



**SURPRISE**

ARIZONA

**City of Surprise**  
**Reclaimed Water Master Plan**  
**Preparation Guide**

Revised  
February 2010

## Introduction

This document provides a template of the necessary information that must be included in a Reclaimed Water Master Plan that is submitted to the City of Surprise. This template outlines the organization, design factors, and information that should be included in a Reclaimed Water Master Plan report. Following this template will help to expedite the City's review and approval process. A checklist has also been included with this document to help facilitate the preparation of the master plan. The master plan template and checklist are included on the following pages.

The information included in the master plan template may not apply to all situations. If a modification needs to be made to the master plan this should be clearly described in the submitted master plan. Any variances from the City's design standards must be approved in writing by the City's Public Works Department. A master plan requesting a variance to the design criteria will not be approved unless a written approval signed by the City's Public Works Department Director or his designee is included in the report.

## Submittal Process

The following is a summary of the City's submittal process.

1. The Applicant requests a concept review meeting with the City's Development Review Team. The concept review meeting can be scheduled by contacting the Community Development Department at 623-222-3000.
2. The Public Works Department will provide the applicant with the Master Plan preparation guide which will be attached to the concept review meeting summary.
3. Applicant prepares the Water, Wastewater, and Reclaimed master plan reports. Each report must be submitted as a stand alone document.
4. Applicant submits two (2) copies each of the Water Master Plan, Wastewater Master Plan, and Reclaimed Master Plan to the City's Community Development Center.
5. The Development Center will route the master plans to the Public Works Department for review.
6. A representative from the Public Works Department will review the master plans within 15 business days.
7. Based on the review of the master plan, Public Works will prepare an approval or deficiency letter for the master plan reports.
8. The letter will be sent to the applicant. If a deficiency letter is issued, then the applicant must repeat the process from step 4, ensuring that all comments have been addressed. If an approval letter is issued that applicant will need to include the approval letter with any future submittals.
9. The Water, Wastewater and Reclaimed master plans must be approved by the Public Works Department prior to proceeding with the Development Review Process.
10. For questions please contact (623)222-7000

## Responding to Comments

When resubmitting a master plan in response to comments provided by the City, please include a letter that references the review number and that lists the City's comments and a response to each comment. Please also reference where the revised information can be found in the new master plan report. Please also include the review number in the letter. Failure to respond to all comments will delay the review and approval process.

# **Project Name**

# **Reclaimed Water Master Plan**

Submittal #

**Date**

***Prepared For:***

Client's Name

Address

Phone

Contact Name

(Stamp of Registered PE Here)

***Prepared By:***

Engineer's Name

**Company Name and Address**

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## **Abbreviations**

Include a list of the abbreviations used in the report.

## **1.0 Introduction**

### **1.1 Introduction**

The introduction should include the following:

- project's name
- area
- general location (including the Special Planning Area (SPA))
- general land uses proposed for the project
- Number of dwelling units

### **1.2 Project Location**

The location of the proposed site should be described in this section. This should include the section, township, and range of the proposed site, and the major cross streets.

A vicinity map showing the general site location must also be included.

### **1.3 Topographic Conditions**

Include a description of the current site land use, and the topography used in preparing the reclaimed water master plan. Include a description of the accuracy of the topography.

## **2.0 Projected System Demands**

### **2.1 Demand Calculations**

This section should outline the demand factors used in the development of the site's Reclaimed Water Master Plan. These demand factors should come from the City of Surprise Integrated Water Master Plan Water Resources (Revised November, 2008) and the City of Surprise Integrated Water Master Plan Water Infrastructure (Revised July 2009) are summarized in Table 1 and Table 2.

**Table 1 City of Surprise Irrigation Water Average Day Demand**

Land Use Category	Units	Non-Irrigation Water			Wastewater Flow	Reclaimed Water Production
		Indoor	Outdoor	Total		
<b>Residential</b>						
Rural Residential (0-1 du/acre)	gpd/du	210	110	320	210	190
Suburban Residential (1-3 du/acre)	gpd/du	210	110	320	210	190
Low Density Residential (3-5 du/acre)	gpd/du	210	110	320	210	190
Medium Density Residential (5-8 du/acre)	gpd/du	190	100	290	190	170
Medium/High Density Residential (8-15 du/acre)	gpd/du	190	100	290	190	170
High Density Residential (15-21 du/acre)	gpd/du	190	100	290	190	170
<b>Commercial/Other</b>						
Airport Preservation (0-2 du/acre)	gpd/acre	390	210	600	390	350
Surprise Center	gpd/acre	1,300	700	2,000	1,300	1,200
Original Townsite	gpd/acre	800	400	1,200	800	720
Commercial	gpd/acre	1,300	700	2,000	1,300	1,200
Employment	gpd/acre	650	350	1,000	650	590
Mixed Use Gateway	gpd/acre	1,200	1,000	2,200	1,200	1,080
Agriculture	gpd/acre	2,600	1,400	4,000	2,600	2,340
Landfill	gpd/acre	325	175	500	325	290
Military	gpd/acre	650	350	1,000	650	590
Open Space	gpd/acre	0	0	0	0	0
Public Facilities	gpd/acre	650	350	1,000	650	590
Proving Grounds	gpd/acre	325	175	500	325	290
<b>Landscape</b>						
Turf	gpd/acre	0	4,000	4,000	0	0
Xeriscape	gpd/acre	0	1,300	1,300	0	0
Desert	gpd/acre	0	0	0	0	0

