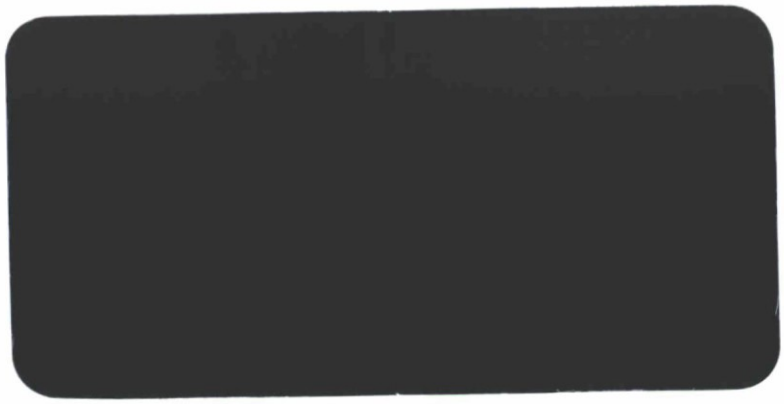

ACCEPTED AS FINAL

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: REZAUR RAHMAN
Date: 7/31/2017

17-DR-2017
07/12/2017

WOOD/PATEL
MISSION: CLIENT SERVICE™

WASTEWATER MASTER PLAN
BASIS OF DESIGN REPORT
FOR
DESERT MOUNTAIN PARCEL 19

April 11, 2017
WP# 164434

ACCEPTED AS FINAL

Accepted For:
City of Scottsdale
Water Resources Department
9379 E. San Salvador
Scottsdale, Arizona

By: REZAUR RAHMAN
Date: 7/31/2017

Prepared for:

DM19, LLC
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Submitted To:

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Prepared By:

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WOOD/PATEL
MISSION: CLIENT SERVICE®

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km
X:\Y-Drive\WP\Reports\Residential\164434 Desert Mountain Parcel 19 Wastewater Basis of Design Report.docx

1.0 INTRODUCTION

1.1 General Background and Project Location

Desert Mountain Parcel 19 (Site) is an approximate 91-acre proposed residential/golf course development in the City of Scottsdale, located between Cave Creek Road and existing church development on the south, Pima Road on the west, and the existing fire station and booster pump site and Desert Mountain development to the east and north (refer to Exhibit 1 – *Vicinity Map*). The property is located within Section 31, Township 6 North, Range 5 East, of the Gila and Salt River Meridian.

The Site is planned to include an 18-hole, short-game golf course, clubhouse, guardhouse, and residential housing. This Wastewater Master Plan / Basis of Design Report (Wastewater Master Plan/BOD) for the Site utilizes a site plan prepared concurrently by Greey | Pickett, dated February 24, 2017.

This Wastewater Master Plan/BOD Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale's technical requirements for wastewater collection systems, as applicable for the Site.

1.2 Scope of Wastewater Master Plan / Basis of Design Report

The purpose of this Wastewater Master Plan/BOD Report is to determine wastewater design flows, pipe sizes, and sewer line locations, as required to provide wastewater service to the proposed development. The required infrastructure identified includes wastewater collection system mains and outfall locations.

1.3 Full Build-Out Condition

The design criteria utilized to calculate wastewater design flows and determine required pipe sizes for the Site are based on projected full build-out conditions. The current zoning is Residential R-4 and OS ESL.

2.0 DESIGN DOCUMENTATION

2.1 Design Criteria

For the purpose of this Wastewater Master Plan/BOD Report, wastewater design flows and pipe-sizing criteria utilized are based on Wood/Patel's understanding of the following:

- Applicable wastewater system design criteria listed in the *City of Scottsdale Design Standards & Policies Manual*, dated January 2010; and
- Title 18, Chapter 9 of the *Arizona Administrative Code;*

Refer to Table 1 – *Wastewater Collection System Design Criteria* for detailed information regarding design criteria.

