

## Executive Summary

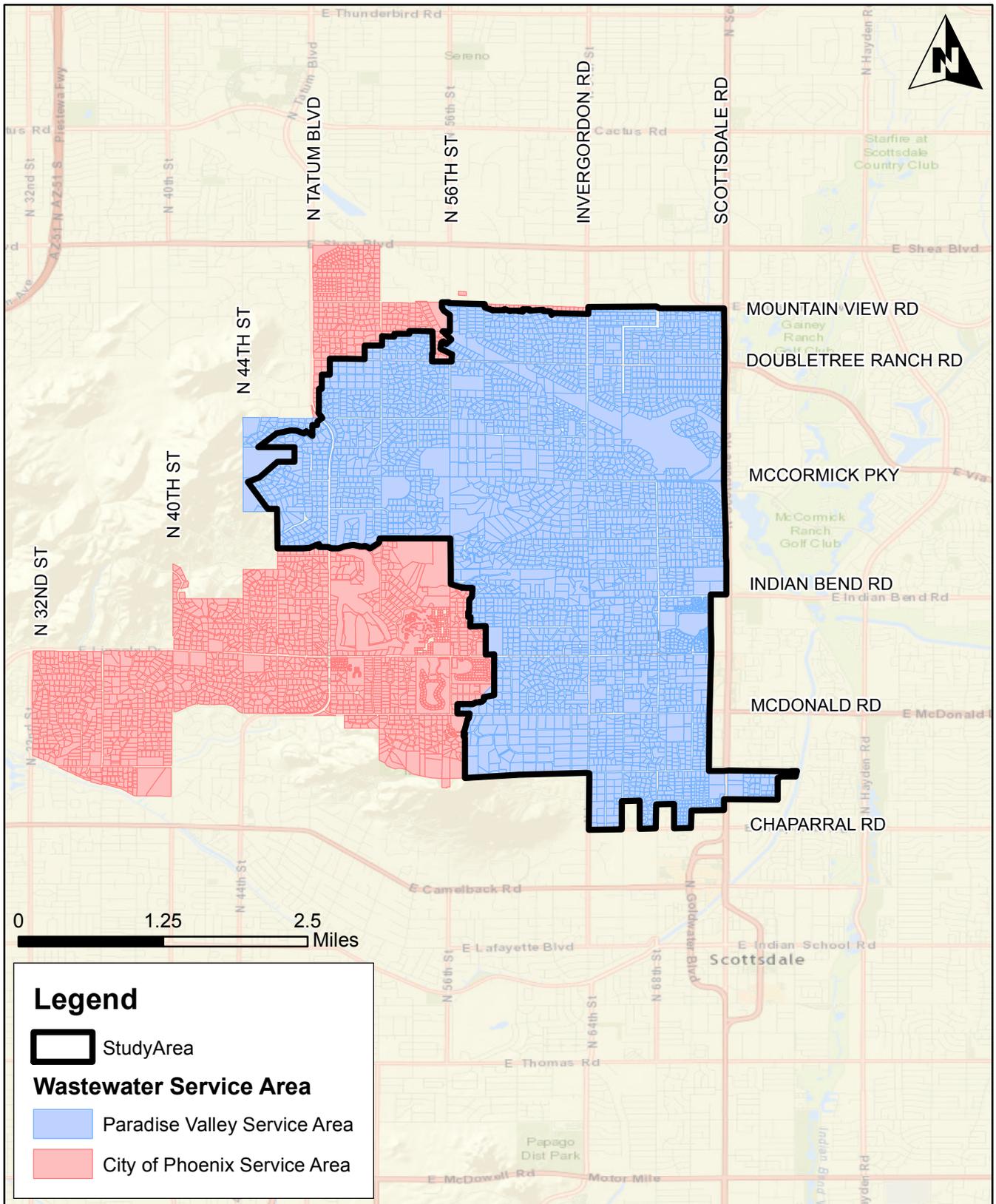
### Introduction

The Town of Paradise Valley (Town) has two wastewater service providers. Portions of the southwest and northwest are served by the City of Phoenix which owns, operates and maintains the wastewater facilities in these areas (**Figure ES-1**). The remaining areas are served by the Town which owns, operates and maintains the collection system within these areas. This Wastewater Master Plan has been developed for the Town's service area.

