

MAG 208 AMENDMENT

FOR THE

CITY OF SURPRISE
SPECIAL PLANNING AREA NO. 2

WATER RECLAMATION FACILITY

PREPARED FOR:

LENNAR COMMUNITIES DEVELOPMENT, INC
1150 W. GROVE PARKWAY, SUITE 109
TEMPE, AZ 85283

&

CITY OF SURPRISE
12425 W. Bell Road, Sulte D-100
SURPRISE, AZ 85374

PREPARED BY:



PACIFIC ENVIRONMENTAL RESOURCES CORP.
17520 NEWHOPE STREET, SUITE 140
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PACIFIC ADVANCED CIVIL ENGINEERING
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May 2005 (Revised)
February 2005 (Revised)
October 2004
Job #8030E

MAG 208 Amendment

for the

City of Surprise Special Planning Area No. 2 Regional Water Reclamation Facility

Prepared for

Lennar Communities Development, Inc
1150 W. Grove Parkway, Suite 109
Suite D-100
Tempe, AZ 85283

City of Surprise
12425 W. Bell Road,

Surprise, AZ 85374

Prepared by



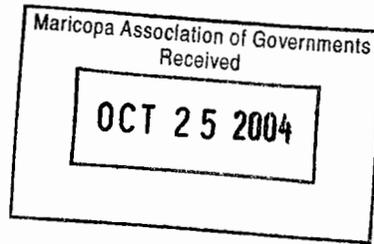
**Pacific Environmental
Resources Corp.**
17520 Newhope Street, Suite 140
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Pacific Advanced Civil Engineering
17520 Newhope Street, Suite 200
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Revised May 2005
Revised February 2005
October 2004
#8030E





WATER SERVICES DEPARTMENT
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Surprise, Arizona 85374
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October 20, 2004

Ms. Brenda Day
Maricopa Association of Governments
302 North 1st Avenue, Suite 300
Phoenix, AZ 85003

RE: Clean Water Act Section 208 Amendment
City of Surprise SPA 2 10.5 MGD Regional Water Reclamation Facility

Dear Ms. Day:

The City of Surprise is requesting an application to request a Clean Water Act Section 208 Amendment to the existing Regional Water Quality Management Plan. The proposed 208 Amendment will include 10.5 million gallons per day (MGD) Regional Water Reclamation Facility in the City of Surprise Special Planning Area Number 2 (SPA 2).

The October, 2002 MAG 208 Water Quality Management Report, addresses growth within the City of Surprise SPA 2 by the construction of "North WWTP" by 2005. The City of Surprise has completed an Integrated Water Master Plan, which has identified the collection and wastewater treatment needs for the City of Surprise General Plan 2020 Special Planning Areas 1 to 5. In the SPA No. 2, the projected build-out capacity is 10.5 MGD based on a total build-out population of 96,607. Lennar Communities Development, Inc. (Lennar) has acquired 1,500 acres within SPA No. 2. Lennar plans to develop a planned master community called "Asante by Lennar Community Development" and will implement a new wastewater collection system and Phases IA and IB of the City of Surprise 10.5 MGD Regional WRF to service the new development, as well as the remaining portion of SPA No. 2. The City plans to build the SPA No. 2, 10.5 MGD Regional Water Reclamation Facility in multiple stages. The first phase consisting of sub-phases IA and IB, will be designated as the Developer's Phase. The City envisions the future design of the subsequent master planned phases, from Phase II to build-out, in multiple modular type treatment facilities at later dates. In addition, the City has hired a consultant to prepare a Technology Assessment Report, which would identify the wastewater treatment technology needs for the City's five special planning areas. Therefore, the City of Surprise is sponsoring this amendment in order to include the SPA No. 2, 10.5 MGD Regional WRF into the Regional Water Quality Management Plan and to reduce the impacts that uncoordinated development may have on the groundwater quality and the City's existing wastewater treatment systems.

The construction of the City of Surprise owned and operated SPA No. 2, 10.5 MGD Regional WRF will reclaim wastewater flows to Arizona Department of Environmental

Quality (ADEQ) Title 18 Class A+ effluent standards from an approximate 13,229 acre region within the City's Regional Analysis Zone (RAZ) 212. The facility will be operating starting from zero flow with accommodations for temporary low-loading conditions. An Aquifer Protection Permit (APP) permit and potentially Arizona Department of Water Resources (ADWR) Aquifer Storage and Recovery Permit will be obtained by the City for non-potable reuse and for groundwater recharge of the facility effluent into recharge basins. Discharge of effluent to water body of the US (i.e. McMicken Dam outlet channel or Agua Fria River) will ultimately be achieved via an AZPDES permits. The SPA No. 2, 10.5 MGD Regional WRF will be designed and constructed in multiple phases which will be sized based on rates of wastewater generation in response to growth in the service area.

By providing a new facility in the region, a local source of effluent will become available for irrigation and other non-potable reuse, alleviating pressure on groundwater resources. In addition, artificial recharge of the effluent will provide groundwater credits to the City, while recharging the aquifer in the general area of the original groundwater withdrawal.

By transmittal of this letter and a copy of the draft 208 Amendment, it is requested of MAG on behalf of the City of Surprise that the amendment process be initiated. Technical questions and comments should be directed to Mr. Steve Owen, PE, of PERC, Inc.; e-mail sowen@percwater.com. After your comments have been received, copies of the 208 Amendment will be prepared and delivered to MAG, as required, for processing and distribution.

Please feel free to contact me at (623) 875-4293 should you have any general questions or require additional information.

Sincerely,



Rich Williams, Sr.
Water Services Director

cc: Jim Rumpeltes, City Manager
Kathy Rice, Assistant City Manager
Jeff Blilie, City of Surprise Attorney
Scott Switzer, Lennar
Raj Thakur, RT Engineers

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- Appendix B SPA No.2 Regional WRF Process Design Information
- Appendix C SPA No.2 Draft Construction Schedule
- Appendix D Lennar Communities Inc. Financial Statement
- Appendix E Communication with ADEQ regarding permitting

EXECUTIVE SUMMARY

The water quality management plan for Maricopa County, AZ, based on Section 208(a)(2)(b) of the Clean Water Act (CWA), is provided by the Maricopa Association of Governments (MAG). The goal of the 208 Plan is to identify area-wide wastewater treatment needs, water quality management problems, and establish a program to alleviate them. The October, 2002 MAG 208 Water Quality Management Plan, addresses growth within the City of Surprise Special Planning Area (SPA) Number 2 by the construction of “North WWTP” by 2005. The City of Surprise has completed an Integrated Water Master Plan, which has identified the collection and wastewater treatment needs for the City of Surprise General Plan 2020 Special Planning Areas 1 to 5. In the SPA No. 2, the projected ultimate build-out capacity is 10.5 MGD, based on a total build-out population of 96,607. Lennar Communities Development, Inc. (Lennar) has acquired 1,500 acres within SPA No. 2. Lennar plans to develop a planned master community called “Asante by Lennar Community Development” and will implement a new wastewater collection system and Phases IA and IB (Developer Phases) of the City of Surprise regional treatment facility to service the new development, as well as the remaining portion of SPA No. 2. The City plans to build the SPA No. 2, 10.5 MGD Regional Water Reclamation Facility in multiple stages. The first two phases, Phases IA and IB, will be designated as the Developer’s phases. The City envisions the future design of the subsequent master planned phases, from Phase II to build-out, in multiple modular type treatment facilities at future dates. In addition, the City has hired a consultant to prepare a Technology Assessment Report, which would identify the wastewater treatment technologies for the City’s five special planning areas. Therefore, the City of Surprise is sponsoring this amendment in order to include the SPA No. 2 10.5 MGD Regional WRF into the Regional Water Quality Management Plan and to reduce the impacts that uncoordinated development may have on the groundwater quality and the City’s existing wastewater treatment systems. It is the City of Surprise intent to correct the 2002 MAG 208 boundaries to mirror image the City’s General Plan 2020 boundaries. The requested amendment includes the following:

Amendment Item:

The construction of a new City of Surprise owned and operated 10.5 MGD (Phase IA - 1.2 MGD) SPA No.2 Regional WRF in the City of Surprise. The new facility will reclaim wastewater flows to Arizona Department of Environmental Quality (ADEQ) Title 18 Class A+ effluent standards from an approximate 13,229 acre region within Surprise in Regional Analysis Zone (RAZ) 212. The facility will be operated starting from zero flow with accommodations for temporary low-loading conditions. An Aquifer Protection Permit (APP) permit and potentially an Arizona Department of Water Resources (ADWR) Aquifer Storage and Recovery permit will be obtained by the City for non-potable reuse and for groundwater recharge of the facility effluent into recharge basins. Discharge of effluent to a water body of the US (i.e. McMicken Dam outlet or Agua Fria River) will ultimately be achieved from the facility via an AZPDES permits. The SPA No.2 Regional WRF will be designed and constructed in multiple phases which will be sized based on rates of wastewater generation in response to growth in the service area.

By constructing a new facility near proposed developments, wastewater collection and effluent distribution systems will be considerably smaller in size and less costly as compared to conveying flows to and from existing or other proposed facilities in the surrounding area. By providing a new facility in the region, a local source of effluent will become available for irrigation and other non-potable reuse, alleviating pressure on groundwater resources. In addition, artificial recharge of the effluent will provide groundwater recharge credits to the City, while recharging the aquifer in the general area of the original groundwater withdrawal.

This CWA 208 Amendment application provides information on the proposed SPA No.2 Regional WRF. The following sections describe how the Section 208 requirements are addressed, including treatment alternatives, permitting, treatment facility design, sludge management, construction, financing, impacts, and public participation.

LETTERS OF NO OBJECTION

City of Peoria & Maricopa County

Water and Waste Management Division

1001 N. Central Ave., Suite 150
Phoenix, AZ 85004
Phone: (602) 506-6666
Fax: (602) 506-6925
TDD: 602 506 6704
www.maricopa.gov/envsvc

May 09, 2005

Maricopa Association of Governments
302 North 1st Avenue, Suite 300
Phoenix, AZ 85003

Attention: Ms. Lindy Bauer, Environmental Program Coordinator

Re: City of Surprise, Special Planning Area No. 2, Water Reclamation Facility
Clean Water Act, MAG 208 Amendment

Dear Ms. Bauer:

In a transmittal dated May 4, 2005, Pacific Environmental Resources Corp. (PERC) & Pacific Advanced Civil Engineering, Inc (PACE) submitted a revised proposed 208 Amendment for expansion of the City of Surprise, Special Planning Area No. 2, Water Reclamation Facility to Maricopa County Environmental Services Department (Department). The Facility is located in the northeast ¼ of Section 18, T4N, R1W, just outside the City of Surprise.

The document was submitted to the Department because it is located within unincorporated areas of Maricopa County. The facility is located approximately one mile from the City of Surprise and four miles from the City of Peoria. The City of Peoria provided a letter of no objection in which it notes "an apparent discrepancy between the MAG 208 Plan and the Peoria – Surprise Planning boundary along the easterly portion of SPA No. 2" that it plans to resolve with the City of Surprise.

Based on a review of the proposed 208 MAG 208 Amendment, revised May 2005, the Department has determined that the proposed plant is acceptable and complies with the MAG 208 Review and Approval Process under the MAG 208 Areawide Water Quality Management Plan. The proposed plant expansion is not in conflict with Maricopa County plans for the area.

Please note that the Department has not reviewed, nor approved, the design of the facilities as part of the 208 review. Any technical issues that remain will need to be resolved during the design phase of the project. Approval to Construct (ATC) and Approval of Construction (AOC) must be obtained from this Department prior to start of construction and startup, respectively, of all treatment, discharge, recharge, and reuse facilities, including all conveyance facilities and final end user facilities.

If you have any questions or comments, please feel free to contact Mr. Kenneth James, PE, or myself at 506-6666.

Sincerely,

Dale Bodiya, P.E.
Acting Manager, Water and Waste Management Division

cc: Rich Williams, Sr., City of Surprise, 12425 W. Bell Rd., Suite D-100, Surprise, AZ 85374
Duong Do, PE, PERC, 17520 Newhope St., Suite 140, Fountain Valley, CA 92708
File



City of Peoria

Utilities Department

8401 West Monroe Street, Peoria, Arizona 85345
Phone: 623-773-7286 Fax: 623-773-7291

February 25, 2006
Revised June 28, 2005

Mr. Rich Williams, Sr.
Water Services Director
12425 West Bell Road, Suite D-100
Surprise AZ 85374

Re: Clean Water Act Section 208 Amendment
City of Surprise SRA 2 Regional Water Reclamation Facility

Dear Mr. Williams,

This is in response to your letter regarding the above referenced Water Reclamation Facility. The City of Peoria has no objection to the proposed new City of Surprise SPA 2 Regional Water Reclamation Facility. We understand the service area of the facility will be limited to that portion of the City of Surprise defined as SPA 2 which is generally south of the Central Arizona Project Canal and northeast of Grand Avenue within the Surprise City Limits.

Please call me at 623-773-7181 if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "William J. Mattingly".

06-28-2005

William J. Mattingly, P.E., R.L.S.
Deputy Utilities Director

**WATER SERVICES DEPARTMENT**

12425 W. Bell Road, Suite D-100

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Office: (623) 875-4290

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October 18, 2004

Dale Bodiya, P.E.
 Manager, Water and Waste Management Division
 Maricopa County Environmental Services Department
 1001 North Central Avenue, Suite 150
 Phoenix, AZ 85004

**Re: Clean Water Act Section 208 Amendment
 City of Surprise SPA 2 Regional Water Reclamation Facility**

Dear Mr. Bodiya:

The City of Surprise is submitting an application to request a Clean Water Act Section 208 Amendment to the existing Regional Water Quality Management Plan of the Maricopa County (Arizona) Planning Area. The objective of the amendment is to include the City of Surprise Special Planning Area Number 2 (SPA 2) 10.5 million gallons per day (MGD) Regional Water Reclamation Facility to the existing Regional Water Quality Management Plan.

The City of Surprise owned and operated SPA 2, 10.5 MGD Regional Water Reclamation Facility would be located in the Northeast ¼ of Section 18 T4N R1W. The proposed site is located in the City's general planning area. The City plans to build the SPA 2, 10.5 MGD Regional Water Reclamation Facility in several phases. The first two phases (Phase IA and Phase IB), funded and constructed by developer(s), would be designated as Developer Phases. The City envisions the future design and construction of the subsequent master planned City Phases (Phase II to Build-Out) in multiple modular type treatment facilities at later dates. The design and construction of the subsequent phases would depend upon the rate of residential and commercial growth in the City's Special Planning Area 2. The City has completed an Integrated Water Master Plan, which has identified the collection and wastewater treatment needs of the City of Surprise General Plan 2020 Special Planning Areas 1 to 5. In addition, the City has hired a Consultant to prepare a Technology Assessment Report, which will identify the Master Planned wastewater treatment technologies for the City's five special planning areas. The MAG 208 Amendment also includes the construction of Developer Phase I of the SPA 2, 10.5 MGD Regional Water Reclamation Facility.

The Lennar Community development Inc. (Lennar) has acquired 1,500 acres and plans to develop a master planned community called "Asante Development" in the City's SPA 2. Lennar will fund the design and construction of the Developer Phases (Phases IA and IB) of

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Re: Clean Water Act Section 208 Amendment
City of Surprise SPA 2 Regional Water Reclamation Facility
Page 2 of 2

the SPA 2, 10.5 MGD Regional WRF, on the City's behalf. The preliminary engineering design of 1.2 MGD Developer Phase IA is currently proceeding. The Phase IA WRF is expected to be completed and operational by the 3rd Quarter of 2006, assuming the commencement of Phase IA construction by the 3rd Quarter of 2005.

We would greatly appreciate if you could write a no objection letter to the Maricopa Association of Governments, indicating that the Maricopa County Environmental Services Department has no objection and supports the MAG 208 Amendment as submitted by the City of Surprise. Please send the letter to the attention of Ms. Lindy Bauer, Environmental Program Director.

Please feel free to contact me at 623-875-4290, should you have any questions or need more information.

Sincerely,



Rich Williams, Sr.
Water Services Director

cc: Jim Rumpeltes, City Manager
Kathy Rice, Assistant City Manager
Jeff Blilie, City of Surprise Attorney
Scott Switzer, Lennar Community Development
Raj Thakur, RT Engineers

ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
APP	Aquifer Protection Permit
AZPDES	Arizona Pollution Discharge Elimination System
CAP	Central Arizona Project
CFR	Code of Federal Regulations
DU	Dwelling Units
E.D.	Equivalent Dwelling
EPA	Environmental Protection Agency
MAG	Maricopa Association of Governments
MGD	Million gallons per day
MSDS	Material Safety Data Sheets
O&M	Operations and maintenance
PACE	Pacific Advanced Civil Engineering, Inc.
NTU	Nephelometric Turbidity Unit
RAS	Return Activated Sludge
RAZ	Regional Analysis Zone
SPA	Special Planning Area
USF	Underground Storage Facility
WAPA	Western Area Power Administration
WRF	Water Reclamation Facility
WWTP	Wastewater Treatment Plant

Requirement	Summary of How Requirements are Addressed	Page	Heading
AUTHORITY			
Proposed Designated Management Agency (DMA) shall self-certify that it has the authorities required by Section 208(c)(2) of the Clean Water Act to implement the plan for its proposed planning and service areas. Self-certification shall be in the form of a legal opinion by the DMA or entity attorney.			
20-YEAR NEEDS			
Clearly describe the existing wastewater treatment (WWT) facilities:			
<ul style="list-style-type: none"> Describe existing WWT facilities. 	The temporary Desert Oasis WWTP is being constructed in the City of Surprise SPA 2.	2,9	I. A. and I. C. 4
<ul style="list-style-type: none"> Show WWT certified service areas for private utilities and sanitary district boundaries, if appropriate. 	There are no private utilities or private sanitation districts within SPA 2.	2,9	I. A. and I. C. 4
Clearly describe alternatives, the recommended WWT plan, and factors that affect discharge:			
<ul style="list-style-type: none"> Provide POPTAC population estimates (or COG-approved estimates only where POPTAC not available) over 20-year period. 	POPTAC estimates that the City of Surprise population in 2010 will be 124,129. The City of Surprise General plan estimates that 149,900 people will be living in the City of Surprise in 2010. The population of SPA 2 will grow to 96,607 at final buildout as identified in the City of Surprise General Plan 2020.	5	I.C.2.
<ul style="list-style-type: none"> Provide wastewater flow estimates over the 20-year planning period. 	The total 20-year wastewater flow projection for the SPA No. 2 Regional WRF service area is 10.5 MGD, based on a total build-out population of 96,607.	6	I.C.2.
<ul style="list-style-type: none"> Illustrate the WWT planning and service areas. 	The proposed SPA 2 Regional WRF will provide wastewater treatment services for approximately 13,229 acres composing SPA 2. The service area for the proposed SPA 2 Regional WRF is illustrated in <i>Figure 2</i> .	3	Figure 2
<ul style="list-style-type: none"> Describe the type and capacity of the recommended WRF. 	The SPA No. 2 Regional WRF will include an activated sludge type biological nutrient removal (BNR) treatment system with advanced tertiary treatment compatible with ADEQ Title 18 Class A+ effluent standards. The facility will be equipped with screening, grit removal, biological BOD reduction and nitrification/denitrification, clarification, filtration, and UV disinfection. The facility will also	6	I.C.3 and Appendix B Contains Design Calculations

Requirement	Summary of How Requirements are Addressed	Page	Heading
	<p>incorporate sludge storage, treatment, and processing capability. Odor and noise control and aesthetic measures will also be incorporated into the design in accordance with the Title 18 Arizona Administrative Code. Odor control will be provided on tankage, equipment, and the sludge processing area. The first phase of the SPA 2 Regional WRF will provide 1.2 MGD average daily flow treatment capacity (2.4 MGD peak day and 3.6 MGD peak hour). Phased expansions of the facility will ultimately provide the full-build out capacity estimated not to exceed 10.5 MGD average day flow. This amendment addresses all phases (full-build out) of the SPA 2 facility.</p>		
<ul style="list-style-type: none"> Identify water quality problems, consider alternative control measures, and recommend solution for implementation. 	<p>By complying with ADEQ Title 18 Class A+ effluent standards, no foreseeable water quality issues are anticipated due to the use of SPA No 2's reclaimed water. The effluent water will be of sufficient quality for unrestricted reuse. Also, the total nitrogen and coliform limits for Class A+ effluent are below the applicable water quality standards for groundwater recharge.</p>	8	I.C.3.c.
<ul style="list-style-type: none"> If private WWT utilities with certificated areas are within the proposed regional service area: define who (municipal or private utility) serves what area and when. Identify whose sewer lines can be approved in what areas, when? 	<p>The proposed service area does not overlap any current WWTP or WRF service areas. The City of Surprise is sponsoring this amendment in order to reduce the impacts that uncoordinated development may have on the groundwater quality and the City's existing wastewater treatment systems. Once the treatment facility and sewer lines are completed per the City's Sewer Master Plan, they will come under the ownership of the city. Additional treatment facility service areas in the neighboring City of Peoria will not be impacted by the City of Surprise SPA 2 Regional WRF.</p>	9	I.C.4.
<ul style="list-style-type: none"> Describe method of effluent disposal and reuse sites (if appropriate). 	<p>Effluent from all phases of the SPA 2 Regional WRF is anticipated to be reclaimed for landscape and open space irrigation; excess effluent will be used for groundwater recharge through percolation basins</p>	6	I.C.3.