2.2 Wastewater Design Flows

Wastewater design flows for the Site were estimated using design criteria listed in Section 2.1 – *Design Criteria*. Wastewater design flows generated by the offsite and onsite areas are summarized as follows:

ANTICIPATED DESERT MOUNTAIN OFFSITE WASTEWATER FLOWS			
Type	**Adjacent Node**	**Average Daily Flow (gpd)**	**Peak Flow (gpd)**
Existing Fire Station	EX-MH-3	540	2,430
TOTAL		**540**	**2,430**

ANTICIPATED DESERT MOUNTAIN PARCEL 19 ONSITE WASTEWATER FLOWS TO PIMA ROAD			
Type	**Adjacent Nodes**	**Average Daily Flow (gpd)**	**Peak Flow (gpd)**
Proposed Single Family Residences	MH-1 to MH-30	47,500	190,000
Proposed Clubhouse	MH-31	20,000	90,000
Proposed Guardhouse	MH-36	340	1,020
TOTAL		**67,840**	**281,020**

Detailed design flow calculations are provided in Table 2 – *Offsite Wastewater Flows*, Table 3 – *Onsite Wastewater Design Flows,* and Table 4 – *Wastewater Model, Full Build-Out Condition.* Refer to Table 5 – *Calculated Pipe Capacities, Full Build-Out Condition* for pipe capacities. For the layout of the proposed wastewater collection system, refer to Exhibit 2 – *Wastewater Exhibit - Full Build-Out.*

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

The proposed project lies in the northern planning section of the City of Scottsdale. The Site generally slopes from east to west, at approximately 3 percent. Elevations range from 2,645 feet above mean sea level (MSL) in the east, to 2,585 feet MSL in the west. The Site is covered with typical Sonoran Desert vegetation including mesquite trees, saguaro cactus, creosote, etc. In addition, existing dirt roads to access the existing onsite wells are located throughout the Site.

3.2 Existing Offsite Wastewater Infrastructure

Relevant public wastewater collection systems near the Site include the following:

- An existing 18-inch gravity sewer located along Pima Road, from the north property boundary of the Site to Carefree Drive, connecting to an existing 21-inch gravity sewer from Carefree Drive to Cave Creek Drive.
- An existing 12-inch gravity sewer located northeast of the Site and connecting to the existing onsite 15-inch gravity sewer along the northern boundary of the Site.

According to the *2012 Water Reuse Master Plan*, wastewater generated on the Site will be treated at the Water Campus Water Reclamation Plant (WCWRP) located near Pima Road and the AZ Loop 101. The WCWRP is the primary treatment facility for wastewater generated in the northern portions of the City of Scottsdale.

3.3 Existing Onsite Wastewater Infrastructure

A portion of the Site has access roads to a City of Scottsdale Potable Water Booster Pump Station and existing well sites. It is Wood/Patel's understanding that no existing onsite wastewater infrastructure exists along these access roads. However, two (2) existing gravity sewers located within the Site include:

- An existing 15-inch gravity sewer located along the northern property boundary and connecting to the existing gravity sewer located in Pima Road.
- An existing 8-inch gravity sewer, which serves the existing fire stations, located along the Twilight Drive alignment and extending to the adjacent Cave Creek Road alignment. This existing gravity sewer then extends west along the southern property boundary to connect to the existing gravity sewer within Pima Road. Development of Parcel 19 proposes to abandon this portion of sewer.

4.0 PROPOSED WASTEWATER COLLECTION SYSTEM

4.1 Sewer Pipe Sizing

Pipes for the Site were sized to accommodate peak wet-weather flow conditions at full build-out for the Site. Using the design criteria previously mentioned, the resulting sewer system consists of gravity-fed, 8-inch sewer pipes. Refer to Exhibit 2 for the proposed wastewater collection system configuration.

4.2 Sewer Layout

The sewer layout generally follows the natural topography of the Site, sloping in a westerly direction. The proposed wastewater collection system meets the minimum depth of cover requirements established by the City of Scottsdale. The proposed wastewater collection system will outfall to the existing 21-inch sewer at two (2) locations. The first outfall location is near the intersection of Carefree Drive and Pima Road. The second outfall location is approximately 1,400 feet north of the intersection of Pima Road and Cave Creek Road.

5.0 CONCLUSIONS

This Wastewater Master Plan / Basis of Design Report, as presented, meets City of Scottsdale standards and requirements, and serves as a guide for construction documents associated with the proposed wastewater collection system. The following items highlight critical conclusions:

1. Wastewater design flows and proposed wastewater collection system for full build-out was analyzed.

2. The approximate average daily flow generated at full build-out by Desert Mountain Parcel 19 is 67,840 GPD, per section 2.2 of this report.

