July 5, 2023

Mr. Joseph Sarracino
Principal Planner
Lee County Department of Community Development, Planning Section
1500 Monroe Street
Fort Myer, FL 33908

Re: Southeast Advanced Water Reclamation Facility
CPA2023-00003

Dear Mr. Sarracino:

Enclosed please find responses to your insufficiency letter dated *June 13, 2023*. The following information has been provided to assist with the approval process:

1. Insufficiency Comment Response Letter;
2. Revised Exhibit M15 Traffic Circulation Analysis;
3. Surface Water and Groundwater Impacts/Benefits Analysis; and
4. Integrated Surface and Groundwater Model and supporting model files;

The following is a list of staff comments with our responses in **bold**:

Traffic Impact Review:

1. Please define the Level of Service standards for Alico Road (tables 6-1, 7-1, and 7-2) using the Lee County Generalized Peak Hour Directional Service Volumes for Urbanized Areas (2016) table. Please also use these Level of Service standards in tables 6-1, 7-1, and 7-2.

   RESPONSE: The level of service standards have been revised. Please see updated TIS.

2. Please provide appropriate references validating the estimated 2045 directional volume on Alico Road between Green Meadow Drive and Corkscrew Road in Table 7-2.

   RESPONSE: Based on the approved Alico Extension Traffic Technical Memorandum completed by Kisinger Campo & Associates, the 2045 volumes were developed using the District One Regional Planning Model (D1RPM), 2045 Long Range Transportation Plan.

3. The estimated 2045 directional volumes for various segments of Alico Road (Table 7-2) seem to be inconsistent with the figures provided in the Alico Road Extension Traffic Technical Memorandum (Appendix F: Table 6.5). Please provide clarification.

RESPONSE: The directional volumes have been revised to be consistent with Table 6.5. Please see updated report.

Environmental Impact Review:

1. Please provide an integrated surface and groundwater model per Lee Plan Policy 33.1.7. Please provide the integrated surface and groundwater supporting model files for Staff to review. Lee Plan policy 2.3.1 requires a formal finding that no significant impacts on present or future water resources will result from the proposed change to the Future Land Use Map. Please note that Staff cannot support such a finding without an integrated surface and groundwater model.

   RESPONSE: Please see the attached integrated Surface and Groundwater Report and Model, along with the supporting model files.

If you have questions, please contact me directly at (239) 908-3421 or JMedina@RViPlanning.com

Thank you,

RVi Planning + Landscape Architecture

Josephine Medina, AICP, LEED Green Associate
Project Manager

TRAFFIC CIRCULATION ANALYSIS

FOR

LEE COUNTY UTILITIES

SOUTHEAST ADVANCED WATER RECLAMATION FACILITY (SEAWRF)

JUNE 2023

Prepared for:

Lee County
Southwest Florida

Post Office Box 398
Fort Myers, Florida 33902-0398

Prepared by:

JOHNSON ENGINEERING
2122 Johnson Street
Fort Myers, Florida 33901
(239) 334-0046
EB 642

JOSHUA J. HILDEBRAND LICENSE No 73952 STATE OF FLORIDA PROFESSIONAL ENGINEER

Digitally signed by Joshua J Hildebrand
DN: c=US, o=JOHNSON ENGINEERING INC, dnQualifier=A01410C0000017BA7E0835B00005CA8, cn=Joshua J Hildebrand
Date: 2023.06.20 13:31:12 -04'00'

Joshua J. Hildebrand, P.E., PTOE
Florida License No. 73952

Date

20181232-002

TABLE OF CONTENTS

APPENDICES

FIGURES

TABLES

1.0 INTRODUCTION

The purpose of this traffic circulation analysis is to assess the potential transportation impacts associated with the addition of a future Water Reclamation Facility in Lee County. The current zoning of the proposed site is Agricultural (AG-2) and is being requested to be rezoned to Community Facilities Planned Development (CFPD). This traffic circulation analysis is in accordance with Lee County Administrative Code (AC) 13-17 and determines the short range 5-year (2025) horizon and long range 20-year (2040) horizon roadway impacts associated with the change in Future Land Use designation from DR/GR to Public Facilities.

2.0 SITE ACCESS

The project site is located on Green Meadow Road, which is currently a two-lane undivided roadway that begins at the eastern end of Alico Road in Lee County (see **Figure 2-1**).

This segment is currently under design for the future extension and widening of Alico Road to a four-lane divided collector from Alico Road to S.R. 82, replacing the current segment of Green Meadow Road in front of the proposed project site. Alico Road is anticipated to have a posted speed limit and design speed of 45-mph within the project vicinity. Construction of the extension and widening is anticipated to occur in two phases. Phase 1 includes the widening of Alico Road from Airport Haul Road through Green Meadow Road, approximately 1-mile east of the Alico Road intersection. Phase 2 includes the extension of Alico Road from Green Meadow Road to S.R. 82. While both are currently under design, Phase 1 construction is anticipated to occur within 5 years and Phase 2 occurring shortly afterwards.

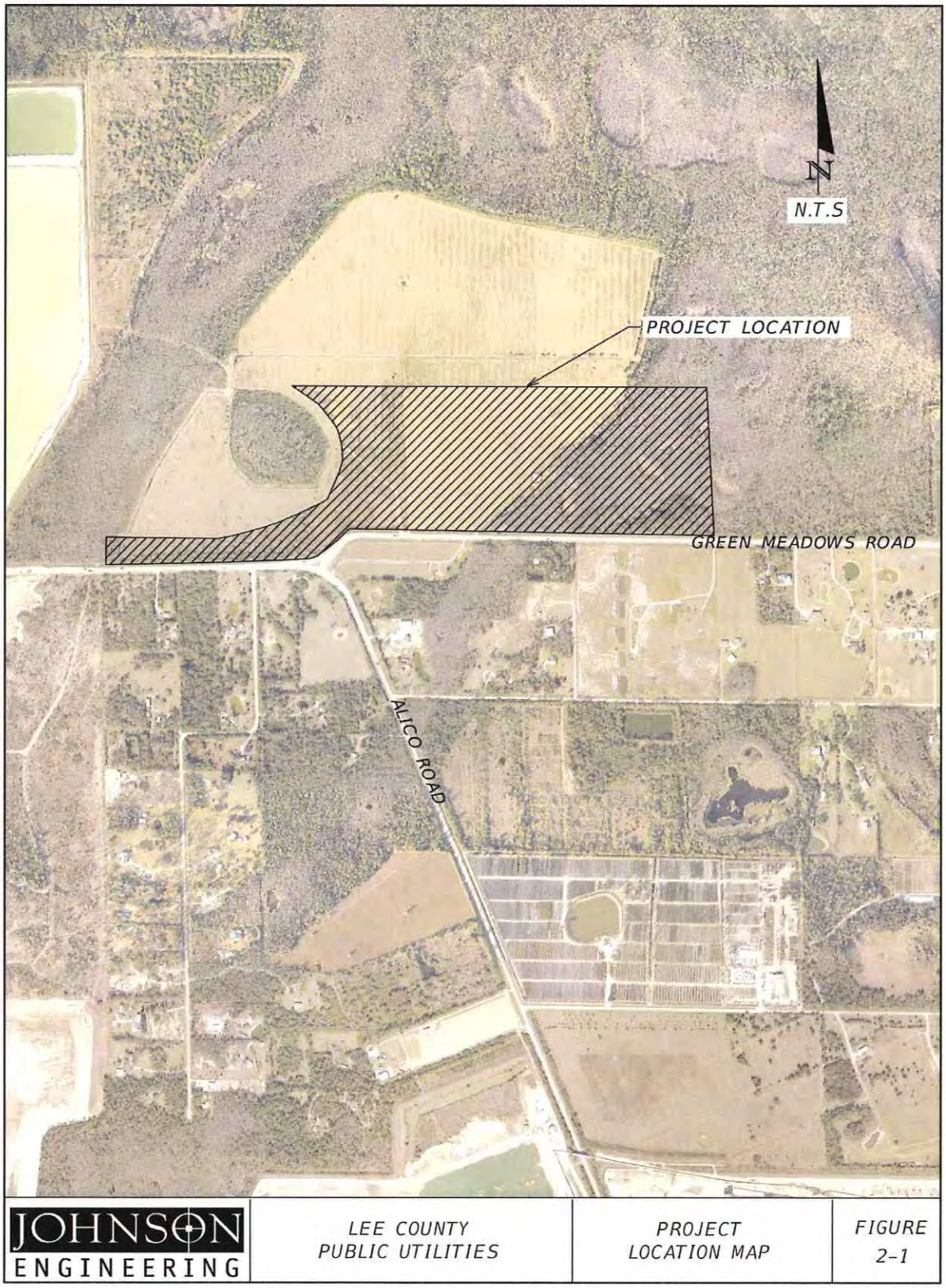


Figure 2-1: Project Location Map

3.0 TRIP GENERATION

The A.M. peak hour, P.M. peak hour, and daily trip generations for the project were estimated using trip generation rates and equations from the Institute of Transportation Engineers (ITE) *Trip Generation (11th Edition)* for the Wastewater Treatment Buildings.

The ITE trip generation estimates are summarized in **Table 3-1** and included in **Appendix A**.

Table 3-1: ITE Trip Generation Summary

Land Use	Size (sqft)	Trip Generation[1]	A.M. Peak Hour			P.M. Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Wastewater Treatment Facility (LUC 170 - Utility)	25,000	AM: 2.33 PM: Ln(T)=0.81Ln(X)+0.86 Weekday: Ln(T)=0.74Ln(X)+2.73	51	7	58	6	26	32	166
		Total	**51**	**7**	**58**	**6**	**26**	**32**	**166**

Footnote:
(1) ITE Trip Generation (11th Edition)

4.0 DATA COLLECTION

To establish base traffic conditions and existing trip distributions, data was obtained from the sources listed herein (see **Figure 4-1** for the data collection map).

4.1 Roadway Directional Volumes

Twenty-four-hour machine traffic data collection counts were recorded during peak season beginning on Thursday, January 26, 2023 through Wednesday, February 1, 2023 at one location on Alico Road (see **Appendix B**). The counts were collected to serve as a base traffic condition for the roadway traffic analysis.

4.2 Turning Movement Counts

Turning movement counts were recorded on Thursday, January 26, 2023 from 7:00 A.M. to 9:00 A.M and 4:00 P.M. to 6:00 P.M. at the intersection of Alico Road and Green Meadow Road (see **Appendix C**) to help establish traffic patterns. A summary of the A.M. and P.M. peak hour turning movement counts are shown in **Figure 4-2** and **Figure 4-3**, respectively.

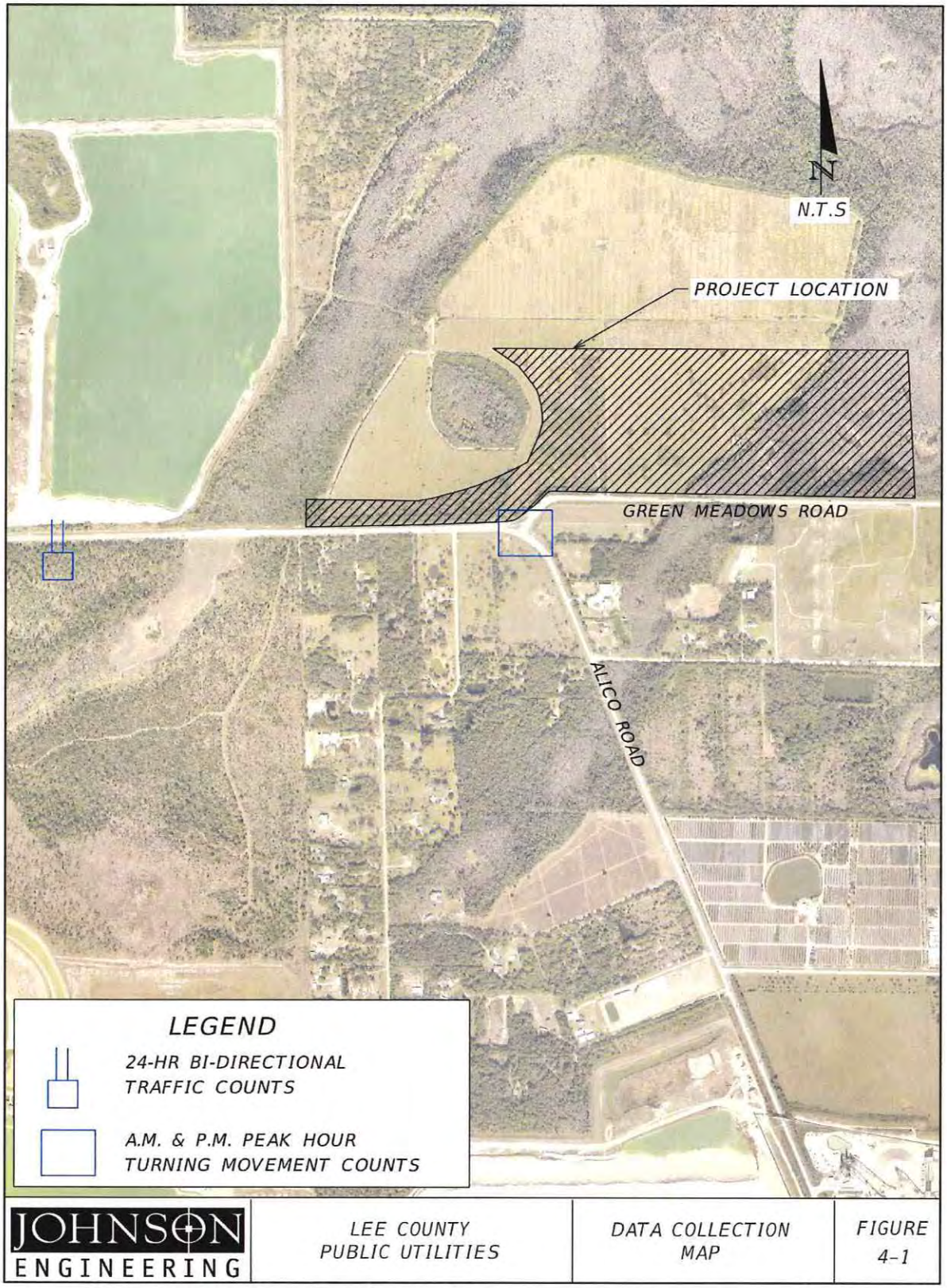


Figure 4-1: Data Collection Map

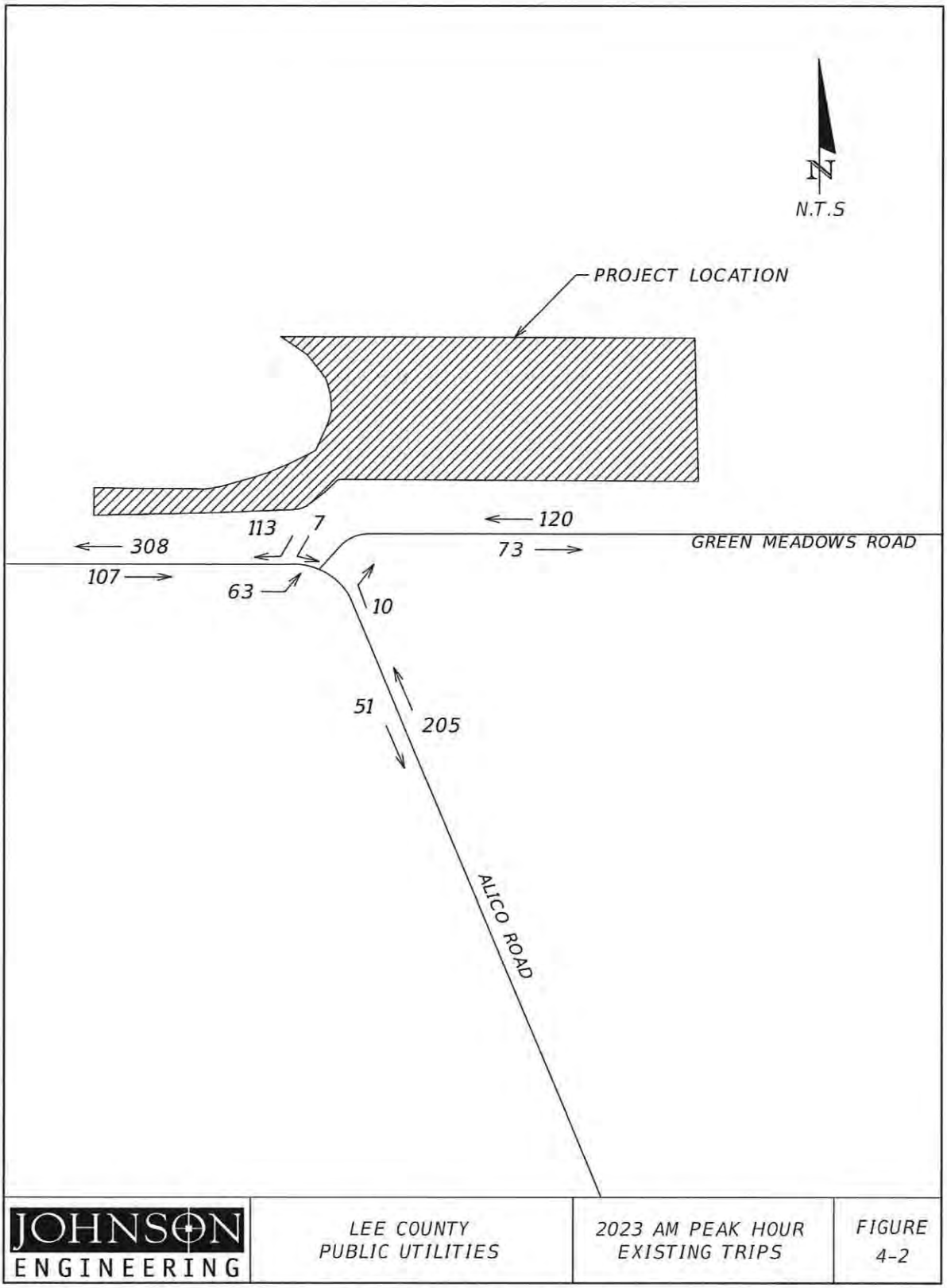


Figure 4-2: 2023 A.M. Peak Hour Existing Trips

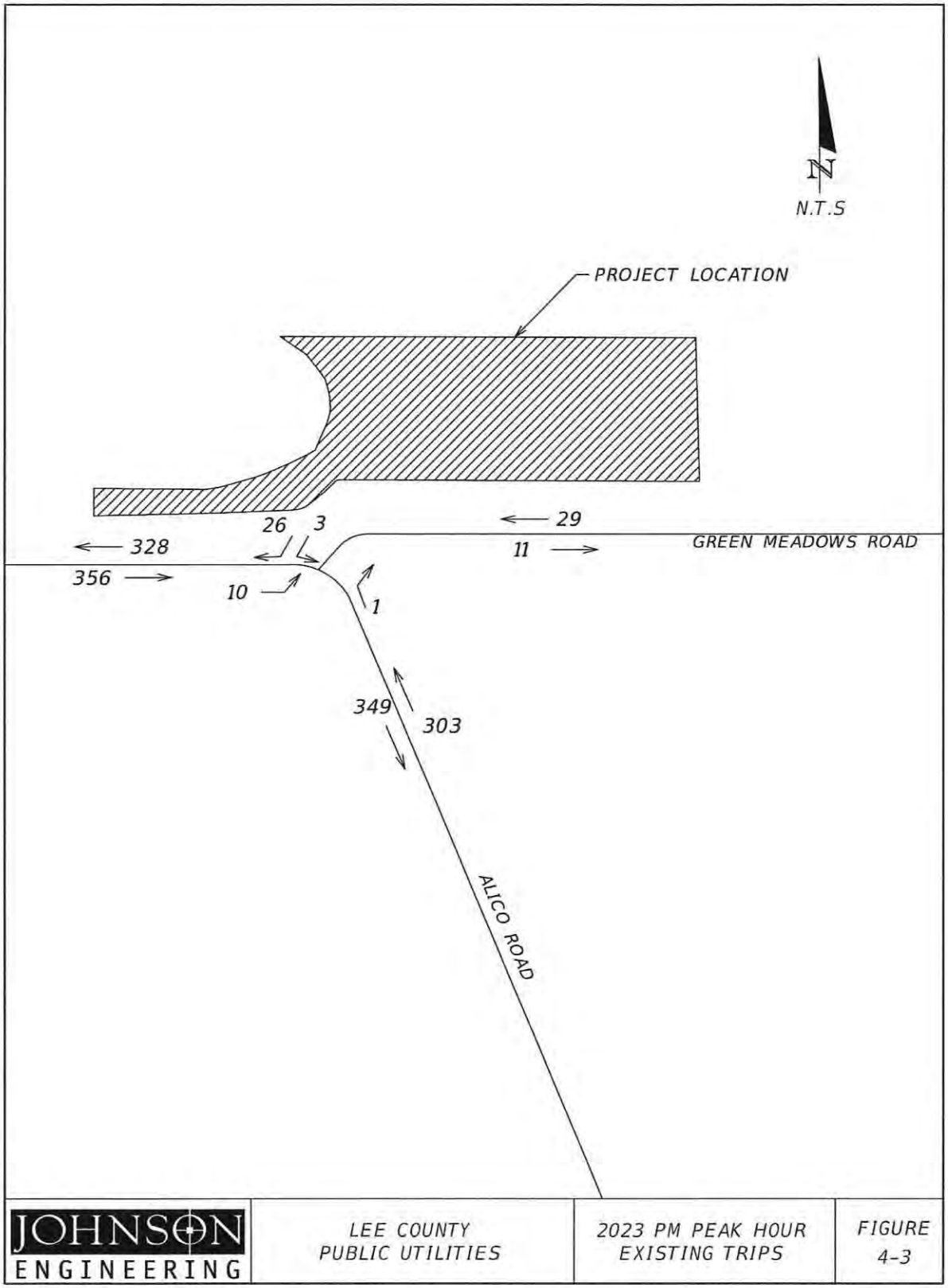


Figure 4-3: 2023 P.M. Peak Hour Existing Trips

5.0 TRIP DISTRIBUTION AND TRIP ASSIGNMENT

The project A.M. and P.M. peak hour turning movements were estimated from the collected traffic data (see Section 4.0). **Figure 5-1** depicts the estimated percent distributions for the project traffic. Based on the estimated percent distributions of project traffic, the estimated project trips for the A.M. peak hour and P.M. peak hour are depicted in **Figure 5-2** and **Figure 5-3**. Anticipated distributions assume the Alico Road Extension Phase 2 has not been completed.

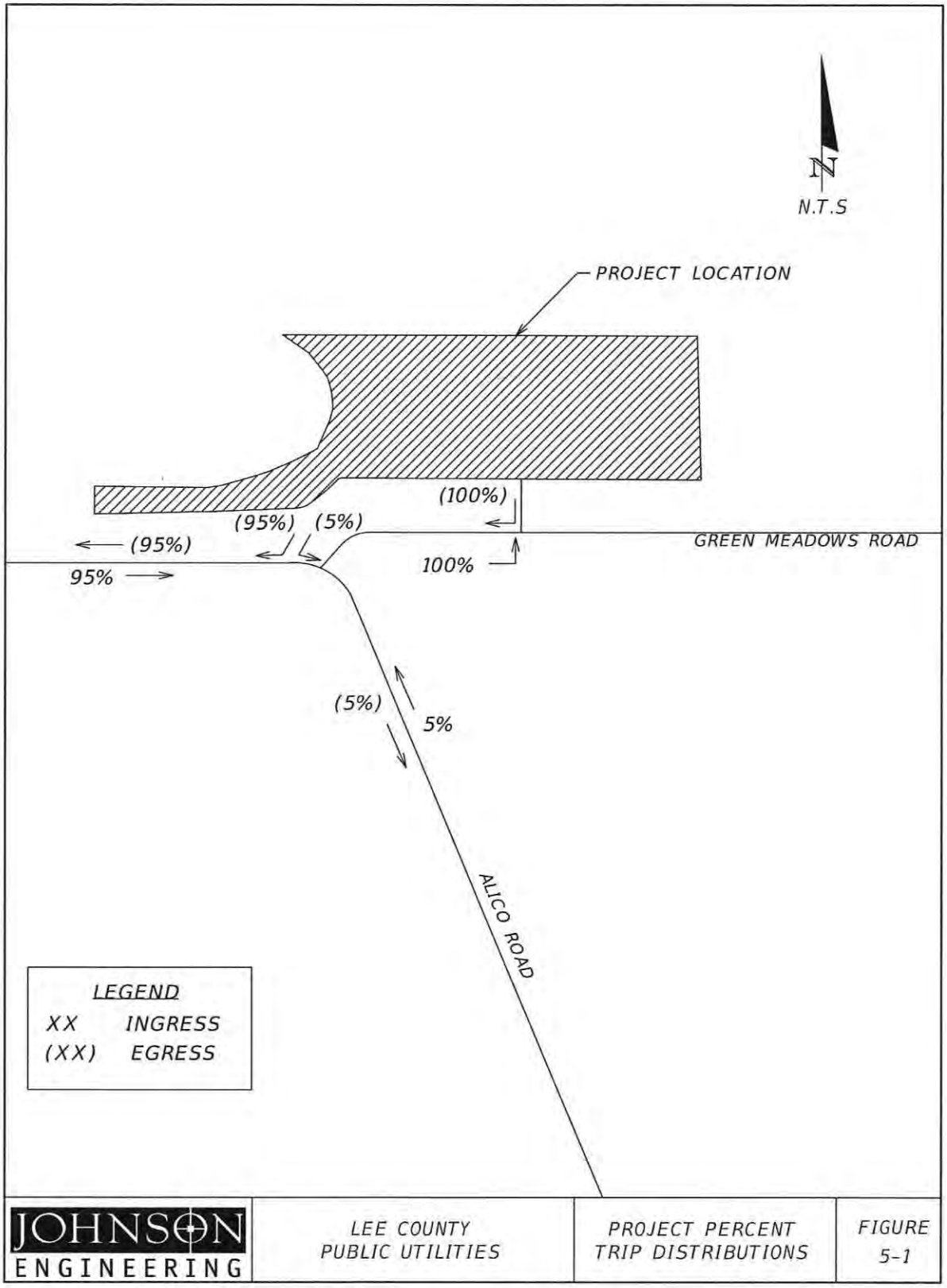


Figure 5-1: Project Percent Trip Distributions

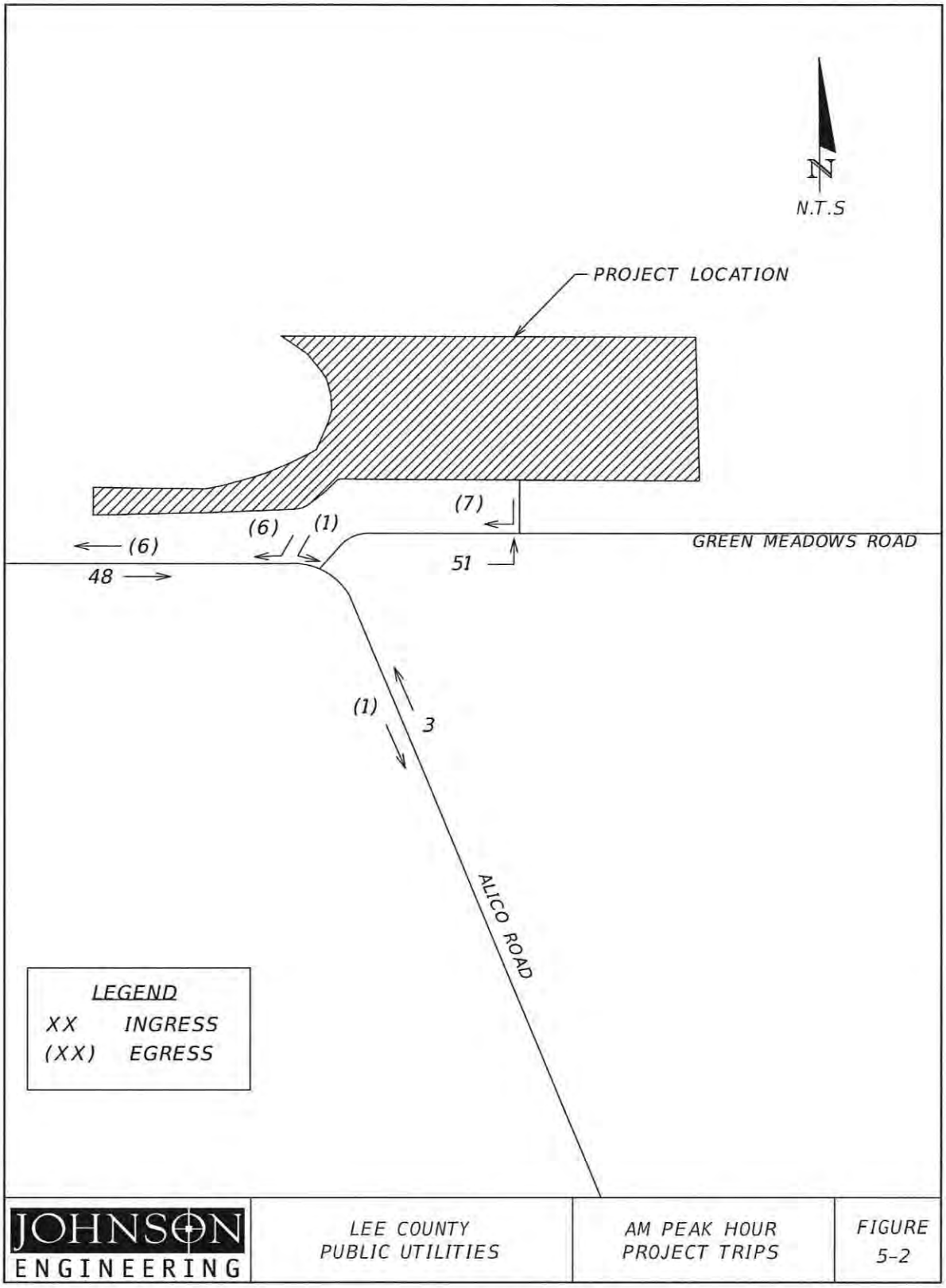


Figure 5-2: A.M. Peak Hour Project Trips

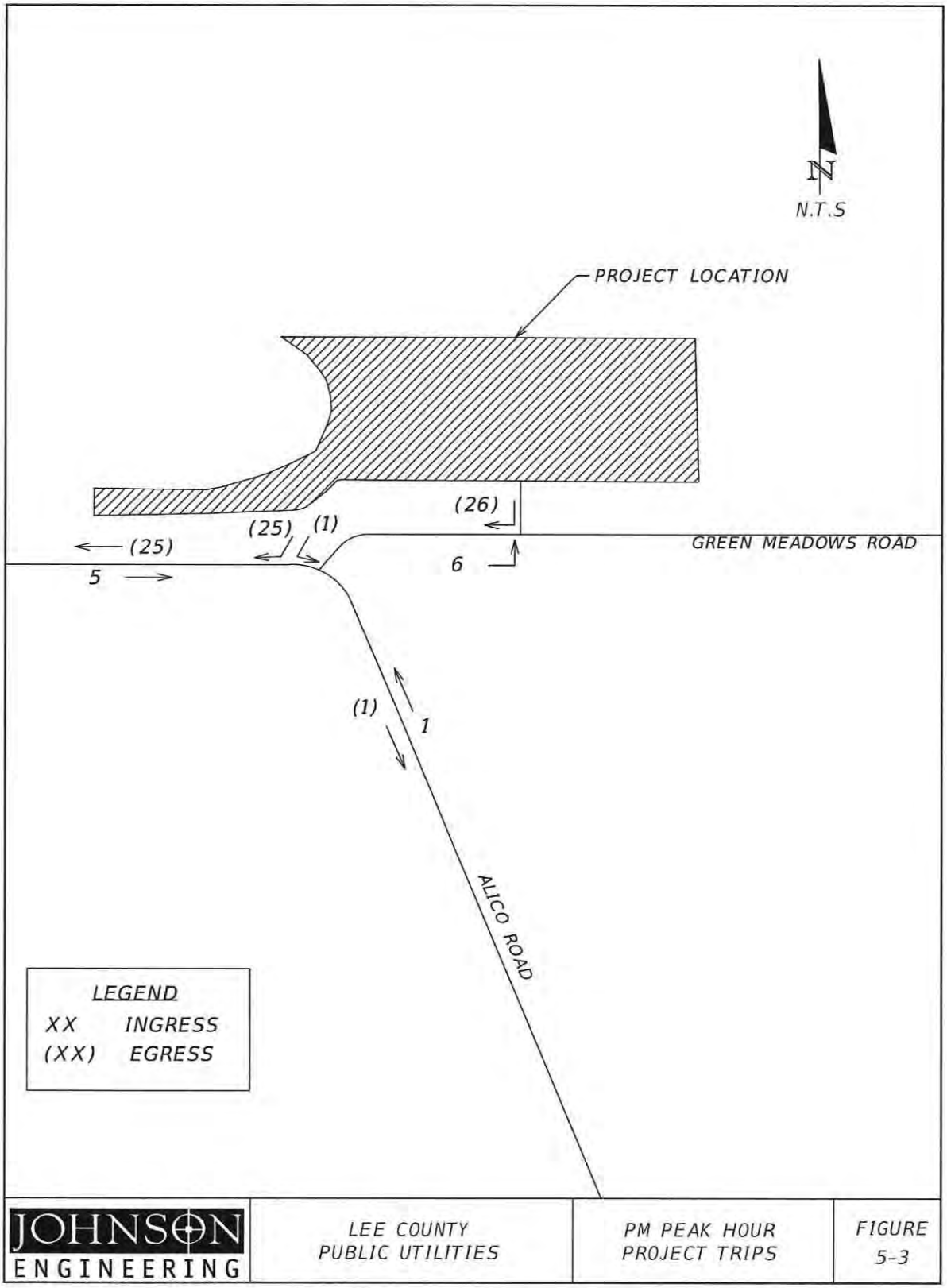


Figure 5-3: P.M. Peak Hour Project Trips

6.0 AREA OF INFLUENCE

The area of influence analyzed was based on the 25,000-sqft of wastewater treatment facility. The area of influence includes all county and state-maintained arterials and collectors within a 3-mile radius of the project site. Additionally, after the distribution of project trips, any roadway segment that is outside of the 3-mile radius, with 10% impact or more, was analyzed, consistent with Lee County requirements. Lee County maintained arterials and collectors and state arterials within the area of influence, according to the Lee County 2022 Concurrency Report (excerpt available in **Appendix D**) and the Lee County Level of Service Tables (**Appendix E**), are provided in **Table 6-1**.

