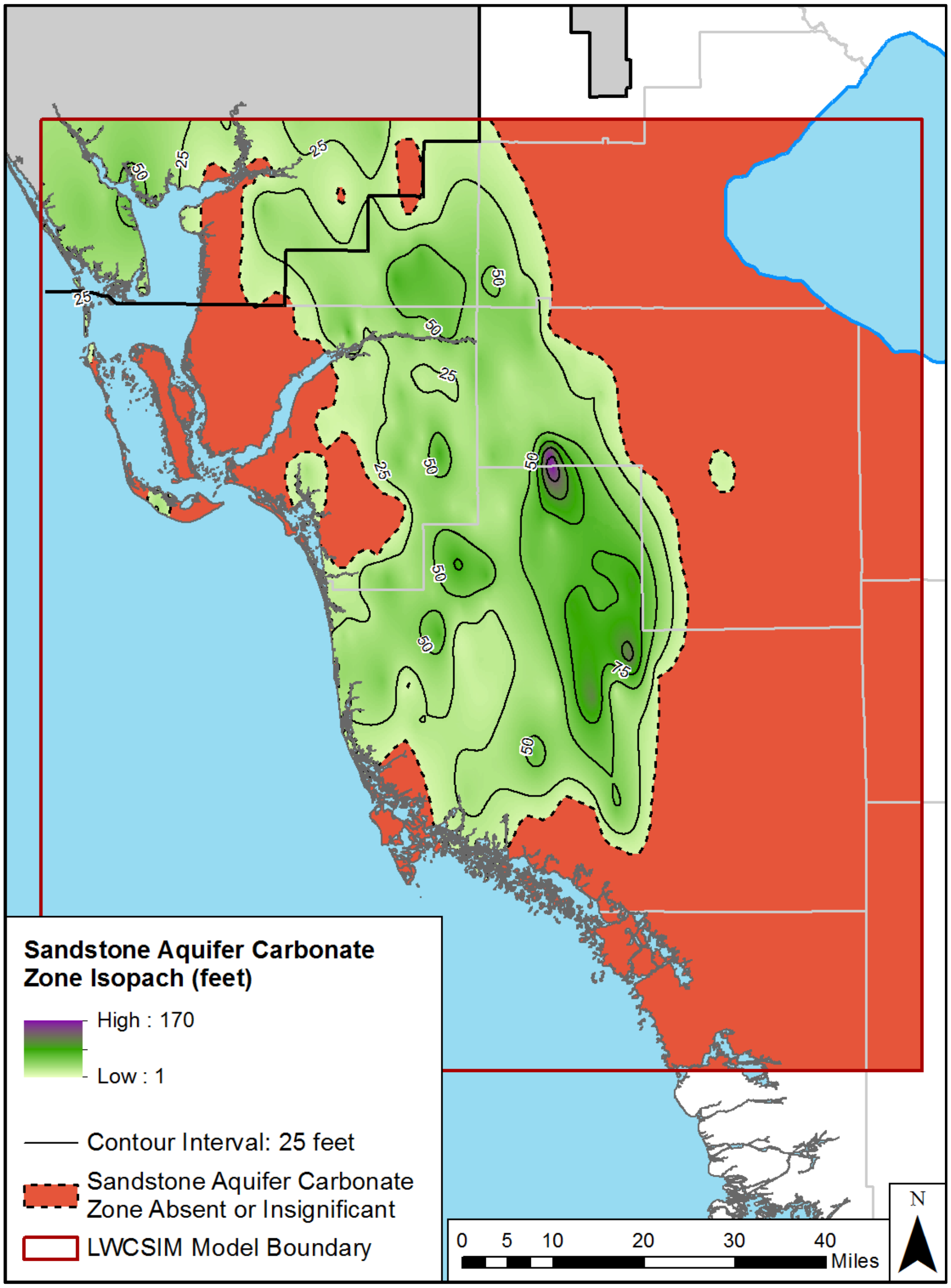

Figure 29. Thickness of the carbonate zone of the Sandstone aquifer.

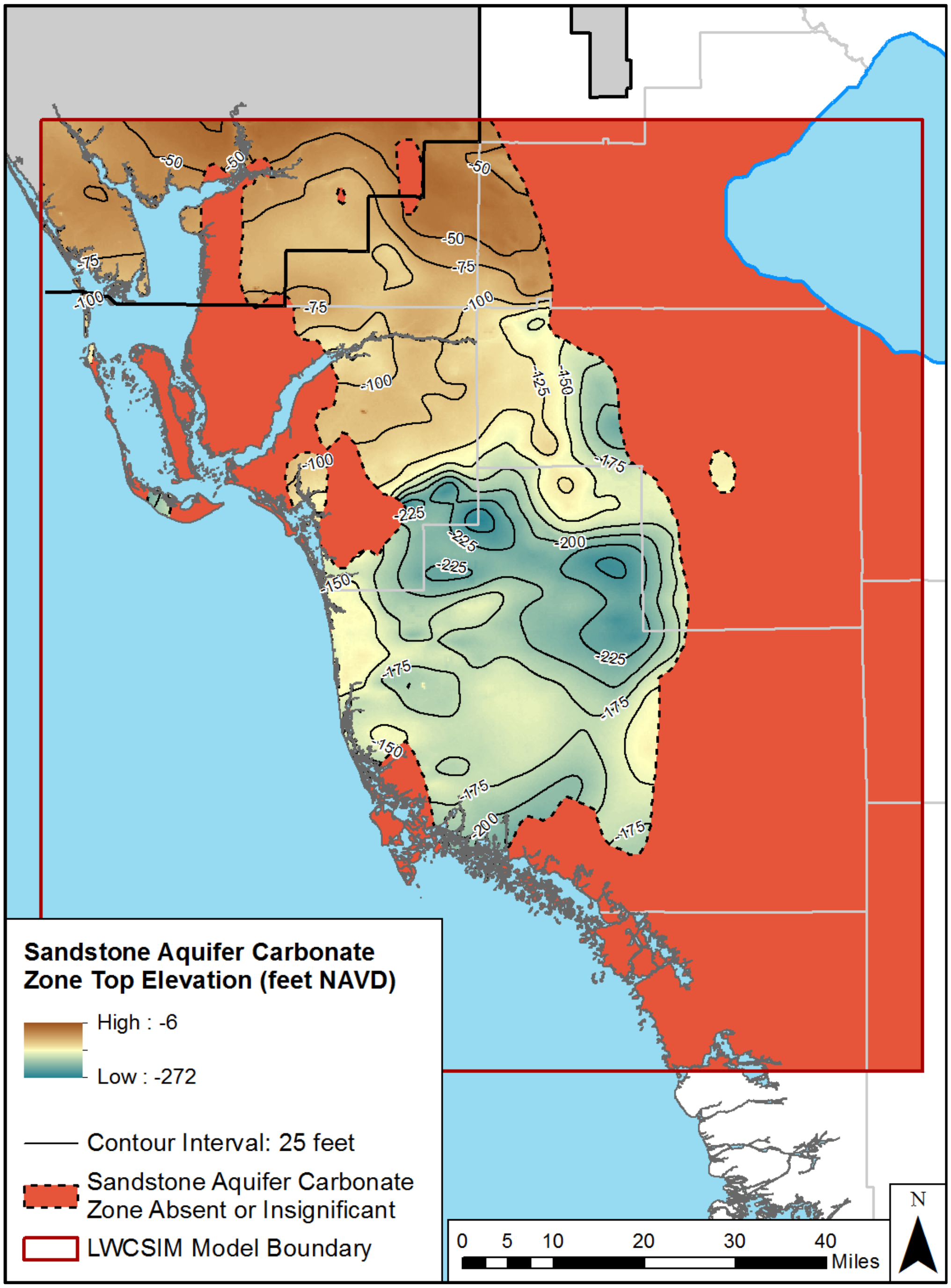

Figure 30. Elevation of the top of the carbonate zone of the Sandstone aquifer.

5.1.6 Mid-Hawthorn Confining Unit

The wells used to determine the thickness of the Mid-Hawthorn confining unit are shown in **Figure 31**. The Mid-Hawthorn confining unit isopach map was interpolated from 364 aquifer picks. Of these 364 picks, there were 14 locations where the Mid-Hawthorn confining unit was absent and assigned a thickness of 1 foot. The thickness of the Mid-Hawthorn confining unit ranges from 1 foot in central to western Lee and western Hendry counties to a maximum of 436 feet in south-central Glades County (**Figure 32**). The Mid-Hawthorn confining unit is considered absent or insignificant with a thickness of 20 feet or less. The elevation of the top of the Mid-Hawthorn confining unit ranges from -14 feet NAVD to -348 feet NAVD, with the highest elevation in western Lee County and the lowest elevation located in northern Collier County (**Figure 33**).

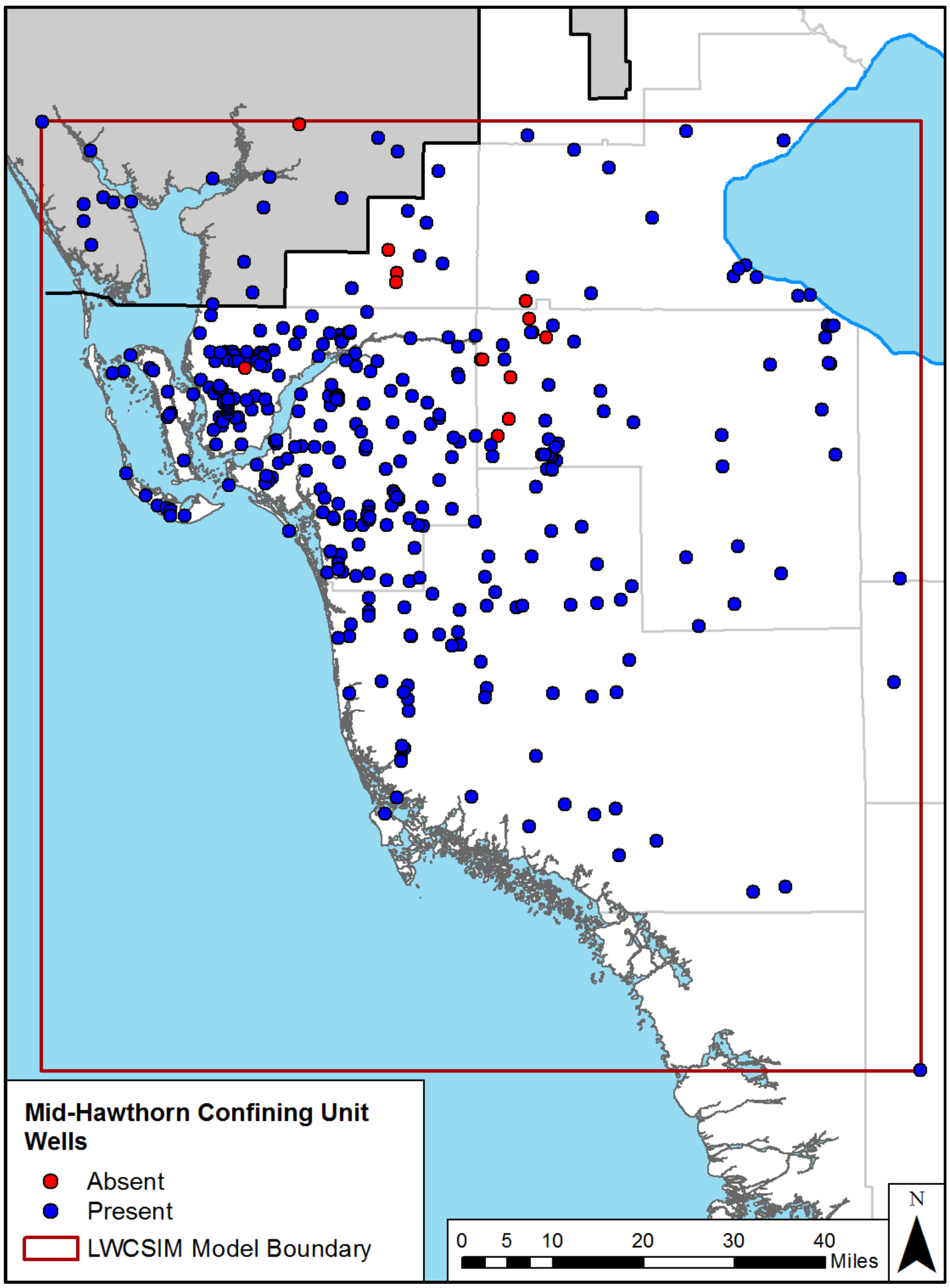

Figure 31. Well locations for the Mid-Hawthorn confining unit.

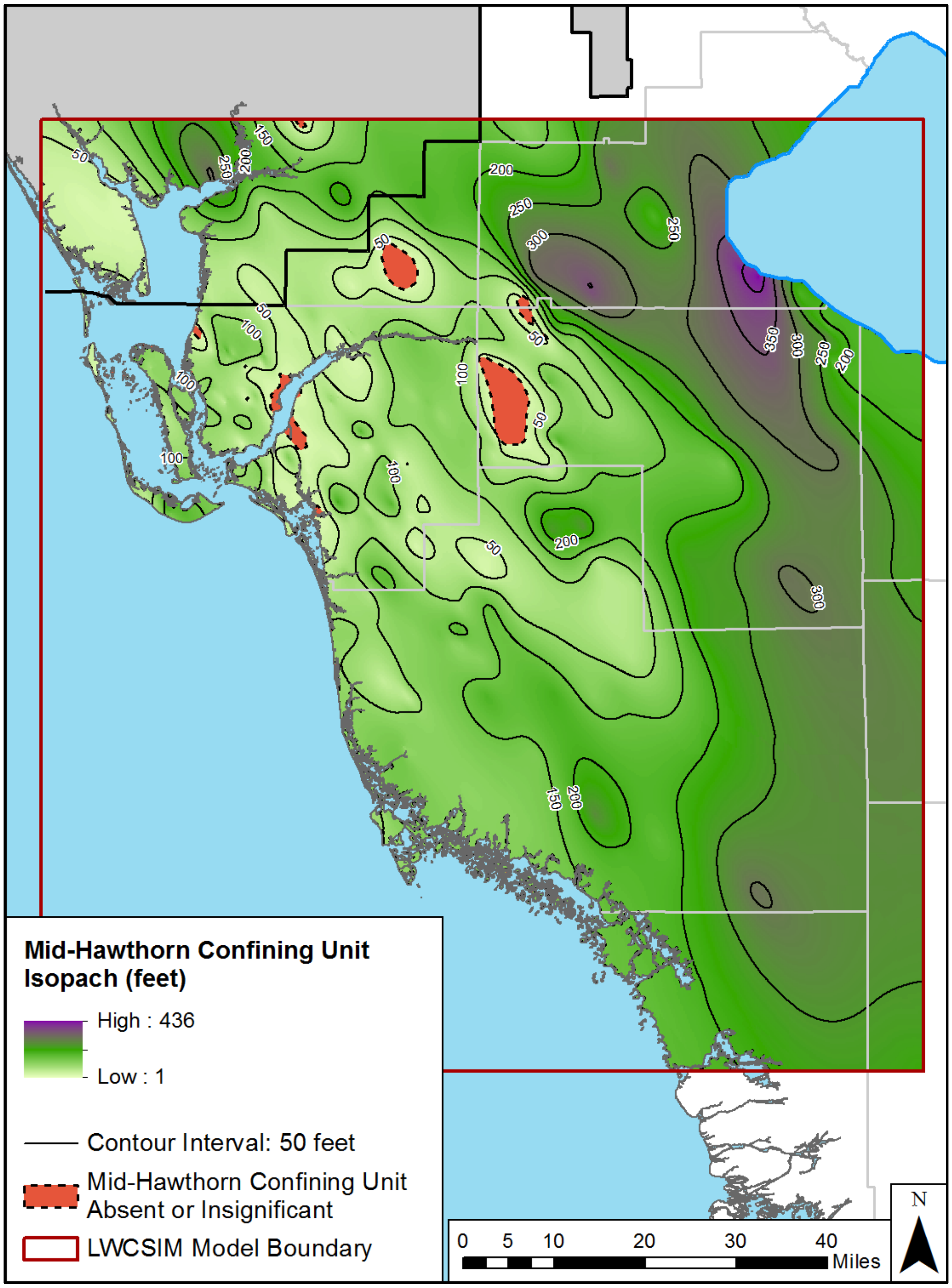

Figure 32. Thickness of the Mid-Hawthorn confining unit.

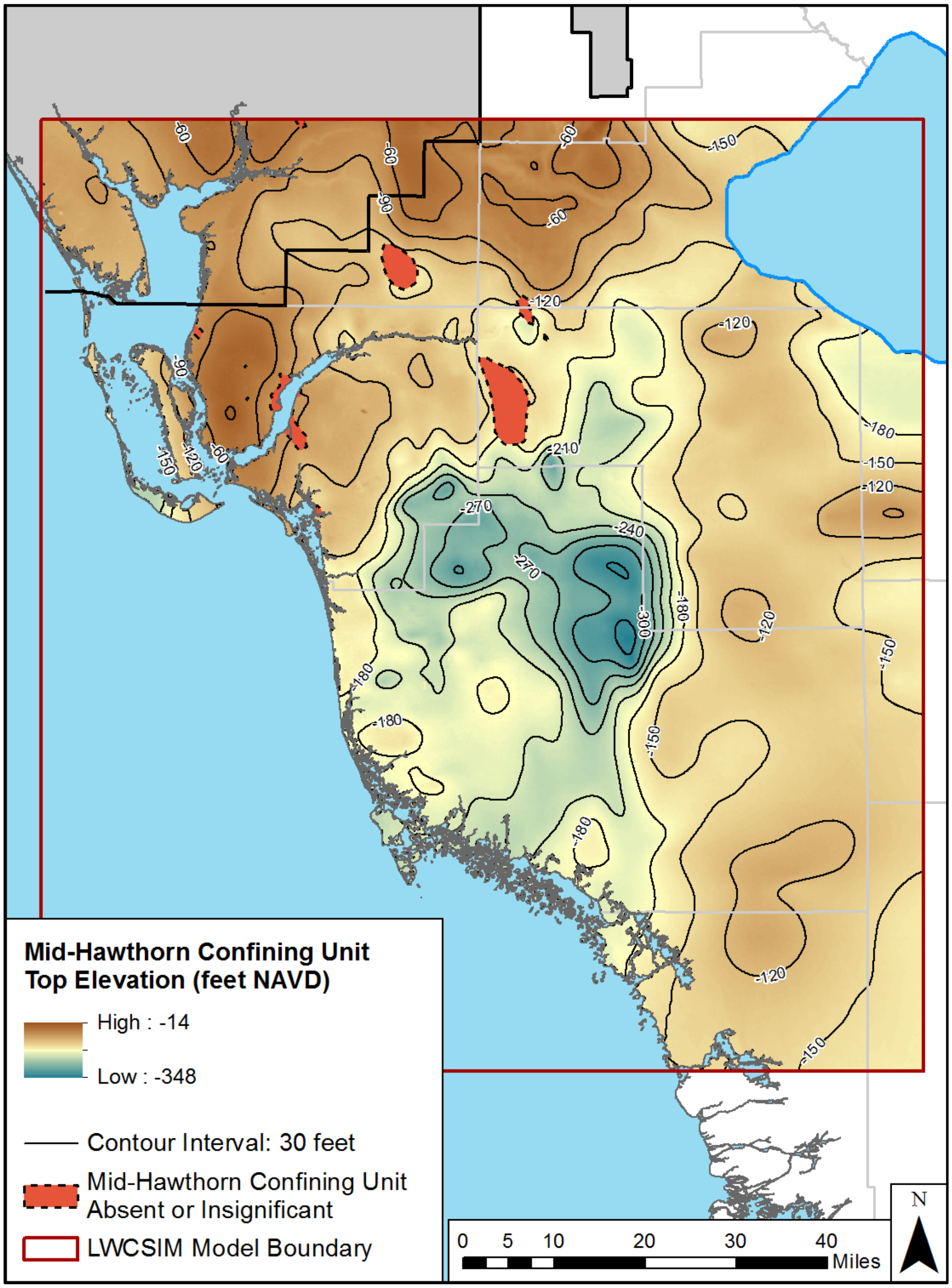

Figure 33. Elevation of the top of the Mid-Hawthorn confining unit.

5.1.7 Mid-Hawthorn Aquifer

The wells used to determine the thickness of the Mid-Hawthorn aquifer are shown in **Figure 34**. The Mid-Hawthorn aquifer isopach map was interpolated from 275 aquifer picks. Of these 275 picks, there were 15 locations where the Mid-Hawthorn aquifer was absent and assigned a thickness of 1 foot. The thickness of the Mid-Hawthorn aquifer ranges from 2 feet in Glades County to 222 feet in western Collier County (**Figure 35**). The Mid-Hawthorn aquifer is considered absent or insignificant with a thickness of 20 feet or less. The elevation of the top of the Mid-Hawthorn aquifer ranges from -56 feet NAVD to -561 feet NAVD, with the highest elevation in western Lee County and the lowest elevation located in south-central Glades County (**Figure 36**).

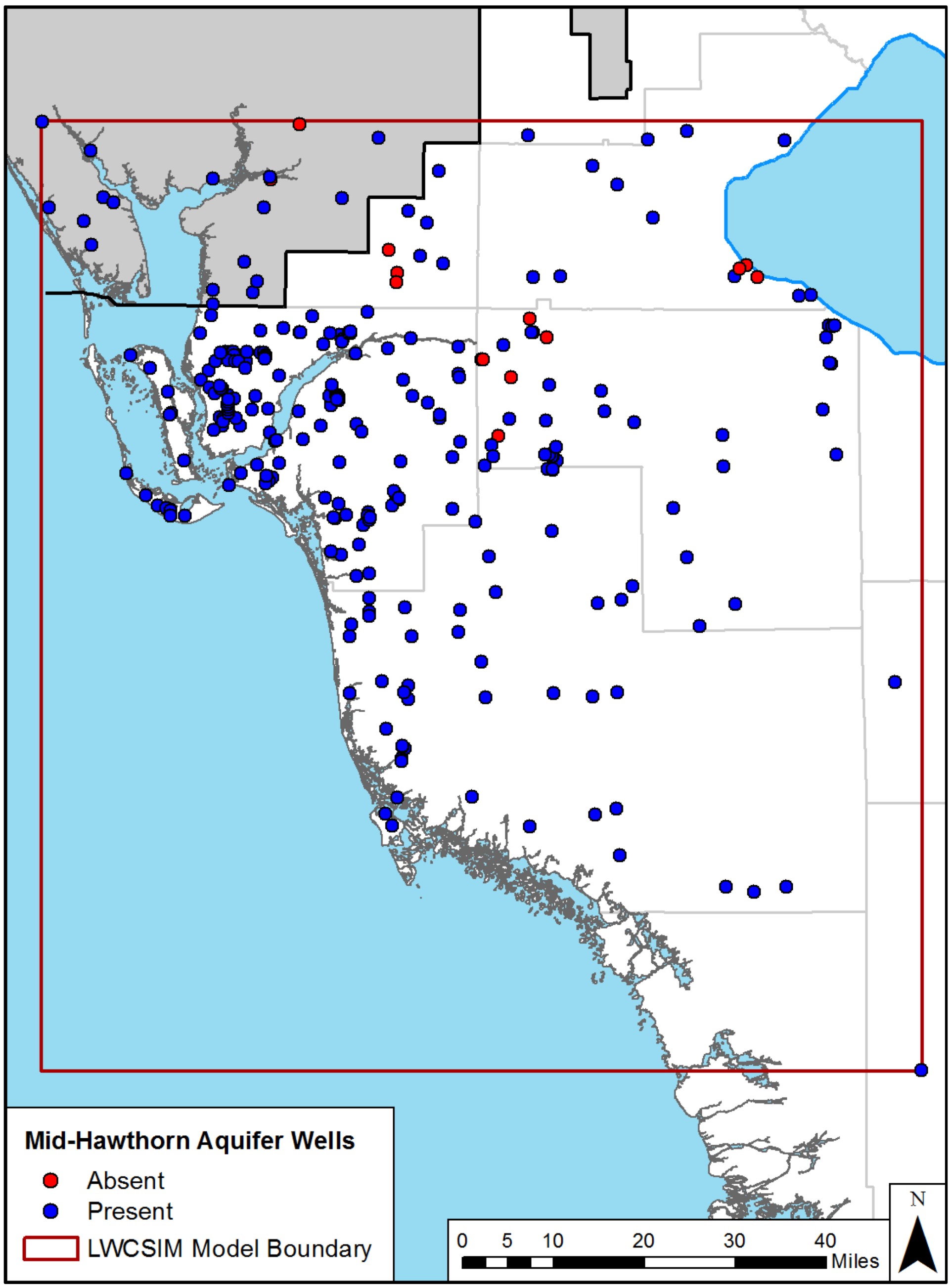

Figure 34. Mid-Hawthorn aquifer well locations.

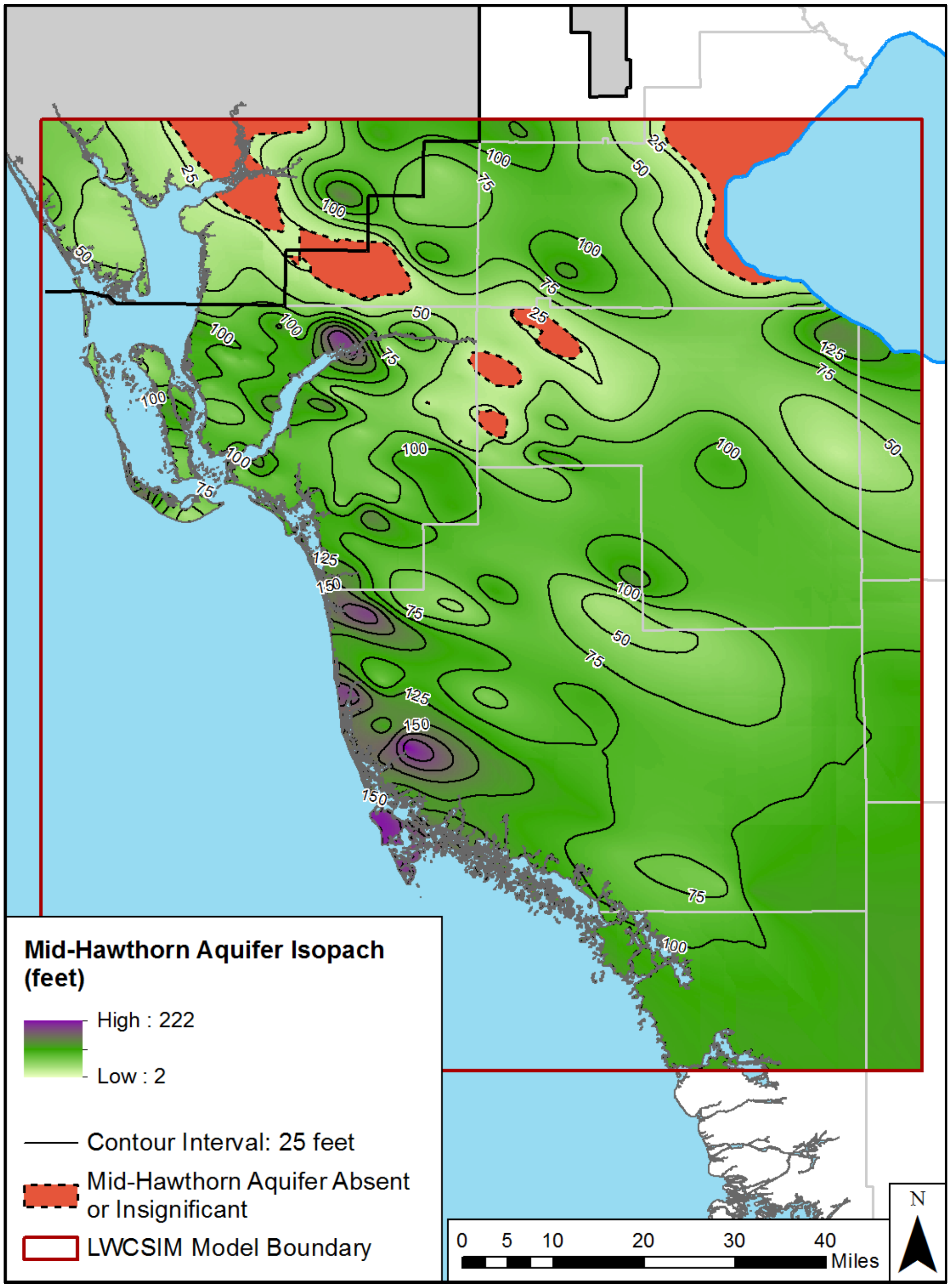

Figure 35. Thickness of the Mid-Hawthorn aquifer.

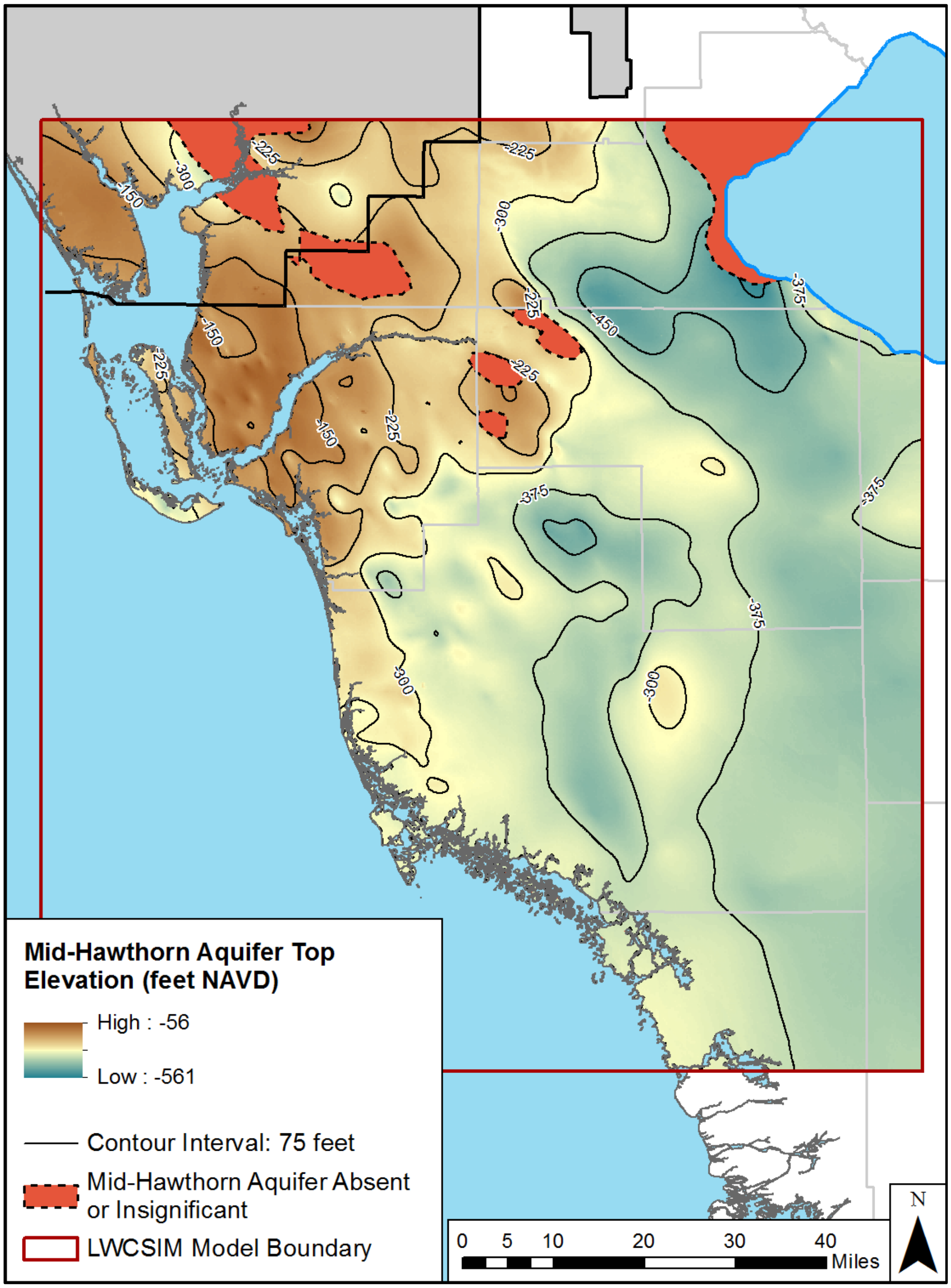

Figure 36. Elevation of the top of the Mid-Hawthorn aquifer.

5.1.8 *Lower Hawthorn Confining Unit*

The wells used to determine the thickness of the Lower Hawthorn confining unit are shown in **Figure 37**. The Lower Hawthorn confining unit isopach map was interpolated from 204 aquifer picks. There were not any aquifer picks where the Lower Hawthorn confining unit was absent. The thickness of the Lower Hawthorn confining unit ranges from 17 feet in western Collier and western Lee counties to 612 feet in south-central Hendry County (**Figure 38**). The Lower Hawthorn confining unit is considered absent or insignificant with a thickness of 20 feet or less. The elevation of the top of the Lower Hawthorn confining unit ranges from -67 feet NAVD to -609 feet NAVD, with the highest elevation in southern DeSoto County and the lowest elevation located in northern Hendry County and southern Glades County (**Figure 39**). The elevation of the base of the Lower Hawthorn confining unit ranges from -253 feet NAVD in the northwest corner of the model domain to -1,046 feet NAVD in south-central Hendry County (**Figure 40**).