Requirement	Summary of How Requirements are Addressed	Page	Heading
	(location to be determined). An Aquifer Protection Permit (APP) and potentially an ADWR Constructed Underground Storage Facility permit will be provided as needed for groundwater recharge. An alternative discharge site to waters of the US (e.g. , the McMicken Dam outlet or the Agua Fria River) may also be sought, which will require an ADEQ AZPDES permit. .		
<ul style="list-style-type: none"> Describe other wastewater treatment options that were considered. 	<p>Two alternatives were considered:</p> <p>Alt. #1 – Provide additional sewerage collection and effluent distribution piping and conveyance to transport flows to and from existing or other proposed plants in City of Surprise or in nearby Peoria. Additional treatment infrastructure would likely be necessary to provide for significant increases in loading from the new service area.</p> <p>Alt. #2 – Provide new wastewater collection and treatment facilities within the service area via the SPA 2 Regional WRF – owned and operated by the City of Surprise. Use effluent on-site for reuse and for groundwater recharge.</p>	2	I.B.
<ul style="list-style-type: none"> If Sanitary Districts are within a proposed planning or service area, describe who services the Sanitary Districts and when. 	There are no sanitary districts within the proposed service area.	9	I.C.4.
<ul style="list-style-type: none"> Describe ownership of land proposed for plant sites and reuse areas. 	The SPA 2 Regional WRF will be located on property that will be owned by Lennar Communities Development, Inc. Following the construction and acceptance of each phase of facility, the City of Surprise will eventually own and operate both Phase IA and Phase IB treatment facilities. Recharge facilities accepting reuse water will be on land transferred to the City of Surprise from Lennar.	4	I.C.1.
<ul style="list-style-type: none"> Address time frames in the development of the treatment works. 	Phase IA of SPA 2 Regional WRF is expected to be substantially complete in 3rd quarter of 2006 assuming commencement of Phase IA construction by the 3rd quarter 2005. The Phase IA facility will have separate	10	II.A. Appendix C

Requirement	Summary of How Requirements are Addressed	Page	Heading
	equipment and control measures incorporated into the plant to treat low-flows: 1) vault-and-haul <20,000 gallons per day (gpd)) and 2) temporary equipment treating <120,000 gpd until development is able to provide larger loadings required for full-facility operation. Additional facility phases for the SPA 2 Regional WRF are anticipated to be designed when average day wastewater flows exceed 70% of the current plant capacity. The timing of future subsequent expansions will therefore be dependent on rates of population and resultant wastewater flow increases.		
<ul style="list-style-type: none"> Address financial constraints in the development of the treatment works. 	There are no foreseeable financial constraints associated with the Regional WRFs' design, construction, and operation other than enabling the development to be competitive within the greater Phoenix, AZ market.	11	III.A. Appendix D
<ul style="list-style-type: none"> Describe how discharges will comply with EPA municipal and industrial stormwater discharge regulations (Section 405, CWA). 	All stormwater generated within the project sites will be detained on-site following completion of construction (zero stormwater discharge will occur from the property of the SPA 2 Regional WRF). During construction, flows will be discharged from the site under an AZPDES temporary construction discharge permit.	9	I.C.3.d
<ul style="list-style-type: none"> Describe how open areas and recreational opportunities will result from improved water quality and how these will be used. 	Effluent irrigation provides the ability to grow plants and grass for aesthetics and provide recreation such as golf, soccer, baseball, etc. for residents.	6	I.C.3.
<ul style="list-style-type: none"> Describe potential use of lands associated with treatment works and increased access to water-based recreation, if applicable. 	Not Applicable	NA	NA
REGULATIONS			
<ul style="list-style-type: none"> Describe types of permits needed, including NPDES, APP and reuse 	The new WRF will require an Aquifer Protection Permit (APP), a MCESD Non-title V air quality permit, MCESD Annual Operations Permit, MCESD Approval to Construct (ATC), MCESD Approval of Construction (AOC), and potentially ADEQ effluent reuse, ADWR Underground Storage and Recovery, AZPDES permits	9	I.D.

Requirement	Summary of How Requirements are Addressed	Page	Heading
	(dependent on future reuse and/or discharge sites). Possibly an ACOE Clean Water Act 404 permit will be needed if site construction exists within a water of the U.S.		
<ul style="list-style-type: none"> Describe restrictions on NPDES permits, if needed, for discharge and sludge disposal. 	<p>If an AZPDES permit is sought for an alternative effluent discharge location, no unattainable restrictions on the permit are anticipated provided the facility is in compliance with ADEQ Title 18 Class A+ water quality standards. The expected water quality requirements are as follows:</p> <ul style="list-style-type: none"> Turbidity < 2 NTU (24 hour mean) Turbidity < 5 NTU (any time) Fecal Coliform = none detected (4 of 7 samples) Fecal Coliform < 23 CFU/100mL (any time) Total Nitrogen < 10 mg/L (5 day mean) 	8	I.C.3.c.2.
<ul style="list-style-type: none"> Provide documentation of communication with ADEQ Permitting Section 30 to 60 days prior to public hearing regarding the need for specific permits. 	PERC, Inc., in conjunction with the City of Surprise and Lennar, is in the process of obtaining necessary permits from ADEQ and potentially ADWR for the SPA 2. Attendance at an APP Pre-Application meeting is document in Appendix F.		Appendix E
<ul style="list-style-type: none"> Describe pretreatment requirements and method of adherence to requirements (Section 208 (b)(2)(d), CWA). 	No industrial user will be connected to the system (only residential and commercial wastewater). If industrial users are added to the service area of the facility, a pretreatment program will be developed with the industrial user being subject to pretreatment standards as regulated by the EPA.	10	I.E
<ul style="list-style-type: none"> Identify, if appropriate, specific pollutants that will be produced from excavations and procedures that will protect ground and surface water quality (Section 208(b)(2)(K) and Section 304, CWA). 	Nutrient and metal pollutants typically bonded to sediment may be introduced by excavation during construction of the SPA 2. Storm water detention areas consisting of depressions or swales can effectively settle potential increases in suspended solids during construction.	11	II.B.
<ul style="list-style-type: none"> Describe alternatives and recommendations in the disposition of sludge generated (Sections 405, CWA 	Sludge will be stored, treated, and dewatered on-site for the SPA 2 Regional WRF. Biological reactors will	10	I.F

Requirement	Summary of How Requirements are Addressed	Page	Heading
and 40 CFR 503).	provide processes to significantly reduce pathogens and volatile solids composition. The facility will provide aerated storage, digestion, thickening, and dewatering capabilities. Following the completion of Phase IB, the facility will produce Class B biosolids for the remainder of the facility build-out. Treated and dewatered sludge from Phase IA is anticipated to be landfilled. Class B bio-solids from Phase IB or subsequent phases can be reused for land application or fertilization of non-contact crops.		
<ul style="list-style-type: none"> Define any non-point issues related to the proposed facility and outline procedures to control them. 	No non-point discharges are anticipated.		
<ul style="list-style-type: none"> Describe process to handle all mining runoff, orphan sites, and underground pollutants, if applicable. 	Not applicable.		
<ul style="list-style-type: none"> If mining related, define where collection of pollutants has occurred, and what procedures are going to be initiated to contain contaminated areas. 	Not applicable.		
<ul style="list-style-type: none"> If mining related, define what specialized procedures will be initiated for orphan sites, if applicable. 	Not applicable.		
CONSTRUCTION			
<ul style="list-style-type: none"> Define construction priorities and time schedules for initiation and completion. 	Construction is expected to be complete with the plant becoming operational by the 3rd quarter of 2006 assuming commencement of Phase IA construction by the 3rd quarter 2005. Near the end of Phase IA construction, the facility will be able to accept flows for vault-and-haul operation to the influent lift station up to 20,000 gallons per day (<70 housing units). Hauling will be provided to another PERC, Inc. operated facility. Following Phase IA Approval of Construction by MCESD, the facility will accept wastewater flows into the main facility provided adequate loadings are available for low-flow processing. As average day flows exceed 70% of the facility's capacity (e.g. 840,000 gpd in Phase IA), design of subsequent	10	II. and Appendix C contains the draft construction schedule

Requirement	Summary of How Requirements are Addressed	Page	Heading
	phases will be initiated, followed by construction as necessary. Construction priorities consist of equipment procurement and proper installation, quality control, and project coordination/documentation.		
<ul style="list-style-type: none"> Identify agencies that will construct, operate, and maintain the facilities and otherwise carry out the plan. 	PERC will construct, operate, and maintain the SPA 2 Regional WRF during the start-up and warranty period to be determined by the City. The City of Surprise will oversee all operation and maintenance services of the Regional WRF.	10	II.A.
<ul style="list-style-type: none"> Identify construction activity-related sources of pollution and set forth procedures and methods to control, to the extent feasible, such sources. 	The construction of the wastewater treatment plant will not be a significant source of pollution. Anticipated pollution from construction activities includes fugitive dust, construction equipment exhaust emissions, and construction related solid waste. Erosion control measures during construction and grading will be implemented to prevent potential storm water runoff to water bodies. The developer and project contractor shall comply with local and county regulatory requirements and provisions of construction permits issued including dust control permits.	11	II.B.
FINANCING AND OTHER MEASURES NECESSARY TO CARRY OUT PLAN			
<ul style="list-style-type: none"> If plan proposes to take over a certified private utility, describe how and when financing will be managed. 	Not applicable.		
<ul style="list-style-type: none"> Describe any significant measure necessary to carry out the plan (e.g., institutional, financial, economic, etc.) 	Lennar Community Development, Inc. will finance the design and construction of the Developer's Phases IA and IB of the SPA No.2 Regional WRF.	11	III.
<ul style="list-style-type: none"> Described proposed method(s) of community financing. 	Additional phased construction will be financed through development contribution/impact fees, in conjunction with City of Surprise capital improvement bonds and sewer system development fees.	11	III.
<ul style="list-style-type: none"> Provide financial information to assure DMA has financial capability to operate and maintain wastewater system over its useful life. 	Lennar has provided copies of the 2003 annual financial report. Excerpts of this report including the balance sheet are contained in <i>Appendix D</i> of this document. A complete copy may be obtained upon request. A memo from the City of Surprise stating the		Appendix D

Requirement	Summary of How Requirements are Addressed	Page	Heading
	city's financial capability to operate and maintain the facility is shown in Appendix D.		
<ul style="list-style-type: none"> Provide a time line that outlines the period of time necessary for carrying out plan implementation. 	Completion of the initial phase (Phase IA) of the SPA 2 Regional WRF is anticipated to be 3rd quarter 2006 assuming construction commences by 3rd quarter 2005. Subsequent phasing of the facility will be completed as dictated by wastewater generation and the rate of residential and commercial growth. Assuming 100% build-out in the service area, the estimated capacity of the facility is 10.5 MGD in 2022.	10	II.A. Appendix C
<ul style="list-style-type: none"> Provide financial information indicating the method and measures necessary to achieve project financing (Section 201 CWA or Section 604 may apply). 	Appendix D contains Lennar Community Development financial statements, as well as the City of Surprise financial capabilities.		Appendix D
IMPLEMENTATION			
Describe impacts and implementation requirements of the Plan:			
<ul style="list-style-type: none"> Describe impacts on existing WWTFs (e.g., Sanitary district, infrastructure/facilities, and certificated areas). 	No existing infrastructure or facilities exist within the SPA 2 service area.	9	I.C.4.
<ul style="list-style-type: none"> Describe how and when existing package plants will be connected to a regional system. 	Currently no plants exist in the proposed service area which would be connected to the proposed SPA 2 Regional WRF regional system.	NA	NA
<ul style="list-style-type: none"> Describe the impact on communities and businesses affected by the plan. 	There are no anticipated negative impacts to the community or businesses due to this plan. Positive impacts expected for the community and businesses include wastewater collection services, aquifer recharge with potential subsequent indirect reuse, and potential direct reuse.	9	I.C.4.
<ul style="list-style-type: none"> If a municipal WWT system is proposed, describe how WWT service will be provided until the municipal system is completed (i.e., will package plants and septic systems be allowed and under what circumstances; interim services). 	Houses will not be occupied prior to the completion and approval of the low-flow portions of the SPA 2 Regional WRF (vault-and-haul operation for flows < 20,000 gpd in the lift station and temporary equipment/controls for flows exceeding 20,000 gpd but less than 120,000 gpd).	10	II.A.

Requirement	Summary of How Requirements are Addressed	Page	Heading
PUBLIC PARTICIPATION			
<ul style="list-style-type: none"> Submit copy of mailing list used to notify the public of the public hearing on the 208 amendments. (40 CFR, Chapter 1, part 25.5) 	All public notifications will be satisfied through MAG.	12	V.
List location where documents are available for review at least 30 days before public hearing.	All public notifications will be satisfied through MAG.	12	V.
<ul style="list-style-type: none"> Submit copy of the public notice of the public hearing as well as an official affidavit of publication from the area newspaper. Clearly show the announcement appeared in the newspaper at least 45 days before the hearing. 	All public notifications will be satisfied through MAG.	12	V.
<ul style="list-style-type: none"> Submit affidavit of publication for official newspaper publication. 	All public notifications will be satisfied through MAG.	12	V.
<ul style="list-style-type: none"> Submit responsiveness summary for public hearing. 	All public notifications will be satisfied through MAG.	12	V.

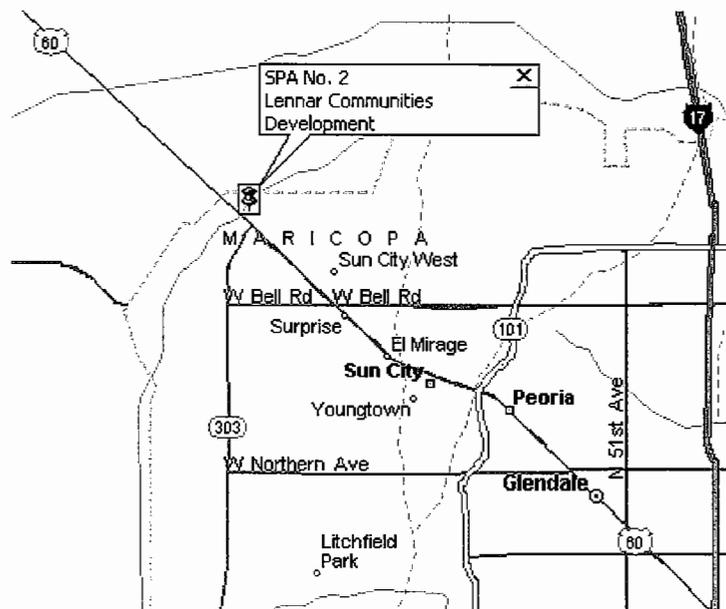
I. 20-Year Needs

The Maricopa Association of Governments (MAG) is the Designated Planning Agency with the authority under Section 208(a)(2)(B) of the Clean Water Act (CWA) to prepare the Regional Water Quality Management Plan for the Maricopa County Planning Area. The purpose of this application is to request a Clean Water Act Section 208 amendment to the current Regional Water Quality Management Plan to facilitate the inclusion of the City of Surprise SPA No. 2, 10.5 MGD Regional WRF. The requested amendment includes the following:

Amendment Item:

The construction of a new City of Surprise owned and operated 10.5 MGD SPA No.2 Regional Water Reclamation Facility (WRF) in the Northeast ¼ of Section 18 T4N RIW just outside the City of Surprise. The new facility will reclaim wastewater flows to Arizona Department of Environmental Quality (ADEQ) Title 18 Class A+ effluent standards from an approximate 13,229 acre region within Surprise in Regional Analysis Zones (RAZ) 212. The service area for SPA No.2 Regional WRF is in the northern portion of the City of Surprise, north of adjacent US Hwy 60 (See Figure 1). The facility will

Figure 1. Vicinity Map



be operated starting from zero flow with accommodations for temporary low-flow conditions. An Aquifer Protection Permit (APP) and potentially an ADWR Underground Storage and Recovery Permit will be completed as necessary for non-potable reuse and groundwater recharge of effluent from the facility by way of percolation basins. In the event that not all effluent water is reused/ recharged, an AZPDES may be sought to allow an additional point of discharge to the Mc Micken Dam outlet or the Agua Fria River.

Lennar Communities Development, Inc will finance the design and construction of the Phase IA SPA No.2 Regional WRF. Phase IA will have an average day capacity of 1.2 MGD, and subsequent phasing will provide treatment up to 10.5 MGD average day flow at full build-out. Phasing of the facility beyond Phase IA will be dependent on rates of population growth and corresponding wastewater loading increases. To conserve time, Lennar Development has opted for a design/build approach for the initial phase of this facility. Pacific Environmental Resources Corporation, Inc. (PERC) has been selected by Lennar as the design/build/operator. Preliminary engineering design of Phase IA is currently proceeding. The facility is expected to be completed and operational by the 3rd quarter 2006 assuming commencement of Phase IA construction by the 3rd quarter 2005.

Following the commissioning of the facility and startup period, Lennar Development will transfer ownership of the facility along with operation responsibilities to the City of Surprise. After 70% of the Phase IA wastewater flow design capacity is achieved, Phase IB design will be initiated. Subsequent phases of the facility will also proceed in this manner.

The following sub-sections describe existing wastewater facilities, considered alternatives for wastewater from future developments, the proposed wastewater collection and treatment system, and regulatory requirements for implementation.

A. Description of Existing Wastewater Treatment Facilities

The 13,229 acre SPA No.2 Regional WRF service area is located within RAZ 212 within the City of Surprise. The location of the City of Surprise existing WWTP is illustrated on *Figure 2*. Proposed and existing facilities in the neighboring community of Peoria are also illustrated. There are no existing sewerage collection systems or treatment facilities within the proposed SPA No.2 service area. Nearby facilities were described in the existing MAG 208 and are summarized below.

The existing South Surprise WWTP is approximately 10 miles from the proposed SPA No.2 Regional WRF and is expected to reach its full capacity of 36 MGD from serving Special Planning Area 1. Its capacity does not include flows from the SPA No.2 service area. Nearby wastewater treatment facilities in Peoria are designed to accommodate wastewater generated at related developments (Jomax WRP, Paddleford WRP, and Quintero WRP) and are not capable of serving the wastewater generated by the SPA No.2 service area. Additionally, the Desert Oasis Development is also located within SPA 2 and is currently constructing a temporary WRF. The temporary WRF will be decommissioned and the development will connect to the SPA 2 Regional WRF once the regional collection system is available.