Table 6-1: Area of Influence

Roadway	Segment	Performance Standard (Peak Hour Directional Volume)[1]		Estimated Project Trips Peak Hour Peak Direction	Percent Impact (%)
		LOS	Capacity		
Alico Road	Ben Hill Griffin Boulevard to Green Meadow Road	E	3,180	48	1.5%
Alico Road	Green Meadow Road to Corkscrew Road	E	860	3	0.3%

Footnotes:
(1) Estimated from Lee County Level of Service Tables

7.0 LEVEL OF SERVICE (LOS) ANALYSIS

A link LOS analysis was conducted for all county and state-maintained arterials and collectors within a 3-mile radius of the project site for the short term 5-year horizon (2028) and long term (2045) horizon at project maximum build-out. Additionally, any roadway segment that is outside of the 3-mile radius, that has a 10% impact or more, was also analyzed for the short term 5-year horizon (2028) and long term (2045) horizon at project maximum build-out. The project trips were applied to the 5-year horizon (2028) conditions and the long-term horizon (2045) conditions.

The 5-year horizon was based on current Lee County Concurrency standards assuming the construction of the Alico Road project has not been completed. The 2028 traffic volumes were estimated using a 2% growth rate from the Lee County Concurrency 2026 volumes, see **Table 7-1**. The 2045 long term horizon roadway capacity was estimated from the Lee County Level of Service Tables (**Appendix E**) based on the ultimate build-out of Alico Road Phase 1 and Phase 2. The 2045 directional volumes were estimated from the Alico Road Extension Traffic Technical Memorandum, prepared by Kisinger Campo & Associates dated March 2022 (see **Appendix F** for excerpts and **Table 7-2**).

Table 7-1: Summary of 2028 Level of Service Analysis

Roadway	Segment	Performance Standard (Peak Hour Directional Volume)[2]		2026 Peak Hour Peak Direction from Lee County Concurrency[1]		2028 Estimated Roadway Peak Hour Peak Direction		2028 Estimated Roadway Peak Hour Peak Direction + Project	
		LOS	Capacity	LOS	Volume	LOS	Volume	LOS	Volume
Alico Road	Ben Hill Griffin Boulevard to Green Meadow Drive	E	3,180	C	808	C	841	C	889
Alico Road	Green Meadow Drive to Corkscrew Road	E	860	B	224	B	233	B	236

Footnote:
(1) Obtained from 2022 Lee County Concurrency Report
(2) Estimated from Lee County Level of Service Tables

Table 7-2: Summary of 2045 Level of Service Analysis

Roadway	Segment	Performance Standard (Peak Hour Directional Volume)[1]		2045 Peak Hour Peak Direction[2]		2045 Peak Hour Peak Direction + Project	
		LOS	Capacity	LOS	Volume	LOS	Volume
Alico Road	Ben Hill Griffin Boulevard to Green Meadow Drive	E	3,180	E	2,400	E	2,448
Alico Road	Green Meadow Drive to Corkscrew Road	E	860	B	610	B	613

Footnotes:
(1) Estimated from Lee County Level of Service Tables
(2) Estimated from Alico Road Extension Traffic Technical Memorandum

8.0 CONCLUSIONS

Based on the link LOS analysis for 2028 and 2045 traffic within the area of study, Alico Road is anticipated to operate within the LOS performance standards with the addition of project trips.

APPENDIX A

ITE TRIP GENERATION

Land Use: 170
Utility

Description

A utility is a free-standing building that can house office space, a storage area, and electromechanical or industrial equipment that support a local electrical, communication, water supply or control, or sewage treatment utility.

Additional Data

The technical appendices provide supporting information on time-of-day distributions for this land use. The appendices can be accessed through either the ITETripGen web app or the trip generation resource page on the ITE website (https://www.ite.org/technical-resources/topics/trip-and-parking-generation/).

The sites were surveyed in the 1980s, the 1990s, the 2000s, and the 2010s in California, Delaware, Oregon, and Texas.

Source Numbers

422, 443, 538, 876

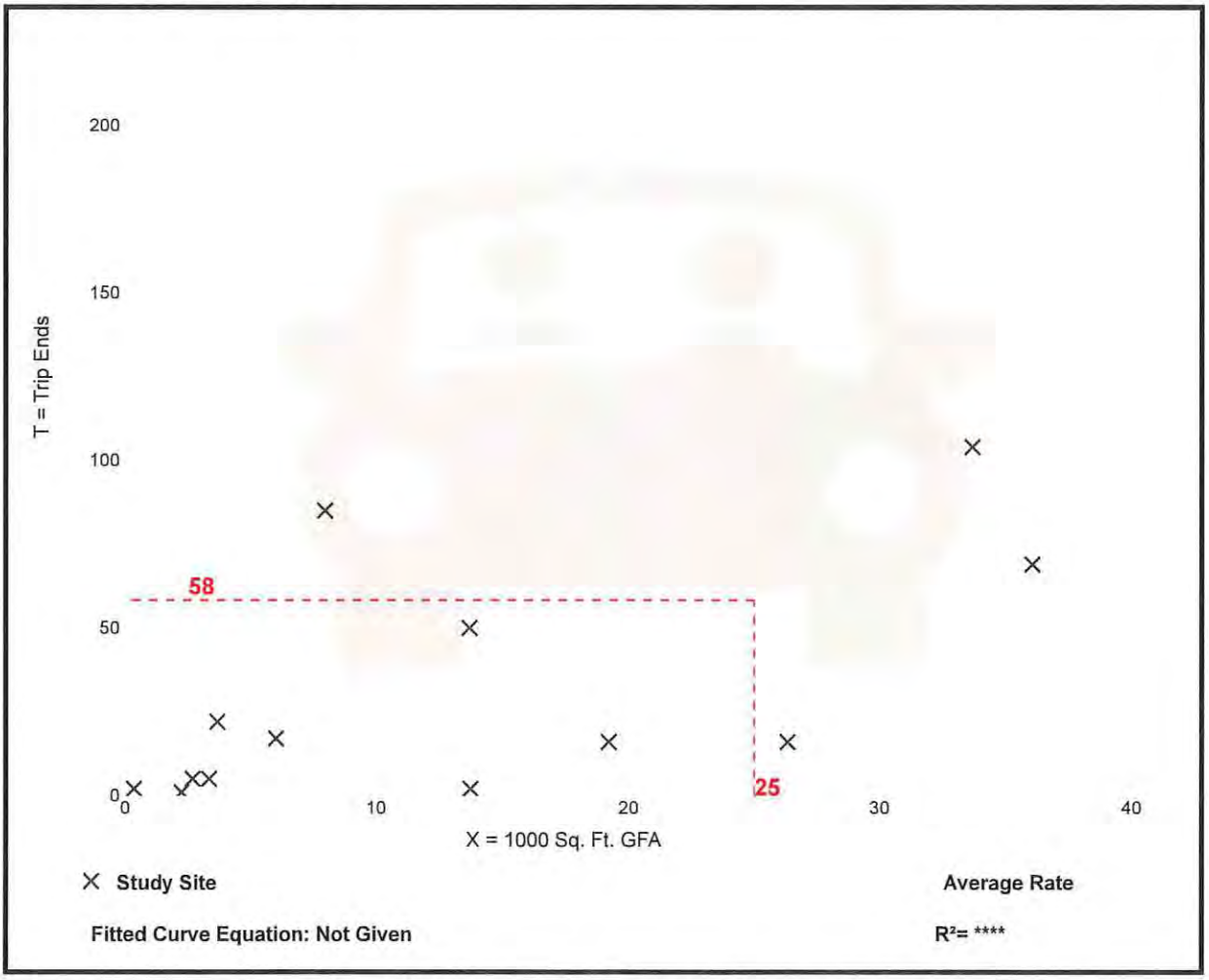
Utility
(170)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 13
Directional Distribution: 87% entering, 13% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.33	0.15 - 10.67	2.34

Data Plot and Equation



Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

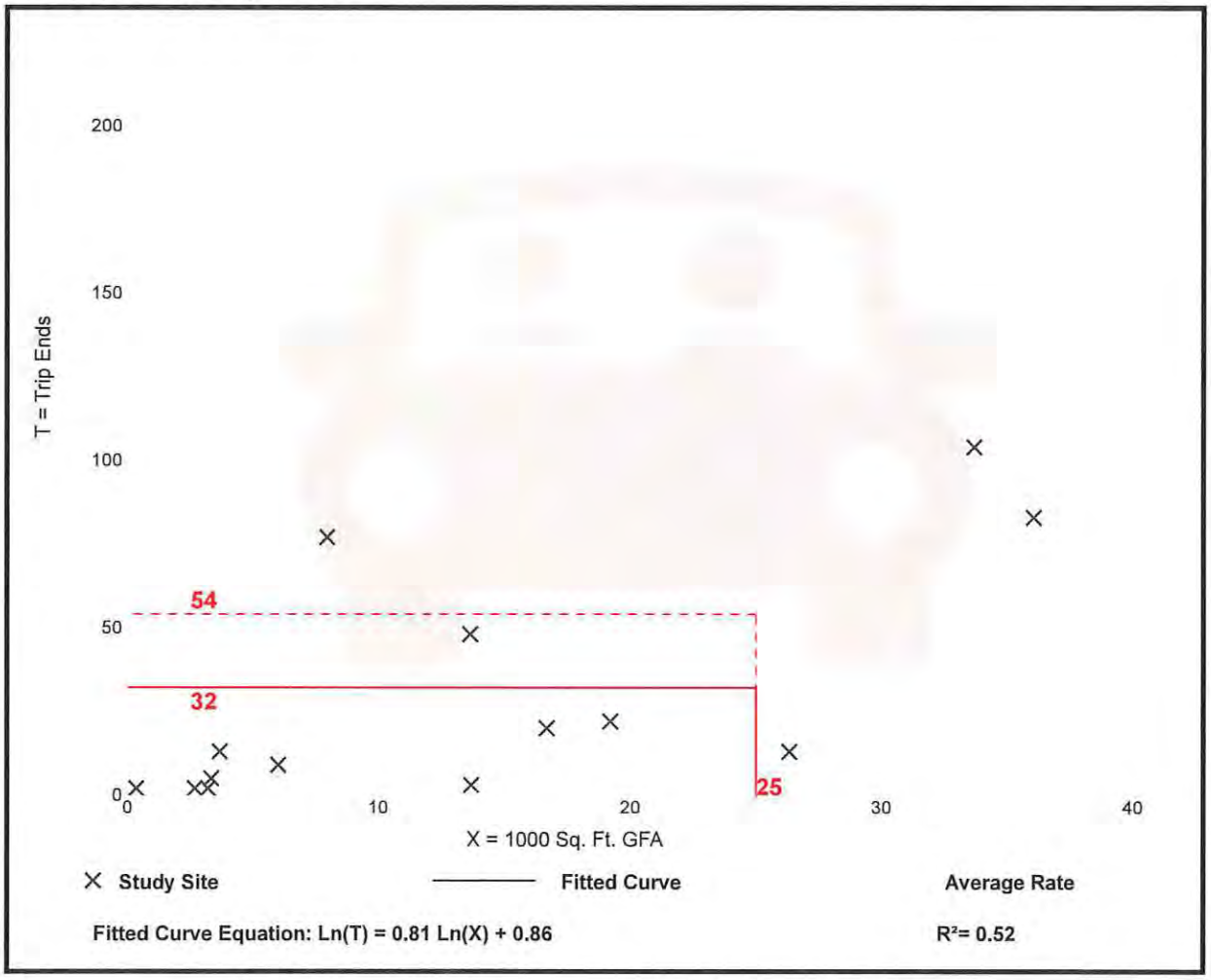
Utility
(170)

Vehicle Trip Ends vs: **1000 Sq. Ft. GFA**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 4 and 6 p.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 14
Avg. 1000 Sq. Ft. GFA: 13
Directional Distribution: 18% entering, 82% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
2.16	0.22 - 9.67	2.00

Data Plot and Equation



Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

Utility
(170)

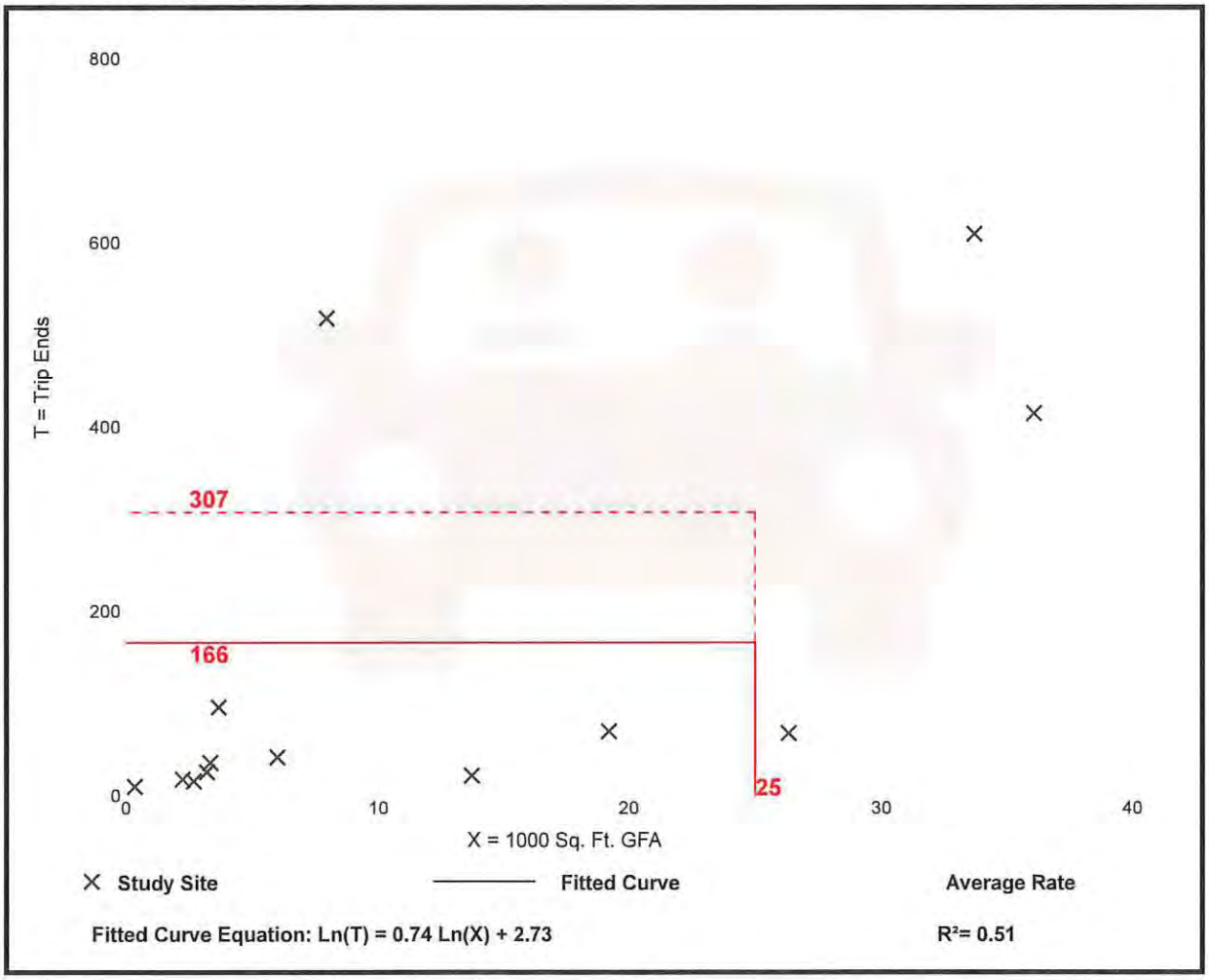
Vehicle Trip Ends vs: 1000 Sq. Ft. GFA
On a: Weekday

Setting/Location: General Urban/Suburban
Number of Studies: 13
Avg. 1000 Sq. Ft. GFA: 12
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per 1000 Sq. Ft. GFA

Average Rate	Range of Rates	Standard Deviation
12.29	1.60 - 65.03	14.32

Data Plot and Equation



Trip Gen Manual, 11th Edition • Institute of Transportation Engineers

APPENDIX B

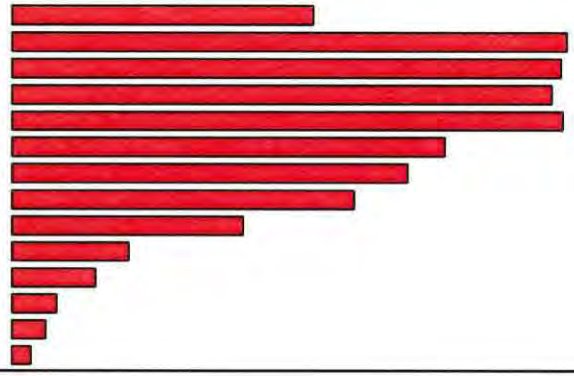
24-HOUR BI-DIRECTIONAL TRAFFIC COUNTS

Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/25/2023 Wednesday	Eastbound	Westbound	Combined Total
12:00 AM		*	*	0
01:00		*	*	0
02:00		*	*	0
03:00		*	*	0
04:00		*	*	0
05:00		*	*	0
06:00		*	*	0
07:00		*	*	0
08:00		*	*	0
09:00		*	*	0
10:00		492	84	576
11:00		676	382	1058
12:00 PM		510	537	1047
01:00		535	496	1031
02:00		495	555	1050
03:00		438	388	826
04:00		392	364	756
05:00		379	274	653
06:00		256	186	442
07:00		166	56	222
08:00		100	60	160
09:00		58	28	86
10:00		42	20	62
11:00		19	16	35
Total		4558	3446	8004
Percent		56.9%	43.1%	

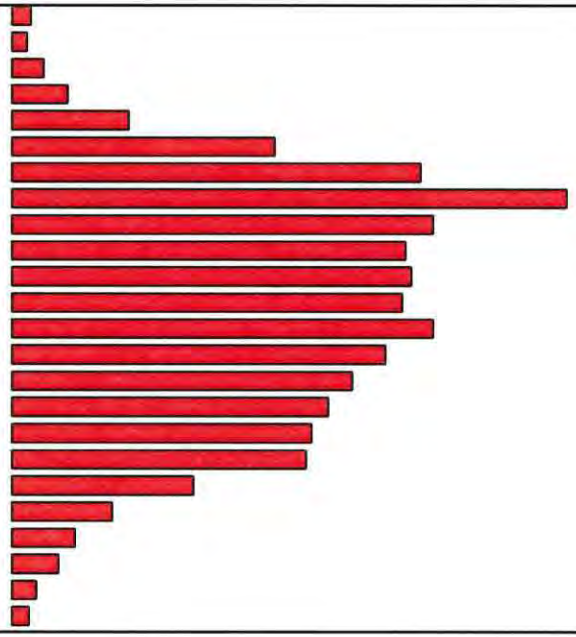


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/26/2023 Thursday	Eastbound	Westbound	Combined Total
12:00 AM		34	10	44
01:00		16	18	34
02:00		31	47	78
03:00		78	57	135
04:00		178	107	285
05:00		355	285	640
06:00		374	622	996
07:00		379	976	1355
08:00		406	624	1030
09:00		478	484	962
10:00		463	512	975
11:00		444	510	954
12:00 PM		500	532	1032
01:00		448	466	914
02:00		387	443	830
03:00		420	353	773
04:00		401	332	733
05:00		400	318	718
06:00		276	166	442
07:00		169	76	245
08:00		105	48	153
09:00		80	32	112
10:00		46	11	57
11:00		24	16	40
Total		6492	7045	13537
Percent		48.0%	52.0%	

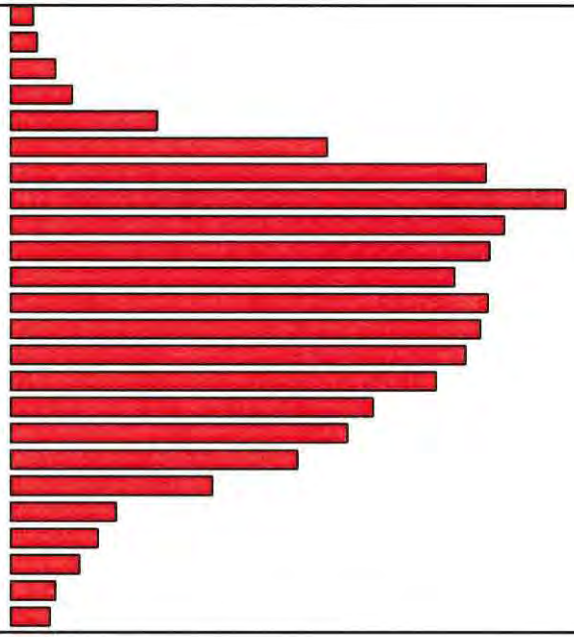


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/27/2023 Friday	Eastbound	Westbound	Combined Total
12:00 AM		31	16	47
01:00		20	33	53
02:00		50	42	92
03:00		75	52	127
04:00		185	116	301
05:00		350	304	654
06:00		348	634	982
07:00		361	786	1147
08:00		413	606	1019
09:00		433	558	991
10:00		410	508	918
11:00		509	478	987
12:00 PM		430	542	972
01:00		472	468	940
02:00		398	480	878
03:00		382	368	750
04:00		402	294	696
05:00		340	254	594
06:00		247	169	416
07:00		144	74	218
08:00		129	51	180
09:00		87	56	143
10:00		57	34	91
11:00		48	31	79
Total		6321	6954	13275
Percent		47.6%	52.4%	

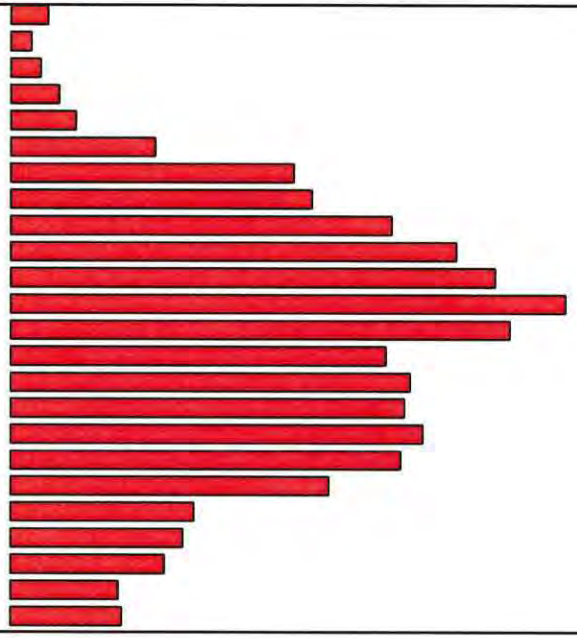


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/28/2023 Saturday	Eastbound	Westbound	Combined Total
12:00 AM		26	9	35
01:00		14	5	19
02:00		17	11	28
03:00		19	26	45
04:00		28	34	62
05:00		90	46	136
06:00		104	164	268
07:00		111	174	285
08:00		144	218	362
09:00		166	256	422
10:00		202	258	460
11:00		242	284	526
12:00 PM		240	234	474
01:00		188	168	356
02:00		208	170	378
03:00		220	154	374
04:00		229	162	391
05:00		196	174	370
06:00		187	114	301
07:00		108	66	174
08:00		106	57	163
09:00		92	54	146
10:00		58	43	101
11:00		58	48	106
Total		3053	2929	5982
Percent		51.0%	49.0%	

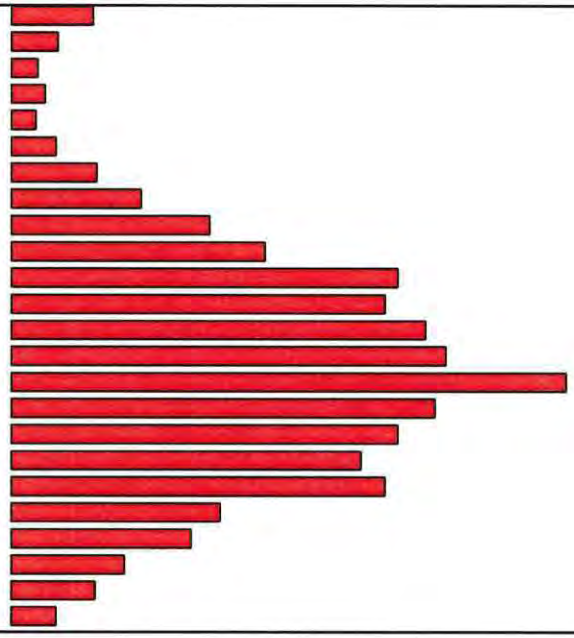


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/29/2023 Sunday	Eastbound	Westbound	Combined Total
12:00 AM		22	34	56
01:00		17	15	32
02:00		14	4	18
03:00		11	12	23
04:00		7	10	17
05:00		14	16	30
06:00		16	43	59
07:00		32	57	89
08:00		52	84	136
09:00		78	96	174
10:00		112	154	266
11:00		126	130	256
12:00 PM		132	152	284
01:00		158	141	299
02:00		240	141	381
03:00		167	124	291
04:00		159	106	265
05:00		124	116	240
06:00		155	102	257
07:00		93	50	143
08:00		79	44	123
09:00		52	25	77
10:00		32	25	57
11:00		18	12	30
Total		1910	1693	3603
Percent		53.0%	47.0%	

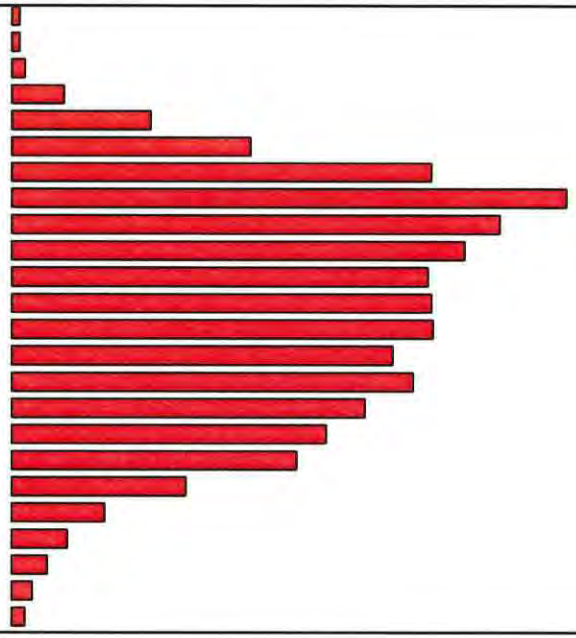


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/30/2023 Monday	Eastbound	Westbound	Combined Total
12:00 AM		9	9	18
01:00		12	6	18
02:00		24	8	32
03:00		77	46	123
04:00		197	132	329
05:00		317	246	563
06:00		408	582	990
07:00		351	958	1309
08:00		514	638	1152
09:00		488	580	1068
10:00		446	536	982
11:00		472	517	989
12:00 PM		450	544	994
01:00		446	455	901
02:00		452	495	947
03:00		416	417	833
04:00		412	331	743
05:00		354	316	670
06:00		260	149	409
07:00		155	62	217
08:00		85	44	129
09:00		64	20	84
10:00		35	12	47
11:00		23	6	29
Total		6467	7109	13576
Percent		47.6%	52.4%	

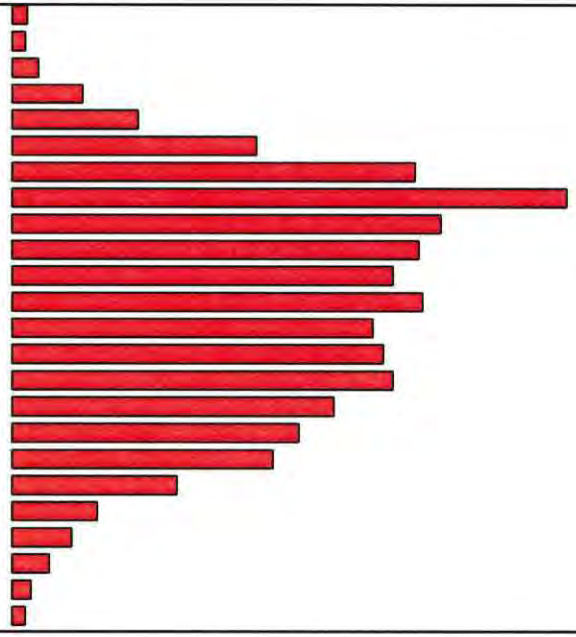


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	1/31/2023 Tuesday	Eastbound	Westbound	Combined Total
12:00 AM		22	15	37
01:00		18	18	36
02:00		32	34	66
03:00		103	80	183
04:00		195	130	325
05:00		364	268	632
06:00		419	628	1047
07:00		410	1031	1441
08:00		446	668	1114
09:00		508	550	1058
10:00		466	523	989
11:00		470	596	1066
12:00 PM		462	473	935
01:00		438	528	966
02:00		466	524	990
03:00		399	436	835
04:00		416	330	746
05:00		397	282	679
06:00		290	138	428
07:00		150	73	223
08:00		107	46	153
09:00		81	15	96
10:00		32	14	46
11:00		25	9	34
Total		6716	7409	14125
Percent		47.5%	52.5%	

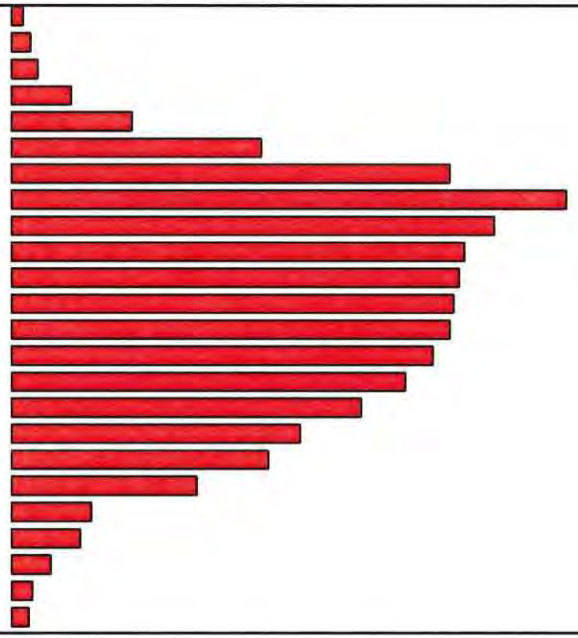


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	2/1/2023 Wednesday	Eastbound	Westbound	Combined Total
12:00 AM		14	13	27
01:00		26	20	46
02:00		29	36	65
03:00		87	64	151
04:00		190	120	310
05:00		386	252	638
06:00		402	720	1122
07:00		457	964	1421
08:00		517	717	1234
09:00		540	622	1162
10:00		524	620	1144
11:00		531	600	1131
12:00 PM		566	555	1121
01:00		496	582	1078
02:00		456	554	1010
03:00		422	475	897
04:00		409	332	741
05:00		370	288	658
06:00		292	182	474
07:00		142	64	206
08:00		114	62	176
09:00		68	31	99
10:00		37	14	51
11:00		32	12	44
Total		7107	7899	15006
Percent		47.4%	52.6%	