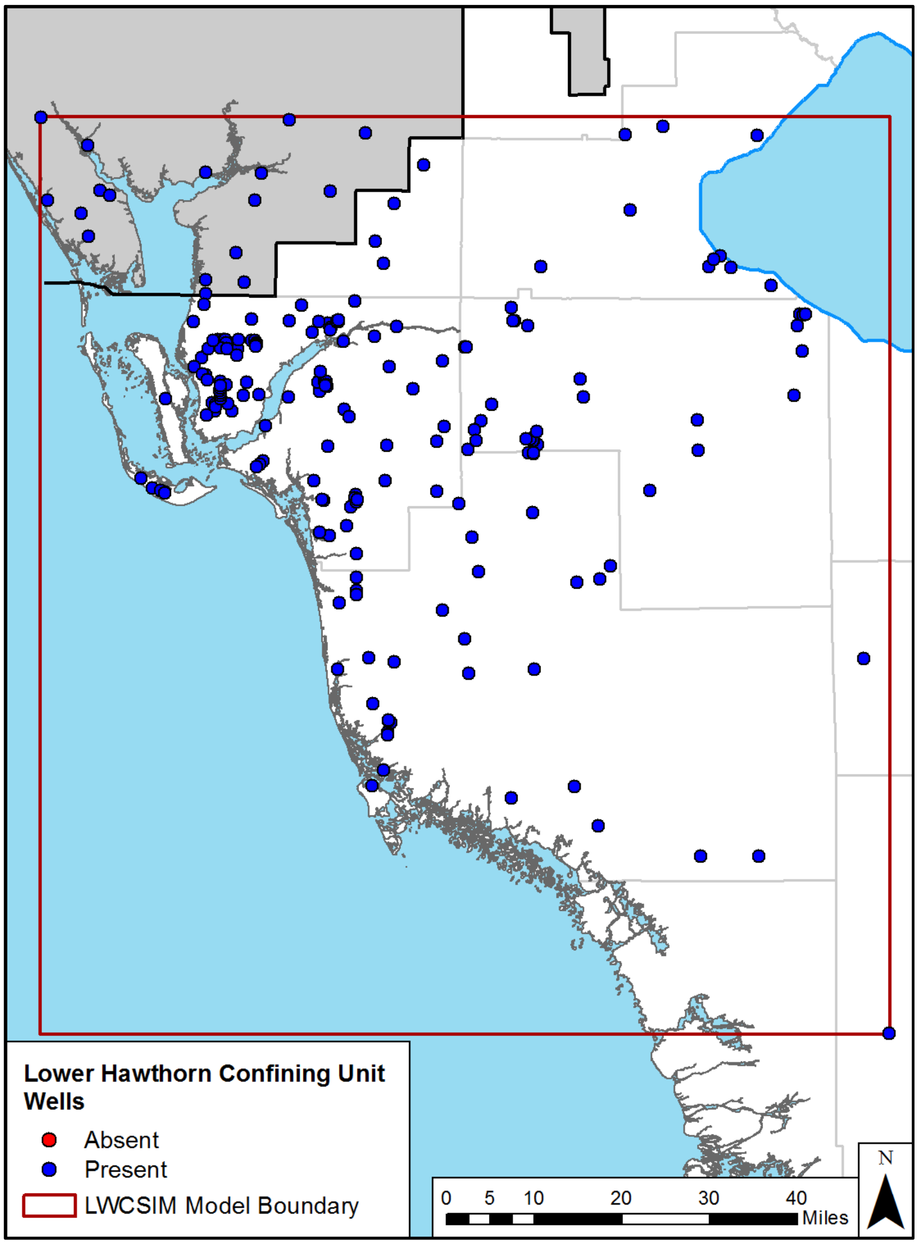

Figure 37. Lower Hawthorn confining unit well locations.

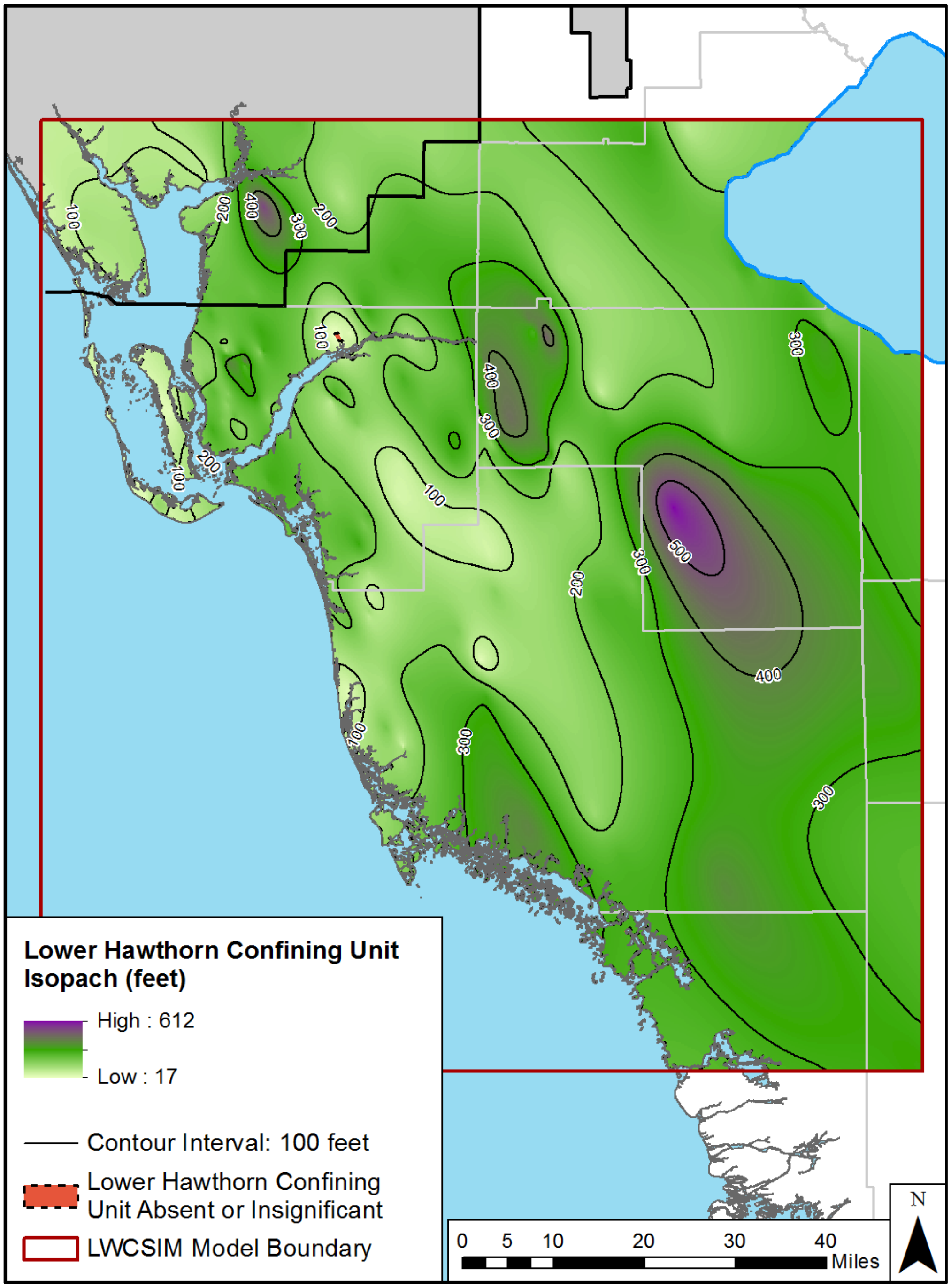

Figure 38. Thickness of the Lower Hawthorn confining unit.

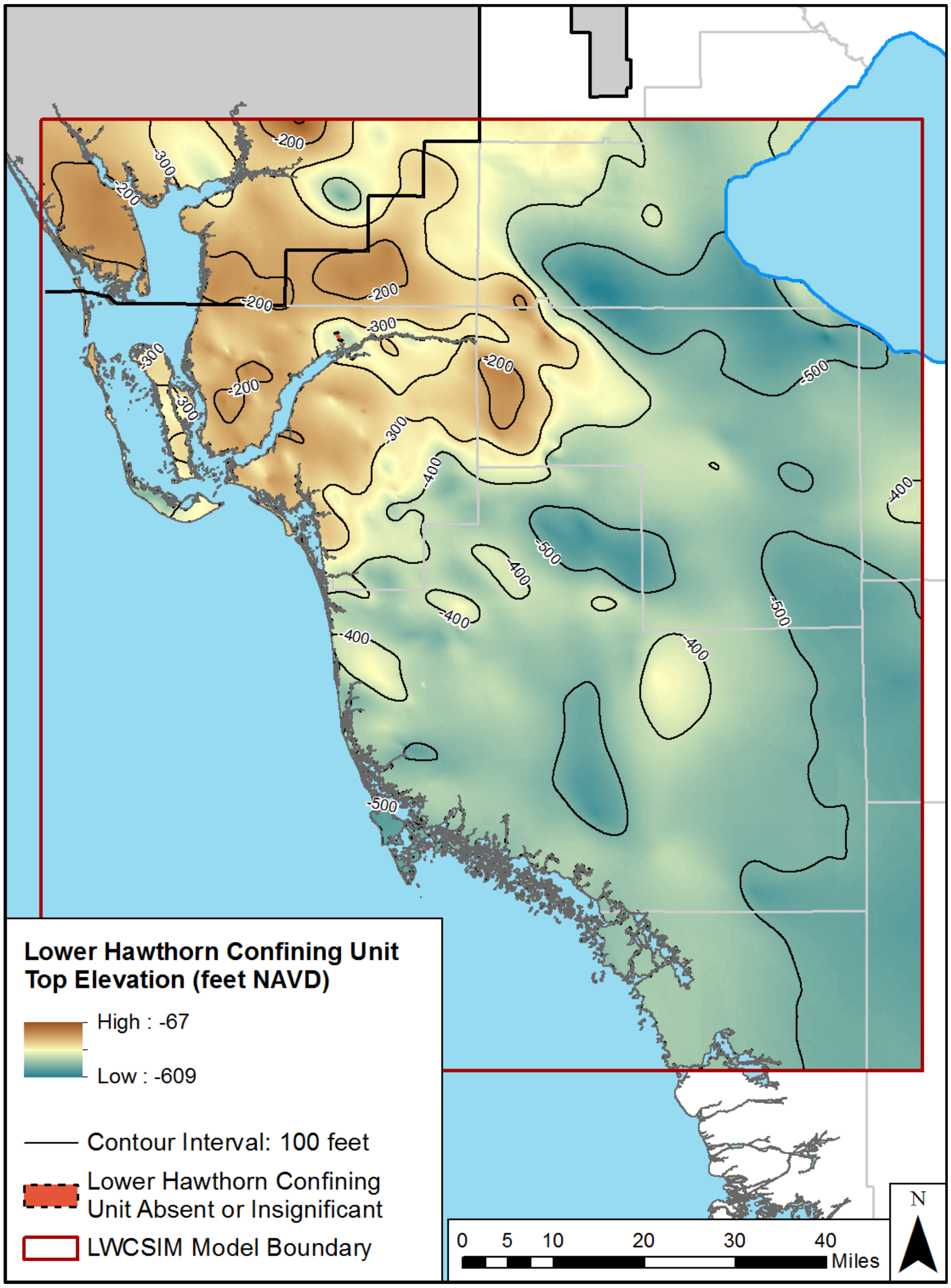

Figure 39. Elevation of the top of the Lower Hawthorn confining unit.

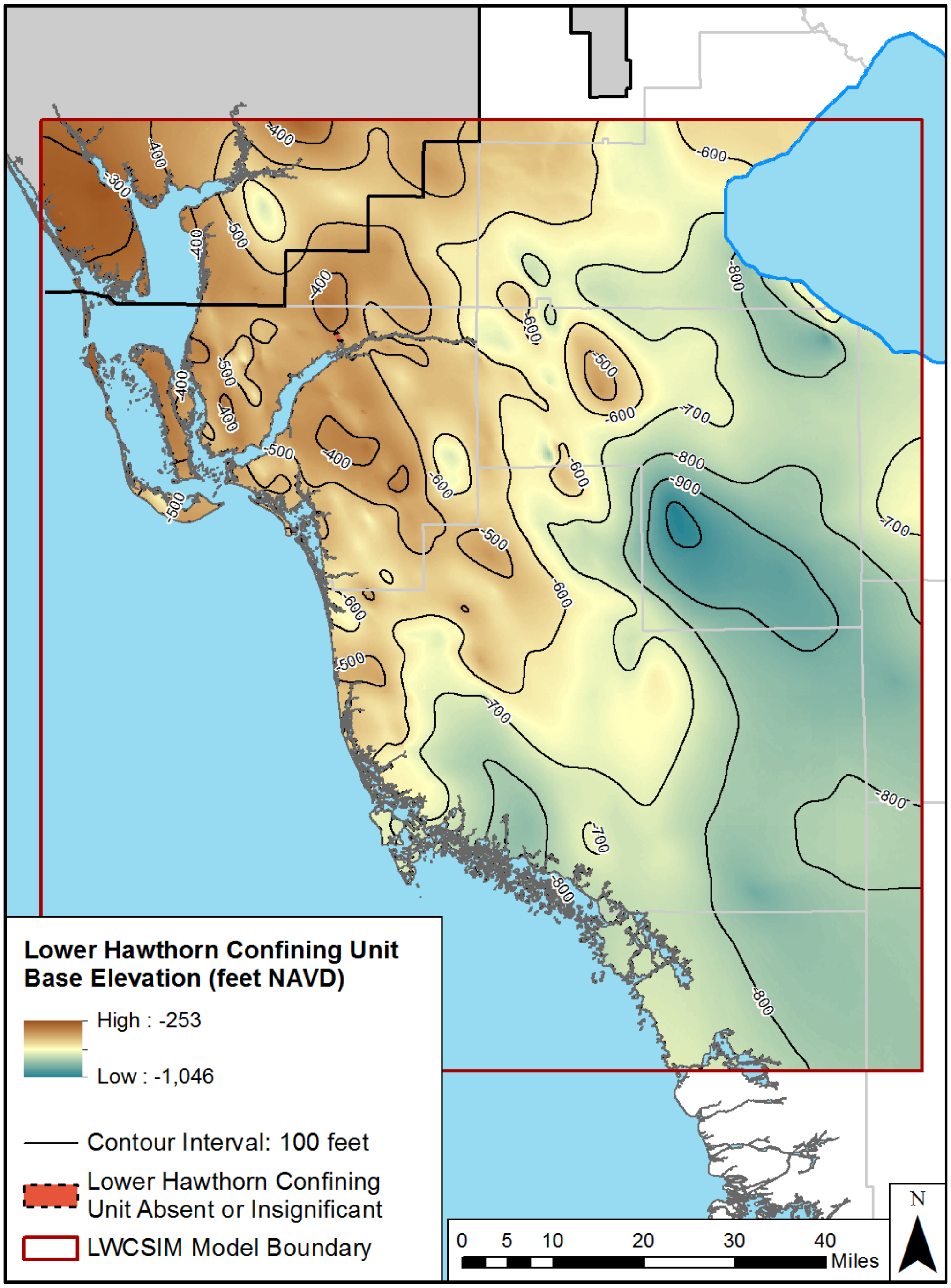

Figure 40. Elevation of the base of the Lower Hawthorn confining unit.

5.2 Hydrogeologic Cross Sections and Fence Diagrams

Nine hydrogeologic cross sections (one oriented north to south and one oriented west to east) for each of Charlotte, Glades, Lee, Hendry, and Collier counties were created using the software Paraview. **Figure 41** shows the hydrogeologic cross-section locations, and the cross sections are included in **Appendix D**.

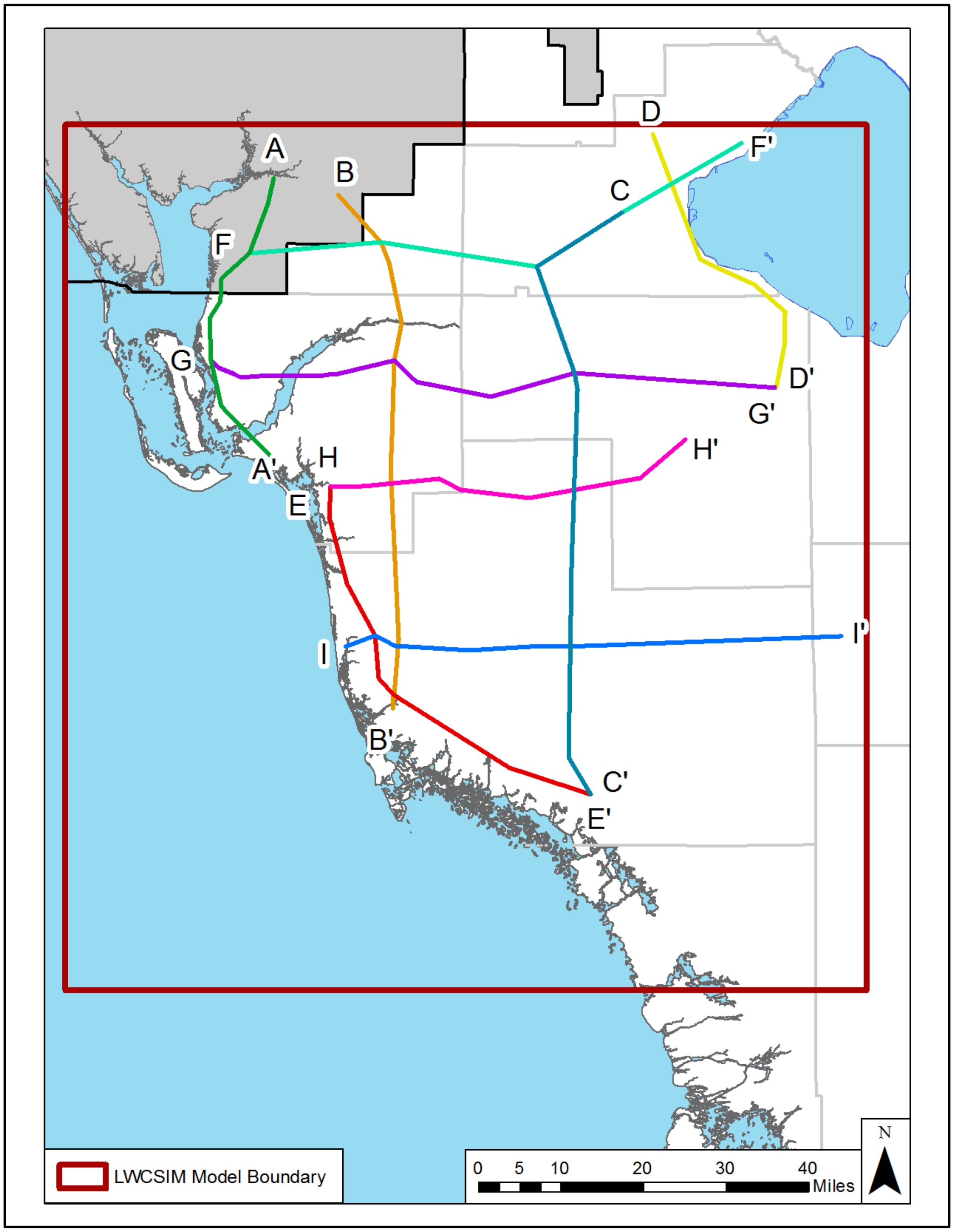

Figure 41. Hydrogeologic cross-section locations.

5.3 Hydraulic Conductivity Rasters

The ranking and review of the APTs in the study area resulted in 87 unique, reliable APTs, from which 90 recommended hydraulic conductivity values were derived for the aquifers and 30 recommended hydraulic conductivity values were derived for the aquitards. To create the hydraulic conductivity rasters needed for the groundwater model, there can only be one hydraulic conductivity value in each 1,000-foot by 1,000-foot model grid cell, per model layer.

Due to the limited number of discrete hydraulic conductivity data points, standard kriging of the hydraulic conductivity values could not be performed. Instead, one of the following three interpolation methods was used to create the hydraulic conductivity rasters:

- **Constant Median:** This method assigns the median value of the recommended hydraulic conductivity values to the entire layer. This method was used when there were six or less data points, or when the data points were spatially clustered.
- **Inverse Distance Weighted:** This method interpolates by averaging the values of nearby data points, with a higher weight given to closer values.
- **Natural Neighbor:** This method interpolates by averaging values of nearby data points, with a higher weight given to values that have a higher proportion of area overlapping nearby Voronoi polygons. This method requires a ghost point to be placed in each corner of the model domain so that the interpolation will cover the region. The media of the hydraulic conductivity values for the layer being interpolated was used for these ghost points.

Table 7 provides a summary of the hydraulic conductivity interpolation methods used to produce the hydraulic conductivity layers, along with the number of discrete points used in the interpolation, the recommended median hydraulic conductivity value for each hydrostratigraphic layer, and the range of reliable hydraulic conductivity values for each hydrostratigraphic layer.

Table 7. Summary of kriging results for hydraulic conductivity layers.

Layer	Discrete Points	Interpolation Method	Hydraulic Conductivity (feet/day)		
			Recommended Median Values	Minimum	Maximum
Water Table aquifer (WT)	9	Constant Median	1,000	30	9,000
Tamiami confining unit (TC)	14	Constant Median	4E-02	3E-05	7
Lower Tamiami aquifer (LT)	46	Natural Neighbor	2,000	80	20,000
Upper Hawthorn confining unit (H1)	8	Constant Median	2E-03	2E-04	0.4
Sandstone aquifer clastic zone (S2)	11	Natural Neighbor	40	10	900
Sandstone aquifer interconfining unit (SC)	3	Constant Median	2E-04	4E-05	0.6
Sandstone aquifer carbonate zone (S1)	10	Constant Median	30	3	40
Mid-Hawthorn confining unit (H2)	5	Constant Median	3E-04	9E-06	1
Mid-Hawthorn aquifer (HM)	13	Inverse Distance Weighted	50	8	800

5.3.1 Water Table Aquifer

The APT review resulted in nine reliable APTs in the Water Table aquifer within the study area. The hydraulic conductivities for the Water Table aquifer range from 30 feet/day to 9,000 feet/day, with a median recommended value of 1,000 feet/day, which was assigned across the raster layer. The APT locations and the hydraulic conductivity raster are shown in **Figure 42**.

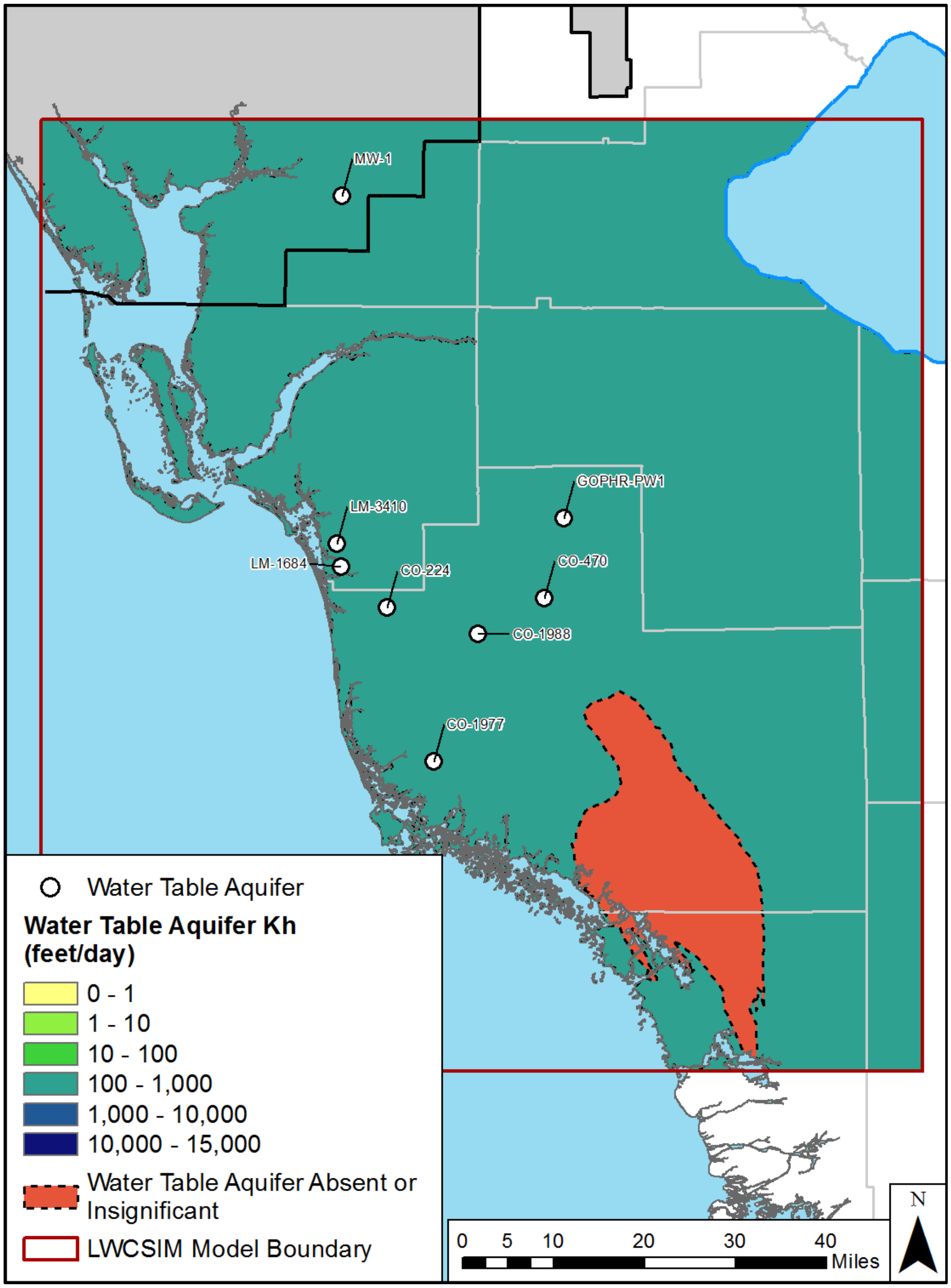

Figure 42. Hydraulic conductivity of the Water Table aquifer (model layer 1).

5.3.2 Tamiami Confining Unit

The APT review resulted in 47 reliable tests conducted in the Lower Tamiami Aquifer within the study area. Of these 47 reliable tests, 14 of the APTs included a leakance value. The hydraulic conductivities calculated from the leakance values range from 3E-05 feet/day to 7 feet/day, with a median recommended hydraulic conductivity of 4E-02 feet/day. These 14 points were used to create the hydraulic conductivity raster for the Tamiami confining unit using the Constant Median method. The APT locations and the hydraulic conductivity raster are shown in **Figure 43**.

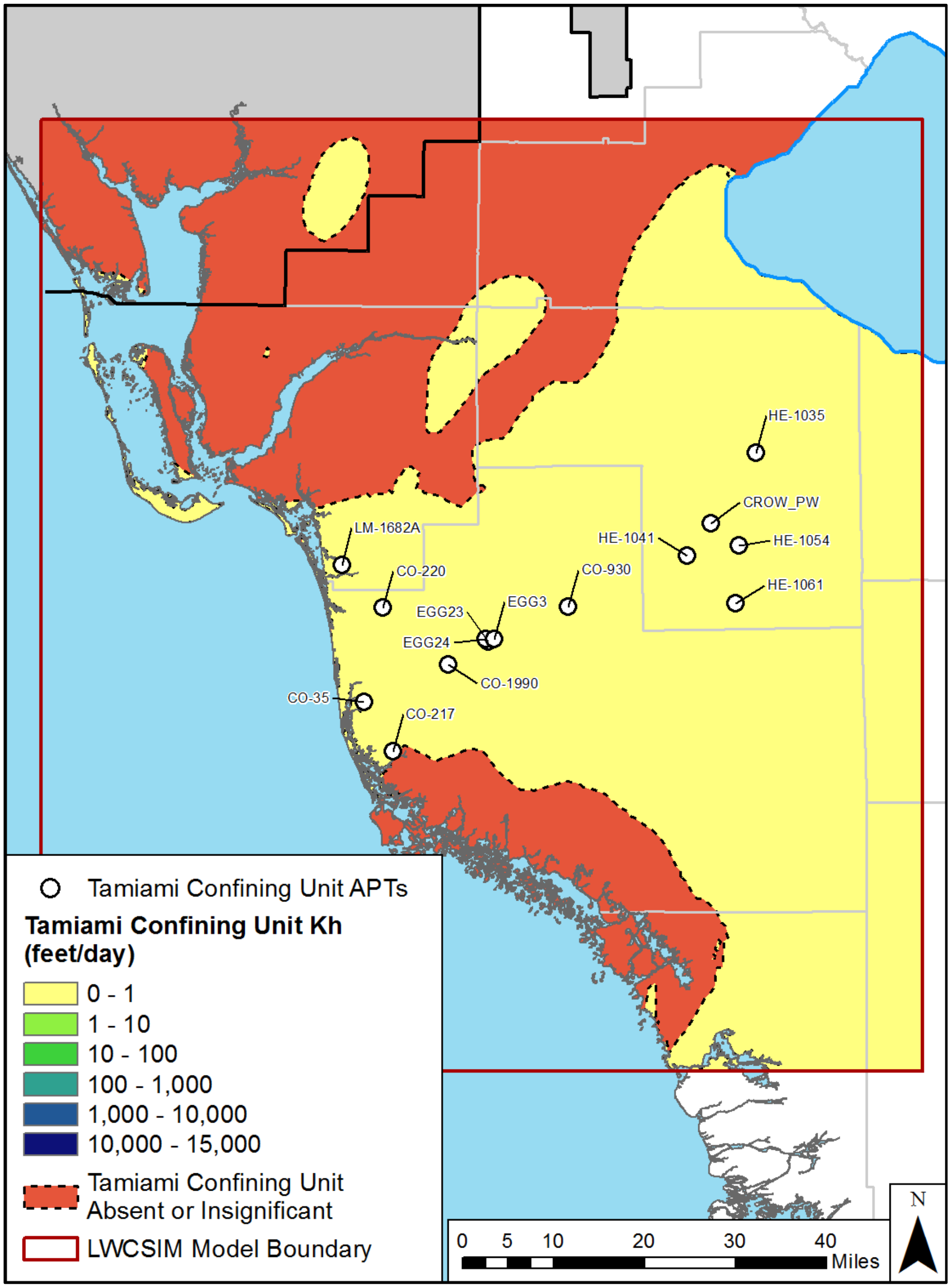

Figure 43. Hydraulic conductivity of the Tamiami confining unit (model layer 2).

5.3.3 Lower Tamiami Aquifer

The APT review resulted in 46 reliable APTs conducted in the Lower Tamiami aquifer. The hydraulic conductivities range from 80 feet/day to 20,000 feet/day, with a median recommended value of 2,000 feet/day. The Natural Neighbor method was used to create the hydraulic conductivity raster for the Lower Tamiami aquifer. Four ghost points with values of the median hydraulic conductivity were used in the interpolation process. The APT locations and the hydraulic conductivity raster are shown in **Figure 44**.

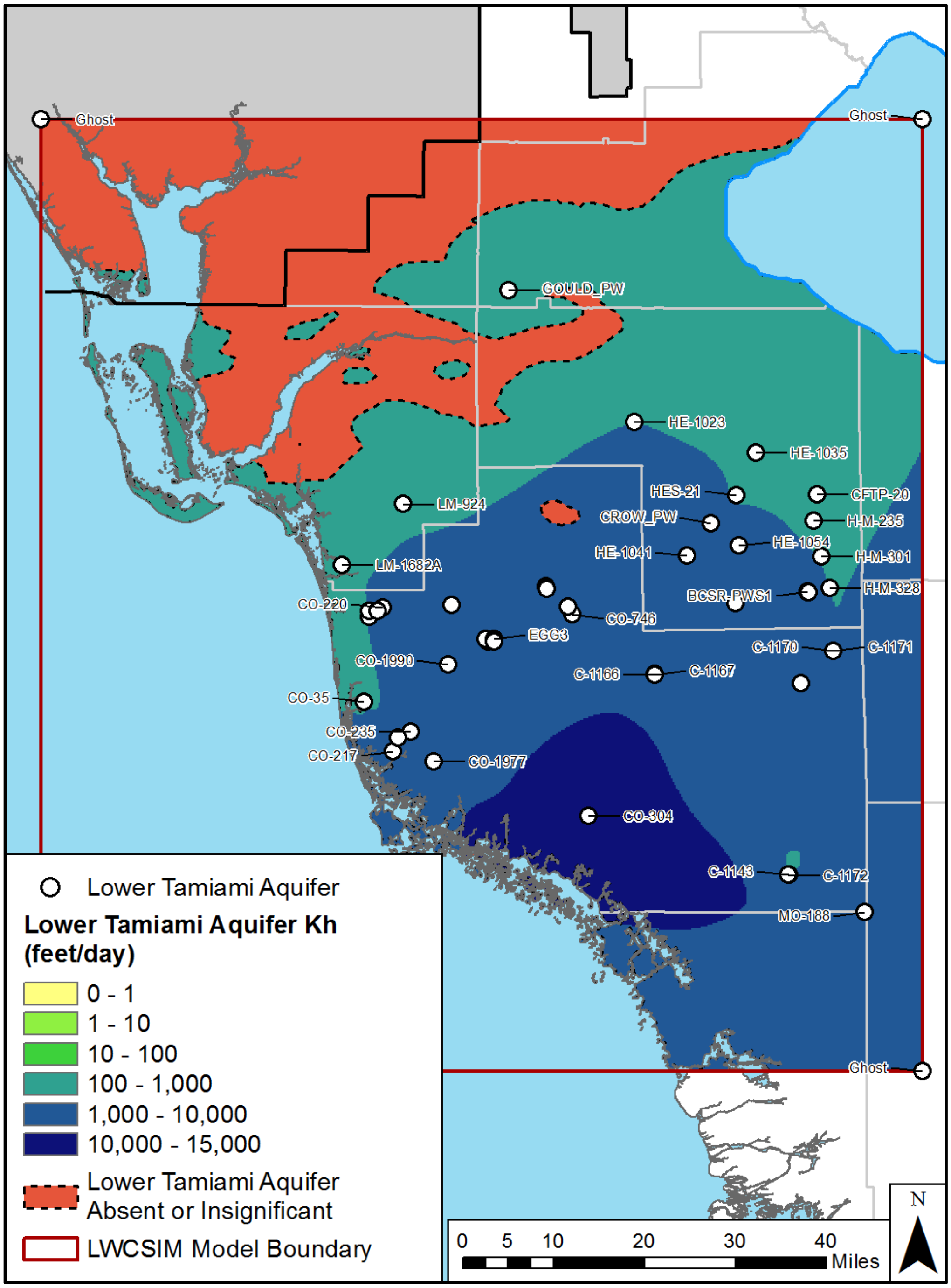

Figure 44. Hydraulic conductivity of the Lower Tamiami aquifer (model layer 3).

