

**MASTER WASTEWATER REPORT UPDATE  
FOR  
DEVELOPMENT UNIT 7  
AT  
EASTMARK**

Revised May 17, 2013  
December 20, 2011  
WP# 113697.07

REVIEWED BY  
CITY STAFF  
11/13/12 BY  
DATE

**WOOD/PATEL**  
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FOR  
DEVELOPMENT UNIT 7  
AT  
EASTMARK**

Revised May 17, 2013  
December 20, 2011  
WP# 113697.07

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EXPIRES 6-30-16

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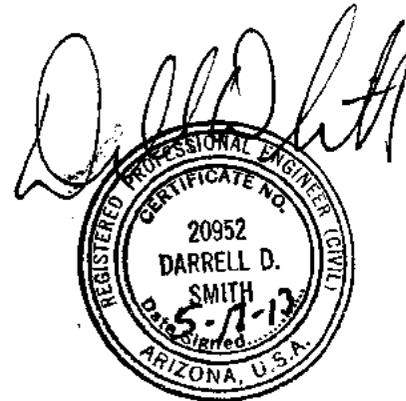
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*EXPIRES 6-30-16*

## 1.0 INTRODUCTION

### 1.1 General Background and Project Location

The proposed Development Unit 7 (Site) is anticipated to be an approximate 582-acre Development Unit (DU) within the 3,155-acre Eastmark master planned community, in Mesa, Arizona. It is a Planned Community District (PCD) which is a mixed-use development that will include single-family residential, multi-family residential, commercial uses, various community uses, and open spaces.

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

The Site is located within portions of Sections 22 and 23 of Township 1 South, Range 7 East of the Gila and Salt River Meridian. The Site is bounded by the Warner Road (South) alignment to the north, Ray Road and the Powerline Floodway on the south, Signal Butte Road to the east, and Spine Road West on the west (refer to Plate 1 – *Vicinity Map*).

### 1.2 Scope of the DU 7 Master Wastewater Report

The DU 7 Master Wastewater Report presents wastewater design flows, and sewer main sizes and locations as required to provide wastewater service to the Site during the full build-out condition. The purpose of this report is to provide a sewer analysis reflecting the developed condition of DU 7 based on a Conceptual Land Use Plan consistent with the *Master Wastewater Report Update for Eastmark*, dated May 14, 2013. While the development of Eastmark will take place over a significant time period, development of DU 7 is anticipated to develop first. It is the goal of this DU 7 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 7 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 Wastewater Master Report for Eastmark**

The *Master Wastewater Report Update for Eastmark*, by Wood, Patel & Associates, Inc. dated February 4, 2013 was approved by the City of Mesa. The approved 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*, by Wood, Patel & Associates, Inc. dated May 14, 2013 was submitted to the City of Mesa for review and approval. The updated report included revised land uses and sewer alignments across Eastmark. The updated master report includes the best available land use information and was therefore utilized as the bases for this report.

### **1.4 Study Area and Development Units**

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

- Table 2 – *Eastmark Modeled Land Use*
- Table 3 – *DU 7 Modeled Land Use*
- Table 4 – *DU 7 Wastewater Model*
- Plate 2 – *DU 7 Master Sewer Exhibit*

### **1.5 Construction Phasing**

It is anticipated that DU 7 construction and associated wastewater infrastructure will be phased. Phase 1 is anticipated to include approximately the southern half of DU 7 along the Ray Road Corridor, and is proposed to consist of single-family residential, commercial, church, and various community uses. Phase 2 is anticipated to include the northern half of DU 7, and is proposed to consist of single-family residential, multi-family residential, educational, church, and commercial uses. Refer to Plate 2 – *DU 7 Master Sewer Exhibit* for the anticipated phasing plan.