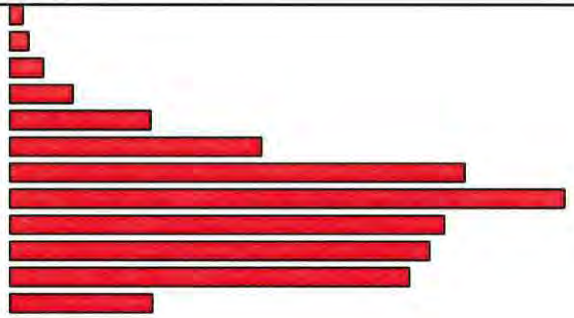


Lee County
Location: Alico Road

JOHNSON ENGINEERING

Start Date: 1/25/2023
End Date: 2/2/2023

Time	2/2/2023 Thursday	Eastbound	Westbound	Combined Total
12:00 AM		16	16	32
01:00		22	20	42
02:00		40	39	79
03:00		82	65	147
04:00		196	128	324
05:00		322	258	580
06:00		381	672	1053
07:00		350	933	1283
08:00		472	533	1005
09:00		440	532	972
10:00		413	510	923
11:00		150	179	329
12:00 PM		*	*	0
01:00		*	*	0
02:00		*	*	0
03:00		*	*	0
04:00		*	*	0
05:00		*	*	0
06:00		*	*	0
07:00		*	*	0
08:00		*	*	0
09:00		*	*	0
10:00		*	*	0
11:00		*	*	0
Total		2884	3885	6769
Percent		42.6%	57.4%	
Grand Total		45508	48369	93877
Percent		48.5%	51.5%	
ADT		ADT: 11,533		AADT: 11,533



APPENDIX C

PEAK HOUR TURNING MOVEMENT COUNTS

JOHNSON ENGINEERING

SUMMARY OF VEHICLE MOVEMENTS

LOCATION: Alico Road & Green Meadow Road

1/26/2023

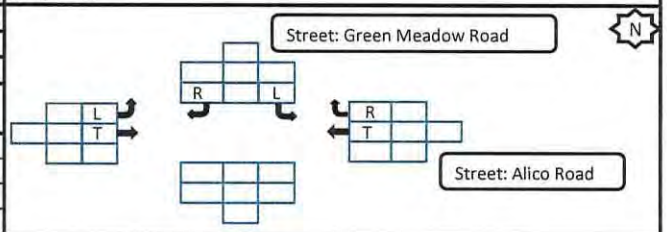
COUNTY: Lee

OBSERVER: Marina

WEATHER:

ROAD CONDITION:

REMARKS:



VEHICLE MOVEMENTS

TIME	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				Total
BEGIN	L	T	R	Ped.	L - TRUCK	L - CAR	R - TRUCK	R - CAR	L - TRUCK	L - CAR	T - TRUCK	T - CAR	T - TRUCK	T - CAR	R - TRUCK	R - CAR	
7:00 AM					0	0	30	3	16	2	9	2	24	9	6	0	**101**
7:15 AM					1	1	28	0	11	1	5	3	15	7	1	1	**74**
7:30 AM					3	0	30	3	11	2	9	3	15	3	0	1	**80**
7:45 AM					0	2	17	2	19	1	9	4	21	4	1	0	**80**
8:00 AM					0	0	8	4	10	3	13	2	22	13	1	0	76
8:15 AM					0	0	15	3	12	0	22	4	12	0	0	3	71
8:30 AM					0	0	11	1	12	0	6	5	7	4	0	0	46
8:45 AM					2	0	15	1	14	1	10	2	26	4	2	2	79
TOTAL	0	0	0	0	6	3	154	17	105	10	83	25	142	44	11	7	**607**
PK. HOUR TOTAL	0	0	0	0	4	3	105	8	57	6	32	12	75	23	8	2	**335**
P.H.F.	0	0	0	0	0.33	0.38	0.88	0.67	0.75	0.75	0.89	0.75	0.78	0.64	0.33	0.50	**0.83**

JOHNSON ENGINEERING

SUMMARY OF VEHICLE MOVEMENTS

LOCATION: Alico Road & Green Meadow Road

1/26/2023

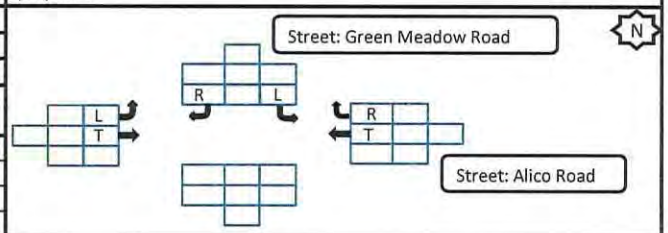
COUNTY: Lee

OBSERVER: JAB

WEATHER: 70 deg. and overcast

ROAD CONDITION: Dry

REMARKS: School bus stopped at 4:20pm



VEHICLE MOVEMENTS

TIME	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				Total
BEGIN	L	T	R	Ped.	L - TRUCK	L - CAR	R - TRUCK	R - CAR	L - TRUCK	L - CAR	T - TRUCK	T - CAR	T - TRUCK	T - CAR	R - TRUCK	R - CAR	
4:00 PM					2	1	3	8	1	1	8	79	6	72	0	1	182
4:15 PM					0	0	3	10	1	1	6	76	5	55	0	1	158
4:30 PM					0	1	0	9	1	5	11	79	10	44	0	0	**160**
4:45 PM					0	0	0	5	0	2	4	78	4	61	1	0	**155**
5:00 PM					0	2	0	11	0	0	4	72	3	108	0	0	**200**
5:15 PM					0	0	0	1	0	2	2	96	9	63	0	0	**173**
5:30 PM					0	1	0	2	0	2	1	95	3	52	0	0	156
5:45 PM					0	1	0	7	0	2	6	87	0	39	0	0	142
TOTAL	0	0	0	0	2	6	6	53	3	15	42	662	40	494	1	2	**1326**
PK. HOUR TOTAL	0	0	0	0	0	3	0	26	1	9	21	325	26	276	1	0	**688**
P.H.F.	0	0	0	0	0	0.38	0.00	0.59	0.25	0.45	0.48	0.85	0.65	0.64	0.25	0.00	**0.86**

APPENDIX D

2022 LEE COUNTY CONCURRENCY REPORT

Lee County
Southwest Florida

PUBLIC FACILITIES LEVEL OF SERVICE AND CONCURRENCY REPORT

2022 - INVENTORY AND PROJECTIONS

November, 2022

Infrastructure Planning Section
Department of Community Development

Table 21 b): Link-Level Service Volumes and LOS Table

Table 21 b) 1 of 7

LEE COUNTY ROAD LINK VOLUMES (County- and State-Maintained Roadways)														
Link No.	NAME	ROADWAY LINK		F. Class	ROAD TYPE	PERFORMANCE STANDARD		2021 100TH HIGHEST HOUR			FUTURE FORECAST (2026)			Notes
		FROM	TO			LOS	DIRECTIONAL CAPACITY	LOS	VOL	V/C	LOS	VOL	V/C	
00100	A & W BULB RD	GLADIOLUS DR	McGREGOR BLVD	Maj. Col	2LN	E	860	C	342	0.40	C	360	0.42	
00200	ALABAMA RD	SR 82	MILWAUKEE BLVD	M. Art	2LN	E	990	C	265	0.27	C	279	0.28	
00300	ALABAMA RD	MILWAUKEE BLVD	HOMESTEAD RD	M. Art	2LN	E	990	C	349	0.35	C	367	0.37	
00400	ALEXANDER BELL BLVD	SR 82	MILWAUKEE BLVD	M. Art	2LN	E	990	D	561	0.57	D	590	0.60	
00500	ALEXANDER BELL BLVD	MILWAUKEE BLVD	LEELAND HEIGHTS	M. Art	2LN	E	990	D	561	0.57	D	654	0.66	Shadow Lakes
00590	ALICO RD	US 41	DUSTY RD	P. Art	4LD	E	1,980	B	1,171	0.59	B	1,230	0.62	
00600	ALICO RD	DUSTY RD	LEE RD	P. Art	6LD	E	2,960	B	1,171	0.40	B	1,532	0.52	Alico Business Park
00700	ALICO RD	LEE RD	THREE OAKS PKWY	P. Art	6LD	E	2,960	B	1,171	0.40	B	1,419	0.48	Three Oaks Regional Center
00800	ALICO RD	THREE OAKS PKWY	I-75	P. Art	6LD	E	2,960	B	2,428	0.82	B	2,552	0.86	EEPCO Study
00900	ALICO RD	I-75	BEN HILL GRIFFIN BLVD	P. Art	6LD	E	2,960	B	1,278	0.43	B	1,425	0.48	EEPCO Study
01000	ALICO RD	BEN HILL GRIFFIN BLVD	GREEN MEADOW DR	Maj. Col	2LN	E	1,100	C	395	0.36	E	808	0.73	4 Ln constr 2018, EEPCO Study*
01050	ALICO RD	GREEN MEADOW DR	CORKSCREW RD	Maj. Col	2LN	E	1,100	B	131	0.12	B	224	0.20	EEPCO Study
01200	BABCOCK RD	US 41	ROCKEFELLER CIR	Min. Col	2LN	E	860	C	55	0.06	C	162	0.19	old count
01400	BARRETT RD	PONDELLA RD	PINE ISLAND RD (US 78)	Maj. Col	2LN	E	860	C	103	0.12	C	116	0.14	old count projection(2009)
01500	BASS RD	SUMMERLIN RD	GLADIOLUS DR	Maj. Col	4LN	E	1,790	C	564	0.32	C	822	0.46	
01600	BAYSHORE RD (SR 78)	BUS 41	NEW POST RD/HART RD	State	4LD	D	2,100	C	1,975	0.94	D	2,076	0.99	
01700	BAYSHORE RD (SR 78)	HART RD	SLATER RD	State	4LD	D	2,100	C	1,821	0.87	F	2,152	1.02	
01800	BAYSHORE RD (SR 78)	SLATER RD	I-75	State	4LD	D	2,100	C	1,222	0.58	C	1,441	0.69	
01900	BAYSHORE RD (SR 78)	I-75	NALLE RD	State	2LN	D	924	C	741	0.80	F	941	1.02	
02000	BAYSHORE RD (SR 78)	NALLE RD	SR 31	State	2LN	D	924	C	741	0.80	F	941	1.02	
02100	BEN HILL GRIFFIN PKWY	CORKSCREW RD	FGCU ENTRANCE	P. Art	4LD	E	2,000	B	1,361	0.68	B	1,763	0.88	
02200	BEN HILL GRIFFIN PKWY	FGCU BOULEVARD S	COLLEGE CLUB DR	P. Art	4LD	E	2,000	B	1,361	0.68	B	1,430	0.72	
02250	BEN HILL GRIFFIN PKWY	COLLEGE CLUB DR	ALICO RD	P. Art	6LD	E	3,000	A	1,123	0.37	A	1,215	0.41	
26950	BEN HILL GRIFFIN PKWY	ALICO RD	TERMINAL ACCESS RD	Controlled xs	4LD	E	1,980	A	980	0.49	A	1,030	0.52	
02300	BETH STACEY BLVD	23RD ST	HOMESTEAD RD	Maj. Col	2LN	E	860	C	340	0.40	C	565	0.66	
02400	BONITA BEACH RD	HICKORY BLVD	VANDERBILT DR	P. Art	4LD	E	1,900	C	736	0.39	C	774	0.41	Constrained In City Plan *
02500	BONITA BEACH RD	VANDERBILT DR	US 41	P. Art	4LD	E	1,900	C	1,433	0.75	C	1,506	0.79	Constrained In City Plan
02600	BONITA BEACH RD	US 41	OLD 41	P. Art	4LD	E	1,860	C	1,427	0.77	C	1,500	0.81	Constrained, old count projection(2010)
02700	BONITA BEACH RD	OLD 41	IMPERIAL ST	P. Art	6LD	E	2,800	C	1,908	0.68	C	2,005	0.72	Constrained In City Plan(2010)
02800	BONITA BEACH RD	IMPERIAL ST	W OF I-75	P. Art	6LD	E	2,800	C	2,091	0.75	C	2,197	0.78	Constrained In City Plan
02900	BONITA BEACH RD	E OF I-75	BONITA GRAND DR	M. Art	4LD	E	2,020	B	626	0.31	B	658	0.33	Constrained In City Plan
02950	BONITA BEACH RD	BONITA GRANDE DR	Logan Boulevard	M. Art	4LD	E	2,020	B	626	0.31	B	658	0.33	Constrained In City Plan
03100	BONITA GRANDE DR	BONITA BEACH RD	E TERRY ST	Maj. Col	2LN	E	860	D	692	0.80	E	782	0.91	old count projection(2009)
03200	BOYSCOUT RD	SUMMERLIN RD	US 41	P. Art	6LN	E	2,520	E	1,847	0.73	E	1,941	0.77	
03300	BRANTLEY RD	SUMMERLIN RD	US 41	Maj. Col	2LN	E	860	C	287	0.33	C	302	0.35	
03400	BRIARCLIFF RD	US 41	TRIPLE CROWN CT	Maj. Col	2LN	E	860	C	158	0.18	C	166	0.19	
03500	BROADWAY RD (ALVA)	SR 80	North RIVER RD	Maj. Col	2LN	E	860	C	280	0.33	C	294	0.34	old count projection(2009)
03700	BUCKINGHAM RD	SR 82	GUNNERY RD	P. Art	2LN	E	990	D	491	0.50	D	516	0.52	
03730	BUCKINGHAM RD	GUNNERY RD	ORANGE RIVER BLVD	P. Art	2LN	E	990	C	395	0.40	C	415	0.42	
03800	BUCKINGHAM RD	ORANGE RIVER BLVD	SR 80	P. Art	2LN	E	990	D	644	0.65	F	1,057	1.07	Buckingham 345 & Portico
03900	BURNT STORE RD	SR 78	VAN BUREN PKWY	Controlled xs	4LD	E	2,950	B	828	0.28	B	870	0.29	
04000	BURNT STORE RD	VAN BUREN PKWY	COUNTY LINE	Controlled xs	2LN	E	1,140	C	528	0.46	C	626	0.55	
04200	BUS 41 (N TAMIAMI TR, S	CITY LIMITS (N END EDISON BRG)	PONDELLA RD	State	6LD	D	3,171	C	1,715	0.54	C	2,082	0.66	
04300	BUS 41 (N TAMIAMI TR, S	PONDELLA RD	SR 78	State	6LD	D	3,171	C	1,715	0.54	C	2,082	0.66	
04400	BUS 41 (N TAMIAMI TR, S	SR 78	LITTLETON RD	State	4LD	D	2,100	C	994	0.47	C	1,245	0.59	
04500	BUS 41 (N TAMIAMI TR, S	LITTLETON RD	US 41	State	4LD	D	2,100	C	596	0.28	C	796	0.38	
04600	CAPE CORAL BRIDGE	DEL PRADO BLVD	McGREGOR BLVD	P. Art	4LB	E	4,000	D	3,097	0.77	D	3,255	0.81	
04700	CAPTIVA DR	BLIND PASS	SOUTH SEAS	Maj. Col	2LN	E	860	C	267	0.31	C	302	0.35	Constrained, old count(2010)

County-Maintained Collector Roadway - Unincorporated Lee County

County-Maintained Collector Roadway - Incorporated Lee County

County-Maintained Arterial Roadway - Unincorporated Lee County

County-Maintained Arterial Roadway - Incorporated Lee County

State-Maintained Arterial Roadway - Unincorporated Lee County

County Maintained Controlled Access Aterial Facility

County Maintained Expressway

APPENDIX E

LEE COUNTY LEVEL OF SERVICE TABLES

Lee County
Generalized Peak Hour Directional Service Volumes
Urbanized Areas

April 2016 c:\input5

Uninterrupted Flow Highway

Level of Service

Lane	Divided	A	B	C	D	E
1	Undivided	130	420	850	1,210	1,640
2	Divided	1,060	1,810	2,560	3,240	3,590
3	Divided	1,600	2,720	3,840	4,860	5,380

Arterials

Class I (40 mph or higher posted speed limit)

Level of Service

Lane	Divided	A	B	C	D	E
1	Undivided	*	140	800	860	860
2	Divided	*	250	1,840	1,960	1,960
3	Divided	*	400	2,840	2,940	2,940
4	Divided	*	540	3,830	3,940	3,940

Class II (35 mph or slower posted speed limit)

Level of Service

Lane	Divided	A	B	C	D	E
1	Undivided	*	*	330	710	780
2	Divided	*	*	710	1,590	1,660
3	Divided	*	*	1,150	2,450	2,500
4	Divided	*	*	1,580	3,310	3,340

Controlled Access Facilities

Level of Service

Lane	Divided	A	B	C	D	E
1	Undivided	*	160	880	940	940
2	Divided	*	270	1,970	2,100	2,100
3	Divided	*	430	3,050	3,180	3,180

Collectors

Level of Service

Lane	Divided	A	B	C	D	E
1	Undivided	*	*	310	660	740
1	Divided	*	*	330	700	780
2	Undivided	*	*	730	1,440	1,520
2	Divided	*	*	770	1,510	1,600

Note: the service volumes for I-75 (freeway), bicycle mode, pedestrian mode, and bus mode should be from FDOT's most current version of LOS Handbook.

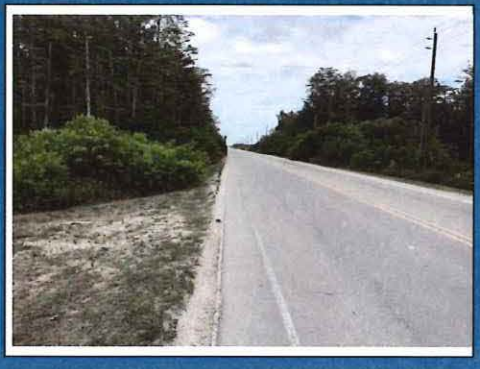
APPENDIX F

ALICO ROAD EXTENSION TRAFFIC TECHNICAL MEMORANDUM, PREPARED BY KISINGER CAMPO & ASSOCIATES DATED MARCH 2022

Lee County
Southwest Florida

Alico Road Extension

Traffic Technical Memorandum



Prepared by:

KCA | KISINGER CAMPO & ASSOCIATES

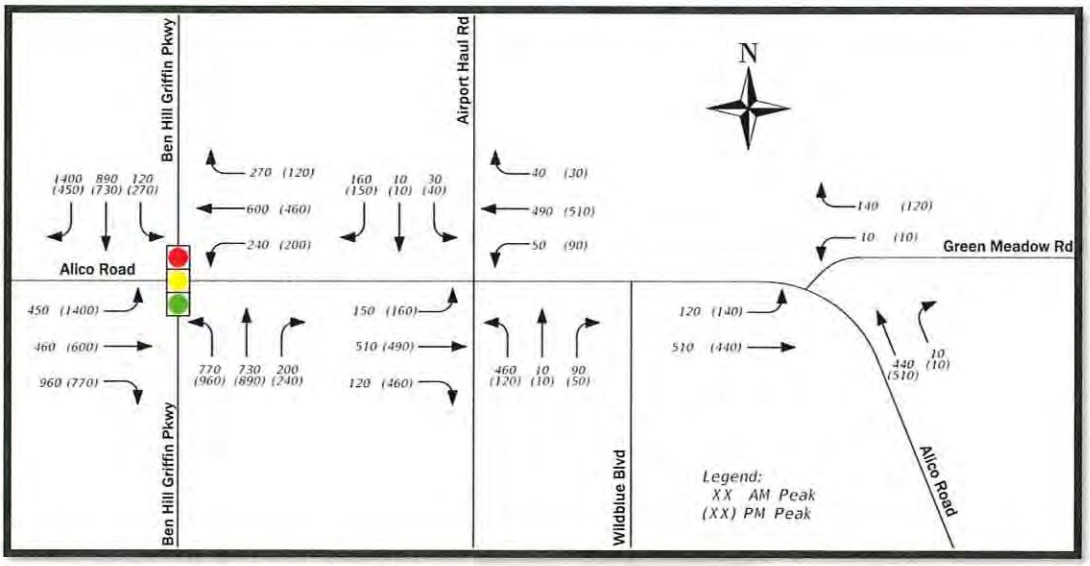
201 N Franklin St Ste 400

March 2022

5.1. Future Year Turning Movement Volumes

The traffic design factors presented in **Section 2.3** were used to compute future year peak hour volumes. The FDOT TURNS5 tool was used to help in estimating future years turning movement counts. Output worksheets from TURNS5 can be found in **Appendix J.** The peak hour intersection turning movement volumes were checked for reasonableness and manually adjusted where necessary and appropriate. Directional AM peak hour volumes were obtained from the reciprocal movement PM peak hour volumes and vice versa. Intersection turning movement volumes were balanced with those of the adjacent intersections such that no addition or deletion of traffic volumes is needed to build the network simulation model. Figures 5.5, 5.6, and 5.7 depict the AM and PM turning movement volumes for the Design Year 2045 No-Build, Opening Year 2025, and Design Year 2045 Build, respectively, along Alico Road. Figures 5.8, 5.9, and 5.10 depict the AM and PM turning movement volumes for the Design Year 2045 No-Build, Opening Year 2025, and Design Year 2045 Build, respectively, along Sunshine Boulevard.

Figure 5.5 Alico Road Design Year 2045 No-Build Turning Movement Volumes



201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PH 813 871-5331 FAX 813 871-5135 |

Figure 5.6 Alico Road Opening Year 2025 Build Turning Movement Volumes

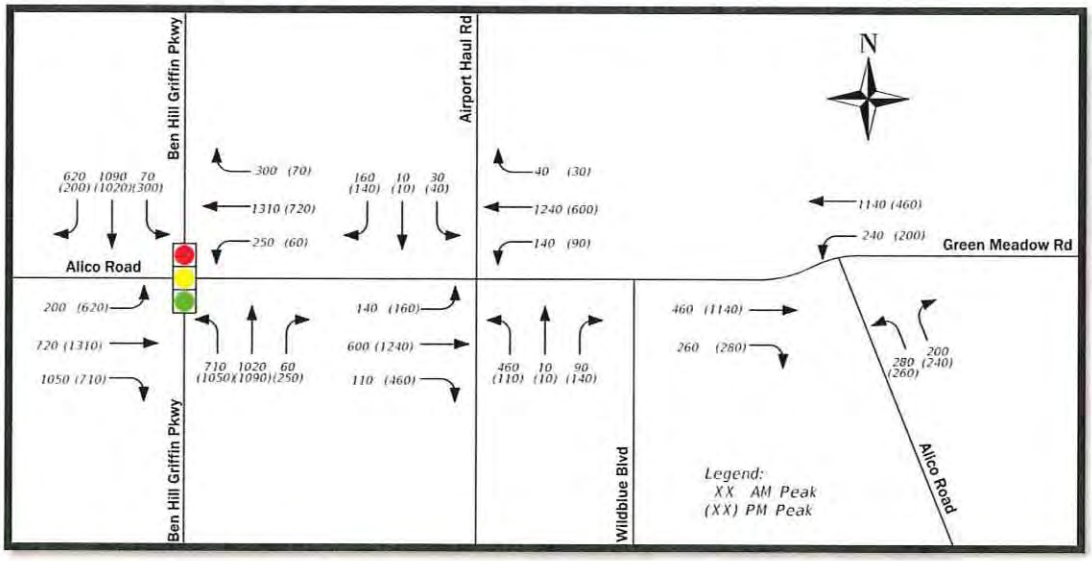
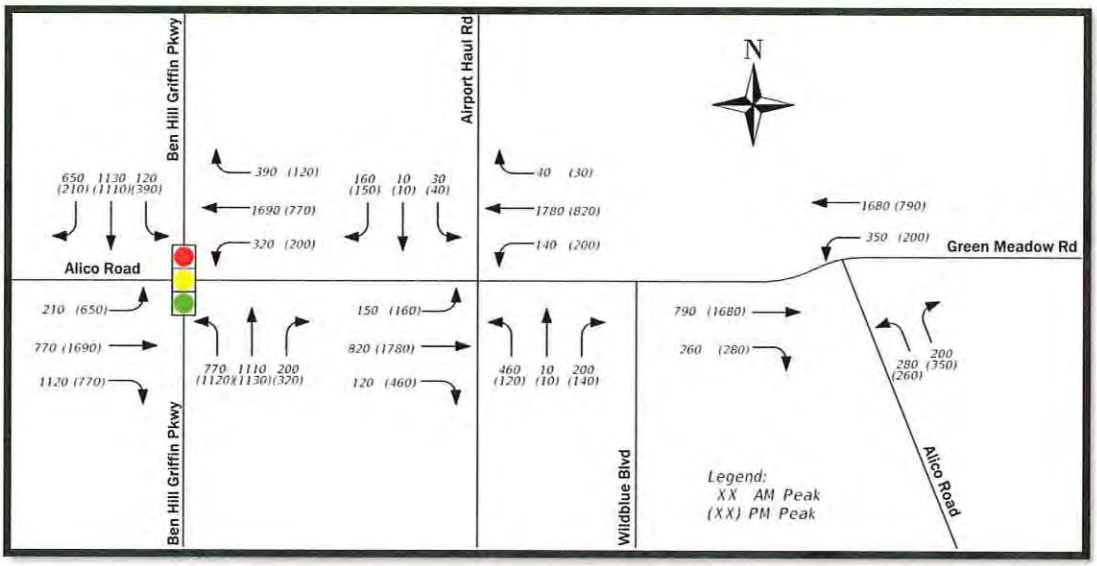
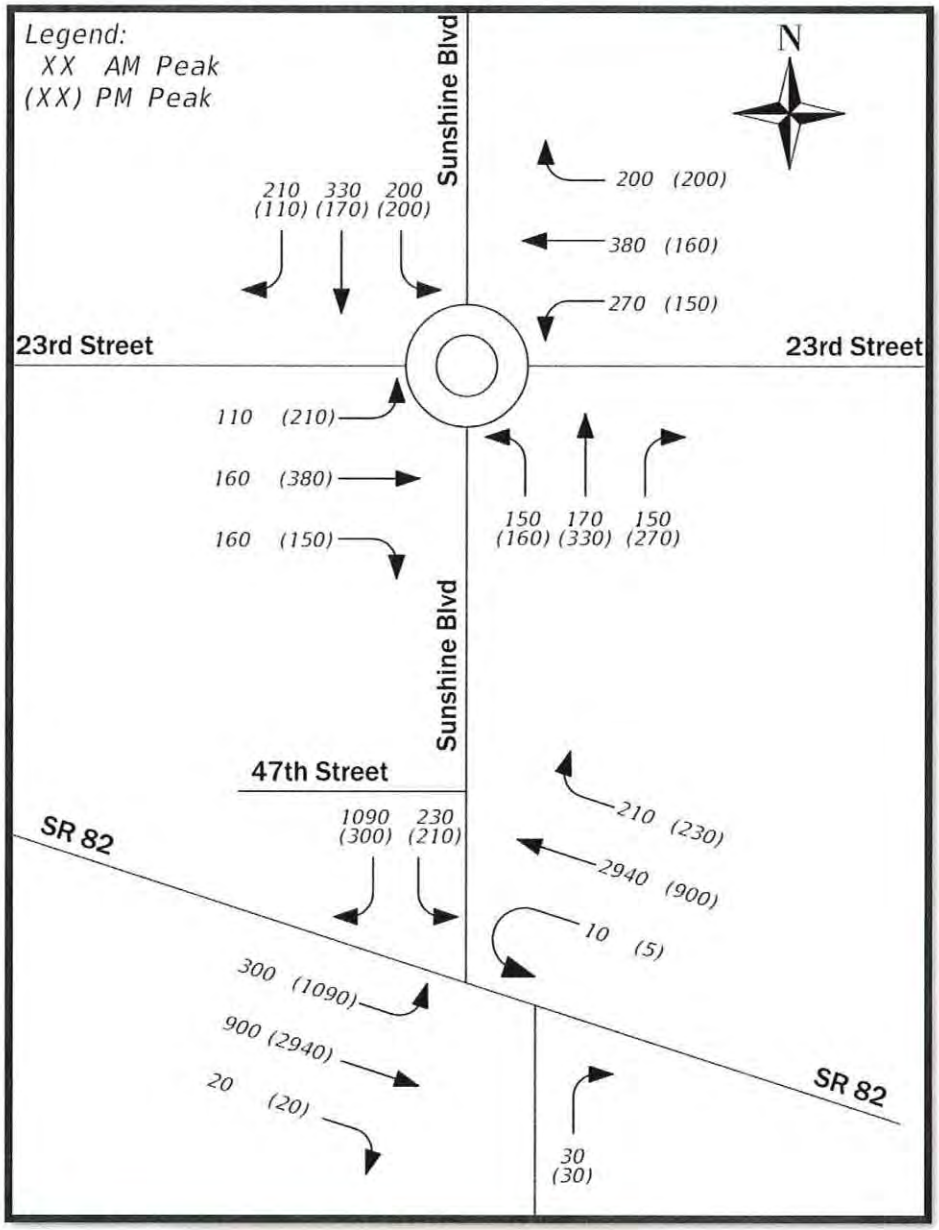


Figure 5.7 Alico Road Design Year 2045 Build Turning Movement Volumes



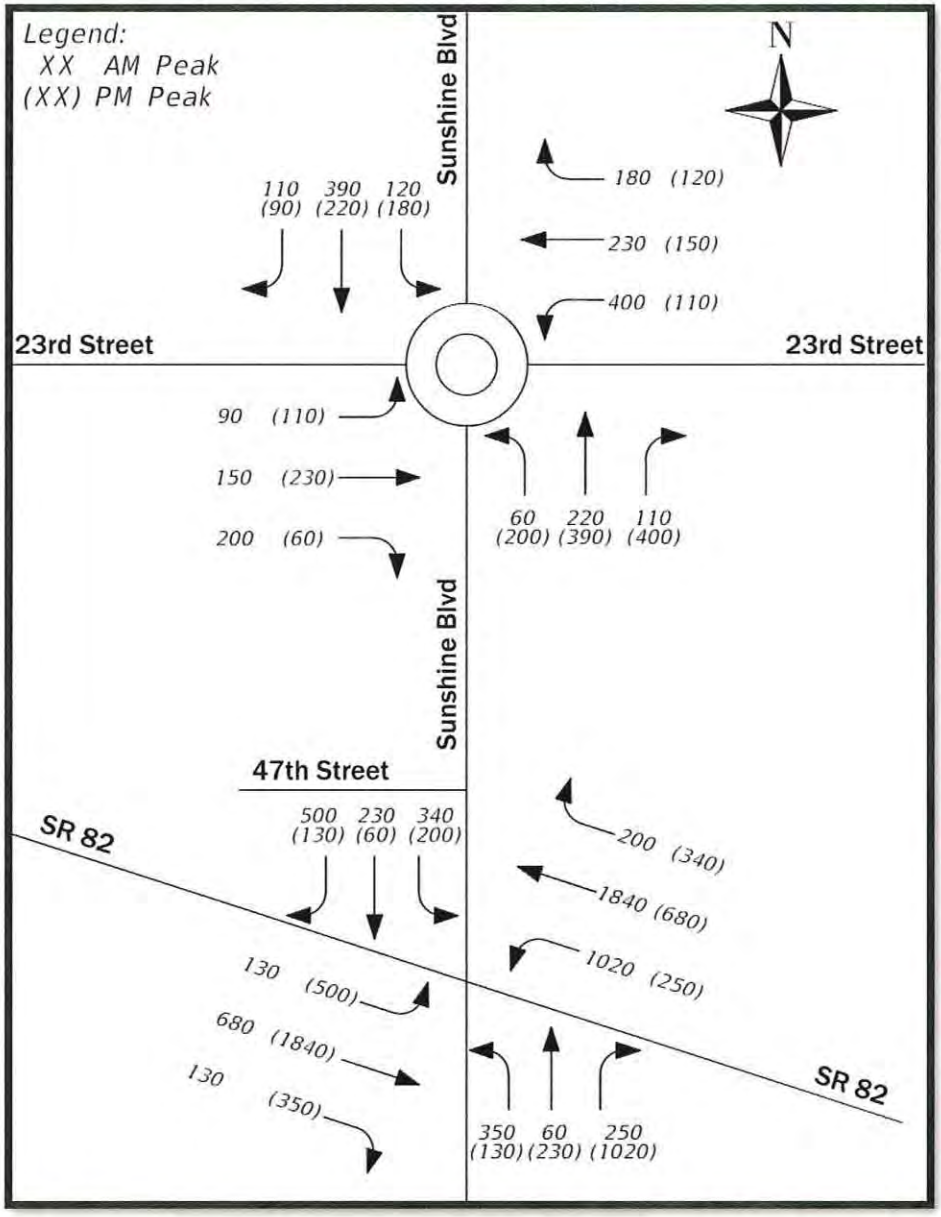
201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | WWW.KISINGERCAMPO.COM

