2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Town of Marana

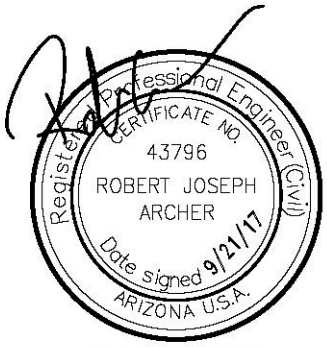
Prepared for:

MARANA AZ
WATER

Town of Marana Water Department
5100 West Ina Road
Marana, Arizona 85743

Project Number: 527.100

September 2017



EXPIRES 3/31/2018

WestLand Resources

WestLand Resources, Inc. • 4001 E. Paradise Falls Drive • Tucson, Arizona 85712 • 520•206•9585

TABLE OF CONTENTS

TABLES

FIGURES

(*follow text*)

APPENDICES

1. INTRODUCTION

The Town of Marana (Town) is the Designated Management Agency providing wastewater service for the Designated Management Area (DMA) area shown in **Figure 1**. Currently the Town operates the Marana Water Reclamation Facility (WRF), which serves approximately 2,778 connections (March 2017). The Town also operates a collection system comprising approximately 50 miles of gravity sewer, 1.25 miles of pressure sewer (force main), the Rillito Vista Lift Station, and the Saguaro Bloom Sewer Lift Station.

The purpose of the infrastructure improvement plan (IIP) is to determine the capital improvements required to meet the demands associated with the next 10 years of growth, and to estimate the costs of those improvements and acquisitions.

2. BENEFIT AREAS

Benefit Areas are areas that derive benefit from unused existing capacity or proposed capacity improvements to the collection and treatment systems. **Figure 2** shows the two benefit areas referenced in this report. The benefit areas are combinations of one or more sewer basins, where the sewer basins are designed to account for natural and man-made barriers and to account for the collection system topology. **Table 1** contains a description of the benefit areas.

Table 1. Description of Benefit Areas

Benefit Area	Sewer Basins	Treatment/Disposal
Northwest Benefit Area	6, 7, 8, 11	Marana WRF
Southeast Benefit Area	12, 18, 19	Marana WRF

The Northwest and Southeast benefit areas are tributary to the Marana WRF, but are separated because each requires different collection system improvements.

3. LEVEL OF SERVICE

This section describes the level of service of the treatment and collection systems for each of the benefit areas, and for existing customers and future development.

3.1. LEVEL OF SERVICE FOR EXISTING CUSTOMERS

The Town provides sewer collection, purification, and disinfection of treated wastewater. The Marana WRF is designed to treat to Class A+ reclaimed water as defined by the Arizona Department of Environmental Quality (ADEQ), and treated water can be reused, recharged, or discharged to a tributary of the Santa Cruz River. The treatment system is designed to treat the average dry-weather flow (ADWF).

The collection system for both benefit areas is designed to carry peak wet-weather flow (PWWF). **Table 2** shows the level of service for each benefit area.

Table 2. Level of Service for Existing Customers by Benefit Area

Benefit Area	Treatment	Collection System
Northwest Benefit Area	Treatment plant designed for Class A+ reclaimed effluent and for ADWF	Capacity greater than PWWF
Southeast Benefit Area		

3.2. Level of Service for Future Customers

The level of service for future customers, in terms of wastewater system engineering design criteria, will be the same as described in **Table 2** for existing customers.

4. 10-YEAR LAND USE ASSUMPTIONS

The Town provided land use assumptions for the 10-year study period (Schladweiler 2017). The 10-year study period runs from 2018 through 2027. **Figure 3** shows each development area and **Table 3** shows the number of dwelling units projected over the next 10 years, the area of commercial development projected over the next 10 years, and the number of equivalent dwelling units (EDUs) projected for the next 10 years for each development area. An EDU represents the wastewater generated by one single-family dwelling unit or one-quarter acre of commercial area. In this IIP, "commercial" represents any non-residential wastewater source, such as retail, offices, industrial, government, or schools.

The last two columns of **Table 3** show the sewer basin(s) and benefit area associated with each development.

Table 3. Projected Equivalent Dwelling Units by Development Area

Development Area	Dwelling Units	Commercial Acres	EDUs	Sewer Basin(s)	Benefit Area
Barrios de Marana	0	4	16	6	Northwest
Cypress Gardens	165	0	165	6	Northwest
Fianchetto Farms	103	0	103	6	Northwest
Gladden Farms	527	14	583	11	Northwest
Gladden Farms II	211	0	211	11	Northwest
Marana Main St.	0	14	56	6	Northwest
Marana Mercantile	0	12	48	6	Northwest
Rancho Marana Town Center	0	5	20	6	Northwest
Saguaro Bloom	1,229	0	1,229	18	Southeast
San Lucas	24	0	24	8	Northwest
Sanders Grove	113	0	113	6	Northwest
Tangerine Commerce Park	0	45	180	12, 19	Southeast

Development Area	Dwelling Units	Commercial Acres	EDUs	Sewer Basin(s)	Benefit Area
The Villages of Tortolita	293	0	293	7	Northwest
Uptown at Marana	0	6	24	6	Northwest
Vanderbilt Farms	391	0	391	12	Southeast
Whitney Farms	12	0	12	11	Northwest
Total	**3,068**	**100**	**3,468**		

Table 4 shows the 10-year projected growth in EDUs for each of the benefit areas.

Table 4. 10-year Projected Growth by Benefit Area

Benefit Area	Projected Growth (EDU)
Northwest Benefit Area	1,737
Southeast Benefit Area	1,731

Table 5 shows the projected annual growth in EDUs for each benefit area. The annual growth is based on the number of existing units and 5- and 10-year projections provided by the Town (Schladweiler 2017). The growth rate for intermediate years was estimated using a quadratic curve passing through 3 years: existing EDUs, 5-year projected EDUs, and 10-year projected EDUs.

Table 5. Projected Annual Growth for Each Benefit Area

Development Area	EDUs by Benefit Area		Total EDUs
	Northwest	Southeast	
2018	115	143	258
2019	128	150	278
2020	141	156	297
2021	154	163	317
2022	167	170	337
2023	180	176	356
2024	193	183	376
2025	206	190	396
2026	219	196	415
2027	234	204	438

5. EXISTING CAPACITY REQUIREMENTS

The following assumptions are used to calculate the flows generated from each EDU.