### **1.6 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 this 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, western, and southern boundaries. The Site is bordered on the east by the Mountain Horizons residential development, which is mostly constructed. The land generally slopes in a southwesterly direction at approximately 0.5 to 1 percent. The peak elevation within the Site is approximately 1,450 feet above mean sea level (MSL), located near the intersection of Signal Butte Road and Warner Road. The lowest elevation within the Site is approximately 1,412 feet MSL, located near the future intersection of Point Twenty-Two Boulevard and Inspirian Parkway.

### **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 discharging to East Mesa Interceptor (EMI).

### **2.3 Onsite Wastewater Collection Systems**

An existing 18- and 21-inch gravity sewer along the Ray Road alignment north of the Powerline Floodway, and located within a public utility easement between Signal Butte Road and Ellsworth Road. A portion of this line is planned to be replaced with the construction of Ray Road.

### 3.0 WASTEWATER SYSTEM DESIGN

#### 3.1 Design Criteria

Wastewater design flows and pipe-sizing criteria utilized in this DU 7 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 *2009 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 7 Modeled Land Use* to determine the Unit Daily Wastewater Flow for each parcel based on a conceptual land use plan. 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 7 are estimated using the design criteria listed above and a conceptual land use plan. Projected full build-out average-day wastewater flows for DU 7 and the first phase of the First Solar manufacturing facility are summarized as follows in millions of gallons per day (MGD):

	Offsite Upstream Ray Basin	Offsite Upstream Williams Field Basin	DU 7	First Solar Phase 1	Eastmark	Total
Ray Road Outfall:	1.04 MGD	0.99 MGD	0.55 MGD	0.05 MGD	0.54 MGD	2.57 MGD
<b>Total:</b>	<b>1.04 MGD</b>	<b>0.99 MGD</b>	<b>0.55 MGD</b>	<b>0.05 MGD</b>	<b>0.54 MGD</b>	<b>2.57 MGD</b>

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 *2009 City of Mesa Engineering Design Standards*.

Detailed design flow calculations are provided in Table 4 – *DU 7 Wastewater Model*, and Table 5 – *DU 7 Calculated Pipe Capacities*. Wood/Patel utilized criteria within the 2009 City of Mesa 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

The City of Mesa's Wastewater Master Plan has four sewer drainage basins within the study area of the Site, which includes the Warner, Ray, Williams Field, and Elliot Sewer Drainage Basins. The Elliot Basin serves the First Solar Manufacturing Facility within DU 6. DU 7 is proposed to contribute wastewater flow to the Ray Sewer Drainage Basin. Currently, the offsite Elliot Road and Ray Road sewers have been constructed downstream of Eastmark, and the Warner Road and Williams Field Road sewers have not been designed or constructed.

#### 4.1.1 Ray Sewer Drainage Basin

The development east of Mountain Road discharges into an existing sewer line along Mountain Road. An existing diversion structure at Mountain Road and Ray Road allows the City to send the flows to either the Ray Road or Pecos Road Sewers. 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 developments east of Eastmark for the Ray Road sewer contributing full build-out flow at this time. This 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.

### 4.2 Pipe Sizing

Proposed sewer lines for the Site were sized to accommodate peak wet-weather flow conditions for the full build-out condition. The onsite collection system includes planned sewer mains with diameters ranging from 8 inches to 21 inches. Refer to Tables 4 and 5 for wastewater models and calculated pipe capacities, and Plate 2 for the planned DU 7 wastewater infrastructure.

#### 4.3 Phasing Infrastructure Sewer Lines

DU 7 is planned to develop in phases. A preliminary phase boundary has been shown on Plate 2 – *DU 7 Master Sewer Exhibit*. The phase line runs east to west bisecting DU 7. The southern half of the site is the proposed Phase 1, and the northern half is proposed Phase 2.