Figure 5.8 Sunshine Blvd Design Year 2045 No-Build Turning Movement Volumes



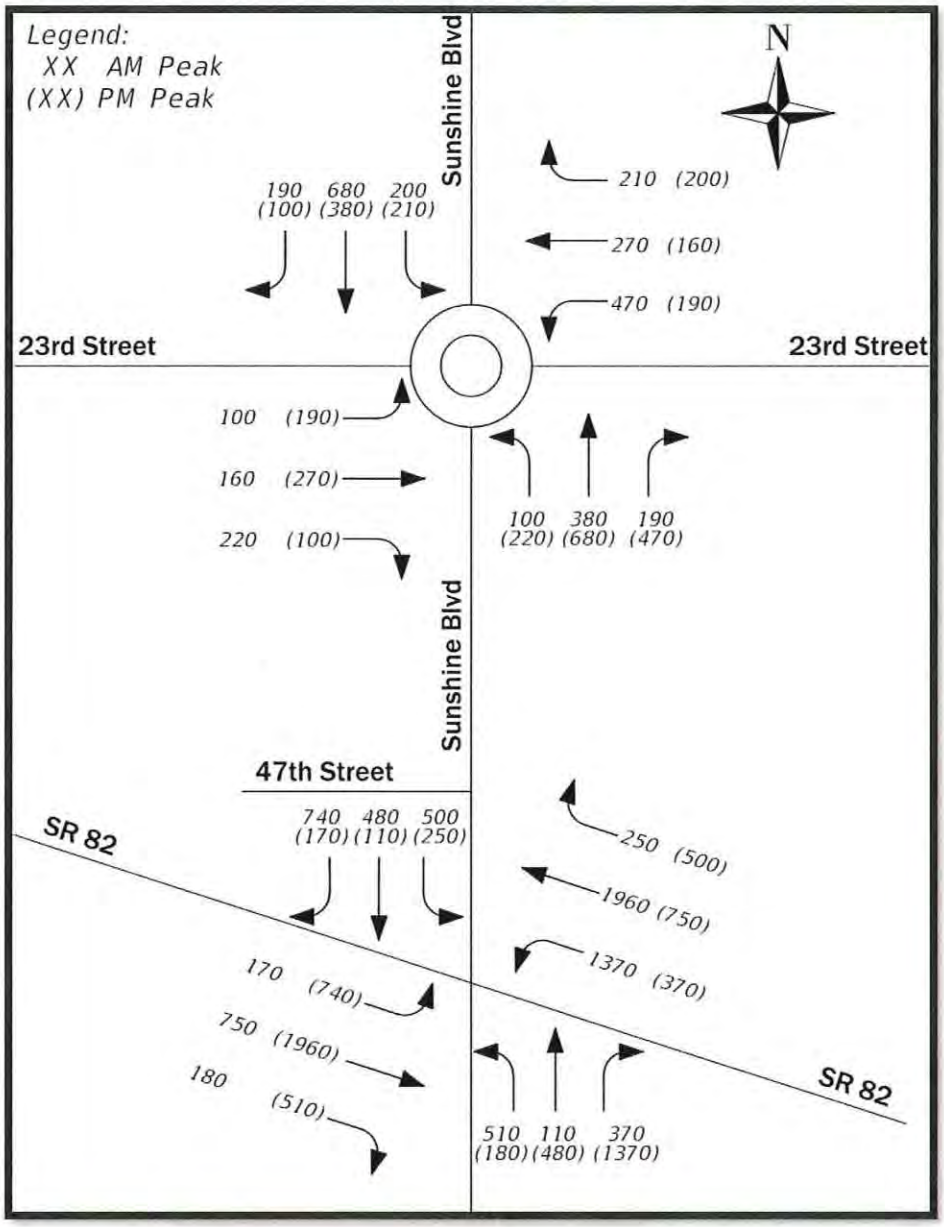
201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 |

Figure 5.9 Sunshine Blvd Opening Year 2025 Build Turning Movement Volumes



201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813.871-5331 | FAX 813.871-5135 | www.kimley-horn.com

Figure 5.10 Sunshine Blvd Design Year 2045 Build Turning Movement Volumes



6. Design Year 2045 LOS Analysis

Design Year 2045 level of service (LOS) analysis was conducted based on the methodology outlined in the Highway Capacity Manual, 6th Edition using Synchro 11 and the Highway Capacity Software (HCS) for the signalized and unsignalized intersection LOS analysis. Delays and LOS for roundabout intersections were calculated using SIDRA INTERSECTION 8 software for the AM and PM peak hour volumes.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-campo.com

Alternative One geometry is the No-Build scenario. The Alternative One Design Year 2045 arterial LOS for each segment of Alico Road and Sunshine Boulevard is shown in Table 6.1. The arterial analysis shows that all the segments are expected to operate at an acceptable LOS except Alico Road between the I-75 ramps and Sunshine Boulevard between SR 82 and 40th Street. The 2045 AM and PM peak hour LOS for the Alternative One geometry for each intersection is presented in Table 6.2. The Design Year 2045 analysis shows that the Ben Hill Griffin Parkway and Airport Haul Road intersections along Alico Road and the SR 82 and 23rd Street intersections along Sunshine Boulevard are expected to operate at an unacceptable LOS with the existing geometry. At the current two-way stop-controlled intersections at Airport Haul Road and SR 82, the minor road delay in the Design Year 2045 is too high that HCS cannot accurately depict the delay. Therefore, a maximum delay of 300 seconds was used. **Appendix D** includes copies of the Synchro, HCS, and SIDRA LOS output spreadsheets.

Table 6.1 Design Year 2045 Arterial LOS – Alternative One

Segment	Northbound/Eastbound				Southbound/Westbound			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Alico Road	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
West of I-75 SB Ramp	1230	C	2130	D	N/A			
I-75 SB Ramp to I-75 NB Ramp	1700	C	2480	D	3320	E	2510	E
I-75 NB Ramp to Ben Hill Griffin Pkwy	1870	D	2770	D	2770	C	1870	C
Ben Hill Griffin Pkwy to Airport Haul Rd	780	B	1110	B	1110	B	780	C
Airport Haul Rd to Green Meadow Rd	630	C	580	C	580	C	630	C
East of Green Meadow Rd	520	C	450	C	450	C	520	C
Sunshine Boulevard	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
SR 82 to 40th Street	510	E	1320	E	1320	E	510	E
40th Street to 23rd Street	470	D	760	D	760	D	470	D
North of 23rd Street	480	D	740	D	740	D	480	D

Signalized (Synchro Results)

Table 6.2 Design Year 2045 Intersection LOS – Alternative One

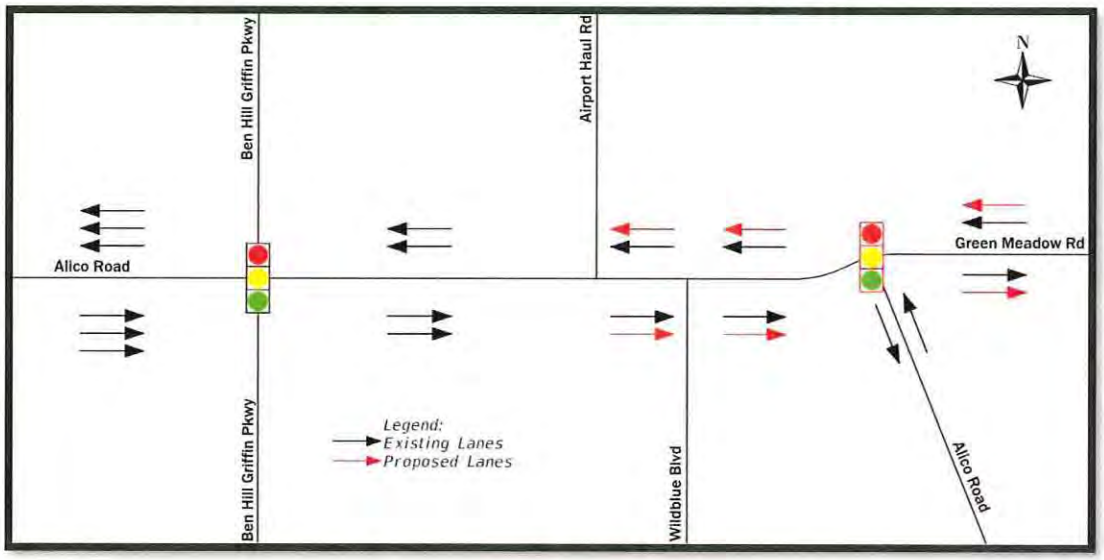
Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Alico Road at Ben Hill Griffin Parkway	E	66.9	F	114.4
Alico Road at Airport Haul Road	F	>300	F	>300
Alico Road at Green Meadow Road	B	12.2	B	12.5
Sunshine Boulevard at SR 82	F	>300	F	>300
Sunshine Boulevard at 23rd Street	F	166.6	F	115.8

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.KisingerCampo.com

6.1. Proposed Geometry

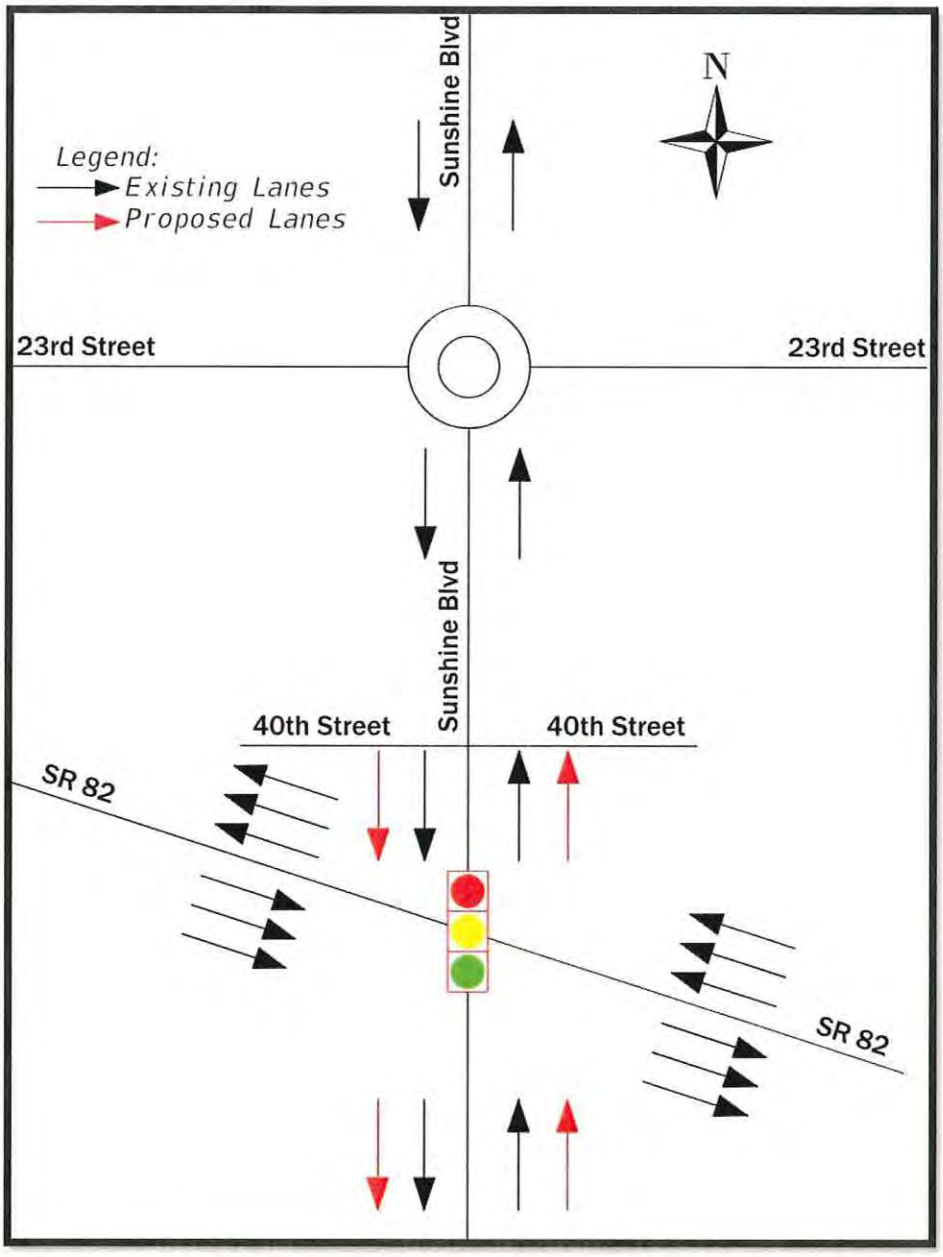
Alternative Two geometry consists of the new four-lane Alico Road extension from the Alico Road at Green Meadow Road intersection to the SR 82 at Sunshine Boulevard intersection. Alternative Two also consists of widening Alico Road from two to four lanes from Airport Haul Road to Green Meadow Road and Sunshine Boulevard from two to four lanes from SR 82 to 40th Street. Figures 6.1 and 6.2 show the Alternative Two lane geometry along Alico Road and Sunshine Boulevard. Intersection improvements in Alternative Two include a T intersection with a continuous green westbound movement at Alico Road and Green Meadow Road (Figure 6.3) and a partial displaced left turn (continuous flow) intersection at SR 82 and Sunshine Boulevard (Figure 6.4).

Figure 6.1 Alico Road Alternative Two Geometry



201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 | FAX 813 871-5135 |

Figure 6.2 Sunshine Boulevard Alternative Two Geometry



201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-horn.com

Figure 6.3 Alico Road at Green Meadow Road Proposed Geometry

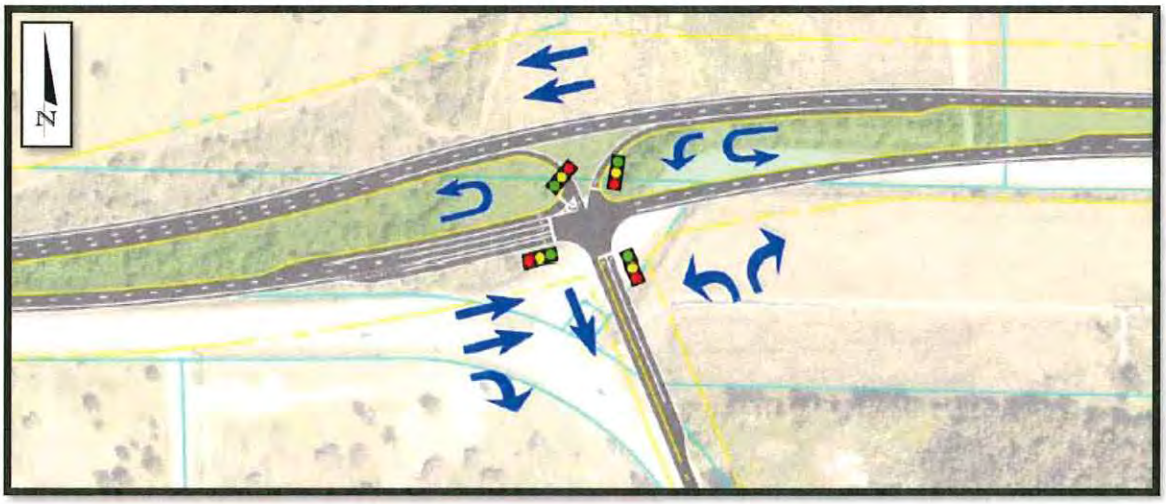
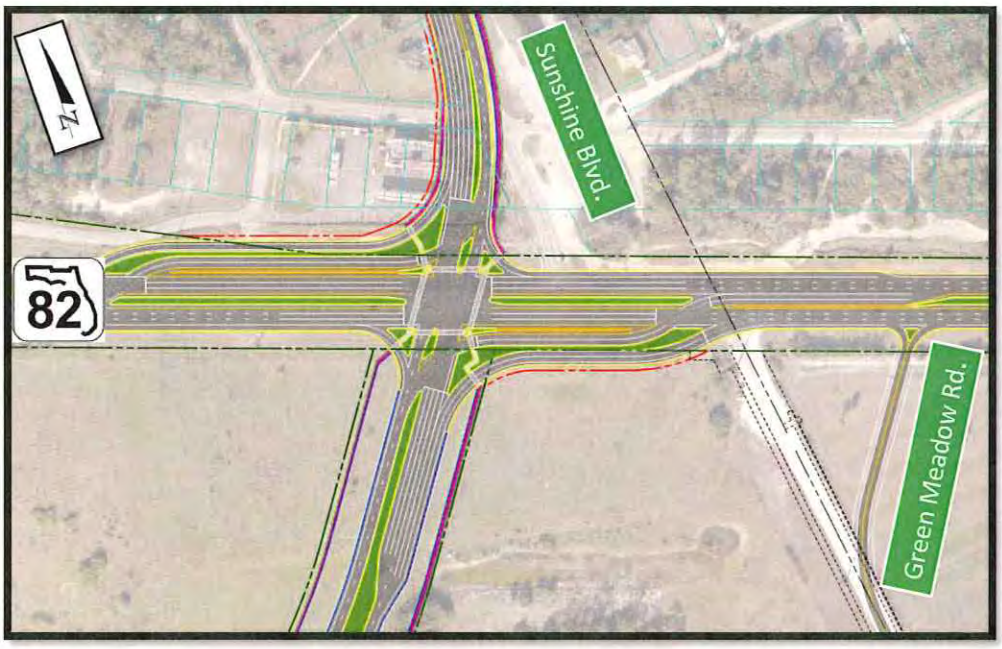


Figure 6.4 SR 82 at Sunshine Boulevard Proposed Geometry



The Alternative Two Opening Year 2025 arterial LOS for each segment of Alico Road and Sunshine Boulevard is shown in Table 6.3. The arterial analysis shows that all the segments except three in Alternative Two are expected to operate at an acceptable LOS. The Opening Year 2025 AM and PM peak hour LOS for the Alternative Two geometry for each intersection is presented in Table 6.4. The Opening Year 2025 analysis shows that the Ben Hill Griffin Parkway and Airport Haul Road intersections along Alico Road and the Sunshine Boulevard at 23rd Street intersection are expected to operate at an unacceptable LOS with the Alternative Two geometry. **Appendix D** includes copies of the Synchro, HCS, and SIDRA LOS output spreadsheets.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kisingercampo.com

Table 6.3 Opening Year 2025 Arterial LOS – Alternative Two

Segment	Northbound/Eastbound				Southbound/Westbound			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Alico Road	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
West of I-75 SB Ramp	1330	C	2000	D	N/A			
I-75 SB Ramp to I-75 NB Ramp	1800	C	2350	C	3190	E	2610	D
I-75 NB Ramp to Ben Hill Griffin Pkwy	1970	D	2640	F	2640	D	1970	C
Ben Hill Griffin Pkwy to Airport Haul Rd	850	B	1860	C	1860	B	850	B
Airport Haul Rd to Green Meadow Rd	720	A	1420	C	1420	C	720	A
East of Green Meadow Rd	N/A				480	C	500	C
Green Meadow Rd to SR 82 (Extension)	660	A	1380	B	1380	B	660	A
Sunshine Boulevard	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
SR 82 to 40th Street	390	A	1070	B	1070	B	390	A
40th Street to 23rd Street	390	E	990	E	990	E	390	E
North of 23rd Street	490	C	620	C	620	C	490	C

Signalized (Synchro Results)

Table 6.4 Opening Year 2025 Intersection LOS – Alternative Two

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Alico Road at Ben Hill Griffin Parkway	F	88.7	F	101.6
Alico Road at Airport Haul Road	F	>300	F	>300
Alico Road at Green Meadow Road	B	16.1	C	27.5
Sunshine Boulevard at SR 82	D	36.3	D	45.6
Sunshine Boulevard at 23rd Street	F	109.2	F	122.6

The Alternative Two Design Year 2045 arterial LOS for each segment of Alico Road and Sunshine Boulevard is shown in Table 6.5. The arterial analysis shows that all the segments are expected to operate at an acceptable LOS except Alico Road between the I-75 ramps and Ben Hill Griffin Parkway and Sunshine Boulevard between 40th Street and north of 23rd Street. The Design Year 2045 AM and PM peak hour LOS for the Alternative Two geometry for each intersection is presented in Table 6.6. The Design Year 2045 analysis shows that the Ben Hill Griffin Parkway and Airport Haul Road intersections along Alico Road and the Sunshine Boulevard at 23rd Street intersection are expected to operate at an unacceptable LOS with the Alternative Two geometry. **Appendix D** includes copies of the Synchro, HCS, and SIDRA LOS output spreadsheets.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-horn.com

Table 6.5 Design Year 2045 Arterial LOS – Alternative Two

Segment	Northbound/Eastbound				Southbound/Westbound			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Alico Road	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
West of I-75 SB Ramp	1460	C	2470	D	N/A			
I-75 SB Ramp to I-75 NB Ramp	1930	C	2820	D	3660	F	2740	D
I-75 NB Ramp to Ben Hill Griffin Pkwy	2100	D	3110	F	3110	D	2100	C
Ben Hill Griffin Pkwy to Airport Haul Rd	1090	B	2400	D	2400	C	1090	B
Airport Haul Rd to Green Meadow Rd	1050	B	1960	D	1960	D	1050	B
East of Green Meadow Rd	N/A				480	C	610	C
Green Meadow Rd to SR 82 (Extension)	990	B	2030	C	2030	C	990	B
Sunshine Boulevard	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
SR 82 to 40th Street	530	A	1720	C	1720	C	530	A
40th Street to 23rd Street	670	E	1370	E	1370	E	670	E
North of 23rd Street	690	E	1070	E	1070	E	690	E

Signalized (Synchro Results)

Table 6.6 Design Year 2045 Intersection LOS – Alternative Two

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Alico Road at Ben Hill Griffin Parkway	F	124.8	F	167.5
Alico Road at Airport Haul Road	F	>300	F	>300
Alico Road at Green Meadow Road	B	19.1	D	34.9
Sunshine Boulevard at SR 82	D	42.6	D	46.8
Sunshine Boulevard at 23rd Street	F	>300	F	>300

Alternative Three consists of the improvements included in Alternative Two as well as additional widening along Alico Road and Sunshine Boulevard and lanes at the intersections of Alico Road at Ben Hill Griffin Parkway and Sunshine Boulevard at 23rd Street. Alternative Three consists of widening Alico Road from four to six lanes from Ben Hill Griffin Parkway to Airport Haul Road and Sunshine Boulevard from two to four lanes from SR 82 to north of 23rd Street. Figures 6.5 and 6.6 show the Alternative Three segment and intersection lane geometry along Alico Road. Figures 6.7 and 6.8 show the Alternative Three segment lane geometry along Sunshine Boulevard and intersection lane geometry at Sunshine Boulevard and 23rd Street.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-horn.com

Figure 6.5 Alico Road Alternative Three Segment Geometry

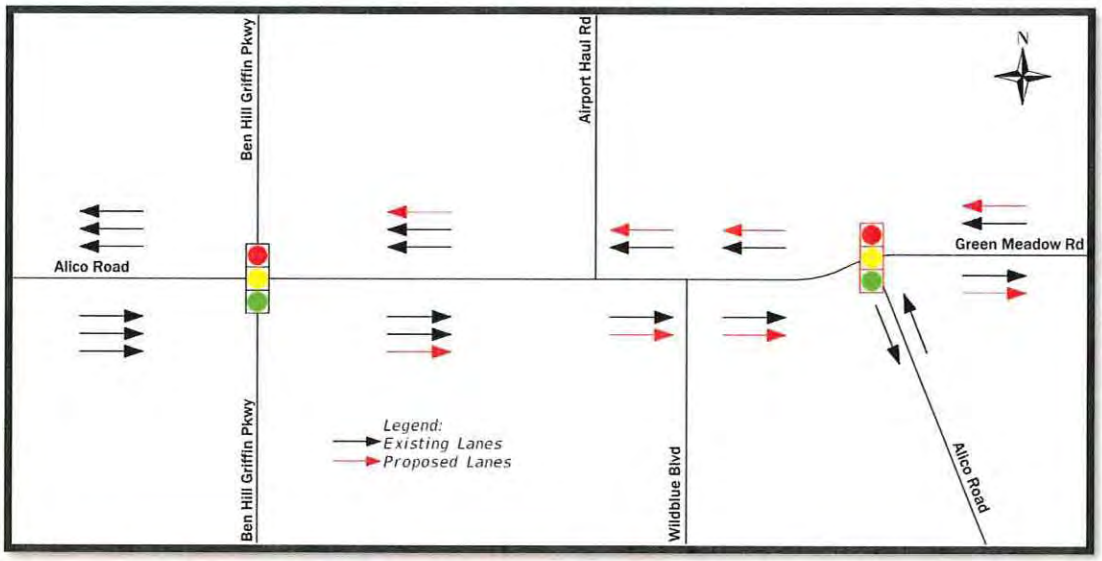
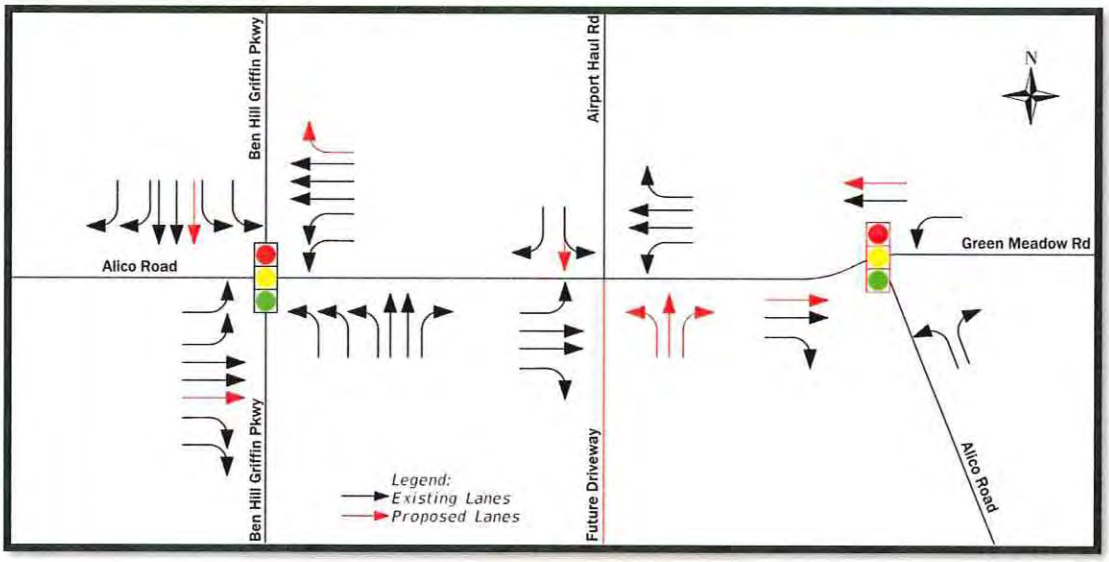
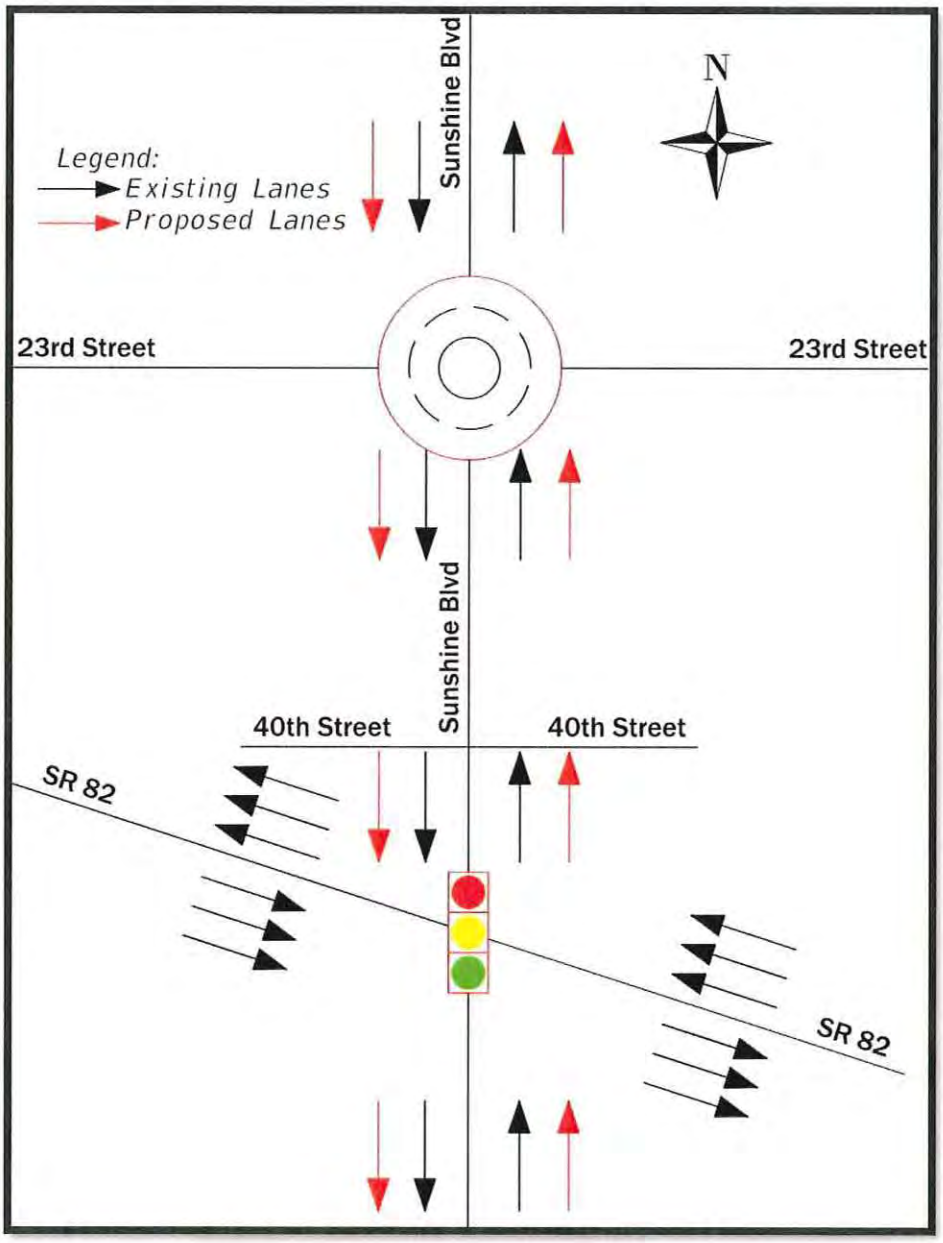