- Each EDU represents 2.7 persons per dwelling unit (ppdu) of equivalent population.
- Each EDU produces 187.2 gallons per day (gpd). ADEQ requires that the treatment plant and collection system have sufficient capacity to support 187.2 gpd for each EDU.

- The peak dry-weather flow (PDWF) is based on the equivalent population upstream of the point of interest, and is equal to the ADWF times a peaking factor. The peaking factor is from the R18-9-E301(D)(b)(i) of the Arizona Administrative Code.
- The peak wet-weather flow (PWWF) is equal to PDWF + inflow and infiltration (I/I). Where I/I is assumed to be 10 percent (10%) of the PDWF.

The treatment system must be able to treat ADWF and the collection system must be capable of handling PWWF.

5.1. Treatment Capacity Requirements

Table 6 shows the existing EDUs and the ADWF based on the assumptions listed above for each sewer basin.

Table 6. Existing Sewer Flows by Sewer Basin and Benefit Area

Benefit Area	Sewer Basin	Existing (EDU)	Existing ADWF (mgd)
Northwest	6	352	0.066
	8	760	0.142
	11	1,835	0.344
Southeast	18	381	0.071
	19	60	0.011
Total		**3,388**	**0.634**

Sewer basins in the Northwest and Southeast benefit areas are tributary to the Marana WRF. The total existing ADWF to the Marana WRF, based on 3,388 EDUs, is 0.634 million gallons per day (mgd). The Marana WRF capacity is currently limited to 0.5 mgd because of the secondary treatment Biolac system. There is no excess capacity in the existing treatment system; however, the 3.5 mgd sand filter and ultraviolet disinfection system have 2.85 mgd of excess capacity, which can be used once the secondary treatment system is replaced with the 1.5 mgd secondary treatment system now being constructed.

5.2. Collection System Capacity Requirements

Figure 4 shows the collection system that is tributary to the Marana WRF. The main lines of the collection system are divided into 11 branches (A through K). Each branch is divided into one or more segments to aid in the analysis of the collection system. The segment name is the same as the collection point just upstream of the segment.

Table 7 shows the existing EDUs, the existing capacity, the calculated PWWF, and the excess capacity for each segment of each branch of the collection system. The existing capacity is equal to the minimum pipe capacity within the segment, where the pipe capacity was calculated using Manning's equation for a full pipe, based on the pipe diameter and slope, and with a roughness coefficient, n, equal to 0.013 (Chow 1959). Where noted, flows from the force main are calculated separately using

a dynamic model and based on the lift station pumping rate. The dynamic model predicts an attenuated flow at points along the segment, and is used until the attenuated flow is equal to the PWWF.

Table 7. Collection System Capacity for Existing Units

Branch	Segment	EDU	Existing Capacity (mgd)	PWWF (mgd)	Excess Capacity (mgd)
A	A-1	760	1.52	0.34	1.18
B	B-1	60	1.13	0.49[1]	0.64
	B-2	60	1.08	0.44[1]	0.64
	B-3	60	1.13	0.38[1]	0.75
	B-4	441	2.26	0.21	2.05
	B-5	456	2.67	0.22	2.45
C	C-1	0	0.73	0.00	0.73
	C-2	0	1.00	0.00	1.00
	C-3	0	1.00	0.00	1.00
	C-4	316	1.56	0.16	1.40
	C-5	367	1.57	0.18	1.39
	C-6	1,120	1.02	0.48	0.54
	C-7	1,323	1.32	0.56	0.76
	C-8	1,323	1.66	0.56	1.10
D	D-1	1,323	1.01	0.56	0.45
	D-2	1,334	1.00	0.56	0.44
	D-3	1,334	1.00	0.56	0.44
	D-4	1,513	1.70	0.63	1.07
E	E-1	481	0.80	0.23	0.57
	E-2	481	1.01	0.23	0.78
	E-3	729	1.06	0.33	0.73
	E-4	780	1.03	0.35	0.68
	E-5	807	0.63	0.36	0.27
F	F-1	1,567	1.73	0.65	1.08
	F-2	1,567	1.73	0.65	1.08
G	G-1	0	2.58	0.00	2.58
H	H-1	0	1.63	0.00	1.63
	H-2	167	1.19	0.09	1.10
I	I-1	167	1.26	0.09	1.17
	I-2	307	1.57	0.15	1.42
	I-3	307	1.54	0.15	1.39
J	J-1	1,820	1.74	0.74	1.00
	J-2	1,821	1.73	0.74	0.99
K	K-1	3,388	2.38	1.30	1.08
	K-2	3,388	2.71	1.30	1.41

[1] PWWF Calculated using dynamic model to account for force main attenuation.

6. PROJECTED CAPACITY REQUIREMENTS AND UTILIZATION OF EXISTING FACILITIES

This section includes the projected capacity requirements based on the 10-year projected growth, and the utilization of existing infrastructure for the treatment and collection systems. As described in **Section 3**, the treatment system capacity must be greater than ADWF, and the collection system is designed for the PWWF.

6.1. TREATMENT CAPACITY REQUIREMENTS

Table 8 shows the projected ADWF for the year 2027 for each sewer basin and benefit area. The Marana WRF treats flows from the Northwest and Southeast benefit areas, and is projected to receive an ADWF of 1.283 mgd of flow in 2027. This exceeds the capacity of the existing Marana WRF, but is within the capacity of the 1.5 mgd Marana WRF upgrade currently being constructed.

Table 8. Projected Sewer Flows by Sewer Basin and Benefit Area

Benefit Area	Sewer Basin	Existing (EDU)	Projected Growth (EDU)	2027 (EDU)	Projected ADWF (mgd)
Northwest	6	352	442	794	0.877
	7	0	293	293	0.149
	8	760	24	784	0.055
	11	1,835	978	2,813	0.147
Southeast	12	0	412	412	0.077
	18	381	1,229	1,610	0.301
	19	60	90	150	0.028
Total		**3,388**	**3,468**	**6,856**	**1.283**

6.2. COLLECTION SYSTEM CAPACITY REQUIREMENTS

Figure 4 shows the gravity collection system tributary to the Marana WRF. For analysis, the main lines have been divided into eleven main branches (A through K), with each branch divided into one or more segments.