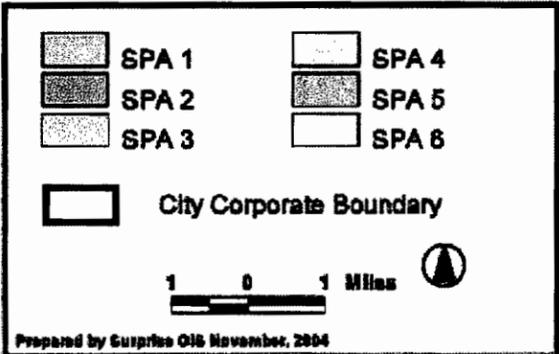
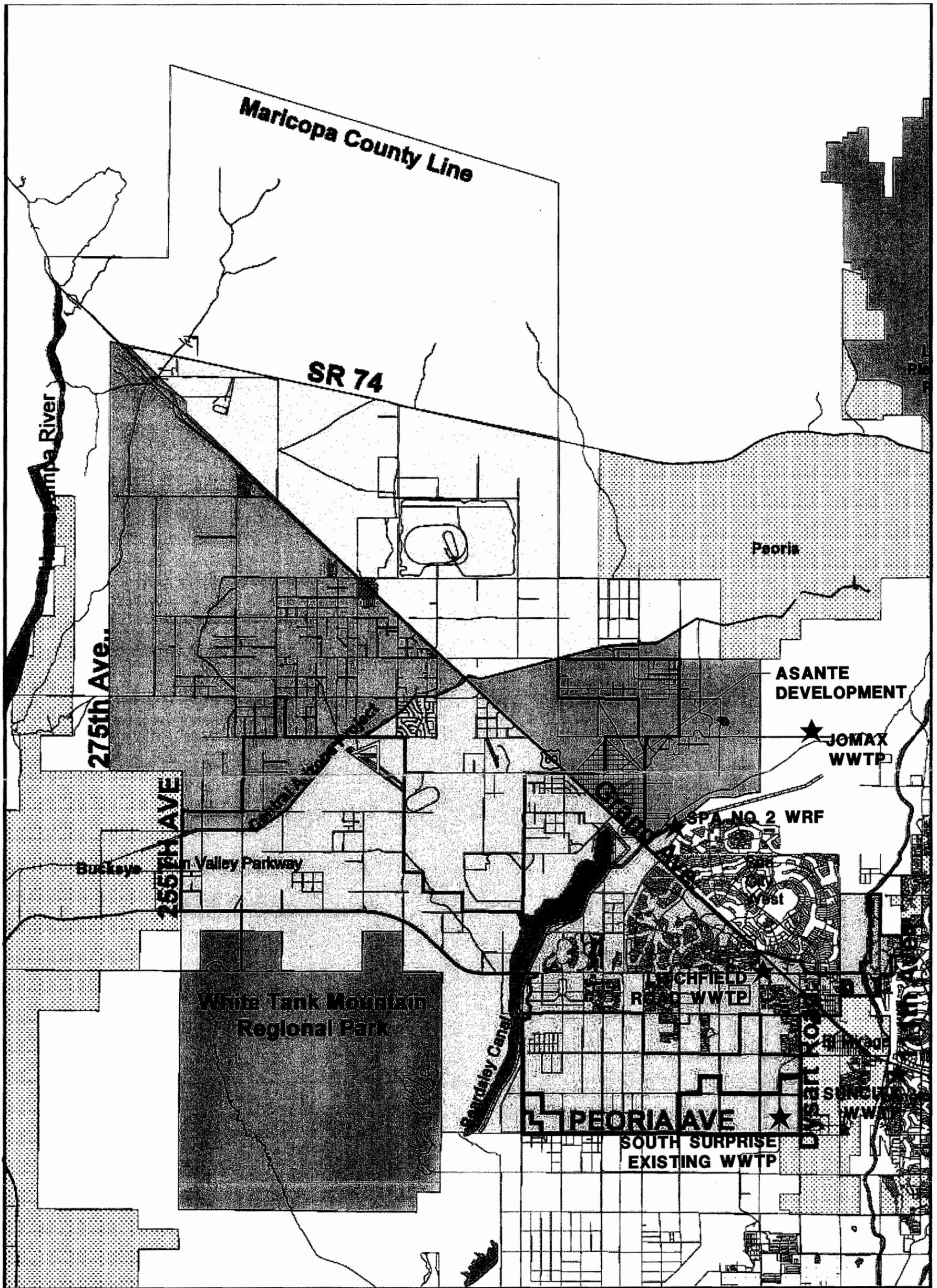
The Special Planning Area 3 has recently submitted a MAG 208 Amendment to Maricopa County for an ultimate build-out capacity of 30 MGD.

B. Summary of Alternatives

The following two alternatives were considered to evaluate the wastewater treatment from the proposed SPA No.2 WRF service area.

Alternative 1:

Providing wastewater collection and pumping infrastructure to convey flows to existing or proposed facilities in the City of Surprise (SPA No.1 South Surprise WWTP) or in nearby Peoria (Jomax WRF, Paddleford WRF, and Quintero WRF). Increases in flow to the existing facilities would necessitate unplanned expansion and redesign of future phases of treatment works based on loading increases from the 13,299-acre service area.



Special Planning Areas (SPA)

Figure 2

Surprise General Plan 2020:
Imagine the Possibilities
City of Surprise, AZ



Alternative 2:

Implementing a new wastewater collection system and treatment facility to effectively treat and reuse/ recharge wastewater flows from proposed developments within the region.

Alternative 2 (building the new SPA No.2 Regional WRF) was considered more beneficial than Alternative 1 (conveying wastewater and effluent flows to/from existing and other proposed facilities) with respect to cost-effectiveness and water supply management to increase supply for sustainable development. Since a majority of the needed treatment infrastructure and corresponding equipment to accommodate the new service area will need to be constructed at existing or other potential facilities in Alternative 1, negligible savings can be realized by diverting flows to other treatment plants in the area. By retaining wastewater flows within the SPA No.2 region, benefits can be realized from non-potable reuse, such as landscape and open space irrigation, and from groundwater recharge of the underlying aquifers, providing the benefit of recharge credits to the City. In addition, cost savings and supply benefits can be achieved from using reclaimed water within the 13,229 acre service area instead of using existing ground and surface water supplies. Assuming effluent could be returned to the SPA No.2 region using Alternative 1, the cost of implementing effluent distribution systems will be considerably larger in magnitude (piping and pumping capacity) and therefore more costly than building a new facility on-site. In addition, collection system piping and potential pump stations needed to convey wastewater will be considerably smaller, if not non-existent, by building a new facility on-site. By implementing a similar hybrid SBR treatment facility to that of the nearby Sundance, Tartesso (both City of Buckeye) and El Mirage WRFs, operation and maintenance of the proposed SPA No.2 Regional WRF will be familiarized.

C. Description of Proposed Construction of the SPA No.2 Regional WRF

1. Site Location, Property Ownership, and Service Area

The proposed SPA No.2 Regional WRF will be constructed within the limits of the City of Surprise, Arizona. The proposed WRF location is approximately 27 acres and is in the Northeast ¼ of the Northeast ¼ of Section 18 in Township 4N, Range 1W. Future build-out needs of the site are also being evaluated by the City. *Appendix A* provides a map which illustrates the proposed location of the treatment facility. The SPA No.2 Regional WRF will be constructed on property owned by Lennar. The property will be ultimately transferred to the City of Surprise for the purpose of maintaining and operating the facility. Similarly, any recharge basins constructed will be transferred from Lennar to the City of Surprise following development. The Regional WRF facility will service an estimated 13,229 acres of land within the City of Surprise encompassing SPA No.2.

The location of recharge basins has not been determined at this time. A hydrogeology study is being conducted to determine if recharge is feasible and if so, the best location to site the basins. Significant consideration is being given to areas adjacent to the Regional WRF due to the high percolation potential and the location's proximity to the proposed WRF.

2. Population, Water Supply, and Wastewater Generation Estimates

As stated previously, 13,229 acres in Regional Analysis Zone 212 were used to define the SPA No.2 WRF service area. This boundary was determined by the city of Surprise in advance of the planning being currently undertaken by Lennar. Approximately 1,500 acres of this land is being purchased from the current owners by Lennar and will be used to site the proposed Asante development. The remaining portion of SPA No. 2, once developed, will also be serviced by the SPA No.2 Regional WRF in keeping with the current Surprise General Plan 2020 and the approved Integrated Water Master Plan. Future developments within the SPA No. 2 service area will ultimately be serviced by the Regional WRF in the City's future phases. *Figure 2* illustrates the Regional WRF service area (SPA No. 2) and the Asante development as well as the existing MAG 208 planning boundaries.

There are two sources of population estimates available for the SPA No. 2 service area. City of Surprise planning area population and wastewater flow projections were included in the October, 2002 MAG 208 report (reproduced in *Table 1*); however, these populations consider the entire City planning area. They are not representative of the population growth to be expected within the SPA No.2 service area itself.

Table 1
Surprise Population and Flow Projections
MAG 208 Water Quality Management Plan Update

Year	Population	Flow (MGD)
2000	36,500	3.65
2005	80,500	8.02
2010	149,900	15.00
2015	236,900	23.69
2020	315,100	31.51

(Source: October, 2002 MAG 208 Water Quality Management Report)

A second source of population estimates is found in the Surprise General Plan 2020. This plan was ratified by public vote on March 13th 2001. It contains a table, (*reproduced in Table 2*) for the SPA No.2. The table is built on the assumption that each household contains 2.82 persons.

Table 2
SPA No.2 Population Projections
Surprise General Plan 2020

Land Use	Build Acreage	DU/acre Mid-range	Total Dwelling Units	Population
Rural Residential (0-1 DU/ac.)	4,393	0.50	2,196	6,193
Suburban Residential (1-3 DU/ac.)	2,747	2.0	5,494	15,493
Low Density Residential (3-5 DU/ac.)	5,203	4.0	20,816	58,701
Medium Density Residential (5-8 DU/ac.)	886	6.5	5,752	16,220
Medium High Density (8-15 DU/ac.)	0	11.5	0	0
High Density Residential (15-21 DU/ac.)	0	18	0	0
Total	13,229	-	34,258	96,607

The population given here is designed to represent the service area population at full build out. This is assumed to occur in or before year 2020, however, no more specific growth related time frames are given.

The Surprise General Plan 2020 information was assumed to be the most accurate for the proposed service area. Thus, the *Table 2* population estimates were used to calculate the wastewater generation for the proposed SPA No.2 Regional WRF. Using a conservative wastewater generation rate of 100 gpd/person, it is reasonable to expect that 9.7 MGD of effluent will be produced on average. This value was rounded up to 10.5 MGD in order to provide another level of protection against an overloaded system.

The water supply to serve the proposed Asante development and the SPA No.2 service area is anticipated to be Central Arizona Project (CAP) water and groundwater.

3. Water Reclamation Facility Description

Consistent with treating wastewater flows to ADEQ Title 18 Class A+ effluent standards, the SPA No.2 Regional WRF design will implement multi-stage, redundant treatment mechanisms consisting of physical and biological means. The facility will be equipped with advanced control systems to allow for enhanced operational capabilities and alarming. Back-up power and manual override systems are also incorporated into the design for emergency scenarios.

A treatment schematic for the Phase IA SPA No.2 Regional WRF is included in *Appendix B*. The design is an activated sludge process within hybrid sequencing batch reactors (SBRs) for secondary removal of organics and nutrients. The SBRs will be completely enclosed and implement noise and odor control features. As typical with conventional SBRs, the treatment process will utilize anoxic mixing, aerobic mixing, and static reaction capabilities to provide biological oxidation, nitrification, denitrification, and clarification within each reactor tank. The hybrid SBR design includes an additional anoxic pre-reactor which provides flow equalization, denitrification, and biological selection. The design also achieves optimal treatment efficiency and significant ease of

operation. The hybrid mechanism allows for efficient foam and scum removal from the SBR during return activated sludge (RAS) periods. Preceding primary treatment within the facility, screening and grit removal will take place within covered and odor-controlled headworks areas. Following the secondary processes, the facility will utilize tertiary treatment capabilities including a surge basin, filtration, and UV disinfection equipment. To provide process redundancy and obtain a Phase IA average-day capacity of 1.2 MGD, four reactor tanks (two SBR reactors and two anoxic pre-reactors) will be constructed in Phase IA.

Wastewater will be treated to exceed the current ADEQ Title 18 requirements for unrestricted irrigation reuse or recharge. The Phase IA plan for effluent includes reuse for irrigation of common areas, such as public landscapes, public parks, etc. Effluent may be stored in lined lakes and water feature amenities prior to distribution for irrigation. Reclaimed water reuse will be encouraged for non-potable water applications. A Groundwater Savings Facility Permit will be sought for those reuse applications which reduce groundwater withdrawals. During times when reclaimed water is produced in excess of irrigation demands, water may be discharged to percolation basins adjacent to the facility under ADEQ's APP and the Arizona Department of Water Resource's (ADWR) Underground Storage Facility (USF) permit programs. Finally, an additional point of discharge to "waters of the US" will also be sought under an Arizona Pollutant Discharge Elimination System (AZPDES) Permit. Water bodies which may be able to receive effluent include the following: McMicken Dam outlet and Agua Fria River.

The SPA No.2 Regional WRF will generate waste sludge which will be directed to an aerated digester reactor for biological conversion for volumetric sludge reduction, pathogen removal, and bio-solids conditioning. The sludge digestion process will ultimately provide pathogen and vector attraction reduction equivalent to the EPA Title 40 CFR 503 regulations for Class B biosolids. However, the Phase IA facility is not expected to obtain Class B biosolids. Biosolids will be dewatered, stored, and hauled to either a landfill for disposal or biosolids reuse areas.

a. Facility Capacity

The SPA No.2 Regional WRF will have an maximum month average day (MMAD) capacity for Phase IA of 1.2 MGD with modular phased expansions which will treat potentially 10.5 MGD MMAD at full build-out. The phasing of the facility will be dependent on population and development growth rates from the service area. The modular design of the facility will allow efficient implementation of subsequent phases to the SPA No.2 Regional WRF. Both the Developer's Phases IA and IB and subsequent City phases will be capable of processing peak day and peak hour flows into the facility.

b. Site Description

The proposed location of the SPA No.2 Regional WRF is in the Northeast ¼ of the Northeast ¼ of Section 18 in Township 4N, Range 1W in Surprise, Maricopa County, AZ. The proposed site is undeveloped, uninhabited desert. The site slopes generally to the southeast at an approximate slope of 0.006 and will be

elevated above the 100-year flood plain. The Beardsley canal is located north of the proposed WRF. It runs along a Northeast Southwest directional. The closest paved road to the site at this time is US Hwy 60, which runs northwest/southeast approximately 1 mile from the site of the proposed SPA No.2 Regional WRF. An unpaved access road from US HWY 60 along the Beardsley Canal and the Western Area Power Administration (WAPA) 500KV power line corridor will be used for site access.

c. Water Reclamation Requirements

Treated effluent from the SPA No.2 Regional WRF will be reclaimed for non-potable water reuse and potentially storage and recovery via an ADWR permit. In addition, an AZPDES may be sought to allow an alternate discharge point of effluent to a water body of the US. Possible waters include the Agua Fria River and the McMicken Dam Outlet Channel. The Agua Fria, being a naturally occurring water body is expected to have the most stringent water quality requirements. The reach of this water body extending below Lake Pleasant to the El Mirage WWTP outfall would be the most likely outfall location if effluent is to be directed to the river. This stretch maintains the following designated uses as directed by the Arizona Administrative Code, Title 18 Chapter 11:

- A&We (Aquatic and Wildlife ephemeral),
- PBC (Partial Body Contact), and
- AgL (agricultural Livestock Watering).

The treated effluent will meet ADEQ Title 18, Chapter 11 requirements for Class A+ reclaimed water for unrestricted irrigation of reclaimed effluent, for use of groundwater recharge, and potentially for discharge to the Agua Fria as described above. Class A+ reclaimed water including the following requirements:

1. Wastewater must undergo treatment via the following mechanisms:

- Secondary treatment, filtration, nitrogen removal, and disinfection
- Chemical feed capabilities are mandatory to allow coagulation prior to filtration and disinfection to ensure low turbidity (see below)

2. Effluent water quality must conform to the following:

- Turbidity < 2 NTU (24 hour mean)
- Turbidity < 5 NTU (any time)
- Fecal Coliform = none detected (4 of 7 samples)
- Fecal Coliform < 23 CFU/100mL (any time)
- Total Nitrogen < 10 mg/L (5 day mean)

d. Stormwater Discharges

The SPA No.2 Regional WRF will be designed to contain all stormwater runoff onsite. Thus, after completion of construction, the facility is not expected to produce stormwater discharges. During construction, an ADEQ permit for construction related stormwater discharges will be sought under the Arizona Pollutant Discharge Elimination System (AZPDES) program.

e. Plant Overflow

The SPA No. 2 Regional WRF will be designed with full redundancy and safe guards to prevent any overflow of wastewater from the WRF to the Beardsley Canal. However, in the event that the WRF overflows, the overflow will not reach the Beardsley Canal due to the topography of the area south of the canal.

4. Existing Sanitary Districts, Private Utilities, and WRF Service Areas

No negative impact to existing treatment facilities, sanitary districts, or certified service areas are expected due to the commissioning of the SPA No.2 Regional WRF, based on the proposed location. The proposed service area does not overlap any current sanitary districts, WWTP or WRF service areas. The City of Surprise is sponsoring this amendment in order to reduce the impacts that uncoordinated development may have on the groundwater quality and the City's existing wastewater treatment systems. Additional treatment facility service areas in the neighboring City of Peoria will not be impacted by the SPA No.2 Regional WRF.

D. Permitting Requirements

The SPA No.2 Regional WRF will require the following permits and clearances:

- Aquifer Protection Permit (APP) issued by the Arizona Department of Environmental Quality (ADEQ) for reclaimed water and sludge disposal
- Maricopa County Environmental Services Division (MCESD) Non-title V Air Quality Permit
- MCESD Approval to Construct (ATC) and Approval of Construction (AOC)
- MCESD Annual Operations Permit
- Archeological and Native Plants clearances through the Arizona State Land Department, and an Environmental Assessment – Phase IA clearance

And Potentially:

- Underground Storage Facility and Recovery Permit by the Arizona Department of Water Resources (ADWR)
- ADEQ Reclaimed Wastewater Reuse Permit
- ADEQ AZPDES Permit
- ACOE Clean Water Act (CWA) 404 Permit

E. Pretreatment Requirements

The Code of Federal Regulations Part 403 Section 403.8 states, “any POTW with a total design flow of 5 million gallons per day and receiving from industrial users pollutants which pass through or interfere with the operation of the POTW or are otherwise subject to pretreatment standards, will be required to establish a pretreatment program.” No industrial users are anticipated to discharge into the proposed SPA No.2 Regional WRF. Thus, the facility is not required to comply with pretreatment requirements. If industrial users are added to the service area of the facility, a pretreatment program will be developed with the industrial user being subject to pretreatment standards as regulated by the EPA.

F. Sludge Management Requirements

The SPA No.2 Regional WRF will be subject to biosolids regulations as promulgated in EPA 40 CFR 503. Sewage sludge, which is produced by the facility, is defined in 40 CFR 501 as any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or wastewater treatment, scum, septage, portable toilet waste, Type III Marine Sanitation device waste, and sewage sludge products. Sewage sludge does not include grit, screening, or ash generated during the incineration sewage. The 40 CFR 503 regulatory requirements include standards for the use and disposal of sludge and consist of general requirements, pollutant limits, management practices and operational standards for the final use or disposal of sewage sludge generated during the treatment of domestic sewage. It also includes pathogen and vector attraction reduction requirements for sewage sludge applied to land or placed in a surface disposal site.