5.3.4 *Upper Hawthorn Confining Unit*

The APT review resulted in 11 reliable APTs in the Upper Hawthorn confining unit. Of these 11 reliable APTs, 8 APTs had hydraulic parameters which included a leakance value. The hydraulic conductivities calculated from the leakance values range from 2.0E-04 feet/day to 0.4 feet/day, with a median recommended calculated hydraulic conductivity of 2E-03 feet/day. Due to the relative clustering of the points, the hydraulic conductivity raster for the Upper Hawthorn confining unit was created using the Constant Median method. The APT locations and the hydraulic conductivity raster are shown in **Figure 45**.

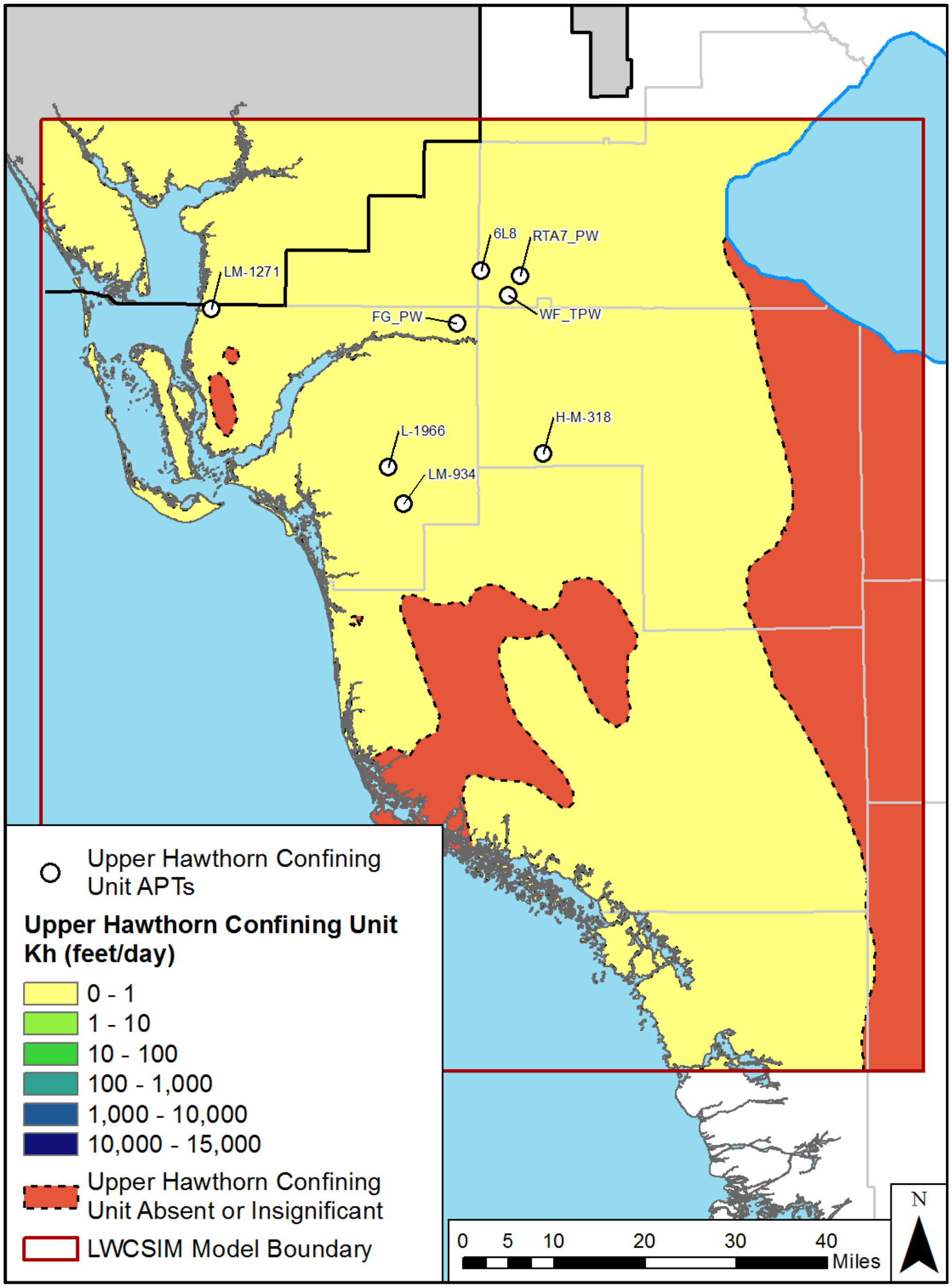

Figure 45. Hydraulic conductivity of the Upper Hawthorn confining unit (model layer 4).

5.3.5 Sandstone Aquifer

As described in Section 5.1.5, hydraulic parameters were assigned to each of the three layers of the Sandstone aquifer: the clastic zone, the interconfining unit, and the carbonate zone.

5.3.5.1 Clastic Zone of the Sandstone Aquifer

The APT review resulted in 11 reliable APTs conducted in the clastic zone of the Sandstone aquifer. The hydraulic conductivities range from 10 feet/day to 900 feet/day, with a median recommended value of 40 feet/day. The Natural Neighbor method was used to create the hydraulic conductivity raster for the clastic zone of the Sandstone aquifer. Four ghost points with values of the median hydraulic conductivity were used in the interpolation process. The APT locations and the hydraulic conductivity raster are shown in **Figure 46**.

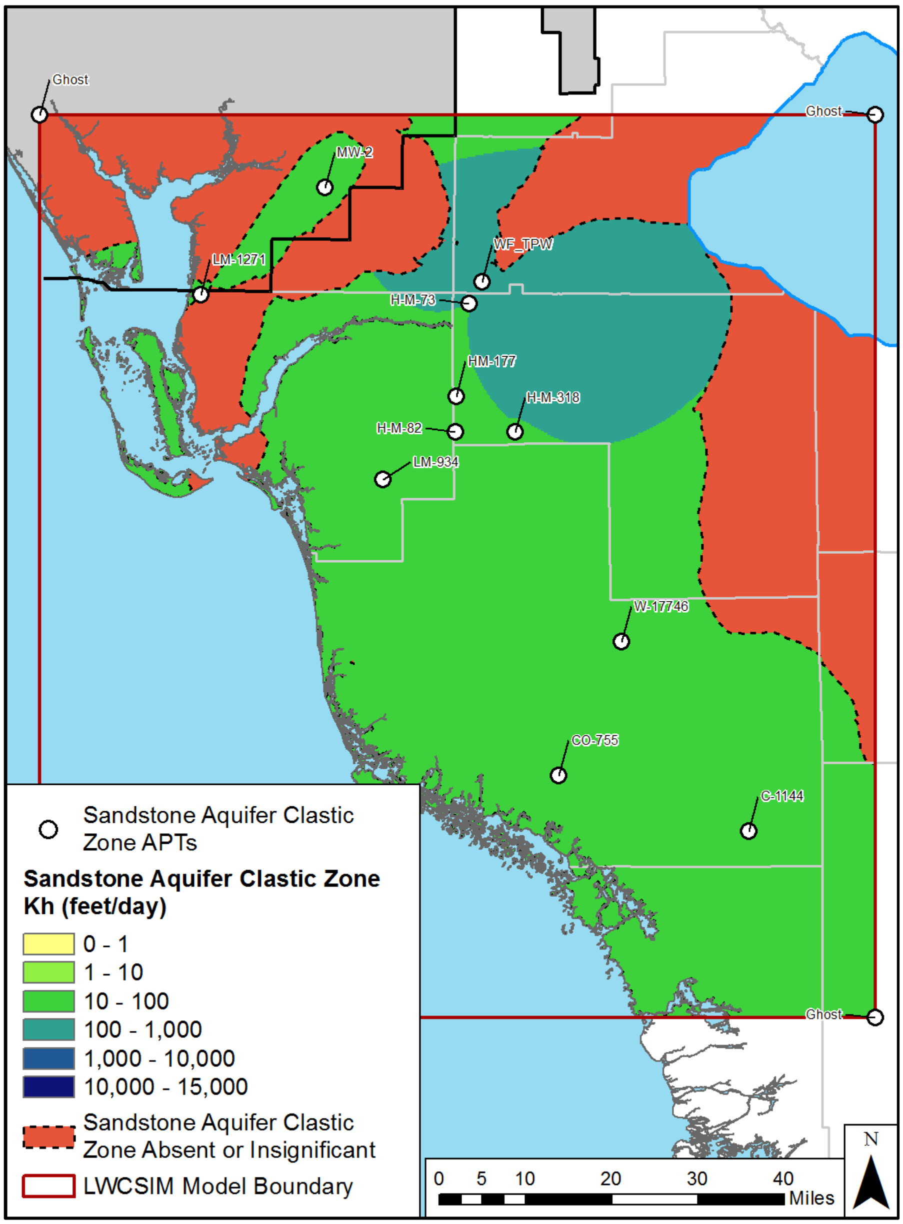

Figure 46. Hydraulic conductivity of the clastic zone of the Sandstone aquifer (model layer 5).

5.3.5.2 Sandstone Aquifer Interconfining Unit

The APT review resulted in 10 reliable tests conducted in the interconfining unit of the Sandstone aquifer. Of these 10 APTs, three of the hydraulic parameters included a leakance value. The three hydraulic conductivities calculated from the leakance values range from 4E-05 feet/day to 0.6 feet/day, with a median recommended hydraulic conductivity of 2E-04 feet/day. Due to the limited number and relative clustering of the points, the hydraulic conductivity raster for the Sandstone aquifer interconfining unit was created using the Constant Median method. The APT locations and the hydraulic conductivity raster are shown in **Figure 47**.

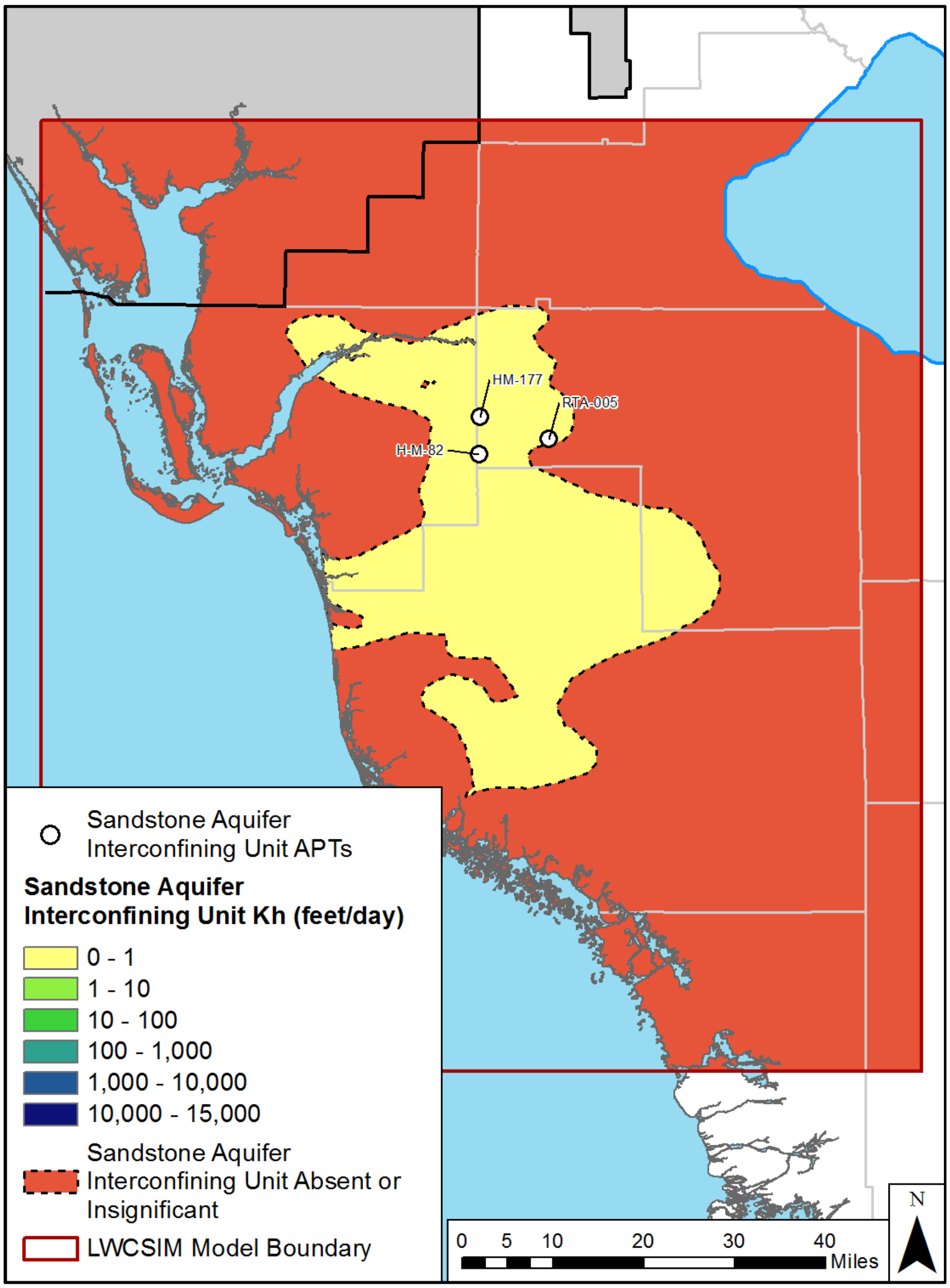

Figure 47. Hydraulic conductivity of the Sandstone aquifer interconfining unit (model layer 6).

5.3.5.3 Carbonate Zone of the Sandstone Aquifer

The APT review resulted in 10 reliable APTs conducted in the carbonate zone of the Sandstone aquifer. The hydraulic conductivities range from 3 feet/day to 40 feet/day, with a median recommended value of 30 feet/day. The Constant Median method was used to create the hydraulic conductivity raster for the carbonate zone of the Sandstone aquifer. The APT locations and the hydraulic conductivity raster are shown in **Figure 48**.

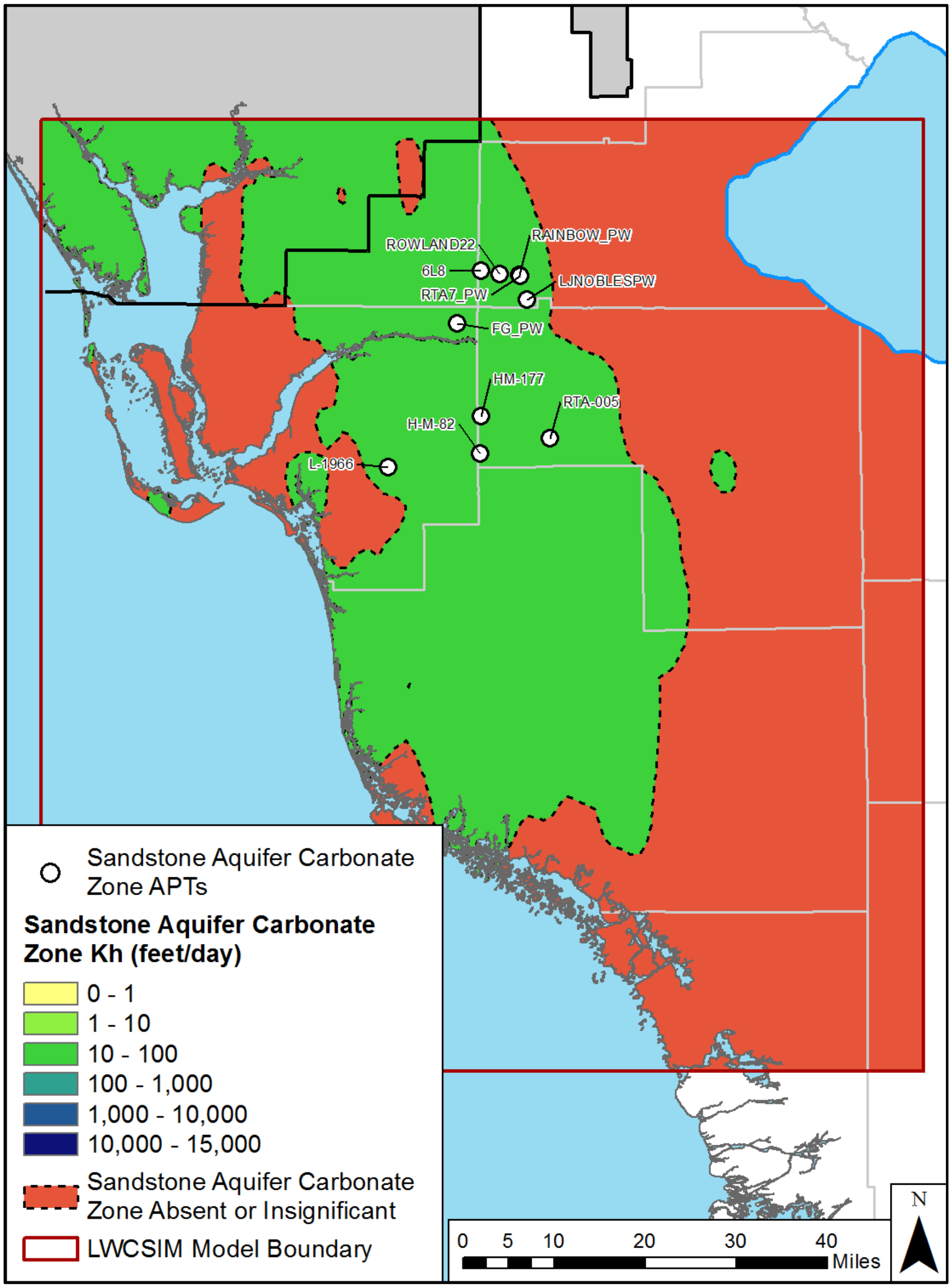

Figure 48. Hydraulic conductivity of the carbonate zone of the Sandstone aquifer (model layer 7).

5.3.6 Mid-Hawthorn Confining Unit

The APT review resulted in 14 reliable tests conducted in the Mid-Hawthorn confining unit. Of these 14 reliable APTs, five of the hydraulic parameters included a leakance value. The hydraulic conductivities calculated from the leakance values range from 9E-06 feet/day to 1 feet/day, with a median recommended hydraulic conductivity of 3E-04 feet/day. These five data points were used to create the hydraulic conductivity raster for the Mid-Hawthorn confining unit using the Constant Median method. The APT locations and the hydraulic conductivity raster are shown in **Figure 49**.

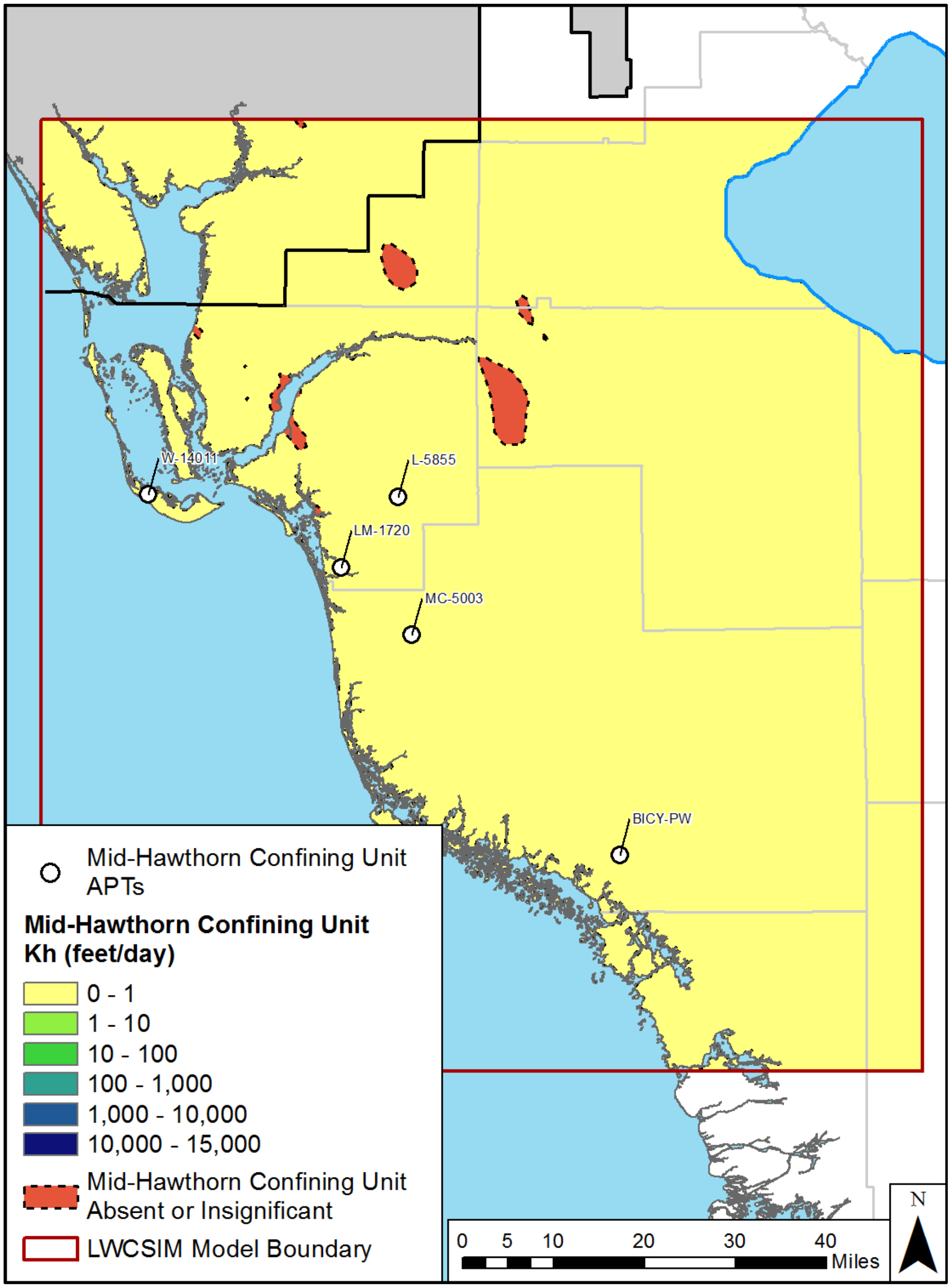

Figure 49. Hydraulic conductivity of the Mid-Hawthorn confining unit (model layer 8).

5.3.7 Mid-Hawthorn Aquifer

The APT review resulted in 13 reliable APTs conducted in the Mid-Hawthorn aquifer. The hydraulic conductivities range from 8 feet/day to 800 feet/day, with a median recommended value of 50 feet/day. The inverse distance weighted method was used to create the hydraulic conductivity raster for the Mid-Hawthorn aquifer. The APT locations and the hydraulic conductivity raster are shown in **Figure 50**.

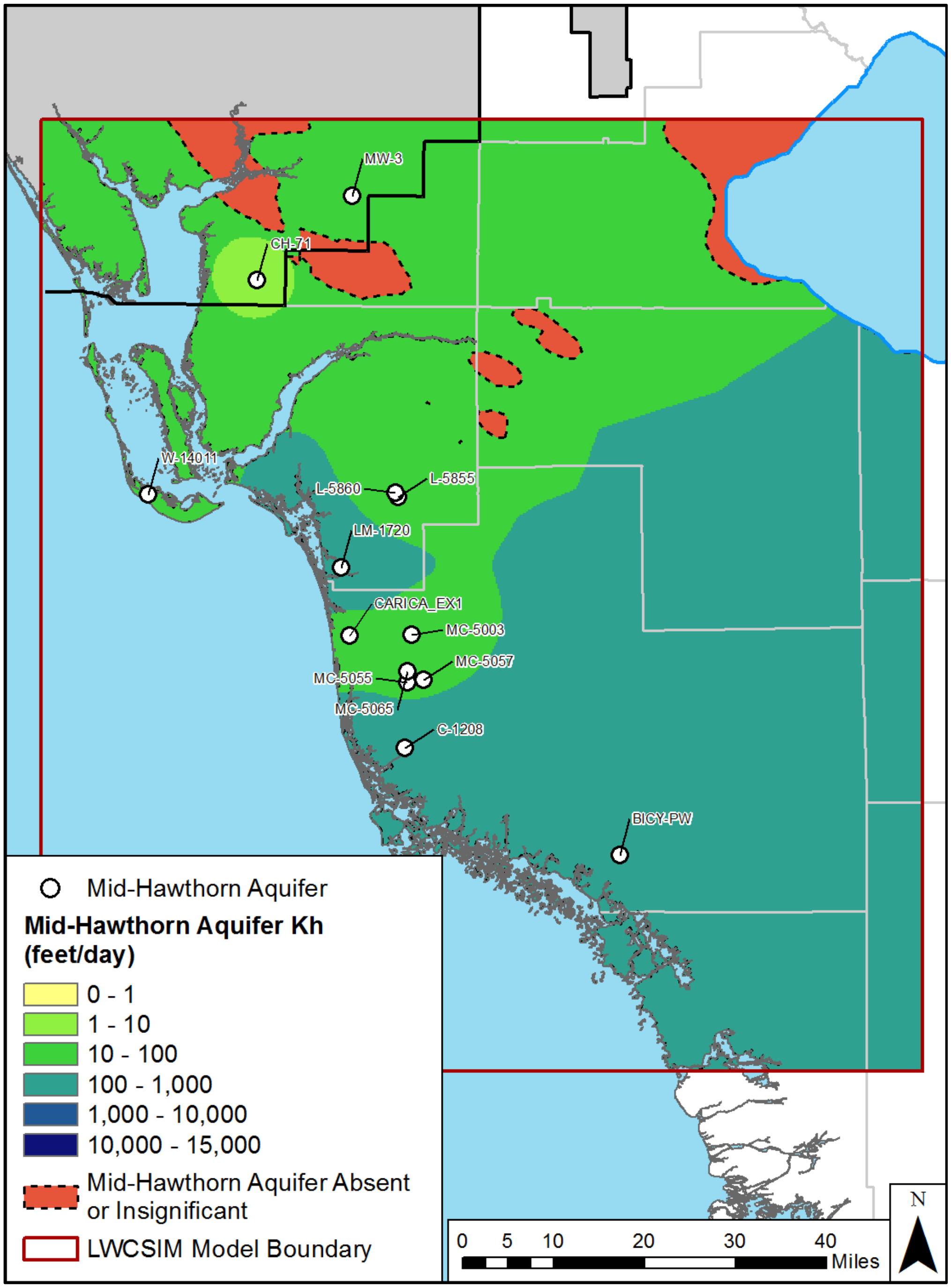

Figure 50. Hydraulic conductivity of the Mid-Hawthorn aquifer (model layer 9).

5.4 Hydraulic Conductivity Partitioning Results

The K_h of each layer pumped at wells H-M-82 and HM-177 were calculated using the equivalent K methodology described in Section 4.3.2 and are presented in **Appendix C**. The hydrostratigraphic units pumped during the APT at H-M-82 were the clastic zone of the Sandstone aquifer, the interconfining unit of the Sandstone aquifer, the carbonate zone of the Sandstone aquifer, and the Mid-Hawthorn confining unit. At well HM-177, the pumped hydrostratigraphic units were the clastic zone of the Sandstone aquifer, the interconfining unit of the Sandstone aquifer, and the carbonate zone of the Sandstone aquifer.

The resultant recommended K_h values for each hydrostratigraphic layer at H-M-82 and HM-177 are shown in the last column of **Appendix C**, Tables 2 and 5. For use during groundwater model calibration, minimum and maximum K_h values were also calculated for each hydrostratigraphic layer (refer to the last columns in **Appendix C**, Tables 3, 4, 6, and 7) at both wells using the same methodology.

6 LIMITATIONS AND RECOMMENDATIONS

This project updated and refined the understanding of the hydrogeology of the SAS and IAS of the LWC Planning Area. Hydrostratigraphic units of regional significance were mapped within the SAS and IAS. Technical uncertainties affecting the accuracy of the maps are predominantly caused by limited spatial coverage and data quality as well as the heterogeneous nature of the aquifers themselves.

Limitations and recommendations for optimizing the mapping of the SAS and IAS in the LWC Planning Area are discussed below.

- Criteria for hydrogeologic unit definitions were agreed upon at the start of this project. Within the LWC Planning Area, the accepted hydrogeologic unit definitions are generally defined based on the formational units that encompass them. This project used data from many different sources and validated that reported hydrogeologic unit boundaries conformed to the project definitions prior to use in mapping. During the data review process, enough clearly inconsistent interpretations were identified to conclude that this might be a common problem in the region. This is a particular concern in discriminating between the carbonate zone of the Sandstone aquifer and the uppermost zone of the Mid-Hawthorn aquifer.
- A helpful follow-up to this report would be to use available geophysical logs to create a correlative framework across the project area and compare the reported lithostratigraphic and hydrogeologic unit boundaries to that framework. This would provide a means to evaluate the consistency of data interpretation for the formations and the aquifer units defined based on these formations. This would also provide a valuable aid to local hydrogeologists for identifying formations, yielding more consistent data in the future.
- Additional data should be collected in eastern Collier County and western Glades County. These regions had large spatial gaps in hydrogeologic data for most layers.

Multiple permeable zones with significant hydraulic head and water quality variations have been identified within the Mid-Hawthorn aquifer in coastal Lee and Collier counties. There were insufficient data to map these permeable zones discretely across the entire project area in the 2015 hydrostratigraphic update (Geddes et al. 2015), or during this 2023 LWC hydrostratigraphic update. Hydrogeology Unit staff recommend that a focused hydrogeologic investigation be conducted to better define the continuity and extents of permeable zones within the Mid-Hawthorn aquifer. This would, however, require extensive field data collection (i.e., drilling and testing) particularly in the inland areas of the LWC Planning Area. For reliable characterization of the Mid-Hawthorn aquifer as a water supply source, it is critical for the aquifer to be more precisely characterized.

- Additional high-quality, reliable APT data should be gathered for the aquifers and confining units in the LWC Planning Area. These APTs should be designed using fully penetrating wells, be conducted for appropriate durations, and use appropriate analytical solutions. This could require additional drilling, installation, and testing of observation wells in areas where existing wells are not present. Ideally, observation wells would be completed in aquifer units and aquitards above the tested aquifer to gather additional leakance data.
- A lack of direct measurement of the leakance properties of the Tamiami confining unit hampered the assessment of that unit. It was often necessary to infer permeability from lithologic description or basic geophysical logs. Likewise, the heterogeneity of the unit necessitates a higher density of data to provide reliable mapping.
- Additional quantitative data should be collected on the hydraulic properties of the Tamiami confining unit. Future APTs of the Lower Tamiami aquifer should be performed with observation wells installed in both the Lower Tamiami aquifer and the overlying Water Table aquifer to allow direct measurement of the degree of confinement of the Lower Tamiami aquifer for improved quantification of water availability.
- Hydrogeology Unit staff recommend that several aspects of the LWC Planning Area aquifer nomenclature be revised to eliminate confusion and bring them more in-line with best practices for naming of hydrostratigraphic units as described in Special Publication No. 28 (2009 revision) of the Florida Geological Survey (Copeland et al. 2009). These include the following:
    - The Water Table aquifer is not an appropriate formal name because it has an inherent meaning that leads to confusion in some places such as where it is absent.
    - The Sandstone aquifer is not an appropriate formal name because it has an inherent meaning that leads to confusion in some places since it is often not comprised of sandstone.
    - There is some question as to whether the clastic zone and carbonate zone of the Sandstone aquifer should be lumped into a single aquifer. These two aquifer zones and the interconfining unit of the Sandstone aquifer should be mapped separately because the interconfining unit is locally quite thick and provides confinement between the two aquifer zones of the Sandstone aquifer.