The Town's wastewater service area is provided wastewater treatment and disposal services through an Intergovernmental Agreement (IGA) with the City of Scottsdale (Scottsdale). The Town's wastewater is either pumped to Scottsdale's Water Campus or flows by gravity through Scottsdale's system to the Sub-Regional Operating Group (SROG) interceptor system, which conveys flows to the 91st Avenue Wastewater Treatment Plant (WWTP). Scottsdale is a member of the SROG. The Town's capacity ownership in the Scottsdale wastewater system is monitored by flow metering at 13 locations in the Town's service area (**Figure ES-2**) for 13 wastewater drainage basins. Flows from 6 drainage basins are not metered; these flows are estimated using information from the metered areas.

### Wastewater Flow Database

Data loggers at the 13 flow metering stations calculate flows at 5-minute intervals and transmit the data to Scottsdale, and Scottsdale provides the data to the Town on a daily basis. The Town has a new Wastewater Flow Management Tool that assists in graphical display and visualization of flow information for any time period and drainage basin (or collection of basins). The Tool calculates flow for the unmetered basins based on the metered flow data and contains data from January 1, 2005 to the present. The Tool was used to develop wastewater flow characteristics, including average and peak flows, diurnal flow curves, and per dwelling unit flow factors.



**Legend**

 Study Area

**Wastewater Service Area**

 Paradise Valley Service Area

 City of Phoenix Service Area



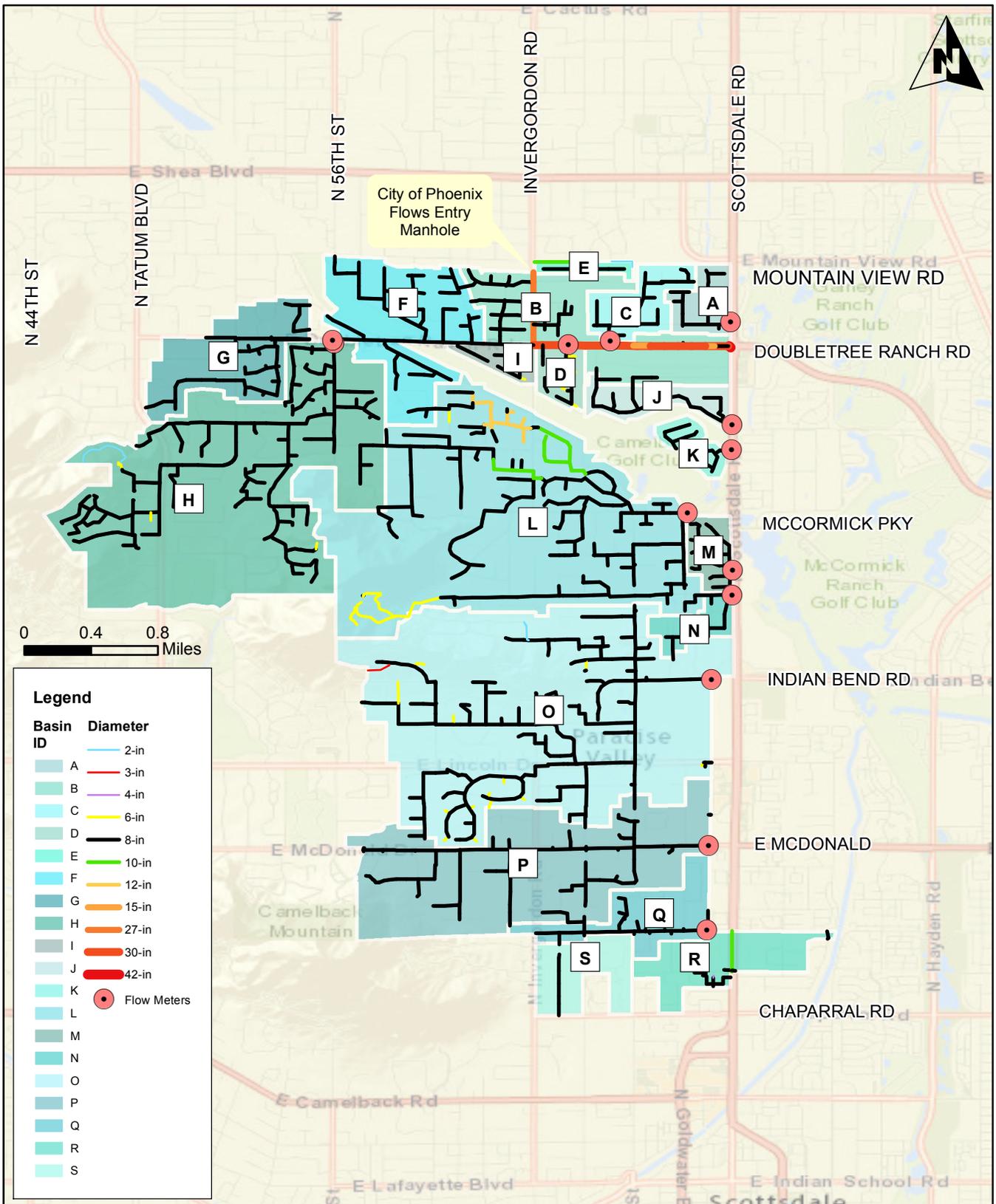
**TOWN OF PARADISE VALLEY, ARIZONA  
WASTEWATER MASTER PLAN**

**Study Area**



May 2015

FIGURE ES-1



TOWN OF PARADISE VALLEY, ARIZONA  
 WASTEWATER MASTER PLAN  
 Existing Collection System



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 FIGURE ES-2

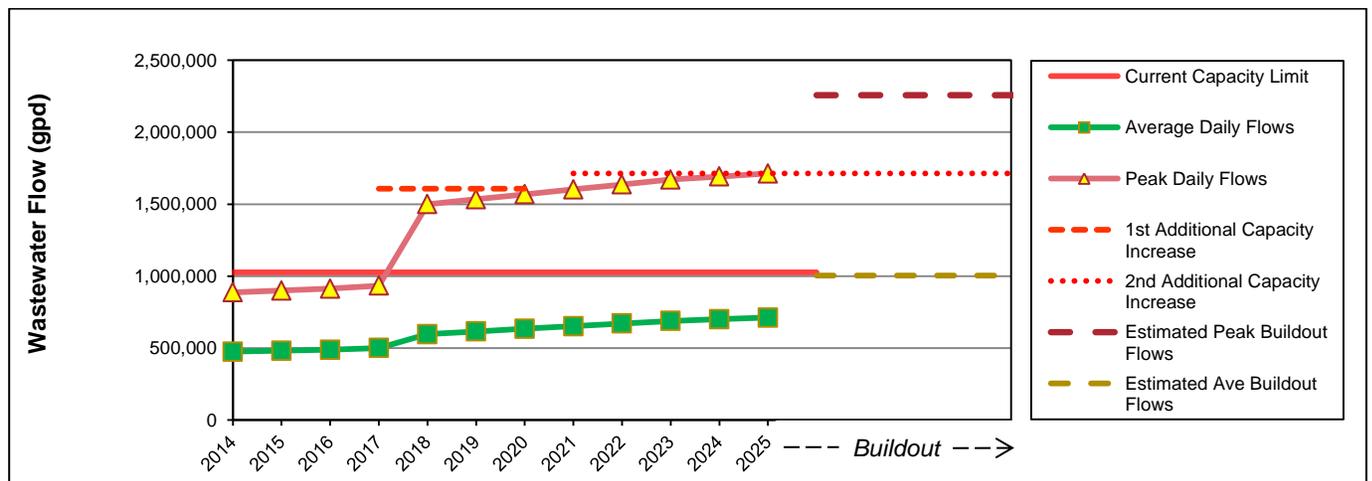
**Wastewater Flow Projections**

Wastewater flow projections were developed based on per dwelling unit flow factors and projected connections of existing dwelling units on septic systems and vacant parcels to the wastewater system through 2025, and at buildout (**Figure ES-3**).

On an average day basis, the flows are projected to increase from approximately 480,000 gpd in 2015 to 710,000 gpd in 2025, and to further increase to 1 mgd at buildout. On a peak day basis, the flows are projected to increase from approximately 890,000 gpd in 2015 to 1.7 mgd in 2025, and to further increase to 2.3 mgd at buildout.

