MASTER WASTEWATER REPORT
FOR
DEVELOPMENT UNITS 8 & 9
AT
EASTMARK

January 15, 2014
WP# 123835.04

Mesa
REVIEWED BY CITY STAFF
BY
DATE 2/6/14

DMB® Master Developer Approval
EASTMARK.
Date 01/21/14
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Date Signed 1-16-14
ARIZONA, U.S.A.

Expires 6-30-16

WOOD/PATEL
MISSION: CLIENT SERVICE™

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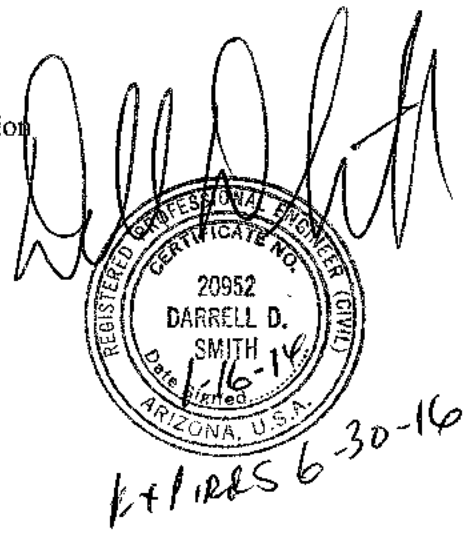

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1.0 INTRODUCTION

1.1 General Background and Project Location

The proposed Development Units 8 & 9 (Site) is anticipated to be an approximate 527-acre Development Unit (DU) within the 3,155-acre Eastmark master planned community, in Mesa, Arizona. It is a Planned Community District (PCD) which will include single-family residential, active-adult residential, various community uses, and open spaces.

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

The Site is located within portions of Section 26, Township 1 South, Range 7 East of the Gila and Salt River Meridian. The Site is bounded by Williams Field Road and Pacific Proving Grounds to the south, Ray Road and the Powerline Floodway on the north, Signal Butte Road to the east, and the Crismon Road alignment and Pacific Proving Grounds on the west (refer to Plate 1 – *Vicinity Map*).

1.2 Scope of the Master Wastewater Report

The DU 8 & 9 Master Wastewater Report presents wastewater design flows and sewer main sizes and locations, as required, to provide wastewater service to the Site during initial and full build-out conditions. The purpose of this report is to provide a sewer analysis to reflect the developed condition of DU 8 & 9 based on a Conceptual Land Use Plan provided by TerraWest Communities, LLC. It is the goal of this DU 8 & 9 Master Wastewater Report to identify the sewers required to serve the Site, while meeting the requirements of the City's Engineering and Design Standards.

Updates to the DU 8 & 9 Master Wastewater Report may be required if significant changes are made to the land uses and assumptions utilized to prepare this report. Additionally, design criteria may change based on actual wastewater generation to calculate demand on the system in the future.

1.3 Master Wastewater Plan for Eastmark

The *Master Wastewater Report Update for Eastmark*, by Wood, Patel & Associates, Inc., dated May 17, 2013, was submitted to the City of Mesa for review and approval. The master report set the design criteria required within Eastmark, and set sewer basin boundaries tributary to the Elliot Road, Warner Road, and Ray Road offsite sewers. The *Master Wastewater Report Update for Eastmark* is currently being updated by Wood/Patel to reflect the wastewater collection system within this report, in addition to new information for other development units within Eastmark, and will be submitted to the City of Mesa for review and re-approval.

1.4 Study Area and Development Units

The study area includes the Ray Road and Williams Field Road Sewer Drainage Basins, per the *City of Mesa Wastewater Master Plan Update*, *2009*. For a detailed breakdown of modeled land use areas, refer to the following:

- Table 2 – *Eastmark Modeled Land Use*
- Table 3 – *DU 8 & 9 Land Use, Full Build-Out Condition*
- Table 6 – *DU 8 & 9 Land Use, Phase 1*
- Plate 2 – *DU 8 & 9 Master Sewer Exhibit – Full Build-Out Condition*
- Plate 3 – *DU 8 & 9 Master Sewer Exhibit – Phase 1*

1.5 Basis of Design Reports for Specific Individual Developments

As development progresses within the Site, Basis of Design (BOD) reports are required for specific individual developments to ensure compliance with the Master Report and the Development Unit Master Report, and to identify significant variations in land use, wastewater flows, and the wastewater infrastructure needed to serve the parcel.

2.0 EXISTING CONDITIONS

2.1 Topographic Conditions

The majority of the Site is surrounded by undeveloped desert and test tracks along the northern and western boundaries. The Site is bordered on the east by Bella Via and SB105 subdivisions, which are currently under design. The land generally slopes in a southwesterly direction at approximately 0.5 to 1 percent. The peak elevation within the Site is approximately 1,435 feet above mean sea level (MSL), located near the intersection of Signal Butte Road and Ray Road. The lowest elevation within the Site is approximately 1,410 feet MSL, located near the future intersection of Williams Field and Crismon Roads.

2.2 Existing Offsite Wastewater Infrastructure

Existing public wastewater infrastructure in the vicinity of the Site includes the following:

- An existing 12-inch gravity sewer located along Mountain Road, between Elliot Road and Pecos Road.
- An existing 12-inch gravity sewer located along Signal Butte Road, between Elliot Road and Galveston Road.
- A 27-inch and 30-inch gravity sewer located along Ray Road, between Ellsworth Road and the East Mesa Interceptor (EMI).
- An 18-inch and 21-inch gravity sewer along the Ray Road alignment north of the Powerline Floodway, between Signal Butte Road and Ellsworth Road.

2.3 Onsite Wastewater Collection Systems

The sewer outfall for DU 8 & 9 shall be at the intersection of Ray Road and Inspirian Parkway. An 18-inch sewer line has been designed to extend east from an existing 21-inch sewer line in the south half-street of Ray Road, east of Ellsworth Road, to Inspirian Parkway. This line will be constructed prior to or concurrently with the Site to provide a sewer outfall.

3.0 WASTEWATER SYSTEM DESIGN

3.1 Design Criteria

Wastewater design flows and pipe-sizing criteria utilized in this DU 8 & 9 Master Wastewater Report are based on Wood/Patel's understanding of the following:

- The *Master Wastewater Report for Eastmark,*
- Applicable wastewater system design criteria listed in the *2012 City of Mesa Engineering & Design Standards,*
- Regionally accepted design standards,
- Title 18, Chapter 9 of the *Arizona Administrative Code.*

Table 1 – *Wastewater Design Criteria* presents the Unit Daily Wastewater Flow for each land use category, based on density and population. This design criterion is used in Table 3 – *DU 8 & 9 Land Use, Full Build-Out Condition* and Table 6 – *DU 8 & 9 Land Use, Phase 1* to determine the Unit Daily Wastewater Flow based on a conceptual land use plan. Parcels 9-1 through 9-7 are part of a proposed Active Adult community; therefore, the population density is assumed to be 2 persons per dwelling unit, in lieu of 3 persons per dwelling unit, as specified within the *City of Mesa Engineering & Design Standards* to reflect a realistic estimation of peak flows. The wastewater flow criteria are used to estimate the wastewater design flows and determine pipe sizes.