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APPENDICES

APPENDIX A:
DATA USED FOR HYDROSTRATIGRAPHIC SURFACE CREATION

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
021-38	378	225	442976	617765	0	5	5	107	107	--	--	--	--	--	--
021-51	387	234	451961	608231	0	15	15	--	--	--	--	--	--	--	--
021-53	371	245	462892	624536	0	8	8	118	133	156	--	--	--	--	--
021-59	366	234	452180	629379	0	15	30	145	145	--	--	--	--	--	--
021-77	378	233	450728	617525	0	9	9	155	155	170	170	188	--	--	--
08-00001-WC	96	169	386599	899567	0	20	20	20	105	105	105	--	--	--	--
08-00002-W E1	67	191	409237	927825	0	38	38	38	76	76	76	122	--	--	--
08-00002-W E1-14	70	192	410274	925198	0	40	40	40	60	60	60	--	--	--	--
08-00002-W F5-1	73	214	431734	922648	0	50	50	50	110	110	110	140	--	--	--
08-00002-W F6-2	75	218	436220	920722	0	50	50	50	80	80	80	--	--	--	--
08-00002-W F6-3	76	218	436086	919073	0	25	26	34	--	--	--	--	--	--	--
08-00002-W G6-2	78	219	437194	917604	0	40	40	40	90	90	90	--	--	--	--
08-00002-W G6-4	77	221	438507	917880	0	40	40	40	80	80	80	--	--	--	--
08-00007-WC	106	160	377701	888788	0	20	20	20	105	105	105	--	--	--	--
08-00021-WC	108	169	387235	887461	0	20	20	20	50	50	50	--	--	--	--
08-00045-WC	107	160	378059	887938	0	40	40	40	125	125	125	--	--	--	--
08-00049-WC	101	162	379956	893909	0	30	60	70	100	100	100	--	--	--	--
08-00059-WC	108	162	380191	887584	0	20	20	20	150	150	150	--	--	--	--
08-00060-WC	106	163	380529	889353	0	10	10	10	100	100	100	--	--	--	--
08-00064-WC	38	238	455566	956855	0	21	21	21	71	71	71	--	--	--	--
08-00065-WC	45	234	451508	950399	0	17	17	17	84	84	84	--	--	--	--
08-00078-W W-10	58	237	455010	937761	0	20	20	27	90	90	90	120	--	--	--
08-00078-W W-11	55	237	455070	940408	0	26	26	26	80	80	80	110	--	--	--
08-00078-W W-21	56	239	457264	938991	0	42	42	42	143	143	143	176	--	--	--
08-00078-W W-3	57	225	442501	937882	0	27	27	27	--	--	--	--	--	--	--
08-00078-W W-5	60	225	442634	935308	0	20	20	20	80	80	80	100	290	360	--
08-00078-W W-8	59	230	447825	936365	0	30	30	30	80	80	80	100	--	--	--
08-00094-WC	36	236	453517	959584	0	10	10	10	60	60	60	--	--	--	--
08-00099-WC	103	162	380322	892562	0	20	20	20	80	80	80	--	--	--	--
08-00105-WC	39	234	451566	956601	0	10	10	10	60	60	60	--	--	--	--
08-00109-WC	41	237	454594	953869	0	20	20	20	80	80	80	--	--	--	--
08-00116-WC	45	237	454978	950552	0	20	20	20	40	40	40	--	--	--	--
08-00121-WC	95	180	397788	900542	0	40	40	40	90	90	90	--	--	--	--
08-00122-W JE-1726	93	199	416545	902263	0	40	40	40	--	--	--	--	--	--	--
08-00122-W PW-1	92	201	418672	903326	0	30	30	30	--	--	--	--	--	--	--
08-00122-WC	104	160	377874	891085	0	30	30	30	30	30	--	--	--	--	--
08-00124-WC	51	228	446131	944498	0	25	25	25	65	65	65	--	--	--	--
08-00125-WC	90	167	385347	904907	0	40	40	40	135	135	135	--	--	--	--
08-00128-WC	92	165	383059	903635	0	70	70	70	93	93	93	--	--	--	--
08-00130-WC	98	167	384546	897434	0	50	50	50	150	150	150	--	--	--	--
08-00132-WC	97	180	397628	898213	0	60	60	60	160	160	160	--	--	--	--
08-00135-WC	104	168	386290	891661	0	40	40	40	120	120	120	--	--	--	--
08-00143-WC	95	177	395423	900612	0	50	50	50	135	135	135	--	--	--	--
08-00148-WC	46	232	449841	949154	0	25	25	25	80	80	80	--	--	--	--
08-00154-W W-1	105	163	380485	890415	0	40	40	40	--	--	--	--	--	--	--
08-00168-WC	75	197	414529	920091	--	--	140	140	140	140	140	--	--	--	--
08-00170-WC	104	186	404211	890967	0	50	50	50	130	130	130	--	--	--	--
08-00171-WC	98	181	399045	897117	0	40	40	40	90	90	90	120	140	--	--
08-00172-WC	105	197	414971	890582	0	30	30	30	70	120	140	--	--	--	--
08-00173-WC	101	207	425000	894350	0	40	40	40	120	140	140	--	--	--	--
08-00175-WC	43	234	451858	952708	0	20	20	20	60	60	60	--	--	--	--
08-00177-WC	40	234	452154	954962	0	20	20	20	60	60	60	--	--	--	--
08-00178-WC	39	236	453475	956288	0	20	20	20	60	60	60	--	--	--	--
08-00183-WC	94	176	394281	900965	0	40	40	40	130	130	130	--	--	--	--
11-00084-W 2	267	303	520579	727970	0	40	90	140	140	--	--	--	--	--	--
11-00084-W 7	271	303	520815	723812	0	46	78	97	94	225	260	320	--	--	--
11-00113-W Litho Test Boring	246	264	482270	749332	0	42	61	145	--	--	--	--	--	--	--
11-00151-W ATW-1 (SZMW-1)	278	191	409186	717011	0	32	59	133	133	157	157	190	258	360	411
11-00249-W 1	311	235	452956	684312	0	27	51	--	--	--	--	--	--	--	--
11-00249-W 17	311	242	459860	684150	0	32	74	122	--	--	--	--	--	--	--
11-00249-W 18	311	243	461189	684150	0	37	80	126	--	--	--	--	--	--	--
11-00249-W 19	311	245	462576	684150	0	40	83	129	--	--	--	--	--	--	--
11-00249-W 2	311	236	454256	684262	0	27	50	99	--	--	--	--	--	--	--
11-00249-W 21	313	240	457846	681947	0	26	52	104	--	--	--	--	--	--	--
11-00249-W 22	314	240	457846	681405	0	26	54	--	--	--	--	--	--	--	--
11-00249-W 23	315	240	457864	680682	0	27	55	104	--	--	--	--	--	--	--
11-00249-W 24	316	240	457864	679583	0	30	56	105	--	--	--	--	--	--	--
11-00249-W 3	311	238	455556	684562	0	27	50	99	--	--	--	--	--	--	--
11-00249-W 31	299	239	457085	696593	0	48	83	--	--	--	--	--	--	--	--
11-00249-W 32	298	239	457085	697624	0	47	83	119	--	--	--	--	--	--	--
11-00249-W 33	311	234	451478	684299	0	27	67	116	--	--	--	--	--	--	--
11-00249-W 34	296	239	457093	699142	0	43	83	--	--	--	--	--	--	--	--
11-00249-W 37	294	239	457112	701337	0	40	91	149	--	--	--	--	--	--	--
11-00419-W PW-5	283	246	464034	712149	0	8	28	38	67	117	117	167	--	--	--
11-00440-W Test Hole	227	282	500372	768605	0	68	68	68	--	--	--	--	--	--	--
11-0084-W 8	273	303	520886	722489	0	23	46	90	98	191	221	276	--	--	--
11-01194-W 9	268	253	470664	727339	0	55	76	--	--	--	--	--	--	--	--
11-01577-W New Well	302	192	409788	693710	0	30	50	--	--	--	--	--	--	--	--
11-01771-W MW-2	232	300	518375	763755	0	64	64	64	--	--	--	--	--	--	--
11-01771-W MW-3	227	305	523357	767899	0	49	49	49	105	135	135	--	--	--	--
11-01771-W MW-4	227	313	531055	767966	0	42	42	42	--	--	--	--	--	--	--
11-01771-W MW-6	213	309	527432	782095	--	--	--	--	114	158	168	--	--	--	--
11-02032-W 554	274	215	432935	721359	0	12	32	--	--	--	--	--	--	--	--
11-02046-W TW-1	292	195	413015	702827	0	18	48	--	--	--	--	--	--	--	--
11-02046-W TW-2	292	196	413557	702820	0	10	48	--	--	--	--	--	--	--	--
11-02233-W DW-1	289	209	426618	705947	0	48	72	--	--	--	--	--	--	--	--
11-02233-W DW-3	283	210	427595	712610	0	39	65	--	--	--	--	--	--	--	--
11-02233-W DW-6	276	209	426531	718838	0	48	69	--	--	--	--	--	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
11-03069-W SS-1	283	193	410524	711860	0	30	50	110	110	--	--	--	--	--	--
11-03069-W SS-2	281	192	410379	714357	0	20	50	110	110	--	--	--	--	--	--
11-03069-W WT-1	287	194	412299	708697	0	21	--	--	--	--	--	--	--	--	--
11-03069-W WT-2	280	191	409161	714851	0	25	--	--	--	--	--	--	--	--	--
11-03069-W WT-4	138	310	528159	857309	0	15	15	15	185	195	--	--	--	--	--
11-03434-W GIW-1	269	162	379731	726305	0	20	75	--	--	--	--	--	--	--	--
11-03494-W RW-1	340	202	419821	655204	0	15	43	--	--	--	--	--	--	--	--
11-03510-W Well-1 SUPPLY	421	199	416863	574040	0	60	60	--	--	--	--	--	--	--	--
11-03639-W DMW-2	254	261	478666	741183	0	25	60	98	110	235	235	280	310	390	440
11-03818-W Well 1	254	245	463399	741677	0	30	57	--	--	--	--	--	--	--	--
11-03887-W RW-1	279	191	409206	715816	0	12	50	--	--	--	--	--	--	--	--
11-04000-W Well-1	279	190	407466	715838	0	45	75	--	--	--	--	--	--	--	--
11-04009-W W-4	289	229	447022	705832	0	24	45	--	--	--	--	--	--	--	--
11-04009-W Well-1	290	215	433252	705535	0	22	40	--	--	--	--	--	--	--	--
11-04009-W Well-2	290	222	439953	705532	0	20	45	--	--	--	--	--	--	--	--
11-04009-W Well-3	290	226	444342	705772	0	20	60	--	--	--	--	--	--	--	--
11-04009-W Well-5	289	234	452086	706156	0	14	70	--	--	--	--	--	--	--	--
20-823	61	175	393151	934489	0	--	--	54	--	--	--	--	--	--	--
22-00073-W PW-2	105	287	504785	890211	0	10	10	10	82	82	82	--	--	--	--
22-00205-W Well-1	102	279	497436	892987	0	19	28	40	100	100	100	130	--	--	--
22-00214-W MH-1	125	364	582117	870103	0	20	65	90	--	--	--	--	--	--	--
22-00245-W P-2	12	353	571220	983773	--	--	Absent	Absent	Absent	Absent	Absent	Absent	448	473	781
22-00574-W W-1	72	374	591538	922883	0	50	75	--	--	--	--	--	--	--	--
22-GW6SS	114	171	389008	881089	0	15	15	27	86	--	--	--	--	--	--
26-00080-W SS-1	135	304	521760	860692	0	20	20	20	160	190	--	--	--	--	--
26-00080-W SS-2	135	301	519157	860136	0	20	20	20	150	175	190	210	--	--	--
26-00080-W SS-4	140	307	524695	855380	0	20	20	20	215	280	--	--	--	--	--
26-00080-W SS-6	139	310	527500	855838	0	--	--	--	185	210	230	257	--	--	--
26-00107-W A1A	240	350	568080	754996	0	7	14	88	--	--	--	--	--	--	--
26-00107-W B2B	245	358	575850	749881	0	15	15	89	--	--	--	--	--	--	--
26-00121-W SSA#4	188	283	500870	807562	0	18	61	97	155	172	172	--	--	--	--
26-00151-W 15R	150	298	515602	845557	0	16	30	60	--	--	180	--	--	--	--
26-00151-W 18R	153	304	522352	842515	0	15	--	--	150	150	150	--	--	--	--
26-00151-W 2 (old 3)	154	310	527856	841100	0	20	20	20	--	--	--	--	--	--	--
26-00151-W 3 (old 4)	151	313	531177	844716	0	10	10	20	160	211	211	226	--	--	--
26-00151-W 3R	154	308	526201	841581	0	20	--	--	--	--	--	--	--	--	--
26-00151-W 9 (old 18)	153	305	522533	841798	0	12	12	15	150	180	180	--	--	--	--
26-00265-W S-1	129	289	507103	866681	0	3	3	3	130	180	180	--	--	--	--
26-00265-W S-5R	135	294	511554	860178	0	25	25	25	100	112	118	--	--	--	--
26-00315-W 16	161	352	569841	834436	0	10	--	--	--	--	--	--	--	--	--
26-00315-W 18	164	353	570782	831375	0	4	7	60	--	--	--	--	--	--	--
26-00315-W 20	164	352	569497	831583	0	3	10	25	--	--	--	--	--	--	--
26-00655-W Well-3	215	417	634660	780780	0	30	65	--	--	--	--	--	--	--	--
26-00665-W Well 1 Panther Tracts	292	371	588823	702901	0	10	50	--	--	--	--	--	--	--	--
26-00665-W Well 2 Panther Tracts	295	369	587016	700287	0	25	50	--	--	--	--	--	--	--	--
26-01148-W Well 1	130	388	605826	865667	0	10	50	--	--	--	--	--	--	--	--
26-01190-W P-10	179	424	641613	815956	0	47	57	--	--	--	--	--	--	--	--
26-01190-W P-17	178	413	630752	817273	0	40	105	--	--	--	--	--	--	--	--
26-01190-W P-18	179	410	627538	815958	0	25	100	--	--	--	--	--	--	--	--
26-01190-W P-19	183	412	630426	812158	0	20	70	--	--	--	--	--	--	--	--
26-01190-W P-4	176	432	650030	819136	0	22	35	--	--	--	--	--	--	--	--
26-01190-W P-5	178	428	645744	816842	0	9	52	--	--	--	--	--	--	--	--
26-01190-W P-8	184	431	649293	811269	0	16	74	--	--	--	--	--	--	--	--
26-01190-W P-9	184	424	641985	811184	0	14	53	--	--	--	--	--	--	--	--
26-01191-W Well #1	166	378	595997	829565	0	30	105	--	--	--	--	--	--	--	--
26-01203-W Wellsan	119	280	497760	875911	0	10	25	35	120	--	--	--	--	--	--
26-01227-W Well 1	131	387	605279	864450	0	20	60	--	--	--	--	--	--	--	--
26-01233-W W-1	145	296	514208	850252	0	10	10	20	150	--	--	--	--	--	--
26-01236-W Well	118	369	586482	877443	0	30	60	90	120	--	--	--	--	--	--
26-01249-W W-1	127	387	604452	868435	0	10	--	--	--	--	--	--	--	--	--
26-01254-W W-1	232	458	675499	763081	0	20	40	40	--	--	--	--	--	--	--
26-01261-W Well-1	129	389	607055	866410	0	20	60	60	--	--	--	--	--	--	--
26-01262-W W-1	107	296	513589	887983	0	10	10	10	64	64	--	--	--	--	--
28-00635-W Well-1	2	278	496300	993482	0	35	35	35	105	--	--	--	--	--	--
36-00445-W W-12	245	175	392671	750440	0	12	15	30	81	140	140	140	--	--	--
36-02992-W Well 2	197	144	361689	798239	0	14	14	14	120	130	--	--	270	--	--
36-02998-W LHA-BIC	137	52	270200	858374	0	26	26	62	120	140	140	140	336	383	--
36-03730-W 2C	206	117	334620	789568	0	20	20	60	60	60	60	60	190	240	--
36-04006-W HH-SA	134	216	434340	861350	0	5	5	5	70	--	--	--	--	--	--
36-04122-W SG-T8	220	165	383309	775297	0	10	12	60	112	--	--	163	208	340	545
36-04259-W LWH-1	223	173	391029	771854	0	9	9	40	71	100	100	100	315	335	--
36-04340-W MW-3R	133	202	419690	862193	--	--	94	94	94	110	135	161	302	317	494
36-04435-W CSF-SSA	149	184	402415	846036	0	6	6	30	88	--	--	--	--	--	--
36-04806-W LH-1	177	184	401752	818234	0	--	--	--	--	--	--	135	231	317	527
36-04806-W SS-1	177	184	401752	818234	0	10	12	20	80	110	110	--	--	--	--
36-04806-W SS-5	182	186	404334	813705	0	5	--	--	--	--	173	182	370	405	527
36-05126-WWell-1	149	174	392351	846404	0	30	30	30	94	--	--	--	--	--	--
36-05982-W W5	255	186	403962	740478	0	10	18	35	--	--	--	--	--	--	--
36-06743-W IS-1	199	112	330010	795930	0	20	Absent	Absent	Absent	Absent	Absent	Absent	--	--	--
36-08246-W W-1R	182	172	390060	813012	0	20	20	20	--	--	--	--	--	--	--
36-08584-W PW-1	165	178	396089	830308	0	35	35	35	90	--	--	--	--	--	--
36-08760-W Well-1	203	178	396094	792592	0	8	--	--	70	--	--	--	--	--	--
36-08787-W W-1	270	182	399465	724867	0	18	20	35	--	--	--	--	--	--	--
36-08893-W Well 1	184	234	451618	811023	0	7	18	50	64	--	--	--	--	--	--
36-09026-W W-1	173	167	384715	822388	0	35	35	35	95	--	--	180	--	--	--
36-09179-W Well 1	183	160	378370	812411	0	12	12	12	80	115	140	--	--	--	--
36-09378-W Well 1	244	167	385303	751360	0	15	15	15	110	145	145	145	--	--	--
37-GW5	143	247	465329	852000	0	5	--	--	--	--	--	--	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
37-GW6	137	246	464255	857912	0	12	--	--	--	--	--	--	--	--	--
40-GW22SS	169	205	422914	826340	0	31	35	44	--	--	--	--	--	--	--
6L8	89	256	473486	906563	0	20	20	30	120	120	120	--	--	--	--
ALLY-TW	327	497	714531	668029	0	48	60	180	180	180	180	180	460	572	917
AM-PW1	265	292	510170	730207	0	23	47	--	--	--	--	--	--	--	--
BCSR-PWS1	275	446	663997	720457	0	30	50	--	--	--	--	--	--	--	--
BCSR-PWS3	275	441	664506	719966	0	35	45	--	--	--	--	--	--	--	--
BICY-MZ1	428	337	554461	567205	0	0	0	35	150	285	285	285	470	545	820
BONSP_ROI1	264	191	408963	731293	0	20	50	100	100	157	194	240	410	503	614
BS_WRF_IW1	253	175	392920	742467	0	50	90	130	130	150	150	150	210	320	560
BSU-MW	107	100	318216	887840	0	25	25	25	134	152	152	152	204	268	485
C-1004R	290	183	400993	705735	0	15	52	--	--	--	--	--	--	--	--
C-1072	279	338	555769	716091	0	12	27	49	49	221	247	310	370	405	680
C-1074	236	349	567054	759277	0	0	20	80	--	--	--	--	--	--	--
C-1077	217	319	536472	778739	0	36	58	100	100	210	210	--	--	--	--
C-1091	336	321	538868	659696	0	4	7	76	76	185	185	310	430	540	--
C-1102	372	210	427772	623496	0	15	15	165	165	205	205	205	350	528	660
C-1103	329	214	431463	666184	0	15	30	170	170	170	170	170	290	400	640
C-1104	404	200	418384	591642	0	40	40	180	180	230	230	230	320	550	700
C-1106	411	204	422363	584755	0	--	--	--	--	--	--	--	330	546	--
C-1124	301	345	563366	694467	0	5	60	180	180	--	--	--	--	--	--
C-1134	439	465	683274	556568	0	10	10	82	--	--	--	--	--	--	--
C-1135	439	435	652697	555818	0	0	18	43	116	130	--	--	--	--	--
C-1136	440	405	623193	555730	0	2	2	53	--	--	--	--	--	--	--
C-1137	427	364	582385	568501	0	0	0	35	78	138	--	--	--	--	--
C-1138	396	463	680530	599236	0	20	52	109	--	--	--	--	--	--	--
C-1138	389	468	685607	606615	0	--	52	109	115	137	137	137	--	--	--
C-1139	327	416	633551	668324	0	40	92	148	148	148	148	148	--	--	--
C-1140	398	359	576685	596881	0	6	9	55	61	164	164	164	--	--	--
C-1142	303	414	632199	692354	0	0	58	117	--	--	--	--	--	--	--
C-1154	275	326	544247	719927	0	0	40	80	80	--	--	--	--	--	--
C-1157	309	443	660721	685956	0	50	70	150	--	--	--	--	--	--	--
C-1169	309	461	678820	686295	0	5	75	139	--	--	--	--	--	--	--
C-1173	330	415	632753	665568	0	0	65	115	--	--	--	--	--	--	--
C-1176	367	352	569629	627789	0	0	8	42	--	--	--	--	--	--	--
C-1178	299	341	559297	695961	0	3	55	144	144	--	--	--	--	--	--
C-1180	427	332	549875	567963	0	0	6	45	53	130	--	--	--	--	--
C-1181	329	372	590298	666521	0	10	42	99	163	182	--	--	--	--	--
C-1182	328	442	659720	667378	0	4	74	125	--	--	--	--	--	--	--
C-1207	365	211	428901	629951	0	20	--	--	--	--	--	--	290	545	575
C-1208	366	212	429768	629750	0	25	25	120	148	194	194	194	290	540	740
C-1242	286	191	409200	708919	0	20	55	102	127	145	145	155	250	454	610
C-1244	251	265	483352	744291	0	34	62	--	--	--	--	--	--	--	--
C-1245	254	267	484524	741560	0	40	72	--	--	--	--	--	--	--	--
C139_MW16D	266	463	681274	729089	0	30	50	--	--	--	--	--	--	--	--
C139_MW4D	249	460	677603	746038	0	22	26	--	--	--	--	--	--	--	--
C139A10	255	446	664190	740358	0	25	--	--	--	--	--	--	--	--	--
C139A14D	265	450	668169	730007	0	21	36	--	--	--	--	--	--	--	--
C139A4D	249	453	670672	745999	0	21	36	--	--	--	--	--	--	--	--
C-2034	337	266	484213	658235	0	28	35	76	90	152	152	170	--	--	--
C-2038D2	253	240	457789	742486	0	30	65	110	115	190	210	--	--	--	--
C2044	370	288	506150	625137	0	46	70	120	120	135	166	240	370	--	--
C2045	426	339	557334	569013	0	0	3	50	--	--	--	--	--	--	--
C2046	298	280	497638	697086	0	60	90	160	160	180	--	--	--	--	--
C2054	232	291	508887	763783	0	100	100	100	135	150	220	300	--	--	--
C2055	237	315	532869	758354	0	50	50	50	130	160	160	230	490	--	--
C2057	290	191	409096	705687	0	20	54	125	125	140	--	--	--	--	--
C2060	276	228	445851	719523	0	10	10	80	110	200	240	270	360	--	--
C2062	282	259	477400	712816	0	55	55	55	65	135	135	150	320	--	--
C-298	237	308	526050	758172	0	--	--	--	130	180	180	--	--	--	--
C-308	333	351	568854	662350	0	--	24	66	--	--	--	--	--	--	--
C-391	320	178	396377	675542	0	18	50	--	--	--	--	--	--	--	--
C-531	214	288	506314	781662	0	15	35	35	35	96	190	250	390	--	--
C-575	308	176	393532	687130	0	25	44	--	--	--	--	--	340	--	--
C-578	228	269	487019	767571	0	40	40	55	90	210	220	235	--	--	--
C-684	282	309	526730	713242	0	30	50	60	60	160	223	320	400	--	--
C-687	232	282	500066	763006	0	--	--	--	--	--	249	310	--	--	--
C-688	280	243	460783	715484	0	27	63	110	110	--	--	204	--	--	--
C-712	284	277	494778	711432	0	50	75	135	135	170	232	270	345	--	--
C-753	203	295	512891	792139	0	18	29	112	112	179	179	314	348	413	650
C-781	220	340	558001	775754	0	--	--	--	--	--	--	--	--	--	1050
C-817	296	335	553180	699235	0	10	70	--	--	--	--	--	--	--	--
C-819	296	338	556274	698824	0	10	75	--	--	--	--	--	--	--	--
C-823	299	339	556450	695997	0	--	60	--	--	--	--	--	--	--	--
C-838	318	347	564786	676898	0	0	10	106	114	--	--	--	--	--	--
C-843	302	346	564274	693455	0	5	50	175	175	--	--	--	--	--	--
C-851	285	316	533639	710595	0	--	22	32	--	--	--	--	--	--	--
C-872	307	341	559073	688520	0	0	65	140	140	--	--	--	--	--	--
C-963	259	242	459849	735812	0	40	55	130	130	160	225	325	--	--	--
C-965	258	325	543356	737020	0	50	95	125	125	--	--	--	--	--	--
C-974_G	331	260	477743	664755	0	--	80	130	130	--	--	164	330	--	--
C-977	333	226	444137	662353	0	33	41	--	--	--	--	--	--	--	--
CARICA_EX1	300	180	397860	694817	0	35	37	122	148	161	161	175	284	400	--
CCBRY-1	140	256	474404	855773	0	12	12	12	65	115	126	187	187	187	480
CCGG-PW10	306	239	457086	689152	0	28	70	112	--	--	--	--	--	--	--
CCGG-PW11	305	239	457086	690612	0	33	54	137	137	--	--	--	--	--	--
CCGG-PW12	304	239	457086	691602	0	38	64	--	--	--	--	--	--	--	--
CCGG-PW13	303	239	457086	692592	0	25	44	131	131	--	--	--	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
CCGG-PW14	302	239	457086	693582	0	44	78	--	--	--	--	--	--	--	--
CCGG-PW15	301	239	457086	694572	0	49	74	130	--	--	--	--	--	--	--
CCGG-PW6	310	239	457086	685212	0	27	59	101	--	--	--	--	--	--	--
CCGG-PW7	309	239	457086	686212	0	24	44	106	--	--	--	--	--	--	--
CCGG-PW8	308	239	457086	687112	0	26	63	106	--	--	--	--	--	--	--
CCGG-PW9	307	239	457086	688162	0	27	61	114	--	--	--	--	--	--	--
CCRO-10A	178	106	323631	817186	0	23	23	23	23	23	23	23	115	193	413
CCRO-10N	140	114	332335	854997	0	30	30	30	30	30	30	30	170	240	565
CCRO-11N	140	117	335075	855027	0	30	30	30	30	30	30	30	160	300	630
CCRO-12N	161	125	342733	834556	0	30	30	30	30	30	30	30	145	265	620
CCRO-13N	141	119	337309	854686	0	30	30	30	30	30	30	30	140	170	643
CCRO-14N	135	107	324510	859894	0	30	30	30	30	30	30	30	140	250	450
CCRO-15N	135	108	325716	860146	0	20	20	20	20	20	20	20	230	350	450
CCRO-16N	135	111	328900	860092	0	30	30	30	30	30	30	30	130	220	430
CCRO-17N	135	112	329880	860193	0	30	30	30	30	30	30	30	140	250	444
CCRO-18N	137	112	330397	858252	0	50	50	50	50	50	50	50	140	230	460
CCRO-225	160	109	326927	835100	0	30	30	30	30	30	30	30	105	202	368
CCRO-22N	136	128	345574	859772	0	25	25	25	25	25	25	25	150	280	420
CCRO-4N	135	130	347604	859815	0	30	30	30	30	30	30	30	140	200	542
CCRO-7N	140	109	326898	855149	0	20	30	60	60	60	60	60	150	200	650
CCRO-9N	140	113	330839	855064	0	20	20	20	20	20	20	20	150	210	587
CCUEP-IW-2	34	100	318258	961260	0	30	30	30	30	30	30	30	360	380	463
CFTP-19	220	449	666700	775700	0	60	60	140	--	--	--	--	--	--	--
CFTP-20	218	451	669100	776950	0	25	60	145	145	145	145	145	--	--	--
CG-IRA2	254	319	537016	740993	0	30	70	110	--	--	--	--	--	--	--
CG-IRF2	269	319	536676	726533	0	30	72	110	--	--	--	--	--	--	--
CH-313	101	124	341510	894659	0	38	38	38	110	110	110	130	163	220	440
CH-316	35	134	351543	960707	0	--	--	--	--	--	--	--	118	118	364
CH-318	59	25	243045	936526	0	40	50	55	70	70	70	120	150	180	310
CH324	99	187	405171	896627	0	40	40	40	--	--	--	--	177	--	--
CH-353	46	191	409021	949516	0	80	80	80	--	--	--	--	--	--	--
CH-369	79	249	467061	916290	0	20	20	30	--	--	--	--	--	--	--
CH-372	95	238	455755	900692	0	35	35	35	--	--	--	--	--	--	--
CH-446	103	103	320858	892475	0	42	--	--	--	--	--	--	--	--	--
CH-71	94	126	343753	901096	0	40	--	--	103	150	--	--	160	220	--
CH-72	97	125	342565	898465	0	42	--	--	--	--	--	--	--	--	--
CH-R5	45	175	392978	949940	0	69	69	69	128	128	128	230	433	608	711
CHS-PW	120	463	680854	875394	0	20	60	118	136	158	158	175	--	--	--
CH-TR12	83	118	336121	912575	0	42	42	42	155	155	155	166	211	258	520
CLEW_IW-1	127	457	674630	868696	0	70	70	210	210	210	210	210	490	641	990
CLEWRO-PW1	120	458	676275	875749	0	65	105	196	196	196	196	196	350	475	680
CLEWRO-PW3	120	460	678404	875303	0	36	--	169	169	169	169	169	370	506	725
CLEWRO-PW4	120	462	679528	875647	0	25	60	199	199	199	199	199	395	552	770
CO-1044	311	240	458086	683892	0	30	55	--	--	--	--	--	--	--	--
CO-1302	300	238	456409	695107	0	45	73	--	--	--	--	--	--	--	--
CO-1305	312	254	471836	683224	0	50	80	--	--	--	--	--	--	--	--
CO-1309	294	237	454615	700871	0	49	78	--	--	--	--	--	--	--	--
CO-1311	311	224	442059	684273	0	36	70	--	--	--	--	--	--	--	--
CO-1312	306	224	441904	689625	0	29	65	--	--	--	--	--	--	--	--
CO-1313	317	233	451320	678371	0	45	80	--	--	--	--	--	--	--	--
CO-1319	311	239	456720	683899	0	30	40	--	--	--	--	--	--	--	--
CO-1351	330	223	440962	665397	0	53	57	142	--	--	--	--	--	--	--
CO-1362	300	239	457048	695508	0	52	82	--	--	--	--	--	--	--	--
CO-152	370	206	424159	624997	0	3	6	118	118	--	--	--	--	--	--
CO-156	367	208	426300	627800	0	20	30	--	--	--	--	--	--	--	--
CO-1643	287	223	440632	708210	0	63	95	--	--	--	--	--	--	--	--
CO-1655	284	248	465658	711133	0	31	57	--	--	--	--	--	--	--	--
CO-1977	374	228	446419	621651	0	20	27	--	--	--	--	--	--	--	--
CO-1984	305	223	441158	689860	0	14	14	32	--	--	--	--	--	--	--
CO-1990	317	240	457788	678441	0	52	68	--	--	--	--	--	--	--	--
CO-1991	312	249	467411	683600	0	50	68	--	--	--	--	--	--	--	--
CO-1993	283	239	456980	712464	0	15	42	--	--	--	--	--	--	--	--
CO-2115	298	182	399698	697634	0	--	43	123	123	--	--	--	--	--	--
CO-2117	300	184	401962	695701	0	32	38	--	--	--	--	--	--	--	--
CO-217	368	205	422716	627732	0	--	--	--	--	--	--	--	--	--	--
CO-221	284	199	416923	710916	0	30	56	165	246	--	--	--	--	--	--
CO-224	284	202	419543	710999	0	37	--	--	--	--	--	--	--	--	--
CO-2752	300	222	439474	695292	0	--	42	--	--	--	--	--	--	--	--
CO-2753	300	218	436287	695207	0	--	42	182	--	--	--	--	--	--	--
CO-2760	300	228	445848	695360	0	--	37	139	--	--	--	--	--	--	--
CO-295	283	201	419288	711975	0	12	14	--	--	--	--	--	--	--	--
CO-296	282	200	417514	713421	0	10	15	--	--	--	--	--	--	--	--
CO-297	300	199	417422	695429	0	15	20	--	--	--	--	--	--	--	--
CO-33	339	188	406009	656097	0	12	20	167	--	--	--	--	--	--	--
CO-488	336	194	412410	659694	0	0	11	120	--	--	--	--	--	--	--
CO-523	273	169	386746	722654	0	28	--	--	--	--	--	--	--	--	--
CO-547	289	207	425239	706271	0	70	--	--	--	--	--	--	--	--	--
CO-548	290	212	430424	705638	0	50	85	--	--	--	--	--	--	--	--
CO-744	288	309	527009	707051	0	18	20	45	--	--	--	--	--	--	--
CO-753	211	304	521725	784692	0	25	--	--	--	--	--	--	--	--	--
CO-755	211	303	521336	783812	0	15	20	50	110	167	167	--	--	--	--
CO-912	354	184	402005	641681	0	16	22	128	--	--	--	--	--	--	--
CO-914	352	190	408396	643259	0	0	8	125	--	--	--	--	--	--	--
CO-931	284	307	524694	711454	0	28	40	--	--	--	--	--	--	--	--
CO-96	283	199	417087	712036	0	30	53	--	--	--	--	--	--	--	--
CO-961	308	182	400001	687534	0	--	43	--	--	--	--	--	--	--	--
COLUFA-2	124	287	504488	871670	0	30	30	30	157	201	201	226	273	329	600
COLUFA-3	124	286	503488	871670	0	40	40	40	120	190	190	230	280	290	575