Figure 6.6 Alico Road Alternative Three Intersection Geometry



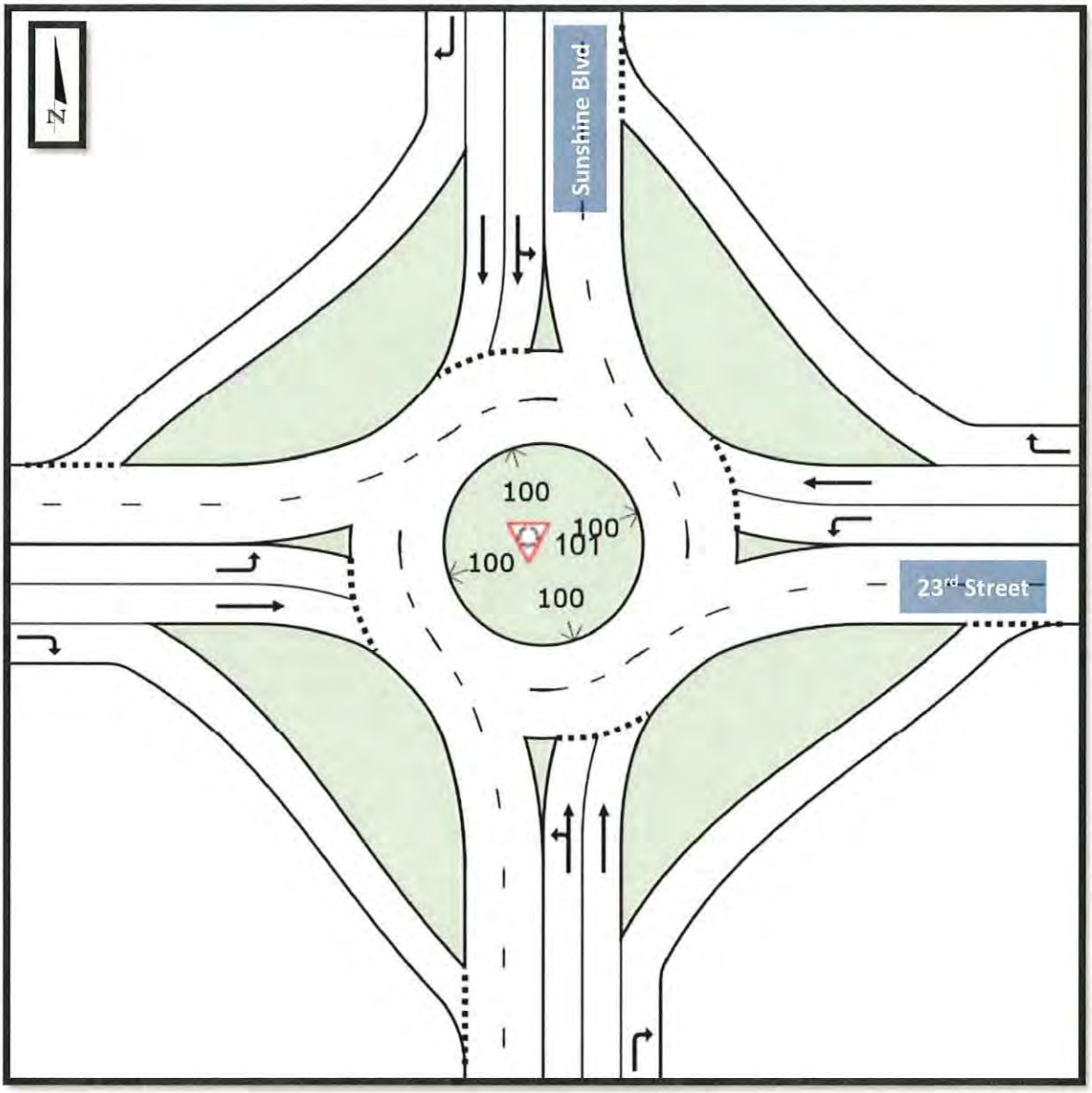
201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kisingercampo.com

Figure 6.7 Sunshine Boulevard Alternative Three Segment Geometry



201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 | FAX 813 871-5135 | www.kcaassociates.com

Figure 6.8 Sunshine Boulevard at 23rd Street Alternative Three Geometry



The Alternative Three Design Year 2045 arterial LOS for each segment of Alico Road and Sunshine Boulevard is shown in Table 6.7. The arterial analysis shows that all the segments are expected to operate at an acceptable LOS except Alico Road between the northbound I-75 ramp and Ben Hill Griffin Parkway. The Design Year 2045 AM and PM peak hour LOS for the Alternative Three geometry for each intersection is presented in Table 6.8. The Design Year 2045 analysis shows that the Ben Hill Griffin Parkway and Airport Haul Road intersections along Alico Road and the Sunshine Boulevard at 23rd Street intersection are expected to operate at an unacceptable LOS with the Alternative Three geometry. **Appendix D** includes copies of the Synchro, HCS, and SIDRA LOS output spreadsheets.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kisingercampo.com

Table 6.7 Design Year 2045 Arterial LOS – Alternative Three

Segment	Northbound/Eastbound				Southbound/Westbound			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
Alico Road	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
West of I-75 SB Ramp	1460	C	2470	D	N/A			
I-75 SB Ramp to I-75 NB Ramp	1930	B	2820	D	3660	D	2740	D
I-75 NB Ramp to Ben Hill Griffin Pkwy	2100	D	3110	E	3110	D	2100	C
Ben Hill Griffin Pkwy to Airport Haul Rd	1090	A	2400	C	2400	C	1090	B
Airport Haul Rd to Green Meadow Rd	1050	B	1960	D	1960	D	1050	B
East of Green Meadow Rd	N/A				480	C	610	C
Green Meadow Rd to SR 82 (Extension)	990	B	2030	C	2030	C	990	B
Sunshine Boulevard	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**	**Volume**	**LOS**
SR 82 to 40th Street	530	A	1720	C	1720	C	530	A
40th Street to 23rd Street	670	A	1370	C	1370	C	670	A
North of 23rd Street	690	A	1070	B	1070	B	690	A

Signalized (Synchro Results)

Table 6.8 Design Year 2045 Intersection LOS – Alternative Three

Intersection	AM Peak Hour		PM Peak Hour	
	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Alico Road at Ben Hill Griffin Parkway	E	65.9	F	85.5
Sunshine Boulevard at 23rd Street	E	37.5	C	18.5

Based on the traffic projections and LOS analysis, the extension of Alico Road from the Alico Road at Green Meadow Road intersection to the SR 82 at Sunshine Boulevard intersection is recommended to be a four-lane roadway in the Opening Year 2025. This segment is not expected to exceed the capacity of a four-lane roadway until the future year 2062 based on the known access point density and number of signalized intersections along the corridor. However, if more access points with signalized intersections are added along the roadway after the Opening Year 2025, this segment is expected to reach four-lane capacity sooner than the future year 2062.

With the extension of Alico Road from Green Meadow Road to SR 82, adjacent roadway segments and intersections are expected to exceed the existing capacity in the Design Year 2045. The segment of Alico Road from Airport Haul Road to Green Meadow Road is currently a two-lane roadway. This segment is expected to require widening from two to four lanes by the Opening Year 2025. The segment of Alico Road from Ben Hill Griffin Parkway to Airport Haul Road is currently a four-lane roadway. This segment is expected to require widening from four to six lanes by the future year 2048. However, similar to the new

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-horn.com

extension segment, if more access points with signalized intersections are added along the roadway after the Opening Year 2025, this segment is expected to reach four-lane capacity sooner than the future year 2048. Table 6.9 summarizes the existing, proposed, and future lanes along the project limits and the years widening is needed by.

The segment of Sunshine Boulevard from SR 82 to 23rd Street is currently a two-lane roadway. This segment is expected to require widening from two to four lanes by the Opening Year 2025. The segment of Sunshine Boulevard north of 23rd Street is currently a two-lane roadway. This segment is expected to require widening from two to four lanes by the future year 2036.

Table 6.9 Lane Geometry Summary

Segment	Existing Lanes	Proposed Lanes	Year Needed	Future Lanes	Year Needed
Alico Road					
West of I-75 SB Ramp	6-Lane	6-Lane	N/A	6-Lane	N/A
I-75 SB Ramp to I-75 NB Ramp	6-Lane	6-Lane	N/A	6-Lane	N/A
I-75 NB Ramp to Ben Hill Griffin Pkwy	6-Lane	6-Lane	N/A	6-Lane	N/A
Ben Hill Griffin Pkwy to Airport Haul Rd	4-Lane	4-Lane	N/A	6-Lane	2048
Airport Haul Rd to Green Meadow Rd	2-Lane	4-Lane	2025	4-Lane	N/A
East of Green Meadow Rd	2-Lane	2-Lane	N/A	2-Lane	N/A
Green Meadow Rd to SR 82 (Extension)	N/A	4-Lane	2025	6-Lane	2062
Sunshine Boulevard					
SR 82 to 40th Street	2-Lane	4-Lane	2025	4-Lane	N/A
40th Street to 23rd Street	2-Lane	4-Lane	2025	4-Lane	N/A
North of 23rd Street	2-Lane	4-Lane	2036	4-Lane	N/A

The intersections of Alico Road at Green Meadow Road and SR 82 at Sunshine Boulevard are expected to require significant improvements with the addition of the new roadway extension. The existing geometry at both intersections will no longer be feasible to serve the projected traffic volumes. Therefore, FDOT ICE analysis has been conducted for the intersections of Alico Road at Green Meadow Road and SR 82 at Sunshine Boulevard to determine the most preferred and feasible intersection alternative. The initial results include CAP-X analysis to determine the alternatives with the best traffic operations. Since traffic patterns change dramatically at the intersection with the new extension, the 2025 Opening Year turning movement volumes were used to analyze the intersection. The best two operating alternatives for the Alico Road at Green Meadow Road intersection were a Continuous Green T and a traffic signal. The best three operating alternatives for the SR 82 at Sunshine Boulevard intersection were a full Displaced Left Turn, a Quadrant Roadway N-W, and a Partial Displaced Left Turn E-W. These initial results are depicted in Figures 6.9 and 6.10 and included in **Appendix K**. The AM and PM peak hour LOS for the proposed intersection alternatives at both intersections is presented in Table 6.10.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kimley-kirn.com

Figure 6.9 Alico Road at Green Meadow Road CAP-X Results

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Continuous Green T S	0.68	1	4.4	Fair	Fair	Excellent
Traffic Signal	0.74	2	7.2	Good	Good	Excellent
Signalized Restricted Crossing U-Turn E-W	0.85	3	9.4	Excellent	Excellent	Good
1NS X 2EW	1.11	4	8.3	Good	Excellent	Excellent
2 X 2	1.11	4	8.3	Good	Excellent	Excellent
2NS X 1EW	2.09	6	8.3	Good	Excellent	Excellent
Unsignalized Restricted Crossing U-Turn E-W	2.12	7	6.7	Good	Good	Good
1 X 1	2.27	8	10.0	Excellent	Excellent	Excellent
All-Way Stop Control	2.66	9	10.0	Excellent	Excellent	Excellent
Two-Way Stop Control E-W	453.20	10	5.6	Fair	Good	Excellent

Figure 6.10 SR 82 at Sunshine Boulevard CAP-X Results

TYPE OF INTERSECTION	Overall V/C Ratio	V/C Ranking	Multimodal Score	Pedestrian Accommodations	Bicycle Accommodations	Transit Accommodations
Displaced Left Turn	0.63	1	4.8	Fair	Fair	Good
Quadrant Roadway N-W	0.70	2	4.4	Fair	Fair	Fair
Partial Displaced Left Turn E-W	0.71	3	4.8	Fair	Fair	Good
Quadrant Roadway S-W	0.75	4	4.4	Fair	Fair	Fair
Quadrant Roadway S-E	0.79	5	4.4	Fair	Fair	Fair
Quadrant Roadway N-E	0.80	6	4.4	Fair	Fair	Fair
Signalized Restricted Crossing U-Turn E-W	0.86	7	6.3	Good	Good	Fair
Partial Median U-Turn E-W	0.94	8	6.3	Good	Good	Fair
Traffic Signal	0.95	9	4.8	Fair	Fair	Good
Median U-Turn E-W	0.96	10	6.3	Good	Good	Fair

The Alico Road at Green Meadow Road intersection is expected to require a traffic signal to provide an acceptable LOS at the intersection. Three alternatives were evaluated at this intersection including a traditional traffic signal, a Continuous Green T intersection, and a Continuous Green T intersection with a northbound left-turn flyover ramp. Each alternative is expected to provide an acceptable LOS at the intersection in the Design Year 2045.

The SR 82 at Sunshine Boulevard intersection is expected to exceed the capacity of a traditional signalized intersection with the Opening Year 2025 traffic volumes. Therefore, more innovative and unique intersection designs were evaluated to provide an acceptable LOS in the Design Year 2045 including a full

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kisingercampo.com

and a partial displaced left turn (continuous flow) intersection. Both the partial and full displaced left turn intersection designs are expected to provide an acceptable LOS in the Design Year 2045. The full displaced left turn provides slightly less delays than the partial displaced left turn.

Table 6.10 Proposed Intersection LOS

Intersection	Year	Alternative	AM Peak Hour		PM Peak Hour	
			LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
Alico Rd at Green Meadow Rd	2025	Traffic Signal	C	25.7	C	30.7
		NB Left-turn Flyover	A	6.3	A	9.7
		Continuous Green T	B	16.1	C	27.5
	2045	Traffic Signal	D	31.3	D	45.5
		NB Left-turn Flyover	A	6.6	B	17.2
		Continuous Green T	B	19.1	D	34.9
SR 82 at Sunshine Blvd	2025	Traffic Signal	E	62.0	E	61.6
		Partial Displaced Left Turn	D	36.3	D	45.6
		Full Displaced Left Turn	D	35.9	D	44.2
	2045	Traffic Signal	F	145.6	F	116.8
		Partial Displaced Left Turn	D	42.6	D	46.8
		Full Displaced Left Turn	D	39.6	D	45.7

6.2. Turn Lane Lengths

With the proposed intersection geometry along the Alico Road extension, new turn lanes are being added. According to the FDOT Design Manual Chapter 212.6, the total deceleration distance is based on the design speed. The design speed limit along Alico Road and Sunshine Boulevard is 45 mph and along SR 82 is 55 mph. The resulting distance is added to the queue length to result in the required turn-lane length. The queue lengths for each location were chosen from the highest length from the Synchro AM and PM models. The minimum queue length was determined to be 50 feet, two vehicle lengths. The total deceleration distances, queue lengths, and total required turn-lane lengths are presented in Table 6.11.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 FAX 813 871-5135 | www.kcaengineers.com

Table 6.11 Turn Lane Lengths

Intersection	Approach	Total Deceleration Distance (Feet)	Queue Length (Feet)			Required Length (Feet)	
			Left Turn	Through	Right Turn	Left Turn	Right Turn
Alico Rd at Green Meadow Rd	Northbound	185	425	325		610	510
	Eastbound	185	N/A	850	200	N/A	385*
	Westbound	185	350	continuous green		535	N/A
SR 82 at Sunshine Blvd	Northbound	185	350	275	50	535	235*
	Southbound	185	325	475	50	510	235*
	Eastbound	350	400	525	125	750	475*
	Westbound	350	775	500	250	1125	600

*The left-turn and right-turn storage lanes lengths will need to exceed the through lane queue length for the turn lanes to remain accessible.

6.3. Safety (Crash) Analysis

The majority of the crashes along Alico Road occurred at the intersections of Airport Haul Road (about 34.62% of total) and Green Meadow Road (about 30.77% of total). Based on the five-year historical trends and crash types, the horizontal curve geometry at the Green Meadow Road intersection is determined to be the major resulting factor of the crashes. The lack of median east of Innovation Lane and excessive speeds leading to run off the road crashes are also determined to be resulting factors of many crashes. These crashes would be reduced with the proposed widening and intersection geometry improvements discussed in **Section 6.1**.

Tables 6.12 and 6.13 summarize the reduction of crashes using the crash modification factors (CMF) included in the proposed geometry. CMF from the USDOT/FHWA CMF Clearinghouse were applied for the appropriate improvements within the study area. **Appendix E** includes copies of the CMF details. The CMF were selected for the conversion of a two-lane roadway to a four-lane divided roadway and flattening a horizontal curve.

The total crashes along Alico Road east of Innovation Lane from the five-year study are expected to be reduced by 28.8% with the conversion of the two-lane roadway to four-lane divided roadway.

Table 6.12 Projected Number of Crashes in 5 Years along Alico Rd east of Innovation Ln

Segment	Existing Crashes	Two-Lane to Four-Lane	
		CMF	Projected Crashes
East of Innovation Lane	9	0.712	6.41

The total crashes for the intersection of Alico Road at Green Meadow Road from the five-year study are expected to be reduced by 68.5% by eliminating the horizontal curve.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 | FAX 813 871-5135 | WWW.KISINGERCAMPO.COM

Table 6.13 Projected Number of Crashes in 5 Years for Alico Rd at Green Meadow Rd

Intersection	Existing Crashes	Flatten Horizontal Curve	
		CMF	Projected Crashes
Green Meadow Road	8	0.315	2.52

7. Conclusions and Recommendations

Below is a summary of recommended improvements within the study area.

The Alico Road Extension is recommended based on the future land use and growth in the project area. The extension will serve as a major southwest to northeast connector in the surrounding project area and is expected to provide considerable relief to the adjacent roadway segments. Currently, Ben Hill Griffin Parkway and Daniels Parkway are the only main arterials used to travel between Estero and Lehigh Acres. The extension will provide an alternative travel route to accommodate this significant traffic demand. Traffic volumes are expected to reduce along Daniels Parkway, Ben Hill Griffin Parkway, and SR 82 by approximately 27%, 18%, and 8%, respectively. This reduction in traffic volumes along these roadways are expected to delay any needed improvements to the roadways and intersections.

Based on the traffic projections and LOS analysis, the extension of Alico Road from the Alico Road at Green Meadow Road intersection to the SR 82 at Sunshine Boulevard intersection is recommended to be a four-lane roadway in the Opening Year 2025. This segment is not expected to exceed the capacity of a four-lane roadway until the future year 2062 based on the known access point density and number of signalized intersections along the corridor. However, if more access points with signalized intersections are added along the roadway after the Opening Year 2025, this segment is expected to reach four-lane capacity sooner than the future year 2062.

With the extension of Alico Road from Green Meadow Road to SR 82, adjacent roadway segments and intersections are expected to exceed the existing capacity in the Design Year 2045. The segment of Alico Road from Ben Hill Griffin Parkway to Airport Haul Road is currently a four-lane roadway. This segment is expected to require widening from four to six lanes by the future year 2048. However, similar to the new extension segment, if more access points with signalized intersections are added along the roadway after the Opening Year 2025, this segment is expected to reach four-lane capacity sooner than the future year 2048. The segment of Alico Road from Airport Haul Road to Green Meadow Road is currently a two-lane roadway. This segment is recommended to be widened from two to four lanes by the Opening Year 2025.

The segment of Sunshine Boulevard from SR 82 to 23rd Street is currently a two-lane roadway. This segment is recommended to be widened from two to four lanes by the Opening Year 2025. The segment of Sunshine Boulevard north of 23rd Street is currently a two-lane roadway. This segment is recommended to be widened from two to four lanes by the future year 2036. Further analysis of this segment is recommended in the future since the traffic volumes along this segment are very much dependent on the potential future extension of Sunshine Boulevard to SR 80.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | [redacted] 813 871 5331 | [redacted] 813 871-5135 | [redacted]

Table 7.1 provides a summary of the recommended lane geometry of each roadway segment.

Table 7.1 Lane Geometry Recommendations

Segment	Existing Lanes	Recommended Lanes	Year Needed
Alico Road			
West of I-75 SB Ramp	6-Lane	6-Lane	N/A
I-75 SB Ramp to I-75 NB Ramp	6-Lane	6-Lane	N/A
I-75 NB Ramp to Ben Hill Griffin Pkwy	6-Lane	6-Lane	N/A
Ben Hill Griffin Pkwy to Airport Haul Rd	4-Lane	4-Lane	N/A
Airport Haul Rd to Green Meadow Rd	2-Lane	4-Lane	2025
East of Green Meadow Rd	2-Lane	2-Lane	N/A
Green Meadow Rd to SR 82 (Extension)	N/A	4-Lane	2025
Sunshine Boulevard			
SR 82 to 40th Street	2-Lane	4-Lane	2025
40th Street to 23rd Street	2-Lane	4-Lane	2025
North of 23rd Street	2-Lane	4-Lane	2036

The intersections of Alico Road at Green Meadow Road and SR 82 at Sunshine Boulevard are expected to require significant improvements with the addition of the new roadway extension. The existing geometry at both intersections will no longer be feasible to serve the projected traffic volumes.

The Alico Road at Green Meadow Road intersection is expected to require a traffic signal to provide an acceptable LOS at the intersection. A Continuous Green T intersection is recommended based on the lower delays compared to the traffic signal alternative and lower cost compared to the flyover ramp alternative. Due to the high truck traffic expected to continue to travel east and west through this intersection, a Continuous Green T intersection is recommended to provide zero delays for vehicles traveling westbound through the intersection. A Continuous Green T intersection will also improve the safety at the intersection and the approaches.

The SR 82 at Sunshine Boulevard intersection is expected to exceed the capacity of a traditional signalized intersection with the Opening Year 2025 traffic volumes. Therefore, a partial displaced left turn (continuous flow) intersection is recommended to provide an acceptable LOS in the Design Year 2045. Although, the full displaced left turn alternative provides slightly less delays than the partial displaced left turn alternative, the partial displaced left turn alternative is recommended to reduce construction and right-of-way costs. The partial displaced left turn alternative will provide a highly efficient operating intersection similar to the one newly constructed at SR 82 and Daniels Parkway.

The intersections of Alico Road at Ben Hill Griffin Parkway and Sunshine Boulevard at 23rd Street are expected to require capacity improvements. Further evaluation of both intersections is recommended to provide acceptable LOS in the Design Year 2045.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 | FAX 813 871-5135 | www.kimley-campo.com

The additional westbound right-turn lane, eastbound through lane, and southbound through lane are recommended at the Alico Road and Ben Hill Griffin Parkway intersection to improve capacity.

At the intersection of Sunshine Boulevard and 23rd Street, further evaluation between a roundabout and signalization is recommended.

201 North Franklin Street, Suite 400 | Tampa, Florida 33602 | PHONE 813 871-5331 | FAX 813 871-5135 |

Surface Water and Groundwater Impacts/Benefits Analysis

For

Southeast Advanced Water Reclamation Facility

Prepared For:
Lee County Utilities
1500 Monroe St.
Fort Myers, FL 33901

Prepared By:
JOHNSON ENGINEERING
Johnson Engineering, Inc., E.B. 642
P.O. Box 1550
2122 Johnson St.
Fort Myers, Florida 33902
(239) 334-0046

July 5, 2023

This item has been digitally signed and sealed by Jordan L. Varble, P.E., on the date adjacent to the seal.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

JORDAN LEVI VARBLE LICENSE No. 81414 STATE OF FLORIDA PROFESSIONAL ENGINEER

Jordan Levi Varble, P.E.
Florida License No. 81414
c=US, o=JOHNSON ENGINEERING INC, dnQualifier=A01410C0000017D9506EDF600003491, cn=Jordan Varble
2023.07.05 14:18:01 -04'00'

TABLE OF CONTENTS

LIST OF FIGURES

I. PROJECT OVERVIEW

Lee County is proposing to construct a new advanced water reclamation facility (WRF) to help serve existing and future wastewater flows in the southeast Lee County service area. The proposed site is on 112.2 acres of property located north of the intersection of Alico Road and Green Meadow Road in Lee County, Florida. The property contains a mix of uplands, wetlands, and ditches. An overview of the existing property attributes is provided below and in the attached figures as well as the separate Environmental Impact Analysis report. The proposed WRF will be constructed on the upland portion of the property. The eastern wetlands on the property will remain undeveloped. This analysis provides an overview of the benefits associated with the drainage and surface water management design of the project.

II. EXISTING CONDITIONS

A. Topography

The topography of the property generally slopes north to south or northeast to southwest. The upland portion of this property was previously cleared and leveled to facilitate agricultural operations which historically included irrigated row crops and more recently pasture. Elevations in the upland area of the site generally range from 24.0 feet to 24.5 feet NAVD 88. Please refer to **Figures 1a** and **1b** for a topographic map of the parcel and surrounding areas.

B. Flow-ways

The subject site is located within the upper watershed of the Estero River. Due to the relatively flat topography of this area of the watershed, a well-defined channel does not exist and stormwater runoff is conveyed downstream via wetland flow-ways. The historical flow-way map (**Figure 2**) shows the wetlands east and west of the project site convey flows from the upstream watershed. Mapping from Lee County shows the current contributory area upstream of the project site is approximately 19 square miles.

C. Hydrology

Several past studies have performed hydrologic and hydraulic modeling of the Estero River, though most efforts focused on the portion of the watershed west of Interstate 75 (approximately five miles downstream). Lee County's 1992 Surface Water Management Plan established the basin allowable discharge rate of 42 cubic feet per second per square mile (CSM) for the 25-year, 3-day storm for the Estero River. The site is outside the 100-year flood zone mapped by the Federal Emergency Management Agency (FEMA). Peak storm results from the 2020 Southern Lee County Flood Mitigation Plan estimate the 25-year, 3-day storm in the wetlands surrounding the site is 25.0 feet NAVD 88 (MIKE-SHE model) or 24.8 feet NAVD 88 (ICPR4 model). The current site inside the proposed development footprint stores approximately 29 acre-feet of water at elevation 25 feet. Extrapolating this elevation to estimate the peak stage from the 100-year,

3-day design storm event yields a peak stage of 25.5 feet and an existing storage volume of 51 acre-feet.

The upland area of the project site is not significant with respect to recharge of the Surficial aquifer. Review of the Florida Department of Environmental Protection (FDEP) rainfall isopleth map for South Florida indicates the site receives a mean rainfall amount of 52 inches annually (FDEP, 2010, Environmental Resource Permit Stormwater Quality Applicant's Handbook). Studies by the South Florida Water Management District (SFWMD) indicate approximately 40 inches to 45 inches per year are returned to the atmosphere annually through evapotranspiration (SFWMD, 2000, Lower West Coast Water Supply Plan).

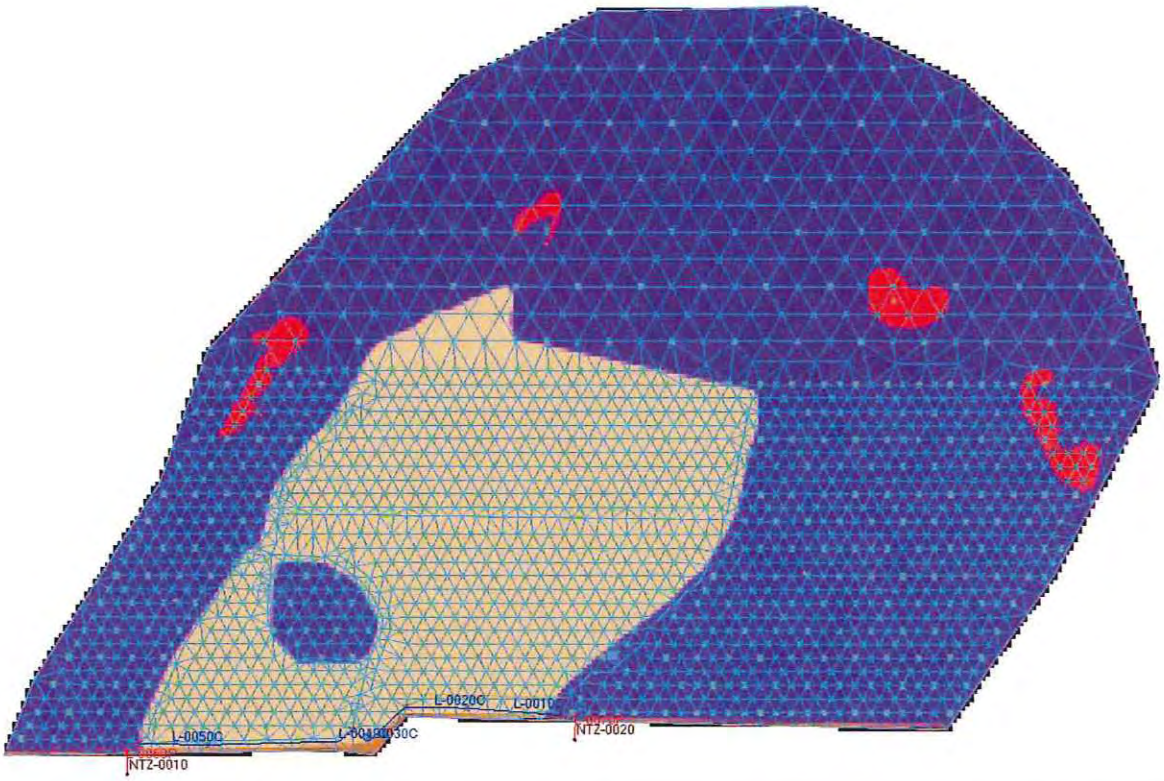
To verify these textbook values, a fully integrated, two-dimensional surface water and groundwater model was created using ICPR4 that simulates the existing hydrologic and hydraulic characteristics of the site and surrounding wetlands. A continuous simulation for the years 2018 through 2021 (years without a major landfalling hurricane) was modeled to estimate an annual water budget. Boundary conditions were applied in the model based on historical groundwater data collected by Lee County at monitoring well site 47A.

An existing ground "surface" was generated in AutoCAD using recent topographic survey data of the site to create a gridded digital elevation model of the property. ICPR4 utilizes this surface to set ground elevations at each triangle vertex in the 2D overland computational mesh, shown in **Figure II-A**. The existing ground surface was also used to set the initial integrated water surface elevation at the beginning of the model simulation period. Land use categories are used by the model to compute runoff, overland flow, and evapotranspiration (ET_p and ET_a, described later). Existing land uses for the site were condensed to "pervious" and "impervious" categories, as shown in **Figure II-B**. Soil types are also input parameters used by the model to determine the runoff/infiltration ratio and soil moisture accounting (used to estimate evapotranspiration). The soil categories used in the model are shown in **Table 1** and were based on information from USDA NRCS soil mapping and are shown in **Figure II-C**. The horizontal saturated hydraulic conductivity used in the model was set at 7 feet per day. An additional model input parameter to estimate evapotranspiration for each land use category is the crop coefficient data set, which includes root zone depths and crop coefficients.

Table 1. NRCS soil characteristics.

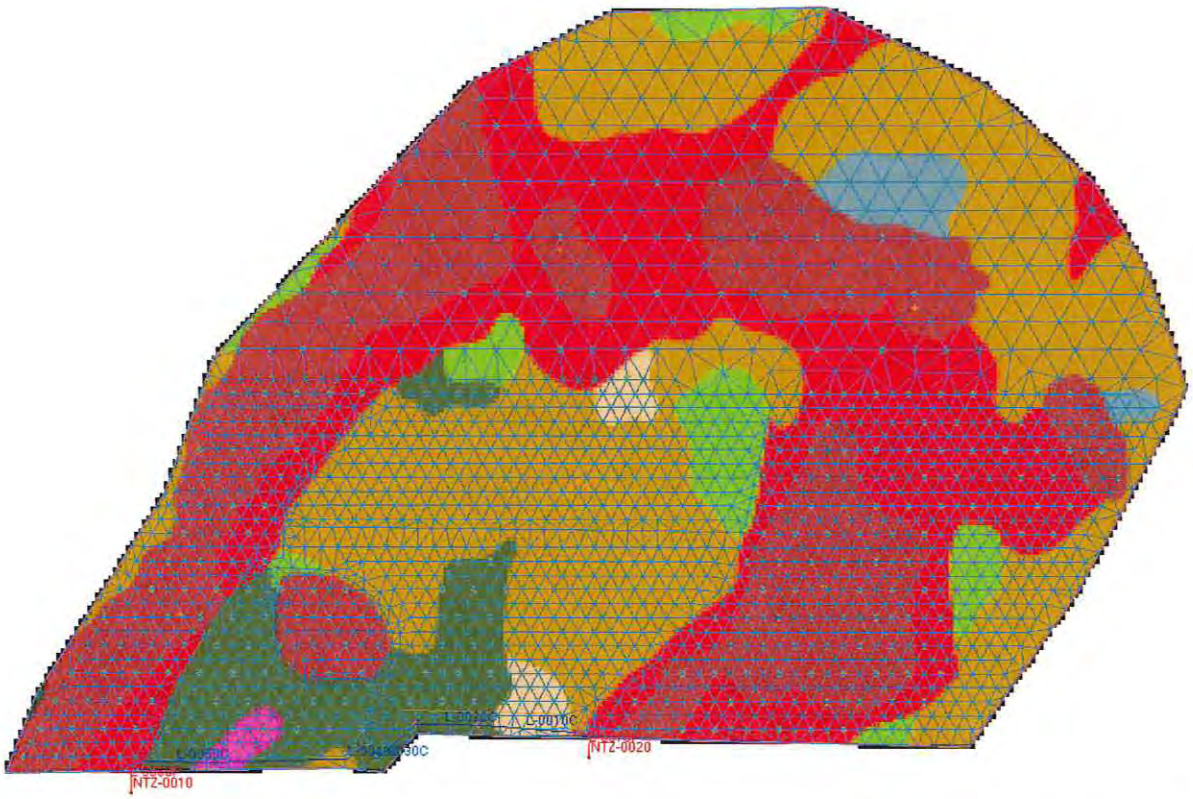
Soil Name	HSG	Kh (ft/day)
6 - Brynwood FS	B/D	10
10 - Pompano FS	A/D	13
12 - Felda FS	A/D	13
13 - Cypress Lake FS	A/D	11
26 - Pineda-Pineda - wet	A/D	13
33 - Oldsmar sand	A/D	13
34 - Malabar FS	A/D	13
49 - Felda FS - ponded	A/D	10
64 - Brynwood FS - wet - Urban land complex	B/D	10
73 - Pineda FS - ponded	A/D	12

Figure II-A. 2D overland computational mesh, with LiDAR.