3.2 Wastewater Design Flows

Wastewater design flows for DU 8 & 9 are estimated using the design criteria listed above and the *City of Mesa 2025 General Plan*. Additionally, sewer service will be extended to the SB105 development, east of DU 8 & 9; therefore, wastewater flows from SB105 have been calculated and accounted for within this report. Projected full build-out average-day wastewater flows for DU 8 & 9 Full Build-Out and Phase 1 are summarized as follows, in millions of gallons per day (MGD):

Full Build-Out

	DU 8 & 9	Additional Eastmark	SB105	Offsite	**Total**
Ray Road Outfall:	0.28 MGD	0.57 MGD	0.08 MGD	1.04 MGD	**1.98 MGD**
Elliot Road Outfall:	0.00 MGD	0.76 MGD	0.00 MGD	0.00 MGD	**0.76 MGD**
Total:	**0.28 MGD**	**1.33 MGD**	**0.08 MGD**	**1.04 MGD**	**2.74 MGD**

Phase 1

	DU 8 & 9	Additional Eastmark	SB105	Offsite	**Total**
Ray Road Outfall:	0.12 MGD	0.57 MGD	0.00 MGD	1.04 MGD	**1.73 MGD**
Elliot Road Outfall:	0.00 MGD	0.76 MGD	0.00 MGD	0.00 MGD	**0.76 MGD**
Total:	**0.12 MGD**	**1.33 MGD**	**0.00 MGD**	**1.04 MGD**	**2.49 MGD**

Sewer pipe capacities are based upon conveying the flow at two-thirds of the pipe capacity. It is Wood/Patel's understanding that wet-weather infiltration is accounted for within the City of Mesa peaking factors listed in the *2012 City of Mesa Engineering & Design Standards*.

Detailed design flow calculations are provided in Table 4 – *Wastewater Model, Full Build-Out Condition,* Table 5 – *Calculated Pipe Capacities, Full Build-Out Condition,* Table 7 – *Wastewater Model, Phase 1,* and Table 8 – *Calculated Pipe Capacities, Phase 1*. Wood/Patel utilized criteria within the *2012 City of Mesa Engineering & Design Standards* based on static peaking methodology to calculate peak wet-weather flows for Eastmark. Static methodology is required by the City on an individual project basis to size onsite sewer lines.

It is our understanding the City utilized a diurnal peaking methodology to evaluate the overall tributary area, including Eastmark, to aid in the design of the Ray Road sewer line, from Ellsworth Road to the EMI. Diurnal peaking methodology is based on observed and/or estimated daily wastewater flow cycles for comparable developed areas, and is generally less conservative than static modeling resulting in lower peak flows. As a result, the peak wet-weather flows calculated in this report for Eastmark may vary from those used in designing the Ray Road sewer line. The controlling section of the Ray Road sewer is an offsite 30-inch pipe at 0.2 percent slope. The capacity of this pipe flowing full is 11.94 MGD, and at d/D = 0.9 is 12.7 MGD. Therefore, the peak wet-weather flows for Eastmark would not exceed the capacity of the Ray Road sewer.

4.0 PROPOSED SYSTEM

4.1 Planned Wastewater Infrastructure

DU 8 & 9 is proposed to contribute wastewater flow to the Ray Road Sewer Drainage Basin. Currently, the offsite Ray Road sewer has been constructed downstream of Eastmark, from Ellsworth Road to the EMI. The 18-inch Ray Road sewer, proposed to serve DU 8 & 9, is currently in the review process with the City of Mesa.

4.1.1 Ray Sewer Drainage Basin

The Ray Road Sewer Drainage Basin at Ellsworth Road receives flow from an existing diversion structure at Mountain Road. All flow north of Ray Road is currently diverted to the Ray Road Sewer, while flow from development south of Ray Road is conveyed south to Pecos Road. It is the City's intent to continue this mode of operation to provide additional capacity in the Pecos Road Sewer for future development along Pecos Road. This report considers the total design flow from the existing and proposed developments east of Eastmark for the Ray Road sewer contributing full build-out flow at this time. A portion of the upstream flow is accounted for per the *Master Wastewater Report for Ray Road Sewer between Ellsworth and Mountain Roads*, prepared by CMX, L.L.C., dated November 18, 2005. Additionally, SB105 has been included in the Ray Road Sewer Basin, which was previously included in the Williams Field Road Sewer Basin. Since the future Williams Field Road Sewer is planned to discharge into the Ray Road sewer at Ellsworth Road, the existing Ray Road Sewer west of Ellsworth Road was designed to accommodate wastewater flows from SB105. DU 7 is currently under construction, and is contributing wastewater flows to the Ray Road Sewer.

4.2 Pipe Sizing

Proposed sewer lines for the Site were sized to accommodate peak wet-weather flow conditions. The onsite collection system includes planned sewer mains with diameters ranging from 8 inches to 18 inches. Refer to Tables 4 and 5 for the Wastewater Model and Calculated Pipe Capacities, and Plate 2 for the planned DU 8 & 9 wastewater infrastructure.

4.3 Sewer Line Infrastructure Phasing

DU 8 & 9 is planned to be developed in phases. A preliminary phase (Phase 1) boundary is shown on Plate 3 – *Master Sewer Exhibit, Phase 1*. Phase 1 includes Parcels 8-1 through 8-5, and 9-1 through 9-3. The analysis in this report identified the required wastewater collection system infrastructure to provide service based on preliminary land use. Local sewer lines for future individual parcels have not been analyzed within this report. Approximately 6,100 linear feet of 18-inch sewer along Ray Road west of Inspirian Parkway, and along Inspirian Parkway south of Ray Road, will be constructed prior to or concurrently with DU 8 & 9 to provide a sewer outfall for the Site. The proposed main trunk line infrastructure is listed below:

Phase 1

- Proposed collection sewers from the intersection of Ray Road and Inspirian Parkway to the Phase 1 boundary through Parcel 9-1 and along proposed South Winchester, will consist of approximately:
  - 2,300 feet of 15-inch sewer
  - 500 feet of 12-inch sewer
  - 1,500 feet of 10-inch sewer

- Proposed Parcels 8-1 through 8-5 main collection sewer will consist of approximately:
  - 6,700 feet of 8-inch sewer

Remaining DU 8 & 9

- Proposed Parcels 8-6 through 8-9 main collection sewer consisting of approximately:
  - 2,200 feet of 8-inch sewer

- Proposed Parcels 9-4 through 9-7 collection sewer consisting of approximately:
  - 300 feet of 10-inch sewer
  - 4,100 feet of 8-inch sewer

5.0 CONCLUSIONS

The Master Wastewater Report for Development Units 8 & 9 at Eastmark presented herein meets City of Mesa standards and requirements, and serves as a guide for construction documents associated with the planned wastewater system. The following items highlight critical conclusions:

1. Development Units 8 & 9 is anticipated to be 469 acres within the 3,155-acre Eastmark master planned community annexed into the City of Mesa.

2. The wastewater system presented is based on the projected full build-out condition of the Site.

3. Wastewater design criteria are based on Wood/Patel's understanding of the *2012 City of Mesa Engineering & Design Standards*, regionally-accepted design standards, and Title 18, Chapter 9 of the *Arizona Administrative Code*.

4. The approximate average daily flow generated at build-out by the Site is 0.28 MGD, per Section 3.2 of this report.

5. Proposed onsite sewer mains are sized to accommodate peak wet-weather design flow for the full build-out condition.

6. The planned public wastewater collection systems outfall into existing and proposed gravity sewer lines located along Ray Road.

7. Wood/Patel's model of the proposed wastewater system provides conveyance and capacity in conformance with City of Mesa's standards, and Title 18 of the *Arizona Administrative Code*.