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
CPG-4	30	231	449362	965643	0	20	20	20	115	115	115	135	309	350	509
CPS2ASRTPW	178	116	333955	817137	0	20	20	20	20	20	20	20	160	240	380
CPS4_SZMW2	169	123	341026	826679	0	20	20	20	20	20	20	20	120	210	460
CR00002	355	195	413002	640742	0	--	54	114	114	155	--	--	--	--	--
CR00006	350	208	426431	645716	0	60	70	160	--	--	--	--	--	--	--
CR00007	313	210	428267	681952	0	10	42	92	--	--	--	--	--	--	--
CR00008	301	213	430880	693954	0	35	51	123	123	153	--	--	--	--	--
CR00010	312	187	404593	683500	0	10	40	80	110	--	--	--	--	--	--
CR00011	332	189	407206	662886	0	5	12	90	108	--	--	--	--	--	--
CR00012	387	228	446211	608157	0	--	47	93	93	139	--	--	--	--	--
CR00016	350	202	419868	645752	0	6	14	117	141	--	--	--	--	--	--
CR00017	303	186	404279	691883	0	12	37	94	94	116	136	170	--	--	--
CR00018	333	201	418958	662518	0	11	35	87	--	--	--	--	--	--	--
CR00020	312	175	393208	683468	0	40	50	123	123	190	--	--	--	--	--
CR00021	295	213	430912	700012	0	50	90	127	--	--	--	--	--	--	--
CR00022	298	171	389103	696923	0	20	40	--	--	--	--	--	--	--	--
CR00023	325	181	398772	669803	0	25	40	90	123	123	123	--	--	--	--
CR00024	333	181	399181	662127	0	20	40	--	--	--	--	--	--	--	--
CR00025	349	183	400816	645963	0	20	30	--	--	--	--	--	--	--	--
CR00026	312	198	415468	682951	0	20	61	--	--	--	--	--	--	--	--
CR00027	373	210	427765	622082	0	70	70	165	165	205	205	205	350	528	660
CR00028	371	234	451945	624283	0	60	60	144	144	190	--	--	--	--	--
CR00029	381	230	448249	614407	0	15	15	165	165	--	--	--	--	--	--
CR00030	355	208	425583	640471	0	0	8	105	--	--	--	--	--	--	--
CR00031	370	215	433435	625284	0	--	--	--	139	175	--	--	--	--	--
CR00032	337	214	431574	658293	0	50	60	170	230	230	230	254	300	428	--
CR00034	360	212	430390	635497	0	0	0	80	80	--	--	--	--	--	--
CR00036	377	224	441701	618174	0	5	5	90	90	--	--	--	--	--	--
CR00037	336	259	476717	659003	0	20	40	160	160	185	185	201	394	450	760
CR00039	334	298	516093	661582	0	0	10	84	124	154	174	190	390	490	630
CR00041	395	207	425268	600785	0	40	60	190	190	220	220	220	360	450	650
CR00042	394	251	468903	601389	0	60	60	150	190	--	--	230	340	460	--
CR00047	306	245	462457	689659	0	40	60	150	150	220	240	250	360	--	--
CR00048	369	230	448033	625817	0	50	60	120	120	160	--	--	--	--	--
CR00051	368	256	474304	627514	0	60	60	140	140	183	--	--	--	--	--
CR00062	217	321	539286	777922	0	40	60	100	160	220	--	--	--	--	--
CR00064	372	223	441362	623425	0	50	50	160	160	--	--	--	--	--	--
CR02003	352	218	435444	643347	0	20	29	99	99	138	138	171	--	--	--
CR02004	370	209	427140	624813	0	15	15	165	165	--	--	--	--	--	--
CSASR-MW4	221	208	426134	774379	0	9	10	80	125	196	196	214	330	385	--
CSASR-MW5	218	207	424615	776894	0	20	20	58	100	157	183	202	295	350	--
CSASR-MW6	216	206	423497	779038	0	14	14	61	100	146	146	184	241	288	--
CYWOOD_PW1	286	196	413907	709335	0	7	48	--	--	--	--	--	--	--	--
DLEE_1	100	262	479990	895456	0	10	18	40	145	145	145	--	--	--	--
DNR H-1	146	48	266341	849123	0	--	--	--	75	145	145	145	155	--	--
DNR H-3	142	460	677937	853566	0	100	100	206	206	206	206	206	378	492	--
DSBCC-PW1	266	259	476663	729567	0	20	30	130	130	150	200	290	310	--	--
ECHO_HM	128	180	397829	867696	0	20	20	20	80	145	--	--	--	--	--
EGG24	302	259	476653	692825	0	12	39	--	--	--	--	--	--	--	--
EGG3	302	264	481730	692986	0	6	55	--	--	--	--	--	--	--	--
EVEREST-IW	168	132	350300	827134	0	20	20	20	70	110	110	110	130	280	430
EXBRY-1	140	257	475404	855773	0	10	10	10	65	110	145	190	190	190	640
FCW_10-70	186	138	355500	809000	0	20	20	20	104	--	Absent	Absent	--	--	--
FCW_11-70	187	151	369000	808500	0	36	36	36	65	--	Absent	Absent	--	--	--
FCW_1-70	189	151	369000	806000	0	50	50	70	80	--	Absent	Absent	--	--	--
FCW_2-70	188	152	369500	807500	0	60	60	60	70	--	Absent	Absent	--	--	--
FCW_3-70	186	151	369000	809000	0	31	60	60	82	--	Absent	Absent	--	--	--
FCW_4-70	185	149	367000	810500	0	31	31	31	80	--	Absent	Absent	--	--	--
FCW_5-70	182	151	369000	813000	0	41	41	41	72	--	Absent	Absent	--	--	--
FCW_7-70	198	151	369000	797500	0	52	52	52	84	--	--	--	--	--	--
FCW_8	192	154	371500	803000	0	40	40	40	78	--	--	--	--	--	--
FGUA-ETW1	188	244	461892	807708	0	25	25	25	75	105	162	186	310	325	660
FGUA-IW1	327	208	425586	668128	0	--	--	180	--	--	--	--	--	--	675
FMB_LHASR1	208	135	352469	786955	0	40	40	40	40	40	40	40	160	210	510
FMB-MZL	210	133	350747	785108	0	40	40	40	115	125	125	125	145	230	530
FMFPL_TW1	136	183	401306	859230	0	8	8	26	79	94	106	134	174	380	500
FP11_GW1	231	204	421819	764546	0	24	24	--	--	--	--	--	--	--	--
FP9_GW1	235	202	419489	760224	0	17	--	--	--	--	--	--	--	--	--
FTM_RO-P1	160	169	386485	835072	0	30	30	30	80	110	110	110	180	210	450
FTM_RO-P3	161	169	387000	834000	0	30	30	30	90	100	100	100	200	--	480
FTM_RO-P4	162	169	387000	832900	0	30	30	30	80	100	100	100	180	300	470
FTM_RO-P5	164	169	387000	831600	0	30	30	30	90	120	120	140	250	410	470
FTM_RO-P6	165	169	387000	830400	0	30	30	30	80	120	120	120	200	340	430
FTM_RO-P7	166	169	386900	829200	0	30	30	30	70	110	110	120	170	340	430
FTM-IW1	160	168	385993	834835	0	30	30	30	80	90	90	100	180	210	420
FTM-P13	160	172	389738	835330	0	50	50	50	110	120	130	140	200	260	570
FTM-P14	160	173	390937	835250	0	60	60	60	80	90	120	140	180	190	460
FTM-P15	161	173	390955	834083	0	40	40	40	80	120	120	130	180	250	--
FTM-P16	162	173	390942	833025	0	20	20	20	80	90	90	100	190	200	480
FTM-P17	163	173	390972	831970	0	30	30	30	100	120	120	140	190	280	460
G-2314	269	493	710642	726203	0	30	40	--	--	--	--	--	--	--	--
G-2329	327	485	703429	667839	0	7	73	137	--	--	--	--	--	--	--
G-2338	356	490	707654	639374	0	47	97	154	--	--	--	--	--	--	--
G-2340	299	494	712046	696522	0	17	60	147	--	--	--	--	--	--	--
G-2346	390	480	698023	605644	0	18	58	128	--	--	--	--	--	--	--
G-3295	447	489	706576	548108	0	19	57	135	--	--	--	--	--	--	--
G-3301	477	495	713284	518739	0	19	72	152	--	--	--	--	--	--	--
GATORS.W1	188	274	491920	807441	0	7	15	31	97	202	207	--	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
GATORS.W2	189	274	491910	806073	0	16	16	16	53	197	210	245	--	--	--
GATORS.W3	191	274	491908	804755	0	12	12	12	96	189	204	245	--	--	--
GATORS.W4	192	274	491876	803462	0	27	27	27	55	178	197	240	--	--	--
GATORS.W5	192	275	493102	803554	0	18	18	18	121	186	197	--	--	--	--
GATORS.W6	187	274	491810	808465	0	15	15	15	57	165	200	--	--	--	--
GIRO-IW1	73	29	247354	922312	0	50	50	50	60	60	60	100	130	170	280
GL-258	75	367	585237	920383	0	40	55	120	--	--	--	--	--	--	--
GL-332	92	423	641102	903705	0	35	--	--	--	--	--	--	--	--	--
GL-5C	38	335	553434	957444	0	40	40	40	--	--	--	--	360	466	--
GLF-0002	12	433	650450	983226	0	162	162	162	215	215	215	215	445	456	640
GLF-5	57	356	573864	938478	0	250	250	250	250	250	250	250	440	487	740
GLF-6	85	410	628323	910488	0	30	30	160	160	160	160	160	540	540	840
GM-7_SA	203	211	429355	792472	0	10	20	50	--	--	--	--	--	--	--
GM-TH-1	180	210	427600	815500	0	9	9	39	89	153	153	194	--	--	--
GM-TH-10	197	206	423800	797800	0	17	17	40	70	160	170	220	--	--	--
GM-TH-12	202	213	430500	793500	0	49	49	49	94	--	--	156	--	--	--
GM-TH-3	195	232	450100	800300	0	29	31	75	75	110	110	208	--	--	--
GM-TH-4	202	232	450200	792800	0	20	20	20	40	--	--	--	--	--	--
GM-TH-4-71	215	177	395000	780000	0	44	44	44	96	--	--	--	--	--	--
GM-TH-6-71	210	188	405500	785500	0	13	13	55	90	--	--	--	--	--	--
GM-TH-7-71	209	196	413500	786250	0	47	47	47	89	--	--	--	--	--	--
GM-TH-8	212	212	429700	783400	0	17	43	75	95	--	--	--	--	--	--
GM-TH-8-71	195	220	437500	800000	0	11	11	39	86	--	--	--	--	--	--
GOPHR1_SA	232	302	519806	762793	0	63	63	63	100	158	--	--	--	--	--
GOPHR22_SA	228	305	523206	767243	0	63	63	63	120	138	163	252	--	--	--
GOPHR34_SA	220	313	531106	775043	0	4	4	4	122	166	194	--	--	--	--
GOPHR7_SA	226	298	515806	769043	0	56	56	56	82	180	--	--	--	--	--
GOULD_PW	100	272	489836	895413	0	10	15	30	--	--	--	--	--	--	--
GS-1-6_SA	208	284	502148	787490	0	--	--	--	40	221	227	260	--	--	--
GS-22-1_SA	188	273	490592	807488	0	--	--	36	118	175	211	259	--	--	--
GS-M30_SA	192	289	506927	803234	0	15	25	35	35	165	171	213	--	--	--
GSW19_ASR	123	128	345624	872429	0	20	20	20	20	20	20	20	110	200	510
HC_ASR	146	98	315683	849275	0	--	--	--	140	140	140	140	140	250	410
HCRSW-DZM1	184	266	484129	811625	0	25	25	50	60	185	185	225	225	225	630
HE-1075	195	463	680486	800384	0	3	22	156	156	156	156	156	462	482	--
HE-1102	159	326	543987	836368	0	30	30	60	90	150	150	210	--	480	540
HE-1110	249	461	679152	746063	0	5	35	148	--	--	--	--	--	--	--
HE-1116	205	455	673314	789878	0	11	31	152	152	152	152	152	--	--	--
HE-281	184	397	614560	811704	0	80	80	150	150	150	150	150	410	510	720
HE-529	188	301	519140	806943	0	5	30	40	84	120	135	165	320	--	--
HE-557	131	269	487022	864125	0	3	3	3	75	85	125	165	280	330	--
HE-559	150	274	491598	845404	0	25	25	25	80	135	160	180	180	180	--
HE-620	123	285	502920	871939	0	45	45	45	120	150	170	230	--	--	--
HE-851	155	296	513811	840787	0	10	15	45	120	135	135	163	230	295	--
HE-868	254	433	650780	741314	0	30	--	--	--	--	--	--	--	--	--
HE-909	168	455	672721	826947	0	15	45	180	--	--	--	--	--	--	--
HERTZ_HM	192	189	407178	803338	0	21	21	21	100	--	--	140	178	--	--
HES-10	219	405	622479	776542	0	13	71	--	--	--	--	--	--	--	--
HES-13	223	404	621585	772740	0	36	66	--	--	--	--	--	--	--	--
HES-15	207	399	617288	788232	0	13	50	--	--	--	--	--	--	--	--
HES-18	203	399	616570	791855	0	10	33	--	--	--	--	--	--	--	--
HES-2	215	398	616131	780181	0	22	55	--	--	--	--	--	--	--	--
HES-20	207	400	617450	788485	0	13	50	--	--	--	--	--	--	--	--
HES-21	219	404	622165	776500	0	13	71	--	--	--	--	--	--	--	--
HES-22D	145	427	645209	849804	0	10	15	--	--	--	--	--	--	--	--
HES-23D	176	397	614663	818897	0	5	30	70	--	--	--	--	--	--	--
HES-24D	196	343	560759	799346	0	10	68	--	--	--	--	--	--	--	--
HES-25D	211	445	662572	784396	0	63	63	--	--	--	--	--	--	--	--
HES-26D	227	445	662938	768332	0	20	65	--	--	--	--	--	--	--	--
HES-27D	274	418	636232	720884	0	20	57	--	--	--	--	--	--	--	--
HES-28D	248	431	649157	747313	0	55	55	--	--	--	--	--	--	--	--
HES-29D	310	468	685455	685754	0	20	70	--	--	--	--	--	--	--	--
HES-5	208	406	623739	787118	0	18	40	--	--	--	--	--	--	--	--
HES-8	213	408	625473	782650	0	17	66	--	--	--	--	--	--	--	--
HF6	245	266	483770	750039	0	35	58	--	--	--	--	--	--	--	--
HG11-10_SA	212	278	496112	783473	0	22	22	22	95	188	217	255	--	--	--
HIF-38	9	283	501354	986245	0	20	20	20	80	180	180	180	301	435	--
H-M-120	175	257	474686	819812	0	20	20	20	90	125	159	189	--	--	--
HM-177	173	256	473486	822312	0	10	12	20	60	80	103	--	--	--	--
H-M-179	173	255	472873	822786	0	20	20	20	105	135	154	--	--	--	--
H-M-235	234	449	667145	761304	0	33	66	178	--	--	--	--	--	--	--
H-M-310	229	403	620447	766036	0	27	49	135	--	--	--	--	--	--	--
H-M-312	234	392	610147	761227	0	20	52	110	--	--	--	--	--	--	--
H-M-318	195	292	509675	800303	0	27	35	64	100	164	169	195	232	--	--
H-M-328	273	459	676640	722308	0	18	35	--	--	--	--	--	--	--	--
H-M-73	116	264	481488	879170	0	20	70	100	110	150	150	--	--	--	--
H-M-82	195	255	473136	800547	0	40	60	100	150	180	215	235	--	--	--
H-M-83	197	254	472128	797851	0	40	60	85	85	100	150	180	--	--	--
HORSE_ASR	141	102	319719	854756	0	20	20	20	20	20	20	20	140	250	410
HY00001	140	270	487893	855741	0	10	10	10	65	110	155	190	238	--	--
HY00006	282	404	621835	713461	0	12	78	124	124	124	124	124	362	450	--
HY00007	185	383	601212	809903	0	11	77	100	--	--	--	--	--	--	--
HY00012	264	431	649142	731218	0	5	40	140	140	140	140	140	450	--	--
HY118	166	296	513486	829312	0	11	19	40	108	122	141	173	--	--	--
I75-PW	327	199	416552	668446	0	10	10	205	220	220	220	280	322	370	490
IWA-H3	227	75	293390	768430	0	10	20	62	147	177	177	177	358	462	533
IWA-S5	224	68	286010	771101	0	15	25	50	188	213	235	275	374	458	626
IWA-TP1	226	73	291114	769443	0	15	28	65	163	185	185	215	420	465	632

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
IWSD-TW	239	297	514985	756311	0	120	120	120	120	255	255	287	535	620	773
JE-1503	53	214	431593	942512	0	30	30	30	135	135	135	135	302	350	610
JE-1705	94	195	412516	900961	0	40	40	40	125	135	135	155	--	--	--
JE-901	89	207	425115	906449	0	87	87	87	150	150	150	220	220	220	520
JE-902	76	203	420500	919404	0	130	130	130	190	190	190	220	220	220	490
JE-903	76	202	420100	919647	0	130	130	130	190	190	190	220	220	220	490
L-1044	121	141	358854	874032	0	30	30	30	72	104	104	104	142	309	--
L-1106	141	115	332787	854662	0	29	29	29	29	29	29	29	143	227	--
L-1113	138	99	316920	857592	0	--	36	45	--	--	--	--	--	--	--
L-1242	119	233	450623	876102	0	--	--	--	90	--	--	--	--	--	--
L-1318	143	184	401516	851837	0	23	23	23	78	--	--	159	180	--	--
L-1358	146	192	410026	848959	0	22	22	22	93	138	188	200	237	--	--
L-1448	231	180	398012	764489	0	5	11	30	86	128	128	128	194	--	--
L-1473	156	100	317858	839204	0	20	20	20	20	20	20	20	137	196	434
L-1510	230	185	403350	764788	0	5	14	34	81	174	174	174	--	--	--
L-1625	186	222	439852	809214	0	--	--	49	61	144	144	160	--	--	--
L-1634	239	145	362743	756065	0	12	12	27	114	136	136	136	180	--	--
L-1853	225	199	416839	770667	0	21	21	44	124	171	--	--	--	--	--
L-1961	202	201	418993	792831	0	27	27	41	--	--	--	--	--	--	--
L-1962	132	151	368663	863259	0	--	--	--	--	--	--	--	--	390	--
L-1963	185	241	458565	810636	0	14	14	14	60	135	135	158	268	--	--
L-1965	184	253	471188	811385	0	8	8	8	49	83	153	186	308	--	--
L-1966	203	202	419733	792398	0	10	10	36	72	94	94	145	--	--	--
L-1968	158	204	421848	837381	0	8	8	8	64	--	--	115	222	--	--
L-1973	163	172	390327	832622	0	--	--	--	80	127	127	140	--	--	--
L-1975	122	206	423498	872914	0	20	20	20	96	113	113	141	--	--	--
L-1977	126	237	455213	868811	0	27	27	27	65	92	118	186	275	--	--
L-1983	203	201	419052	792363	0	--	--	--	--	--	--	--	321	--	--
L-1986	129	176	393560	866201	0	8	8	8	64	86	--	--	--	--	--
L-1993	190	190	407619	805530	0	18	18	18	73	117	132	150	192	--	--
L-1996	268	215	432785	726959	0	37	56	99	99	168	267	291	390	--	--
L-2003	178	163	380787	817536	0	21	21	21	95	105	105	125	175	260	--
L-2061	196	239	457147	799232	0	--	--	58	--	--	--	--	325	450	750
L-2063	202	239	456665	793378	0	28	45	125	--	--	--	--	--	475	--
L-2115	189	137	355105	806707	0	21	21	21	102	123	123	123	138	--	--
L-2183	224	204	422410	770809	0	24	24	70	117	157	157	157	342	398	--
L-2187	148	243	460942	847485	0	22	22	22	63	--	--	158	270	300	532
L-2192	225	229	446738	769801	0	45	62	113	153	--	--	180	--	--	--
L-2194	268	202	419439	727206	0	30	50	95	95	158	207	276	451	--	--
L-2292	163	172	390327	832622	0	30	30	30	83	--	--	120	195	255	466
L-2295	232	171	389251	763361	0	--	--	--	--	--	--	--	200	305	550
L-2310	265	184	401503	730066	0	30	48	105	135	--	--	170	254	400	--
L-2315	206	50	267665	789756	0	--	--	--	110	180	180	180	285	320	--
L-2328	109	190	407800	886031	0	50	50	50	127	127	127	150	--	--	--
L-2341	114	158	375950	881084	0	13	13	13	115	115	115	125	220	270	455
L-2435	182	133	351159	813502	0	--	--	--	--	--	--	--	135	225	--
L-2459	148	241	458919	847386	0	2	89	125	--	--	--	--	--	--	--
L-2460	150	244	461451	845658	0	26	26	26	61	--	--	138	240	300	--
L-2525	198	83	301073	796831	0	40	40	40	135	150	150	150	250	309	--
L-2526	114	99	317115	881523	0	35	35	35	35	35	35	35	160	220	505
L-2527 2	145	64	281568	850725	0	75	75	75	153	198	198	198	268	308	--
L-2529	211	131	348672	783934	0	35	35	35	35	35	35	35	145	225	475
L-2642	189	117	335034	806655	0	29	29	29	82	82	82	82	97	--	--
L-2643	189	102	320046	806369	0	42	42	42	42	42	42	42	130	--	--
L-2645	160	89	306668	835763	0	55	55	55	55	55	55	55	160	--	--
L-2646	112	137	355114	883249	0	45	45	45	45	45	45	45	--	--	--
L-2657	201	126	343570	794472	0	30	30	30	30	30	30	30	150	310	--
L-2700	146	104	321672	849676	0	10	10	20	--	--	--	--	--	--	--
L-2820	146	65	283281	849295	0	74	74	94	94	94	94	94	212	--	--
L2-TW	169	455	672741	826627	0	--	--	--	180	180	180	180	435	475	780
L-3000D	187	136	354057	808507	0	32	32	32	32	32	32	32	138	200	489
L-3275	140	178	395459	855308	0	22	22	22	56	96	152	168	193	--	--
L-4820	140	126	343688	854934	0	35	35	35	35	35	35	35	116	--	--
L-4841	207	131	348974	788070	0	35	35	35	35	35	35	35	150	285	--
L-4846	149	139	356754	846682	0	22	22	22	74	105	105	105	120	224	--
L-4900	186	137	355031	809030	0	30	30	30	100	110	110	110	130	217	--
L-5009	217	235	452597	778757	0	15	18	148	180	310	370	--	--	--	--
L-5605	112	190	407963	883303	0	37	37	37	119	119	119	170	254	280	600
L-5641	199	174	391546	795860	0	20	20	20	85	120	135	140	165	240	433
L-5649	210	181	398679	785681	0	30	30	30	70	135	135	135	--	--	--
L-5664	236	222	440412	759231	0	--	--	117	170	--	--	280	350	--	--
L-5666	236	201	419320	759647	0	--	--	96	140	210	210	210	270	--	--
L-5668	236	180	398227	759367	0	--	--	30	100	155	155	155	223	--	--
L-5734	219	61	279178	776725	0	20	30	105	270	321	321	321	373	587	608
L-581	173	115	332949	822318	0	11	11	11	11	11	11	11	110	--	--
L-5811	130	165	382461	864984	0	40	40	40	64	118	161	170	230	395	480
L-5812	247	185	402976	748028	0	30	80	140	140	160	160	160	250	330	650
L-5818	127	215	433173	868215	0	11	11	11	62	62	62	117	262	394	506
L-5860	217	206	424331	777894	0	14	17	58	112	162	162	162	286	--	--
L-5871	170	150	368223	825699	0	60	60	60	80	102	102	102	136	248	450
L-602	236	220	437750	759750	0	40	40	60	170	--	--	240	295	--	--
L-603	263	176	393448	732306	0	20	53	130	130	152	152	165	274	--	--
L-607	232	171	388731	763133	0	4	4	22	98	145	145	145	191	--	--
L-610	191	168	385633	804452	0	24	24	24	77	121	121	131	161	--	--
L-611	190	152	369927	805264	0	7	7	7	68	101	101	101	119	--	--
L-612	165	205	422500	830500	0	5	10	20	50	--	--	--	--	--	--
L-613	177	227	445008	818248	0	30	45	75	75	90	90	140	260	--	--
L-614	225	238	456035	769928	0	9	9	109	190	--	--	229	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
L-615	225	253	470941	769961	0	21	21	170	216	255	255	294	--	--	--
L-616	216	219	437359	779109	0	60	60	105	150	165	165	210	--	--	--
L-617	226	222	440219	769704	0	18	18	99	175	--	--	235	276	--	--
L-619	199	231	449000	796000	0	12	12	85	120	--	--	--	--	--	--
L-621	185	215	432801	810536	0	10	10	40	61	140	150	200	280	--	--
L-622	176	205	423000	819500	0	7	7	20	60	115	115	130	250	--	--
L-624	155	222	439855	839984	0	7	7	7	59	106	106	119	--	--	--
L-625	150	238	455487	845257	0	0	0	0	45	93	93	112	--	--	--
L-626	152	253	471082	843065	0	18	18	18	117	117	117	173	--	--	--
L-629	126	253	471109	869520	0	2	2	2	75	95	131	161	290	--	--
L-631	126	220	438195	869578	0	2	2	2	69	84	84	105	--	--	--
L-632	121	185	402862	874727	0	11	11	11	91	111	111	111	--	190	--
L-636	225	191	408863	770179	0	7	7	34	97	136	136	136	236	--	--
L-637	137	162	379670	858027	0	10	10	10	54	75	75	75	130	--	--
L-639	190	159	377190	804912	0	11	11	11	78	111	111	111	136	--	--
L-6401	231	170	388254	763972	0	42	42	42	100	127	127	127	185	303	535
L-6411	228	75	293280	767712	0	16	26	64	151	184	198	220	370	466	490
L-6412	145	62	280382	850027	0	--	--	--	183	183	183	183	183	--	--
L-6414	119	242	459871	876159	0	20	20	20	90	135	135	188	--	--	--
L-6432	137	131	348672	858151	0	30	89	92	92	92	92	92	160	328	561
L-6435	181	100	318387	814762	0	50	50	50	50	50	50	50	150	239	544
L-6436	151	93	311364	844104	0	30	30	30	30	30	30	30	125	250	395
L-6437	124	93	310591	871174	0	40	40	40	120	120	120	120	130	269	486
L-6438	135	120	337983	860049	0	30	30	30	30	30	30	30	160	260	535
L-6439	120	135	352972	875589	0	55	55	55	55	55	55	55	--	--	--
L-6444	138	131	348755	857141	0	25	25	25	25	25	25	25	135	219	499
L-6445	230	76	293529	764883	0	10	20	50	125	140	140	140	270	317	--
L-646	130	148	365892	864971	0	24	24	24	71	93	93	93	139	--	--
L-6462	232	215	432888	763510	0	--	--	163	209	--	--	286	323	--	630
L-648	165	107	324534	830541	0	33	33	46	104	104	104	104	128	--	--
L-652	140	196	414055	854995	0	30	30	30	70	--	--	110	200	--	--
L-657	190	148	366020	805089	0	11	11	11	81	110	110	110	124	--	--
L-660	152	246	464005	842996	0	1	1	1	89	115	115	138	--	--	--
L-662	165	188	406221	829973	0	9	9	9	74	124	124	148	190	--	--
L-663	160	151	369225	835361	0	10	10	10	79	120	120	120	138	--	--
L-665	173	74	292057	822329	0	45	45	75	125	150	150	150	209	--	--
L-667	163	131	348514	832781	0	13	13	13	90	109	109	109	136	--	--
L-674	134	136	353530	861121	0	26	26	26	73	84	84	84	125	--	--
L-675	135	99	316606	860194	0	36	46	56	114	114	114	114	145	--	--
L-729	185	222	439791	809895	0	15	15	41	60	--	--	--	--	--	--
L-735	215	163	380816	780278	0	50	50	50	120	--	--	170	225	--	--
L-742	186	153	370681	809198	0	--	--	--	--	--	--	--	140	225	--
L-798	163	120	337800	832256	0	9	9	9	92	92	92	92	100	--	--
LAB_80-3	113	297	514560	882196	0	17	29	58	110	200	--	--	--	--	--
LABELLE-IW	127	294	512108	868495	0	51	51	51	130	135	135	140	140	140	636
LAB-TW	116	284	502274	879737	0	0	45	50	50	125	190	235	235	235	655
LCCS-PW42	284	212	429568	711443	0	32	84	108	108	143	220	258	387	442	--
LE00002	227	178	395828	768671	0	--	--	--	70	110	110	110	--	340	--
LE00006	230	178	395717	765441	0	--	--	--	--	--	--	--	200	300	--
LE00008	113	197	415117	881848	0	40	40	40	99	--	--	129	--	--	--
LE00009	156	98	316226	839419	0	20	20	20	20	20	20	20	137	194	435
LE00014	173	104	322079	822307	0	19	19	19	19	19	19	19	137	185	429
LE011	254	196	414398	741299	0	60	90	135	135	165	165	165	--	--	--
LE021	170	41	258461	825288	0	--	--	--	--	--	--	--	230	--	--
LE-037	212	109	327248	782958	0	28	30	44	44	44	44	44	154	268	--
LE1001	174	232	450173	821581	0	32	32	32	60	--	--	130	225	280	--
LE1007	132	243	460988	863028	0	4	4	4	49	58	115	148	283	330	--
LHA-UZMW1	165	225	443005	830761	0	20	20	20	50	100	120	150	280	290	520
LJNOBLESPW	105	282	500336	890053	0	20	20	20	100	100	100	160	160	--	--
LM-1268	111	99	316442	884432	0	30	30	30	80	100	100	100	--	--	--
LM-1269	111	98	316351	884334	0	32	40	50	82	--	--	--	--	--	--
LM-1443	116	115	332630	879455	0	20	--	--	--	--	--	--	--	--	--
LM-1644	263	175	392556	732780	0	32	72	--	--	--	--	--	--	--	--
LM-1646	258	170	387500	737500	0	32	95	--	--	--	--	--	--	--	--
LM-1675	258	173	391206	737470	0	27	65	125	160	160	160	160	215	--	--
LM-1676	260	174	391698	735140	0	27	65	--	--	--	--	--	--	--	--
LM-1677	260	175	392802	735079	0	25	69	118	--	--	--	--	--	--	--
LM-1680	261	175	392459	734130	0	33	80	--	--	--	--	--	--	--	--
L-M-1682A	259	175	392964	735939	0	32	76	--	--	--	--	--	--	--	--
L-M-1684	262	177	394877	732833	0	33	--	--	--	--	--	--	--	--	--
LM-1713	263	167	385000	732000	0	30	80	148	160	162	162	178	228	--	--
LM-1716	257	165	383000	738000	0	22	82	105	105	145	197	218	--	--	--
LM-1718	261	174	391824	734436	0	25	65	115	120	155	182	186	234	--	--
LM-1719	261	173	391000	734000	0	27	69	118	124	160	160	180	255	--	--
LM-1883	263	207	425014	731920	0	10	29	--	--	--	--	--	--	--	--
LM-2041	251	169	386883	744163	0	36	100	110	110	155	155	155	200	315	535
LM-2428	162	113	330472	833334	0	40	40	40	40	40	40	40	125	202	443
L-M-2701	221	191	409408	774740	0	11	11	38	73	--	--	--	--	--	--
LM-2763	222	191	408728	773744	0	38	73	--	--	--	--	--	--	--	--
L-M-3176	111	145	362732	884233	--	--	Absent	Absent	109	130	130	130	--	--	--
LM-3280	271	196	414051	723802	0	37	64	--	--	--	--	--	--	--	--
L-M-360	157	137	355049	838730	0	31	31	31	72	84	84	84	--	--	--
LM-3642	201	246	464235	794124	0	16	16	44	--	--	--	--	--	--	--
LM-3644	205	241	459132	790714	0	17	17	42	--	--	--	--	--	--	--
LM-3645	206	248	465575	789271	0	16	16	50	--	--	--	--	--	--	--
LM-3650	211	241	458830	784455	0	28	28	65	--	--	--	--	--	--	--
LM-3652	212	241	458915	783344	0	22	22	--	--	--	--	--	--	--	--
LM-3653	213	244	461547	782524	0	17	17	--	--	--	--	--	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
LM-3654	212	245	463276	783223	0	20	20	--	--	--	--	--	--	--	--
LM-3659	216	241	458987	779204	0	18	18	--	--	--	--	--	--	--	--
LM-3680	170	76	293674	824825	0	28	28	45	132	148	148	148	237	385	410
LM-3871	202	202	419718	793040	0	4	7	46	100	120	121	145	--	--	--
LM-3982	220	208	426225	775258	0	21	21	70	114	212	221	247	336	479	525
L-M-444	280	189	407005	715535	0	33	--	--	--	--	--	--	--	--	--
LM-562	144	68	286053	851668	0	45	45	72	--	--	--	--	--	--	--
LM-6204	115	216	433899	880204	0	2	9	14	--	--	--	--	--	--	--
LM-640	269	196	414159	726730	0	30	60	--	--	--	--	--	--	--	--
LM-650	263	201	419284	732052	0	45	70	--	--	--	--	--	--	--	--
LM-697	259	191	409026	735847	0	30	55	--	--	--	--	--	--	--	--
LM-6996	158	74	291951	837176	0	18	18	40	132	151	151	151	260	338	--
LM-716	198	217	434637	797097	0	15	27	45	82	130	130	149	--	--	--
LM-7733	229	191	408591	766596	0	11	13	32	84	143	143	143	220	400	555
LM-785	218	177	394457	777537	0	30	30	38	96	--	Absent	Absent	--	--	--
LM-7973	171	75	293069	823835	0	50	50	50	123	166	166	166	249	375	--
LM-922	223	208	425460	772590	0	13	17	113	146	284	284	284	--	--	--
LM-923	224	209	427350	771040	0	24	29	154	200	309	309	309	--	--	--
LM-928	224	208	425849	771499	0	10	10	138	168	--	--	--	--	--	--
LM-929	223	209	427000	772500	0	6	6	130	180	--	--	--	--	--	--
LM-9290	236	188	405539	759345	0	17	17	36	96	143	143	143	239	365	557
LM-933	222	212	429500	773000	0	12	12	154	196	--	--	--	--	--	--
LM-934	224	211	428665	771388	0	45	45	154	202	290	290	290	--	--	--
LM-936	220	212	429630	774950	0	20	20	120	176	--	--	--	--	--	--
LM-938	225	208	426006	770396	0	5	25	132	180	--	--	--	--	--	--
LM-940	225	210	427789	770208	0	10	32	152	204	--	--	--	--	--	--
Lower-Right Corner	553	512	729936	442288	0	10	70	150	155	180	180	180	400	520	840
LS-6043	199	248	466334	795845	0	--	--	57	99	--	--	--	--	--	--
LS-6092	203	247	464700	792526	0	39	39	47	--	--	--	--	--	--	--
LS-6093	202	245	463077	792812	0	17	17	45	85	--	--	--	--	--	--
LS-6097	205	238	456130	789815	0	52	52	104	--	--	--	--	--	--	--
LS-6098	201	244	462108	794252	0	32	32	45	--	--	--	--	--	--	--
LS-6101	203	242	459958	792493	0	--	--	53	95	--	--	--	--	--	--
LS-6102	203	238	456186	792414	0	55	55	87	134	--	--	--	--	--	--
LS-6107	200	245	462790	795552	0	39	39	55	--	--	--	--	--	--	--
LS-6109	205	240	457569	789912	0	42	42	86	--	--	--	--	--	--	--
LS-6110	206	243	460558	789128	0	40	40	65	--	--	--	--	--	--	--
LS-6114	208	238	455980	786963	0	62	62	130	--	--	--	--	--	--	--
LS-6116	207	238	456133	788313	0	67	67	120	--	--	--	--	--	--	--
LS-6117	208	240	457926	786996	0	70	70	115	--	--	--	--	--	--	--
LS-6119	207	244	462064	788231	0	47	47	62	--	--	--	--	--	--	--
LS-6122	205	245	462513	789961	0	35	35	55	--	--	--	--	--	--	--
LS-6123	206	246	464000	789633	0	23	23	44	--	--	--	--	--	--	--
LS-6124	207	246	463448	788230	0	45	45	58	--	--	--	--	--	--	--
LS-6125	207	247	464566	788213	0	27	27	50	--	--	--	--	--	--	--
LS-6126	207	248	466420	788392	0	25	25	48	95	--	--	--	--	--	--
LS-6129	200	247	464883	795591	0	34	34	45	--	--	--	--	--	--	--
LS-6130	204	247	465276	790918	0	33	33	52	100	--	--	--	--	--	--
LS-6131	208	242	460275	786961	0	53	53	112	162	--	--	--	--	--	--
LS-6133	220	238	456116	775560	0	58	58	--	--	--	--	--	--	--	--
LS-6134	210	243	460604	785081	0	39	39	130	--	--	--	--	--	--	--
LS-6135	214	243	460648	781622	0	67	67	115	175	--	--	--	--	--	--
LS-6149	210	239	457244	785727	0	56	56	158	--	--	--	--	--	--	--
LS-6150	210	241	459027	785731	0	49	49	134	--	--	--	--	--	--	--
LS-6151	215	248	466112	780567	0	46	46	111	203	--	--	--	--	--	--
LS-6158	213	245	462762	782363	0	66	66	97	--	--	--	--	--	--	--
LS-6159	215	241	459025	780775	0	88	88	173	--	--	--	--	--	--	--
LS-6160	217	240	458190	778174	0	106	106	190	--	--	--	--	--	--	--
LS-6161	211	240	458432	784401	0	97	97	181	--	--	--	--	--	--	--
LS-6162	212	242	459620	783292	0	69	69	135	--	--	--	--	--	--	--
LS-6165	208	245	463410	787013	0	40	40	72	--	--	--	--	--	--	--
LS-6166	216	243	460965	779348	0	75	75	118	--	--	--	--	--	--	--
LS-6168	220	241	459094	775595	0	55	55	125	--	--	--	--	--	--	--
LS-6170	218	248	465479	776837	0	38	38	81	204	--	--	--	--	--	--
LS-6172	231	254	472069	763880	0	48	48	173	215	--	--	--	--	--	--
LS-6176	214	240	457661	781708	0	53	53	175	--	--	--	--	--	--	--
LS-6180	217	245	462747	777977	0	57	57	92	--	--	--	--	--	--	--
LS-6182	221	251	469349	774112	0	53	53	88	179	--	--	--	--	--	--
LS-6185	220	244	461945	775545	0	37	37	88	--	--	--	--	--	--	--
LS-6186	220	248	465686	775582	0	37	37	81	--	--	--	--	--	--	--
LS-6188	220	234	451753	775351	0	72	72	--	--	--	--	--	--	--	--
LS-6191	212	233	451235	783229	0	32	32	139	--	--	--	--	--	--	--
LS-6192	208	234	452113	787781	0	51	51	116	--	--	--	--	--	--	--
LS-6216	226	214	432322	769646	0	56	68	184	--	--	--	--	--	--	--
LS-6226	244	219	436461	750904	0	25	45	104	--	--	--	--	--	--	--
LS-6229	209	237	454631	786430	0	35	35	136	170	--	--	--	--	--	--
LS-6337	231	216	433681	764695	0	--	--	100	252	--	--	--	--	--	--
LSS-1	120	205	422676	875248	0	14	14	14	93	93	93	--	--	--	--
MARIA-P1	272	294	511809	723664	0	30	64	--	--	--	--	--	--	--	--
MARIA-P3	273	294	512255	722045	0	30	56	80	--	--	--	--	--	--	--
MC-5000	300	216	433700	694940	0	18	18	194	194	227	227	268	379	521	--
MC-5001	275	264	482346	720669	0	20	42	70	70	110	144	174	289	413	594
MC-5002	315	256	474164	679914	0	75	80	135	135	252	252	278	394	509	523
MC-5004	298	243	460763	697339	0	--	80	118	118	185	185	198	390	489	687
MC-5065	321	213	431156	673865	0	30	38	175	--	--	--	--	--	--	--
MHGW_GW1	91	404	621500	904362	0	35	35	142	142	160	160	160	540	560	790
MHPUD_LT	297	210	427996	697900	0	--	80	--	--	--	--	--	--	--	--
MIU-MZ1	404	201	418502	591506	0	40	40	180	180	230	230	230	350	550	700