Raster Legend			
	Building		Non Forested Marsh
	Cropland		Transportation
	Forested Wetland		

Figure II-B. Land use categories within 2D overland computational mesh.



Raster Legend			
	10 - Pompano FS		34 - Malabar FS
	12 - Felda FS		49 - Felda FS - ponded
	13 - Cypress Lake FS		6 - Brynwood FS
	26 - Pineda-Pineda - wet		64 - Brynwood FS - wet - ...
	33 - Oldsmar sand		73 - Pineda FS - ponded

Figure II-C. Soil categories within 2D overland computational mesh.

Input parameters for the groundwater computational mesh include the ground surface, aquifer bottom, and horizontal conductivity. The same ground surface used in the overland flow mesh is used in the groundwater region to establish the interface between the two. A simplistic, uniform aquifer bottom elevation of 0 feet NAVD 88 provides an aquifer thickness of approximately 24 feet across the property. The horizontal saturated hydraulic conductivity was set at 7 feet per day.

Daily rainfall amounts used in the model were based on NEXRAD rainfall data provided by SFWMD. Daily reference evapotranspiration (ET_{ref}) amounts were based on ET estimates at the FAWN station in Immokalee. The model uses these input parameters, along with site-specific soil information to calculate potential evapotranspiration (ET_p), actual evapotranspiration (ET_a), site runoff, surficial aquifer recharge (percolation), and the change in the water stored onsite. The annual water budget for the simulation period is provided in **Table 2**.

Table 2. Water budget for existing conditions model simulation (all units are inches).

Simulation Year	Precipitation	ET_p	ET_a	Storage	Runoff	Percolation
2018	53.9	41.7	37.8	0.2	9.8	6.1
2019	64.3	42.8	42.1	0.3	12.3	9.6
2020	58.8	43.9	38.0	0.5	10.6	9.7
2021	48.1	42.9	38.2	-0.3	4.2	5.9

Wet season water table (WSWT) mapping from Lee County shows the average WSWT elevation at the project site is 23 feet NAVD 88 (see **Figure 3a**), which is approximately one foot below the existing ground elevation. Historical monitoring well data from wells surrounding the site are also provided in **Figures 3b** through **3e** and suggest that the historical WSWT may be as high as 24 feet NAVD 88 in this area. Based on these measurements and the existing ground elevation, the soil storage capacity of the existing upland areas of the site is around one inch during the wet season.

D. Hydrogeology

Three main aquifers compose the groundwater resources below the project site: the Surficial (water table), Intermediate (including Sandstone and Mid-Hawthorn), and the Floridan (including Lower Hawthorn and Suwannee) aquifers. **Figures 4a** and **4b** provide a schematic representation of the hydrogeology of the Green Meadows wellfield, which lies approximately one mile to the north. The surficial and intermediate aquifers generally contain fresh groundwater, with chloride concentrations typically less than 250 milligrams per liter (mg/l), which is the secondary maximum contaminant level for drinking water. The Floridan aquifer typically contains brackish groundwater, with chloride concentrations typically exceeding 250 mg/l. Chloride concentrations generally increase with depth, both among the four aquifers and within the Floridan aquifer.

The Surficial Aquifer System (SAS) is the uppermost system, comprised of sediments extending from the land surface to the upper confining zone of the Intermediate Aquifer System (IAS). This aquifer system is usually unconfined. At the project site, the upper part of the SAS is comprised of fine sand and the lower is made up of limestone and sand and has a total thickness of approximately 50 feet.

The Sandstone and Mid-Hawthorn aquifers comprise the IAS and have a total aquifer thickness of 350 feet at the project site. The Sandstone aquifer is the first water-bearing unit encountered in the IAS. This aquifer underlies the Upper Hawthorn confining zone separating the SAS from the IAS. This aquifer is characterized by phosphatic limestones with interbedded sand and shell, generally occurring at depths between 100 feet and 250 feet below land surface (bls). The Mid-Hawthorn aquifer underlies the Mid-Hawthorn confining zone within the IAS, but often does not constitute a

significant producing zone in this area. This aquifer generally occurs at depths between 450 feet to 600 feet bls.

Wells penetrating the Floridan aquifer typically flow at land surface. The FAS underlies all of Florida and contains several distinct producing zones. However, since the water quality generally deteriorates with depth, only the top of the FAS is typically utilized as a source of drinking water. This system generally consists of a porous, fractured limestone and dolostone formation. The Lower Hawthorn aquifer is the first water bearing unit encountered in the FAS. This aquifer underlies the Lower Hawthorn confining zone separating the IAS from the FAS. This aquifer is encountered at approximately 600 feet to 650 feet bls.

E. Water Use

Irrigation withdrawals from the Surficial and Intermediate Aquifer Systems have been permitted on the site since the 1990s. SFWMD water use permit number 36-03772-W allocated 335 million gallons per year from the water table aquifer for irrigation of row crops on the property and adjacent fields to the north and west. The permit allowed the construction of four wells cased to 20 feet bls. The property also has a water use permit for landscape irrigation with an annual allocation of 0.94 million gallons per year from the Mid-Hawthorn aquifer.

III. PROPOSED CONDITIONS

A. Drainage and Surface Water Management

Onsite stormwater management facilities will be constructed in conjunction with the proposed WRF and will largely maintain the historical stormwater runoff from the existing site. Stormwater runoff from the developed area of the property will be collected through swales and catch basins and routed to onsite stormwater ponds which temporarily detain stormwater runoff to provide water quality treatment and attenuation benefits. A control structure will limit the discharge of water from the ponds into the adjacent wetlands to the west. The stormwater will then continue within the western slough, following existing drainage patterns. The proposed stormwater management system will include a retention component to foster additional percolation and thus recharge the surficial aquifer.

Peak discharge rates from the 25-year, 3-day design storm event will be limited to the basin allowable discharge rate of 42 CSM, meeting SFWMD and FDEP criteria. The onsite system will also provide the required water quality treatment volume, calculated as the greater of one inch of runoff from the entire drainage area or 2.5 inches times the percent imperviousness of the site. A perimeter berm will be constructed around the site to provide more than 51 acre-feet of storage, which is greater than the existing site storage for either the 25-year or 100-year, 3-day storm events.

B. Water Supply

Water use requirements for the proposed WRF are minimal and limited to the needs of the office staff who will be operating the facility. The potable water supply demand of approximately 3,750 gallons per day to service 25,000 square feet of building space will be supplied by Lee County Utilities. Onsite irrigation water, if utilized, will be sourced from treated effluent from the WRF, defined as an "alternative water supply." The project has minimal water supply requirements and therefore will not impact present or future water resources. This application intends to demonstrate that the proposed land use change and associated water use will prove compatible and compliant with both Lee County and SFWMD regulations and long-range water supply planning.

C. DR/GR

Lands designated Density Reduction/Groundwater Resource (DR/GR) are defined in the Lee Plan as "upland areas that provide substantial recharge to aquifers most suitable for future wellfield development" and areas that "are the most favorable locations for physical withdrawal of water from those aquifers." The subject site is located on lands currently depicted as DR/GR (see **Figure 5**) and the following narrative demonstrates the proposed uses are consistent with the DR/GR goals.

The preceding Water Supply section demonstrated the availability of irrigation and potable water supplies to meet the project's needs at build-out, including the use of reclaimed water for irrigation. SFWMD considers this source an "alternative water supply" and encourages its use. Use of the proposed sources will not adversely impact the shallow aquifers that the DR/GR designation seeks to protect, nor will use of these sources interfere with use of shallow aquifers for public supply wellfield development. Due to development at the project site, withdrawals for agricultural irrigation from the water table and sandstone aquifers will be eliminated. This application intends to demonstrate that the proposed land use change and associated water use will prove compatible and compliant with both Lee County and SFWMD regulations and long-range water supply planning. This section will use previously established DR/GR definition criteria to discuss the recharge potential to the Surficial aquifer at the project site. This includes formulation of a water budget for the site based on site-specific aquifer data and recorded water levels.

As discussed previously, the site-specific integrated stormwater model estimated the existing water budget for the project site and surrounding wetlands. A revised model was created to represent the proposed physical changes to the site and analyze the associated changes to the local hydrology. The model utilized the same continuous simulation period of 2018 through 2021 with its associated rainfall, ET_{ref}, aquifer bottom, saturated conductivity, and boundary conditions. Updated input parameters to reflect the new site layout included an updated ground surface, land use categories, soil types, crop coefficients, and onsite stormwater management structures. The

proposed onsite stormwater management system is designed to retain up to 1.1 inches of runoff *per rainfall event* from the project site, which will recharge the surficial aquifer.

A site specific runoff analysis shows that the proposed site and its stormwater management system results in de minimis change in infiltration into the Surficial aquifer (see **Table 3**). Additionally, the import of fill material to raise site elevations will increase the storage capacity of the Surficial aquifer by increasing the distance from land surface to the water table. To further demonstrate the uses being proposed are consistent with the DR/GR goal to slow down the discharge rates of the stormwater runoff in the area, the project's proposed stormwater management system will limit the peak discharge from the site resulting from the 25-year storm event.

Table 3. Water budget for proposed conditions model simulation (all units are inches).

Simulation Year	Precipitation	ET_p	ET_a	Storage	Runoff	Percolation
2018	53.9	40.2	36.6	0.3	11.0	5.9
2019	64.3	41.3	40.4	0.4	13.6	9.8
2020	58.8	42.3	37.0	0.5	12.2	9.2
2021	48.1	41.3	37.2	-0.3	5.2	5.9

Additional illustrations that demonstrate the site is protecting regional water resources are shown by the model result graphs in **Figures 6a** through **6h**. The four time-stage graphs show that the water levels inside the site during the continuous simulation period are elevated above the existing conditions (**Figure 6b**) which will recharge the surficial aquifer while the water levels of the surrounding offsite wetlands remain generally unchanged (typically no more than a 0.1-foot difference is shown in the graphs, which is well within the margin of error of LiDAR data or typical regional models) when comparing the existing vs. proposed conditions simulations (**Figures 6c** through **6e**). The three profile charts (**Figures 6f** through **6h**) demonstrate that even though the onsite water levels are increased inside the perimeter berm, the proposed site is not increasing the peak water levels of the offsite wetlands.

Underlying the SAS are the Upper Hawthorn confining zone and then the IAS. The first water bearing unit encountered in the IAS is the Sandstone aquifer. Given the low Surficial aquifer recharge values resulting from the water budget and the confining unit separating the aquifers, this area does not represent an area of significant recharge for the Sandstone aquifer. The only substantial recharge areas in Lee County are those surrounding the major Surficial or Sandstone aquifer wellfields, where recharge is induced rather than naturally occurring. These areas are defined by Wellfield Protection Zones and are protected by the Lee County Wellfield Protection Ordinance. The recharge areas for Lee County's existing and proposed wellfield expansions are not overlying the project site. No part of the project site lies within the Lee County Wellfield Protection Zones specified in the Ordinance. See **Figure 7** for Lee County wellfield protection zones and major public water supply wellfield locations.

FIGURES

Notes

1. LiDAR was acquired from Lee County and has a flight date of 2018 and References NAVD 88.

2. Aerial photographs were acquired from Lee County and have a flight date of 2022.

N

0 2,000 4,000 Feet

Project Limits

ALICO RD

GREEN MEADOW RD

FEMA Zone X

ALICO RD

Legend

FEMA FLOOD ZONE

- A
- AE
- AH
- AO
- OPEN WATER
- VE
- X
- Project Limits

LiDAR Value

- -4 - 15
- 16 - 17
- 18 - 19
- 20 - 21
- 22 - 23
- 24 - 25
- 26 - 27
- 28 - 29
- 30 - 31
- 32 - 33

\\ftms01\Drawings\2018\20181232-002\Water Mgmt\Exhibits\Topographic Map.mxd 4/24/2023 1:30:47 PM jlv

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Topographic Map with FEMA Flood Zones

Figure 1a

Notes

1. Topographic lines are based on LiDAR information acquired from Lee County and has a flight date of 2007 and references NAVD 88.

2. Aerial photographs were acquired from Lee County and have a flight date of 2022.

3. Propoerty lines were acquired from Lee County in March 2021.

N

0 500 1,000 Feet

Project Limits

GREEN MEADOW RD

ALICO RD

ALICO RD

FEMA Zone X

Legend

- Project Limits
- Parcels
- Elev. Contour (2-ft)

FEMA FLOOD ZONE

- A
- AE
- AH
- AO
- OPEN WATER
- VE
- X

\\ftms01\Drawings\2018\20181232-002\Water Mgmt\Exhibits\Topographic Map b.mxd 4/24/2023 1:56:56 PM jlv

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

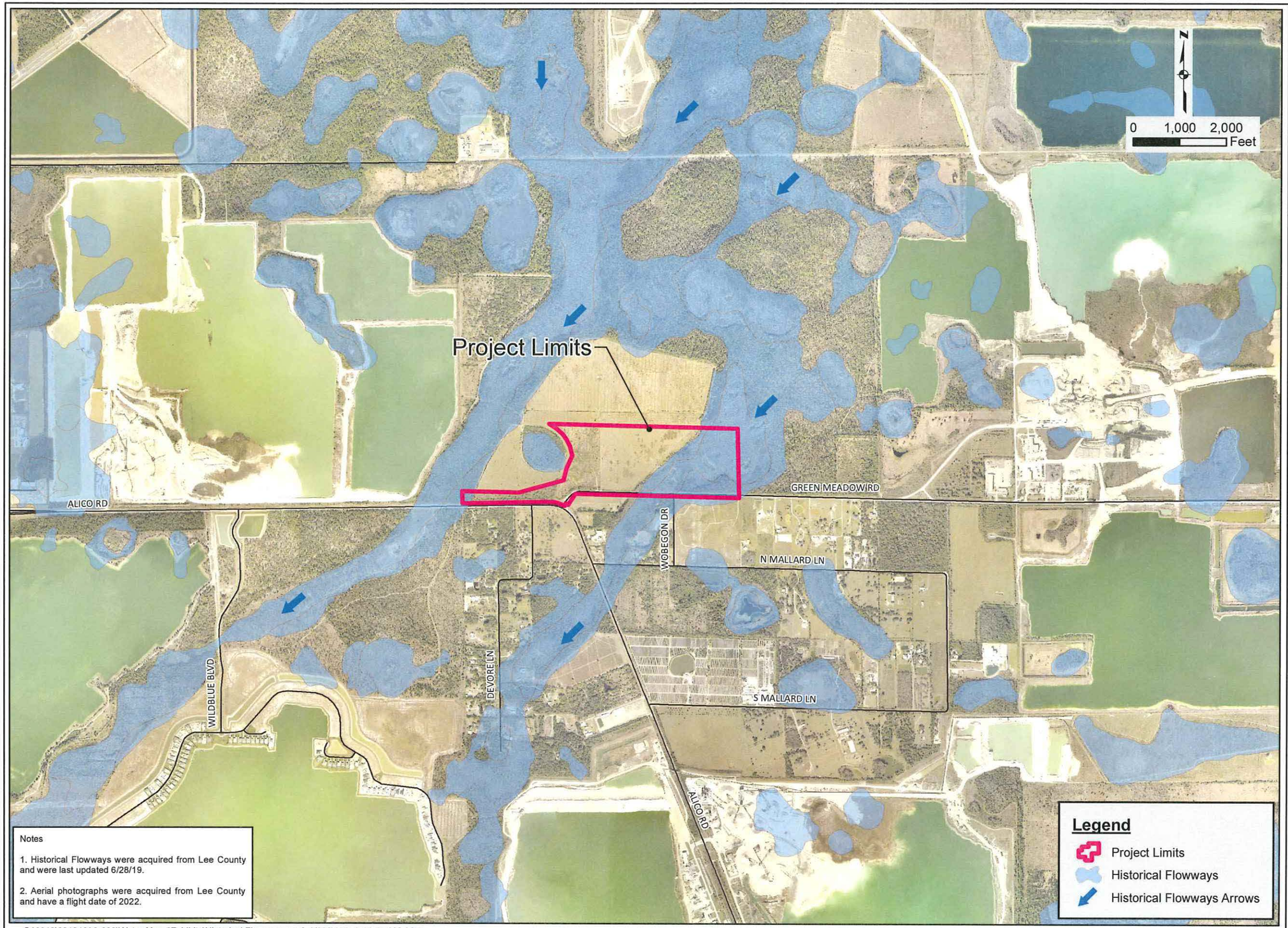
REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Topographic Map with FEMA Flood Zones

Figure 1b



O:\2018\20181232-002\Water Mgmt\Exhibits\Historical Flowways.mxd 2/20/2023 8:01:52 AM bkm

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

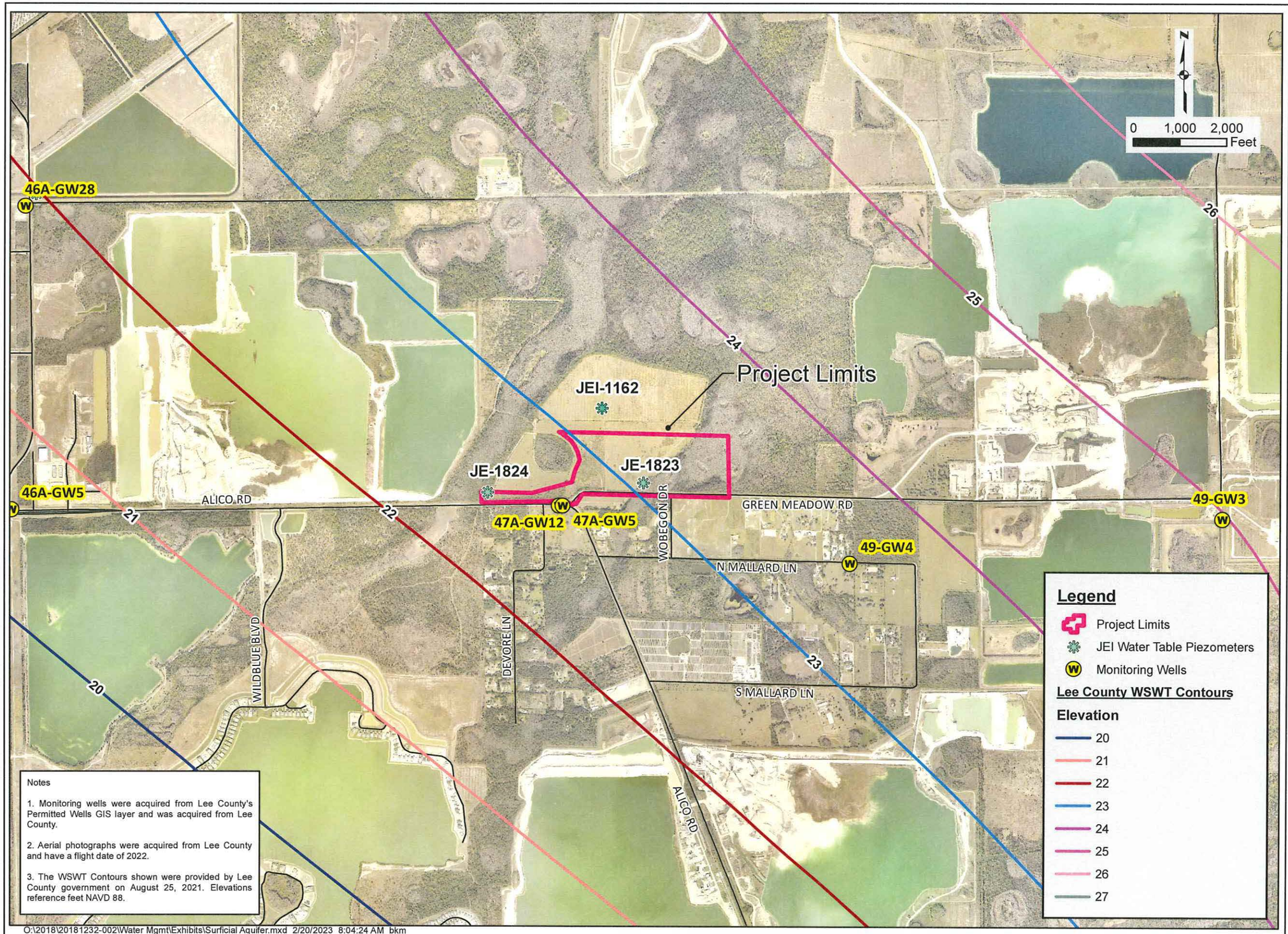
REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Historical Flowways

Figure 2



O:\2018\20181232-002\Water Mgmt\Exhibits\Surficial Aquifer.mxd 2/20/2023 8:04:24 AM bkm

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Surficial Aquifer
Wet Season Water
Table Map

SHEET NUMBER

Figure 3a

JOHNSON ENGINEERING

Historical Water Elevation
Lee County Surficial Monitoring Wells

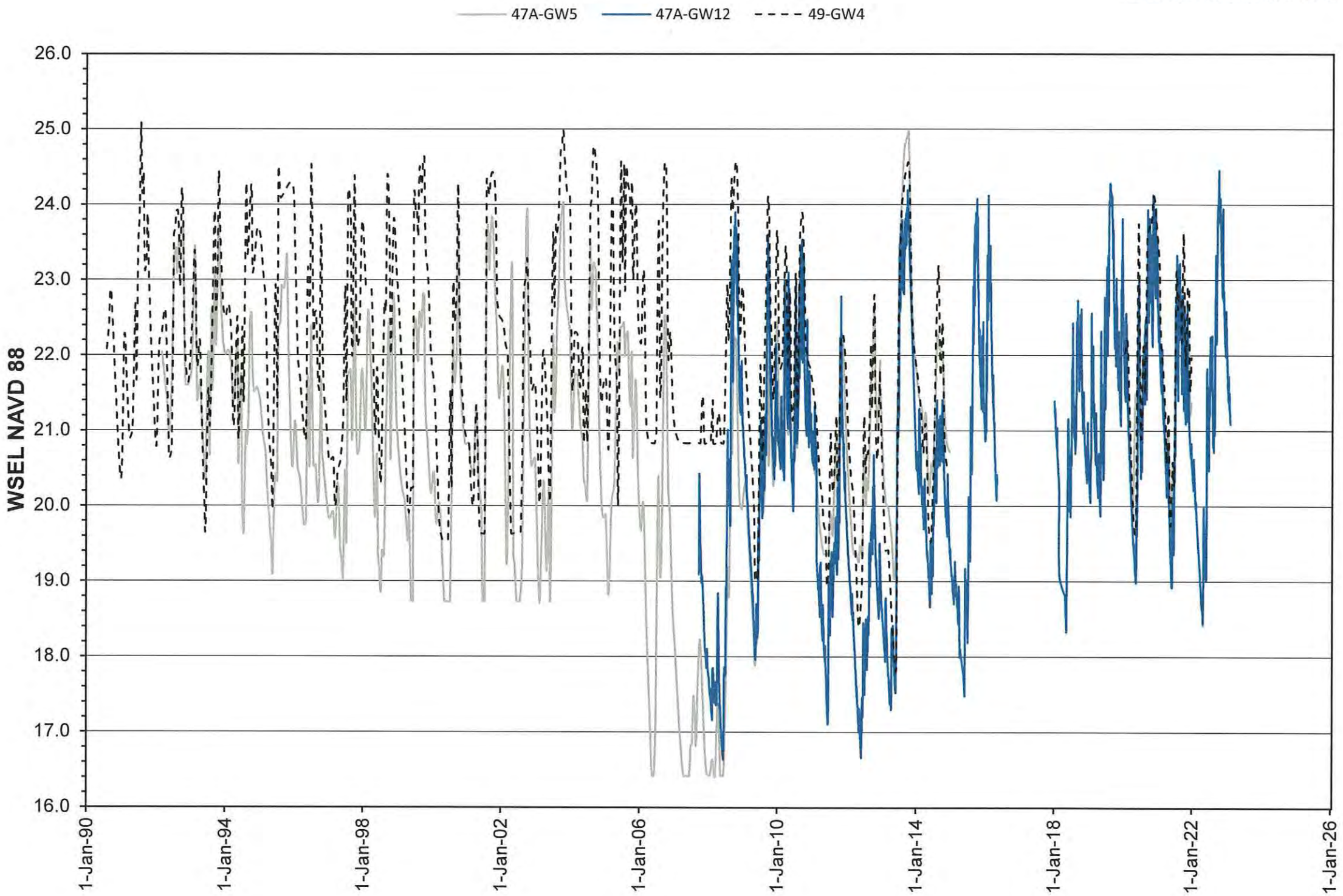


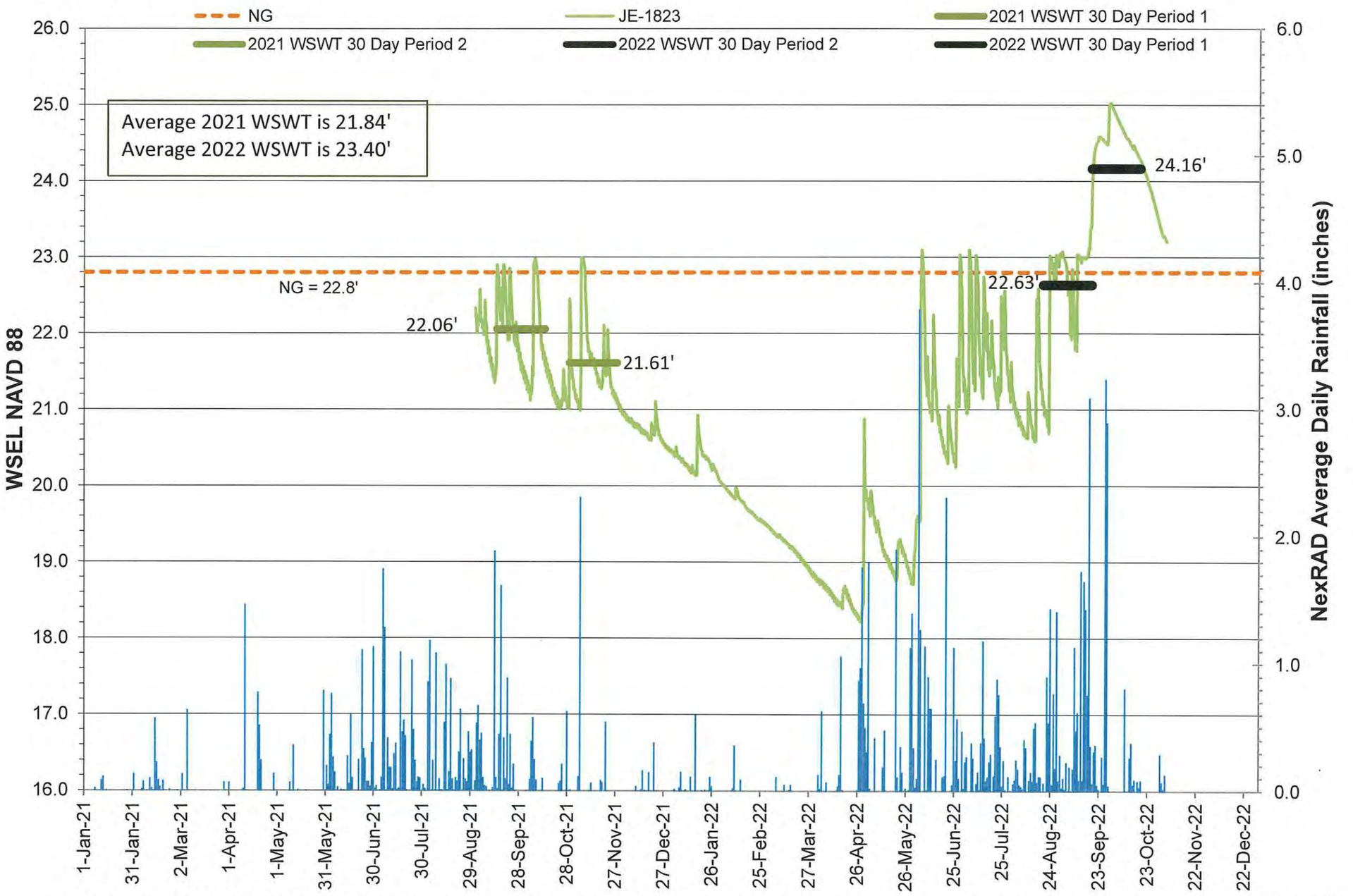
Figure 3b

Historical Water Elevation
JEI Surficial Monitoring Well 1823

JOHNSON ENGINEERING

Notes:
JE-1823 in service 8/31/2021.

Rainfall is from SFWMD NexRAD data for a block of 27 grid cells covering the project



\\ftms01\proj-fma\20180000\20181232-002 - Southeast Advanced Water Reclamation Facility\Planning\Research-Examples\Alico Connector 2021-2023

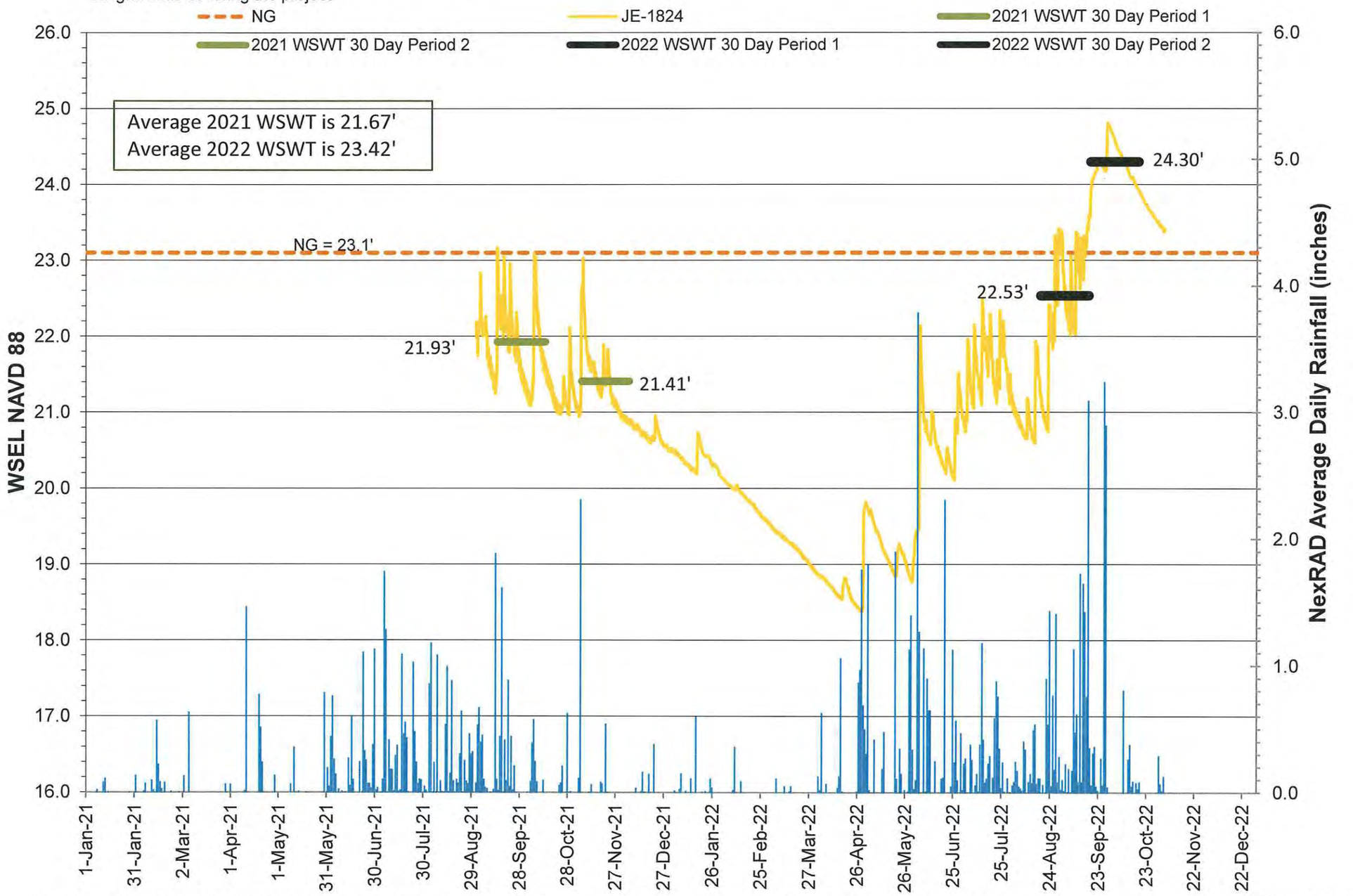
Figure 3c

Historical Water Elevation
JEI Surficial Monitoring Well 1824

JOHNSON ENGINEERING

Notes:
JE-1824 in service 8/31/2021.