The Town’s current purchased capacity in the Scottsdale system is 1.026 mgd. The first capacity exceedance is projected to occur in 2018, primarily as a result of the proposed 5-Star Development. The Town would need an additional 580,000 gpd of capacity in 2017 (total capacity to increase to 1.6 mgd). As the wastewater customer base increases from new connections, the Town would require an additional 110,000 gpd of treatment capacity in 2021 (total capacity to increase to 1.7 mgd). This final capacity increase will be sufficient through 2025.

**Figure ES-3 Wastewater Flow Projections**



**Wastewater Drainage Basin Modifications**

An important objective of the Town was to improve monitoring of its capacity ownership in the Scottsdale system by assessing options for modifying drainage basins and meter locations to achieve 100 percent metering of its wastewater flows. Multiple options were explored, including connecting unmetered basins, combining basins, and

identifying suitable locations for new meters. The Town selected the option that provided the best tradeoff between costs and meter reductions (**Figure ES-4**). The selected option reduces the number of flow meters from 13 to 6, but provides 100 percent metering of the Town's flows.

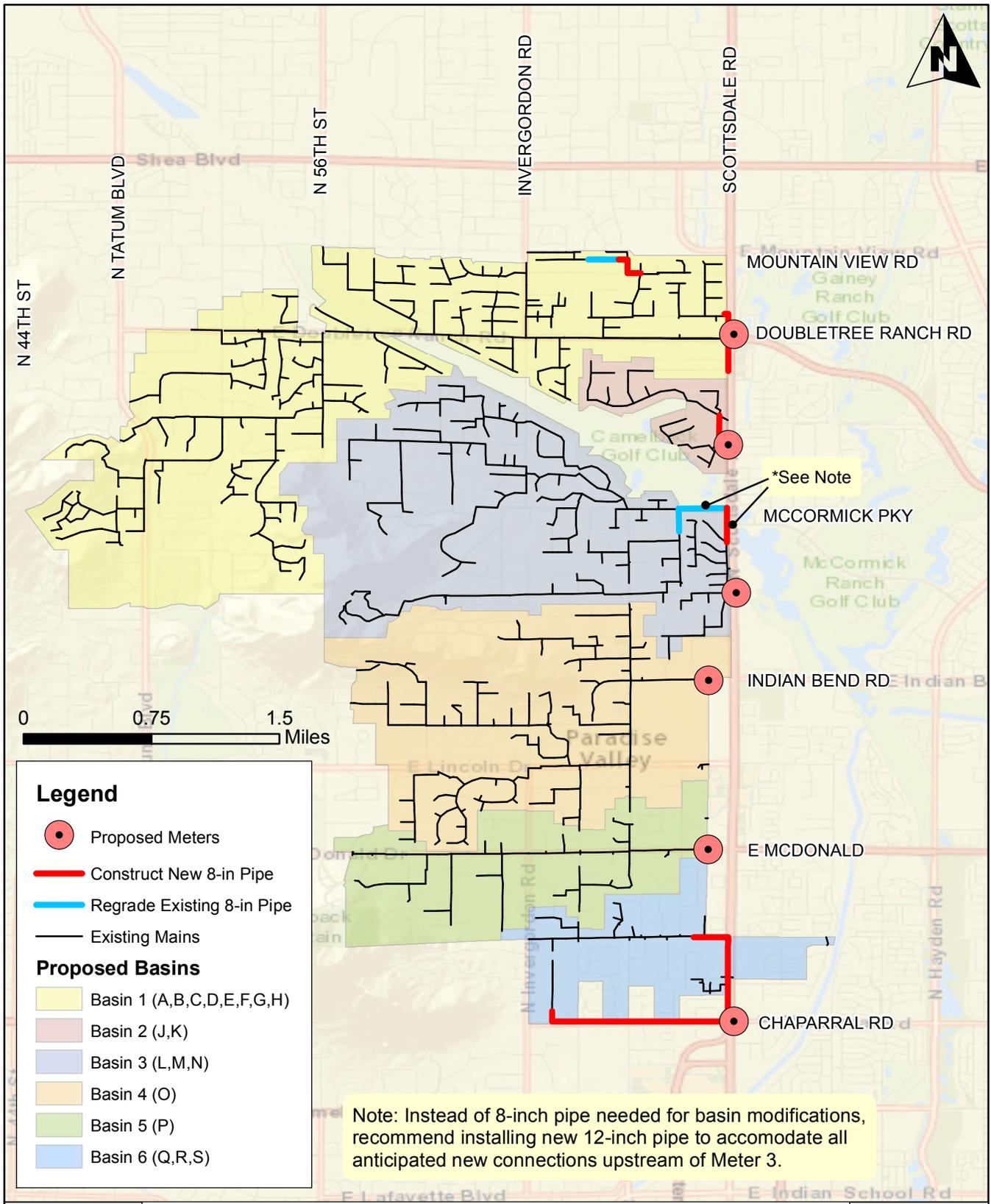
### **Wastewater System Hydraulic Model**