3. Onsite wastewater flows will outfall to the existing 21-inch gravity sewer along Pima Road at two (2) locations; the intersection of Carefree Drive and Pima Road, and approximately 1,400 feet north of the intersection of Pima Road and Cave Creek Road.

4. Wood/Patel's model of the proposed wastewater collection system provides system conveyance and capacity in conformance to City of Scottsdale's standards and Title 18, Chapter 9 of the *Arizona Administrative Code*.

5. It is Wood/Patel's understanding that the proposed wastewater collection system conforms to the City of Scottsdale's *2012 Water Reuse Master Plan.*

TABLE 1

WASTEWATER COLLECTION SYSTEM
DESIGN CRITERIA

TABLE 1 - WASTEWATER COLLECTION SYSTEM DESIGN CRITERIA

Project: Desert Mountain
Location: Scottsdale, AZ
References: 2010 City of Scottsdale Design Standards & Policies Manual

Proj. Number: 164434
Proj. Engineer: Mike Young, P.E.

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS

Description	Value	Units	Note(s)
General			
Minimum Full-Flow Velocity	2.5	ft/sec	1
Maximum Peak Flow Velocity	10	ft/sec	1
Minimum Cover on Sanitary Sewer Pipe	4	feet	1
Maximum Peak Flow Depth-to-Diameter Ratio (d/D) for Sewer Pipes 12 inches in Diameter or Less	0.65	-	1
Maximum Peak Flow Depth-to-Diameter Ratio (d/D) for Sewer Pipes Greater than 12 inches in Diameter	0.7		1
Minimum Pipe Diameter	8	in	1
Manning's "n" value	0.013	-	1
Peaking Factor (Single Family Residential for sanitary sewer lines 8 to 12 inches in diameter)	4.0		1
Peaking Factor (Resort Hotel)	4.5		1,2
Peaking Factor (Office)	3.0		1,3
Residential			
Average Day Wastewater Flow per Person (Pipes with 8 to 12 inch diameters)	100	GPD/person	1
Population Density	2.5	persons/du	1
Average Day Wastewater Flow per Dwelling Unit (Pipes with 8 to 12 inch diameters)	250	GPD/du	1
Average Day Wastewater Design Flows, Non-Residential			
Country Club Amenities (Resident Member)	100	GPD/Resident Member	4

Notes:

1. *Per City of Scottsdale Design Standards & Policies Manual*
2. This peaking factor was used for modeling the Clubhouse and Fire Station.
3. This peaking factor was used for modeling the Guardhouse.
4. Per Table 1- *Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9*

TABLE 2

OFFSITE WASTEWATER FLOWS

Project: Desert Mountain
Location: Scottsdale, Arizona

Proj. Number: 164434
Proj. Engineer: Mike Young, P.E.

OFFSITE LAND USE

Land Use	Non-Residential Acres	Population Density (employees/station)		Commercial/ Industrial/ Retail S.F.	Unit Daily Wastewater Flow (GPD/Employee)[1]		Total Avg Day (GPD)	Peaking Factor	Peak Wet Weather Flow (GPD)
Existing Fire Station	1	12	Employees	7,000	45	GPD/Employee	540	4.5	2,430
Offsite Totals							**540**		**2,430**

Notes:

1. Per Table 1- *Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9*

TABLE 3

ONSITE WASTEWATER DESIGN FLOWS

WOOD/PATEL **TABLE 3 -ONSITE WASTEWATER DESIGN FLOWS**

Project: Desert Mountain
Location: Scottsdale, Arizona

Proj. Number: 164434
Proj. Engineer: Mike Young, P.E.

PROPOSED 8-INCH SEWER DESIGN FLOWS

Land Use	No. of Dus	Residential Acres	Non-Residential Acres	Population Density (patrons/day)		Commercial/ Retail S.F.	Unit Daily Wastewater Flow (GPD/DU, Person)		Total Avg Day (GPD)	Peaking Factor	Peak Wet Weather Flow (GPD)
Single Family Residential	190	36.0	-	-	-	-	250	GPD/DU	47,500	4.0	190,000
Clubhouse	-	-	2.0	200	Patrons/Day[1]	5,000	100	GPD/Person	20,000	4.5	90,000
Guardhouse	-	-	0.1	-	-	850	0.4	GPD/sq. ft.	340	3.0	1,020
Total Onsite Wastewater Flow to Pima Road (GPD)	**190**	**36.0**	**2.1**			**5,000**			**67,840**		**281,020**

1) The estimated number of patrons utilizing the clubhouse daily, assumes a group of 4 patrons having a golf tee time every 15 mintues. Assuming the clubhouse is open for 12 hours, the total number of patrons is equal to 16 patrons/hour*12 hours=192 patrons/day. Adding 8 employees results in approximately 200 Patrons/Day utilizing the clubhouse.