**Table 2 City of Surprise Reclaimed Water Peaking Factors**

Demand	Factor
Maximum Day Demand/ Average Day Demand	2
Peak Hour Demand / Average Day Demand	5

The reclaimed water demand calculations should be summarized in this section. Detailed demand calculations for a project consisting of multiple parcels should be included in the Appendix. If off-site reclaimed water demands are involved, the off-site demand calculations should be summarized in this section. If the project will be phased, the phasing calculations should be summarized in this section.

### 3.0 Distribution System

Provide an overview of the proposed reclaimed water distribution system infrastructure. Explain if the project will be connecting to the City’s existing infrastructure. If a will serve letter has been obtained, include a copy in the Appendix.

#### 3.1 Pressure Zone

Describe the pressure zones for the proposed site. The pressure zones should match the City of Surprise Integrated Water Master Plan unless the City had previously approved a change in the pressure zone boundary, in which case, documentation for the approval of the change should be included in the appendix and should be referenced from this section.

Include an exhibit that shows the boundary of the proposed project and the City's pressure zones.

#### 3.2 System Pressure

Parameter	Design Requirement
Maximum Pressure	100 PSI
Minimum Pressure (peak hour condition)	25 PSI

#### 3.3 Pipe Sizing

Parameter	Design Requirement
Velocity	< 5 ft/s
Headloss	< 10 ft/1000 ft
Design Criteria	Peak Hour Demand

#### 3.4 Reclaimed Water Storage

This section should outline the reclaimed water storage required for the proposed development.

The reclaimed water storage requirements from the City of Surprise guidelines are listed in Table 3. If existing reclaimed water storage capacity at the development does not exceed these requirements, an existing tank site should be upgraded or a new tank site



should be added so that these requirements will be met. If a tank site is to be upgraded or a new tank site is to be constructed, a site plan should be provided for the site and the capacity of the new tank shall be provided.

**Table 3 City of Surprise Reclaimed Water Storage Requirements**

Storage Requirement	Average Day Demand
Maximum Reservoir Sidewall Height	16 ft

### 3.5 Booster Pump Capacity

This section should outline the booster pump capacity required for serving reclaimed water to the proposed development.

At Water Supply Facility	Peak Hour
At Distribution System	Peak Hour
At Water Reclamation Facility (WSF)	Maximum Recharge
At Transmission Mains Boosting to WSF	Maximum Day Demand

### 3.6 Reclaimed Water Supply

A description of the facilities anticipated to supply reclaimed water to the proposed site should be provided in this section. The description should identify the treatment plant providing the reclaimed water, the capacity of any existing reclaimed water facilities, and any proposed improvements for supplying reclaimed water to the site. This section should also identify how the integration of reclaimed water will happen; i.e.: usage of raw water, potable water in a reclaimed system, or reclaimed water from day one.

## 4.0 Transmission System

This section should provide an overview of the proposed transmission system infrastructure. This section will describe the pipelines from the reclaimed water source to the water supply facility. Explain if the project will be connecting to the City's existing infrastructure.

Parameter	Design Requirement
Velocity	< 5.0 ft/s
Headloss	< 10.0 ft/1000 ft
Design Criteria	Access Reclaimed Water Available

## 5.0 Recharge Mains

This section should provide an overview of the proposed recharge main infrastructure. This section will describe the pipelines from the reclaimed water source to the area of recharge. Explain if the project will be connecting to the City's existing infrastructure

Parameter	Design Requirement
Velocity	< 5.0 ft/s
Headloss	< 10.0 ft/1000 ft
Design Criteria	Maximum Reclaimed Water Available

## 6.0 Reclaimed Water Model

This section should discuss the reclaimed water model for the proposed development. A separate reclaimed water model shall be provided for the distribution system and transmission system or recharge mains. The water model should include the Average Day, Maximum Day, and Peak Hour scenarios and results for each of these scenarios should be included in the Appendix.