An Extended Period Simulation (EPS) computer model of the Town's collection system was built using Bentley SewerGEMS V8i software. Bentley SewerGEMS uses the U.S. Environmental Protection Agency's SWMM (Storm Water Management Model) engine, which is an industry standard for dynamic hydraulic modeling and computation, particularly in urban areas. The hydraulic model was used to evaluate the existing wastewater system under existing and projected future flow conditions. The modeling evaluations found no system deficiencies under existing conditions. The model was also used to evaluate future flow conditions to identify recommended system improvements over time.

### **Potential for Water Reuse**

The opportunity for water reuse within the Town appears challenging as the Town does not generate enough wastewater to serve even the most preferable demands within the Town, and constructing and operating a Town water reuse system would be costly. There is, however, demonstrated value for the Town's wastewater effluent as a water resource. Since the current wastewater IGA with Scottsdale stipulates that ownership of the Town's wastewater reverts to Scottsdale once it enters their system, the stipulation would have to be negotiated out of the agreement before the Town would realize any benefit or value from its wastewater resource. In addition, any option for obtaining value for the wastewater resource would have to be negotiated into the IGA or other agreement with Scottsdale. The options that the Town has for obtaining value from its wastewater resource would include the following:

- Receive an offset or credit in the wastewater rate paid to Scottsdale for the value that the wastewater resource represents as a new water supply to Scottsdale (based on costs for new water supplies paid by other communities in Arizona).
- Receive reclaimed water back from Scottsdale and sell to Town customers. The revenues from the sales could offset a portion of the wastewater treatment and disposal rate paid to Scottsdale.



**Legend**

- Proposed Meters
- Construct New 8-in Pipe
- Regrade Existing 8-in Pipe
- Existing Mains

**Proposed Basins**

- Basin 1 (A,B,C,D,E,F,G,H)
- Basin 2 (J,K)
- Basin 3 (L,M,N)
- Basin 4 (O)
- Basin 5 (P)
- Basin 6 (Q,R,S)

Note: Instead of 8-inch pipe needed for basin modifications, recommend installing new 12-inch pipe to accommodate all anticipated new connections upstream of Meter 3.



**TOWN OF PARADISE VALLEY, ARIZONA  
WASTEWATER MASTER PLAN  
Selected Drainage Basin and Meter  
Configuration Modifications**



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FIGURE ES-4

- Receive the storage credits for reclaimed water recharged by Scottsdale at the Water Campus, and sell the credits to local water suppliers (such as EPCOR, Berneil Water Company, Phoenix, and/or Scottsdale) or the Central Arizona Groundwater Replenishment District (CAGR). The revenues from sale of the recharge credits could also offset a portion of the wastewater fees paid to Scottsdale.

### **Recommended System Improvements that can be Scheduled**

The recommended wastewater system improvements include 1) projects that can be scheduled in a Wastewater CIP, and 2) projects that will allow service to future customer connections, but cannot be scheduled.

The recommended system improvements that can be scheduled include the following (**Table ES-1 and Figure ES-5**):