Table 9 below shows the projected PWWF, existing capacity, and excess capacity for each segment. The existing capacity is equal to the minimum pipe capacity within the segment, where the pipe capacity was calculated using Manning's equation for a full pipe, based on the pipe diameter and slope, and with a roughness coefficient, n, equal to 0.013 (Chow 1959). Where noted, flows from the force main are calculated separately using a dynamic model and based on the lift station pumping rate. The dynamic model predicts an attenuated flow at points along the segment, and is used until the attenuated flow is equal to the PWWF. Values in the Excess Capacity column shown in red font and surrounded by parentheses indicate a negative excess capacity or a projected deficiency.

Table 9. Collection System Capacity for Projected Units

Branch	Segment	EDU	Existing Capacity (mgd)	PWWF (mgd)	Excess Capacity (mgd)
A	A-1	1,077	1.52	0.47	1.05
B	B-1	60	1.13	1.04[1]	0.09
	B-2	150	1.08	1.05[1]	0.03
	B-3	240	1.13	1.07[1]	0.06
	B-4	1,850	2.26	0.75	1.51
	B-5	2,256	2.67	0.90	1.77
C	C-1	211	0.73	0.11	0.62
	C-2	211	1.00	0.11	0.89
	C-3	267	1.00	0.14	0.86
	C-4	847	1.56	0.38	1.18
	C-5	1,162	1.57	0.50	1.07
	C-6	1,915	1.02	0.78	0.24
	C-7	2,117	1.32	0.85	0.47
	C-8	2,117	1.66	0.85	0.81
D	D-1	2,117	1.01	0.85	0.16
	D-2	2,231	1.00	0.89	0.11
	D-3	2,231	1.00	0.89	0.11
	D-4	2,422	1.70	0.96	0.74
E	E-1	2,281	0.80	0.91	(0.11)
	E-2	2,446	1.01	0.97	0.04
	E-3	2,714	1.06	1.06	(0.00)
	E-4	2,781	1.03	1.09	(0.06)
	E-5	2,864	0.63	1.12	(0.49)
F	F-1	3,989	1.73	1.51	0.22
	F-2	4,013	1.73	1.52	0.21
G	G-1	0	2.58	0.00	2.58
H	H-1	0	1.63	0.00	1.63
	H-2	167	1.19	0.09	1.10
I	I-1	167	1.26	0.09	1.17
	I-2	307	1.57	0.15	1.42
	I-3	307	1.54	0.15	1.39
J	J-1	2,729	1.74	1.07	0.67
	J-2	2,730	1.73	1.07	0.66
K	K-1	6,856	2.38	2.48	(0.10)
	K-2	6,856	2.71	2.48	0.23

[1] PWWF Calculated using dynamic model to account for force main attenuation.

Deficiencies in the existing collection system are projected for Segments E-1, E-3, E-4, and E-5 of Branch E and for Segment K-1 of Branch K.

7. CAPITAL IMPROVEMENTS

Capital projects for the treatment and collection systems are required to eliminate the projected deficiencies presented in **Section 6**. The following sections describe the capital projects required to eliminate these deficiencies.

7.1. TREATMENT: EXISTING CAPACITY AND UPGRADES

The Biolac (secondary treatment), headworks, and biosolids handling facilities limit the existing Marana WRF to 0.5 mgd; however, the existing tertiary filters and ultraviolet disinfection system each have a capacity of 3.5 mgd. The existing Marana WRF also has a combination of land and agreements with neighboring land owners for the setbacks required for a 4.5 mgd or larger treatment facility.

The Town is currently in the construction phase of improvements to the existing Marana WRF to increase the plant's capacity to 1.5 mgd. The improvements include replacing the existing headworks, replacing the existing Biolac secondary treatment system with a 1.5 mgd activated sludge treatment system, and upgrades to the biosolids handling system. The existing facility has excess tertiary filtration and disinfection capacity, and the land required for all of the improvements and setbacks.

Table 10 shows the affected benefit areas, the existing components and proposed capital projects, and the number of affected EDUs.

Table 10. Existing Capacity and Proposed Capital Facilities for Marana WRF

Affected Benefit Areas	Level of Service	Capital Facilities	Projected Affected EDUs
Northwest and Southeast	Treat ADWF (see **Section 3**)	Existing Marana WRF facilities with excess capacity including existing tertiary filtration system, existing ultraviolet disinfection system, land required for proposed upgrades, and land and agreements required for setbacks.	3,468
		Proposed 1.5 mgd secondary treatment system, replacement headworks to increase capacity, new biosolids handling facilities to increase biosolids handling capacity.	

7.2. COLLECTION SYSTEM IMPROVEMENTS

Table 11 shows the capital projects required to meet the projected deficiencies in the collection system tributary to the Marana WRF. **Figures 5** and **6** show the location of the proposed capital improvements to the collection system.

Table 11. Proposed Capital Facilities for Collection System

Affected Benefit Areas	Capital Facilities	Projected Affected EDUs	Level of Service
Southeast	Clark Farms Flow Split (**Figure 5**). Modifications to the collection system along Clark Farms Blvd to split incoming flows between Clark Farms Blvd. and Sandario Road. Modifications include replacing exiting weir at Clark Farms Blvd. and Sandario with control structure, and connecting the Clark Farms sewer across Tangerine Farms Rd.	1,731	PWWF (see **Section 3**)
Northwest and Southeast	Marana/Sanders 21-inch Gravity Main (**Figure 6**). Replace 90 feet of 18-inch gravity main with 21-inch gravity main. Conveyance system master plan	3,468	

8. COST OF CAPITAL IMPROVEMENTS

The projected capital improvement costs have four components:

1) One-half of the Marana WRF debt service
2) One-half of the debt service for the 1.5 mgd upgrade to the Marana WRF
3) Improvements to the collection system
4) Conveyance system master plan

8.1. MARANA WRF DEBT SERVICE

The Marana WRF and designated management area was acquired from Pima County to assist the Town in meeting its renewable water resource demands. Existing customers have already paid for capacity in the plant, and future customers will pay for unused existing capacity. Since the Marana WRF was acquired primarily for water resource recovery, future water customers will pay for one-half of the cost of the acquisition debt service, and future sewer customers will pay for one-half of the acquisition debt service. **Table 12** below shows the plant acquisition debt service and the portion of the acquisition debt service devoted to new sewer customers over the next 10 years.