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
ML_ASR-5	365	210	428202	630629	0	30	30	130	140	--	--	185	324	440	570
ML_ASR-9	364	211	428480	631334	0	63	63	125	140	160	160	160	300	550	575
MLV_WT	299	311	528785	696655	0	30	--	--	--	--	--	--	--	--	--
MO-178	461	479	697270	534672	0	25	48	126	130	148	148	148	--	--	--
MO-179	476	419	636604	518872	0	5	5	56	--	--	--	--	--	--	--
MOOBAYA_WT	323	173	390534	672106	0	42	--	--	--	--	--	--	--	--	--
MV-IA2	91	302	519903	904185	0	55	55	55	--	--	--	--	320	465	600
NAPEGG-W11	313	263	481231	682080	0	0	5	--	--	--	--	--	--	--	--
NAPEGG-W12	314	263	481251	680829	0	0	0	125	--	--	--	--	--	--	--
NAPEGG-W13	316	263	481231	679447	0	50	75	115	--	--	--	--	--	--	--
NAPEGG-W14	317	263	481200	678023	0	5	5	--	--	--	--	--	--	--	--
NAPEGG-W16	297	264	481792	698213	0	20	20	--	--	--	--	--	--	--	--
NAPEGG-W17	296	264	481781	699681	0	15	15	--	--	--	--	--	--	--	--
NAPEGG-W18	294	264	481781	701020	0	25	25	120	--	--	--	--	--	--	--
NAPLES-EW1	334	180	397676	661538	0	20	65	130	200	200	200	227	332	547	572
NCC-IW2	136	112	329932	859127	0	50	Absent	Absent	Absent	Absent	Absent	Absent	--	--	--
NCWRF-IW1	293	180	398376	701832	0	10	50	120	120	120	120	150	250	420	655
NFM-MW	124	151	368708	871748	0	10	10	38	90	130	130	130	170	210	420
NLCPW-1	122	180	398371	872881	0	20	20	20	70	70	70	130	--	--	--
NLCPW-11	125	174	391822	870317	0	19	19	19	63	120	161	204	243	465	483
NLCPW-13A	124	168	386308	871026	0	21	21	21	78	110	150	203	235	424	441
NLCPW-16A	127	176	393596	867940	0	17	17	17	69	119	121	128	230	438	503
NLCPW-17A	129	175	393268	866240	0	13	13	13	63	128	156	183	201	403	411
NLCPW-3	124	180	398288	871289	0	20	20	20	70	70	70	140	260	410	435
NLCPW-5	124	179	397333	871374	0	20	20	20	90	90	90	220	250	410	435
NLCPW-6	123	179	397334	871840	0	25	25	25	75	75	75	130	240	395	460
NLCWTP-IW1	123	180	397888	872374	0	30	30	30	90	120	160	200	260	400	440
NNB_LT	294	197	414740	701315	0	--	80	--	--	--	--	--	--	--	--
NPORT_DIW	18	29	246982	977191	0	70	70	70	90	90	90	120	180	250	330
NROWTP-1NR	135	105	322682	859944	0	20	20	20	20	20	20	20	160	220	480
NROWTP-2NR	139	130	348415	856212	0	20	20	20	20	20	20	20	150	250	498
NROWTP-3NR	138	130	348241	857223	0	28	28	28	28	28	28	28	155	--	588
P-1151	174	273	490659	821198	0	20	20	20	65	100	175	210	210	230	680
P-1167	384	466	684411	611516	0	--	--	60	--	--	--	--	--	--	--
P-319	204	297	515433	791726	0	15	38	82	82	107	107	272	326	378	612
P-322	198	300	517995	797271	0	10	30	144	144	233	233	306	366	547	680
P-326	196	298	515641	799500	0	14	37	86	86	144	144	270	324	423	694
P-328	296	327	545169	699457	0	10	40	85	--	--	--	--	--	--	--
P-335	196	297	515005	799300	0	13	38	56	56	113	113	293	361	476	767
P-348	203	298	515617	792230	0	18	28	78	78	101	101	304	357	414	515
P-427	201	258	476105	794037	0	20	40	80	100	--	--	--	300	360	500
P-486	189	262	479972	805886	0	50	50	70	80	140	160	200	290	370	510
P-806	195	296	513919	800616	0	15	31	85	85	96	96	310	362	474	907
P-824	271	344	561974	723849	0	20	64	64	93	204	303	406	472	625	839
P-858	161	216	434109	834561	0	50	50	50	75	--	--	160	250	307	--
P-885	361	382	599945	633896	0	--	30	90	--	--	--	--	--	--	--
P-937	291	335	553100	703981	0	10	50	160	--	--	--	--	--	--	--
PB-1137	267	500	718009	728333	0	40	80	200	200	200	200	200	440	--	918
PB-ASR1	301	173	391125	693929	0	22	40	94	94	110	142	161	270	--	--
PG-IW1	51	130	347711	944375	0	20	20	20	123	123	123	180	250	260	800
PINE-IW1	228	191	408463	767092	0	9	11	32	108	165	165	165	225	357	557
PTLAB_82-5	113	321	539410	882193	0	61	61	61	135	222	222	222	--	--	--
PTLAB_82-6	104	319	537298	891071	0	43	43	43	130	150	150	150	--	--	--
PTLAB_83-1	107	315	532905	887875	0	57	57	57	110	240	240	240	--	--	--
PTLAB_83-2	113	339	556588	881833	0	73	73	73	210	230	230	230	--	--	--
PTLAB_83-3	120	337	554448	874911	0	65	65	65	235	339	339	339	--	--	--
PTLAB_83-6	124	338	556321	871251	0	68	68	68	138	176	176	176	--	--	--
PWPW-RO2	230	190	408232	765189	0	4	4	31	83	127	127	127	221	346	610
PWPW-RO5	233	191	409150	762678	0	12	12	37	98	145	145	145	259	417	653
PW-RO4	231	191	409300	763928	0	15	15	45	91	149	149	149	245	383	658
RAINBOW_PW	91	278	495816	904354	0	8	8	55	68	68	68	85	--	--	--
RO-109N	300	225	443356	695134	0	38	40	120	--	--	--	--	--	--	--
RO-114N	300	232	449908	695694	0	45	70	115	115	160	160	255	405	--	--
RO-115N	300	235	452584	695517	0	40	65	115	--	--	--	--	--	--	--
RO-116N	299	234	451442	696456	0	50	70	115	115	--	--	255	--	--	--
RO-117N	298	233	451300	697440	0	60	80	115	115	--	--	255	--	--	--
RO-118N	297	232	449860	698440	0	40	75	105	105	--	--	285	--	--	--
RO-119N	297	230	448370	698590	0	40	70	105	105	--	--	250	--	--	--
RO-120N	298	229	447225	697550	0	40	65	100	100	--	--	260	--	--	--
RO-26S	344	214	432380	651570	0	14	21	150	172	178	178	198	311	--	--
ROMP10	13	110	328159	981913	0	20	20	20	30	30	30	60	--	--	--
ROMP11	33	133	351255	962043	0	20	20	20	20	20	20	20	213	232	--
ROMP12	10	197	414514	984827	0	25	25	25	57	57	57	106	274	406	557
ROWLAND22	90	267	484584	904904	0	5	5	60	70	120	120	180	--	--	--
RTA-005	186	296	513676	809200	0	25	40	60	90	130	150	190	335	--	--
SALT-1	325	176	393621	669873	0	40	50	86	120	133	133	175	--	--	--
SALT-2	315	177	394854	680456	0	20	30	87	110	140	140	180	--	--	--
SALT-3	301	176	393754	694769	0	50	50	100	100	120	140	180	--	--	--
SCRWWTPIW1	354	201	418932	641112	0	20	30	140	140	140	--	--	300	390	610
SEMI_PW	279	467	685086	716261	0	10	60	--	--	--	--	--	--	--	--
SI-T1	28	331	548860	967730	0	40	40	40	40	40	40	40	352	--	776
SI-T2	17	311	528450	978000	0	120	120	120	120	120	120	120	300	--	717
SS6_WT	289	307	525146	706026	0	37	--	--	--	--	--	--	--	--	--
ST4	220	231	448977	775157	0	24	--	--	--	--	--	--	--	--	--
ST5	225	228	445627	770106	0	42	62	113	153	--	--	180	--	--	--
SWCC-IW1	174	106	323830	821482	0	30	30	30	30	30	30	30	130	220	430
SWRO-230R	173	113	331185	821907	0	20	20	20	20	20	20	20	110	160	420
SWROWTP112	176	106	323874	819642	0	20	20	20	20	20	20	20	130	180	360

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
SWROWTP227	171	109	326942	824664	0	20	20	20	20	20	20	20	112	180	360
SWROWTP228	169	109	326974	826680	0	20	20	20	20	20	20	20	112	180	360
SWROWTP229	167	109	326954	828241	0	23	23	23	23	23	23	23	115	188	350
SWROWTP230	166	108	326379	829429	0	23	23	23	23	23	23	23	115	190	350
SWROWTP231	164	109	326754	831069	0	26	26	26	26	26	26	26	120	200	400
SWROWTP232	163	109	326978	832506	0	20	20	20	20	20	20	20	128	190	400
TREVISO_WT	364	198	415852	630986	0	4	--	--	--	--	--	--	--	--	--
TUCKERS	77	190	408354	917936	0	55	55	55	150	150	150	178	--	--	--
Upper-Left Corner	1	1	218936	994288	0	70	70	70	90	90	90	120	180	250	330
USEPPA-EX1	147	42	259625	847901	0	17	50	60	84	148	148	148	158	--	--
VIS_HM	173	225	442523	822353	0	--	--	--	--	--	--	--	200	--	--
W-10018	299	453	671258	696185	0	--	60	150	150	150	150	150	--	--	--
W-10075	285	478	695554	710537	0	30	50	180	180	180	180	180	--	--	--
W-10089	94	207	424743	900979	0	10	10	70	130	130	130	220	220	220	500
W-10093	79	221	438810	916162	0	40	40	40	70	70	70	150	180	310	--
W-10132	170	328	545753	825749	0	30	40	60	210	270	270	280	370	400	650
W-10180	401	335	552561	594340	0	--	0	83	83	120	120	190	405	500	--
W-10183	449	415	632573	546369	0	--	--	97	97	97	97	97	410	540	--
W-10184	446	398	616404	549107	0	--	0	70	70	125	--	--	390	450	835
W-10187	446	434	651486	549089	0	10	10	118	118	118	118	118	400	517	840
W-10190	419	359	576621	575814	0	0	0	60	60	255	255	255	422	--	702
W-10201	398	305	523183	597046	0	7	7	62	62	250	250	250	410	--	683
W-10479	194	247	464693	800813	0	--	--	--	90	--	--	--	--	--	--
W-10687	143	131	348807	851891	0	15	15	15	15	15	15	15	120	--	--
W-10750	74	215	433004	920926	0	25	25	25	--	--	--	--	--	--	--
W-10752	69	220	437559	925950	0	27	27	27	--	--	--	--	--	--	--
W-10755	64	228	445735	930956	0	30	30	30	--	--	--	--	--	--	--
W-10756	61	217	434885	933840	0	36	36	36	--	--	--	--	--	--	--
W-10757	61	212	429724	933868	0	34	34	34	59	59	59	--	--	--	--
W-10758	61	206	423569	934004	0	31	31	31	--	--	--	--	--	--	--
W-10883	150	144	362017	845306	0	11	11	11	71	117	117	117	--	--	--
W-11669	18	208	425620	977008	0	36	36	36	36	36	36	36	205	--	--
W-12378	160	210	427736	835632	0	30	30	30	60	90	120	180	--	--	--
W-12562	142	128	345548	852824	0	20	20	20	70	90	90	90	110	--	--
W-12994	328	370	588271	667564	0	--	--	--	--	--	--	--	--	--	720
W-13289	72	17	234758	923078	0	35	--	--	--	--	--	--	--	--	--
W-14045	230	84	301710	764815	0	18	27	108	108	108	108	108	286	307	--
W-14072	220	207	425136	775669	0	30	55	60	94	173	173	173	230	--	--
W-14348	199	209	427249	796457	0	0	0	90	90	150	150	210	240	360	420
W-14534	333	211	429254	662056	0	20	45	173	234	234	234	240	293	440	--
W-14600	335	295	513174	660582	0	0	2	80	140	160	170	193	--	--	--
W-1475	36	123	341097	959090	0	60	60	60	60	70	70	70	--	--	--
W-14919	333	335	552999	662082	0	0	20	100	100	295	295	295	439	523	--
W-14920	411	284	502147	584193	0	0	0	90	130	250	250	250	372	480	880
W-14924	314	343	560604	681146	0	0	9	110	140	250	250	395	462	--	--
W-14934	404	322	540231	590838	0	0	0	80	80	160	160	160	430	550	690
W-15274	306	218	436321	689381	0	10	42	92	--	--	--	--	--	--	--
W-15286	151	211	428508	844109	0	21	21	21	56	86	86	104	214	300	591
W-15287	210	232	449814	785738	0	35	35	99	138	194	199	246	332	--	--
W-15332	45	37	254588	950250	0	20	20	20	51	51	51	79	114	141	253
W-15333	40	70	288213	955086	0	8	--	--	--	--	--	--	--	--	--
W-15371	226	368	585798	769236	0	--	--	--	--	--	--	--	350	440	1060
W-15526	154	296	513602	840803	0	20	20	40	140	140	140	180	370	--	--
W-15528	306	226	443606	689446	0	25	50	190	190	250	--	--	--	--	--
W-15529	261	240	458385	734001	0	40	55	130	130	172	225	301	--	--	--
W-15530	283	280	498332	712429	0	50	75	135	135	170	232	270	345	--	--
W-15531	254	286	503574	741334	0	35	35	90	160	208	310	375	465	--	--
W-15532	152	264	482219	843648	0	20	20	20	50	80	150	190	--	--	--
W-15533	92	286	504304	903538	0	10	10	20	65	65	65	90	410	460	--
W-15534	336	229	447372	659037	0	50	68	130	130	172	210	237	--	--	--
W-15535	258	324	542085	737025	0	55	85	130	130	173	310	390	450	--	--
W-15553	251	296	514364	743872	0	30	--	--	--	--	--	--	--	--	--
W-15556	133	244	461440	862723	0	4	25	28	--	--	--	--	--	--	--
W-15557	285	244	461914	710157	0	35	68	117	117	182	197	222	319	352	--
W-15683	51	5	222842	944209	0	35	--	--	--	--	--	--	151	255	306
W-15799	159	101	319168	836195	0	30	30	30	30	30	30	30	98	185	445
W-15880	6	376	593673	988828	0	195	195	195	--	--	--	--	578	591	680
W-16029	176	345	563005	819258	0	7	20	185	202	222	222	222	342	401	--
W-16030	194	416	633622	800987	0	35	75	120	150	150	150	150	--	--	--
W-16032	255	376	593480	740652	0	10	40	75	75	75	75	75	310	400	--
W-16059	158	326	543899	837479	0	8	8	22	276	352	352	352	450	472	--
W-16077	138	354	572342	857304	0	13	77	98	291	320	320	320	--	--	--
W-16098	123	151	368724	871818	0	38	38	38	90	110	170	210	250	335	--
W-16146	380	198	415596	615384	0	--	23	125	--	--	--	--	--	--	--
W-16194	223	310	527911	772604	0	40	40	60	--	--	--	--	--	--	--
W-16285	143	425	642630	852677	0	15	35	140	140	140	140	140	490	--	--
W-16329	148	393	611058	847146	0	--	--	--	212	251	251	251	--	--	--
W-16387	142	459	676826	853689	0	97	97	198	198	198	198	198	422	492	--
W-16434	235	338	555510	760211	0	--	7	23	--	--	--	--	--	--	--
W-16524	248	406	623954	747079	0	30	55	140	140	140	140	140	392	--	--
W-16884	300	215	433375	695525	0	28	33	160	160	230	230	280	400	--	--
W-16918	129	98	316175	866484	0	10	10	30	30	30	30	30	--	--	--
W-16929	258	309	526438	736867	0	15	59	--	--	--	--	--	--	--	--
W-16942	266	221	438526	728849	0	65	95	150	150	180	270	310	410	--	--
W-16959	129	244	461456	866055	0	10	10	10	45	74	74	--	--	--	--
W-16960	99	100	318052	896461	0	--	Absent	Absent	Absent	Absent	--	--	202	245	480
W-17035	48	279	496680	946883	0	40	--	--	60	--	--	--	--	--	--
W-17090	16	312	529633	979484	0	30	30	30	170	170	170	170	--	--	--

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
W-17360	393	248	466168	602207	0	20	20	111	111	128	146	181	--	--	--
W-17361	398	272	490241	597766	0	17	17	111	111	171	171	--	--	--	--
W-17389	387	303	521120	608562	0	4	6	90	90	--	--	--	--	--	--
W-17393	407	320	537669	588422	0	--	4	58	--	--	Absent	Absent	--	--	--
W-17394	338	323	541348	657739	0	3	5	71	71	145	145	--	--	--	--
W-17450	337	254	471884	658317	0	22	29	87	95	140	166	181	--	--	--
W-17454	364	210	427995	631067	0	10	21	86	132	160	165	181	--	--	--
W-17534	281	324	541773	713975	0	12	27	49	49	221	247	310	370	405	680
W-17554	231	500	718229	763973	0	19	80	92	92	92	92	92	--	--	--
W-17746	323	357	574978	672333	0	21	21	71	85	125	125	125	--	--	--
W-17750	298	382	599516	697129	0	6	41	83	175	--	--	--	--	--	--
W-17764	273	380	597548	722473	0	46	46	80	--	--	--	--	--	--	--
W-17782	280	366	583706	715427	0	12	35	50	--	--	--	--	--	--	--
W-17785	278	352	570424	717673	0	16	63	91	--	--	--	--	--	--	--
W-17810	196	345	562778	799065	0	4	56	123	193	--	Absent	Absent	--	--	--
W-17919	27	321	538916	968349	0	50	50	50	50	50	50	50	321	376	--
W-18069	101	320	538253	894542	0	38	38	38	38	38	38	38	401	--	--
W-18070	108	310	527718	886798	0	55	55	55	55	55	55	55	--	--	--
W-18071	129	245	463362	866450	0	5	5	5	40	91	91	--	--	--	--
W-18074	98	400	617726	896916	0	29	39	96	141	176	176	176	--	--	--
W-18075	104	377	595156	891289	0	70	93	153	153	206	206	206	--	--	--
W-18116	3	151	368568	992516	0	35	35	35	56	56	56	90	90	90	327
W-18291	289	191	409221	706767	0	22	50	107	126	131	131	152	252	453	525
W-18778	144	119	336685	850941	0	30	30	30	100	130	130	130	130	220	440
W-2004	458	319	536524	537341	0	--	20	107	120	--	Absent	Absent	--	--	--
W-2229	51	196	413672	944663	0	55	55	55	120	120	120	--	--	--	--
W-2420	356	209	427307	638845	0	7	12	118	--	--	--	--	--	--	--
W-2912	102	441	658773	892960	0	55	55	160	160	160	160	160	350	410	700
W-3441	175	294	511899	820514	0	12	26	42	95	120	144	170	210	300	--
W-3792	229	165	382544	766736	0	35	35	35	105	145	145	155	175	--	--
W-4750	46	349	566916	949095	0	140	140	140	140	140	140	--	--	--	--
W-50028	125	283	500465	870333	0	4	4	4	100	165	180	230	--	--	--
W-50029	129	286	504168	866381	0	15	15	15	110	170	180	240	--	--	--
W-50030	129	311	528742	866299	0	40	40	40	160	180	180	180	290	--	--
W-50033	112	303	521360	882881	0	10	10	40	--	--	--	--	--	--	--
W-50034	117	272	490340	877844	0	35	60	90	90	100	--	--	--	--	--
W-50038	196	263	481310	799731	0	20	30	100	100	150	150	210	260	300	550
W-50039	147	272	490221	847957	0	25	25	25	80	135	160	180	--	--	--
W-50041	120	298	516169	875628	0	99	99	99	99	99	99	99	315	--	--
W-50043	123	295	513347	872306	0	51	51	51	128	143	143	159	--	--	--
W-50045	180	272	490090	815143	0	20	20	20	65	100	175	200	--	--	--
W-50046	155	325	543271	840207	0	30	30	60	--	--	--	--	--	--	--
W-50048	135	296	514214	860490	0	20	20	20	130	170	170	200	--	--	--
W-50049	176	431	648973	819357	0	30	75	150	150	150	150	150	--	--	--
W-50050	120	459	676634	875700	0	35	45	125	--	--	--	--	--	--	--
W-50051	169	385	603229	825953	0	6	45	55	--	--	--	--	--	--	--
W-50052	127	359	576806	868198	0	35	45	95	--	--	--	--	--	--	--
W-50054	240	456	673510	755248	0	25	75	132	--	--	--	--	--	--	--
W-50058	234	452	669871	761305	0	70	145	--	Absent	Absent	Absent	Absent	--	--	--
W-50060	233	375	592966	761855	0	10	30	80	--	--	--	--	--	--	--
W-50061	234	396	614329	761626	0	6	25	118	--	--	--	--	--	--	--
W-50062	219	458	676228	776451	0	--	60	--	Absent	Absent	Absent	Absent	--	--	--
W-50064	208	411	628981	787561	0	9	60	120	--	--	--	--	--	--	--
W-50066	91	269	486820	903808	0	20	20	60	120	120	120	--	--	--	--
W-5406	92	417	634493	903669	0	40	42	100	100	100	100	100	540	540	780
W-5435	102	448	665751	893264	0	80	80	170	170	170	170	170	390	420	--
W-5436	87	406	624259	908724	0	60	60	120	120	120	120	120	540	540	820
W-5437	55	401	618672	940231	0	38	--	--	Absent	Absent	Absent	Absent	--	--	--
W-5438	16	429	647193	978886	0	105	105	105	105	105	105	105	--	--	--
W-7109	195	293	511356	800704	0	13	38	80	80	107	107	306	357	504	820
W-7443	156	106	323573	838856	0	35	35	35	35	35	35	35	120	205	--
W-7444	156	103	321395	838975	0	26	26	26	26	26	26	26	120	--	--
W-7473	191	300	517838	804743	0	11	48	87	87	154	154	279	330	382	552
W-7478	156	105	322667	839065	0	30	30	30	30	30	30	30	120	215	--
W-7479	155	104	322043	840484	0	40	40	40	40	40	40	40	120	210	--
W-7748	47	53	270497	947876	0	20	20	20	50	50	50	120	150	--	--
W-7754	49	25	242780	946226	0	60	60	60	60	60	60	110	130	--	--
W-8079	83	234	452069	911840	0	43	43	43	--	--	--	--	233	340	--
W-8089	74	155	372598	921296	0	80	80	80	130	130	130	170	--	--	--
W-8095	68	178	395462	927709	0	90	90	90	--	--	--	--	--	--	--
W-810	58	114	331785	937249	0	46	--	--	Absent	Absent	Absent	Absent	--	--	--
W-8529	77	206	423842	918250	0	55	--	--	130	150	150	--	--	--	--
W-8530	44	135	353433	950818	0	50	--	--	--	--	--	--	--	--	--
W-8813	22	73	291093	973642	0	40	--	--	90	90	90	--	--	--	--
W-8951	419	316	534165	576014	0	0	10	70	70	150	150	150	--	--	--
W-9008	76	369	587408	918865	0	--	--	--	Absent	Absent	Absent	Absent	380	--	--
W-9200	47	223	441295	947842	0	60	--	--	--	--	--	--	--	--	--
W-9309	199	139	356843	795790	0	--	--	--	120	120	120	130	150	250	--
W-9321	234	253	470969	761408	0	40	40	200	210	260	280	290	370	460	520
W-9322	226	240	457550	768840	0	30	30	110	200	210	220	240	320	440	540
W-9324	249	218	435798	746432	0	80	90	120	160	260	260	300	320	--	--
W-9336	201	397	614816	793834	0	20	30	80	140	160	160	180	320	430	800
W-9389	295	383	601250	700761	0	20	40	60	100	120	120	120	350	400	--
W-9799	204	155	372438	791340	0	40	40	40	90	100	100	140	160	--	--
W-9800	207	154	372415	787907	0	--	--	--	--	--	--	150	180	--	--
W-9905	326	396	614055	669247	0	50	50	100	100	120	--	--	--	--	--
WA-25	171	232	449912	823903	0	48	48	48	80	--	--	160	256	310	--
WA-70	154	169	387021	840922	0	32	32	32	72	92	92	92	140	240	460

Well	Row	Column	X	Y	WT Top	WT Base	LT Top	LT Base	S2 Top	S2 Base	S1 Top	S1 Base	HM Top	HM Base	H3 Base
WBC-CMW1	156	74	292136	838972	0	21	21	32	107	116	116	116	--	--	--
WBC-PW2	306	240	457557	689437	0	40	60	150	150	220	240	250	360	--	--
WF_TPW	103	271	489336	892163	0	10	15	35	95	135	--	--	--	--	--
WF10	215	243	460474	780464	0	19	56	--	--	--	--	--	--	--	--
WF8	201	248	466360	794556	0	18	29	54	--	--	--	--	--	--	--
WF9	207	245	463219	788663	0	19	19	--	72	--	--	--	--	--	--
WO8-110	273	358	576008	722510	0	5	47	90	--	--	--	--	--	--	--
WPU-IW1	48	42	260044	947309	0	20	20	20	30	30	30	80	100	160	270