TABLE 4

WASTEWATER MODEL
FULL BUILD-OUT CONDITION

Project: Desert Mountain
Location: Scottsdale, AZ
References: Arizona Administrative Code, Title 18, Chapter 9
City of Scottsdale 2009 Design Standards & Policies Manual, Chapter 7 Wastewater

Proj. Number: 164434
Proj. Engineer: Mike Young, P.E.

FROM NODE	TO NODE	SEWER AREA(S) SERVED/Number of Dus	PARCEL ADF (GPD)	TOTAL ADF (GPD)	PEAKING FACTOR	PEAK WET WEATHER FLOW (GPD)
OFFSITE WASTEWATER FLOWS						
EX-MH-3	MH-32	Fire Station	540	540	4.5	2,430
Total Offsite Flows			**540**	**540**		**2,430**
FULL BUILD OUT ONSITE WASTEWATER FLOWS						
MH-36	MH-35	Guardhouse	340	340	3.0	1,020
MH-35	MH-34	0	0	340	3.0	1,020
MH-34	MH-33	0	0	340	3.0	1,020
MH-33	MH-32	0	0	340	3.0	1,020
EX MH-3	MH-32	Fire Station	540	880	4.5	3,450
MH-32	MH-31	0	0	880	4.0	3,450
MH-31	MH-30	Clubhouse	20,000	20,880	4.5	93,450
MH-30	MH-29	4	1,000	21,880	4.0	97,450
MH-29	MH-28	4	1,000	22,880	4.0	101,450
MH-28	MH-27	12	3,000	25,880	4.0	113,450
MH-27	MH-26	12	3,000	28,880	4.0	125,450
MH-26	MH-25	10	2,500	31,380	4.0	135,450
MH-25	MH-24	6	1,500	32,880	4.0	141,450
MH-24	MH-23	15	3,750	36,630	4.0	156,450
MH-23	MH-22	8	2,000	38,630	4.0	164,450
MH-22	MH-21	8	2,000	40,630	4.0	172,450
MH-21	MH-20	4	1,000	41,630	4.0	176,450
MH-20	MH-15	4	1,000	42,630	4.0	180,450
MH-19	MH-18	6	1,500	1,500	4.0	6,000
MH-18	MH-17	8	2,000	3,500	4.0	14,000
MH-17	MH-16	5	1,250	4,750	4.0	19,000
MH-16	MH-15	0	0	4,750	4.0	19,000
MH-15	MH-14	6	1,500	48,880	4.0	205,450
MH-14	MH-13	5	1,250	50,130	4.0	210,450
MH-13	EX MH-2	0	0	50,130	4.0	210,450
MH-12	MH-11	7	1,750	1,750	4.0	7,000
MH-11	MH-10	5	1,250	3,000	4.0	12,000
MH-10	MH-9	4	1,000	4,000	4.0	16,000
MH-9	MH-8	0	0	4,000	4.0	16,000
MH-8	MH-7	0	0	4,000	4.0	16,000
MH-7	MH-3	0	0	4,000	4.0	16,000
MH-6	MH-5	8	2,000	2,000	4.0	8,000
MH-5	MH-4	12	3,000	5,000	4.0	20,000
MH-4	MH-3	13	3,250	8,250	4.0	33,000
MH-3	MH-2	12	3,000	15,250	4.0	61,000
MH-2	MH-1	12	3,000	18,250	4.0	73,000
MH-1	EX-MH-1	0	0	18,250	4.0	73,000
Totals		**190**	**-**	**68,380**		**283,450**
Total Onsite Flow to Pima Road Gravity Sewer (Pima Road & Carefree Drive)			**-**	**50,130**		**210,450**
Total Onsite and Offsite Flow to Pima Road Gravity Sewer (500 feet South of Short Putt Place)			**-**	**18,250**		**73,000**
Total Onsite and Offsite Flow to Pima Road Gravity Sewer			**-**	**68,380**		**283,450**

TABLE 5

CALCULATED PIPE CAPACITIES
FULL BUILD-OUT CONDITION

TABLE 5 - CALCULATED PIPE CAPACITIES, FULL BUILD-OUT CONDITION

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: Desert Mountain
Location: Scottsdale, Arizona
Proj. Number: 164434
Proj. Engineer Mike Young, P.E.