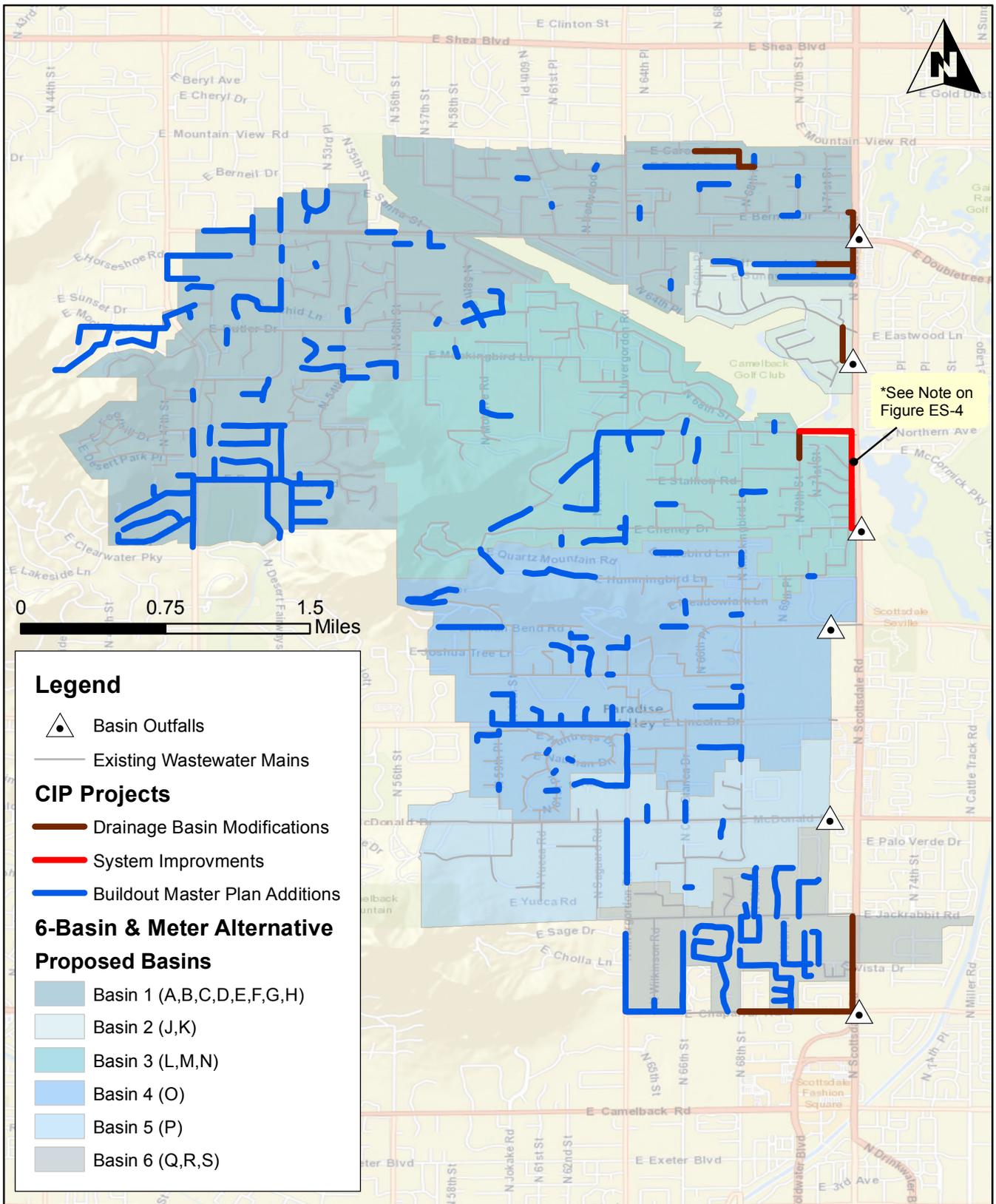
- Drainage basin modifications – includes re-grading of existing pipes and new pipes to reconfigure drainage basins from a 13-meter to a 6-meter program. The Town will proceed with design and construction of these improvements in 2016.
- Additional capacity in the Scottsdale system. The Town anticipates that construction of the proposed 5-Star Development will begin in 2018 and maximum occupancy can be expected shortly thereafter. Therefore, the Town will be required to purchase 580,000 gpd of additional Scottsdale system capacity in 2017. The wastewater flow projections also indicate that the Town will require an additional 110,000 gpd of Scottsdale capacity in 2021.
- Rehabilitation of existing pipes that were found to have defects based on previous pipe inspections. The recommended rehabilitation and replacement program is described in the following section.