Table 12. Debt Service for Acquisition of the Marana WRF

Year	Plant Acquisition Debt Service	Portion of Plant Acquisition Debt Service Devoted to New Sewer Customers
2018	$1,809,925	$904,963
2019	$1,809,925	$904,963
2020	$1,810,550	$905,275
2021	$1,807,150	$903,575
2022	$1,812,350	$906,175
2023	$1,810,750	$905,375
2024	$1,806,750	$903,375
2025	$1,810,250	$905,125
2026	$1,810,750	$905,375
2027	$1,808,250	$904,125
Total	**$18,096,650**	**$9,048,326**

8.2. MARANA WRF 1.5 MGD UPGRADE

Table 13 shows the debt service for the 1.5 mgd upgrade to the Marana WRF. New sewer customers will be responsible for one-half the debt service. To account for the contributions made by the current customer base toward the existing utilized capacity in the Biolac secondary treatment system and acquisition of the WRF, the Town will contribute approximately $3.2 million toward the cost of debt to finance the expansion. This funding provided by the Town is not included in the debt servicing shown in **Table 13** and will not be reimbursed by new customers through impact fees. Additionally, while the Biolac will not be utilized as part of the secondary treatment process in the current expansion of the WRF, it will not be clean-closed at the time of the expansion to allow further consideration for its proposed future use.

Table 13. Debt Service for Marana WRF 1.5 mgd Upgrade

Year	Plant Upgrade Debt Service	Portion of Plant Upgrade Debt Service Devoted to New Sewer Customers
2018	$815,091	$407,546
2019	$680,819	$340,409
2020	$680,819	$340,409
2021	$680,819	$340,409
2022	$680,819	$340,409
2023	$680,819	$340,409
2024	$680,819	$340,409
2025	$680,819	$340,409
2026	$680,819	$340,409
2027	$680,819	$340,409
Total	**$6,942,462.00**	**$3,471,227**

8.3. IMPROVEMENTS TO COLLECTION SYSTEM

Table 14 shows the costs for improvements to the collection system. **Appendix A** contains cost opinions for each of the improvements.

Table 14. Costs for Improvements to the Collection System

Year	Marana/Sanders 21-inch Gravity Main	Clark Farms Flow Split	Total Collection System Improvements
2021		$465,750	$465,750
2025	$248,400		$248,400
Total	**$248,400**	**$465,750**	**$714,150**

8.4. COLLECTION SYSTEM MASTER PLAN

A collection system master plan will be completed in 2018 at an estimated cost of $70,000. Master planning is performed periodically to plan for future growth.

8.5. TOTAL CIP

Table 15 shows the total CIP based on the existing unused Marana WRF capacity, the 1.5 mgd upgrade to the Marana WRF, the collection system improvements, and the conveyance system master plan.

Table 15. Total CIP Costs

Period	Plant Acquisition Debt Service	Portion of Upgrade Debt Service	Collection System Improvements	Collection System Master Plan	Total
2018	$904,963	$407,546		$70,000	$1,382,509
2019	$904,963	$340,409			$1,245,372
2020	$905,275	$340,409			$1,245,684
2021	$903,575	$340,409	$465,750		$1,709,734
2022	$906,175	$340,409			$1,246,584
2023	$905,375	$340,409			$1,245,784
2024	$903,375	$340,409			$1,243,784
2025	$905,125	$340,409	$248,400		$1,493,934
2026	$905,375	$340,409			$1,245,784
2027	$904,125	$340,409			$1,244,534
Total	**$9,048,326**	**$3,471,227**	**$714,150**	**$70,000**	**$13,303,703**

9. REFERENCES

Schladweiler, Scott. 2017. Email: Infrastructure Improvement Plans. Attachment: 5-10 year projections 12_13_16.xlsx. To: Erik Christenson, WestLand Resources, Inc. February 22, 2017.

Chow, Ven Te. 1959. *Open-channel Hydraulics*. McGraw-Hill Book Company, New York.

FIGURES

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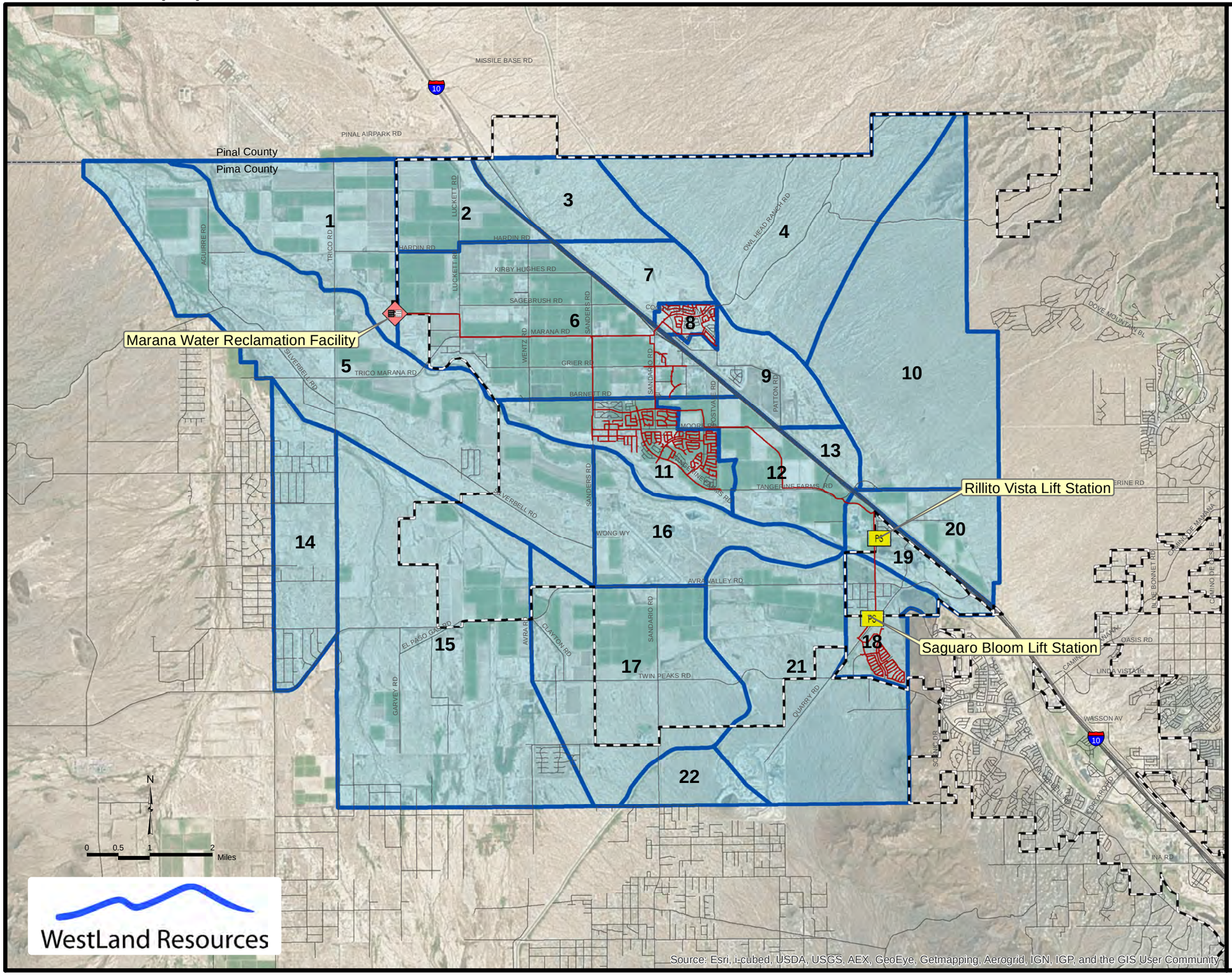