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 developments have not been analyzed within this report. The proposed main trunk line infrastructure is listed below:

##### Phase 1

- Proposed Ray Road sewer from Ellsworth Road East to Eastmark Parkway consisting of approximately:
  - 6,300 feet of 21-inch sewer
  - 2,780 feet of 18-inch sewer
- The portion of the Ray Road sewer proposed to be replaced will be abandoned in place. The City of Mesa Water Resources has no objection to the abandonment in place with the following requirements:
  1. The abandoned sewer will be outside of the pavement section of Ray Road.
  2. The existing manhole frames, covers, and grade rings are removed and the manholes backfilled with a 1-sack CLSM slurry, except the top 2 feet, which shall be native material.
  3. The new sewer line is sized to carry the projected build-out flows from both the DMB property and offsite.
- Proposed Eastmark Parkway from proposed Ray Road, north to the phase boundary consisting of approximately 1,330 feet of 15-inch sewer.
- Proposed subdivisions will utilize 8-inch sewer lines, and drain to the proposed 15-inch main line in Eastmark Parkway.

Phase 2

- Proposed Eastmark Parkway sewer from Point Twenty-Two Boulevard to the Phase 1 boundary, consisting of approximately 2,040 feet of 15-inch sewer.
- Proposed Point Twenty-Two Boulevard sewer from Eastmark Parkway to sub-area DU 7A, consisting of approximately 3,570 feet of 12-inch sewer.
- Proposed Everton Terrace sewer from Point Twenty-Two Boulevard, south to future Parcels 7 through 8, consisting of approximately 800 feet of 8-inch sewer.

## 5.0 CONCLUSIONS

The Master Wastewater Report for Development Unit 7 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 Unit 7 is anticipated to be 582 acres within the 3,155-acre Eastmark master planned community in 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 *2009 City of Mesa Engineering & Design Standards*, regionally accepted design standards, the *Master Wastewater Report Update for Eastmark*, and Title 18, Chapter 9 of the *Arizona Administrative Code*.
4. The approximate average daily flow generated at build-out by the Site is 0.55 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 system will outfall into the existing gravity sewer line located along Ray Road.
7. Wood/Patel's model of the proposed wastewater system provides conveyance and capacity in conformance with the City of Mesa's standards and Title 18 of the *Arizona Administrative Code*.

**TABLE 1**

**Wastewater Design Criteria**

Project: Eastmark  
 Location: Mesa, Arizona  
 References: 2009 City of Mesa Engineering Design Standards

Proj. Number: 113697.07  
 Proj. Engineer: Darrell Smith, P.E

UNIT DAILY RESIDENTIAL WASTEWATER FLOWS											
LAND USE CATEGORY	LAND USE	DWELLING UNIT DENSITY		POPULATION DENSITY		PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA)		UNIT DAILY WASTEWATER FLOWS		NOTES
		VALUE	UNITS	VALUE	UNITS		Value	Units	Value	Units	
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 2007 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 8-10)	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		POPULATION DENSITY		PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA)		UNIT DAILY WASTEWATER FLOWS		NOTES
	VALUE	UNITS	VALUE	UNITS		Value	Units	Value	Units	
Hotel	--	--	--	--	--	--	--	150	GPD/ ROOM	Source: City of Mesa 2007 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		POPULATION DENSITY		PERSONS PER ACRE	WASTEWATER DESIGN FLOWS (PER CAPITA)		UNIT DAILY WASTEWATER FLOWS		NOTES
	VALUE	UNITS	VALUE	UNITS		Value	Units	Value	Units	
CC	--	--	14.0	Employees/ Acre	14.00	54	GPD/ Employee	756	GPD/ AC	Source: City of Mesa 2007 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)
<b>General</b>			
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 2009 Engineering & Design Standards  
 2. Title 18, Chapter 9 of the Arizona Administrative Code

**TABLE 2**

**Eastmark Modeled Land Use**

**TABLE 2 - EASTMARK MODELED LAND USE**

WOOD/PATEL

Proj. Number: 113697.07  
 Proj. Engineer: Darrell Smith, P.E.