Table ES-1 Recommended Scheduling of Wastewater System Improvements

Type of Project	Opinion of Probable Construction Costs (\$ million)										
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
<b>Projected System Improvements</b>											
Drainage Basin Modifications <sup>1</sup>	-	\$2.77	-	-	-	-	-	-	-	-	\$2.77
Additional Scottsdale Capacity	-	-	\$6.71	-	-	\$1.24	-	-	-	-	\$7.95
<b>Rehabilitation and Replacement Program</b>											
Rehabilitation Based on Pipe Inspection Records	\$0.099	\$0.099	\$0.099	\$0.099	\$0.099	-	-	-	-	-	\$0.49
Evaluation and Repair of Balance of System	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$0.18	\$1.82
<b>Grand Total</b>	<b>\$0.28</b>	<b>\$3.05</b>	<b>\$6.99</b>	<b>\$0.28</b>	<b>\$0.28</b>	<b>\$1.52</b>	<b>\$0.18</b>	<b>\$0.18</b>	<b>\$0.18</b>	<b>\$0.18</b>	<b>\$13.03</b>

**Note:**

1. Includes new 12-inch pipe upstream of new Meter 3, instead of regarding of 8-inch pipe and new 8-inch pipe required for basin modifications. New 12-inch pipe will accommodate all anticipated new connections upstream of new Meter 3.



\*See Note on Figure ES-4



TOWN OF PARADISE VALLEY, ARIZONA  
 WASTEWATER MASTER PLAN  
 Recommended Capital Improvements



May 2015  
 FIGURE ES-5

### Recommended Rehabilitation and Replacement Program

Available wastewater system inspection records were reviewed to identify rehabilitation and/or replacement projects. Approximately 19.5 miles of pipe were included in the available inspection reports, out of estimated 69 miles in the entire system. Of the 441 pipes inspected, just 54 pipes (12 percent) of the pipes were found to have structural defects and 202 pipes (46 percent) had operational and maintenance (O&M) defects. No collapsed or partially collapsed pipes were found.

Of the 54 pipes identified with structural defects, 21 are recommended for repairs, 19 are candidates for repair following another inspection, and the remaining 14 require no further action. Of the 202 pipes identified with O&M defects, 75 are recommended for inspection to determine further action, 11 also had structural defects and are recommended for repairs, and the remaining 116 require no further action.

The above inspections and recommendations account for 28 percent of the Town's system. The remainder of the system should be inspected over 5 years to identify repairs to be made within 10 years of the start of the program. The inspection program will cover 20 percent of the system annually. The entire system will be inspected within the first 5 years and all pipes requiring repair will be identified. This annual inspection rate is aggressive but not uncommon and will avoid letting the system fall into further disrepair. The repair program will repair 3 percent of system annually, or 30 percent over 10 years. The inspection and repair rates and budgets can be reconsidered after the first inspection cycle (5 years).

### System Improvements that cannot be Scheduled

The recommended system improvements that will allow service to future customer connections, but cannot be scheduled ("Master Plan Additions") are only needed if and when existing septic and vacant parcels are connected to the system (**Table ES-2**).

**Appendix H** provides a detailed list, cost estimates, and map of the Master Plan Additions projects. The Master Plan Additions are grouped according to the modified wastewater drainage basins (for reference, the existing drainage basins comprising the modified basins are also provided). The Town can implement these projects based on customer demand and/or the success of a public information program encouraging connection to the system.

**Table ES-2 Summary of Master Plan Additions**

<b>Item</b>	<b>Amount</b>	<b>Total Cost</b>
<b>Basin 1</b> New 8-in Pipe for System Expansion <i>(Original Basins A, C, B, D, E, F, G, H, I)</i>	56,039 LF	\$10,200,000
<b>Basin 2</b> New 8-in Pipe for System Expansion <i>(Original Basins J &amp; K)</i>	875 LF	\$160,000
<b>Basin 3</b> New 8-in Pipe for System Expansion <i>(Original Basins L, M, N)</i>	15,718 LF	\$2,860,000
<b>Basin 4</b> New 8-in Pipe for System Expansion <i>(Original Basin O)</i>	23,408 LF	\$4,260,000
<b>Basin 5</b> New 8-in Pipe for System Expansion <i>(Original Basin P)</i>	3,211 LF	\$590,000
<b>Basin 6</b> New 8-in Pipe for System Expansion <i>(Original Basins Q, R, S)</i>	25,979 LF	\$4,730,000
<b>TOTAL</b>		<b>\$22,780,000</b>