Sludge produced from the proposed Phase IA SPA No.2 Regional WRF will be unclassified due to low SRT and will be dewatered and disposed of in a sanitary landfill. Following completion of Phase IB of the SPA No.2 Regional WRF, sludge produced at the facility will conform to the Class B biosolids standard for time and temperature (40 days retention time at 20 degrees C). By meeting the EPA requirements for sludge re-use, the biosolids produced at the facility will be available for use for restricted land application or fertilization of non-contact crops.

II. Construction

A. Construction and Operation Responsibility

Lennar has selected Pacific Environmental Resources Corp, Inc. (PERC) to design/build/operate Phase IA of the SPA No.2 Regional WRF. Construction of Phase IA is anticipated to be completed by 3rd quarter 2006 assuming facility construction is commenced by the 3rd quarter 2005 (the design and permitting phases of the project is anticipated to take approximately 9 months; construction will initiate thereafter). A draft construction schedule for the facility is included in *Appendix C*. Near the end of Phase IA construction, the facility will be able to accept flows for vault-and-haul operation to the influent lift station up to 20,000 gallons per day (<70 housing units). Hauling will be provided to another PERC operated facility. Following Phase IA Approval of Construction by MCESD, the facility will accept wastewater flows into the main facility provided adequate loadings are available for low-flow processing. As average

day flows exceed 70% of the facility's capacity (e.g. 840,000 GPD in Phase IA), design of subsequent phases will be initiated, followed by construction as necessary.

Following the construction and acceptance of each phase of the facility, the City of Surprise will eventually own and operate both Phase IA and Phase 1B treatment facilities. The City of Surprise will thereby be responsible for oversight of operation and maintenance of the facility. PERC will operate the WRF during the start-up and warranty periods as determined by the City.

B. Sources of Pollution

The construction of the wastewater treatment plant will not be a significant source of pollution. Anticipated pollution from construction activities includes fugitive dust, construction equipment exhaust emissions, and construction related solid waste. Erosion control measures during construction and grading will be implemented to prevent potential storm water runoff to water bodies. The developer and project contractor shall comply with local regulatory requirements and provisions of construction permits issued.

III. Financing and Other Actions to Implement Plan

A. Financing Plan

Lennar has made financial plans for the construction and operation of the proposed SPA No.2 Regional WRF. The new facility will be constructed using private, tax exempt, and or developer/development funds. Once ownership of the WRF is transferred to the City of Surprise, the City will finance the operation of the WRF through development contribution, impact fees, and user fees in conjunction with the City of Surprise capital improvement bonds and sewer system development fees.

B. Financing Capability to Construct the Facility

Lennar has the financial capacity to construct and operate the SPA No.2 Regional WRF. Lennar has provided copies of the 2003 annual financial report. Excerpts of this report including the balance sheet are contained in *Appendix D* of this document. A complete copy may be obtained upon request. In addition, a memo from the City of Surprise stating the city's financial capability to operate and maintain the WRF is shown in Appendix D.

IV. Impacts and Implementation Plan

A. Implementation Plan

The implementation of construction and operation of the water reclamation facility will be planned and executed by Lennar. Lennar has hired PERC to design/build/operate the SPA No.2 Water Reclamation Facility. PERC is a licensed contractor in the state of Arizona (AZ # 150360). The PERC design/build/operate team includes Arizona licensed engineers and Arizona certified wastewater facility operators. PERC will be contracted by Lennar to operate the SPA 2 WRF during the Start-up period to ensure that the facility will operate as designed.

Once the WRF is turn over to the City of Surprise, the City will have the option for PERC to continue operating the facility or to have Arizona certified City operators take over operation of the facility. Design completion for Phase IA is anticipated to be completed by the 3rd quarter of 2006. A draft schedule of construction for Phase IA is provided in *Appendix C*.

B. Impacts of the Proposed Water Reclamation Plant

The construction and operation of SPA No.2 Regional WRF is not expected to adversely impact any neighboring municipality, sanitary district, certificated area, community or business. The Regional WRF will provide sewage treatment services for a 13,229 acre area within the City of Surprise, which will encourage residential and business growth.

Potential environmental issues include odor, noise, vectors and hazardous materials. The following briefly discuss and addresses these issues.

Odors: The plant will include odor-scrubbing systems for process equipment, tankage, and sludge processing areas. All process tanks are covered to maintain negative pressure on the odor-control system. All headworks and sludge processing equipment is housed inside buildings. In addition, wastewater and sludge in the SPA No.2 Regional WRF is aerobically treated which reduces ammonia, sulfide, and other odorous producing compounds.

Noise: All process equipment will be enclosed in insulated masonry buildings. Additionally, the aeration blowers will be provided with sound attenuation enclosures. All pumps and aerators will be submersible type and will minimize noise production.

Vectors: The treatment facilities will be properly operated and maintained to reduce vector attraction. Headworks equipment and sludge processing facilities will be covered and enclosed in building structures.

Hazardous Materials: The wastewater treatment facility will not accept any hazardous materials. Only municipal sewage from the SPA No.2 service area will be accepted. An emergency plan will be developed to isolate and contain any hazardous materials discovered. The proposed treatment system does not require the use of any hazardous materials beyond the use of activated carbon contained within the odor control system, polymers for sludge dewatering and diesel fuel for the back-up power generator. A current set of Material Safety Data Sheets (MSDS) will be maintained for all chemicals, polymers, and bio-augmentation products used at the facility.

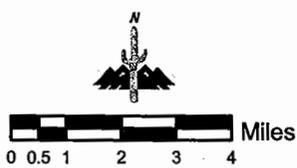
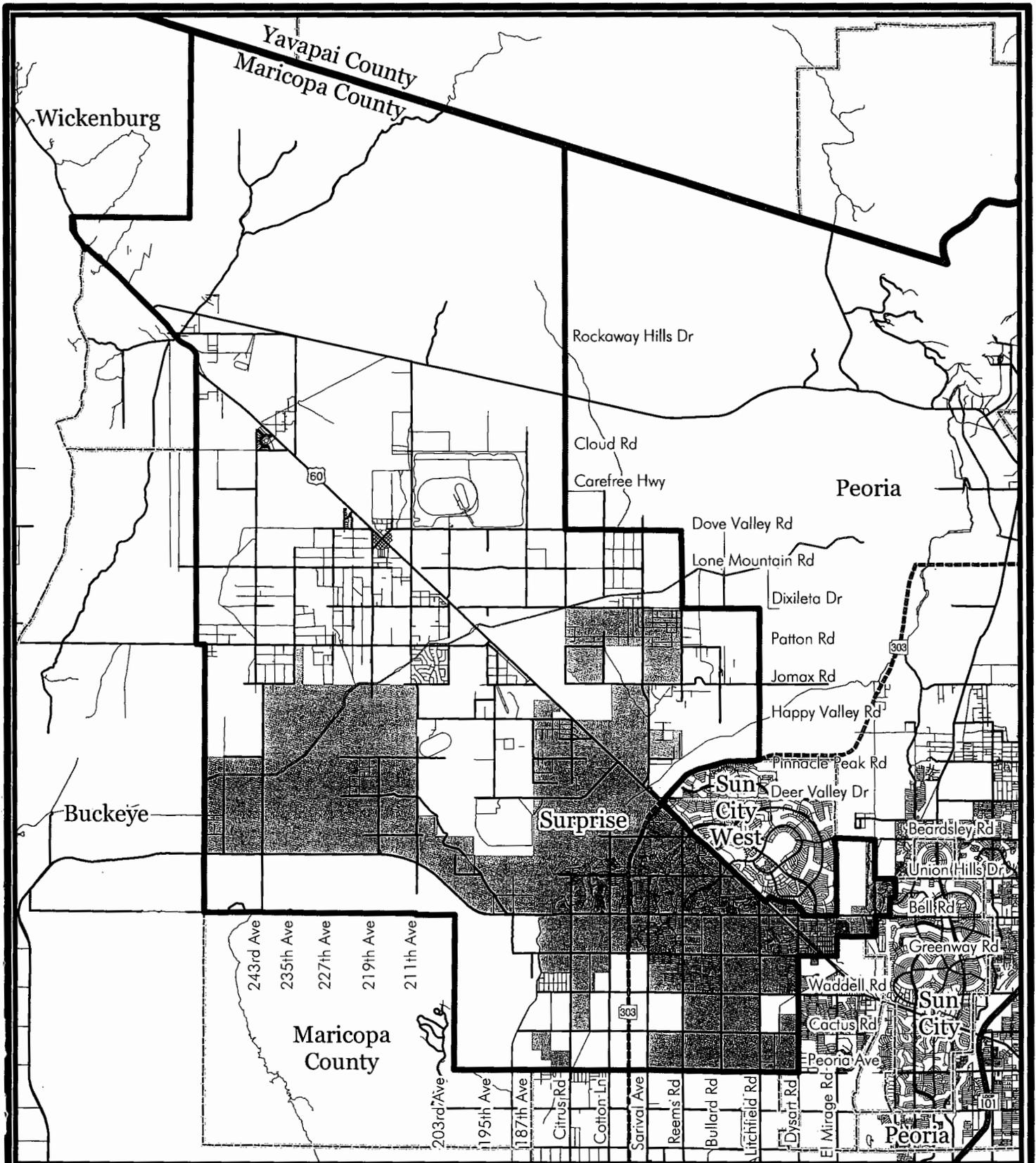
V. Public Participation

As part of the MAG Water Quality Management Plan Amendment Process, the Maricopa Association of Governments (MAG) with cooperation of the City of Surprise is responsible for ensuring that the following actions are implemented after submittal of the draft 208 Amendment:

- Notify all parties of a public hearing on the 208 Amendment by sending notices to interested parties at least 30 days prior to the public hearing. The notice may include the date, time, subject and location of the public hearing for the 208 Amendment.
- Notify public at least 45 days in advance of the public hearing by advertising in a publication. The notice should include the date, time, subject and location of the public hearing for the 208 Amendment.
- Notify public that draft amendments are available for public viewing 30 days before the hearing. This may include the location, days, and time of availability.
- Submittal of an affidavit of publication of the public notice.
- Submittal of a responsiveness summary for the public hearing.

Appendix A
Site Map and City of Surprise MPA Map





Legend

-  Surprise Municipal Planning Area
-  Surprise Incorporated Area
-  Existing Freeways
-  Planned Freeways
-  Major Roads
-  Other Streets

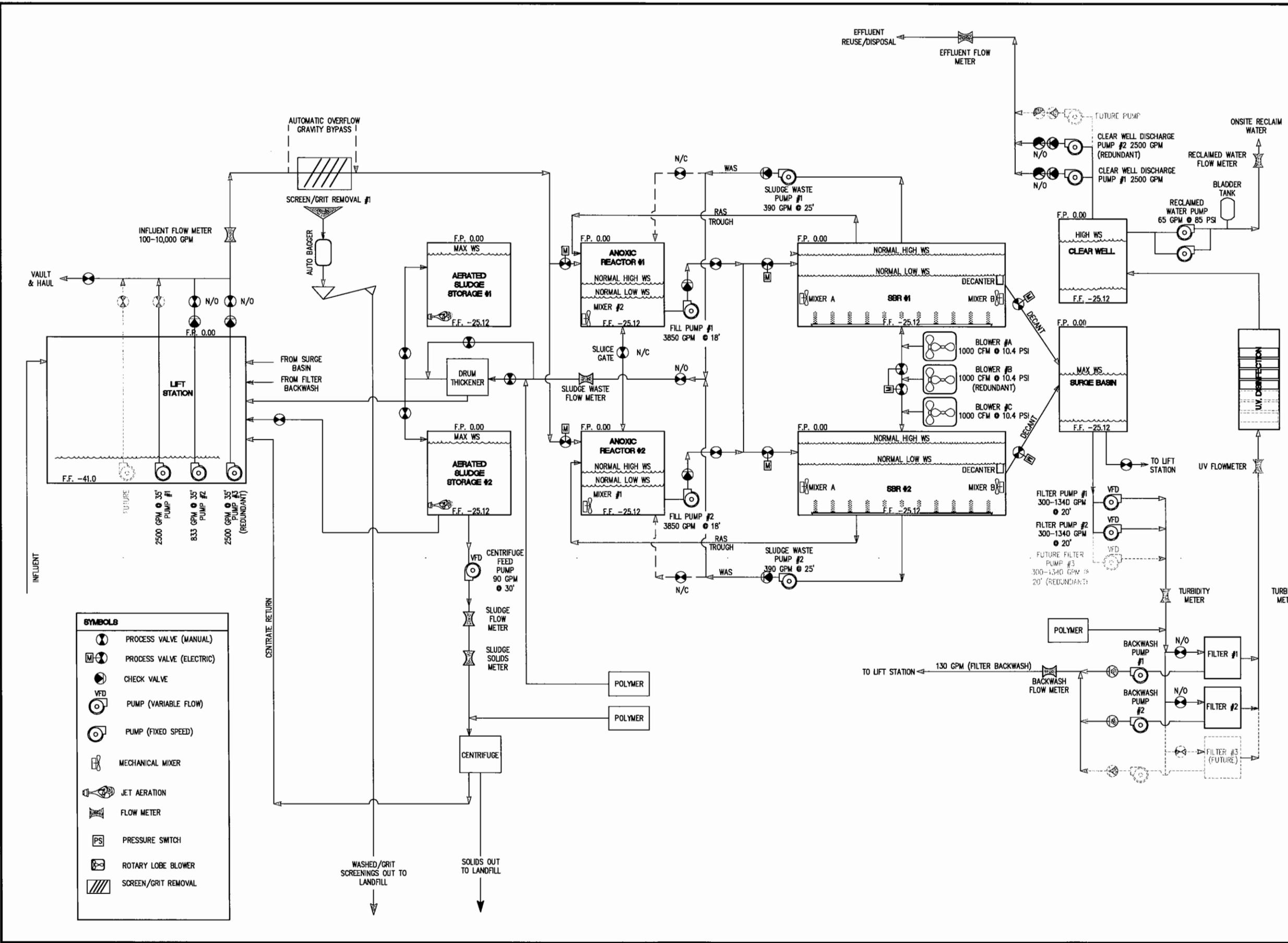


Surprise

While every effort has been made to ensure the accuracy of this information, the Maricopa Association of Governments makes no warranty, expressed or implied, as to its accuracy and expressly disclaims liability for the accuracy thereof.

Sources:
Municipal Planning Areas, MAG 2004
Incorporated Areas, Maricopa County Planning Department 2004

Appendix B
SPA 2 WRF Process Design Information



SYMBOLS

	PROCESS VALVE (MANUAL)
	PROCESS VALVE (ELECTRIC)
	CHECK VALVE
	PUMP (VARIABLE FLOW)
	PUMP (FIXED SPEED)
	MECHANICAL MIXER
	JET AERATION
	FLOW METER
	PRESSURE SWITCH
	ROTARY LOBE BLOWER
	SCREEN/GRIT REMOVAL

PREPARED BY: DUONG T. DO PROJECT ENGINEER R.C.E. NO. AZ #40050 EXP. 12/31/06	SCALE: NONE DRAWN BY: N/A CHECKED BY: DTD DATE: 9-16-2004
PACIFIC ADVANCED CIVIL ENGINEERING 1750 NEWPORT STREET, SUITE 200 FOUNTAIN VALLEY, CA 92708 PH (714) 481-7300 FAX (714) 481-7299	
SPA NO. 2 REGIONAL WATER RECLAMATION FACILITY PROCESS FLOW SCHEMATIC PHASE 1A	
SHEET: 8030-E	

THESE DRAWINGS ARE THE PROPERTY OF P.E.R.C. AND SHALL NOT BE REPRODUCED IN ANY MANNER NOR BE USED FOR CONSTRUCTION UNLESS STAMPED "ISSUED FOR CONSTRUCTION".
 P:\8030\Engineering\8030-51\Sheet\Phase 1A\8030-51-03.dwg By: dtd Date: May 03, 2005 Time: 10:58 am

**SPA 2 Water Reclamation Facility
Phase IA
Design Calculations
Duong Do, P.E.
March, 2004**

**Calculation Methods Adapted from:
H. David Stensel, Ph.D., P.E.
University of Washington**

DESIGN CONDITION

Flow:

Average	1.2 Mgal/d
Peak Day	2.4 Mgal/d
Peak Hour	3.6 Mgal/d

Wastewater Parameters:

BOD5	300 mg/L
TSS	300 mg/L
TKN	40 mg/L

Plant Design Load:

BODs	3,003 lb/d
TKN	400 lb/d
Water Temp.	25° C
Ambient Air Temp.	38° C

Effluent Parameters:

BOD5	< 5.0 mg/L
TSS	< 5.0 mg/L
TN	< 10.0 mg/L
Turbidity	< 2 NTU
Coliform (FCU/100 ml.)	non-detect

PROCESS OPERATION (TWO AEROBIC SBR TANKS)

Operation description:

A sequencing batch reactor (SBR) is operated with alternating cycles, or sequences of fill, interact, react, settle, decant, and idle. The hybrid PERC-ASP SBR system for Phase I of the SPA 2 WRF includes two SBRs with pre-SBR anoxic reactors which provide enhanced flow equalization and denitrification capability. Under low-loading conditions, only one anoxic reactor is utilized (1,100 ft² area); however, following increases in loading, a sluice gate connecting the two anoxic tanks is opened to create one large anoxic tank (2,200 ft² area). The anoxic reactor is continuously fed raw primary wastewater and return activated sludge from the

two aerobic SBRs. When an SBR cycle starts the aerobic tank receives an initial input from an anoxic tank (i.e. “fill”) equivalent to approximately ¼ of the SBR tank volume. Mixed liquor combined with raw influent from the anoxic reactor is pumped to the aerobic tank at a higher rate than the influent feed rate. Thus, the anoxic volume is drawn down during fill. Following the fill cycle, the SBR water level is at the top of the tank and interact phase is initiated. In the interact phase, mixed liquor and influent from the anoxic reactor continue to be transferred to the SBR. With the SBR full, activated sludge flows back to the anoxic tank via the RAS weir. The overflow from the aerobic SBR tank feeds NO₃-N to the anoxic tank, which was produced by aerobic nitrification of NH₄-N. During interact the anoxic reactor again begins to fill. Once the anoxic reactor level reaches a pre-determined set-point, the SBR stops interact and initiates settle, followed by decant and idle to complete its cycle. At the point when the first SBR goes to settle, the other SBR starts a new cycle by initiating fill.

The following tables show the time sequence and volume changes during a complete cycle for each aerobic SBR tank.

1. Cycle Times Per Aerobic Tank – From Table 8.0:

Fill	39 min (mix during fill)
Interact	132 min
Settle	45 min
Decant	42 min
Idle	<u>84 min</u>
Total Time	342 min/cycle

$$\begin{aligned}
 \text{Number of cycles/day/tank} &= 1440 \text{ min/day} / 342 \text{ min/cycle} \\
 &= 4.2 \text{ cycles/day} \\
 @ 2 \text{ tanks} &= 8.4 \text{ fills/day}
 \end{aligned}$$

2. Fill volume at average design load:

$$\begin{aligned}
 \text{Average volume/fill} &= 1.2 \text{ MGD} / 8.4 \text{ fills} \\
 &= 142,857 \text{ gal/fill}
 \end{aligned}$$

$$\begin{aligned}
 \text{Fill Volume} &= \text{Aerobic Tank Decant Volume} \\
 \text{Decant volume} &= 142,857 \text{ gallons}
 \end{aligned}$$

$$\begin{aligned}
 \text{Aerobic Tank Area} &= 38.5 \text{ ft} \times 78.5 \text{ ft} \\
 &= 3,022 \text{ ft}^2
 \end{aligned}$$

3. Determine Decant depth:

$$\begin{aligned}
 \text{Decant Depth (ft)} &= (\text{Decant Volume, ft}^3) / (\text{Aerobic tank area ft}^2) \\
 &= (142,857 \text{ gal} / 7.48 \text{ gal/ft}^3) / (3,022 \text{ ft}^2)
 \end{aligned}$$

$$\text{Decant Depth (ft)} = 19,099 \text{ ft}^3 / (3,022 \text{ ft}^2)$$

$$\text{Decant Depth} = 6.3 \text{ ft}$$

4. Determine change in anoxic depth at design flow (using both anoxic tanks):

Assume:

Total surface area of Anoxic Tank = $2 \times (38.5' \times 28.5') = 2,195 \text{ ft}^2$

Average day flow of 1.2 MGD = 833 gpm into Anoxic Tank

Average Flow out of Anoxic Tanks = 3650 gpm^a (using one pump)

^a - fill pumping rate conservatively calculated @ 20' TDH

Actual flow out of Anoxic Tanks = 3650 gpm – 833 gpm
= 2818 gpm

SBR fill time = 142,857 gallons / 3650 gpm = 39 min.