Project: Eastmark  
 Location: Mesa, Arizona

**EASTMARK - PRELIMINARY RESIDENTIAL LAND USE AND DWELLING UNIT BREAKDOWN**

Land Use	LDR-2	MDR-1	MDR-2	MDR-3	MDR-4	HDR-1	HDR-2	Residential Total	Mixed Use Residential Units	Total Residential Units/Flow
Acreage	0.0	177.8	0.0	306.9	0.0	20.0	0.0	504.7	0.0	504.7
Dwelling Units	0	537	0	1,342	0	220	0	2,099	0	2,099

**EASTMARK - WASTEWATER FLOW CALCULATIONS**

Development Unit	Total Area (AC)	Residential (AC)	Total Dwelling Units	Keys	Gross Non-Residential <sup>(1)(3)</sup> (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 (GPD/AC)
6	65.7	0.0	0	0	65.7	1,324,601	0.0	0.0	0.0	0.0	0.0	704,642	65.7	n/a <sup>(3)</sup>
7	581.5	504.7	2,129	0	5.5	15,000	20.0	13.5	2.5	35.3	0.0	551,303	581.5	n/a <sup>(4)</sup>
<b>Subtotal:</b>	<b>647</b>	<b>504.7</b>	<b>2,129</b>	<b>0</b>	<b>71.2</b>	<b>1,339,601</b>	<b>20.0</b>	<b>13.5</b>	<b>2.5</b>	<b>35</b>	<b>0</b>	<b>1,255,945</b>	<b>647.2</b>	<b>---</b>

**UNIT DAILY RESIDENTIAL WASTEWATER FLOWS<sup>(1)</sup>**

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<sup>(2)</sup>**

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

(1) Non-residential wastewater flows are calculated based on net non-residential acreage.

(2) See Table 1 - Wastewater Design Criteria for additional design criteria information.

(3) Contributing flows from non-residential acreage of approximately 50.7 acres for the First Solar phase 1 (1 FAB) were taken from the Beck Consulting Final Sewer Report which discharge to the offsite Elliot Road Sewer, and approximately 15 acres of First Solar phase 1 administrative buildings which discharge to the offsite Signal Butte Road sewer.

(4) See Table 3 - DU7 Modeled Land Use for Flow calculations within DU7

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

**TABLE 3**

**DU 7 Modeled Land Use**

**WOOD/PATEL**

**TABLE 3 - DU7 MODELED LAND USE**

Proj. Number: 113697.07  
 Proj. Engineer: Darrell Smith, P.E.

Project: Eastmark  
 Location: Mesa, Arizona

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN (East of Eastmark Pkwy)										
DU Sub-Area	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
DU-7A	569	137.5	4.14	--	MDR-3	3.2	1820.8	80	145,664	151,739
	--	--	--	7.5	CHURCH	15.0	112.5	54	6,075	
DU-7B	528	104.3	5.06	--	MDR-3	3.2	1689.6	80	135,168	135,168
	220	20.0	11.00	--	HDR-1	2.0	440.0	80	35,200	
DU-7C	--	--	--	20.0	EDUCATION	15.0	300.0	54	16,200	56,260
	--	--	--	6.0	CHURCH	15.0	90.0	54	4,860	
	--	--	--	17.65	PARK/LAKE	--	--	--	--	
DU-7D	473	157.8	3.00	--	MDR-1	3.0	1419.0	80	113,520	113,520
DU-7E	245	55.0	4.45	--	MDR-3	3.2	784.0	80	62,720	62,720
	--	--	--	2.5	CIVIC	15.0	37.5	54	2,025	
DU-7F	--	--	--	5.5	COMMERCIAL/ RESTAURANT	23.0	126.5	54	6,831	8,856
	--	--	--	17.65	PARK/LAKE	--	--	--	--	
DU-7G	64	20.0	3.20	--	MDR-1	3.0	192.0	80	15,360	15,360
<b>DU7 Totals</b>	<b>2129</b>	<b>504.7</b>		<b>76.8</b>			<b>7108</b>		<b>551,303</b>	<b>551,303</b>

**TABLE 4**

**DU 7 Wastewater Model**

Project: Eastmark  
 Location: Mesa, Arizona  
 References: City of Mesa 2009 Engineering and Design Standards  
 Arizona Administrative Code, Title 18, Chapter 9

Proj. Number: 113697.07  
 Proj. Engineer: Darrell Smith, P.E.