Include a description of the assumptions used in developing the reclaimed water model.

### 6.1 Average Day Demand Analysis

Results from the reclaimed water model for the Average Day scenario should be discussed in this section. Velocities for all pipes should be below 5 feet per second, and the headloss through each pipe should be less than 10 ft per 1,000 ft of pipe.

### 6.2 Maximum Day Demand Analysis

Results from the reclaimed water model for the Maximum Day scenario should be discussed in this section. Velocities for all pipes should be below 5 feet per second, and the headloss through each pipe should be less than 10 ft per 1,000 ft of pipe.

### 6.3 Peak Hour Demand Analysis

Results from the reclaimed water model for the Peak Hour scenario should be discussed in this section. Velocities for all pipes should be below 5 feet per second, and the headloss through each pipe should be less than 10 ft per 1,000 ft of pipe.

## 7.0 Conclusion

This section should summarize the key findings and proposed improvements discussed in the reclaimed water master plan.

## References

List all references used.

## Appendices

At a minimum, the following Appendices should be included in the report.

### Demand Calculations

Reclaimed water demand calculations by parcel.

**Water Model Exhibits (including Distribution & Transmission System or Recharge Mains)**

- Overall development layout identifying parcels and street layouts and names
- Well Site locations- raw water
- Water Supply facility locations
- Clearly label all junction and pipe IDs.
- Color code all pipe diameters.
- Show development phasing plan
- Identify any reclaimed water lines anticipated to be located outside of dedicated ROW i.e. within an easement (if known).

**Model Results**

Include the reclaimed water model results ordered by element ID.

- Average Day Results: Junction, Pipe, Pump, Reservoir, and Valve Reports
- Maximum Day Results: Junction, Pipe, Pump, Reservoir, and Valve Reports
- Peak Hour Results: Junction, Pipe, Pump, Reservoir, and Valve Reports

**Preliminary Site Plan Layouts**

- Well Sites
- Water Campuses

**Additional Information Supporting the Master Plan**

Include additional supporting information in the appendix as necessary.



# City of Surprise

## Reclaimed Water Master Plan Check List

### Cover Sheet

- Project title
- Prepared for
- Prepared by
- Stamped by registered PE

### Table of Contents

### Abbreviations

### Introduction

- Project Name
- Project Location (Include Special Planning Area (SPA))
- Project Size
- General Land Use
- Number of Units
- Vicinity Map Showing Project Location (include bench marks used, scale, and north arrow)

### Demand Calculation

- Reclaimed Demand Factors match the 2009 IWMP
- Reclaimed water demand factors based on proposed land uses in the area
- Maximum Day Demand = Average Day Demand x 2.0
- Peak Hour Demand = Average Day Demand x 5.0
- Show reclaimed water demand calculations in the report
- Reclaimed water demand calculated in the report matches the demand in the result sheet
- If off-site demands are involved, calculate off-site demands or reference from other reports

### Pressure Zone

- Pressure zone in the report matches with pressure zone in IWMP
- If pressure zone doesn't match with IWMP (check elevation), has approval been received for changing pressure zone boundary
- Pressure zone map showing project boundary

### **Pipe Sizing**

- Distribution, Transmission, Recharge Mains : Velocity <5ft/s, Headloss <10ft/1000 ft

### **Reclaimed Water Supply Facility**

- Identify reclaimed water supply
- Identify the proposed improvements required at the reclaimed water supply facility
- Reclaimed water storage = 1.0 x Average Day Demand
- Booster Pump Capacity provides for the Peak Hour Demand

### **Reclaimed Water Model**

- Model results for the Distribution, Transmission, and/ or Recharge Mains
- Show results for Average Day, Maximum Day, and Peak Hour scenarios
- Pressure for all junctions for Average Day, Maximum Day, and Peak Hour scenarios between 25 and 100 psi
- Velocity for all pipes are below 5 feet per second
- Unit headloss is below 10-ft/1,000-ft

### **Appendices**

#### **Model Results**

Include the following reports in the Appendix:

- Average Day: Junction, Pipe, Pump, Reservoir, and Valve Reports
- Maximum Day: Junction, Pipe, Pump, Reservoir, and Valve Reports
- Peak Hour: Junction, Pipe, Pump, Reservoir, and Valve Reports
- All results sorted in numerical order by node or pipe ID.

#### **Exhibit**

- Overall development layout identifying parcels and street layouts and names
- Well Site locations
- Water Supply facility locations
- Clearly label all junction and pipe IDs.
- Color code all pipe diameters.
- Show development phasing plan
- Identify any reclaimed water lines anticipated to be located outside of dedicated ROW i.e. within an easement (if known).