References Title 18, Chapter 9 of the Arizona Administrative Code
City of Scottsdale 2010 Design Standards & Policies Manual, Chapter 7 *Wastewater*

FROM NODE	TO NODE	NOTES	PIPE DIA. (INCHES)	MODELED PIPE SLOPE (FT / FT)	PIPE CAPACITY		PEAK FLOW RESULTS					
					GPD	GPM	PEAK WET WEATHER FLOW (GPD)	PEAK WET WEATHER FLOW (GPM)	d/D (WET WEATHER)	FLOW VELOCITY (FT/S) AT d/D=0.65	SURPLUS CAPACITY (WET WEATHER) (GPD)	PERCENT OF CAPACITY (WET WEATHER)
Offsite Pipe Sizes												
EX-MH-3	MH-32	Proposed	8	0.0100	789,641	548	2,430	2	0.04	3.8	787,211	0.3%
Full Build-Out Onsite Pipe Sizes												
MH-36	MH-35	Proposed	8	0.0265	1,263,426	877	1,020	1	0.02	6.1	1,262,406	0.1%
MH-35	MH-34	Proposed	8	0.0100	789,641	548	1,020	1	0.03	3.8	788,621	0.1%
MH-34	MH-33	Proposed	8	0.0100	789,641	548	1,020	1	0.03	3.8	788,621	0.1%
MH-33	MH-32	Proposed	8	0.0100	789,641	548	1,020	1	0.03	3.8	788,621	0.1%
EX MH-3	MH-32	Proposed	8	0.0100	789,641	548	3,450	2	0.05	3.8	786,191	0.4%
MH-32	MH-31	Proposed	8	0.0100	789,641	548	3,450	2	0.05	3.8	786,191	0.4%
MH-31	MH-30	Proposed	8	0.0100	789,641	548	93,450	65	0.24	3.8	696,191	11.8%
MH-30	MH-29	Proposed	8	0.0100	789,641	548	97,450	68	0.24	3.8	692,191	12.3%
MH-29	MH-28	Proposed	8	0.0100	789,641	548	101,450	70	0.24	3.8	688,191	12.8%
MH-28	MH-27	Proposed	8	0.0100	789,641	548	113,450	79	0.26	3.8	676,191	14.4%
MH-27	MH-26	Proposed	8	0.0100	789,641	548	125,450	87	0.27	3.8	664,191	15.9%
MH-26	MH-25	Proposed	8	0.0100	789,641	548	135,450	94	0.28	3.8	654,191	17.2%
MH-25	MH-24	Proposed	8	0.0100	789,641	548	141,450	98	0.29	3.8	648,191	17.9%
MH-24	MH-23	Proposed	8	0.0257	1,263,426	877	156,450	109	0.24	6.1	1,106,976	12.4%
MH-23	MH-22	Proposed	8	0.0196	1,105,498	768	164,450	114	0.26	5.4	941,048	14.9%
MH-22	MH-21	Proposed	8	0.0100	789,641	548	172,450	120	0.32	3.8	617,191	21.8%
MH-21	MH-20	Proposed	8	0.0100	789,641	548	176,450	123	0.32	3.8	613,191	22.3%
MH-20	MH-15	Proposed	8	0.0100	789,641	548	180,450	125	0.33	3.8	609,191	22.9%
MH-19	MH-18	Proposed	8	0.0100	789,641	548	6,000	4	0.06	3.8	783,641	0.8%
MH-18	MH-17	Proposed	8	0.0133	902,447	627	14,000	10	0.09	4.4	888,447	1.6%
MH-17	MH-16	Proposed	8	0.0100	789,641	548	19,000	13	0.11	3.8	770,641	2.4%
MH-16	MH-15	Proposed	8	0.0100	789,641	548	19,000	13	0.11	3.8	770,641	2.4%
MH-15	MH-14	Proposed	8	0.0100	789,641	548	205,450	143	0.35	3.8	584,191	26.0%
MH-14	MH-13	Proposed	8	0.0250	1,240,865	862	210,450	146	0.28	6.0	1,030,415	17.0%
MH-13	EX MH-2	Proposed	8	0.0200	1,105,498	768	210,450	146	0.29	5.4	895,048	19.0%
MH-12	MH-11	Proposed	8	0.0100	789,641	548	7,000	5	0.07	3.8	782,641	0.9%
MH-11	MH-10	Proposed	8	0.0100	789,641	548	12,000	8	0.09	3.8	777,641	1.5%
MH-10	MH-9	Proposed	8	0.0100	789,641	548	16,000	11	0.10	3.8	773,641	2.0%
MH-9	MH-8	Proposed	8	0.0238	1,218,304	846	16,000	11	0.08	5.9	1,202,304	1.3%
MH-8	MH-7	Proposed	8	0.0101	789,641	548	16,000	11	0.10	3.8	773,641	2.0%
MH-7	MH-3	Proposed	8	0.0100	789,641	548	16,000	11	0.10	3.8	773,641	2.0%
MH-6	MH-5	Proposed	8	0.0100	789,641	548	8,000	6	0.07	3.8	781,641	1.0%
MH-5	MH-4	Proposed	8	0.0326	1,421,354	987	20,000	14	0.08	6.9	1,401,354	1.4%
MH-4	MH-3	Proposed	8	0.0150	947,569	658	33,000	23	0.13	4.6	914,569	3.5%
MH-3	MH-2	Proposed	8	0.0213	1,150,620	799	61,000	42	0.16	5.6	1,089,620	5.3%
MH-2	MH-1	Proposed	8	0.0188	1,082,936	752	73,000	51	0.18	5.3	1,009,936	6.7%
MH-1	EX-MH-1	Proposed	8	0.0200	1,105,498	768	73,000	51	0.18	5.4	1,032,498	6.6%

