



City of Surprise
Wastewater Master Plan
Preparation Guide

Revised
February 2010

Introduction

This document provides a template of the necessary information that must be included in a Wastewater 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 Wastewater 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

Wastewater 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
- wastewater treatment plant proposed to receive flows from 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 should also be included in this section.

1.3 Topographic Conditions

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

2.0 Projected System Flows

2.1 Wastewater Generation Calculations

This section should outline the demand factors used in the development of the site's Wastewater 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) and are summarized in Table 1 and Table 2.

Table 1 City of Surprise Wastewater Generation Factors

Land Use Category	Units	Non-Irrigation Water			Wastewater Flow	Reclaimed Water Production
		Indoor	Outdoor	Total		
Residential						
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
Commercial/Other						
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
Landscape						
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 Wastewater Peaking Factors

Pipe Diameter	Peaking Factor
	Multiply by the average day flow
< 12 inches	4
≥ 12 inches	3

This section should summarize the additional flows that the project will impose on the City’s wastewater system. The wastewater generation calculations should be summarized in this section. Detailed generation calculations for a project consisting of multiple parcels should be included in the Appendix. If off-site wastewater flows are involved, the off-site wastewater flows should be summarized in this section.

3.0 Wastewater Collection System

This section should provide an overview of the proposed wastewater collection system infrastructure. Explain where the project will be connecting to the City’s existing infrastructure.

3.1 Treatment Plant

This section should include information about the treatment plant proposed to serve the project, including the available plant capacity to service the project. Include an exhibit that shows the boundary of the proposed project and the location of the treatment plant.

3.2 Existing Wastewater Collection System

This section should describe the existing sewer mains that will service the project, including the location, size and invert elevation at the tie-in point. It should also include the available capacity in the existing sewer mains for servicing the project.

3.3 System Pipes

Gravity Sewer	Design Requirement
Design Requirement	Peak Flow
Manning’s Coefficient	0.013
Minimum Velocity	2ft/s when flowing full
Maximum Velocity	9 ft/ second
Minimum Pipe Size	8 inch

Force Main	Design Requirement
Design Requirement	Max Velocity- 8ft/s Minimum Velocity – 3ft/s

3.4 Depth Ratio

The Max Depth Over Diameter Ratio for Peak Dry Weather and Peak Wet Weather is 0.8.

3.5 Lift Stations

Lift Stations shall be designed with a firm capacity of the Largest Pump Out of Service

Identify whether or not a lift station will be required to service the development. Lift stations are strongly discouraged and are only allowed under unusual circumstances with the written approval of the Public Works Department. If a lift station will be required to service the development, please include a copy of the approval letter in the Appendix.

3.6 Project Improvements

This section should outline the wastewater system improvements proposed to service the project. Proposed sewer lines shall be sized to accommodate their ultimate service area. Sewer lines in public streets should have a diameter of at least eight inches. Private onsite sewer lines may have a smaller diameter with the written approval of the Public Works Department. If an approval letter has been obtained, include a copy in the Appendix.

Manholes containing a through sanitary sewer line with a change in direction less than 30 degrees should have a minimum drop of 0.1 feet across the manhole. A minimum drop of 0.20 feet should be provided for manholes with a change in direction greater than 30 degrees. The minimum depth of cover shall be 48 inches for all laterals and six-foot for all trunks, mains, and branch sewer lines. Sewerlines should be designed using a Manning's roughness value (n value) of 0.013, unless otherwise approved in writing by the Public Works Department. In such case, please include a copy of the written approval in the Appendix.

Any sewerlines that will be conveying offsite flows must be placed at an adequate depth to allow the offsite flows to be conveyed by gravity.

Gravity Sewerlines should be sloped to maintain a minimum velocity of 2 feet per second. The minimum slopes are listed in Table 3.

Table 3 City of Surprise Minimum Sewerline Slopes

Pipe Size (inches)	Minimum Slope (ft/ft)
6	0.01090
8	0.00334
10	0.00248
12	0.00194
15	0.00144
18	0.00113
21	0.00092
24	0.00077

4.0 Wastewater Model

This section should discuss the wastewater model for the proposed development. The wastewater model should include the Average Day and Peak Flow scenarios and results for each of these scenarios should be included in the Appendix.

Include a description of the assumptions used in developing the wastewater model.

4.1 Average Day Analysis

Results from the wastewater model for the Average Day scenario should be discussed in this section. The d/D (depth over diameter) ratio for each pipe should remain below 80% and the full-flow velocities for all pipes should be between 2 feet per second and 9 feet per second.

4.2 Peak Flow Analysis

Results from the wastewater model for the Peak Flow scenario should be discussed in this section. The d/D (depth over diameter) ratio for each pipe should remain below 80% and the full-flow velocities for all pipes should be between 2 feet per second and 9 feet per second.

5.0 Conclusion

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

References

List all references used.

Appendices

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

Wastewater Generation Calculations

Wastewater generation calculations by parcel.

Manhole and Pipe Exhibit

- Clearly label all manhole and pipe IDs.
- Color code all pipe diameters.
- Include street names and layout on the exhibit.
- Include elevation contours.
- Identify any wastewater facilities- Lift Stations or Water Reclamation Facilities
- Identify any wastewater lines anticipated to be located outside of dedicated ROW i.e. within an easement (if known).

Model Results

Include the wastewater model results ordered by element ID.

- Average Day Results
- Peak Flow Results

Lift Station Site Plan

Additional Information Supporting the Master Plan

Include additional supporting information in the appendix as necessary.



City of Surprise

Wastewater Master Plan Check List

Cover Sheet

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

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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)

Wastewater Generation Calculation

- Demand Criteria Per Table A-4 of the 2009 Integrated Water Master Plan

Existing Wastewater Collection System

- Treatment plant capacity to service the project
- Existing sewer mains that service the project
- Existing sewer main capacity to service the project

Project Improvements

- On-site improvements to service the project
 - Identify existing and proposed sewer lines, line sizes, and locations
- Off-site improvements to service the project
 - Location of the existing City sewer main that will serve the project
 - Location of sewer mains to be constructed
 - Easements
 - Location of offsite flows being introduced into the sewer lines

Wastewater Model

- Schematic map identifying sewer lines analyzed

- Sewer analysis results identifying sufficient capacity
 - Average Day Flow
 - Peak Flow
- All calculations used to determine sufficient capacity within the existing system

Appendices

Model Results

Include the following reports in the Appendix:

- Average Day Reports
- Peak Flow Reports
- All results sorted in numerical order by pipe ID.

Exhibit

- Show pipe and manhole IDs which correspond to model results
- Include street names
- Show connection point to off-site system
- Show elevation contours
- Wastewater Facilities