FROM NODE	TO NODE	SEWER AREA(S) 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)
<b>Elliot Road Onsite Wastewater Flows</b>									
--	--	FIRST SOLAR PHASE 1	50.7	12,951	656,640	656,640	656,640	3.0	1,969,920
<b>Ray Road Onsite And Offsite Upstream Wastewater Flows</b>									
R14	R10	--	--	--	--	--	0	3.0	0
R10	R9	--	--	--	--	--	0	3.0	0
R9	R1	--	--	--	--	--	0	3.0	0
R21	R19	1/3 DU-7A	48.3	--	50,580	50,580	50,580	3.0	151,740
R24	R19	2/3 DU-7A	96.7	--	101,159	101,159	101,159	3.0	303,477
R19	R22	--	--	--	--	--	151,739	3.0	455,217
R22	R23	1/2 DU-7B	52.2	--	67,584	95,714	247,453	3.0	742,359
		1/2 DU-7C	31.8	--	28,130				
R23	R26	1/2 DU-7B	52.2	--	67,584	95,714	343,167	3.0	1,029,501
		1/2 DU-7C	31.8	--	28,130				
R26	R27	DU-7E	55.0	--	62,720	71,576	414,743	3.0	1,244,229
		DU-7F	25.7	--	8,856				
R41	R40	OFFUPSTREAM <sup>(1)</sup>	1,473	707	1,041,710	1,203,232	1,203,232	2.5	3,008,080
		FIRST SOLAR PHASE 1 ADMIN	15	3,200	48,002				
		DU-7D	157.8	--	113,520				
R40	R27	DU-7G	20.0	--	15,360	15,360	1,218,592	2.5	3,046,480
R27	R12	--	--	--	--	--	1,633,335	2.5	4,083,338
R12	R11	--	--	--	--	--	1,633,335	2.5	4,083,338
R11	R2	--	--	--	--	--	1,633,335	2.5	4,083,338
R2	R1A	--	--	--	--	--	1,633,335	2.5	4,083,338
R1A	R1	LDR3-1	318	720	227,520	988,206	2,621,541	2.5	6,553,853
		BPI-1	160	432	69,120				
		GI-1	40	810	32,400				
		LI-1	318	378	120,204				
		MUE-1	112	810	90,720				
		MUE-2	7	810	5,670				
		MDR3-1	231	1,280	295,680				
		MUR1-1	62	2,040	126,480				
CC-1	27	756	20,412						
R1	RAY ROAD SEWER	--	--	--	--	--	2,621,541	2.5	6,553,853

<b>Total Onsite Flow to Ray Road Outfall at Ellsworth Road</b>	<b>2059.5</b>	<b>543,623</b>	<b>543,623</b>	<b>543,623</b>	<b>1,630,869</b>
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<b>Total Onsite Flow, Ray Road + Elliot Road Basins:</b>	<b>2110.2</b>	<b>1,200,263</b>	<b>1,200,263</b>	<b>1,200,263</b>	<b>3,600,789</b>
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<b>Total to Ray Road Outfall at Ellsworth Road</b>	<b>3332.5</b>	<b>2,621,541</b>	<b>2,621,541</b>	<b>2,621,541</b>	<b>6,553,853</b>
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Notes

(1) Offsite wastewater flow within the Signal Butte Road sewer line includes flow from the Mountain Horizons and Nova Vista developments (Avg Day = 1,040,576 gpd) per the Master Wastewater Report for Ray Road Sewer Between Ellsworth and Mountain Roads, by CMX, 11/18/2005, and the City of Mesa Signal Butte/Elliot Water Campus (Avg Day = 1,134 gpd)