Legend

- Marana Town Limits
- Pima/Pinal County Line
- Marana DMA
- 1 Sewer Basin Boundaries
- Sewer Basin Number

Wastewater Facilities

- Marana WRF
- PS Rillito Vista WRF
- PS Saguaro Bloom Lift Station
- Existing Sewers

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2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 1

Marana DMA and Sewer Basins

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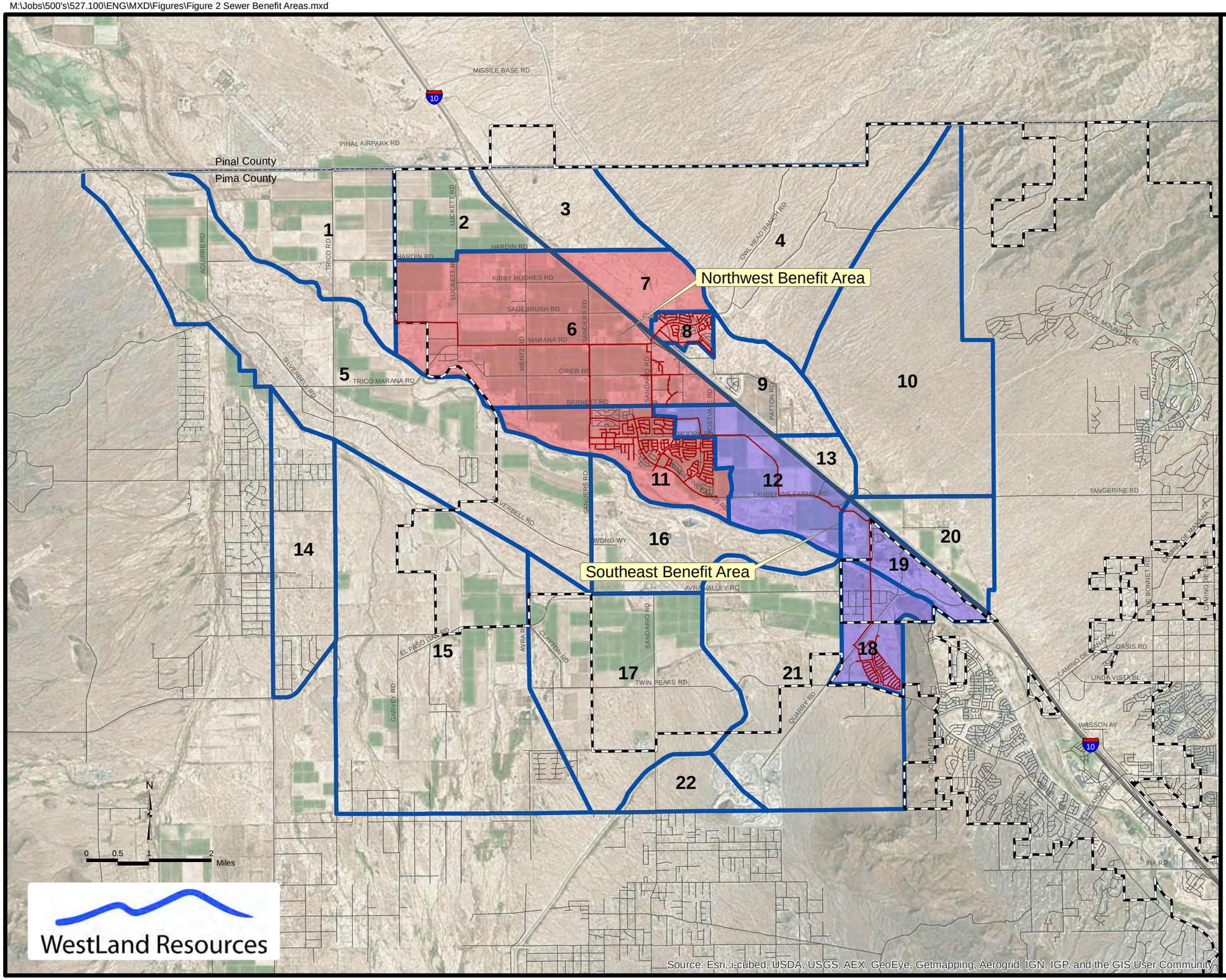

Legend

- Existing Sewers
- Marana Town Limits
- Pima/Pinal County Line

Benefit Area

- Northwest
- Southeast
- 1 Sewer Basin Boundaries
- Sewer Basin Number

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2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 2