TABLE 1

Wastewater Design Criteria

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: 2012 City of Mesa Engineering Design Standards

Proj. Number: 123635.04
Proj. Engineer: Darrell Smith, P.E.

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS

LAND USE CATEGORY	LAND USE	DWELLING UNIT DENSITY VALUE	DWELLING UNIT DENSITY UNITS	POPULATION DENSITY VALUE	POPULATION DENSITY UNITS	PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA) Value	WASTEWATER DESIGN FLOWS (PER CAPITA) Units	UNIT DAILY WASTEWATER FLOWS Value	UNIT DAILY WASTEWATER FLOWS Units	NOTES
LDR-1	Low Density Residential (LDR 0-1)	0.5	DU / Acre	2.5	Persons/ DU	1.25	80	GPD/ Person	100	GPD/AC	Source: Dwelling unit density divisions are based on City of Mesa 2025 General Plan. Unit wastewater flows are based on the City of Mesa 2012 Engineering and Design Standards.
LDR-2	LDR 0-1 & LDR 1-2 AVG.	1	DU / Acre	2.5	Persons/ DU	2.50	80	GPD/ Person	200	GPD/AC	
LDR-3	Low Density Residential (LDR-1-2)	1.2	DU / Acre	3.0	Persons/ DU	3.60	80	GPD/ Person	288	GPD/AC	
MDR-1	Medium Density Residential (MDR 2-4)	3.0	DU / Acre	3.0	Persons/ DU	9.00	80	GPD/ Person	720	GPD/AC	
MDR-2	MDR 2-4 & MDR 4-6 AVG.	4	DU / Acre	3.1	Persons/ DU	12.50	80	GPD/ Person	1,000	GPD/AC	
MDR-3	Medium Density Residential (MDR 4-6)	5.0	DU / Acre	3.2	Persons/ DU	16.00	80	GPD/ Person	1,280	GPD/AC	
MDR-4	Medium Density Residential (MDR 6-10)	6.5	DU / Acre	2.7	Persons/ DU	17.55	80	GPD/ Person	1,404	GPD/AC	
HDR-1	High Density Residential (HDR 10-15)	11.0	DU / Acre	2.0	Persons/ DU	22.00	80	GPD/ Person	1,760	GPD/AC	
HDR-2	High Density Residential (HDR 15+)	17.0	DU / Acre	1.7	Persons/ DU	28.90	80	GPD/ Person	2,312	GPD/AC	
MUR-1	Mixed Use/Residential (MUR) Residential	15.0	DU / Acre	1.7	Persons/ DU	25.50	80	GPD/ Person	2,040	GPD/AC	

UNIT DAILY NON-RESIDENTIAL WASTEWATER FLOWS

LAND USE	DWELLING UNIT DENSITY VALUE	DWELLING UNIT DENSITY UNITS	POPULATION DENSITY VALUE	POPULATION DENSITY UNITS	PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA) Value	WASTEWATER DESIGN FLOWS (PER CAPITA) Units	UNIT DAILY WASTEWATER FLOWS Value	UNIT DAILY WASTEWATER FLOWS Units	NOTES
Hotel	--	--	--	--	--	--	--	150	GPD/ ROOM	Source: City of Mesa 2012 Engineering and Design Standards.
Commercial/Retail Office	--	--	23.0	Employees/ Acre	23.00	54	GPD/ Employee	1,242	GPD/ AC	
Education/Civic/ Church	--	--	15.0	Employees/ Acre	15.00	54	GPD/ Employee	810	GPD/ AC	

OFFSITE

LAND USE	DWELLING UNIT DENSITY VALUE	DWELLING UNIT DENSITY UNITS	POPULATION DENSITY VALUE	POPULATION DENSITY UNITS	PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA) Value	WASTEWATER DESIGN FLOWS (PER CAPITA) Units	UNIT DAILY WASTEWATER FLOWS Value	UNIT DAILY WASTEWATER FLOWS Units	NOTES
CC	--	--	14.0	Employees/ Acre	14.00	54	GPD/ Employee	756	GPD/ AC	Source: City of Mesa 2012 Engineering and Design Standards and the City of Mesa 2025 General Plan
O	--	--	23.0	Employees/ Acre	23.00	54	GPD/ Employee	1,242	GPD/ AC	
RC	--	--	14.0	Employees/ Acre	14.00	54	GPD/ Employee	756	GPD/ AC	
BPI	--	--	8.0	Employees/ Acre	8.00	54	GPD/ Employee	432	GPD/ AC	
NC	--	--	11.0	Employees/ Acre	11.00	54	GPD/ Employee	594	GPD/ AC	
LI	--	--	7.0	Employees/ Acre	7.00	54	GPD/ Employee	378	GPD/ AC	
MUE	--	--	15.0	Employees/ Acre	15.00	54	GPD/ Employee	810	GPD/ AC	
GI	--	--	15.0	Employees/ Acre	15.00	54	GPD/ Employee	810	GPD/ AC	
OFFUPSTREAM	1,040,576 GPD / 1470 Acres = 708 GPD/AC							708	GPD/ AC	Source: *Master Wastewater Report for Ray Road Sewer Between Ellsworth and Mountain Roads*, by CMX, 11/18/2005.

Description	Value	Units	Note(s)
General			
Minimum Velocity (d/D=2/3)	2	ft/sec	1
Maximum Flow Velocity (d/D=2/3)	9	ft/sec	1
Maximum Peak Flow Depth-to-Diameter Ratio (d/D)	0.67	-	
Minimum Pipe Diameter	8	in	1
Manning's "n" value	0.013	-	2
Peaking Factor (ADF< 1.0 MGD)	3		1
Peaking Factor (1.0 < ADF< 10.0 MGD)	2.5		1
Peaking Factor (10.0 < ADF< 20.0 MGD)	2.3		1

Notes:
1. *Per The City of Mesa 2012 Engineering & Design Standards*
2. Title 18, Chapter 9 of the Arizona Administrative Code

TABLE 2

Eastmark Modeled Land Use

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

EASTMARK - PRELIMINARY RESIDENTIAL LAND USE AND DWELLING UNIT BREAKDOWN

Land Use	LDR-2	LDR-3	MDR-1	MDR-2	MDR-3	MDR-4	HDR-1	HDR-2	**Residential Total**	Mixed Use Residential Units	**Total Residential Units**
Acreage	--	20.0	726.7	22.4	148.4	--	37.3	--	**954.8**	--	--
Dwelling Units	--	39	2,364	90	669	--	410	--	**3,572**	--	**3,572**

EASTMARK - WASTEWATER FLOW CALCULATIONS

Development Unit	Total Area (AC)	Residential (AC)	Total Dwelling Units	Keys[1]	Gross Non-Residential[2][5] (AC)	Total Floor Area (sq. ft.)	Education (AC)	Church (AC)	Civic (AC)	Other (AC)	Golf (AC)	Avg. Day Wastewater Flow (GPD)	Development Unit Flow Area (AC)	Unit Daily Wastewater Flow[3] (GPD/AC)
1	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
6	65.0	--	--	--	65.0	1,340,000	--	--	--	--	--	759,168	65.0	11,680
7	581.5	504.7	2,129	--	5.5	15,000	20.0	13.5	2.5	35.3	--	524,952	581.5	903
8	198.8	192.0	535	--	--	--	--	--	--	6.8	--	128,400	198.8	646
9	270.5	258.1	908	--	--	--	--	--	12.4	--	--	155,324	270.5	574
Subtotal:	**1,115.8**	**954.8**	**3,572**	--	**70.5**	**1,355,000**	**20.0**	**13.5**	**14.9**	**42.1**	--	**1,567,844**	**1,115.8**	—