**TABLE 5**

**DU 7 Calculated Pipe Capacities**

Project: Eastmark  
 Location: Mesa, Arizona  
 References: ADEQ Bulletin No. 11  
 City of Mesa 2009 Engineering and Design Standards

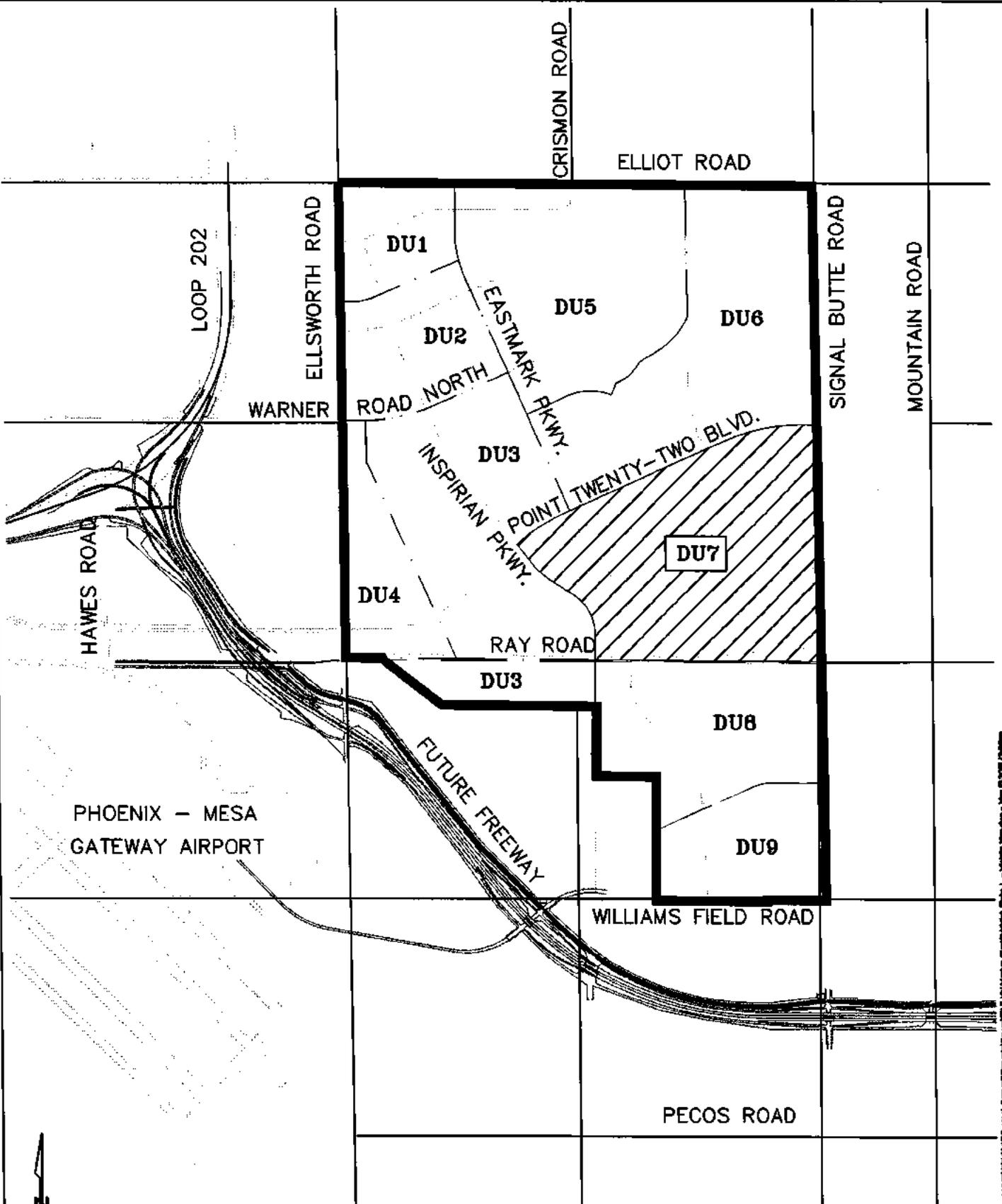
Proj. Number: 113697.07  
 Proj. Engineer: Darrell Smith, P.E.