Sewer Benefit Areas

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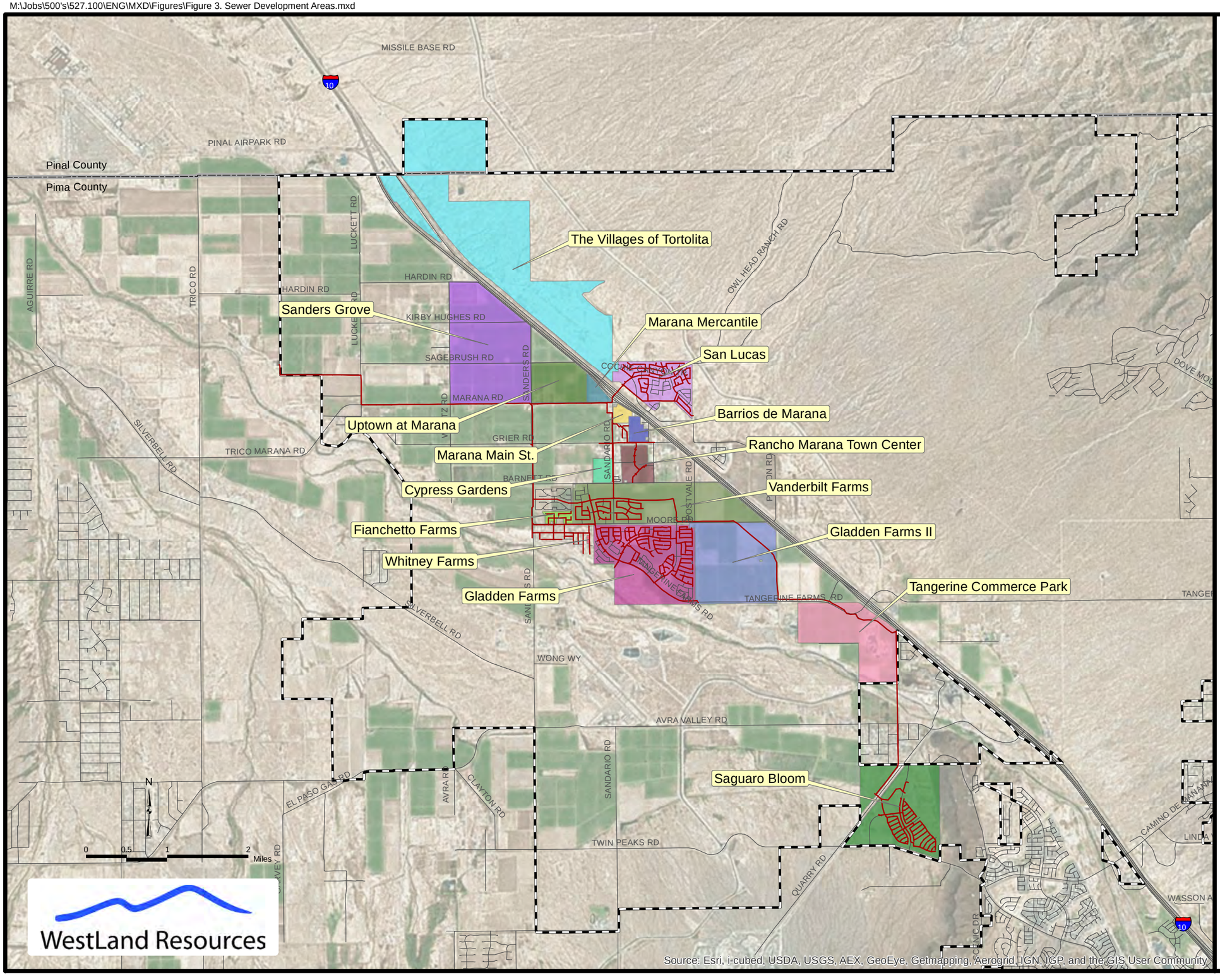

WestLand Resources

Legend

- Existing Sewers
- Marana Town Limits
- Pima/Pinal County Line

Development Areas

- Barrios de Marana
- Cypress Gardens
- Fianchetto Farms
- Gladden Farms
- Gladden Farms II
- Marana Main St.
- Marana Mercantile
- Rancho Marana Town Center
- Saguaro Bloom
- San Lucas
- Sanders Grove
- Tangerine Commerce Park
- The Villages of Tortolita
- Uptown at Marana
- Vanderbilt Farms
- Whitney Farms

MARANA AZ
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2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 3
Development Areas

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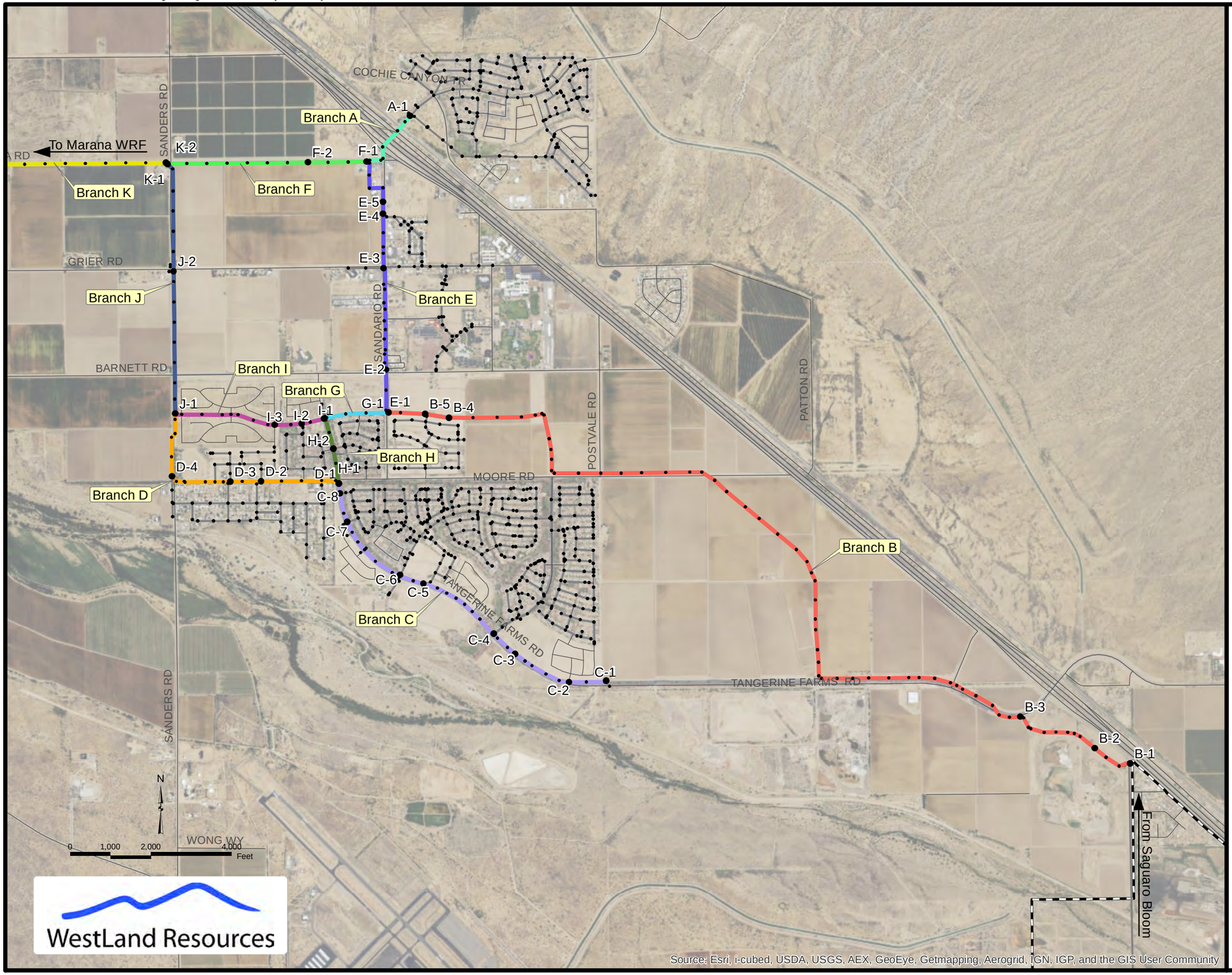