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS[4]

LAND USE CATEGORY	UNIT DAILY WASTEWATER FLOWS Value	Units
LDR-1	100	GPD/AC
LDR-2	200	GPD/AC
LDR-3	288	GPD/AC
MDR-1	720	GPD/AC
MDR-2	1,000	GPD/AC
MDR-3	1,280	GPD/AC
MDR-4	1,404	GPD/AC
HDR-1	1,760	GPD/AC
HDR-2	2,312	GPD/AC
MUR-1	2,040	GPD/AC

UNIT DAILY NON-RESIDENTIAL WASTEWATER FLOWS[6]

LAND USE	UNIT DAILY WASTEWATER Value	Units
Hotel	150	GPD/ROOM
Commercial / Retail / Office (Net Area)	1,242	GPD/AC
Education/Civic/ Church	810	GPD/AC

[1] Anticipated number of "Keys" represents hotel and resort uses. This includes approximately 8 acres within DU-1 and 133 acres within DU-5.

[2] Non-residential wastewater flows are calculated based on net non-residential acreage.

[3] Unit daily wastewater flow calculations do not include golf course acreage.

[4] See Table 1 - Wastewater Design Criteria for additional design criteria information.

[6] Non-residential acreage of approximately 260 acres for the First Solar site is not represented within Table 4 as it drains to the Elliot Road Sewer.

Abbreviations:
AC = Acres
GPD = Gallons Per Day
GPD/AC = Gallons Per Day Per Acre

TABLE 3

DU 8 & 9 Land Use, Full Build-Out Condition

WOOD/PATEL **TABLE 3 - DU 8 & 9 LAND USE, FULL BUILD-OUT CONDITION**

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN

Parcel	No. of DUs	Residential Acres	Density (DU/AC)	Non-Residential Acres	Land Use	Population Density (persons/ DU or Acre)	Total Population	GPDC	Avg Day	Total Avg Day
8-1	74	22.9	3.23	--	MDR-1	3	222	80	17,760	17,760
8-2	87	30.0	2.90	--	MDR-1	3	261	80	20,880	20,880
8-3	64	24.7	2.59	--	MDR-1	3	192	80	15,360	15,360
8-4	42	20.9	2.01	--	MDR-1	3	126	80	10,080	10,080
8-5	--	--	--	6.8	PARK	--	--	--	--	--
8-6	91	23.6	3.86	--	MDR-1	3	273	80	21,840	21,840
8-7	74	28.2	2.62	--	MDR-1	3	222	80	17,760	17,760
8-8	39	20.0	1.95	--	LDR-3	3	117	80	9,360	9,360
8-9	64	21.7	2.95	--	MDR-1	3	192	80	15,360	15,360
9-1	189	54.0	3.50	--	MDR-1	2	378	80	30,240	30,240
9-2	99	31.8	3.11	--	MDR-1	2	198	80	15,840	15,840
9-3	--	--	--	12.4	CIVIC	15	186	54	10,044	10,044
9-4	159	49.4	3.22	--	MDR-1	2	318	80	25,440	25,440
9-5	145	39.8	3.64	--	MDR-1	2	290	80	23,200	23,200
9-6	90	22.4	4.02	--	MDR-2	2	180	80	14,400	14,400
9-7	226	60.7	3.72	--	MDR-1	2	452	80	36,160	36,160
DU 8 & 9 Totals	**1443**	**450.1**		**19.2**			**3607**		**283,724**	**283,724**

1) Parcels 9-1 through 9-7 are part of a proposed Active Adult community therefore the assumption of 2 persons per dwelling unit in lieu of 3 persons per dwelling unit for the population density would produce a more accurate estimation of peak flows.

TABLE 4

Wastewater Model, Full Build-Out Condition

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: City of Mesa 2012 Engineering and Design Standards
Arizona Administrative Code, Title 18, Chapter 9

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	SEWER AREA(S)/PARCEL SERVED	AREA SERVED (ACRES)	UNIT FLOW (GPD/AC)	PARCEL ADF (GPD)	SEWER NODE ADF (GPD)	TOTAL ADF (GPD)	PEAKING FACTOR	PEAK WET WEATHER FLOW (GPD)
Ray Road Onsite And Offsite Upstream Wastewater Flows									
R21	R19	7-8	25.3	1,173	29,680	61,382	61,382	3.0	184,146
		7-9	7.5	814	6,102				
		7-11	19.1	1,340	25,600				
R24	R19	7-6	26.8	699	18,720	95,200	95,200	3.0	285,600
		7-7	31.4	795	24,960				
		7-10	25.4	1,090	27,680				
		7-12	19.6	1,216	23,840				
R19	R22	--	--	--	--	--	156,582	3.0	469,746
R22	R23	7-13	20.1	1,043	20,960	112,940	269,522	3.0	808,566
		7-14	17.3	1,757	30,400				
		7-15	18.1	1,189	21,520				
		7-23	20.0	1,760	35,200				
		7-24	6.0	810	4,860				
R23	R26	7-16	25.4	945	24,000	58,920	328,442	3.0	985,326
		7-17	23.4	800	18,720				
		7-22	20.0	810	16,200				
		7-27	35.3	--	--				
R26	R27	7-18	28.9	706	20,400	92,430	420,872	3.0	1,262,616
		7-19	25.1	937	23,520				
		7-20	20.1	955	19,200				
		7-21	22.1	923	20,400				
		7-25	2.5	821	2,052				
		7-26	5.5	1,247	6,858				
R46	R45	OFFUPSTREAM FIRST SOLAR PHASE 1 ADMIN	1,473	707	1,041,710	1,145,632	1,145,632	2.5	2,864,080
		7-1	15	3,200	48,002				
		7-4	21.0	926	19,440				
		7-5	34.8	579	20,160				
		7-2	26.9	607	16,320				
R45	R27	7-3	20.8	1,058	22,000	48,160	1,193,792	2.5	2,984,480
			33.1	790	26,160				
R27	R12	--	--	--	--	--	1,614,664	2.5	4,036,660
R12	R11	--	--	--	--	--	1,614,664	2.5	4,036,660
R11	R2	--	--	--	--	--	1,614,664	2.5	4,036,660
R42	R41	SB105	99.1	840	83,280	83,280	83,280	3.0	249,840
R41	R40	9-6	22.4	643	14,400	14,400	97,680	3.0	293,040
R40	R35	9-2	31.8	498	15,840	25,884	123,564	3.0	370,692
		9-3	12.4	810	10,044				
R36C	R36A	9-7	60.7	596	36,160	48,800	48,800	3.0	146,400
		18% of 9-5	7.2	578	4,160				
		33% of 9-4	16.3	520	8,480				
R36B	R36A	82% of 9-5	32.6	584	19,040	36,000	36,000	3.0	108,000
		67% of 9-4	33.1	512	16,960				
R36A	R35	---	--	--	--	--	84,800	3.0	254,400
R35	R34	---	--	--	--	--	208,364	3.0	625,092
R34	R32	18% of 9-1	9.7	561	5,440	5,440	213,804	3.0	641,412
R39	R38A	8-6	23.6	925	21,840	58,320	58,320	3.0	174,960
		8-7	28.2	630	17,760				
		42% of 8-3	10.4	623	6,480				
		8-5	6.8	--	--				
		67% of 8-4	14.0	480	6,720				
		26% of 8-2	6.4	863	5,520				
R38B	R38A	58% of 8-3	14.3	621	8,880	38,400	38,400	3.0	115,200
		56% of 8-2	16.8	700	11,760				
		8-1	22.9	776	17,760				
R38A	R33	---	--	--	--	--	96,720	3.0	290,160
R37	R33	8-9	21.7	708	15,360	31,680	31,680	3.0	95,040
		8-8	20.0	468	9,360				
		33% of 8-4	6.9	487	3,360				
		18% of 8-2	5.4	667	3,600				
R33	R32	---	--	--	--	--	128,400	3.0	385,200
R32	R31	42% of 9-1	22.7	557	12,640	12,640	354,844	3.0	1,064,532
R31	R30	40% of 9-1	21.6	563	12,160	12,160	367,004	3.0	1,101,012
R30	R2	---	--	--	--	--	367,004	3.0	1,101,012
R2	R1A	---	--	--	--	--	1,981,668	2.5	4,954,170