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)	SURPLUS CAPACITY (WET WEATHER) (GPD)	PERCENT OF CAPACITY (WET WEATHER)
<b>Ray Road Basin Pipe Sizes</b>										
R14	R10		12	0.0040	1,472,019	0	---	---	1,472,019	0.0%
R10	R9		15	0.0040	2,617,146	0	---	---	2,617,146	0.0%
R9	R1		15	0.0040	2,617,146	0	---	---	2,617,146	0.0%
R21	R19		12	0.0045	1,522,778	151,740	0.22	3.3	1,371,038	10.0%
R24	R19		8	0.0050	564,029	303,477	0.53	2.8	260,552	53.8%
R19	R22		12	0.0045	1,522,778	455,217	0.38	3.3	1,067,561	29.9%
R22	R23		12	0.0020	1,015,186	742,359	0.63	2.2	272,827	73.1%
R23	R26		15	0.0020	1,903,379	1,029,501	0.53	2.7	873,878	54.1%
R26	R27		15	0.0020	1,903,379	1,244,229	0.58	2.7	659,150	65.4%
R41	R40		18	0.0094	6,623,956	3,008,080	0.47	6.4	3,615,876	45.4%
R40	R27		18	0.0070	5,710,307	3,046,480	0.52	5.5	2,663,827	53.4%
R27	R12		21	0.0029	5,596,069	4,083,338	0.63	4.0	1,512,731	73.0%
R12	R11		21	0.0030	5,596,069	4,083,338	0.63	4.0	1,512,731	73.0%
R11	R2		21	0.0030	5,596,069	4,083,338	0.63	4.0	1,512,731	73.0%
R2	R1A		21	0.0045	6,839,640	4,083,338	0.55	4.9	2,756,302	59.7%
R1A	R1	PER PLAN	24	0.0079	12,994,088	6,553,853	0.50	7.1	6,440,235	50.4%

NOTES:

**PLATE 1**

**Vicinity Map**



N.T.S.