Legend

- Marana Town Limits
- Pima/Pinal County Line
- Manholes
- Collection Points
- Sewer Lines

Sewer Main Lines

- Branch A
- Branch B
- Branch C
- Branch D
- Branch E
- Branch F
- Branch G
- Branch H
- Branch I
- Branch J
- Branch K

WestLand Resources

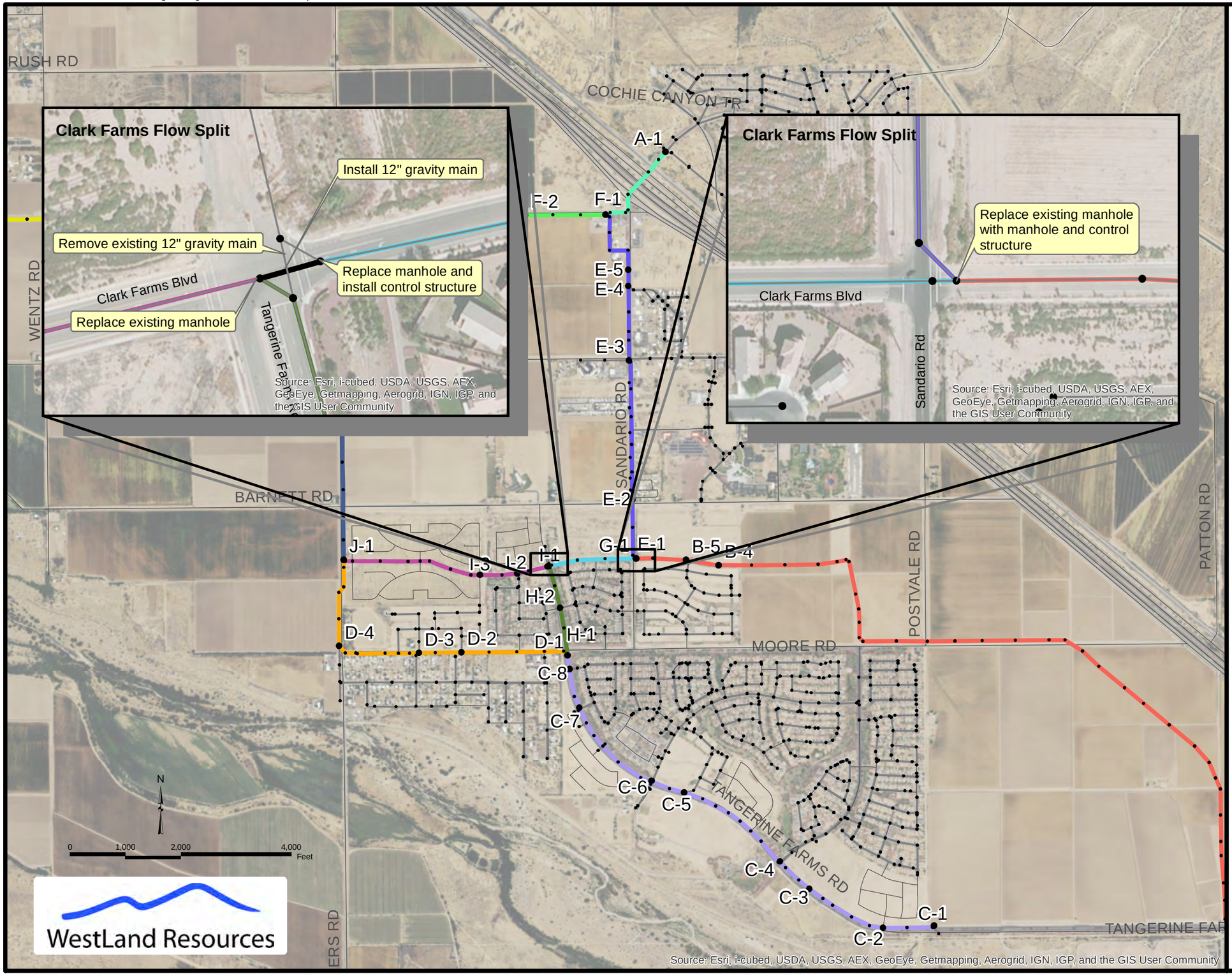
MARANA AZ
WATER

2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 4

Sewer Collection System Analysis

M:\Jobs\500's\527.100\ENG\MXD\Figures\Figure 5 Clark Farms Flow Split.mxd



Legend

- Marana Town Limits
- Pima/Pinal County Line
- Manholes
- Collection Points
- Sewer Lines

Sewer Main Lines

- Branch A
- Branch B
- Branch C
- Branch D
- Branch E
- Branch F
- Branch G
- Branch H
- Branch I
- Branch J
- Branch K