Therefore: Volume change in anoxic tanks = 2818 gpm x 39 min = 109,902 gallons

Calculated depth change at the end of Fill for 1.2 MGD = $(109,902 \text{ gal} / 7.48) / (2195 \text{ ft}^2) = 6.7 \text{ ft}$

5. The following shows the changes in anoxic volume and the cycle operation:

CYCLE DESCRIPTION				
Δt min	Total Time (min)	Anoxic Volume	Aerobic 1 Volume/Condition	Aerobic 2 Volume/Condition
	0	Top Water	Bottom Water	Top Water
		Start Fill #1	Stop Idle/Start Fill	Start Settle
+39	39	Bottom Water	Top Water	Top Water
		Draining	Start Interact	Settling
+6	45	Filling	Top Water	Stop Settle
			Interact	Start Decant
+42	87	Filling	Top Water	Bottom Water
			Interact	Stop Decant/Start Idle
+84	171	Top Water	Top Water	Bottom Water
		Start Fill #2	Start Settle	Stop Idle/Start Fill
+39	210	Bottom Water	Top Water	Top Water
		Draining	Settling	Start Interact
+6	216	Filling	Stop Settle	Top Water
			Start Decant	Interact
+42	258	Filling	Bottom Water	Top Water
			Stop Decant/Start Idle	Interact
+84	342	Top Water	Bottom Water	Top Water
		Start Fill #1	Stop Idle/Start Fill	Start Settle

@ 1.2 MGD, Flow = 833 gpm

AEROBIC TANK NITRIFICATION DESIGN

Average Daily Load To Each Aerobic SBR Tank:

$$\text{BOD} = 3,003 \text{ lb/d} \div 2 = 1,502 \text{ lb/d/t}$$

$$\text{TKN} = 400 \text{ lb/d} \div 2 = 200 \text{ lb/d/t}$$

SBR Tank Volume at Full

$$\begin{aligned} &= (23 \text{ ft Depth}) 3022 \text{ ft}^2 \\ &= 69,513 \text{ ft}^3 \\ &= 519,956 \text{ gallons} \end{aligned}$$

1. Determine equivalent hydraulic retention times

Equivalent Hydraulic Retention Time (HRT):

$$\text{HRT} = 519,956 \text{ gal} / (1.2 \text{ MGD} / 2 \text{ tanks}) \times 24 \text{ hrs} = \mathbf{20.8 \text{ hrs}}$$

Equivalent Anoxic HRT

Maximum Depth = 23 ft

Normal Max. Depth : 23 – 7.0 = 16.0 ft (volume of full batch avail.)

Anoxic tank depth (Average): = 16.0 ft – (6.7 / 2) = 12.7 ft

$$\begin{aligned} \text{Anoxic Volume} &= (12.7 \text{ ft}) (2195 \text{ ft}^2) \\ &= 27,870 \text{ ft}^3 \\ &= 208,468 \text{ gallons} \end{aligned}$$

$$\text{HRT} = (208,468 \text{ gal} / 1.2 \text{ MGD}) \times 24 \text{ hrs} = \mathbf{4.2 \text{ hrs}}$$

2. Determine Aerobic Tank SRT

Assume that MLSS = 3500 mg/L – typical of SBR operations

Check for sufficient depth in aerobic reactor during settling to handle a MLSS of 3500 mg/L, based on typical SVI achieved:

Assume SVI = 120 mg/L

$$\text{Thickened MLSS during settling} = \frac{10^6}{\text{SVI}} = 8333 \text{ mg/L}$$

MLSS mass full = MLSS mass in settled volume

$$23 \text{ ft} (3500 \text{ mg/L}) = \text{sludge depth} (8333 \text{ mg/L})$$

$$\text{Sludge depth} = 9.7 \text{ ft.}$$

Liquid level above sludge depth after settling: 23 ft – 9.7 ft = 13.3 ft

Decant depth = 6.3 ft, so liquid depth below decanter is 13.3– 6.3 ft = 7.0 ft
So sufficient depth in settle and decant period to handle MLSS of 3500 mg/L

To determine system SRT, a solids balance is needed accounting for solids yield and BOD removal. The following is a standard equation for solids yield that accounts for biomass production and inert solids that enter with wastewater and are not degraded and accumulate in the system:

$$\text{Net Solids Yield: } \left(\frac{Y}{1 + b\text{SRT}} + Y_I \right) = Y_N$$

$$\begin{aligned} Y &= \text{g VSS/g BOD removal} \approx 0.60 \text{ g/g} \\ B &= 0.08 \text{ g/g-d} \\ \text{SRT} &= \text{Solids retention time, days} \\ Y_I &= \text{g non-biodegradable solids / g BOD} \\ &\approx 0.50 \text{ g/g} \end{aligned}$$

$$\begin{aligned} V(\text{MLSS}) &= Y_N (\Delta\text{BOD})Q (\text{SRT}) \\ Q &= 0.6 \text{ Mgal/d/tank} \\ \Delta\text{BOD} &= 300 \text{ mg/L} \\ V &= 0.520 \text{ Mgal} \\ Y_N &= \left(\frac{0.6}{1 + .08 \text{ SRT}} + 0.50 \right) \\ \text{MLSS} &= 3500 \text{ mg/L} \end{aligned}$$

Solve for SRT
Use spreadsheet:

$$\begin{aligned} (3500) (0.520) &= \left(\frac{0.6}{1 + .08 \text{ SRT}} + 0.50 \right) (300) (0.6) \text{ SRT} \\ \text{SRT} &= 12.7 \text{ days} \end{aligned}$$

3. What is the net solids yield?

$$Y_N = (0.60 / (1 + 0.08 \times 12.7) + 0.50) = \mathbf{0.80 \text{ gTSS/g BOD}}$$

4. Determine the aerobic SRT, which accounts for the time that the mixed liquor is under aeration (accounts for fraction of aeration time per cycle):

Design for 10 hrs/day/tank,

Aeration Fraction = 10 hours aeration / 24 per day = 0.417 hours aeration/day/tank

$$\begin{aligned} \text{Aerobic SRT @ 3500 mg/L MLSS} &= 0.417 (12.7 \text{ d}) \\ &= 5.3 \text{ days} \end{aligned}$$

5. Determine if this aerobic SRT is sufficient to result in satisfactory nitrification and maintain concentrations of nitrifiers in the system (i.e. the minimum nitrifier growth rate must exceed the wasting rate) – the design goal is to achieve is NH₄-N concentration less than 0.5 mg/L.

Because of recirculation through the anoxic tank with continuous feeding, the aerobic SBR tank can be considered equivalent to a continuously stirred tank reactor (CSTR). Thus, we can consider that the minimum nitrifying bacteria growth rate (i.e. growth rate is minimized at the lowest substrate concentration) is related to the aerobic SRT as follows. From this we can determine the NH₄-N concentration expected in the SBR related to the nitrifier growth rate and sludge wasting rate (i.e. SRT).

$$\frac{1}{\text{SRT}} = \mu = \frac{\mu_m N}{K_N + N} \quad \text{Nitrification Monod Kinetics}$$

where: μ = specific growth rate of nitrifiers, g/g-d
 N = NH₄-N Conc., mg/L
 μ_m = Maximum specific growth rate, 0.72 g/g-d @ 25° C
 K_N = 0.75 mg/L

(EPA Nitrogen Control Manual, 1993)

From above the aerobic SRT = 5.3 days

$$\begin{aligned} \mu &= 1 / \text{SRT} = 1 / 5.3 = 0.189 \\ 0.189 &= 0.72 \times N / (0.75 + N) \\ N &= \text{NH}_4\text{-N} = 0.27 \text{ mg/L} \end{aligned}$$

Sufficient capacity for complete nitrification

Check safety factor for NH₄-N = 0.50 mg/L treatment goal.

$$\frac{1}{\text{SRT}} = \mu = \frac{(0.72)(0.50)}{(0.75 + 0.50)} = 0.28 / \text{day}$$

$$\begin{aligned} \text{SRT} &= 1 / 0.28 = 3.5 \text{ days} \\ \text{Safety factor} &= 5.3 / 3.5 = 1.5 \text{ (okay)} \end{aligned}$$

PERFORM NITROGEN BALANCE TO GET AMOUNT OF N OXIDIZED

Nitrogen N = nitrogen for synthesis + effluent N + N oxidized to nitrate

Nitrogen for synthesis: SRT = 12.7 days @ 3500 mg MLSS

$$\text{Biomass Yield} = Y / (1 + b \times \text{SRT}) = 0.72 / (1 + 0.08 \times 12.7) = 0.36 \text{ g VSS / g BOD}$$

$$\text{Biomass Produced} = (0.36 \text{ g VSS/g BOD}) * (300 \text{ mg/L} - 5 \text{ mg/L BOD}) = 106.2 \text{ mg/L}$$

$$\text{@ 10\% nitrogen, N synthesis} = 0.10 (106.2) = 10.6 \text{ mg/L}$$

Assume 30% N for synthesis is returned/recycled during digestion/dewatering of sludge:

$$10.6 \text{ mg/L} - (0.3 * 10.6 \text{ mg/L}) = \mathbf{7.4 \text{ mg/L}}$$

Nitrate Produced:

$$\text{TKN} - \text{N}_{\text{syn}} - \text{NH}_4\text{-N} = \text{NO}_3\text{-N}$$

$$40 - 7.4 - 0.5 = \text{NO}_3\text{-N}$$

$$\text{NO}_3\text{-N} = \mathbf{32.1 \text{ mg/L}}$$

NO₃-N Produced Per Feed Cycle:

$$= 32.1 \text{ mg/L} (0.143 \text{ Mgal / cycle}) * 8.34 = \mathbf{38.3 \text{ lb/cycle}}$$

EVALUATE NITROGEN REMOVAL CAPACITY

1. Determine NO₃-N balance:

Since the reactor approaches a complete mix operation with the internal recycle, we can assume a relatively constant NO₃-N concentration in the aerobic reactor. The nitrate produced has to be accounted for as follows:

$$\text{NO}_3\text{-N produced} = (\mathbf{38.3 \text{ lb/cycle}})$$

$$\begin{aligned} = & \quad \underline{\mathbf{A.}} \text{ - NO}_3\text{-N removed in aerobic reactor (during settle and decant)} \\ & \quad + \\ & \quad \underline{\mathbf{B.}} \text{ - NO}_3\text{-N removed in aerobic reactor (during anoxic mix)} \\ & \quad + \\ & \quad \underline{\mathbf{C.}} \text{ - NO}_3\text{-N allowed in effluent discharge (< 9.5 mg/l)} \\ & \quad + \\ & \quad \underline{\mathbf{D.}} \text{ - NO}_3\text{-N removed in overflow to anoxic reactor (during interact)} \end{aligned}$$

A - Aerobic reactor nitrate loss (denitrification) will occur in the mixed liquor during the decant, settle, and idle periods when oxygen is depleted.

Use SDNR for endogenous respiration per the following reference:

Biological Nutrient Removal, Randall, Barnard, and Stensel, Technomics, 1992

$$SDNR = \left(\frac{0.50}{2.86} \right) \left(\frac{A_n}{Y_n} \right) \left(\frac{1}{SRT} \right)$$

$$A_n = 1.5 - 1.42Y + \frac{1.42bYSRT}{1+bSRT}$$

$$Y_n = \frac{Y}{1+bSRT} + Y_I$$

$$A_n = 1.5 - (1.42 * 0.6) + ((1.42)(0.08)(0.6)(5.3) / (1 + (0.08)*(5.3))) = 0.90$$

$$Y_n = (0.6 / (1 + (0.08)*(5.3))) + 0.50 = 0.92$$

$$SDNR = (0.5/2.86) * (0.90/0.92) * (1/12.7) = \mathbf{0.013 \text{ g/g-d}}$$

$$\text{Removed} = SDNR(V)(MLSS)(8.34)(\text{time}),$$

$$\begin{aligned} \text{Time} &= 45 \text{ min (Settle)} \\ &+ 42 \text{ min (Decant)} \\ &+ \underline{84 \text{ min (Idle)}} \\ &= 171 \text{ min (Total)} \end{aligned}$$

$$= (0.01)(0.520)(3500)(8.34)(171)/60/24$$

$$= \mathbf{18.0 \text{ lb/cycle}}$$

B. - Denitrification occurs in the SBR during anoxic mix throughout the cycle of interact when air is periodically turned off. The SDNR during this cycle can be calculated below

$$(\text{NO}_3\text{-N removal} = (\text{Volume}) (\text{MLSS}) (\text{SDNR}) \frac{\Delta t}{\text{cycle}} \quad (8.34)$$

Average SBR Volume = 0.520 Mgal

$\Delta t = 30 \text{ min} = 0.021 \text{ days/cycle}$

NO₃-N removed:

$$= (0.01)(0.520)(3500)(8.34)(0.021) = \mathbf{3.2 \text{ lb/cycle}}$$

C. - NO₃-N allowed to be in the effluent is < 9.5 mg/l;

Assume 5 mg/L of NO₃-N is discharge:

$$\text{Removed} = (5 \text{ mg/l}) * (0.143) * (8.34)$$

$$= \mathbf{5.9 \text{ lbs/cycle}}$$

D. - Determine how much NO₃-N must be removed in anoxic zone:

$$\text{NO}_3\text{-N to be removed on anoxic zone} = 38.3 \text{ lb/cycle} - 18.0 - 3.2 - 5.9$$

$$= \mathbf{11.2 \text{ lb/cycle}}$$

D. (continued) Determine amount of nitrate fed to anoxic reactor:

To evaluate the nitrate removal capacity we have to determine the amount of nitrate that flows from the aerobic reactor to the anoxic tank and use the SDNR to determine if it can be sufficiently reduced.

Nitrate return feed rate to anoxic zone (using only one fill pump):

Flow to anoxic = 3850 gpm (132 min) = 508,200 gallons/cycle

Average initial nitrate concentration in the recycle flow:

$$\text{NO}_3\text{-N (mg/L)} = ((38.3 \text{ lbs N} / 0.520 \text{ Mgal}) / 8.34) = 8.8 \text{ mg/L}$$

Assume 60% of this concentration = 5 mg/l

$$\text{At 5 mg/L NO}_3\text{-N} = 5 * (0.508) * (8.34) = 21.2 \text{ lb/cycle}$$

As 21.2 lb/cycle > 11.2 lb/cycle, the system is not limited by recycle rate

Determine NO₃-N removal capacity of anoxic reactor:

Specific Denitrification Rate in the Anoxic Reactor can be related to BOD F/M Ratio. (EPA Nitrogen Control Manual)

$$\begin{aligned} \text{SDNR} &= 0.03 \text{ F/M} + 0.029 \\ \text{SDNR} &= \text{Specific NO}_3\text{-N reduction rate, g NO}_3\text{-N / g MLSS-d} \\ \text{F/M} &= \text{g BOD / g MLSS-d} \\ \\ \text{F/M} &= \frac{1.2 \text{ Mgal/d} \times 300 \text{ mg/L BOD}}{3500 \text{ mg/L} \times 0.208 \text{ Mgal (average depth)}} \\ \text{F/M} &= 0.44 \text{ g/g-d} \\ \text{SDNR} &= 0.044 \text{ g/g-d} \end{aligned}$$

The SDNR \cong 0.044 g NO₃-N/g MLSS-d

$$\text{NO}_3\text{-N removal} = (\text{Volume}) (\text{MLSS}) (\text{SDNR}) \frac{\Delta t}{\text{cycle}} \quad (8.34)$$

Average Anoxic Volume = 0.208 Mgal

$\Delta t = 132 \text{ min} = 2.2 \text{ hours} = 0.09 \text{ days/cycle}$

$$\text{NO}_3\text{-N removed} = (0.208) (3500) (0.044) (0.09) \quad (8.34)$$

$$= \mathbf{24.0 \text{ lbs/cycle}}$$

$$= 24.0 \text{ lb/cycle} > 11.2 \text{ lb/cycle required}$$

Therefore, sufficient capacity in anoxic is available to remove the necessary amount of NO₃-N

DETERMINE OXYGEN REQUIRED

Flow/Tank	= 0.6 MGD
BOD	= 300 mg/L
NO ₃ -N Produced	= 32.1 mg/L
Effluent TN	= < 5 mg/L

Oxygen for BOD Removal:

$$O_2 = [1.5] \frac{g^{O_2}}{g^{BOD}} (BOD)Q - 1.42P_{XBio}$$

P_{XBio} = Biomass sludge wasted/day

Biomass yield = 0.37 gVSS/gBOD

$$P_{XBio}/\text{Tank} = 0.37 \text{ g/g} \times 300 \text{ mg/L} \times 0.6 \text{ MGD} \times 8.34 \\ = 555.4 \text{ lb/d}$$

$$\text{Lbs } O_2/\text{day} = 1.5 \text{ g } O_2 / \text{g BOD} \times (300 \text{ mg/L} - 5 \text{ mg/L}) \times 0.6 \text{ MGD} \times 8.34 - 1.42 \times 555.4 \text{ lb/d} \\ = 1425.6 \text{ lb } O_2/\text{day}$$

Max Aeration Time Available

$$= 39 \text{ min (fill)} + (132 \text{ min} - 30 \text{ min anoxic mix}) \text{ (interact)} + 84 \text{ min (idle)} / 342 \text{ (cycle)} = 0.66$$

0.66 (24 hr/d) = 15.8 hrs/day available aeration

Design Aeration Time = 10.0 hrs/day

$$\text{Lbs } O_2 / \text{hr aeration} = 1425.6 \text{ lb/d} / 10.0 \text{ hrs/d} = 142.6 \text{ lb } O_2/\text{hr (AOR)}$$

Nitrification O₂:

NO₃-N produced = 32.1 mg/L

$$O_2 = 4.3 \text{ g } O_2 / \text{g N} \times (32.1 \text{ mg/L} - 5 \text{ mg/L}) \times 0.6 \text{ MGD} \times 8.34$$

$$\text{Lbs } O_2 / \text{hr aeration} = 583 \text{ lbs/d} / 10.0 \text{ hrs/d} = 58.3 \text{ lbs } O_2/\text{hr (AOR)}$$

Denitrification O₂ Credit:

NO₃-N reduced = 27.1 mg/L (accounts for 5 mg/L in effluent)

O₂ credit = 2.86 (27.1) (0.6) 8.34

Lbs O₂ / hr aeration = 387.8 / 10.0 = **38.7 lbs/hr (AOR)**

Net O₂ Require:

Net O₂ req'd/Tank = 142.6 (BOD) + 58.3 (Nitro) – 38.7 (De-nitro)

= 162.2 lbsO₂/hr

AOR = **162.2 lbsO₂/hr**

Determine Clean Water Transfer Rate

$$\text{SOR} = \frac{\text{AOR}(C_{\text{Sat}20a})}{\infty (BC_{\text{Sat,TH}} - \text{DO})(1.024^{T-20})}$$

$$C_{\text{Sat,TH}} = (C_{\text{Sat}})(0.5) \left[\frac{P_d}{P_{\text{Atm,H}}} + \frac{O_t}{21} \right]$$

$$C_{\text{Sat}20a} = (C_{\text{Sat}20})(0.5) \left[\frac{P_d}{P_{\text{Atm}20}} + \frac{O_t}{21} \right]$$

SOR = standard oxygen transfer rate

$\infty = 0.6$

$\beta = 0.95$

T = 25°C

C_{Sat} = 7.96 mg/L (at 1000 ft Elevation)

DO = 2.0 mg/L

C_{Sat20} = 9.08 mg/L

P_d = 24.15 psi

P_{Atm,H} = 14.17 psi

Please note: P_d = depth + atmospheric

pressure

O_t = 18%

$$C_{\text{Sat,TH}} = (7.96)(0.5) \left[\frac{24.15}{14.17} + \frac{18}{21} \right] = 10.19 \text{ mg/L}$$

$$C_{\text{Sat}20a} = (9.08)(0.5) \left[\frac{24.64}{14.69} + \frac{18}{21} \right] = 11.5 \text{ mg/L}$$

$$\text{SOR} = \frac{\text{AOR}(C_{\text{Sat}20a})}{\infty (\text{BC}_{\text{Sat,TH}} - \text{DO})(1.024^{T-20})}$$

$$\text{SOR} = \frac{162.2 (11.5)}{0.6[(0.95)(10.19) - 2](1.024^{25-20})}$$

$$\text{SOR} = 359.5 \text{ lbs/hr}$$

Determine air rate @ 41.2% O₂ transfer efficiency (From Sanitaire)

$$\text{Blower CFM} = \text{SOR} / (60 \text{ min/hr} \times \text{Transfer Eff.} \times 0.0172 \text{ lbO}_2/\text{ft}^3)$$

$$\text{Blower CFM} = 359.5 / (60 * 0.412 * 0.0172)$$

$$\text{Blower CFM} = \mathbf{845 \text{ SCFM @ 10.0 hours}}$$

Each SBR requires one blower per tank with rated capacity of 845 scfm @ 10.4 psi using 10.0 hours aeration to provide design capacity. Provide (3) three blowers at capacity of **1000 SCFM at 10.4** psi to provide additional capacity for peak loads – two per tank with one redundant. Using a 1.3 peaking factor, 845 scfm * 1.3 = 1100 scfm @ 10.0 hrs or 1000 scfm @ 11 hrs (<15.8 hrs max available).