TOWNSHIP 1 SOUTH, RANGE 7 EAST  
OF THE GILA AND SALT RIVER  
MERIDIAN, MARICOPA COUNTY, ARIZONA

NOT FOR CONSTRUCTION  
OR RECORDING

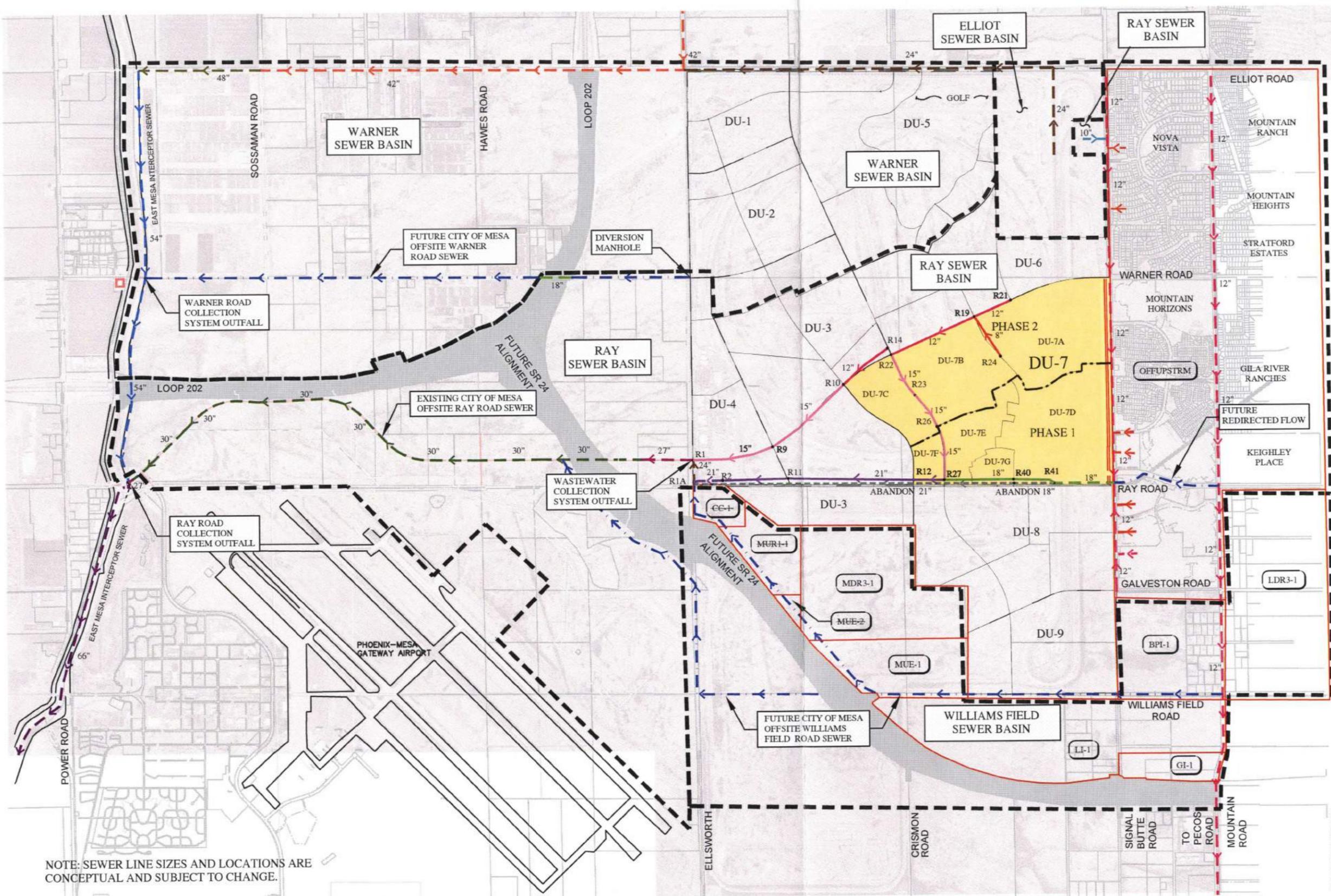
**PLATE 1: VICINITY MAP**  
EASTMARK  
MESA, ARIZONA

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In These Plans, Symbols, Dimensions, Notes, Specifications, and Other Information, Shall Govern Over Any Other Information.

**PLATE 2**

**DU 7 Master Sewer Exhibit**



NOTE: SEWER LINE SIZES AND LOCATIONS ARE CONCEPTUAL AND SUBJECT TO CHANGE.

**LEGEND**

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

DU7 PROPOSED PHASE LINE: - - - - -

DU-7: [Yellow Box]

**OFF-SITE LAND USE DESIGNATIONS\***

SEWER BASIN BOUNDARIES: - - - - -

ONSITE SEWER SUB-BASIN BOUNDARIES: ————

ONSITE SEWER SUB-BASIN LABELS: DU-1A

OFFSITE CONTRIBUTING SEWER BASIN: (LDR3-1)

OFFSITE SEWER SUB-BASIN BOUNDARIES: ————

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

**OTHER**

FUTURE SEWER BY OTHERS: - - - - -

EXISTING SEWER LIFT STATION: [Red Square]

Scale: 2500 0 1250 2500  
 Horz. 1 in. = 2500 ft.

**PLATE 2 - DU7 MASTER SEWER EXHIBIT**

EASTMARK  
MESA, ARIZONA

PRELIMINARY  
NOT FOR CONSTRUCTION  
OR RECORDING

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