MARANA AZ
WATER

2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 5

Capital Improvements:
Clark Farms Blvd. Flow Split

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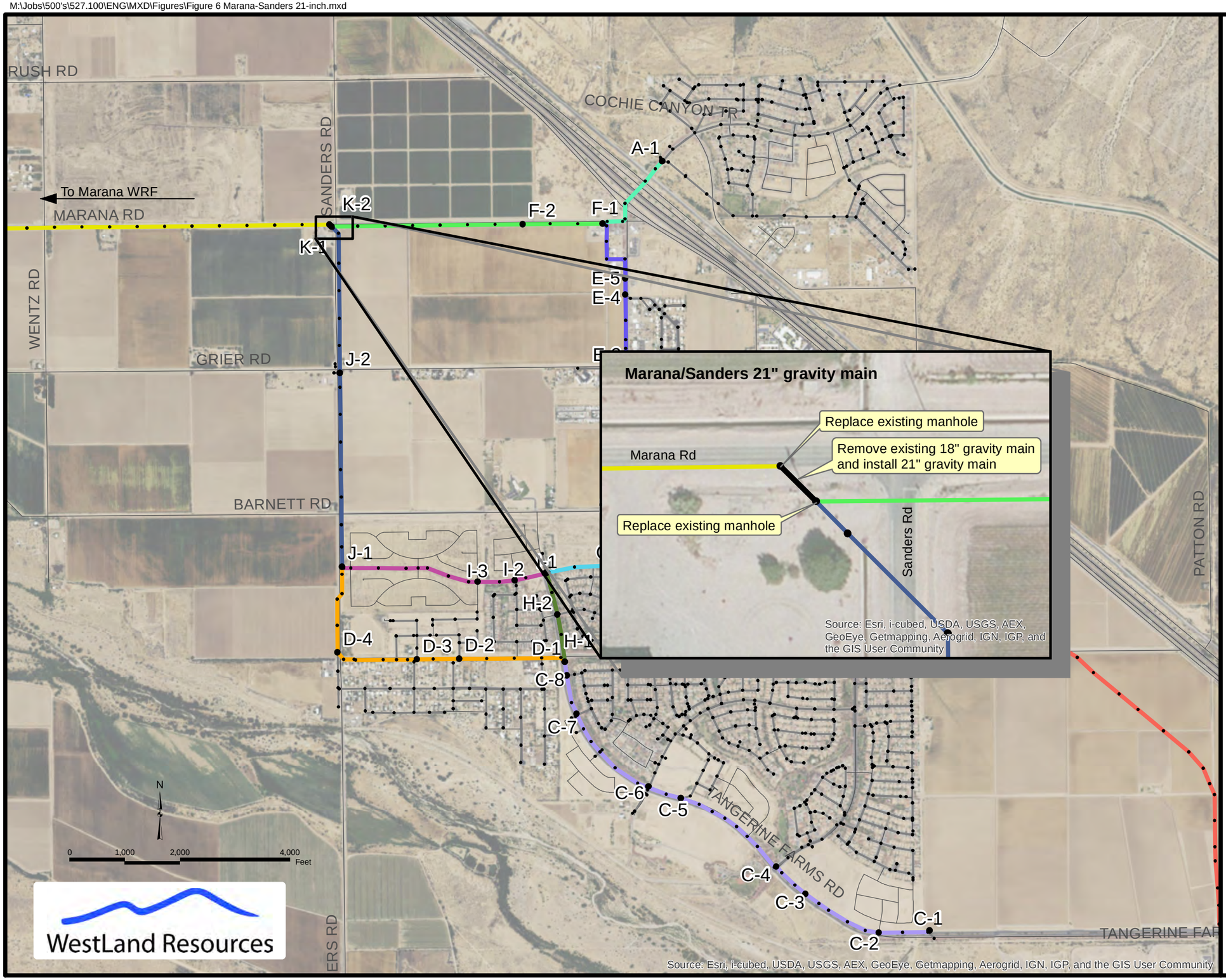

Legend

- Marana Town Limits
- Pima/Pinal County Line
- Manholes
- Collection Points
- Sewer Lines

Sewer Main Lines

- Branch A
- Branch B
- Branch C
- Branch D
- Branch E
- Branch F
- Branch G
- Branch H
- Branch I
- Branch J
- Branch K

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MARANA AZ
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2017 SEWER IMPACT FEE INFRASTRUCTURE IMPROVEMENT PLAN

Figure 6

Capital Improvements:
Marana/Sanders 21-inch Gravity Main

APPENDIX A

Opinions of Probable Construction Cost

WestLand Resources, Inc.

Engineering and Environmental Consultants

Project Name: Marana 2017 Impact Fee Study
Project No.: 527.100
Location: Marana, Arizona
Description: Clark Farms Blvd. Flow Split

Prepared by: MDO **Date:** 5/12/2017
Checked by: RJA **Date:** 5/12/2017
Client: Town of Marana

Item No.	Item Description	Unit	Quantity	Unit Price	Amount	Remarks
1	Remove existing 5' diameter manhole and replace with 5' diameter manhole with control structure	LS	1	$62,000	$62,000	Manhole at Sandario and Clark Farms Blvd.
2	Replace upstream manhole with 5' diameter manhole with control structure.	LS	1	$59,000	$59,000	Manhole at Clark Farms Blvd. on east side of Tangerine Farms Rd.
3	Replace downstream manhole with 5' diameter manhole.	LS	1	$57,000	$57,000	Manhole at Clark Farms Blvd. on east side of Tangerine Farms Rd.
4	Install new 12" diameter pipe. (Approximately 40 feet)	LS	1	$8,000	$8,000	
5	Flow Bypass	EA	2	$53,000	$106,000	
6	Paving Patches	LS	1	$53,000	$53,000	
	Subtotal				**$345,000**	
	Contingencies (20%)				$69,000	
	Design & Construction Management (15%)				$51,750	
	TOTAL PROJECT COSTS				**$465,750**	

WestLand Resources, Inc.

Engineering and Environmental Consultants

Project Name:	Marana 2017 Impact Fee Study	**Prepared by:**	MDO	**Date:**	5/12/2017
Project No.:	527.100	**Checked by:**	RJA	**Date:**	5/12/2017
Location:	Marana, Arizona	**Client:**	Town of Marana		
Description:	Marana/Sanders 21-inch Gravity Main				

Item No.	Item Description	Unit	Quantity	Unit Price	Amount	Remarks
1	Remove 5' diameter manhole and replace with 6' diameter manhole	EA	2	$37,000	$74,000	
2	Remove 18" diameter pipe and replace with 21" diameter pipe (90')	LS	1	$22,000	$22,000	
3	Prepare and patch road crossings for bypass piping.	LS	1	$18,000	$18,000	Installation, removal, and AC patch
4	Flow bypass	LS	1	$70,000	$70,000	
	Subtotal				**$184,000**	
	Contingencies (20%)				$36,800	
	Design & Construction Management (15%)				$27,600	
	TOTAL PROJECT COSTS				**$248,400**	