PROCESS OPERATION (ONE AEROBIC TANK)

Operation description:

When either the facility is performing maintenance or under an emergency scenario where one SBR tank is removed from service, the treatment process will be single SBR tank operation. Under the single-tank mode, the anoxic reactor is fed raw influent wastewater from the headworks similar to two-tank operation; however, in single tank mode activated sludge is returned from only one SBR and the anoxic reactor is idle during SBR settle and decant. When the single-tank SBR cycle starts, the SBR receives an initial input from the anoxic tank (i.e. "fill") equivalent to approximately $\frac{1}{4}$ of the SBR tank volume. Mixed liquor combined with raw influent from the anoxic reactor is pumped to the aerobic tank at a higher rate than the influent feed rate. Thus, the anoxic volume is drawn down during fill. Following the fill cycle, the SBR water level is at the top of the tank and interact phase is initiated. In the interact phase mixed liquor and influent from the anoxic reactor is continued to be transferred to the SBR, but the SBR is full and overflows return activated sludge back to the anoxic tank via the RAS weir. The overflow from the aerobic SBR tank feeds $\text{NO}_3\text{-N}$ to the anoxic tank, which was produced by aerobic nitrification of $\text{NH}_4\text{-N}$. During interact the anoxic reactor again begins to fill. Once the anoxic reactor level reaches a pre-determined set-point, the SBR initiates settle and decant to complete its cycle. The anoxic reactor idles until the SBR completes decant and is able to accept fill again to begin a new cycle.

1. Cycle Times for Single SBR Tank:

Fill (using two pumps)	18 min
Interact	66 min
Settle	45 min
Decant	<u>42 min</u>
Total Time	171 min/cycle

$$\text{Number of cycles/day/tank} = 1440 \text{ min/day} / 171 \text{ min/cycle}$$

$$= 8.4 \text{ cycles/day}$$

2. Fill volume at average design load:

$$\text{Average volume/fill} = 1.2 \text{ MGD} / 8.4 \text{ fills}$$

$$= 142,857 \text{ gal/fill}$$

$$\begin{aligned} \text{Fill Volume} &= \text{Aerobic Tank Decant Volume} \\ \text{Decant volume} &= 142,857 \text{ gallons} \end{aligned}$$

$$\begin{aligned} \text{SBR Tank Area} &= 38.5 \text{ ft} \times 78.5 \text{ ft} \\ &= 3,022 \text{ ft}^2 \end{aligned}$$

Determine equivalent hydraulic retention times

Equivalent Hydraulic Retention Time (HRT):

$$\text{HRT} = 519,956 \text{ gal} / 1.2 \text{ MGD} \times 24 \text{ hrs} = 10.4 \text{ Hrs}$$

Determine change in anoxic depth at design flow:

Assume:

$$\text{Total surface area of Anoxic Tanks} = 2195 \text{ ft}^2$$

$$\text{Average day flow of 1.2 MGD} = 833 \text{ gpm into Anoxic Tanks}$$

$$\text{Pumping out of Anoxic Tanks (two pumps)} = 7940 \text{ gpm}^a$$

$$\begin{aligned} \text{Actual flow out of Anoxic Tanks} &= 7940 \text{ gpm} - 833 \text{ gpm} \\ &= 7107 \text{ gpm} \end{aligned}$$

^a – pumping rate of 3970 gpm per pump assumed for 17' TDH

SBR fill time = 18 min.

Therefore: Volume change during Fill in anoxic tanks = 7107 gpm x 18 min = 127,926 gallons

Volume change (surge) during Settle and Decant = (45 + 42) x 833 gpm = 72,471 gallons

Increase in anoxic depth at 1.2 MGD during settle/decant in single-tank mode

$$= (71,638 \text{ gal} / 7.48 * 2195 \text{ ft}^2) = 4.4 \text{ ft}$$

Calculated depth change at the end of Fill = (127,926) / (2195 x 7.48) = 7.8 Ft

Equivalent Anoxic HRT

Tank depth: = 23 – 6.6 = 16.4 ft (¾ batch reserved)

$$\begin{aligned} \text{Average Tank Depth:} &= 16.4 + 4.4 \text{ (during settle and decant)} - (7.8/2) \\ &= 16.9 \text{ ft} \end{aligned}$$

$$\begin{aligned} \text{Anoxic Volume} &= (16.9 \text{ ft}) (2195 \text{ ft}^2) \\ &= 37,096 \text{ ft}^3 \\ &= 277,474 \text{ gallons} \end{aligned}$$

$$\text{HRT} = (277,474 \text{ gal} / 1.2 \text{ MGD}) \times 24 \text{ hrs} = 5.5 \text{ hrs}$$

2. Determine Aerobic Tank SRT

Assume that MLSS has been increased to 4500 mg/L for single tank operation.

Check for sufficient depth in aerobic reactor during settling to handle a MLSS of 4500 mg/L, based on typical SVI achieved:

Assume SVI = 120 mg/L

$$\text{Thickened MLSS during settling} = \frac{10^6}{\text{SVI}} = 8333 \text{ mg/L}$$

MLSS mass full = MLSS mass in settled volume
 23 ft (4500 mg/L) = sludge depth (8333 mg/L)
 Sludge depth = 12.4 ft.

Liquid level above sludge depth after settling: 23 ft – 12.4 ft = 10.6 ft

Decant depth = 6.3 ft, so liquid depth below decanter is 10.6 – 6.3 ft = 4.3 ft
 So sufficient depth in settle and decant period to handle MLSS of 4500 mg/L

To determine system SRT a solids balance is needed accounting for solids yield and BOD removal. The following is a standard equation for solids yield that accounts of biomass production and inert solids that enter with wastewater and are not degraded and accumulate in the system:

$$\text{Net Solids Yield: } \left(\frac{Y}{1 + b\text{SRT}} + Y_I \right) = Y_N$$

Y = g VSS/g BOD removal \approx 0.60 g/g
 B = 0.08 g/g-d
 SRT = solids retention time, days
 Y_I = g inert solids / g BOD \approx 0.50 g/g

$$\begin{aligned} V(\text{MLSS}) &= Y_N (\Delta\text{BOD})Q (\text{SRT}) \\ Q &= 1.2 \text{ Mgal/d} \\ \Delta\text{BOD} &= 300 \text{ mg/L} \\ V &= 0.520 \text{ Mgal} \\ Y_N &= \left(\frac{0.6}{1 + .08 \text{ SRT}} + 0.50 \right) \\ \text{MLSS} &= 4500 \text{ mg/L} \end{aligned}$$

Solve for SRT
 Use spreadsheet:

$$\begin{aligned} (4500) (0.520) &= \left(\frac{0.6}{1 + .08 \text{ SRT}} + 0.50 \right) (300) (0.520) \text{ SRT} \\ \text{SRT} &= 7.4 \text{ days} \end{aligned}$$

3. What is the net solids yield?

$$Y_N = (0.60 / (1 + 0.08 \times 7.4) + 0.5) = 0.88 \text{ g TSS/g BOD}$$

4. Determine the aerobic SRT, which accounts for the time that the mixed liquor is under aeration:

Aerobic SRT accounts for fraction of Aeration Time

Note: Unlike two-tank operation, at design flow and loading single-tank operation will require aeration during fill period and during the entire interact period.

$$\begin{aligned} \text{Aeration Time Fraction} &= 18 \text{ min (fill)} + 66 \text{ min (interact)} - 0 \text{ min (anoxic mix)} / \\ &171 \text{ min (total cycle)} \\ &= 0.50 \end{aligned}$$

$$\begin{aligned} \text{Aerobic SRT @ 4500 mg/L MLSS} &= 0.50 (7.4 \text{ d}) \\ &= 3.7 \text{ days} \end{aligned}$$

5. Determine if this aerobic SRT is sufficient to result in satisfactory nitrification and maintain concentrations of nitrifiers in the system (i.e. the minimum nitrifier growth rate must exceed the wasting rate) – the design goal for single-tank mode is to achieve is $[\text{NH}_4\text{-N}]$ less than 2.0 mg/L.

Because of recirculation through the anoxic tank with continuous feeding, the aerobic SBR tank can be considered equivalent to a continuously stirred tank reactor (CSTR). Thus, we can consider that the minimum nitrifying bacteria growth rate (i.e. growth rate is minimized at the lowest substrate concentration) is related to the aerobic SRT as follows. From this we can determine the $\text{NH}_4\text{-N}$ concentration expected in the SBR related to the nitrifier growth rate and sludge wasting rate (i.e. SRT).

$$\frac{1}{\text{SRT}} = \mu = \frac{\mu_m N}{K_N + N} \quad \text{nitrification monod kinetics}$$

where: μ = specific growth rate of nitrifiers, g/g-d
 N = $\text{NH}_4\text{-N}$ Conc., mg/L
 μ_m = maximum specific growth rate, 0.72 g/g-d @ 25° C
 K_N = 0.75 mg/L

(EPA Nitrogen Control Manual, 1993)

From above the aerobic SRT = 3.7 days

$$\begin{aligned} \mu &= 1 / \text{SRT} = 1 / 3.7 = 0.27 \\ 0.27 &= 0.72 \times N / (0.75 + N) \\ N = \text{NH}_4\text{-N} &= 0.45 \text{ mg/L} \end{aligned}$$

sufficient capacity for complete nitrification

Check safety factor for $\text{NH}_4\text{-N} = 2.0$ mg/L treatment goal.

$$(1/\text{SRT}) = ((0.72 * 2) / (0.75 + 2)) = 0.52 / \text{day}$$

$$1 / \text{SRT} = 1 / 0.52 = 1.9$$

$$\text{Safety factor} = 3.7 / 1.9 = 1.9 \text{ (Okay)}$$

PERFORM NITROGEN BALANCE TO GET AMOUNT OF N OXIDIZED

Nitrogen N = nitrogen for synthesis + effluent N + N oxidized to nitrate

Nitrogen for synthesis: SRT = 7.4 days @ 4500 mg/L MLSS

$$\text{Biomass Yield} = Y / (1 + b \times \text{SRT}) = 0.72 / (1 + 0.08 \times 7.4) = 0.45 \text{ gVSS / g BOD}$$

$$\text{Biomass Produced} = 0.45 \text{ g} (300 \text{ mg/L} - 5 \text{ mg/L BOD}) = 132.8 \text{ mg/L}$$

$$\text{@ 10\% nitrogen, N synthesis} = 0.10 (132.8) = \mathbf{13.3 \text{ mg/L}}$$

Assume no return/recycle N during digestion/dewatering of sludge for single tank mode:

Nitrate Produced:

$$\text{TKN} - \text{N}_{\text{syn}} - \text{NH}_4\text{-N} = \text{NO}_3\text{-N}$$

$$40.0 - 13.3 - 2.0 = \text{NO}_3\text{-N}$$

$$\text{NO}_3\text{-N} = 24.7 \text{ mg/L}$$

NO₃-N Produced Per Feed Cycle:

$$= 24.7 \text{ mg/L} (0.143 \text{ Mgal}) 8.34 = 29.5 \text{ lb/cycle}$$

EVALUATE NITROGEN REMOVAL CAPACITY

1. Determine NO₃-N balance:

Since the reactor approaches a complete mix operation with the internal recycle, we can assume a relatively constant NO₃-N concentration in the aerobic reactor. The nitrate produced has to be accounted for as follows:

NO₃-N produced = (29.5 lb/cycle)

$$\begin{aligned} = & \quad \underline{\mathbf{A.}} \text{ - NO}_3\text{-N removed in aerobic reactor (during settle and decant)} \\ & \quad + \\ & \quad \underline{\mathbf{B.}} \text{ - NO}_3\text{-N removed in aerobic reactor (during anoxic mix)} \\ & \quad + \\ & \quad \underline{\mathbf{C.}} \text{ - NO}_3\text{-N allowed in effluent discharge (< 4.5 mg/l)} \\ & \quad + \\ & \quad \underline{\mathbf{D.}} \text{ - NO}_3\text{-N removed in overflow to anoxic reactor (during interact)} \end{aligned}$$

A. - Aerobic reactor nitrate loss (denitrification) will occur in the mixed liquor during the decant and settle period when oxygen is depleted.

Use SDNR for endogenous respiration per the following reference:

Biological Nutrient Removal, Randall, Barnard, and Stensel, Technomics, 1992

$$SDNR = \left(\frac{0.50}{2.86} \right) \left(\frac{A_n}{Y_n} \right) \left(\frac{1}{SRT} \right)$$

$$A_n = 1.5 - 1.42Y + \frac{1.42bYSRT}{1+bSRT}$$

$$Y_n = \frac{Y}{1+bSRT} + Y_I$$

$$A_n = 1.5 - (1.42 * 0.6) + ((1.42)(0.08)(0.6)(3.7) / (1 + (0.08)*(3.7))) = 0.84$$

$$Y_n = (0.6 / (1 + (0.08)*(3.7))) + 0.50 = 0.96$$

$$SDNR = (0.5/2.86) * (0.84/0.96) * (1/7.4) = \mathbf{0.021 \text{ g/g-d}}$$

Removed = SDNR(V)(fraction of sludge blanket)(MLSS)(8.34)(time),

$$\begin{aligned} \text{Time} &= 45 \text{ min (Settle)} \\ &+ \underline{42 \text{ min (Decant)}} \\ &= 87 \text{ min (Total)} \end{aligned}$$

$$= (0.021)(0.520)(12.4/23 \text{ ft})(4500)(8.34)(86)/60/24$$

$$= \mathbf{13.2 \text{ lb/cycle}}$$

B. - Since anoxic mixing will not occur during single tank operation, denitrification cannot be credited.

C. - NO₃-N allowed to be the effluent is < 6 mg/l ([NH₄-N] single tank mode < 2 mg/L);

Assume 6 mg/L of NO₃-N is discharge:

$$\text{Removed} = (6 \text{ mg/l}) * (0.143) * (8.34)$$

$$= \mathbf{7.1 \text{ lbs/cycle}}$$

D. - Determine how much NO₃-N must be removed in anoxic zone:

$$\text{NO}_3\text{-N to be removed on anoxic zone} = 29.5 \text{ lb/cycle} - 13.2 - 7.1$$

$$= \mathbf{9.2 \text{ lb/cycle}}$$

Determine amount of nitrate fed to anoxic reactor:

To evaluate the nitrate removal capacity we have to determine the amount of nitrate that flows from the aerobic reactor to the anoxic tank and use the SDNR to determine if it can be sufficiently reduced.

Nitrate return feed rate to anoxic zone (using two pumps):

$$\text{Flow to anoxic} = 7940 \text{ gpm (66 min)} = 524,040 \text{ gallons/cycle}$$

Average initial nitrate concentration in the recycle flow:

$$\text{NO}_3\text{-N (mg/L)} = ((29.5 \text{ lbs N} / 0.520 \text{ Mgal}) / 8.34) = 6.8 \text{ mg/L}$$

$$\text{Assume 75\% of this concentration} = 5.0 \text{ mg/l}$$

$$\text{At 5.0 mg/L NO}_3\text{-N} = 5.0 * (0.524) * (8.34) = 21.9 \text{ lb/cycle}$$

As 21.9 lb/cycle > 9.2 lb/cycle, the system is not limited by recycle rate

Determine NO₃-N removal capacity of anoxic reactor:

Specific Denitrification Rate in the Anoxic Reactor can be related to BOD F/M Ratio. (EPA Nitrogen Control Manual)

$$\text{SDNR} = 0.03 \text{ F/M} + 0.029$$

$$\text{SDNR} = \text{Specific NO}_3\text{-N reduction rate, g NO}_3\text{-N / g MLSS-d}$$

$$\text{F/M} = \text{g BOD / g MLSS-d}$$

$$\text{F/M} = \frac{1.2 \text{ Mgal/d} \times 300 \text{ mg/L BOD}}{4500 \text{ mg/L} \times 0.277 \text{ Mgal (average depth)}}$$

$$\text{F/M} = 0.29 \text{ g/g-d}$$

$$\text{SDNR} = 0.038 \text{ g/g-d}$$

The SDNR \cong 0.038 g NO₃-N/g MLSS-d

$$\text{NO}_3\text{-N removal} = (\text{Volume}) (\text{MLSS}) (\text{SDNR}) \frac{\Delta t}{\text{cycle}} \quad (8.34)$$

$$\text{Average Anoxic Volume} = 0.277 \text{ Mgal}$$

$$\Delta t = 66 \text{ min} = 1.1 \text{ hours} = 0.046 \text{ days/cycle}$$

$$\begin{aligned} \text{NO}_3\text{-N removed} &= (0.277) (4500) (0.038) (0.046) (8.34) \\ &= \mathbf{18.2 \text{ lbs/cycle}} \end{aligned}$$

$$= 18.2 \text{ lb/cycle} > 9.2 \text{ lb/cycle required (safety provided)}$$

Therefore, sufficient capacity in anoxic is available to remove the necessary amount of $\text{NO}_3\text{-N}$

EVALUATE SINGLE TANK AERATION CAPACITY

At the end of decant there will not be an “Idle” period because the anoxic reactor will already be at cycle water level. Therefore, the amount of aeration time available is equal to:

$$\begin{aligned} \text{Aeration time available} &= (18 \text{ min (fill)} + 66 \text{ min (interact/react)} - 0 \text{ (anoxic mix)}) * \\ &\quad (8.4 \text{ cycles/day}) \\ &= 706 \text{ min/day or } 11.8 \text{ hrs/day} \end{aligned}$$

Therefore, from the previous calculations:

SOR required = 359.5 lbs/hr @ 1.2 MGD and 10.0 hours of aeration time per tank

CFM required (single tank) = 359.5 lbs/hr x 2 x (10.0/11.8) = 609 lbs/hr.