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: City of Mesa 2012 Engineering and Design Standards
Arizona Administrative Code, Title 18, Chapter 9

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	SEWER AREA(S)/PARCEL SERVED	AREA SERVED (ACRES)	UNIT FLOW (GPD/AC)	PARCEL ADF (GPD)	SEWER NODE ADF (GPD)	TOTAL ADF (GPD)	PEAKING FACTOR	PEAK WET WEATHER FLOW (GPD)
Ray Road Onsite And Offsite Upstream Wastewater Flows									
R1A	R1	--	--	--	--	--	1,981,668	2.5	4,954,170
R1	RAY ROAD SEWER	--	--	--	--	--	1,981,668	2.5	4,954,170
Total DU 8 & 9 Flow to Ray Road Sewer			**469.3**		**283,724**	**283,724**	**283,724**		**851,172**
Total Eastmark Flow to Ray Road Sewer			**2543.4**		**856,678**	**856,678**	**856,678**		**2,570,034**
Total Flow to Ray Road Outfall at Ellsworth Road			**2636.5**		**1,981,668**	**1,981,668**	**1,981,668**		**4,954,170**

TABLE 5

Calculated Pipe Capacities, Full Build-Out Condition

WOOD/PATEL

TABLE 5 - CALCULATED PIPE CAPACITIES, FULL BUILD OUT CONDITION

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: ADEQ Bulletin No. 11
City of Mesa 2012 Engineering and Design Standards

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	NOTES	PIPE DIA. (INCHES)	MODELED PIPE SLOPE (FT / FT)	PIPE CAPACITY (GPD)	PEAK FLOW RESULTS				
						PEAK WET WEATHER FLOW (GPD)	d/D (WET WEATHER)	FLOW VELOCITY (FT/S) AT d/D=2/3	SURPLUS CAPACITY (WET WEATHER) (GPD)	PERCENT OF CAPACITY (WET WEATHER)
Ray Road Basin Pipe Sizes										
R21	R19		12	0.0045	1,522,778	184,146	0.24	3.3	1,338,632	12.1%
R24	R19		8	0.0050	564,029	285,600	0.50	2.8	278,429	50.6%
R19	R22		12	0.0045	1,522,778	469,746	0.39	3.3	1,053,032	30.8%
R22	R23		15	0.0020	1,903,379	808,566	0.45	2.7	1,094,813	42.5%
R23	R26		15	0.0020	1,903,379	985,326	0.51	2.7	918,053	51.8%
R26	R27		15	0.0020	1,903,379	1,262,616	0.59	2.7	640,763	66.3%
R46	R45		18	0.0094	6,623,956	2,864,080	0.46	6.4	3,759,876	43.2%
R45	R27		18	0.0070	5,710,307	2,984,480	0.51	5.5	2,725,827	52.3%
R27	R12		21	0.0029	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R12	R11		21	0.0030	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R11	R2		21	0.0030	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R42	R41		10	0.0027	740,224	249,840	0.40	2.3	490,384	33.8%
R41	R40		10	0.0027	740,224	293,040	0.43	2.3	447,184	39.6%
R40	R35		10	0.0027	740,224	370,692	0.50	2.3	369,532	50.1%
R36C	R36A		8	0.0033	451,224	146,400	0.39	2.2	304,824	32.4%
R36B	R36A		8	0.0033	451,224	108,000	0.34	2.2	343,224	23.9%
R36A	R35		10	0.0025	704,975	254,400	0.42	2.2	450,575	36.1%
R35	R34		12	0.0025	1,167,463	625,092	0.53	2.5	542,371	53.5%
R34	R32		15	0.0014	1,586,149	641,412	0.44	2.2	944,737	40.4%
R39	R38A		8	0.0038	473,785	174,960	0.43	2.3	298,825	36.9%
R38B	R38A		8	0.0098	767,080	115,200	0.27	3.8	651,880	15.0%
R38A	R33		8	0.0127	879,886	290,160	0.40	4.3	589,726	33.0%
R37	R33		8	0.0038	473,785	95,040	0.31	2.3	378,745	20.1%
R33	R32		8	0.0040	496,346	385,200	0.67	2.4	111,146	77.6%
R32	R31		15	0.0014	1,586,149	1,064,532	0.60	2.2	521,617	67.1%
R31	R30		18	0.0011	2,284,123	1,101,012	0.48	2.2	1,183,111	48.2%
R30	R2		18	0.0011	2,284,123	1,101,012	0.48	2.2	1,183,111	48.2%
R2	R1A		21	0.0046	6,995,087	4,954,170	0.62	5.0	2,040,917	70.8%
R1A	R1	PER PLAN	24	0.0081	13,197,121	4,954,170	0.42	7.2	8,242,951	37.5%

NOTES:

TABLE 6

DU 8 & 9 Land Use, Phase 1

TABLE 6 - DU 8 & 9 LAND USE, PHASE 1

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN

Parcel	No. of DUs	Residential Acres	Density (DU/AC)	Non-Residential Acres	Land Use	Population Density (persons/ DU or Acre)	Total Population	GPDC	Avg Day	Total Avg Day
8-1	74	22.9	3.23	--	MDR-1	3	222	80	17,760	17,760
8-2	87	30.0	2.90	--	MDR-1	3	261	80	20,880	20,880
8-3	64	24.7	2.59	--	MDR-1	3	192	80	15,360	15,360
8-4	42	20.9	2.01	--	MDR-1	3	126	80	10,080	10,080
8-5	--	--	--	6.8	PARK	--	--	--	--	--
9-1	189	54.0	3.50	--	MDR-1	2	378	80	30,240	30,240
9-2	99	31.8	3.11	--	MDR-1	2	198	80	15,840	15,840
9-3	--	--	--	12.4	CIVIC	15	186	54	10,044	10,044
DU 8 & 9 Totals	**555**	**184.3**		**19.2**			**1563**		**120,204**	**120,204**

1) Parcels 9-1 through 9-2 are part of a proposed Active Adult community therefore the assumption of 2 persons per dwelling unit in lieu of 3 persons per dwelling unit for the population density would produce a more accurate estimation of peak flows.