APPENDIX B:
SUMMARY TABLES OF RELIABLE AQUIFER PARAMETERS FROM AQUIFER PERFORMANCE TEST DATA

Site and Well Information for APTs					Recommended Aquifer Parameters									
Site Name	Well ID	X-Coord. (Florida State Plane, feet)	Y-Coord. (Florida State Plane, feet)	Aquifer Intercepted by Well, Based on 2022 Review	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Aquitard	Aquitard Thickness, ft	Aquitard K (ft/day)	Rounded Aquitard K (ft/day)	Specific Yield
Alban Gould	GOULD_PW	489837.000	895414.000	LT	2,149	113	100	--	--	--	--	--	--	9.00E-02
Alico (site A)	HE-1023	563287.000	818964.000	LT	122,873	1,365	1,000	3.10E-04	--	--	--	--	--	--
Alico (site C)	HE-1035	633623.000	800989.000	LT	33,422	668	700	5.80E-05	6.70E-06	TC	35	3.14E-05	3.00E-05	--
Aligator Alley East	C-1182	659721.000	667379.000	LT	100,000	2,000	2,000	1.10E+00	--	--	--	--	--	--
ASR pilot project Marco Lakes	C-1208	429769.000	629751.000	HM	43,380	421	400	--	--	--	--	--	--	--
Barron Collier	HE-1041	593482.000	741053.000	LT	60,963	1,524	2,000	1.50E-04	1.00E-02	TC	28	3.71E-02	4.00E-02	--
Bear Island Campground	C-1166	574912.000	672404.000	LT	200,000	10,000	10,000	--	--	--	--	--	--	--
Bear Island Campground	C-1167	574911.000	672101.000	LT	200,000	5,714	6,000	--	--	--	--	--	--	--
Bear Island Campground	W-17746	574979.000	672334.000	S2	840	42	40	8.00E-05	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS1	663997.000	720457.000	LT	42,434	2,122	2,000	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS2	663963.000	719962.000	LT	78,715	2,624	3,000	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS3	664506.000	719966.000	LT	68,602	2,744	3,000	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BICY-PW	554523.000	567149.000	HM	67,112	790	800	6.80E-05	6.00E-02	H2	185	1.49E+00	1.00E+00	--
Bonita Bay Development	LM-1682A	392851.000	734751.000	LT	8,021	174	200	1.00E-04	1.30E-03	TC	44	7.66E-03	8.00E-03	--
Bonita Bay Development	LM-1684	392882.000	734633.000	WT	8,690	668	700	1.50E-01	--	--	--	--	--	--
Bonita Bay Development	LM-1720	392617.000	734440.700	HM	9,358	493	500	5.00E-05	1.00E-05	H2	235	3.15E-04	3.00E-04	--
Brighton Reservation ASR	SBPW-1	618137.000	997210.000	WT	1,200	80	80	--	--	--	--	--	--	--
Burnt Store Marina and Country Club	LM-1271	316900.000	884666.000	S2	642	32	30	3.70E-05	1.10E-04	H1	59	8.70E-04	9.00E-04	--
Carica Road ASR	CARICA_EX1	397860.000	694819.000	HM	2,273	17	20	--	--	--	--	--	--	--
Carl Gallagher	HE-1054	623955.000	747081.000	LT	88,235	2,941	3,000	5.00E-04	4.00E-02	TC	25	1.34E-01	1.00E-01	--
CH-71	CH-71	343753.000	901096.000	HM	508	8	8	--	--	--	--	--	--	--
City of Naples - East Golden Gate Wellfield	EGG3	481730.000	692986.000	LT	98,300	2,398	2,000	3.20E-06	3.00E-05	TC	49	1.97E-04	2.00E-04	--
City of Naples - East Golden Gate Wellfield	EGG4	481681.000	691498.000	LT	38,000	974	1,000	1.00E-04	--	--	--	--	--	--
CO-1977	CO-1977	446419.000	621651.000	WT LT	67,380	1,497	1,000	--	--	--	--	--	--	--
CO-1988	CO-1988	472122.538	695715.051	WT	104,278	1,931	2,000	--	--	--	--	--	--	--
CO-1990	CO-1990	454932.700	678146.600	LT	105,615	2,640	3,000	3.20E-03	4.30E-03	TC	27.66	3.71E-02	4.00E-02	--
CO-1994	CO-1994	456841.980	712475.290	LT	86,898	2,897	3,000	1.10E-04	3.30E-01	--	--	--	--	--
CO-217	CO-217	422716.000	627732.000	LT	53,472	3,565	4,000	2.80E-04	4.70E-02	TC	8	5.19E-02	5.00E-02	--
CO-26	CO-26	409175.000	705876.000	LT	24,064	650	700	--	--	--	--	--	--	--
CO-304	CO-304	536643.000	590264.000	LT	160,428	16,043	20,000	1.20E-01	--	--	--	--	--	--
CO-35	CO-35	405924.300	656431.800	LT	28,877	525	500	6.00E-04	3.20E-01	TC	6	2.57E-01	3.00E-01	--
CO-470	CO-470	510980.000	716490.000	WT	33,422	6,684	7,000	--	1.00E-02	--	--	--	--	--
CO-755	CO-755	536557.500	590314.800	S2	1,872	34	30	2.00E-04	2.00E-03	--	--	--	--	--
CO-930	CO-930	524615.400	711494.000	LT	133,690	4,610	5,000	1.00E-03	2.00E-02	TC	12	3.22E-02	3.00E-02	--
Collier Enterprises-Crow's Nest South	EGG23	478346.000	691358.000	LT	82,700	5,169	5,000	3.20E-04	1.00E-02	TC	32	4.32E-02	4.00E-02	--
Collier Enterprises-Gopher Ridge	GOPHR-PW1	522091.000	763206.000	WT	17,075	190	200	3.50E-04	4.00E-03	--	--	--	--	--
Corkscrew WTP ASR	L-5855	425771.000	775262.000	HM	3,410	49	50	7.70E-05	1.60E-05	H2	74	1.59E-04	2.00E-04	--
Corkscrew WTP ASR	L-5860	424331.000	777895.000	HM	1,765	28	30	1.20E-04	--	--	--	--	--	--
CPI	HM-177	473487.000	822314.000	S2 S1	4,011	67	70	5.00E-04	1.30E-02	H1	40	6.97E-02	7.00E-02	--
Cypress Woods Development	CYWOOD_PW1	413907.000	709335.000	LT	147,059	24,510	20,000	--	--	--	--	--	--	--
David Lee	EGG24	476653.000	692825.000	LT	72,700	2,423	2,000	6.90E-03	1.80E+00	TC	27	6.51E+00	7.00E+00	--
Drill Site 4 Crooks Ranch Hendry County	HES-21	622166.000	776502.000	LT	21,738	621	600	2.46E-04	--	--	--	--	--	--
FAA radar	C-1143	652761.000	555909.000	LT	1,500	75	80	--	--	--	--	--	--	--
FAA radar	C-1144	652761.000	555879.000	S2	180	18	20	--	--	--	--	--	--	--
FAA Radar	C-1172	652752.000	555768.000	LT	300,000	7,500	8,000	4.00E-03	--	--	--	--	--	2.00E-01
FPL Ft Myers Test Well Program	FMFPL_TW1	401306.000	859322.000	HM	10,840	23	20	1.00E-03	--	--	--	--	--	--
Frank Green	FG_PW	459877.000	876164.000	S1	162	3	3	1.61E-04	3.90E-02	H1	70	3.66E-01	4.00E-01	--
Green Meadows Wellfield	L-1966	419734.000	792400.000	S1	3,115	39	40	1.24E-05	1.10E-04	H1	36	5.31E-04	5.00E-04	NA
H-M-328	H-M-328	676640.000	722308.000	LT	68,182	1,176	1,000	--	--	--	--	--	--	--
Jo Mar El	H-M-318	509675.000	800303.000	S2	4,011	50	50	2.00E-04	7.00E-03	H1	36	3.38E-02	3.00E-02	--
H-M-73	H-M-73	481488.000	879170.000	S2	1,238	65	70	2.60E-03	--	--	--	--	--	8.00E-03
L.J. Nobles	LJNOBLESPW	500337.000	890054.000	S1	2,005	27	30	5.00E-05	--	--	--	--	--	--
Lely Resort Community site	CO-776	425716.000	635611.000	LT	68,293	1,707	2,000	7.70E-02	--	--	--	--	--	--

Site and Well Information for APTs					Recommended Aquifer Parameters									
Site Name	Well ID	X-Coord. (Florida State Plane, feet)	Y-Coord. (Florida State Plane, feet)	Aquifer Intercepted by Well, Based on 2022 Review	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Aquitard	Aquitard Thickness, ft	Aquitard K (ft/day)	Rounded Aquitard K (ft/day)	Specific Yield
LM-3410	LM-3410	390305.940	748079.870	WT	12,257	1,167	1,000	3.83E-04	--	--	--	--	--	2.00E-01
L-M-924	LM-924	428894.000	771152.000	LT	26,738	276	300	--	--	--	--	--	--	--
L-M-934	LM-934	428666.000	771390.000	S2	2,674	27	30	3.00E-05	4.70E-04	H1	48	3.02E-03	3.00E-03	--
LM-944 Sanibel Island	W-14011	280541.000	776613.000	HM	2,219	13	10	4.50E-03	6.70E-06	H2	10	8.98E-06	9.00E-06	--
NE Big Cypress Preserve	C-1170	678570.000	686164.000	LT	70,000	1,750	2,000	--	--	--	--	--	--	--
NE Big Cypress Preserve	C-1171	678843.000	686164.000	LT	70,000	1,167	1,000	--	--	--	--	--	--	--
North Collier County Waste Water Treatment Plant	MC-5003	433672.000	695082.000	HM	2,580	22	20	8.70E-04	1.50E-04	H2	111	2.23E-03	2.00E-03	--
Pelican Bay well field	CO-289	409170.000	709029.000	LT	29,810	621	600	--	--	--	--	--	--	--
QUAIL CREEK COUNTRY CLUB	CO-220	416922.000	710916.000	LT	80,214	2,292	2,000	--	1.00E-03	TC	26	3.48E-03	3.00E-03	--
QUAIL CREEK COUNTRY CLUB	CO-224	419544.000	710999.000	WT	133,690	8,913	9,000	--	--	--	--	--	--	--
Rainbow Ranch	RAINBOW_PW	495816.000	904354.000	S1	1,277	40	40	3.00E-04	--	--	--	--	--	--
ROMP 5 Cecil Webb	MW-1	392998.214	950320.490	WT	2,780	35	30	--	--	--	--	--	--	--
ROMP 5 Cecil Webb	MW-2	393010.020	950320.490	S2	1,390	14	10	2.10E-03	--	--	--	--	--	--
ROMP 5 Cecil Webb	MW-3	399020.040	950320.490	HM	2,970	20	20	--	--	--	--	--	--	--
Rowland Walker	ROWLAND22	484584.000	904904.000	S1	3,393	32	30	2.00E-05	--	--	--	--	--	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5055	431311.800	667756.400	HM	12,834	122	100	1.40E-04	3.00E-04	--	--	--	--	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5057	440785.000	669257.000	HM	13,099	131	100	1.50E-04	--	--	--	--	--	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5065	431156.000	673865.000	HM	5,971	48	50	8.30E-05	--	--	--	--	--	--
Sabal palm nursery	CO-235	433080.000	639086.000	LT	89,572	2,297	2,000	--	--	--	--	--	--	--
Seminole Tribe - Road site	HE-1061	621836.000	713462.000	LT	50,401	1,120	1,000	2.00E-05	1.30E-04	TC	68	1.18E-03	1.00E-03	--
SFWMD C2033 test site	CROW_PW	607587.000	760113.000	LT	100,267	2,507	3,000	1.60E-04	7.30E-02	TC	20	1.94E-01	2.00E-01	--
Silver Strand IV	CO-746	526851.730	707006.000	LT	133,690	5,348	5,000	1.00E-03	1.00E-03	--	--	--	--	--
SITE RTA-5	RTA-005	513676.000	809201.000	S1	905	26	30	9.77E-05	8.48E-05	SC	2.00E+01	2.27E-04	2.00E-04	--
SITE RTA-7	RTA7_PW	496307.000	903544.000	S1	842	42	40	2.40E-05	8.48E-05	H1	1.65E+01	1.87E-04	2.00E-04	--
Six L's	6L8	473487.000	906565.000	S1	1,824	21	20	3.16E-05	5.46E-04	H1	9.00E+01	6.58E-03	7.00E-03	--
Town of Ave Maria public water supply	MARIA-P1	511810.000	723665.000	LT	48,355	2,303	2,000	--	--	--	--	--	--	--
Town of Ave Maria public water supply	MARIA-P2	511845.000	722921.000	LT	52,684	2,509	3,000	--	--	--	--	--	--	--
Town of Ave Maria public water supply	MARIA-P3	512256.000	722046.000	LT	27,351	1,094	1,000	--	--	--	--	--	--	--
Trail Center Big Cypress Preserve	MO-188	696835.000	534434.000	LT	90,000	3,600	4,000	--	--	--	--	--	--	--
Turner Corp. South Site	H-M-82	473136.000	800547.000	S2 S1	10,027	141	100	1.00E-04	1.00E-06	H1	5.00E+01	6.70E-06	7.00E-06	--
USSC So. Div. Ranch I	H-M-235	667146.000	761305.000	LT	13,369	223	200	--	--	--	--	--	--	--
USSC So. Div. Ranch II	H-M-301	671956.000	740682.000	LT	43,449	905	900	4.00E-04	2.70E-04	--	--	--	--	--
WF_TPW	WF_TPW	489337.000	892164.000	S2	8,690	869	900	4.00E-03	2.00E-05	H1	6.00E+01	1.61E-04	2.00E-04	--
Williams Little Cypress Farm	CFTP-20	669100.000	776950.000	LT	27,940	337	300	--	--	--	--	--	--	--

Site and Well Information for APTs					Minimum Aquifer Parameters						Maximum Aquifer Parameters					
Site Name	Well ID	X-Coord. (Florida State Plane, feet)	Y-Coord. (Florida State Plane, feet)	Aquifer Intercepted by Well, Based on 2022 Review	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Specific Yield	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Specific Yield
Alban Gould	GOULD_PW	489837.000	895414.000	LT	1,970	104	100	--	--	1.59E-01	2,507	132	100	--	--	5.57E-02
Alico (site A)	HE-1023	563287.000	818964.000	LT	110,960	1,233	1,000	--	--	--	125,450	1,394	1,000	1.50E-04	--	--
Alico (site C)	HE-1035	633623.000	800989.000	LT	31,846	637	600	9.00E-05	2.21E-05	--	32,842	657	700	1.90E-05	6.43E-06	--
Aligator Alley East	C-1182	659721.000	667379.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
ASR pilot project Marco Lakes	C-1208	429769.000	629751.000	HM	42,380	411	400	--	--	--	66,845	649	600	--	--	--
Barron Collier	HE-1041	593482.000	741053.000	LT	60,958	1,524	2,000	2.01E-04	1.30E-03	--	61,279	1,532	2,000	1.20E-04	1.40E-03	--
Bear Island Campground	C-1166	574912.000	672404.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Bear Island Campground	C-1167	574911.000	672101.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Bear Island Campground	W-17746	574979.000	672334.000	S2	--	--	--	--	--	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS1	663997.000	720457.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS2	663963.000	719962.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BCSR-PWS3	664506.000	719966.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Big Cypress Seminole Reservation Wellfield	BICY-PW	554523.000	567149.000	HM	--	--	--	--	--	--	--	--	--	--	--	--
Bonita Bay Development	LM-1682A	392851.000	734751.000	LT	8,021	174	200	1.00E-04	1.30E-03	--	11,898	259	300	1.60E-04	1.30E-03	--
Bonita Bay Development	LM-1684	392882.000	734633.000	WT	8,690	668	700	--	--	--	14,706	1,131	1,000	--	--	--
Bonita Bay Development	LM-1720	392617.000	734440.700	HM	9,358	493	500	4.20E-05	--	--	10,160	535	500	6.80E-05	--	--
Brighton Reservation ASR	SBPW-1	618137.000	997210.000	WT	1,113	74	70	--	--	--	1,273	85	80	3.59E-04	1.12E-01	--
Burnt Store Marina and Country Club	LM-1271	316900.000	884666.000	S2	642	32	30	3.30E-05	1.10E-04	--	668	33	30	3.70E-05	1.10E-04	--
Carica Road ASR	CARICA_EX1	397860.000	694819.000	HM	--	--	--	--	--	--	--	--	--	--	--	--
Carl Gallagher	HE-1054	623955.000	747081.000	LT	88,164	2,939	3,000	2.12E-04	1.05E-01	--	100,096	3,337	3,000	3.29E-04	1.60E-02	--
CH-71	CH-71	343753.000	901096.000	HM	--	--	--	--	--	--	--	--	--	--	--	--
City of Naples - East Golden Gate Wellfield	EGG3	481730.000	692986.000	LT	74,800	1,824	2,000	5.02E-05	--	--	92,000	2,244	2,000	5.17E-06	--	--
City of Naples - East Golden Gate Wellfield	EGG4	481681.000	691498.000	LT	16,400	421	400	--	--	--	62,400	1,600	2,000	--	--	--
CO-1977	CO-1977	446419.000	621651.000	WT LT	21,283	473	500	--	--	--	67,380	1,497	1,000	--	--	--
CO-1988	CO-1988	472122.538	695715.051	WT	--	--	--	--	--	--	--	--	--	--	--	--
CO-1990	CO-1990	454932.700	678146.600	LT	--	--	--	--	--	--	--	--	--	--	--	--
CO-1994	CO-1994	456841.980	712475.290	LT	--	--	--	--	--	--	--	--	--	--	--	--
CO-217	CO-217	422716.000	627732.000	LT	48,663	3,244	3,000	3.90E-04	5.10E-02	--	56,150	--	--	2.40E-04	4.40E-02	--
CO-26	CO-26	409175.000	705876.000	LT	1,537	42	40	5.00E-06	3.00E-04	--	38,235	1,033	1,000	5.00E-06	3.00E-04	--
CO-304	CO-304	536643.000	590264.000	LT	2,566,845	256,684	300,000	--	--	--	467,914	46,791	50,000	--	--	--
CO-35	CO-35	405924.300	656431.800	LT	22,460	1,321	1,000	1.40E-03	1.20E+00	--	39,171	2,304	2,000	4.00E-04	5.00E-01	--
CO-470	CO-470	510980.000	716490.000	WT	24,866	4,973	5,000	1.10E-04	6.40E-03	--	55,615	11,123	10,000	--	7.40E-03	--
CO-755	CO-755	536557.500	590314.800	S2	1,732	31	30	2.20E-04	2.30E-03	--	1,992	36	40	3.70E-04	1.00E-03	--
CO-930	CO-930	524615.400	711494.000	LT	127,005	4,379	4,000	3.00E-03	1.00E-02	--	187,166	6,454	6,000	6.00E-04	6.00E-02	--
Collier Enterprises-Crow's Nest South	EGG23	478346.000	691358.000	LT	55,500	3,469	3,000	3.55E-04	--	--	76,800	4,800	5,000	3.72E-04	--	--
Collier Enterprises-Gopher Ridge	GOPHR-PW1	522091.000	763206.000	WT	2,918	32	30	--	--	4.50E-01	13,928	279	300	3.50E-04	4.00E-03	--
Corkscrew WTP ASR	L-5855	425771.000	775262.000	HM	3,380	49	50	6.70E-05	--	--	3,460	50	50	--	--	--
Corkscrew WTP ASR	L-5860	424331.000	777895.000	HM	--	--	--	--	--	--	--	--	--	--	--	--
CPI	HM-177	473487.000	822314.000	S2 S1	3,209	53	50	7.00E-03	--	--	4,679	78	80	5.00E-04	--	--
Cypress Woods Development	CYWOOD_PW1	413907.000	709335.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
David Lee	EGG24	476653.000	692825.000	LT	38,500	1,283	1,000	9.48E-03	--	--	90,300	3,010	3,000	2.50E-02	--	--
Drill Site 4 Crooks Ranch Hendry County	HES-21	622166.000	776502.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
FAA radar	C-1143	652761.000	555909.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
FAA radar	C-1144	652761.000	555879.000	S2	--	--	--	--	--	--	--	--	--	--	--	--
FAA Radar	C-1172	652752.000	555768.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
FPL Ft Myers Test Well Program	FMFPL_TW1	401306.000	859322.000	HM	--	--	--	--	--	--	--	--	--	--	--	--
Frank Green	FG_PW	459877.000	876164.000	S1	162	3	3	1.61E-04	3.90E-02	--	288	6	6	2.01E-04	--	--
Green Meadows Wellfield	L-1966	419734.000	792400.000	S1	3,115	39	40	1.24E-05	1.10E-04	--	3,289	41	40	1.05E-05	--	--
H-M-328	H-M-328	676640.000	722308.000	LT	65,508	1,129	1,000	--	2.50E-03	--	69,519	1,199	1,000	--	3.40E-03	--
Jo Mar El	H-M-318	509675.000	800303.000	S2	3,342	42	40	2.00E-04	8.90E-03	--	4,144	52	50	3.00E-04	5.00E-03	--
H-M-73	H-M-73	481488.000	879170.000	S2	1,238	65	70	2.60E-03	--	8.00E-03	1,243	65	70	5.00E-04	--	--
L.J. Nobles	LJNOBLESPW	500337.000	890054.000	S1	1,787	24	20	6.20E-05	2.00E-04	--	2,145	29	30	1.10E-04	3.40E-04	--
Lely Resort Community site	CO-776	425716.000	635611.000	LT	5,615	140	100	6.60E-04	5.60E-02	--	67,380	1,684	2,000	1.00E-02	7.70E-02	--

Site and Well Information for APTs					Minimum Aquifer Parameters						Maximum Aquifer Parameters					
Site Name	Well ID	X-Coord. (Florida State Plane, feet)	Y-Coord. (Florida State Plane, feet)	Aquifer Intercepted by Well, Based on 2022 Review	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Specific Yield	T (ft^2/day)	K (ft/day)	Rounded K (ft/day)	Storativity or Storage Coefficient	Leakance Coefficient (k'/b') (gpd/ft^3)	Specific Yield
LM-3410	LM-3410	390305.940	748079.870	WT	13,841	1,318	1,000	--	--	--	14,406	1,372	1,000	--	--	--
L-M-924	LM-924	428894.000	771152.000	LT	26,070	269	300	1.70E-01	--	--	27,406	283	300	5.20E-03	--	--
L-M-934	LM-934	428666.000	771390.000	S2	2,675	27	30	6.00E-05	5.00E-03	--	3,516	35	40	4.80E-06	4.50E-05	--
LM-944 Sanibel Island	W-14011	280541.000	776613.000	HM	2,085	12	10	8.50E-05	5.00E-05	--	2,353	14	10	9.00E-04	--	--
NE Big Cypress Preserve	C-1170	678570.000	686164.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
NE Big Cypress Preserve	C-1171	678843.000	686164.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
North Collier County Waste Water Treatment Plant	MC-5003	433672.000	695082.000	HM	2,580	22	20	8.70E-04	1.50E-04	--	2,955	25	30	9.80E-05	--	--
Pelican Bay well field	CO-289	409170.000	709029.000	LT	28,877	602	600	--	--	--	29,947	624	600	--	--	--
QUAIL CREEK COUNTRY CLUB	CO-220	416922.000	710916.000	LT	16,043	458	500	--	--	--	85,561	2,445	2,000	--	5.80E-03	--
QUAIL CREEK COUNTRY CLUB	CO-224	419544.000	710999.000	WT	133,690	8,913	9,000	1.30E-02	--	--	207,219	13,815	10,000	8.00E-04	--	3.80E-01
Rainbow Ranch	RAINBOW_PW	495816.000	904354.000	S1	1,277	40	40	5.40E-04	5.60E-04	--	1,277	40	40	1.80E-04	1.50E-04	--
ROMP 5 Cecil Webb	MW-1	392998.214	950320.490	WT	1,580	20	20	--	--	--	3,440	43	40	--	--	--
ROMP 5 Cecil Webb	MW-2	393010.020	950320.490	S2	1,160	12	10	1.96E-03	--	--	1,810	18	20	1.64E-04	--	--
ROMP 5 Cecil Webb	MW-3	399020.040	950320.490	HM	--	--	--	--	--	--	--	--	--	--	--	--
Rowland Walker	ROWLAND22	484584.000	904904.000	S1	2,803	26	30	6.10E-05	5.90E-05	--	5,750	54	50	1.70E-03	3.50E-03	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5055	431311.800	667756.400	HM	12,701	121	100	1.40E-04	2.90E-04	--	12,834	122	100	1.40E-04	2.90E-04	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5057	440785.000	669257.000	HM	10,963	110	100	1.90E-04	--	--	14,037	140	100	1.50E-04	1.30E-03	--
S. Collier County Waste Water Treatment Plant - FAS	MC-5065	431156.000	673865.000	HM	5,829	47	50	8.30E-05	1.80E-04	--	6,016	49	50	5.70E-05	--	--
Sabal palm nursery	CO-235	433080.000	639086.000	LT	64,171	1,645	2,000	7.00E-04	4.10E-01	--	114,973	2,948	3,000	4.00E-04	1.50E-01	--
Seminole Tribe - Road site	HE-1061	621836.000	713462.000	LT	44,121	980	1,000	4.10E-04	2.60E-04	--	52,226	1,161	1,000	2.00E-04	1.40E-04	--
SFWMD C2033 test site	CROW_PW	607587.000	760113.000	LT	90,010	2,250	2,000	2.00E-04	7.00E-02	--	138,477	3,462	3,000	1.70E-04	7.00E-03	--
Silver Strand IV	CO-746	526851.730	707006.000	LT	201,203	8,048	8,000	4.00E-03	2.50E-02	--	264,706	10,588	10,000	5.00E-04	4.00E-03	--
SITE RTA-5	RTA-005	513676.000	809201.000	S1	--	--	--	--	--	--	--	--	--	--	--	--
SITE RTA-7	RTA7_PW	496307.000	903544.000	S1	--	--	--	--	--	--	--	--	--	--	--	--
Six L's	6L8	473487.000	906565.000	S1	--	--	--	--	--	--	--	--	--	--	--	--
Town of Ave Maria public water supply	MARIA-P1	511810.000	723665.000	LT	33,790	1,609	2,000	--	--	--	62,920	2,996	3,000	--	--	--
Town of Ave Maria public water supply	MARIA-P2	511845.000	722921.000	LT	40,597	1,933	2,000	--	--	--	64,771	3,084	3,000	--	--	--
Town of Ave Maria public water supply	MARIA-P3	512256.000	722046.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Trail Center Big Cypress Preserve	MO-188	696835.000	534434.000	LT	--	--	--	--	--	--	--	--	--	--	--	--
Turner Corp. South Site	H-M-82	473136.000	800547.000	S2 S1	9,626	136	100	1.40E-04	7.20E-06	--	18,717	264	300	1.50E-04	8.10E-05	--
USSC So. Div. Ranch I	H-M-235	667146.000	761305.000	LT	12,834	214	200	3.90E-04	2.50E-03	--	16,444	274	300	5.60E-04	1.30E-03	--
USSC So. Div. Ranch II	H-M-301	671956.000	740682.000	LT	42,781	891	900	3.40E-04	1.30E-04	--	44,118	919	900	8.00E-04	1.40E-03	--
WF_TPW	WF_TPW	489337.000	892164.000	S2	11,377	1,138	1,000	4.30E-04	1.50E-05	--	15,117	1,512	2,000	2.50E-04	8.10E-05	--
Williams Little Cypress Farm	CFTP-20	669100.000	776950.000	LT	24,465	295	300	1.40E-02	7.20E-01	--	30,615	369	400	--	3.10E-02	--

APPENDIX C:
RESULTS OF HYDRAULIC CONDUCTIVITY PARTITIONING FOR MULTILAYER AQUIFER PERFORMANCE TESTS

Table 1. Horizontal hydraulic conductivity reference values for common unconsolidated materials and sedimentary rocks.

Domenico and Schwartz, 1990			
Unconsolidated Sedimentary Materials			
Material	**Minimum K_h**	**Maximum K_h**	**Average K_h**
	ft/day	**ft/day**	**ft/day**
Gravel	85.03950	8,504	4,294
Coarse sand	2.55E-01	1,701	851
Medium sand	2.55E-01	142	71
Fine sand	5.67E-02	57	28
Silt, loess	2.83E-04	6	3
Till	2.83E-07	5.67E-01	2.83E-01
Clay	2.83E-06	1.33E-03	6.68E-04
Unweathered marine clay	2.27E-07	5.67E-04	2.84E-04
Sedimentary Rocks			
Rock Type	**Minimum**	**Maximum**	**Average**
	ft/day	**ft/day**	**ft/day**
Karst and reef limestone	2.83E-01	5,669	2,835
Limestone, dolomite	2.83E-04	1.7	8.51E-01
Sandstone	8.50E-05	1.7	8.50E-01
Siltstone	2.83E-06	3.97E-03	1.99E-03
Salt	2.83E-07	2.83E-05	1.43E-05
Anhydrite	1.13E-07	5.67E-03	2.83E-03
Shale	2.83E-08	5.67E-04	2.83E-04

Data from Domenico, P.A. and F.W. Schwartz, 1990. Physical and Chemical Hydrogeology, John Wiley & Sons, New York, 824 p

Table 2. Estimated recommended horizontal K values for hydrostratigraphic units at H-M-82.

H-M-82 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended T* (ft^2/day) from Closest Reliable APT	Aquitard K_h, ft/day	K_xd_x, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended K_h from APT (ft/d)	K_h (ft/d) based on the Proportionality of each layer
Limestone, numerous casts and molds, minor marl shell and phosphorite	155-175	20	**S2**	4,011		4,011	81%	141	**115**
Marl, limestone, marly, sandy, clay	189-215	26	**SC**		8.51E-01	22	0.45%		**0.6**
Limestone, sandy in places, shell fragments, some marl	215-235	20	**S1**	905		905	18%		**26**
Marl, limestone, shell fragments, minor sand and phosphorite	235-240	5	**H2**		8.51E-01	4	0.09%		**0.1**
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to K_xd_x values by multiplying K by the layer thickness.	***Total thickness (d), ft***	71			**Sum of K_xd_x values, ft^2/day, (numerator in equivalent K formula)**	4,942			
					Equivalent K_h, ft/day	70			

Depth interval tested (ft bls)	Tested Interval Min.(ft)	Tested Interval Max.(ft)	Total, ft
155-175	155	175	20
189-240	189	240	51

Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
71	**9,626**	**18,717**	**10,027**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**136**	**264**	**141**

Table 3. Estimated minimum horizontal K values for hydrostratigraphic units at H-M-82.

H-M-82 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended Minimum T* (ft^2/day) from Closest Reliable APT	Aquitard K_h, ft/day	K_xd_x, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended Minimum K_h from APT (ft/d)	Minimum K_h (ft/d) based on the Proportionality of each layer
Limestone, numerous casts and molds, minor marl shell and phosphorite	155-175	20	**S2**	3,342		3,342	68%	136	**95**
Marl, limestone, marly, sandy, clay	189-215	26	**SC**		2.83E-03	0.074	0.001%		**2.1E-03**
Limestone, sandy in places, shell fragments, some marl	215-235	20	**S1**	162		162	3%		**5**
Marl, limestone, shell fragments, minor sand and phosphorite	235-240	5	**H2**		2.83E-03	0.014	0.0003%		**4.0E-04**
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to K_xd_x values by multiplying K by the layer thickness.	***Total thickness (d), ft***	71			**Sum of K_xd_x values, ft^2/day, (numerator in equivalent K formula)**	3,504			
					Equivalent K_h, ft/day	49			

Depth interval tested (ft bls)	Tested Interval Min.(ft)	Tested Interval Max.(ft)	Total, ft
155-175	155	175	20
189-240	189	240	51

Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
71	**9,626**	**18,717**	**10,027**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**136**	**264**	**141**

Table 4. Estimated maximum horizontal K values for hydrostratigraphic units at H-M-82.

H-M-82 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended Maximum T* (ft^2/day) from Closest Reliable APT	Aquitard K_h, ft/day	$K_x d_x$, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended Maximum K_h from APT (ft/d)	Maximum K_h (ft/d) based on the Proportionality of each layer
Limestone, numerous casts and molds, minor marl shell and phosphorite	155-175	20	**S2**	4,144		4,144	84%	264	**118**
Marl, limestone, marly, sandy, clay	189-215	26	**SC**		1.7	44.200	0.894%		**1.3E+00**
Limestone, sandy in places, shell fragments, some marl	215-235	20	**S1**	2,145		2145	43%		**61**
Marl, limestone, shell fragments, minor sand and phosphorite	235-240	5	**H2**		1.7	8.500	0.1720%		**2.4E-01**
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to $K_x d_x$ values by multiplying K by the layer thickness.	***Total thickness (d), ft***	71			**Sum of $K_x d_x$ values, ft^2/day, (numerator in equivalent K formula)**	6,342			
					Equivalent K_h, ft/day	89			

Depth interval tested (ft bls)	Tested Interval Min.(ft)	Tested Interval Max.(ft)	Total, ft
155-175	155	175	20
189-240	189	240	51

Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
71	**9,626**	**18,717**	**10,027**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**136**	**264**	**141**

Table 5. Estimated recommended horizontal K values for hydrostratigraphic units at HM-177.

HM-177 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended T* (ft^2/day) from closest reliable APT	Aquitard K_h, ft/day	K_xd_x, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended K_h from APT (ft/d)	K_h (ft/d) based on the Proportionality of each layer
Sand, coarse with pebbles, clayey, limestone, shell mold fragments, clay lenses 75-77'	65-80	15	**S2**	4,011		4,011	53%	100	53
Clay, green, sandy, sand with pebbles, shell and phosphorite	80-85	5	**SC**		6.68E-04	0.003	0.00004%		4.39E-05
Sand, very fine to medium coarse, clayey, shell and limestone fragments, interbedded sandstone layers (1-2' thick)	105-113	8	**S1**	905		905	12%		12
Limestone	113-114	1	**S1**	905		905	12%		12
Sand, very fine to medium coarse, clayey, shell and limestone fragments	114-124	10	**S1**	905		905	12%		12
Clay, very sandy, phosphorite	124-125	1	**S1**	905		905	12%		12
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to K_xd_x values by multiplying K by the layer thickness.	***Total thickness (d), ft***	**40**			**Sum of K_xd_x values, ft^2/day, (numerator in equivalent K formula)**	7,631			
					Equivalent K_h, ft/day	**191**			

Depth interval tested (ft bls)	Tested Interval Top, ft bls	Tested Interval Bottom, ft bls	Total ft
65-85	**65**	**85**	**20**
105-125	**105**	**125**	**20**

Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
40	**3,209**	**4,679**	**4,011**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**80**	**117**	**100**

Table 6. Estimated minimum horizontal K values for hydrostratigraphic units at HM-177.