Determine air requirement @ 39.1% O_2 transfer efficiency (From Sanitaire)

$$\text{Blower CFM} = \text{SOR} / (60 \text{ min/hr} \times \text{Transfer Eff.} \times 0.0177 \text{ lbO}_2/\text{ft}^3)$$

$$\text{Blower CFM} = 609 \text{ lbs/hr} / (60 * 0.391 * 0.0172)$$

$$\text{Blower CFM} = \mathbf{1509 \text{ SCFM}}$$

Therefore, two blowers designed for two-tank mode (1000 SCFM @ 10.4 psi) will be able to provide the required air to operate in single tank mode at design capacity with one additional blower for redundancy.

SURGE TANK AND FILTER DESIGN REQUIREMENTS

Decant Time = 42 min

Decant Volume = 0.143 Mgal
= 142,857 gal

Decant Rate = 142,857 gal / 42 min
= 3400 gpm

Using Decanters @ 225 gpm/ft – requires 15.1 ft of weir length

Filter area: 215.2 ft² per 4 disc filter

Two filters in service (one redundant)

Flux rate (peak) = 1666 gpm / (215.2 ft² x 1 filter)
= 7.7 gpm/ft² (< 8.0 gpm/ft² - okay)

Minimum surge tank volume needed:

$$= (3400 \text{ gpm} - 833 \text{ gpm}) * 42 \text{ min}$$

$$= 107,814 \text{ gallons (14,414 ft}^3\text{)}$$

Area provided = 18.5' x 58.5' = 1082 ft²

Minimum depth required = 14,414 ft³ / 1082 ft² = 13.3 ft

Design Depth = 16.7'

Total Volume provided = (1082 x 13.17 x 7.48) + (17.75 x 18.5 x 3.4 x 7.48) = 114,940 gallons

SLUDGE PRODUCTION

1. Waste to Aerobic Storage for Thickening (to 1.5%)
2. Aerobic Digestion for Solids reduction (assume 30%)
3. Dewater with centrifuge (polymer addition)
4. Haul to disposal

1. Pre-Thickened Sludge Volume
 $2402 \text{ lb/day} / (0.0088 \times 8.34) = 32,728 \text{ gallons/day wasted}$

Therefore $32,728 / (4.2 \text{ cycles/day/tank} \times 2 \text{ tanks}) = 3,896 \text{ gallons/cycle}$
@ 300 gpm (waste pump capacity) waste time = 13 minutes/cycle

Alternately - On a continuous waste mode of operation:
 $32,728 \text{ gallons/day} @ 0.88\% = 82,286 \text{ gallons/day} @ 0.35\%$ (mixed liquor)

Required waste rate = $82,286 \text{ gal/d} / 2 \text{ tanks} / 24 \text{ hrs} / 60 \text{ min/hr} = 29 \text{ gpm}$

So more than sufficient waste capacity is installed for either mode of operation.

After Thickening:
TS = $2402 \text{ lb/d} @ 1.5\% = 19,200 \text{ gallons}$

2. After Solids Reduction
Assume 80% VSS = $2402 \text{ lb TS} \times 0.8 = 1922 \text{ lb VSS}$
Assume 30% VSS reduction in storage.
TS after reduction = $(2402 \text{ lb TS} - 1922 \text{ lb VSS}) + (1922 \text{ lb VSS} \times (1 - 0.30))$
 $= 1825 \text{ lb TS} @ 1.5\% = 14,592 \text{ gallons/day wet sludge}$

Calculate Solids Storage in Aerobic Storage:

Aerobic storage surface area = $28.5' \times 58.5' = 1667.3 \text{ ft}^2$

Therefore, volume per foot depth = $1667.3 \times 7.48 = 12,470 \text{ gallons/ft}$

Total water depth in reactor = 23 feet (15 feet usable storage)

Therefore the available storage volume = $12,470 \times 15 \text{ ft} = 187,050 \text{ gallons}$

The available days of storage = $187,050 \text{ gal} / 14,592 \text{ gal/day} = 12.8 \text{ days}$

3. Final sludge for dewatering

Volume = $14,592 \text{ gal/d} @ 1.5\%$

Provide 1 Centrifuge Unit @ 90 gpm loading rate

$$\begin{aligned}\text{Hours of operation per day @ design flow} &= 14,592 \text{ gal/d} / 90 \text{ gpm} \times 60 \text{ min/hr} \\ &= 2.7 \text{ hours per day @ 1.5\%}\end{aligned}$$

Assume polymer usage is average = 10 lb/2000 lb D.S.
Polymer consumption per day = 1871 lb / 2000 x 10 = 9.4 lb/day

Calculate gallons of neat emulsion polymer required / day:

$$= 9.4 \text{ lbs/d} / 8.75 \text{ (specific gravity)} \times 3 \text{ (dilution factor)} = 3.1 \text{ gallons/day}$$

4. Final sludge for disposal

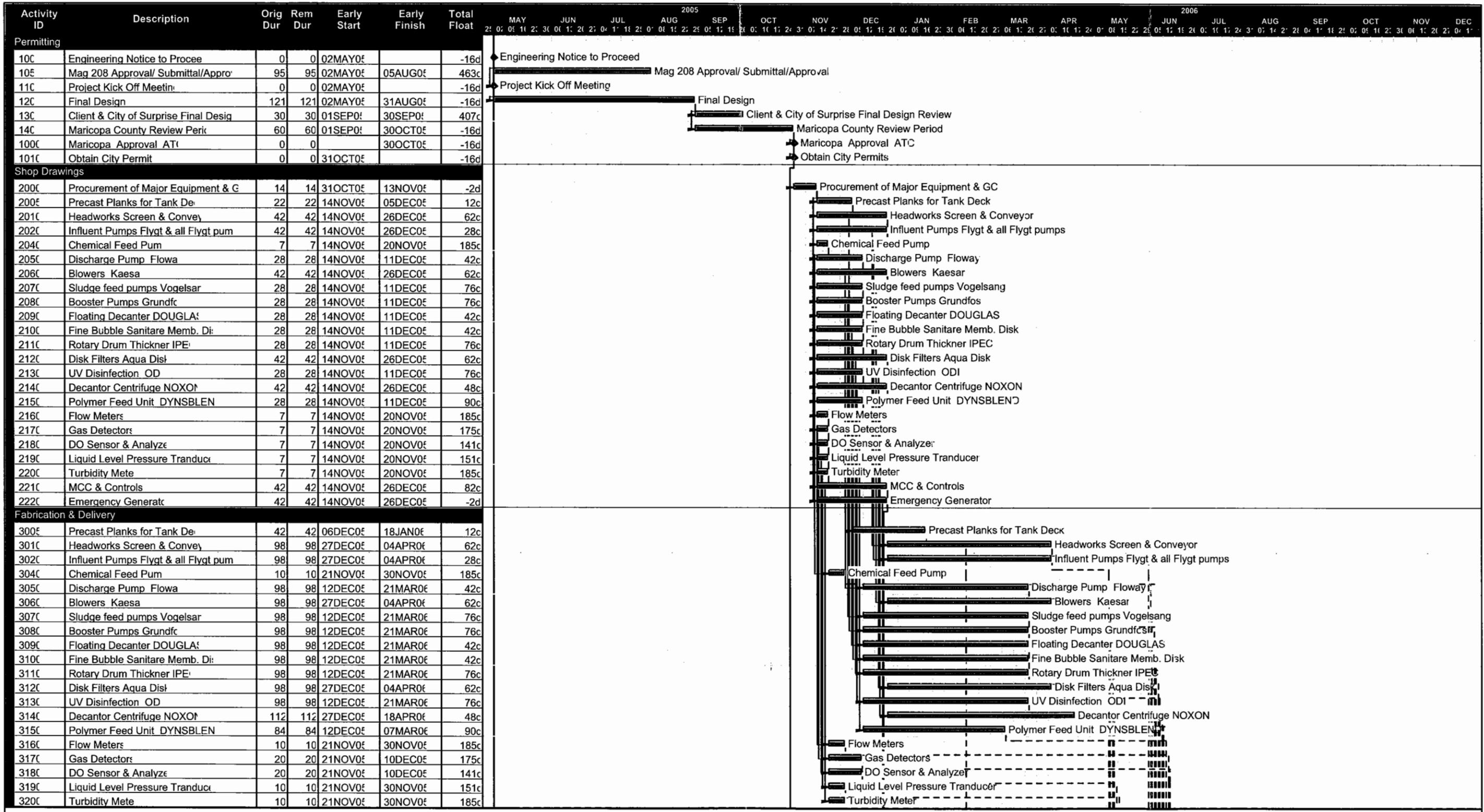
Assume:

Solids concentration from centrifuge = 25%

Solids feed concentration = 1.5%

$$\begin{aligned}\text{Total volume of dewater sludge} &= 14,592 \text{ gallons} \times 1.5\% / 25\% / 7.48 \text{ gal/ft}^3 / 27 \text{ ft}^3/\text{yd} \\ &= 4.3 \text{ yd/day}\end{aligned}$$

Appendix C
SPA 2 Draft Construction Schedule



Start date	02MAY05
Finish date	30NOV06
Data date	02MAY05
Run date	03MAY05
Page number	1A
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Pacific Environmental Resource Corp
SPA 2 WRF
Lennar Communities Development Inc.

	Early bar
	Progress bar
	Critical bar
	Summary bar
	Start milestone point
	Finish milestone point

CDR

Appendix D

Lennar Communities Development Inc.
And City of Surprise Financial Statements

The following information was provided by Lennar Communities Development, Inc. Included are excerpts from the year 2003 annual financial report. A complete copy may be obtained upon request.

**Lennar Communities Development, Inc.
Financial Statement**

LENNAR CORPORATION AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

17. Supplemental Financial Information

As discussed in Note 7, the Company's obligations to pay principal, premium, if any, and interest under certain debt instruments are guaranteed on a joint and several basis by substantially all of the Company's subsidiaries, other than subsidiaries primarily engaged in mortgage and title reinsurance activities. The guarantees are full and unconditional and the guarantor subsidiaries are 100% directly or indirectly owned by Lennar Corporation. The Company has determined that separate, full financial statements of the guarantors would not be material to investors and, accordingly, supplemental financial information for the guarantors is presented.

**Consolidating Balance Sheet
November 30, 2003**

	<u>Lennar Corporation</u>	<u>Guarantor Subsidiaries</u>	<u>Non-Guarantor Subsidiaries</u>	<u>Eliminations</u>	<u>Total</u>
	(In thousands)				
ASSETS					
Homebuilding:					
Cash and receivables, net	\$ 895,715	365,953	—	—	1,261,668
Inventories	—	3,649,493	6,608	—	3,656,101
Investments in unconsolidated partnerships	16,346	373,988	—	—	390,334
Other assets	99,614	351,005	—	—	450,619
Investments in subsidiaries	3,541,747	390,722	—	(3,932,469)	—
	4,553,422	5,131,161	6,608	(3,932,469)	5,758,722
Financial services	—	16,285	1,000,425	—	1,016,710
Total assets	\$4,553,422	5,147,446	1,007,033	(3,932,469)	6,775,432
LIABILITIES AND STOCKHOLDERS' EQUITY					
Homebuilding:					
Accounts payable and other liabilities	\$ 325,695	715,041	225	—	1,040,961
Liabilities related to consolidated inventory not owned	—	45,214	—	—	45,214
Senior notes and other debts payable, net	1,476,860	75,357	—	—	1,552,217
Intercompany	(512,907)	762,867	(249,960)	—	—
	1,289,648	1,598,479	(249,735)	—	2,638,392
Financial services	—	7,220	866,046	—	873,266
Total liabilities	1,289,648	1,605,699	616,311	—	3,511,658
Stockholders' equity	3,263,774	3,541,747	390,722	(3,932,469)	3,263,774
Total liabilities and stockholders' equity	\$4,553,422	5,147,446	1,007,033	(3,932,469)	6,775,432

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Balance Sheet
November 30, 2002

	Lennar Corporation	Guarantor Subsidiaries	Non-Guarantor Subsidiaries	Eliminations	Total
	(In thousands)				
ASSETS					
Homebuilding:					
Cash and receivables, net	\$ 622,019	157,566	10	—	779,595
Inventories	—	3,231,015	6,562	—	3,237,577
Investments in unconsolidated partnerships	—	285,594	—	—	285,594
Other assets	84,122	273,616	—	—	357,738
Investments in subsidiaries	<u>2,584,512</u>	<u>302,655</u>	—	<u>(2,887,167)</u>	<u>—</u>
	3,290,653	4,250,446	6,572	(2,887,167)	4,660,504
Financial services	—	35,933	1,074,241	(15,045)	1,095,129
Total assets	<u>\$3,290,653</u>	<u>4,286,379</u>	<u>1,080,813</u>	<u>(2,902,212)</u>	<u>5,755,633</u>
LIABILITIES AND STOCKHOLDERS' EQUITY					
Homebuilding:					
Accounts payable and other liabilities	\$ 333,746	635,842	222	(31)	969,779
Senior notes and other debts payable, net ...	1,478,821	121,502	—	(15,014)	1,585,309
Intercompany	<u>(751,071)</u>	<u>931,951</u>	<u>(180,880)</u>	—	—
	1,061,496	1,689,295	(180,658)	(15,045)	2,555,088
Financial services	—	12,572	958,816	—	971,388
Total liabilities	<u>1,061,496</u>	<u>1,701,867</u>	<u>778,158</u>	<u>(15,045)</u>	<u>3,526,476</u>
Stockholders' equity	<u>2,229,157</u>	<u>2,584,512</u>	<u>302,655</u>	<u>(2,887,167)</u>	<u>2,229,157</u>
Total liabilities and stockholders' equity	<u>\$3,290,653</u>	<u>4,286,379</u>	<u>1,080,813</u>	<u>(2,902,212)</u>	<u>5,755,633</u>

LENNAR CORPORATION AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Statement of Earnings
Year Ended November 30, 2003

	<u>Lennar Corporation</u>	<u>Guarantor Subsidiaries</u>	<u>Non-Guarantor Subsidiaries</u> (In thousands)	<u>Eliminations</u>	<u>Total</u>
Revenues:					
Homebuilding	\$ —	8,348,645	—	—	8,348,645
Financial services	—	12,726	558,282	(12,034)	558,974
Total revenues	<u>—</u>	<u>8,361,371</u>	<u>558,282</u>	<u>(12,034)</u>	<u>8,907,619</u>
Costs and expenses:					
Homebuilding	—	7,291,417	561	(3,622)	7,288,356
Financial services	—	11,549	401,384	(8,412)	404,521
Corporate general and administrative	111,488	—	—	—	111,488
Total costs and expenses	<u>111,488</u>	<u>7,302,966</u>	<u>401,945</u>	<u>(12,034)</u>	<u>7,804,365</u>
Equity in earnings from unconsolidated partnerships	—	81,937	—	—	81,937
Management fees and other income, net	—	21,863	—	—	21,863
Earnings (loss) before income taxes	(111,488)	1,162,205	156,337	—	1,207,054
Provision (benefit) for income taxes	(42,084)	438,732	59,015	—	455,663
Equity in earnings (losses) from subsidiaries	820,795	97,322	—	(918,117)	—
Net earnings (loss)	\$ 751,391	820,795	97,322	(918,117)	751,391

Consolidating Statement of Earnings
Year Ended November 30, 2002

	<u>Lennar Corporation</u>	<u>Guarantor Subsidiaries</u>	<u>Non-Guarantor Subsidiaries</u> (In thousands)	<u>Eliminations</u>	<u>Total</u>
Revenues:					
Homebuilding	\$ —	6,751,295	6	—	6,751,301
Financial services	—	66,577	420,604	(2,962)	484,219
Total revenues	<u>—</u>	<u>6,817,872</u>	<u>420,610</u>	<u>(2,962)</u>	<u>7,235,520</u>
Costs and expenses:					
Homebuilding	—	5,995,607	564	(2,962)	5,993,209
Financial services	—	54,434	302,174	—	356,608
Corporate general and administrative	85,958	—	—	—	85,958
Total costs and expenses	<u>85,958</u>	<u>6,050,041</u>	<u>302,738</u>	<u>(2,962)</u>	<u>6,435,775</u>
Equity in earnings from unconsolidated partnerships	—	42,651	—	—	42,651
Management fees and other income, net	—	33,313	—	—	33,313
Earnings (loss) before income taxes	(85,958)	843,795	117,872	—	875,709
Provision (benefit) for income taxes	(32,391)	318,533	44,438	—	330,580
Equity in earnings (losses) from subsidiaries	598,696	73,434	—	(672,130)	—
Net earnings (loss)	\$ 545,129	598,696	73,434	(672,130)	545,129

LENNAR CORPORATION AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Statement of Earnings
Year Ended November 30, 2001

	<u>Lennar Corporation</u>	<u>Guarantor Subsidiaries</u>	<u>Non-Guarantor Subsidiaries</u> (In thousands)	<u>Eliminations</u>	<u>Total</u>
Revenues:					
Homebuilding	\$ —	5,554,743	4	—	5,554,747
Financial services	—	55,146	370,208	—	425,354
Total revenues	<u>—</u>	<u>5,609,889</u>	<u>370,212</u>	<u>—</u>	<u>5,980,101</u>
Costs and expenses:					
Homebuilding	—	4,933,528	543	—	4,934,071
Financial services	—	62,358	273,865	—	336,223
Corporate general and administrative	75,831	—	—	—	75,831
Total costs and expenses	<u>75,831</u>	<u>4,995,886</u>	<u>274,408</u>	<u>—</u>	<u>5,346,125</u>
Equity in earnings from unconsolidated partnerships	—	27,051	—	—	27,051
Management fees and other income, net	—	18,396	—	—	18,396
Earnings (loss) before income taxes	(75,831)	659,450	95,804	—	679,423
Provision (benefit) for income taxes	(27,829)	253,888	35,519	—	261,578
Equity in earnings (losses) from subsidiaries	465,847	60,285	—	(526,132)	—
Net earnings (loss)	<u>\$417,845</u>	<u>465,847</u>	<u>60,285</u>	<u>(526,132)</u>	<u>417,845</u>

LENNAR CORPORATION AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Statement of Cash Flows
Year Ended November 30, 2003

	Lennar Corporation	Guarantor Subsidiaries	Non-Guarantor Subsidiaries (In thousands)	Eliminations	Total
Cash flows from operating activities					
Net earnings (loss)	\$ 751,391	820,795	97,322	(918,117)	751,391
Adjustments to reconcile net earnings (loss) to net cash provided by (used in) operating activities	(789,215)	(457,339)	172,859	903,103	(170,592)
Net cash provided by (used in) operating activities	(37,824)	363,456	270,181	(15,014)	580,799
Cash flows from investing activities					
(Increase) decrease in investments in unconsolidated partnerships, net	(16,346)	88,419	—	—	72,073
Acquisitions, net of cash acquired	—	(149,212)	(10,177)	—	(159,389)
Other	(9,177)	(6,662)	(15,042)	—	(30,881)
Net cash used in investing activities	(25,523)	(67,455)	(25,219)	—	(118,197)
Cash flows from financing activities					
Net borrowings (repayments) under revolving credit facilities and other borrowings	(95,237)	(106,083)	228	15,014	(186,078)
Net proceeds from issuance of 5.95% senior notes	341,730	—	—	—	341,730
Net repayments under financial services short-term debt	—	—	(118,989)	—	(118,989)
Common stock:					
Issuance	18,197	—	—	—	18,197
Repurchases	(1,044)	—	—	—	(1,044)
Dividends and other	(22,705)	—	—	—	(22,705)
Intercompany	94,746	7,882	(102,628)	—	—
Net cash provided by (used in) financing activities	335,687	(98,201)	(221,389)	15,014	31,111
Net increase in cash	272,340	197,800	23,573	—	493,713
Cash at beginning of year	621,163	109,995	46,001	—	777,159
Cash at end of year	<u>\$ 893,503</u>	<u>307,795</u>	<u>69,574</u>	<u>—</u>	<u>1,270,872</u>

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Statement of Cash Flows
Year Ended November 30, 2002