TABLE 7

Wastewater Model, Phase 1

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: City of Mesa 2012 Engineering and Design Standards
Arizona Administrative Code, Title 18, Chapter 9

Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	SEWER AREA(S)/PARCEL SERVED	AREA SERVED (ACRES)	UNIT FLOW (GPD/AC)	PARCEL ADF (GPD)	SEWER NODE ADF (GPD)	TOTAL ADF (GPD)	PEAKING FACTOR	PEAK WET WEATHER FLOW (GPD)
Ray Road Onsite And Offsite Upstream Wastewater Flows									
R21	R19	7-8	25.3	1,173	29,680	61,382	61,382	3.0	184,146
		7-9	7.5	814	6,102				
		7-11	19.1	1,340	25,600				
R24	R19	7-6	26.8	699	18,720	95,200	95,200	3.0	285,600
		7-7	31.4	795	24,960				
		7-10	25.4	1,090	27,680				
		7-12	19.6	1,216	23,840				
R19	R22	--	--	--	--	--	156,582	3.0	469,746
R22	R23	7-13	20.1	1,043	20,960	112,940	269,522	3.0	808,566
		7-14	17.3	1,757	30,400				
		7-15	18.1	1,189	21,520				
		7-23	20.0	1,760	35,200				
		7-24	6.0	810	4,860				
R23	R26	7-16	25.4	945	24,000	58,920	328,442	3.0	985,326
		7-17	23.4	800	18,720				
		7-22	20.0	810	16,200				
		7-27	35.3	--	--				
R26	R27	7-18	26.8	706	20,400	92,430	420,872	3.0	1,262,616
		7-19	25.1	937	23,520				
		7-20	20.1	955	19,200				
		7-21	22.1	923	20,400				
		7-25	2.5	821	2,052				
		7-26	5.5	1,247	6,858				
R46	R45	OFFUPSTREAM[1]	1,373	707	1,041,710	1,145,632	1,145,632	2.5	2,864,080
		FIRST SOLAR PHASE 1 ADMIN	15	3,200	48,002				
		7-1	21.0	926	19,440				
		7-4	34.6	679	20,160				
		7-5	26.9	607	16,320				
R45	R27	7-2	20.8	1,058	22,000	48,160	1,193,792	2.5	2,984,480
		7-3	33.1	790	26,160				
R27	R12	--	--	--	--	--	1,614,664	2.5	4,036,660
R12	R11	--	--	--	--	--	1,614,664	2.5	4,036,660
R11	R2	--	--	--	--	--	1,614,664	2.5	4,036,660
R41	R40	--	--	--	--	--	--	3.0	--
R40	R35	9-2	31.8	498	15,840	25,884	25,884	3.0	77,652
		9-3	12.4	810	10,044				
R35	R34	---	--	--	--	--	25,884	3.0	77,652
R34	R32	18% of 9-1	9.7	561	5,440	5,440	31,324	3.0	93,972
R39	R38A	42% of 8-3	10.4	623	6,480	18,720	18,720	3.0	56,160
		8-5	6.8	--	--				
		67% of 8-4	14.0	480	6,720				
		26% of 8-2	7.8	708	5,520				
R38B	R38A	58% of 8-3	14.3	621	8,880	38,400	38,400	3.0	115,200
		56% of 8-2	16.8	700	11,760				
		8-1	22.9	776	17,760				
R38A	R33	---	--	--	--	--	57,120	3.0	171,360
R37	R33	33% of 8-4	6.9	487	3,360	6,960	6,960	3.0	20,880
		18% of 8-2	5.4	667	3,600				
R33	R32	---	--	--	--	--	64,080	3.0	192,240
R32	R31	42% of 9-1	22.7	557	12,640	12,640	108,044	3.0	324,132
R31	R30	40% of 9-1	21.6	563	12,160	12,160	120,204	3.0	360,612
R30	R2	---	--	--	--	--	120,204	3.0	360,612
R2	R1A	--	--	--	--	--	1,734,868	2.5	4,337,170
R1A	R1	---	--	--	--	--	1,734,868	2.5	4,337,170
R1	RAY ROAD SEWER	--	--	--	--	--	1,734,868	2.5	4,337,170
Total DU 8 & 9 Phase 1 Flow to Ray Road Sewer			**203.5**		**120,204**	**120,204**	**120,204**		**360,612**
Total Eastmark Flow to Ray Road Sewer			**2279.0**		**693,158**	**693,158**	**693,158**		**2,079,474**
Total Flow to Ray Road Outfall at Ellsworth Road			**2273.0**		**1,734,868**	**1,734,868**	**1,734,868**		**4,337,170**

TABLE 8

Calculated Pipe Capacities, Phase 1

WOOD/PATEL

TABLE 8 - CALCULATED PIPE CAPACITIES, PHASE 1

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: DU 8 & 9 at Eastmark
Location: Mesa, Arizona
References: ADEQ Bulletin No. 11
City of Mesa 2012 Engineering and Design Standards