Rainfall is from SFWMD NexRAD data for a block of 27 grid cells covering the project



\\ftms01\proj-fma\20180000\20181232-002 - Southeast Advanced Water Reclamation Facility\Planning\Research-Examples\Alico Connector 2021-2023

Figure 3d

Historical Water Elevation
JEI Surficial Monitoring Well 1162

JOHNSON ENGINEERING

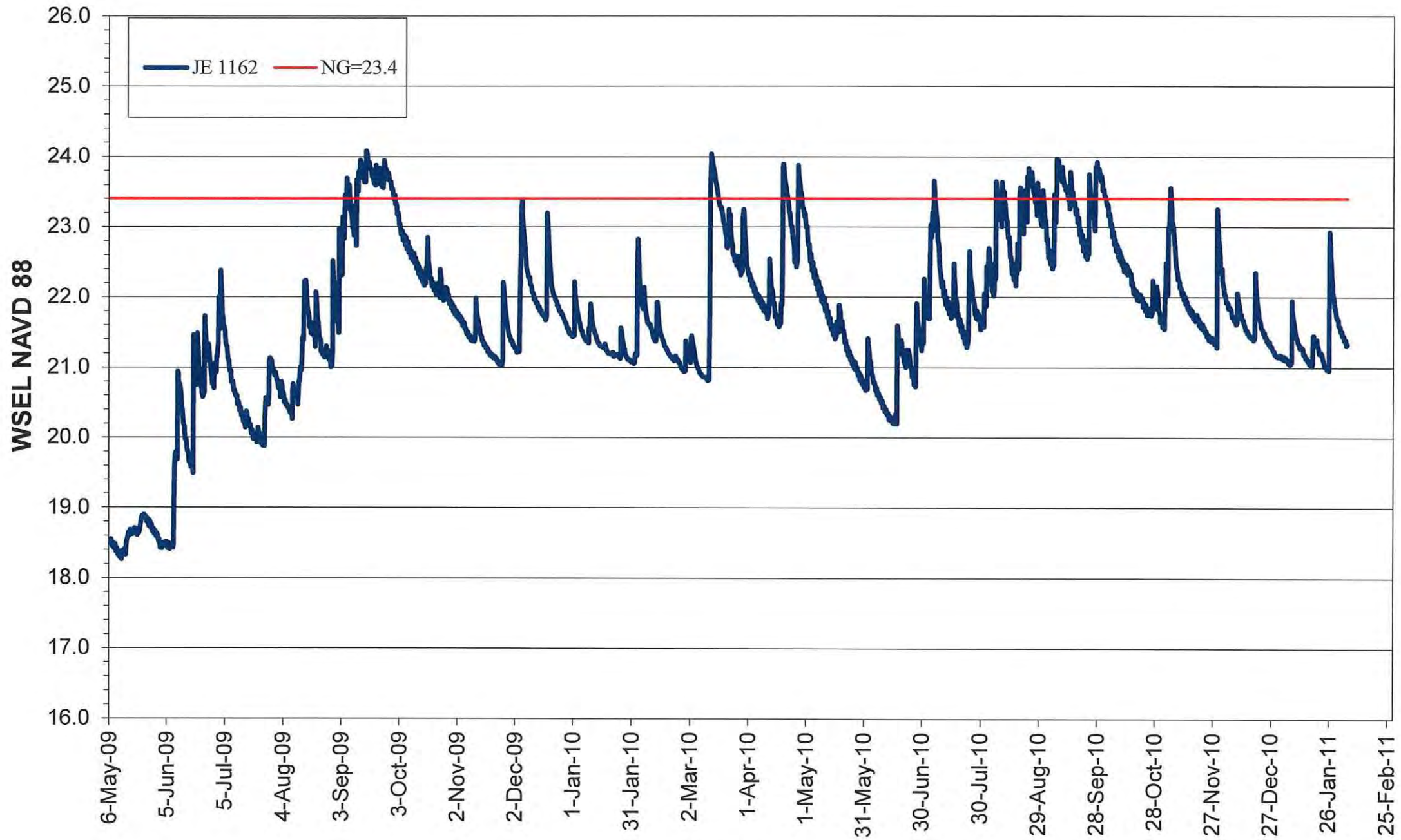
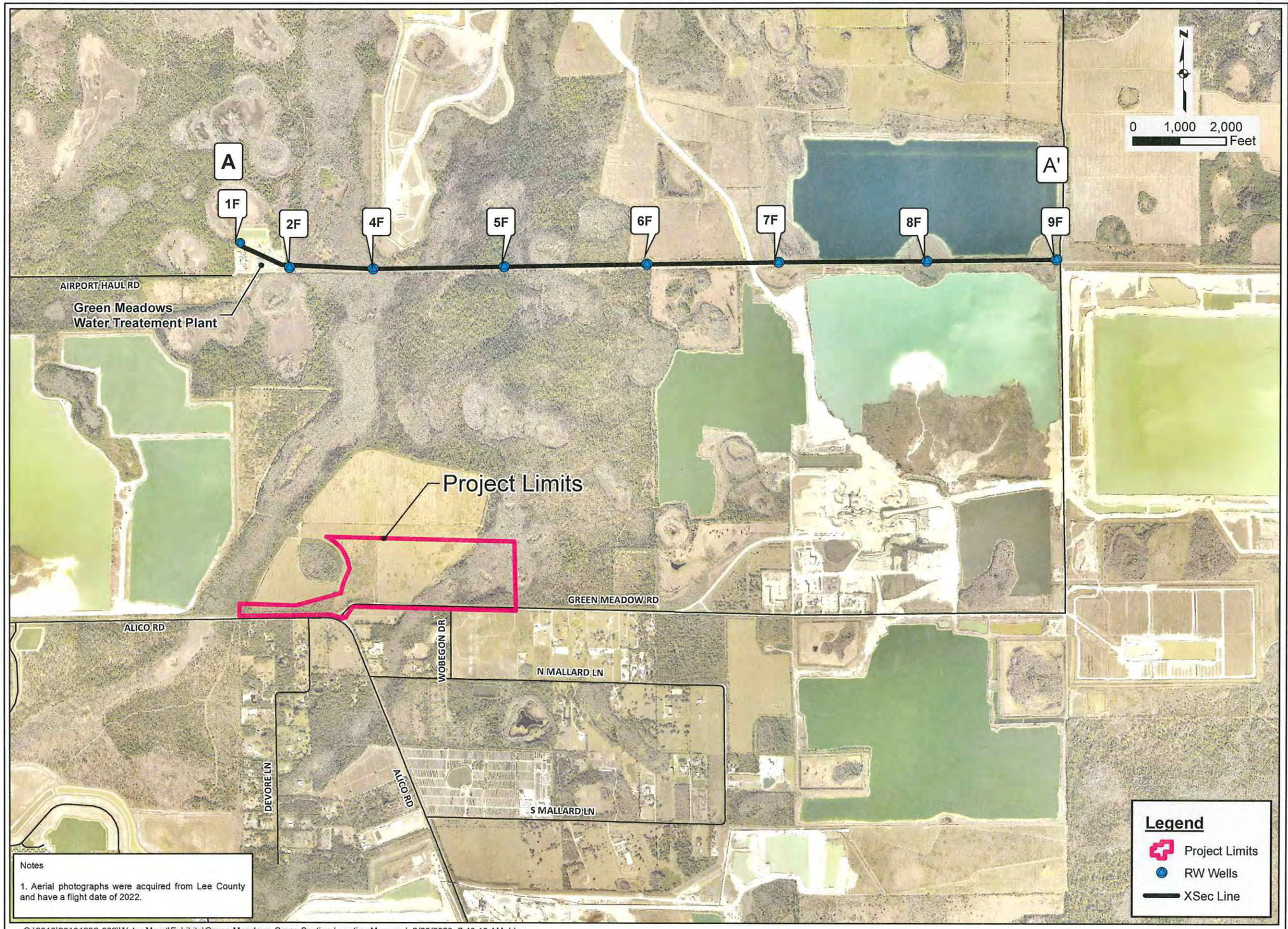


Figure 3e



O:\2018\20181232-002\Water Mgmt\Exhibits\Green Meadows Cross Section Location Map.mxd 2/20/2023 7:40:10 AM bkm

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

REVISIONS

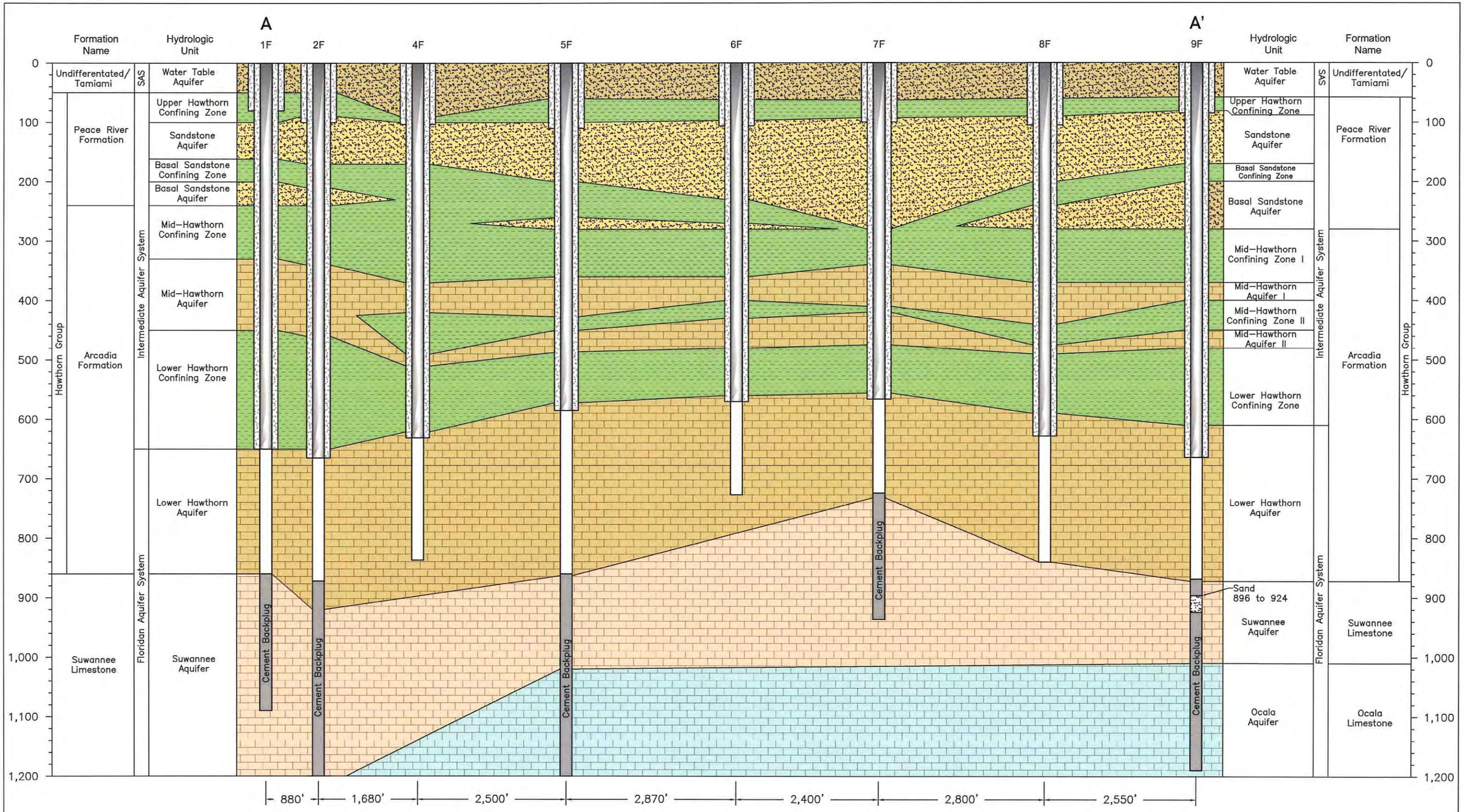
NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Green Meadows
Wellfield Cross
Section Location Map

SHEET NUMBER

Figure 4a

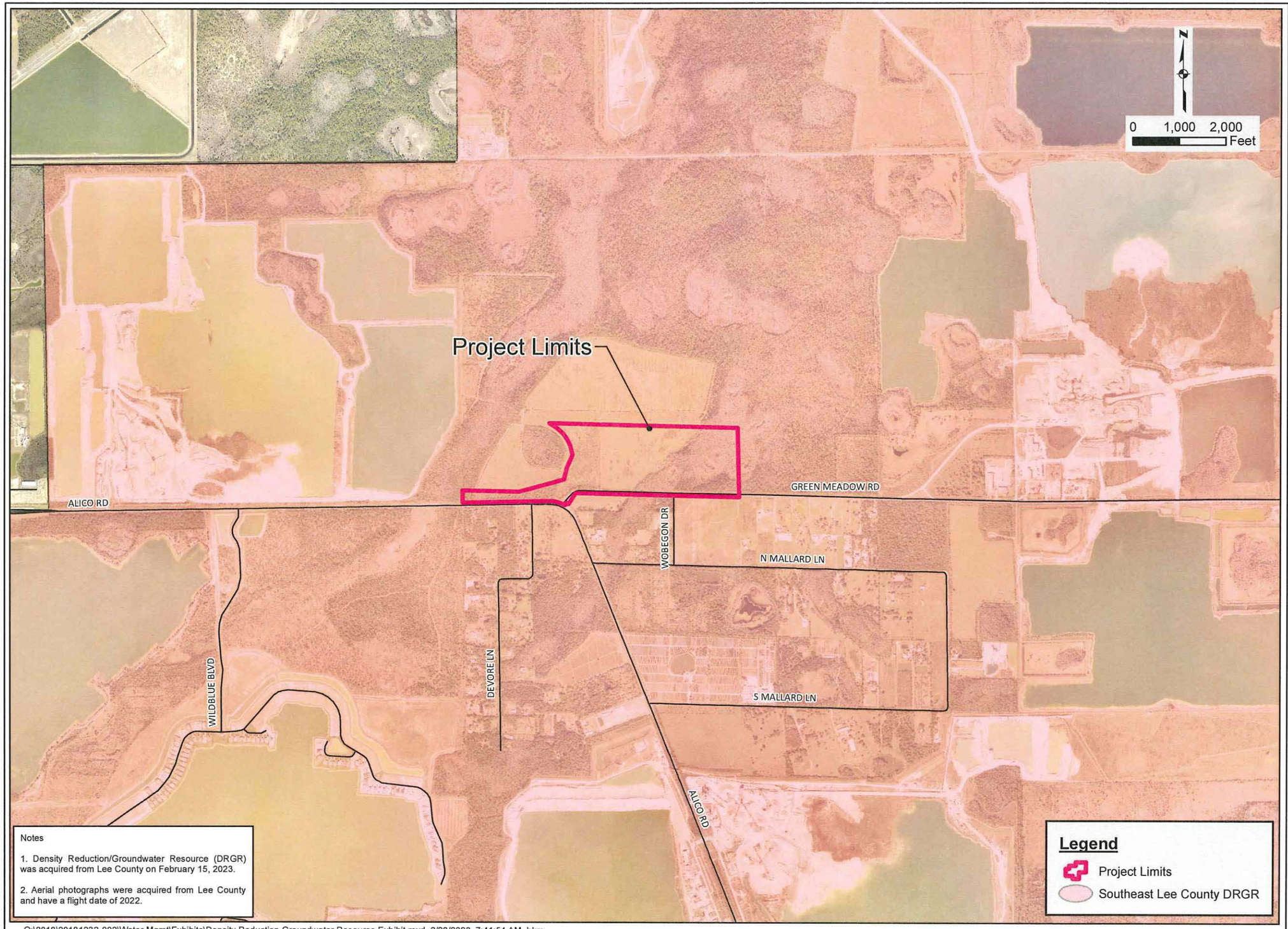


GREEN MEADOWS WELLFIELD STRATIGRAPHIC CROSS SECTION A TO A'

Vertical Exaggeration: 13x

\\FTMS01\Proj–jei\20108376–000\Drawings\8x11 DIW\Completion Report\11x17section A–A'.dwg (Section A–A) JWM Oct 31, 2017 – 3:55pm

Figure 4b



O:\2018\20181232-002\Water Mgmt\Exhibits\Density Reduction Groundwater Resource Exhibit.mxd 2/20/2023 7:41:54 AM bkm

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

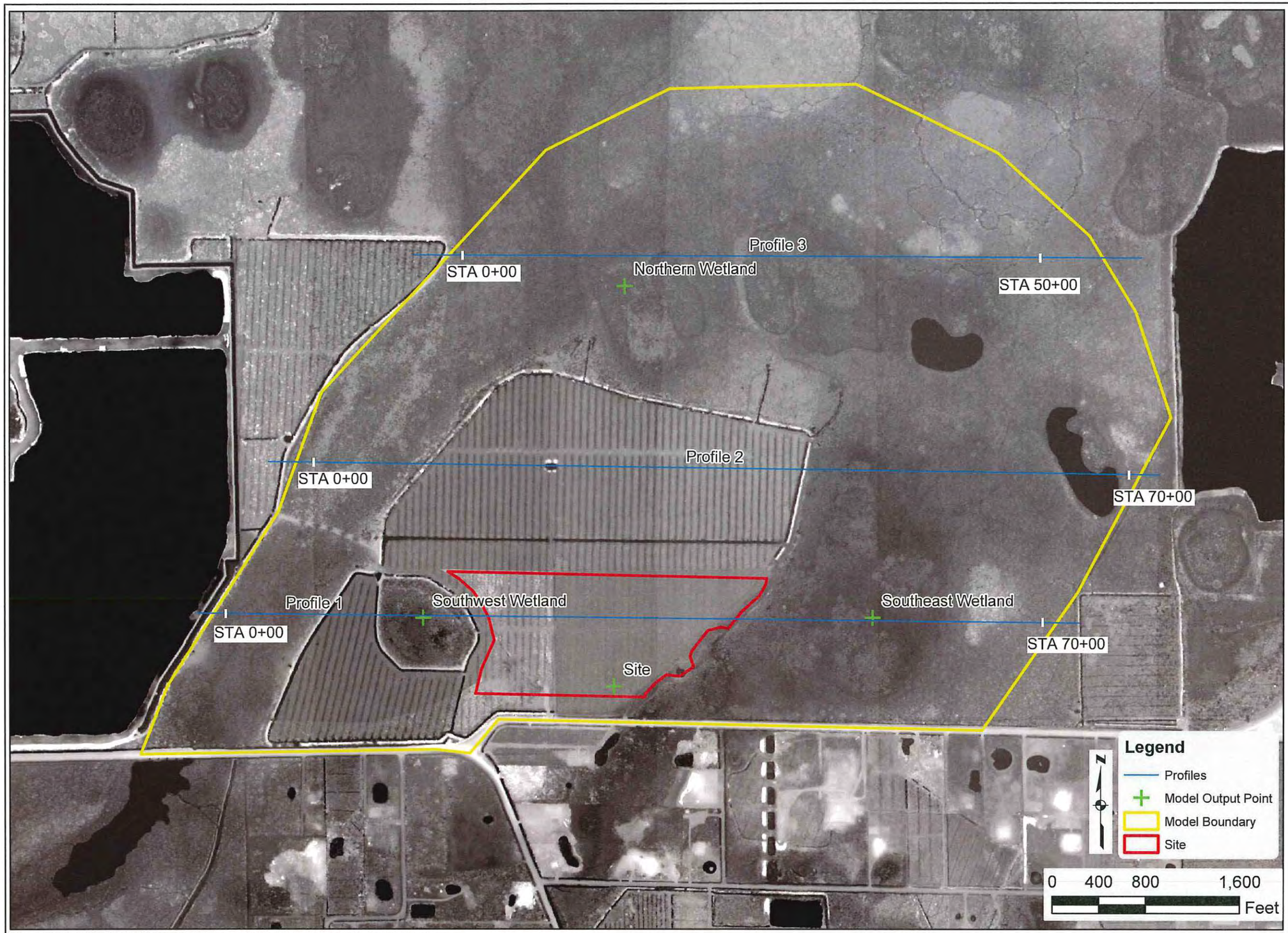
REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Density Reduction/ Groundwater Resource (DRGR)

Figure 5



\\ftms01\Drawings\2018\20181232-002\ArcGIS\WM Areas for Modeling.mxd 6/30/2023 3:34:58 PM crz

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Lee County Utilities

Southeast Area Water Reclamation Facility
Lee County, Florida

REVISIONS

NO.	DESCRIPTION	DATE

DATE:	June 2023
PROJECT NO.	20181232-002
FILE NO.	00-00-00
SCALE:	As Shown

Model Output Profile Locations

SHEET NUMBER

6a

Southeast Wetland

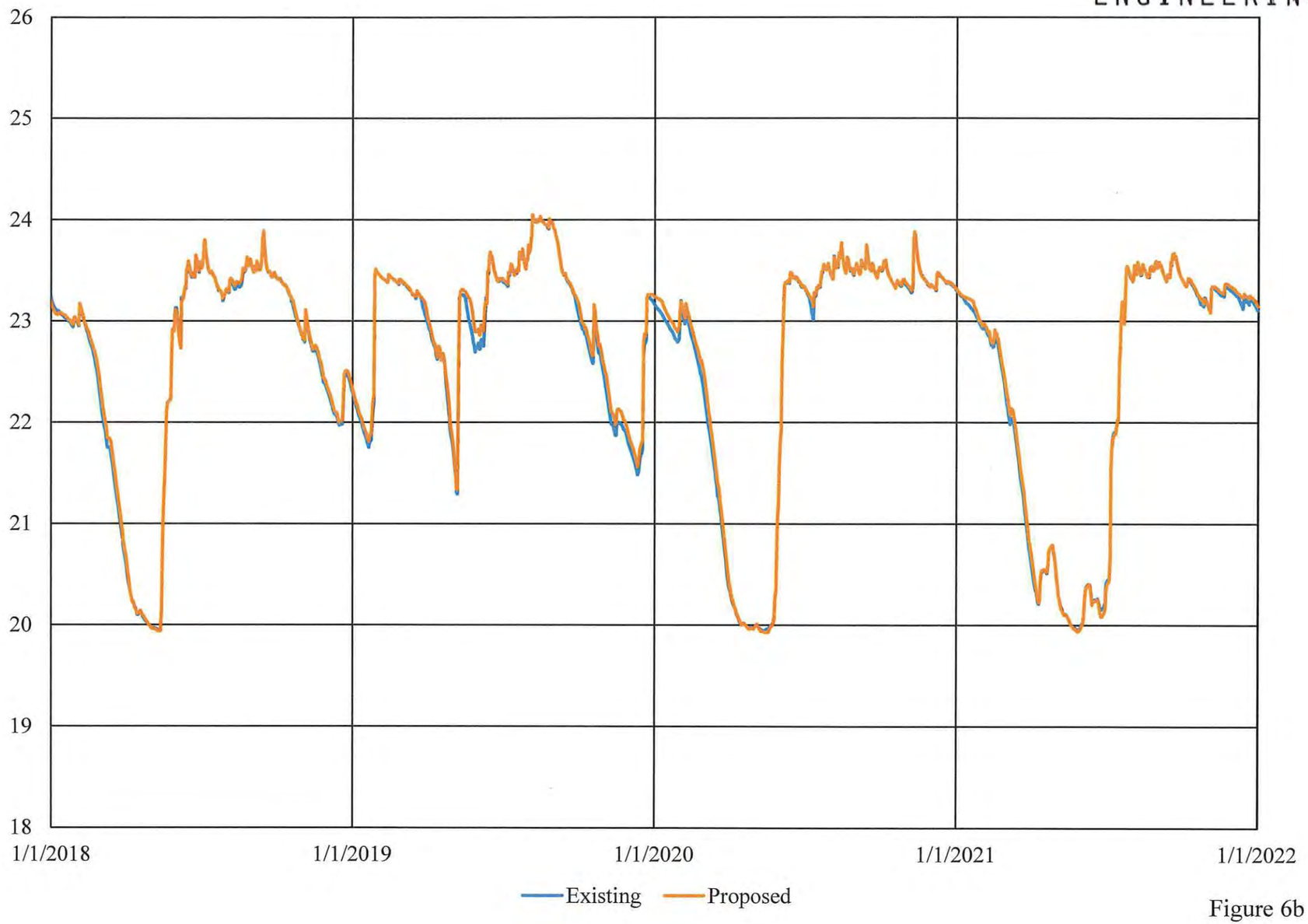


Figure 6b

Southwest Wetland

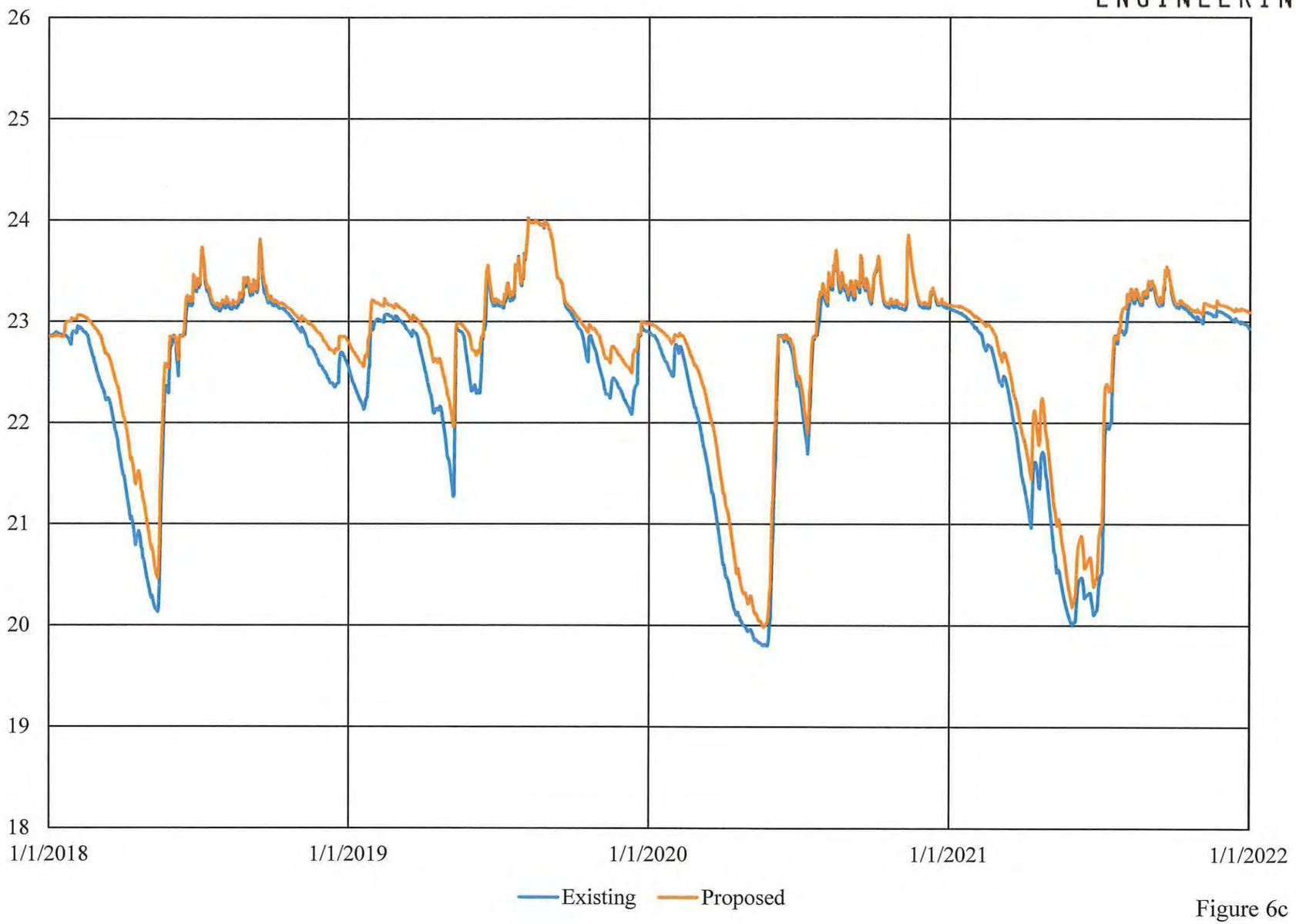


Figure 6c

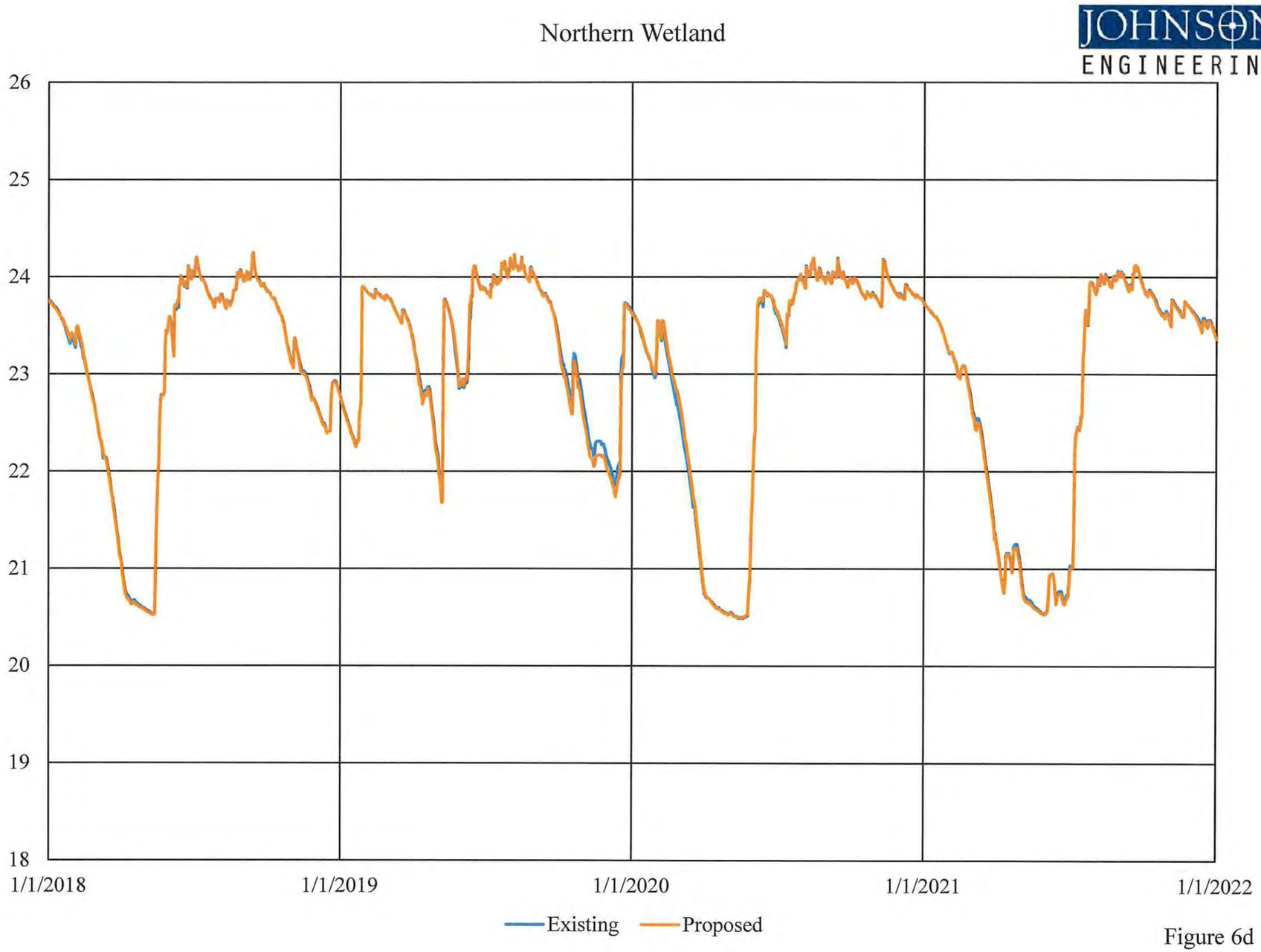

Northern Wetland
JOHNSON
ENGINEERING
26
25
24
23
22
21
20
19
18
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
Existing
Proposed