HM-177 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended Minimum T* (ft^2/day) from Closest Reliable APT	Aquitard K_h, ft/day	K_xd_x, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended Minimum K_h from APT (ft/d)	Minimum K_h (ft/d) based on the Proportionality of each layer
Sand, coarse with pebbles, clayey, limestone, shell mold fragments, clay lenses 75-77'	65-80	15	**S2**	3,342		3,342	71%	80	57
Clay, green, sandy, sand with pebbles, shell and phosphorite	80-85	5	**SC**		2.83E-06	0.000	0.00000%		0.00000
Sand, very fine to medium coarse, clayey, shell and limestone fragments, interbedded sandstone layers (1-2' thick)	105-113	8	**S1**	162		162	3%		3
Limestone	113-114	1	**S1**	162		162	3%		3
Sand, very fine to medium coarse, clayey, shell and limestone fragments	114-124	10	**S1**	162		162	3%		3
Clay, very sandy, phosphorite	124-125	1	**S1**	162		905	19%		15
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to K_xd_x values by multiplying K by the layer thickness.	***Total thickness (d), ft***	**40**			**Sum of K_xd_x values, ft^2/day, (numerator in equivalent K formula)**	4,733			
					Equivalent K_h, ft/day	**118**			

Depth interval tested (ft bls)	Interval Top, ft bls	Tested Interval Bottom, ft bls	Total ft
65-85	**65**	**85**	**20**
105-125	**105**	**125**	**20**

Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
40	**3,209**	**4,679**	**4,011**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**80**	**117**	**100**

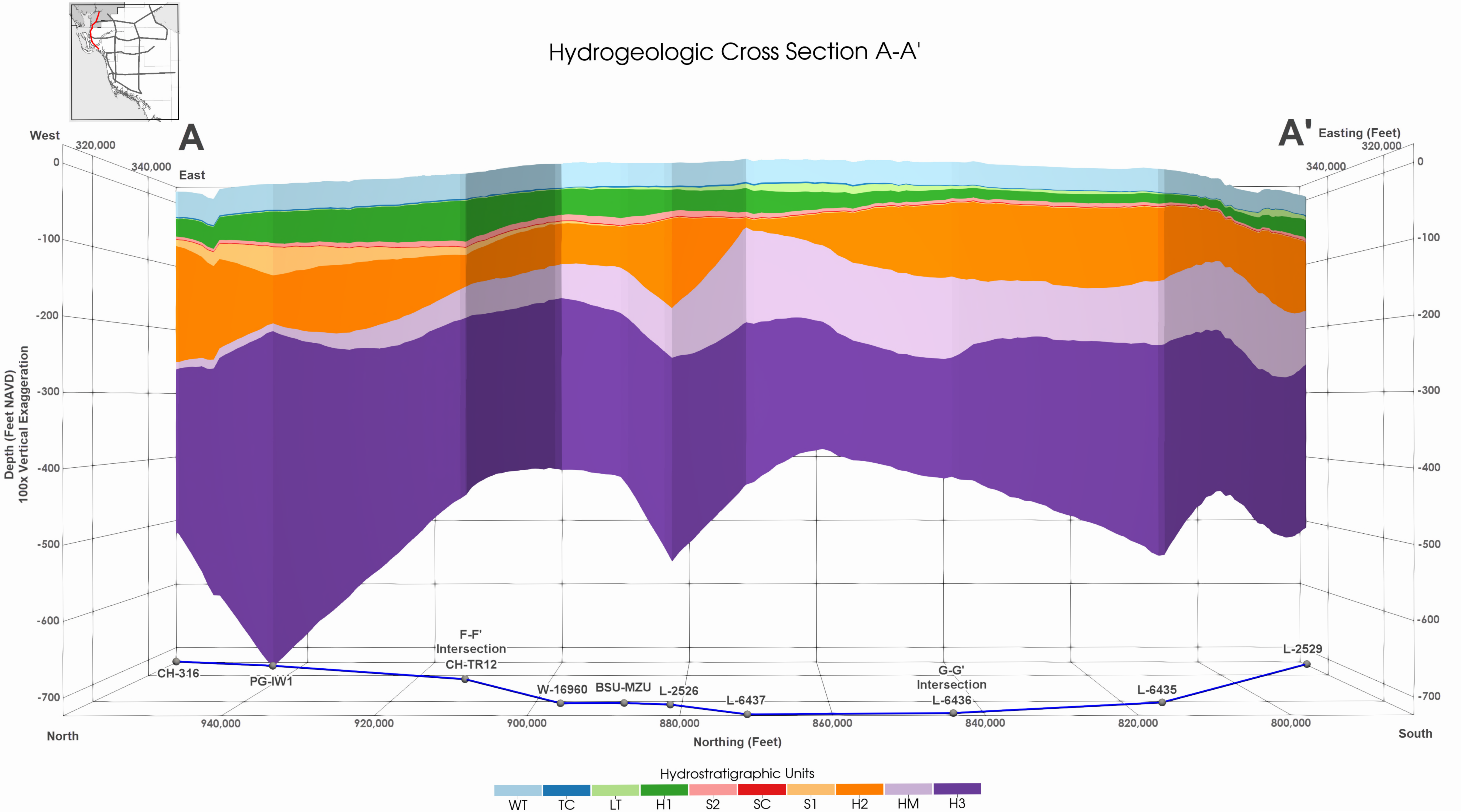
Table 7. Estimated maximum horizontal K values for hydrostratigraphic units at HM-177.

HM-177 Lithology of Hydrostratigraphic Unit	Layer Depth Interval, ft bls	Layer Thickness (d), ft	Hydrostratigraphic Unit	Recommended Maximum T* (ft^2/day) from Closest Reliable APT	Aquitard K_h, ft/day	$K_x d_x$, ft^2/day. (Numerator Terms in Equivalent K Formula)	Proportionality	Recommended Maximum K_h from APT (ft/d)	Maximum K_h (ft/d) based on the Proportionality of each layer
Sand, coarse with pebbles, clayey, limestone, shell mold fragments, clay lenses 75-77'	65-80	15	**S2**	4,144		4,144	36%	117	42
Clay, green, sandy, sand with pebbles, shell and phosphorite	80-85	5	**SC**		1.33E-03	0.007	0.00006%		0.00007
Sand, very fine to medium coarse, clayey, shell and limestone fragments, interbedded sandstone layers (1-2' thick)	105-113	8	**S1**	2145		2145	19%		22
Limestone	113-114	1	**S1**	2145		2145	19%		22
Sand, very fine to medium coarse, clayey, shell and limestone fragments	114-124	10	**S1**	2145		2145	19%		22
Clay, very sandy, phosphorite	124-125	1	**S1**	2145		905	8%		9
* For S1 and S2, the recommnended T is from the closest reliable APTs. For aquitards, K values from "book" K values were used, then converted to $K_x d_x$ values by multiplying K by the layer thickness.	***Total thickness (d), ft***	**40**			**Sum of $K_x d_x$ values, ft^2/day, (numerator in equivalent K formula)**	11,484			
					Equivalent K_h, ft/day	**287**			

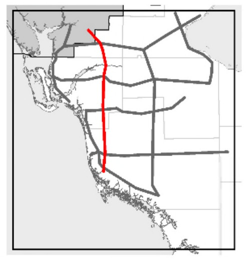
Depth interval tested (ft bls)	Interval Top, ft bls	Tested Interval Bottom, ft bls	Total ft
65-85	**65**	**85**	**20**
105-125	**105**	**125**	**20**

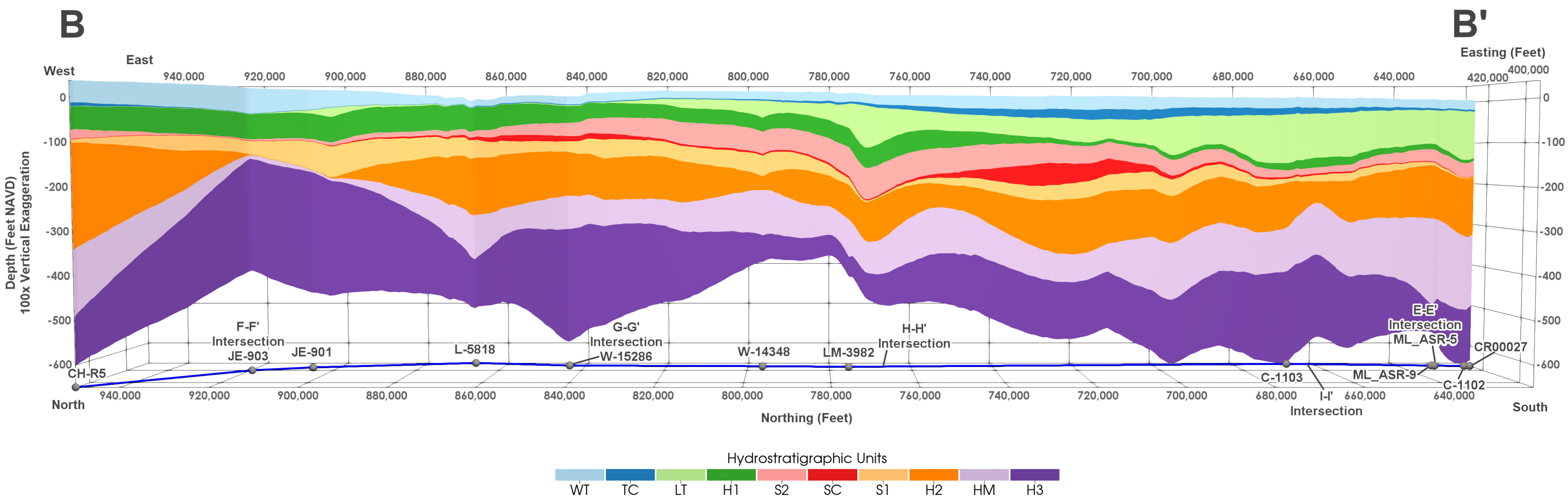
Thickness of tested interval, ft	Minimum T (ft^2/day)	Maximum T (ft^2/day)	Recommended T (ft^2/day)
40	**3,209**	**4,679**	**4,011**
Converting T to K:	**Min K, (ft/day)**	**Max K, (ft/day)**	**Recommended K, (ft/day)**
K=T/b (ft/day)	**80**	**117**	**100**

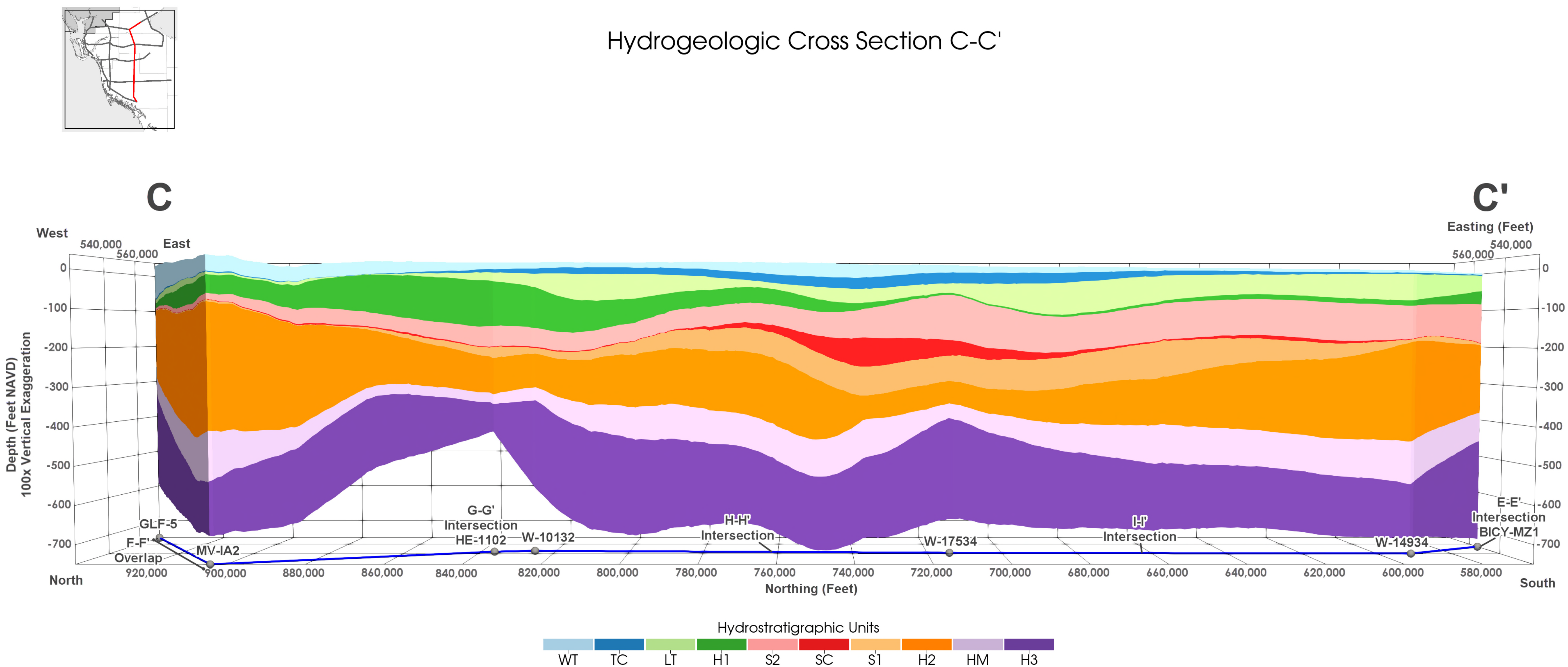
APPENDIX D:
HYDROGEOLOGIC CROSS SECTIONS


Hydrogeologic Cross Section A-A'
A
A'
West
East
Easting (Feet)
320,000
340,000
North
South
Northing (Feet)
940,000
920,000
900,000
880,000
860,000
840,000
820,000
800,000
Depth (Feet NAVD)
100x Vertical Exaggeration
0
-100
-200
-300
-400
-500
-600
-700
CH-316
PG-IW1
F-F'
Intersection
CH-TR12
W-16960
BSU-MZU
L-2526
L-6437
G-G'
Intersection
L-6436
L-6435
L-2529
Hydrostratigraphic Units
WT
TC
LT
H1
S2
SC
S1
H2
HM
H3

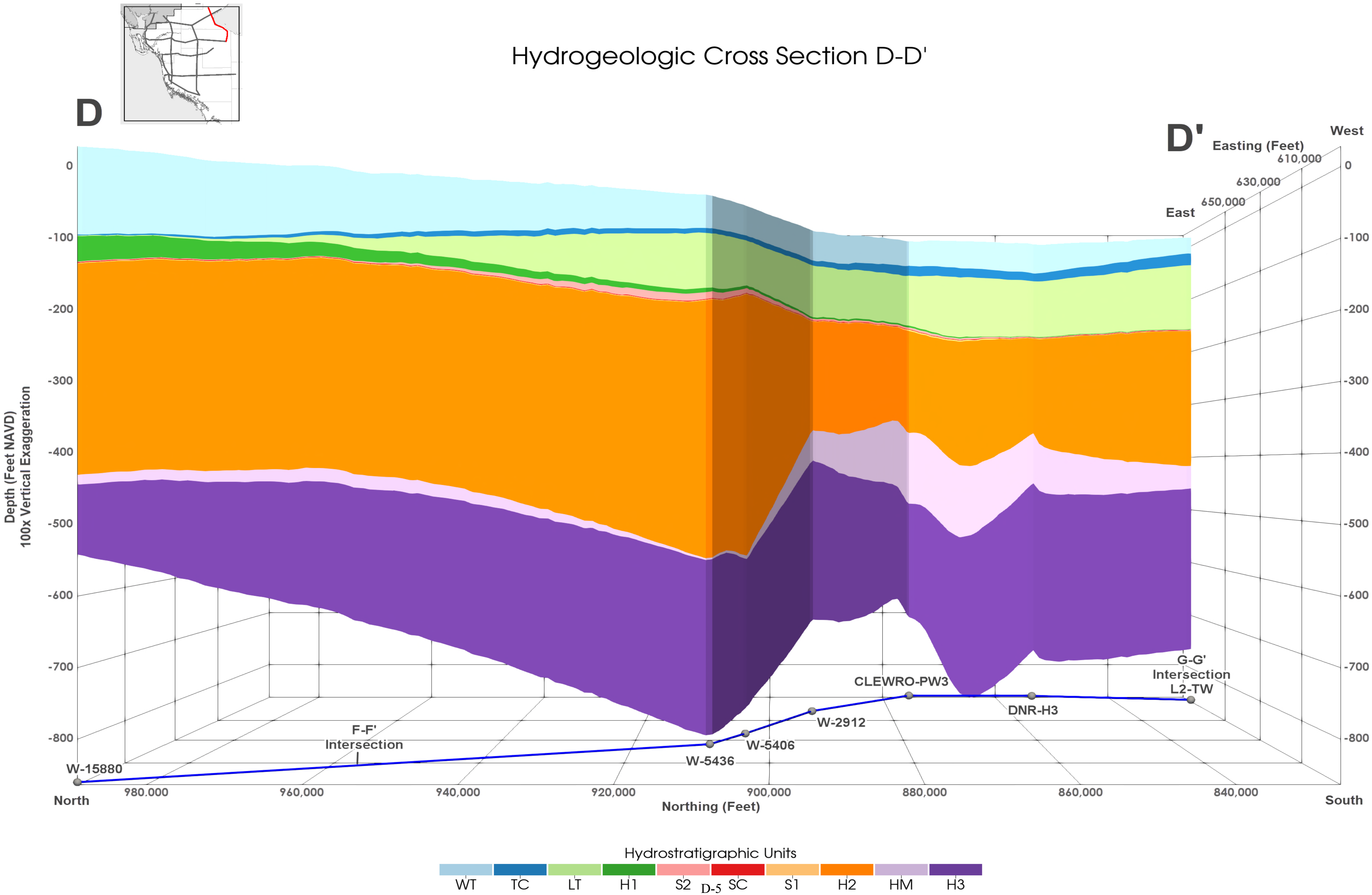
Hydrogeologic Cross Section B-B'

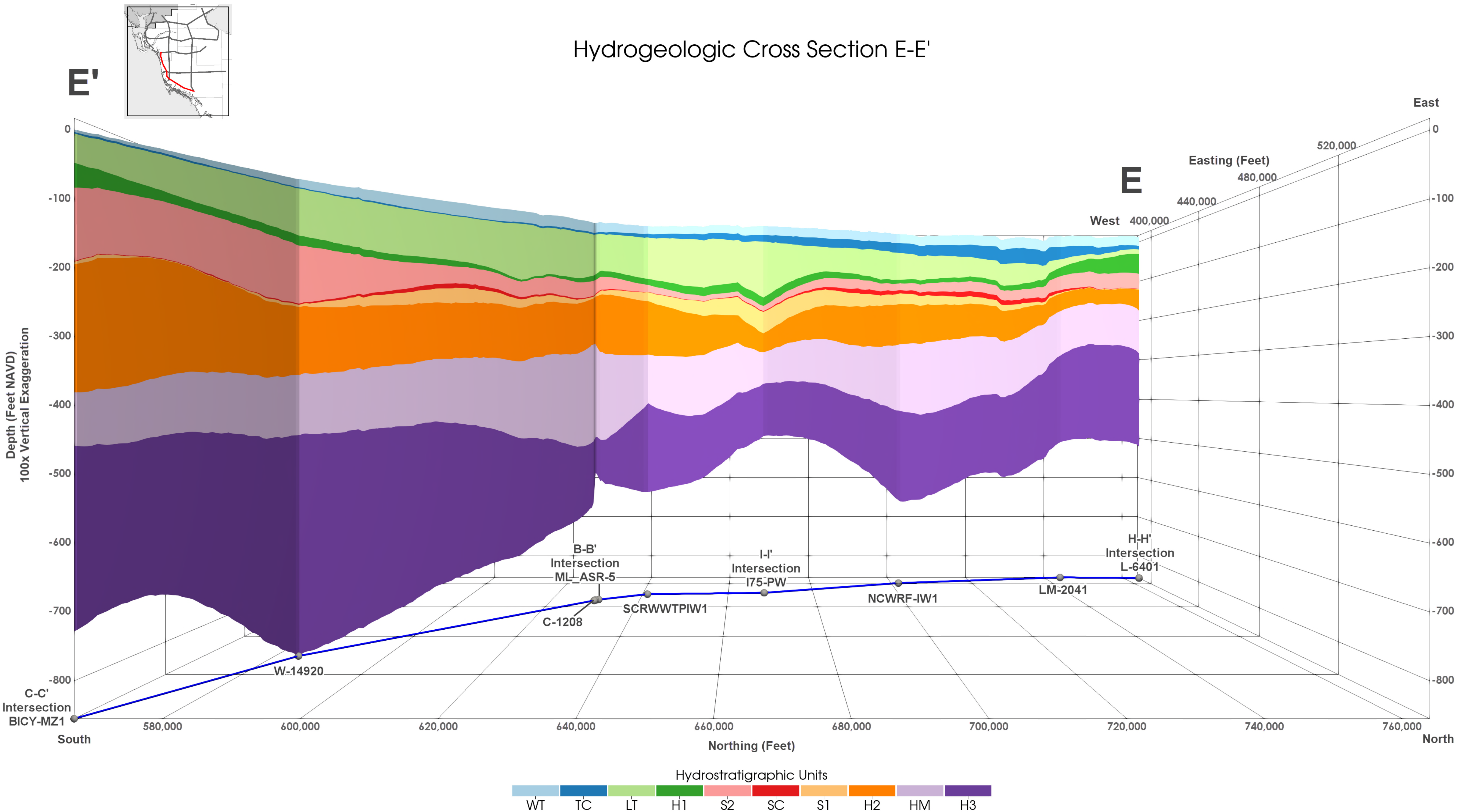




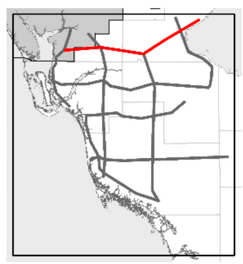


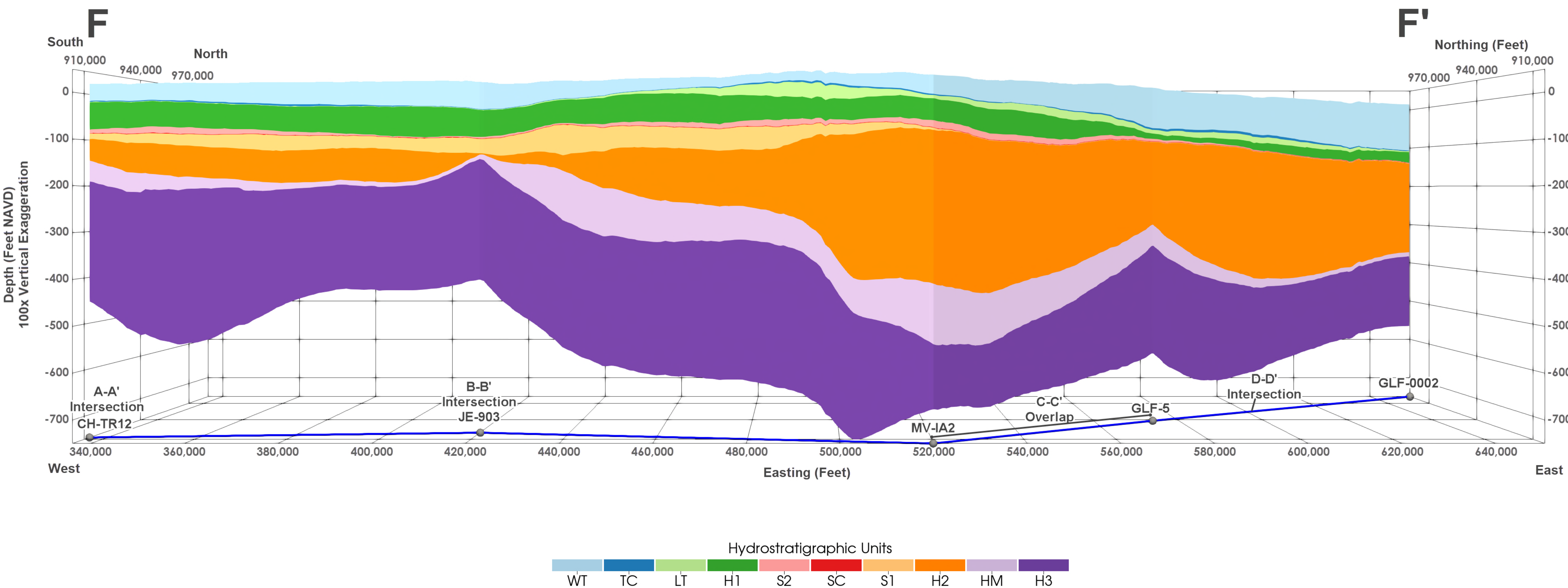
Hydrogeologic Cross Section C-C'
C
C'
West
East
Easting (Feet)
540,000
560,000
Depth (Feet NAVD)
100x Vertical Exaggeration
0
-100
-200
-300
-400
-500
-600
-700
North
South
Northing (Feet)
920,000
900,000
880,000
860,000
840,000
820,000
800,000
780,000
760,000
740,000
720,000
700,000
680,000
660,000
640,000
620,000
600,000
580,000
GLF-5
F-F'
Overlap
MV-IA2
G-G'
Intersection
HE-1102
W-10132
H-H'
Intersection
W-17534
I-I'
Intersection
W-14934
E-E'
Intersection
BICY-MZ1
Hydrostratigraphic Units
WT
TC
LT
H1
S2
SC
S1
H2
HM
H3


Hydrogeologic Cross Section D-D'
D
D'
Easting (Feet)
West
East
610,000
630,000
650,000
Depth (Feet NAVD)
100x Vertical Exaggeration
0
-100
-200
-300
-400
-500
-600
-700
-800
W-15880
F-F'
Intersection
W-5436
W-5406
W-2912
CLEWRO-PW3
DNR-H3
G-G'
Intersection
L2-TW
North
980,000
960,000
940,000
920,000
900,000
880,000
860,000
840,000
South
Northing (Feet)
Hydrostratigraphic Units
WT
TC
LT
H1
S2
SC
S1
H2
HM
H3

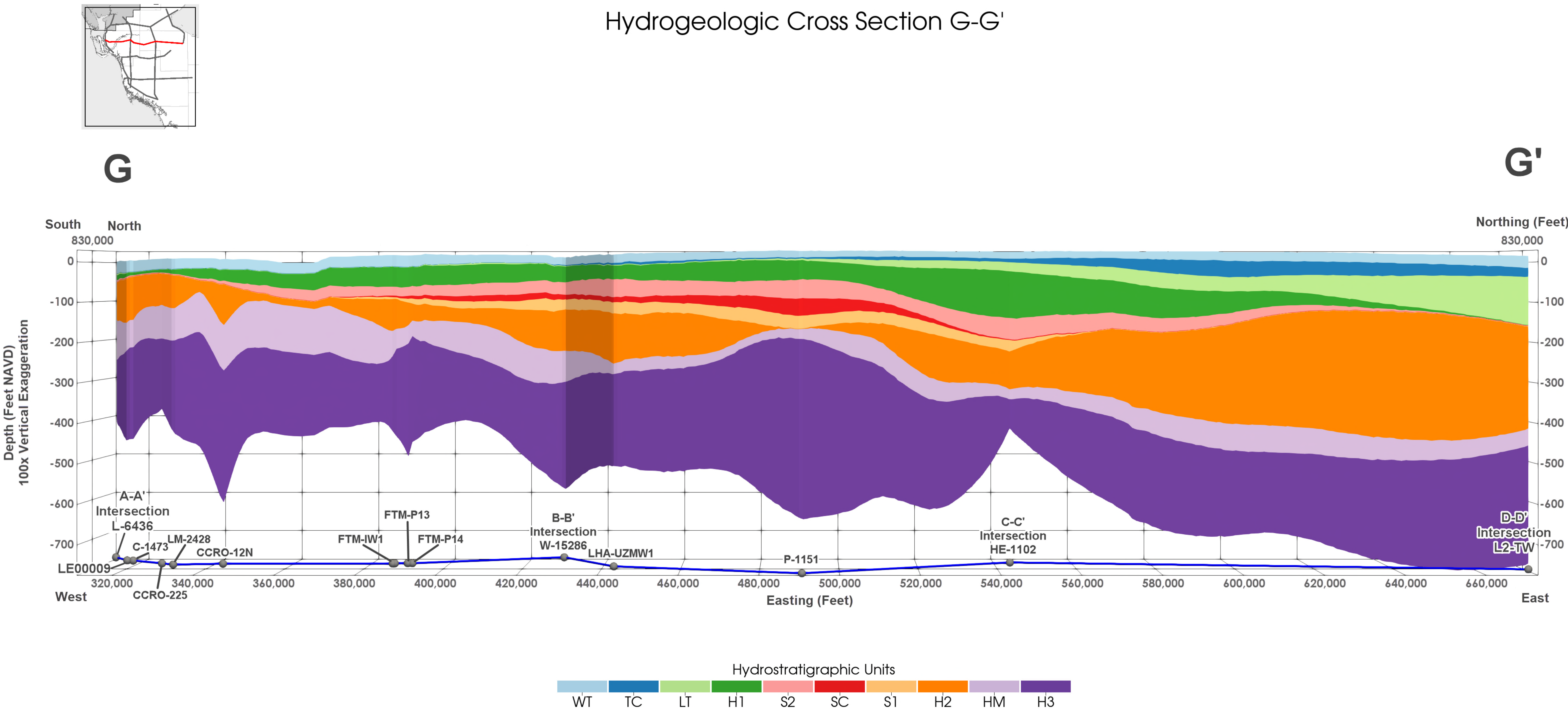

Hydrogeologic Cross Section E-E'
E'
E
East
West
Easting (Feet)
400,000
440,000
480,000
520,000
Depth (Feet NAVD)
100x Vertical Exaggeration
0
-100
-200
-300
-400
-500
-600
-700
-800
B-B'
Intersection
ML_ASR-5
I-I'
Intersection
I75-PW
H-H'
Intersection
L-6401
C-1208
SCRWWTPIW1
NCWRF-IW1
LM-2041
W-14920
C-C'
Intersection
BICY-MZ1
South
North
580,000
600,000
620,000
640,000
660,000
680,000
700,000
720,000
740,000
760,000
Northing (Feet)
Hydrostratigraphic Units
WT
TC
LT
H1
S2
SC
S1
H2
HM
H3

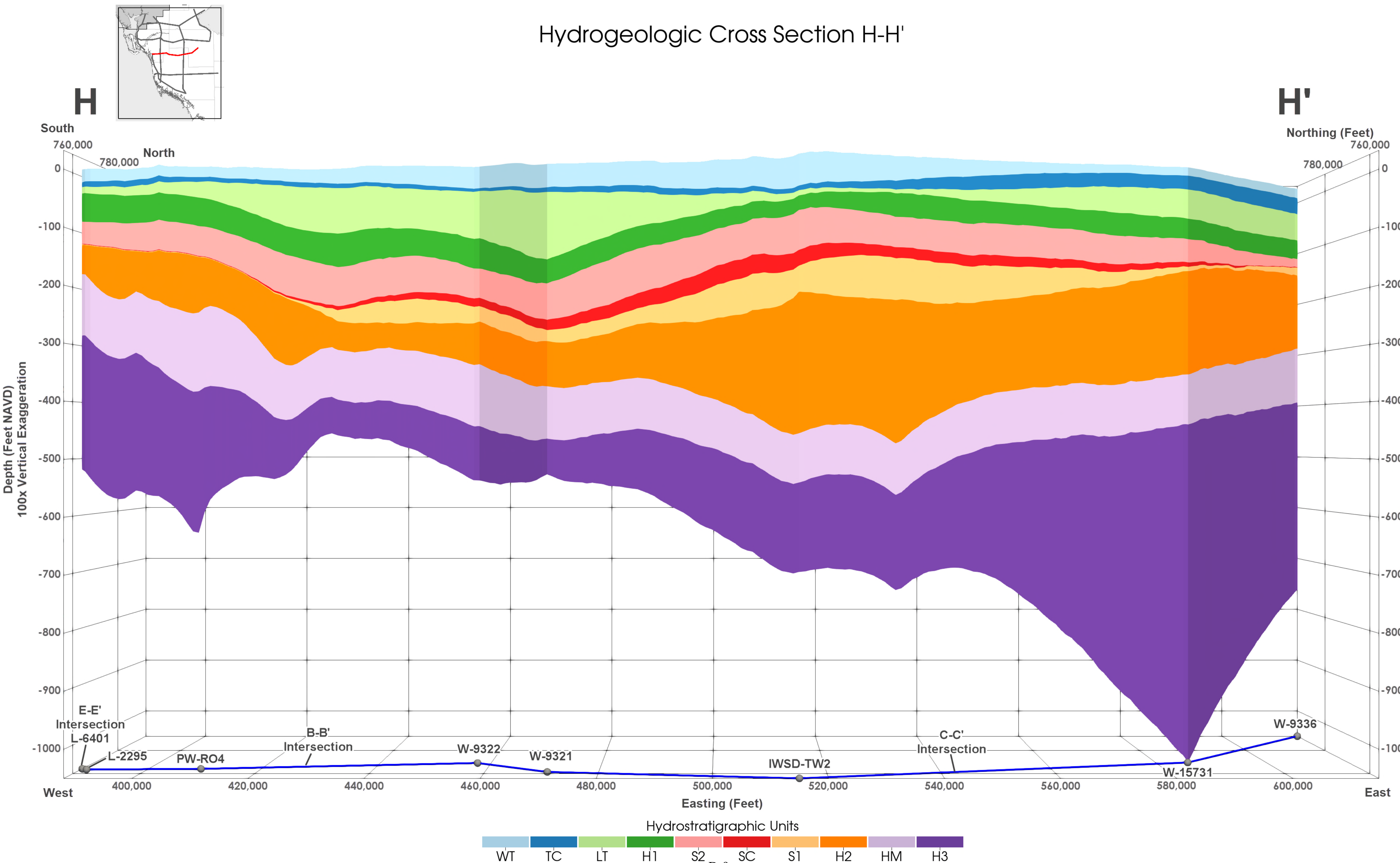
Hydrogeologic Cross Section F-F'





Hydrogeologic Cross Section G-G'




Hydrogeologic Cross Section H-H'
H
H'
South
North
Northing (Feet)
760,000
780,000
Depth (Feet NAVD)
100x Vertical Exaggeration
0
-100
-200
-300
-400
-500
-600
-700
-800
-900
-1000
E-E'
Intersection
L-6401
L-2295
PW-RO4
B-B'
Intersection
W-9322
W-9321
IWSD-TW2
C-C'
Intersection
W-15731
W-9336
West
East
400,000
420,000
440,000
460,000
480,000
500,000
520,000
540,000
560,000
580,000
600,000
Easting (Feet)
Hydrostratigraphic Units
WT
TC
LT
H1
S2
SC
S1
H2
HM
H3

Hydrogeologic Cross Section I-I'