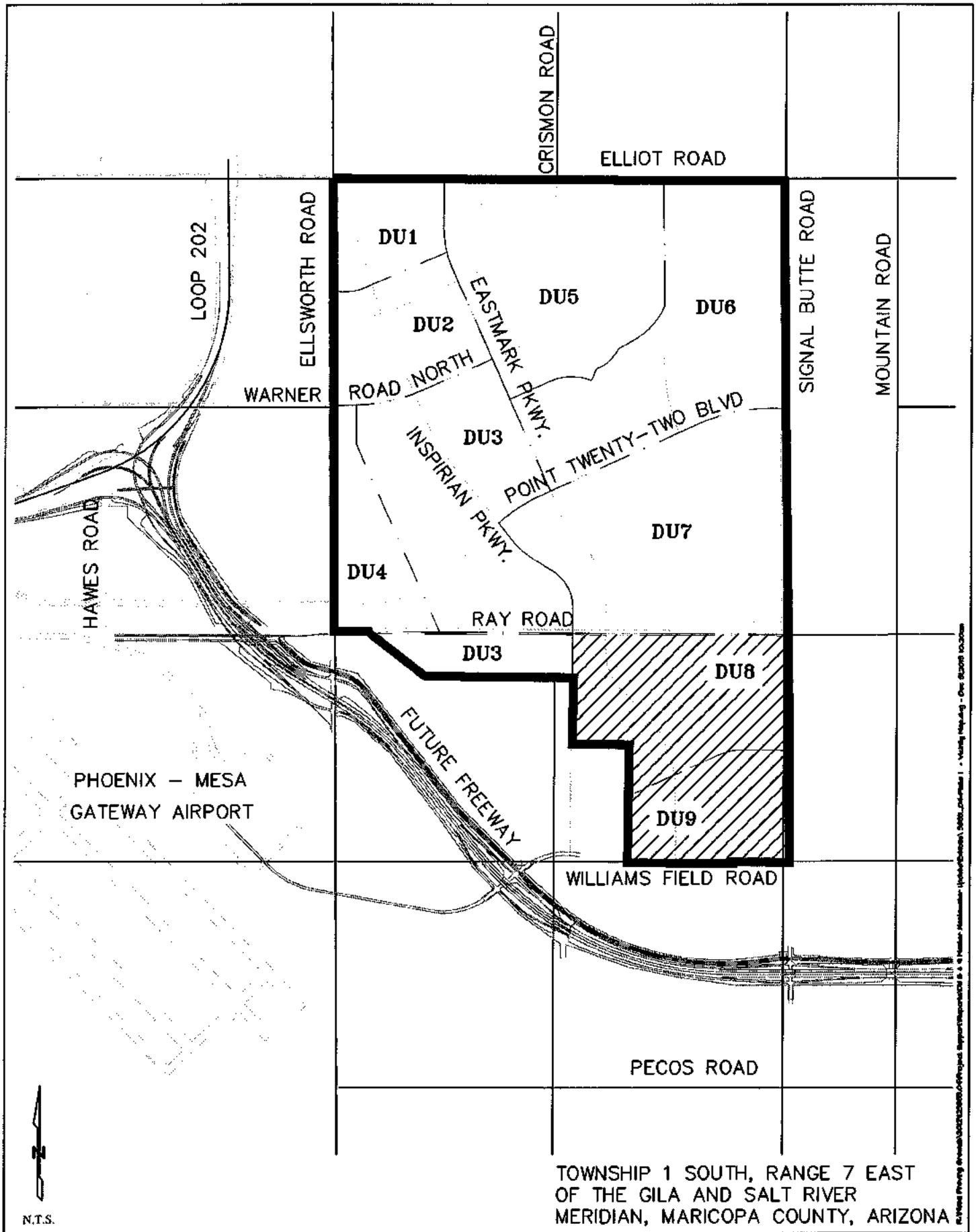
Proj. Number: 123835.04
Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	NOTES	PIPE DIA. (INCHES)	MODELED PIPE SLOPE (FT / FT)	PIPE CAPACITY (GPD)	PEAK FLOW RESULTS				
						PEAK WET WEATHER FLOW (GPD)	d/D (WET WEATHER)	FLOW VELOCITY (FT/S) AT d/D=2/3	SURPLUS CAPACITY (WET WEATHER) (GPD)	PERCENT OF CAPACITY (WET WEATHER)
Ray Road Basin Pipe Sizes										
R21	R19		12	0.0045	1,522,778	184,146	0.24	3.3	1,338,632	12.1%
R24	R19		8	0.0050	564,029	285,600	0.50	2.8	278,429	50.6%
R19	R22		12	0.0045	1,522,778	469,746	0.39	3.3	1,053,032	30.8%
R22	R23		15	0.0020	1,903,379	808,566	0.45	2.7	1,094,813	42.5%
R23	R26		15	0.0020	1,903,379	985,326	0.51	2.7	918,053	51.8%
R26	R27		15	0.0020	1,903,379	1,262,616	0.59	2.7	640,763	66.3%
R46	R45		18	0.0094	6,623,956	2,864,080	0.46	6.4	3,759,876	43.2%
R45	R27		18	0.0070	5,710,307	2,984,480	0.51	5.5	2,725,827	52.3%
R27	R12		21	0.0029	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R12	R11		21	0.0030	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R11	R2		21	0.0030	5,596,069	4,036,660	0.63	4.0	1,559,409	72.1%
R41	R40		10	0.0027	740,224	0	0.00	2.3	740,224	0.0%
R40	R35		10	0.0027	740,224	77,652	0.22	2.3	662,572	10.5%
R35	R34		12	0.0025	1,167,463	77,652	0.18	2.5	1,089,811	6.7%
R34	R32		15	0.0014	1,586,149	93,972	0.16	2.2	1,492,177	5.9%
R39	R38A		8	0.0038	473,785	56,160	0.23	2.3	417,625	11.9%
R38B	R38A		8	0.0098	767,080	115,200	0.27	3.8	651,880	15.0%
R38A	R33		8	0.0127	879,886	171,360	0.30	4.3	708,526	19.5%
R37	R33		8	0.0038	473,785	20,880	0.14	2.3	452,905	4.4%
R33	R32		8	0.0040	496,346	192,240	0.43	2.4	304,106	38.7%
R32	R31		15	0.0014	1,586,149	324,132	0.30	2.2	1,262,017	20.4%
R31	R30		18	0.0011	2,284,123	360,612	0.27	2.2	1,923,511	15.8%
R30	R2		18	0.0011	2,284,123	360,612	0.27	2.2	1,923,511	15.8%
R2	R1A		21	0.0046	6,995,087	4,337,170	0.57	5.0	2,657,917	62.0%
R1A	R1	PER PLAN	24	0.0081	13,197,121	4,337,170	0.39	7.2	8,859,951	32.9%

NOTES:

PLATE 1

Vicinity Map



NOT FOR CONSTRUCTION
OR RECORDING

PLATE 1: VICINITY MAP

EASTMARK
MESA, ARIZONA

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LAND DEVELOPMENT • WATER RESOURCES
STRUCTURES • TRANSPORTATION / TRAFFIC
WATER / WASTEWATER • SURVEYING
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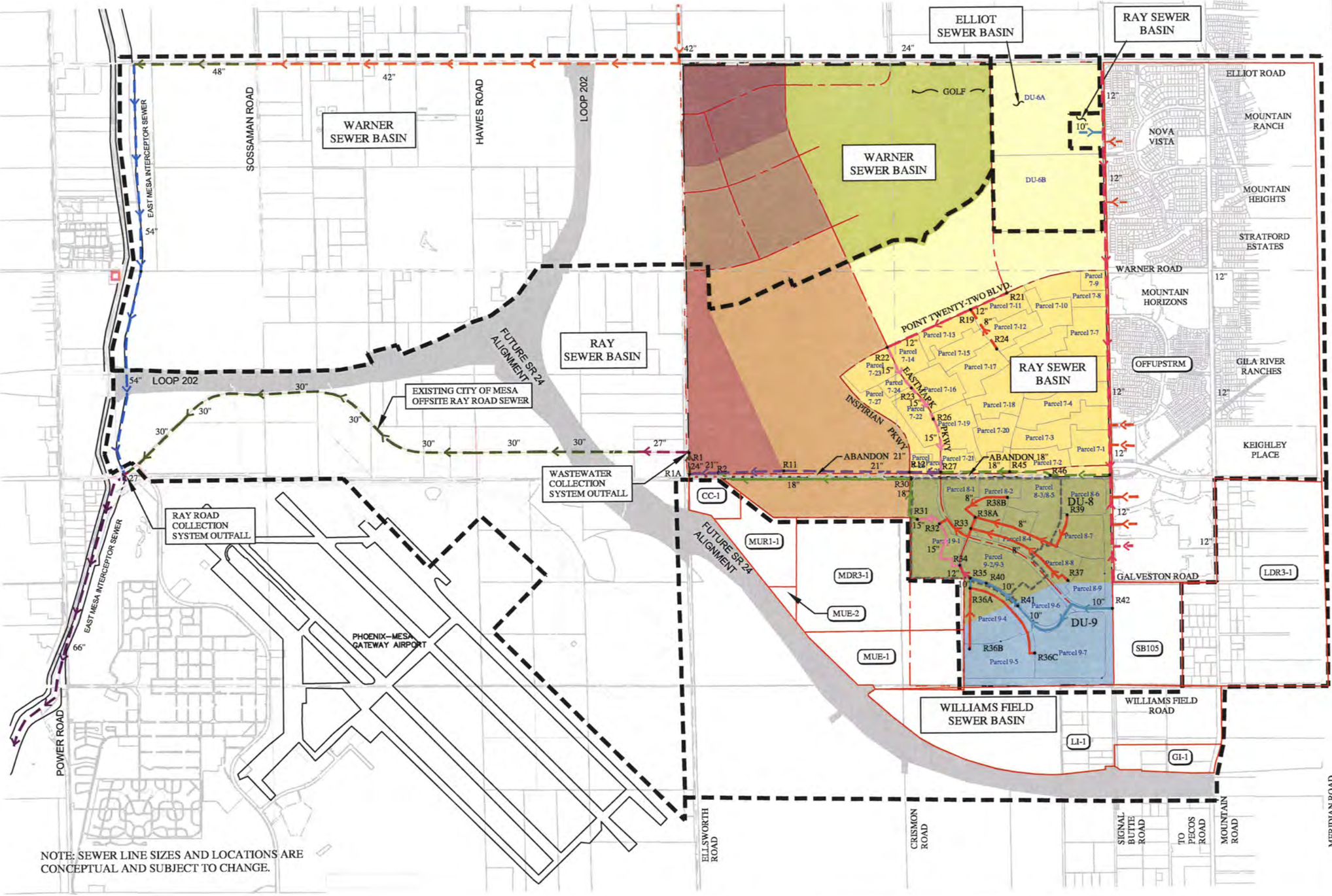
PLATE 2