EXHIBIT 1

VICINITY MAP

N

0 250 500

Horz. 1 in. = 500 ft.

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(602) 335-8500
WWW.WOODPATEL.COM

DESERT MOUNTAIN

EXHIBIT 1
VICINITY MAP

DATE:	SCALE:	SHEET
4/3/2017	1" = 500'	

EXHIBIT 2

WASTEWATER EXHIBIT – FULL BUILD-OUT

EX. 8"

EXISTING 15" SEWER TO REMAIN

EX. 15"

EX. 12"

MH-22

MH-23

MH-24

MH-25

MH-21

MH-20

MH-26

MH-15

MH-27

MH-14

MH-18

MH-16

MH-17

MH-19

EX. 18"

EX MH-2

MH-13

MH-28

MH-29

PROPOSED CONNECTION TO EXISTING 21" GRAVITY SEWER

Floodplain

MH-12

MH-30

PROPOSED CLUBHOUSE

MH-11

MH-31

MH-9

MH-10

MH-8

MH-32

EX-MH-3

EX. 21"

MH-7

MH-1

MH-33

MH-5

EXISTING FIRE STATION

MH-2

MH-3

MH-4

MH-34

MH-35

EX MH-1

MH-6

10.7 Ac.

MH-36

PROPOSED CONNECTION TO EXISTING 21" GRAVITY SEWER

EXISTING 8" SEWER TO BE ABANDONED

EX. 8"

PIMA ROAD

DESERT MOUNTAIN PARCEL 19 BOUNDARY

CAVE CREEEK ROAD

LEGEND

8"	PLANNED SEWER
8"	EXISTING SEWER
12"	EXISTING SEWER
15"	EXISTING SEWER
18"	EXISTING SEWER
21"	EXISTING SEWER

N

300 600

Horz. 1 in. = 300 ft.

NOT *FOR CONSTRUCTION OR RECORDING*

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DESERT MOUNTAIN P19

EXHIBIT 2- WASTEWATER EXHIBIT

DATE	SCALE	SHEET
4/3/2017	1" = 300'	1 OF 1
JOB NO. 164434	DESIGN RH	CHECK DC
	DRAWN SU	