Figure 6d

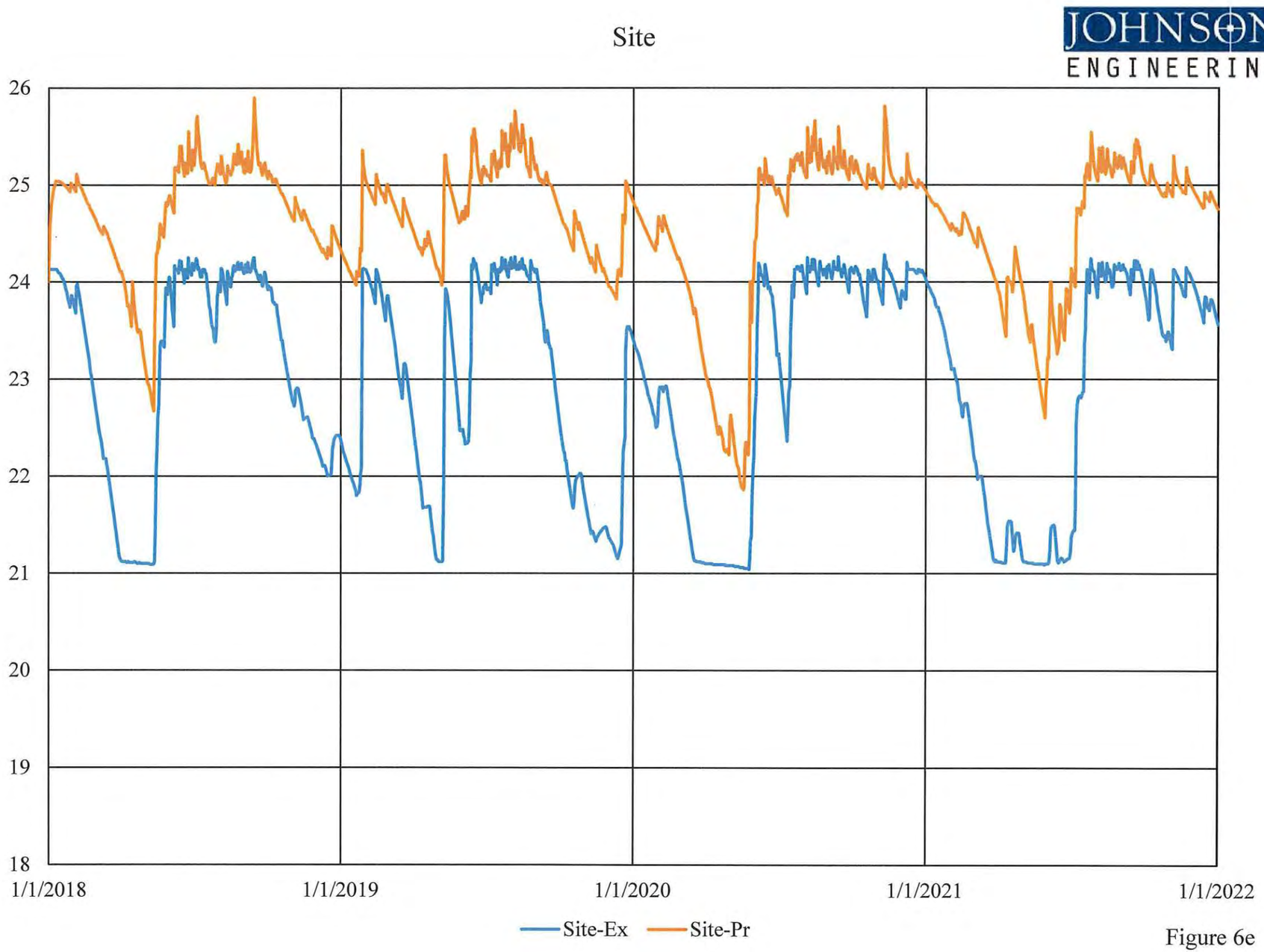

Site
26
25
24
23
22
21
20
19
18
1/1/2018
1/1/2019
1/1/2020
1/1/2021
1/1/2022
Site-Ex
Site-Pr

Figure 6e

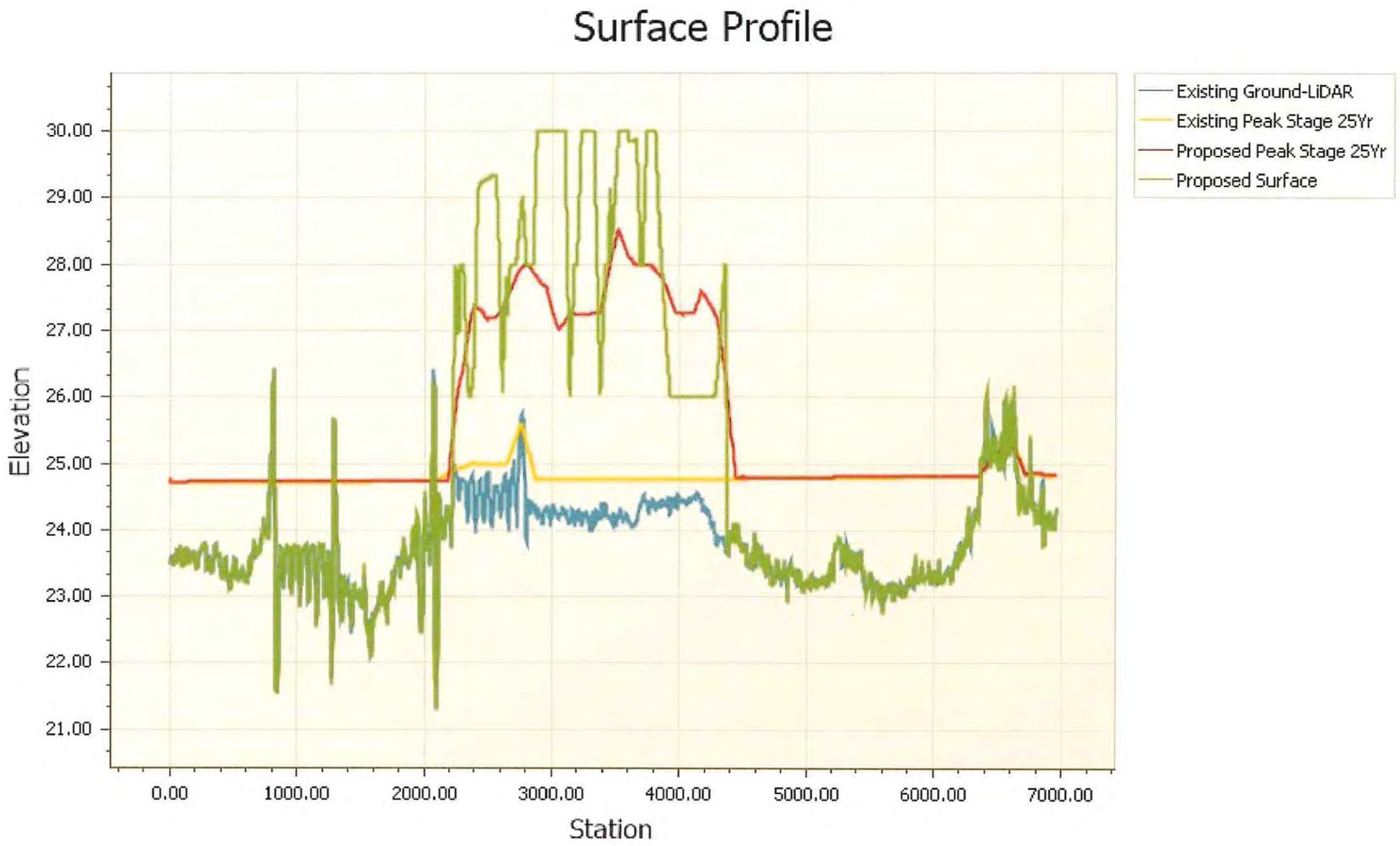


Figure 6f. Existing and proposed 25-year, 3-day peak stages along Profile 1.

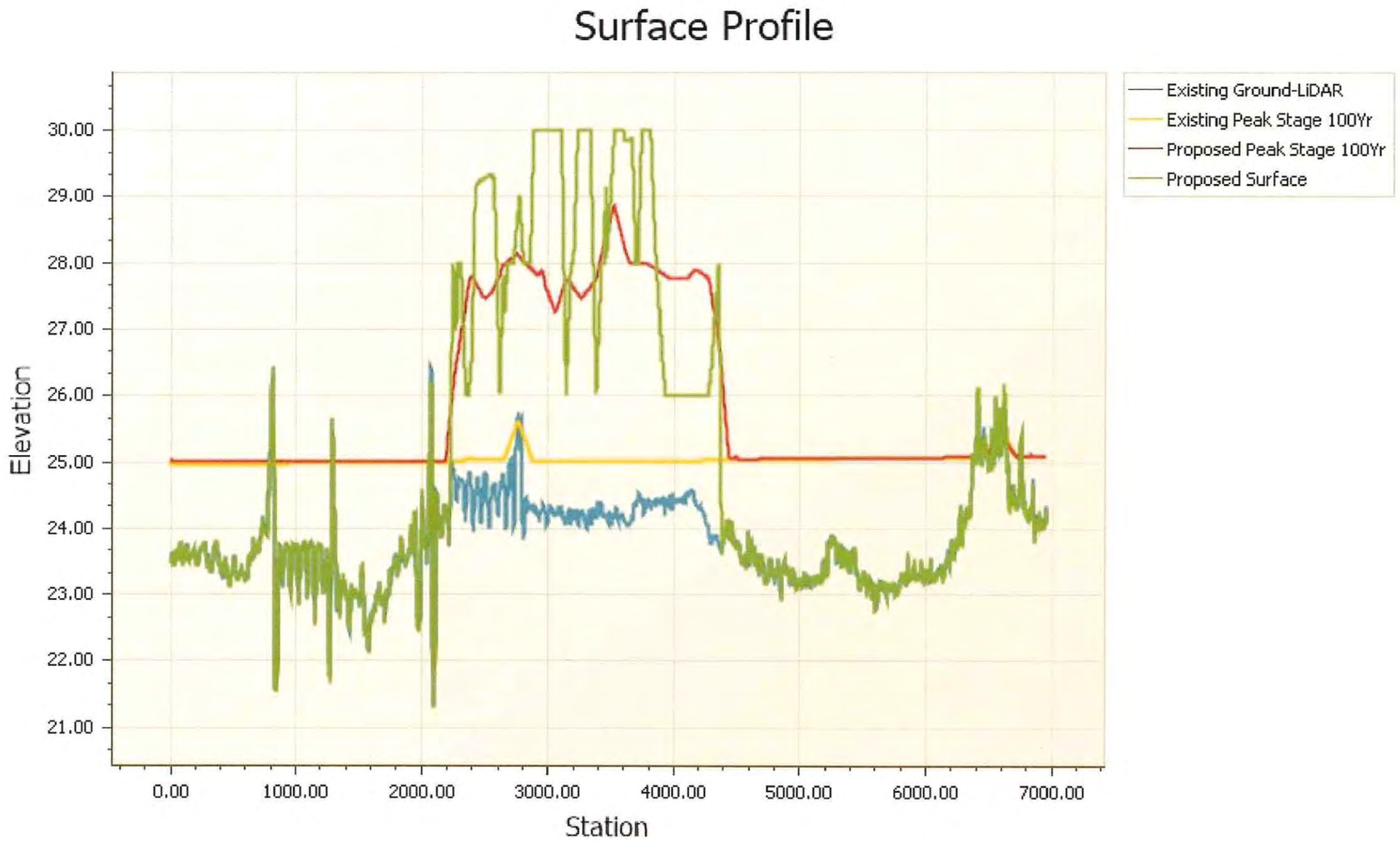


Figure 6g. Existing and proposed 100-year, 3-day peak stages along Profile 1.

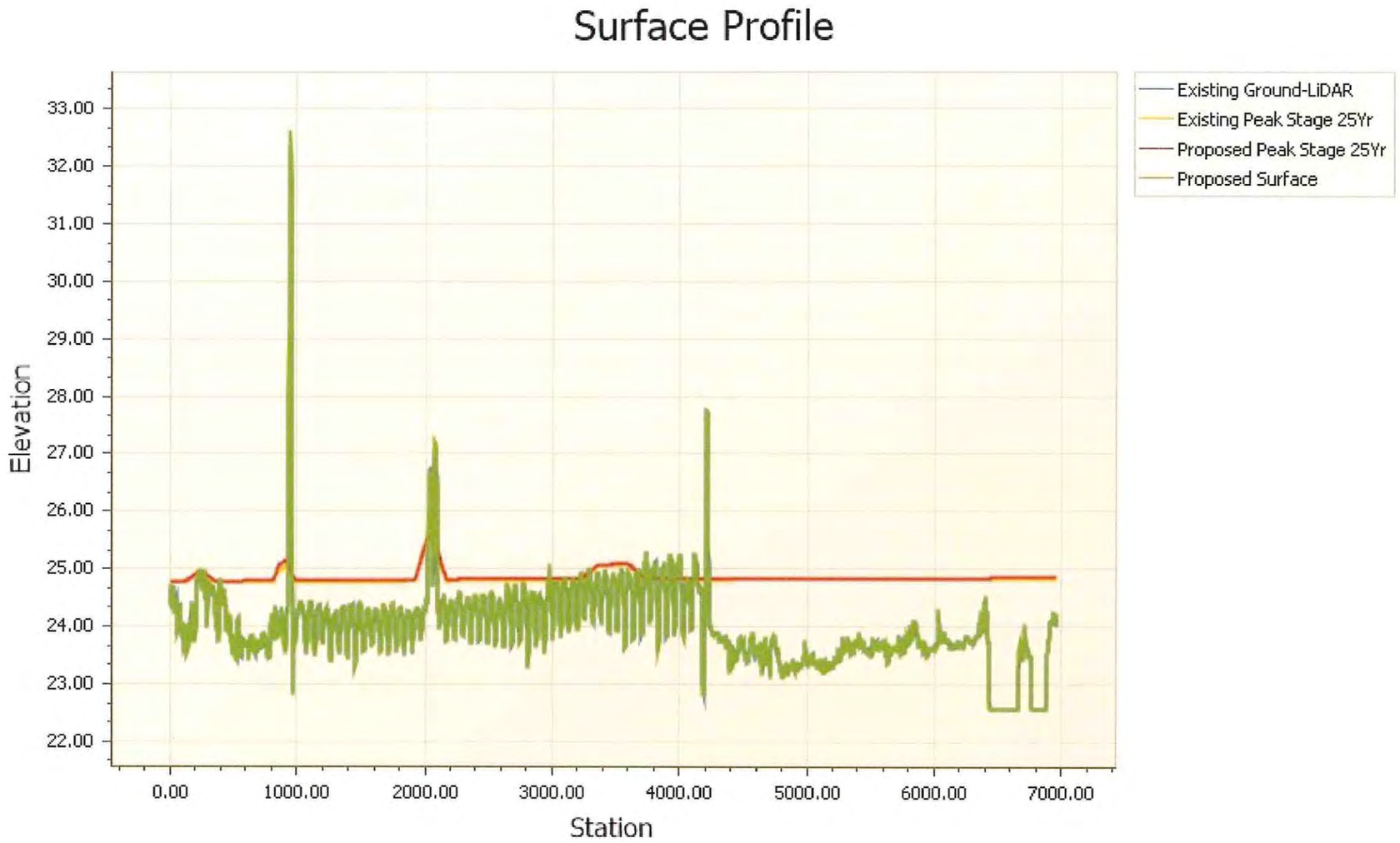


Figure 6h. Existing and proposed 25-year, 3-day peak stages along Profile 2.

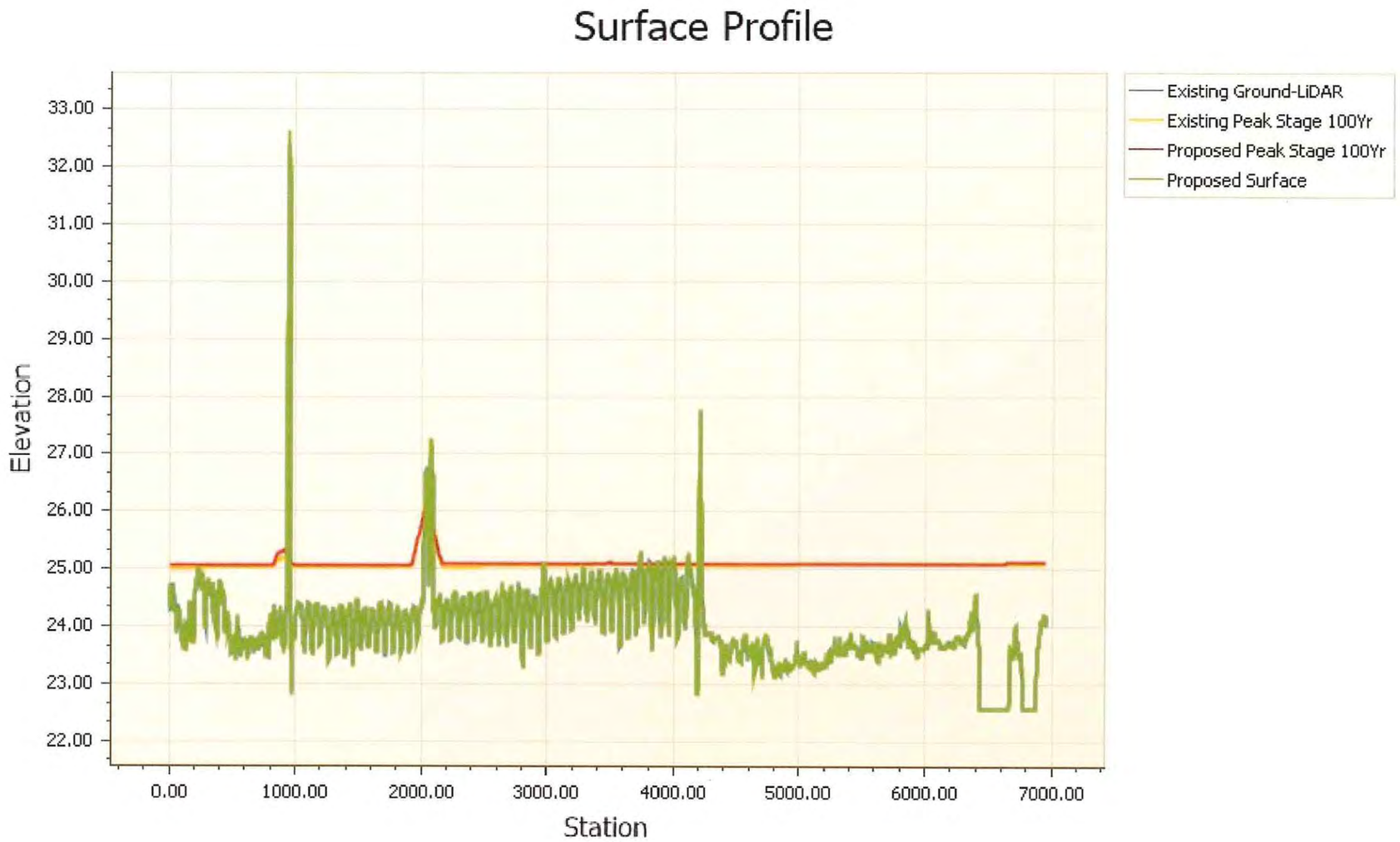


Figure 6i. Existing and proposed 100-year, 3-day peak stages along Profile 2.

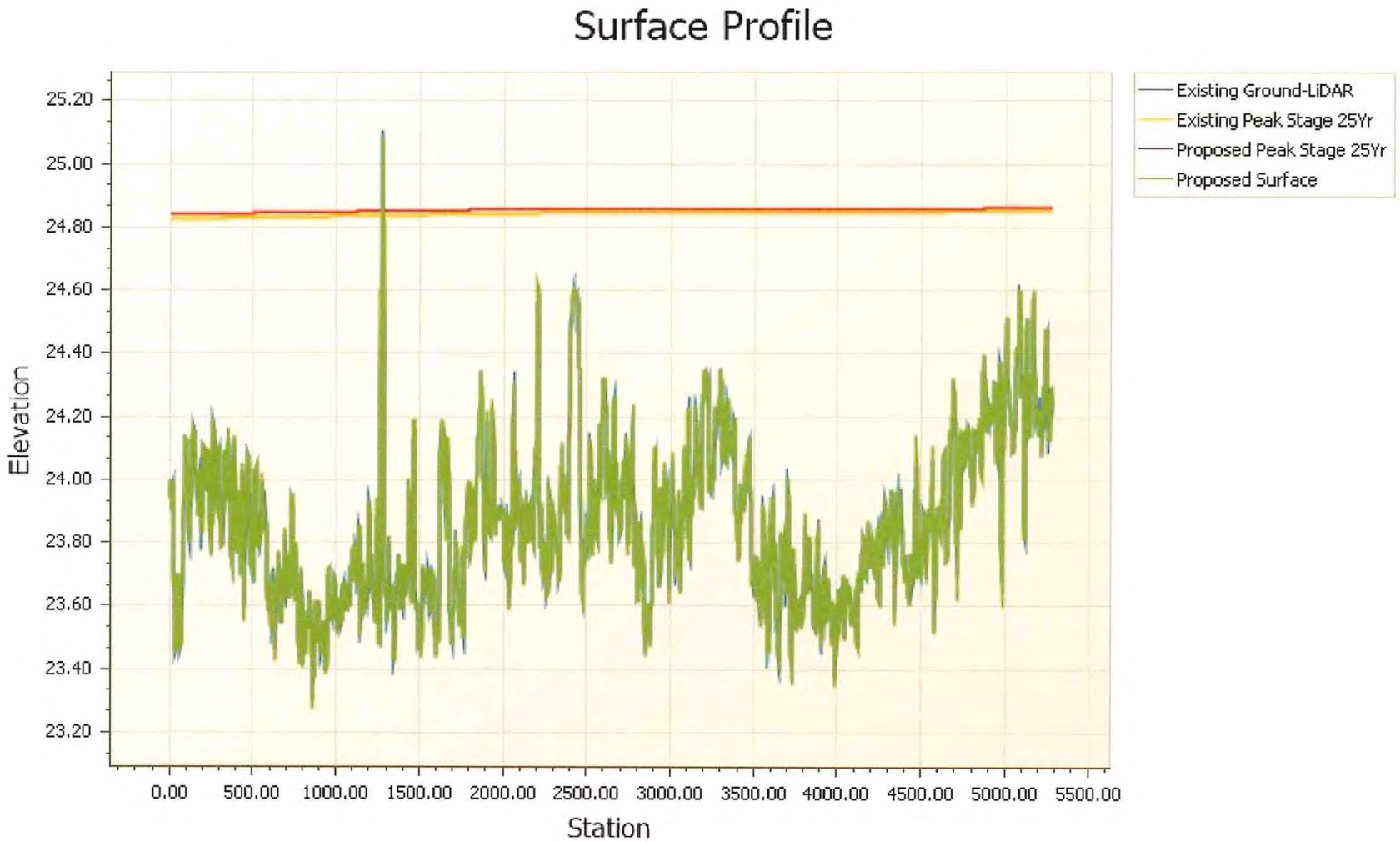


Figure 6j. Existing and proposed 25-year, 3-day peak stages along Profile 3.

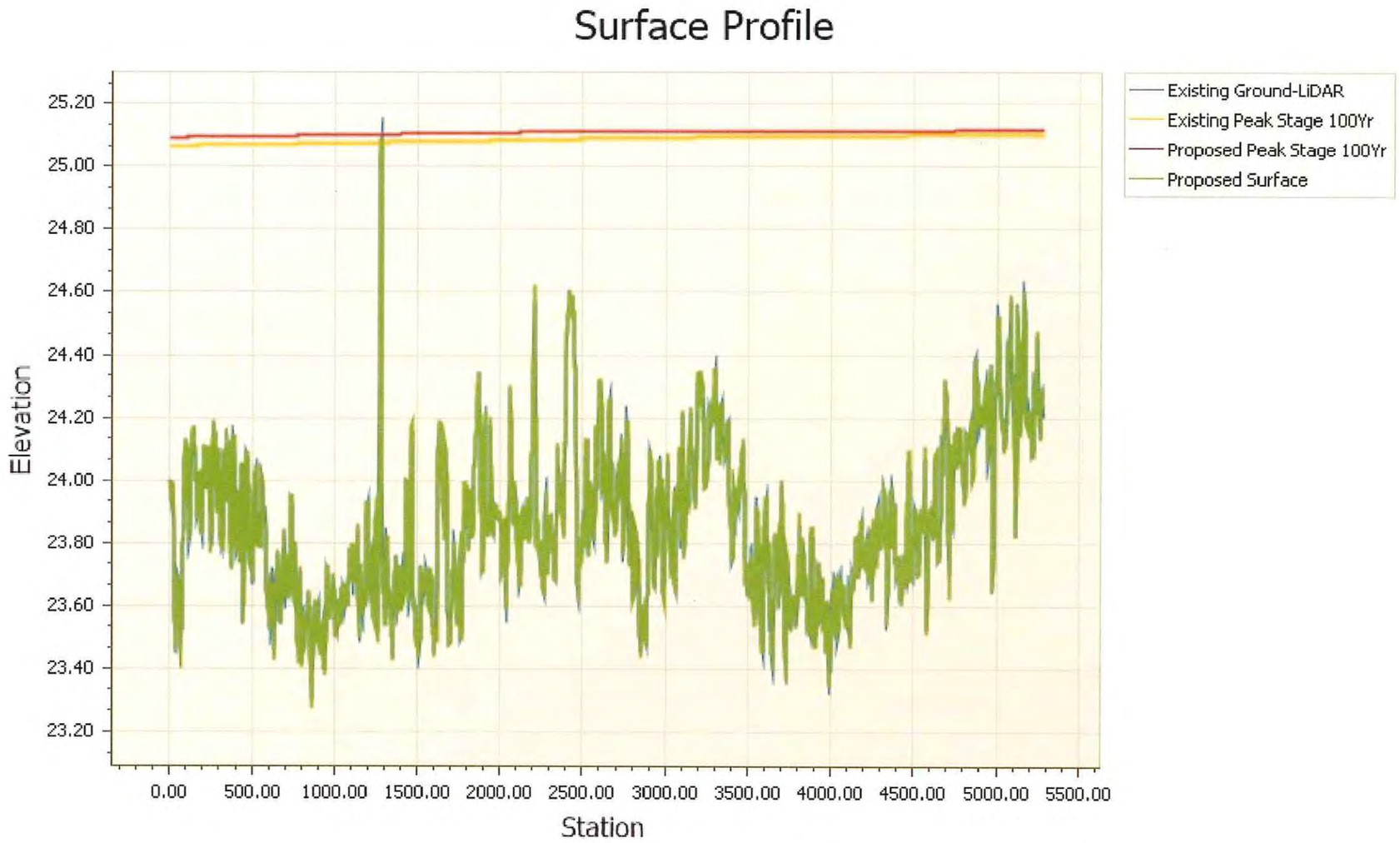
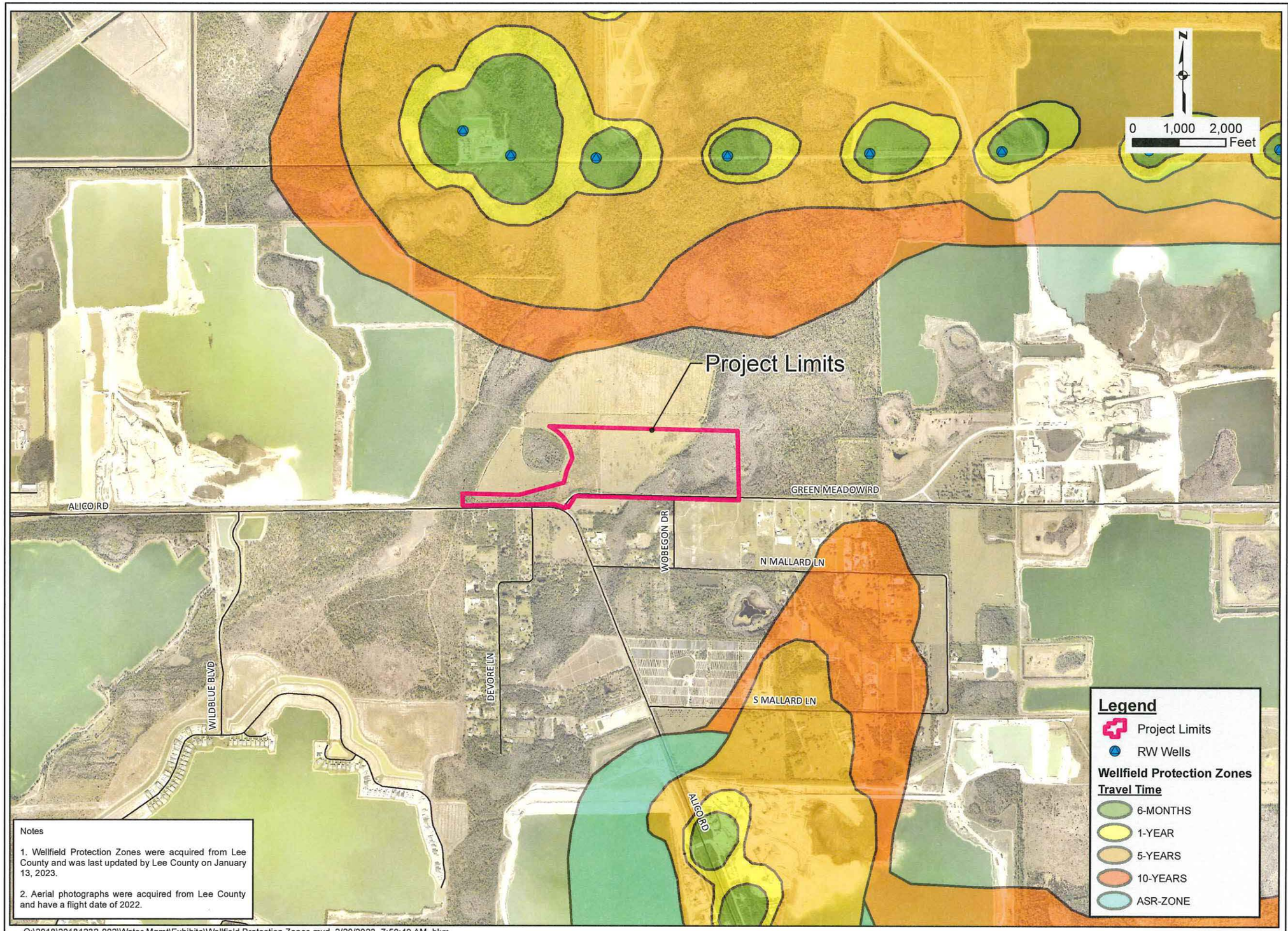


Figure 6k. Existing and proposed 100-year, 3-day peak stages along Profile 3.



O:\2018\20181232-002\Water Mgmt\Exhibits\Wellfield Protection Zones.mxd 2/20/2023 7:50:49 AM bkm

JOHNSON ENGINEERING

JOHNSON ENGINEERING, INC.
2122 JOHNSON STREET
P.O. BOX 1550
FORT MYERS, FLORIDA 33902-1550
PHONE (239) 334-0046
E.B. #642 & L.B. #642

Jacobs Engineering Group

Southeast Advanced Water Reclamation Facility
Lee County, Florida

REVISIONS

NO.	DESCRIPTION	DATE

DATE:	February 2023
PROJECT NO.	20181232-002
FILE NO.	04-46-26
SCALE:	As Shown

Wellfield Protection Zones

Figure 7