Master Sewer Exhibit, Full Build-Out Condition



LEGEND

EXISTING SEWER / PLANNED SEWER

8" 10" 12" 15" 18" 21" 24" 27" 30" 36" 42" 48" 54" 66"

ON-SITE DEVELOPMENT UNITS

DU-8

DU-9

OFF-SITE LAND USE DESIGNATIONS*

SEWER BASIN BOUNDARIES

ONSITE SEWER SUB-BASIN BOUNDARIES

ONSITE SEWER SUB-BASIN LABELS — PARCEL 8-1

OFFSITE CONTRIBUTING SEWER BASIN — LDR3-1

OFFSITE SEWER SUB-BASIN BOUNDARIES

* OFF-SITE LAND USE DESIGNATIONS ARE PER THE 2004 COM WWMP

OTHER

EXISTING SEWER LIFT STATION

2500 0 1250 2500

Horz. 1 in. = 2500 ft.

PRELIMINARY
NOT FOR CONSTRUCTION
OR RECORDING

PLATE 2 - MASTER SEWER EXHIBIT, FULL BUILD OUT CONDITION

EASTMARK
MESA, ARIZONA

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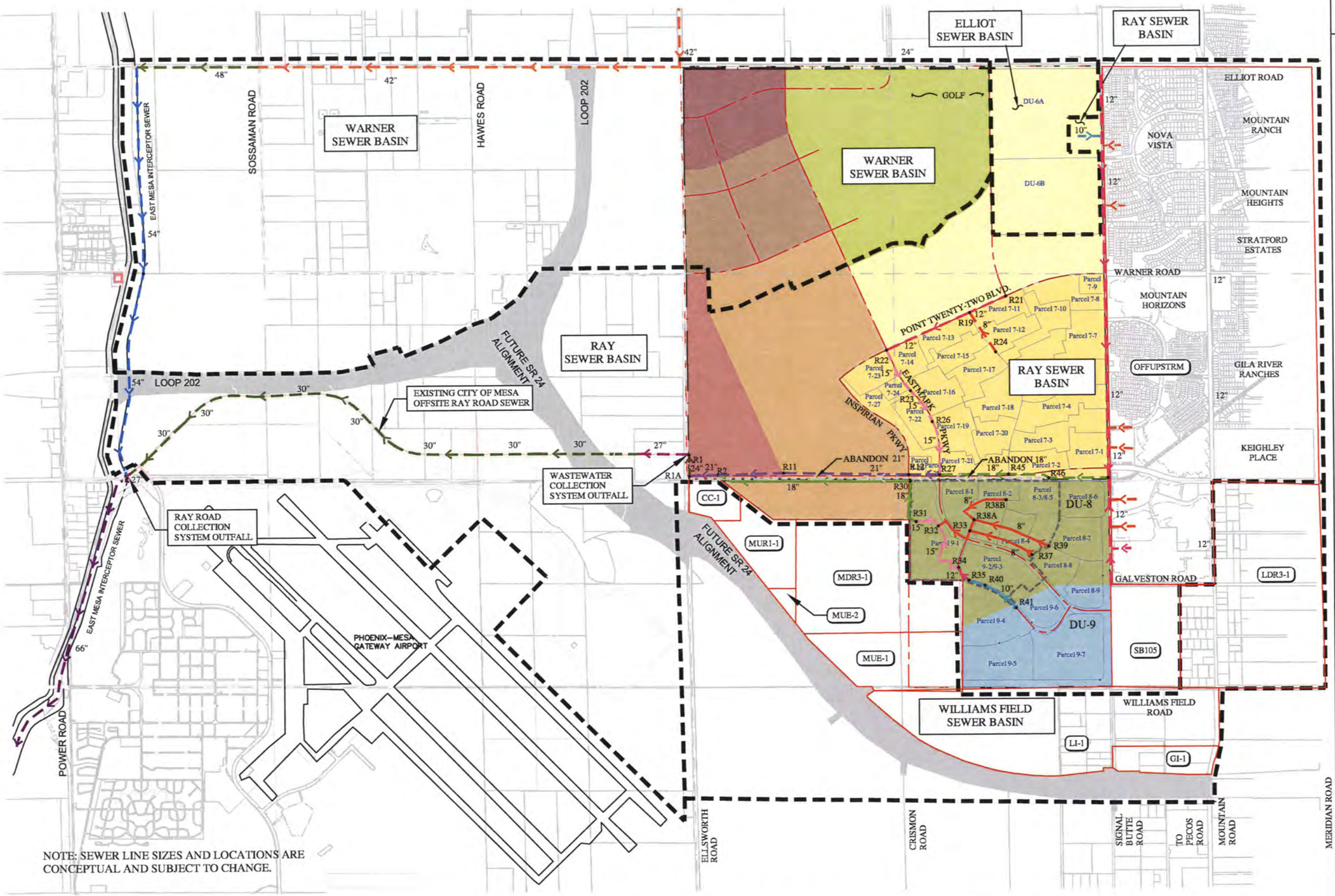
R:\Mesa Proving Grounds\2012\23835.04\Project Support\Reports\DU 8 & 9 Master Wastewater Update\Exhibits\ 3835_04-Plate 2 - Master Sewer Exhibit - FBO.dwg - Jan 14,2014 2:54pm

PLATE 3

Master Sewer Exhibit, Phase 1



LEGEND

EXISTING SEWER / PLANNED SEWER

8" 10" 12" 15" 18" 21" 24" 27" 30" 36" 42" 48" 54" 66"

ON-SITE DEVELOPMENT UNITS

DU-8

DU-9

OFF-SITE LAND USE DESIGNATIONS*

SEWER BASIN BOUNDARIES

ONSITE SEWER SUB-BASIN BOUNDARIES

ONSITE SEWER SUB-BASIN LABELS — PARCEL 8-1

OFFSITE CONTRIBUTING SEWER BASIN — LDR3-1

OFFSITE SEWER SUB-BASIN BOUNDARIES

* OFF-SITE LAND USE DESIGNATIONS ARE PER THE 2004 COM WWMP

OTHER

EXISTING SEWER LIFT STATION

2500 0 1250 2500

Horz. 1 in. = 2500 ft.

PRELIMINARY
NOT FOR CONSTRUCTION
OR RECORDING

PLATE 3 - MASTER SEWER EXHIBIT, PHASE 1

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R:\Mesa Proving Grounds\2012\23835.04\Project Support\Reports\DU 8 & 9 Master Wastewater Update\Exhibits\ 3835_04-Plate 3 - Master Sewer Exhibit - Phase 1.dwg - Jan 14,2014 3:51pm