	Lennar Corporation	Guarantor Subsidiaries	Non-Guarantor Subsidiaries (In thousands)	Eliminations	Total
Cash flows from operating activities:					
Net earnings (loss)	\$ 545,129	598,696	73,434	(672,130)	545,129
Adjustments to reconcile net earnings (loss) to net cash provided by (used in) operating activities	(500,149)	(299,043)	(198,513)	657,144	(340,561)
Net cash provided by (used in) operating activities	44,980	299,653	(125,079)	(14,986)	204,568
Cash flows from investing activities:					
Decrease in investments in unconsolidated partnerships, net	—	57,891	11	—	57,902
Acquisitions, net of cash acquired	—	(415,607)	(8,670)	—	(424,277)
Other	(1,759)	3,382	(925)	—	698
Net cash used in investing activities	(1,759)	(354,334)	(9,584)	—	(365,677)
Cash flows from financing activities:					
Net borrowings (repayments) under revolving credit facilities and other borrowings	(6,806)	(119,635)	259	14,986	(111,196)
Net borrowings under financial services short- term debt	—	—	156,120	—	156,120
Common stock:					
Issuance	19,317	—	—	—	19,317
Repurchases	(65)	—	—	—	(65)
Dividends	(3,182)	—	—	—	(3,182)
Intercompany	(141,647)	170,593	(28,946)	—	—
Net cash provided by (used in) financing activities	(132,383)	50,958	127,433	14,986	60,994
Net decrease in cash	(89,162)	(3,723)	(7,230)	—	(100,115)
Cash at beginning of year	710,325	113,718	53,231	—	877,274
Cash at end of year	\$ 621,163	109,995	46,001	—	777,159

LENNAR CORPORATION AND SUBSIDIARIES

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

Consolidating Statement of Cash Flows
Year Ended November 30, 2001

	Lennar Corporation	Guarantor Subsidiaries	Non-Guarantor Subsidiaries (In thousands)	Eliminations	Total
Cash flows from operating activities:					
Net earnings (loss)	\$ 417,845	465,847	60,285	(526,132)	417,845
Adjustments to reconcile net earnings (loss) to net cash provided by (used in) operating activities	(393,618)	(217,936)	(273,227)	526,132	(358,649)
Net cash provided by (used in) operating activities	<u>24,227</u>	<u>247,911</u>	<u>(212,942)</u>	<u>—</u>	<u>59,196</u>
Cash flows from investing activities:					
Decrease in investments in unconsolidated partnerships, net	—	5,582	19	—	5,601
Other	17	(7,913)	4,158	—	(3,738)
Net cash provided by (used in) investing activities	<u>17</u>	<u>(2,331)</u>	<u>4,177</u>	<u>—</u>	<u>1,863</u>
Cash flows from financing activities:					
Net borrowings (repayments) under revolving credit facilities and other borrowings	219,974	(21,385)	1,499	—	200,088
Net borrowings under financial services short- term debt	—	—	265,607	—	265,607
Common stock:					
Issuance	19,789	—	—	—	19,789
Dividends	(3,146)	—	—	—	(3,146)
Intercompany	243,681	(198,242)	(45,439)	—	—
Net cash provided by (used in) financing activities	<u>480,298</u>	<u>(219,627)</u>	<u>221,667</u>	<u>—</u>	<u>482,338</u>
Net increase in cash	504,542	25,953	12,902	—	543,397
Cash at beginning of year	205,783	87,765	40,329	—	333,877
Cash at end of year	<u>\$ 710,325</u>	<u>113,718</u>	<u>53,231</u>	<u>—</u>	<u>877,274</u>

LENNAR CORPORATION AND SUBSIDIARIES
NOTES TO CONSOLIDATED FINANCIAL STATEMENTS—(Continued)

18. Quarterly Data (unaudited)

	<u>First</u>	<u>Second</u>	<u>Third</u>	<u>Fourth</u>
	(In thousands, except per share amounts)			
2003				
Revenues	\$1,600,470	2,103,108	2,267,842	2,936,199
Earnings before provision for income taxes	\$ 170,792	257,534	323,819	454,909
Net earnings	\$ 106,318	160,315	201,577	283,181
Earnings per share:				
Basic	\$ 0.75	1.13	1.35	1.81
Diluted	\$ 0.68	1.02	1.21	1.69
2002				
Revenues	\$1,236,901	1,549,484	1,847,952	2,601,183
Earnings before provision for income taxes	\$ 115,487	170,293	228,464	361,465
Net earnings	\$ 71,891	106,007	142,219	225,012
Earnings per share:				
Basic	\$ 0.52	0.76	1.01	1.60
Diluted	\$ 0.47	0.68	0.91	1.44

Quarterly and year-to-date computations of per share amounts are made independently. Therefore, the sum of per share amounts for the quarters may not agree with per share amounts for the year. All earnings per share amounts were adjusted for the Company's April 2003 10% Class B stock distribution and the January 2004 two-for-one stock split.

**City of Surprise
Financial Statement Memo**



**CITY OF SURPRISE
WATER SERVICES DEPARTMENT**

MEMORANDUM

To: Brenda Day
MAG

From: Rich Williams, Sr. *RAW*
Water Services Director
City of Surprise

Date: 7/27/04

The City of Surprise is committed to meeting the growth projections enhancement with its General Plan of Development. As a full service municipality providing a complete operational sewage system, the City has sanitary sewer personnel on its staff that is versed in all aspects of sanitary sewer service from maintenance and repair of its collection system to operations of its wastewater treatment facilities.

As further evidence of the City's intention in meeting its growth projections several key growth policies have been recently approved through City Council actions including the Integrated Water Master Plan (for both potable water and sanitary sewer); Special Development Planning Areas, SPA 1- SPA 6 that give further substance to the above mentioned Master Plan; and a policy that outlines a Sanitary Sewer System Development Fee structure to be used in conjunction with planned area development.

These fees have been structured to meet future City obligations with regard to both, capital improvement projects as well as sewer service fees to the City's citizens that we are structured to meet future operational needs and meet the City's financial obligations.



CITY OF SURPRISE
COUNCIL AGENDA ACTION FORM

#8

SURPRISE ARIZONA Meeting Type: Regular Meeting Time Scheduled: May 27, 2004 7:00 PM
If Special submit date time

Submitting Department: Finance Contact Person: Robert Nilles

Consent Regular Requesting Action Report Only

Type of Document Needing Approval (Check all that apply):

- Public Hearing
- Agreement
- Special Consideration
- Grant
- Liquor/Bingo License Application
- Resolution
- Emergency Clause
- Intergovernmental Agreement
- Submission
- Acceptance
- First Reading/Ordinance
- Final Reading/Ordinance

Council Priority (Check Appropriate Areas):

- Education
- Job Creation
- Public Safety
- Transportation
- City Revenue
- Public Fitness
- Quality Service Delivery
- Housing Rehabilitation
- Human Service Needs
- Community Activities
- Neighborhood Revitalization
- Employment Infrastructure
- Work Force Preparation
- Parks, Recreation & Library
- Public Infrastructure

Regular Agenda Wording: Consideration and action to approve Ordinance #04-24
an ordinance repealing Chapters 15.08 and 15.12 and Sections 13.04.280, 13.04.290,
13.04.300, 13.04.310, 13.04.320, 13.08.660, 13.08.670, 13.08.680, 13.08.690 and 13.08.700 of
Surprise Municipal Code; and adding Chapter 15.10 adopting the new Development Fee Study and
development fees.

Staff Recommendation: Approve Fiscal Impact: Yes, increasing development fees will increase the
revenue produced for capital improvements
related to new development.

Background Information: The new Development Fee Study updates all of the City's current fees. This
Ordinance will adopt the Development Fee Study and the new development fees, and make numerous
clean-up revisions to the existing Municipal Code sections related to development fees. The
Development Fee Study is on file with the City Clerk and was provided to the Council in January
2004.

List Attachments as Follows: Ordinance #04-24; Figure 1: Schedule of Maximum Supportable
Development Fees - Page 4 of Tischler & Associates Development Impact Fee Study; Council
Communication

Signatures of Submitting Officers (Sign Legibly):

Robert Nilles Department Head *Robert Nilles* Supervisor *Robert Nilles* Budget Authorization

[Signature] Legal Review *Kathy Rice* City Manager/Designee

<u>Distribution After Council Action:</u>	<u>Council Action:</u>	<u>Results:</u>
- Robert Nilles	Motion/Second	For <u>7</u>
- Agenda file	Shafer	Against <u>0</u>

SURPRISE, ARIZONA DEVELOPMENT FEE STUDY

Figure 1: Schedule of Maximum Supportable Development Fees

All Development - North (SPA's 2-5)		Water Resources	Water System	Wastewater	TOTAL
Meter Size (inches)	Type				
0.75	Displacement	\$456	\$2,879	\$2,245	\$5,580
1.00	Displacement	\$580	\$3,665	\$2,841	\$7,086
1.50	Displacement	\$1,505	\$9,506	\$7,272	\$18,283
2.00	Displacement	\$2,406	\$15,199	\$11,590	\$29,195
3.00	Compound	\$4,864	\$30,718	\$23,363	\$58,945
3.00	Turbine	\$5,455	\$34,451	\$26,194	\$66,100
4.00	Compound	\$7,748	\$48,931	\$37,178	\$93,857
4.00	Turbine	\$9,346	\$59,023	\$44,834	\$113,203
6.00	Compound	\$15,052	\$95,062	\$72,171	\$182,285
6.00	Turbine	\$18,789	\$118,661	\$90,073	\$227,523
8.00	Compound	\$24,320	\$153,592	\$116,571	\$294,483
8.00	Turbine	\$27,435	\$173,265	\$131,494	\$332,194

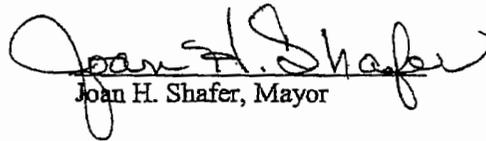
All Development - South (SPA 1)		Water Resources	Water System	Wastewater	TOTAL
Meter Size (inches)	Type				
0.75	Displacement	\$456	\$2,879	\$1,808	\$5,143
1.00	Displacement	\$580	\$3,665	\$2,284	\$6,529
1.50	Displacement	\$1,505	\$9,506	\$5,827	\$16,838
2.00	Displacement	\$2,406	\$15,199	\$9,281	\$26,886
3.00	Compound	\$4,864	\$30,718	\$18,696	\$54,278
3.00	Turbine	\$5,455	\$34,451	\$20,961	\$60,867
4.00	Compound	\$7,748	\$48,931	\$29,744	\$86,423
4.00	Turbine	\$9,346	\$59,023	\$35,867	\$104,236
6.00	Compound	\$15,052	\$95,062	\$57,730	\$167,844
6.00	Turbine	\$18,789	\$118,661	\$72,046	\$209,496
8.00	Compound	\$24,320	\$153,592	\$93,237	\$271,149
8.00	Turbine	\$27,435	\$173,265	\$105,172	\$305,872

All Development - Citywide	Parks & Recreation		Police	Fire	Public Works	General Gov't	TOTAL
	Libraries						
Residential							
<u>Per Housing Unit</u>							
Single Family Detached	\$266	\$1,127	\$424	\$454	\$885	\$314	\$3,470
Single Family Attached/Multi-Family	\$224	\$948	\$357	\$382	\$437	\$265	\$2,614
All Other Housing Types	\$235	\$995	\$375	\$401	\$458	\$278	\$2,743
<u>Nonresidential</u>							
<u>Per Thousand Square Feet of Floor Area</u>							
Com / Shop Ctr 25,000 SF or less	N/A	N/A	\$2,065	\$1,405	\$683	\$311	\$4,464
Com / Shop Ctr 25,001-50,000 SF	N/A	N/A	\$1,905	\$1,204	\$586	\$267	\$3,962
Com / Shop Ctr 50,001-100,000 SF	N/A	N/A	\$1,659	\$1,053	\$512	\$233	\$3,457
Com / Shop Ctr 100,001-200,000 SF	N/A	N/A	\$1,429	\$936	\$455	\$207	\$3,027
Com / Shop Ctr over 200,000 SF	N/A	N/A	\$1,221	\$843	\$410	\$186	\$2,660
Office / Inst 10,000 SF or less	N/A	N/A	\$950	\$1,850	\$900	\$410	\$4,110
Office / Inst 10,001-25,000 SF	N/A	N/A	\$768	\$1,708	\$828	\$377	\$3,676
Office / Inst 25,001-50,000 SF	N/A	N/A	\$654	\$1,597	\$777	\$354	\$3,382
Office / Inst 50,001-100,000 SF	N/A	N/A	\$556	\$1,505	\$732	\$333	\$3,126
Office / Inst over 100,000 SF	N/A	N/A	\$474	\$1,412	\$687	\$313	\$2,886
Business Park	N/A	N/A	\$535	\$1,332	\$648	\$295	\$2,810
Light Industrial	N/A	N/A	\$292	\$973	\$474	\$215	\$1,954
Warehousing	N/A	N/A	\$208	\$539	\$262	\$119	\$1,128
Manufacturing	N/A	N/A	\$160	\$767	\$373	\$170	\$1,470

Section 4. This Ordinance #04-24 shall be codified.

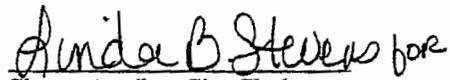
Section 5. Staff is hereby directed to conduct the next development fee study 18 months following the adoption of this Ordinance #04-24.

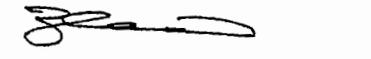
PASSED AND ADOPTED this 27 day of May, 2004.


Joan H. Shafer, Mayor

ATTEST:

APPROVED AS TO FORM:


Sherry Aguilar, City Clerk


Jeffrey M. Blilie, City Attorney

Yeas: Mayor Shafer, Vice-Mayor Cox, Council Members; Allen, Bails, Arismendez, Sullivan & Vukanovich.

Nays: _____

a. Qualifying commercial and/or industrial developments within the Original Town Site Infill District shall receive a one hundred percent waiver of building permit and building plan review fees.

b. Qualifying commercial and/or industrial developments within the Original Town Site Infill District generating sales tax shall be eligible to receive a one time fifty percent rebate of the city's sales tax apportionment during its first full year of operation. Applicants must apply for annual sales tax rebate in January for the previous calendar year sales tax revenues. Upon approval by the City Manager or designee, rebates shall be calculated and disbursed within 45 days of receipt of the application.

c. Qualifying commercial and/or industrial developments within the Original Town Site Infill District shall be eligible to receive expedited plan review services. Commercial site plans, commercial subdivision plats, landscape plans, civil plans and building plans shall be reviewed within a maximum of twelve business days from date of submittal to issuance of redline or administrative comments. The city shall bear all cost associated with the expedited review process.

d. Qualifying Commercial and/or industrial developments within the Original Town Site Infill District shall be eligible to receive expedited administrative processing for rezones when possible. Administrative processes will be accelerated to facilitate advancing the project to the Planning and Zoning Commission and City Council.

C. Persons developing commercial property within the Original Town Site Infill District wishing to receive incentives under the Original Town Site Infill Incentive Plan shall submit an application to the Community and Economic Development Director ("CEDD"). The CEDD shall process the request and make recommendations to City Council for final approval. If approved, the CEDD shall administer the Original Town Site Infill Incentive Plan.

15.10.070 Expanding existing businesses. In order to be considered an expanding existing business, a business must demonstrate all of the following requirements:

1. Facility expansion of at least an additional 1000 square feet.
2. A ten percent increase in employees.
3. For purposes of the sales tax rebate option, generation of sales tax and a twenty percent overall income increase by the end of the first full year of operation after expansion completion.

15.10.080 Penalties for violation. Any person found to have violated any provision of this chapter shall be guilty of a class 1 misdemeanor, punishable by a fine of up to \$2500 and six months in jail.

15.10.090 Procedure for violations. Every action to prosecute a violation of this chapter shall be processed in the manner provided in Chapter 1.18.

15.10.100 Jurisdiction of city court. The Surprise City Court shall have exclusive jurisdiction over all proceedings to enforce this chapter.

Development Fee Study. The development fees shall be annually adjusted to account for inflation using the index published by Engineering News Record.

B. The development fees set forth in the Development Fee Study shall be collected by the building inspector prior to the issuance of a building permit for the construction of any dwelling unit or commercial or industrial building or structure. The development fees with respect to any mobile, manufactured, or modular home space shall be collected prior to the issuance of a permit for the establishment of a mobile, manufactured, or modular home within a mobile home park or a manufactured housing subdivision. The development fees with respect to any recreational vehicle pad or travel trailer pad shall be collected prior to the issuance of a permit for the construction of a recreational vehicle or travel trailer park, or for the construction of a pad contained therein. The building inspector shall not issue a building permit until the applicable development fees have been paid.

C. In the event a building permit is issued for the enlargement, reconstruction, or remodel of an existing structure, the development fees may be reduced by giving a credit for previously paid development fees with regard to that unit or parcel, the purpose being to collect development fees when additional demand is created on the city services because of enlargement, reconstruction, removal or remodeling of a structure.

15.10.040 Disposition. A. All development fees collected shall be deposited into separate accounts according to the development fee category and shall not be commingled with the general fund revenues of the city.

B. The revenues generated by development fees shall be used for the purposes as identified in the Development Fee Study.

15.10.050 Exemptions. Development fees shall only be collected where services are provided by the city. For example, development located outside of the city's water service area shall not be assessed the development fees related to the provision of water. Additionally, commercial development shall not be assessed the park and recreation development fee, the library development fee or the sanitation portion of the public works development fee.

15.10.060 Infill incentive district. A. There is established, pursuant to the authority granted in A.R.S. §9-499.10(A), an infill incentive district in the area bounded by Bell Road to the north, El Mirage to the east, Greenway Road to the south and Dysart Road to the west. This district is designated as the Original Town Site Infill Incentive District.

B. Original town site infill incentive plan.

1. Residential development. All residential development within the Original Town Site Infill Incentive District shall receive a one hundred percent waiver of development fees.

2. Commercial development.

- 15.10.020 Development fee study.
- 15.10.030 Development fees.
- 15.10.040 Disposition.
- 15.10.050 Exemptions.
- 15.10.060 Infill incentive district.
- 15.10.070 Expanding existing businesses.
- 15.10.080 Penalties for violation.
- 15.10.090 Procedure for violation.
- 15.10.100 Jurisdiction of city court.

15.10.010 Definitions. The following words and phrases, shall have the meanings respectively ascribed to them in this section, unless from the content, a different meaning is clearly intended:

A. "Commercial development" and/or "industrial development" means all buildings and lots within the territorial limits of the city, other than single-family residences, multifamily residences, apartments, mobile home subdivisions, and recreational vehicle parks or other dwelling units.

B. "Dwelling unit" means a room or group of rooms within a building or structure containing cooking accommodations. An apartment, a mobile, manufactured or modular home, a recreational vehicle, and a travel trailer shall be considered a dwelling unit, but a motel room or hotel room is not considered a dwelling unit under the provisions of this chapter.

C. "Mobile, manufactured, or modular home space" means any lot or space contained in a mobile home park or manufactured housing subdivision.

D. "New Business" means new construction or fifty one percent (51%) reconstruction of the total building square footage of an existing building. For the purposes of this ordinance, a new business is not an existing business, which has only changed ownership.

E. "Qualifying Commercial and/or industrial developments" means new or expanding developments that will be: (i) legal and conforming upon project completion, (ii) in possession of all required development approvals pursuant to city process, procedures and policies, (iii) occupying vacant property or replacing dilapidated buildings, or if expanding will comply with the criteria for "expanding existing businesses."

F. "Recreational vehicle pad" or "travel trailer pad" means any lot or space contained in a recreational vehicle park.

15.10.020 Development fee study. The Development Fee Study, prepared by Tischler & Associates, dated January 23, 2004 and declared a public record by Resolution #04-105, is hereby adopted by the city and incorporated in this section by reference as though it had been fully and completely set forth in this section.

15.10.030 Development fees. A. The residential and commercial development fees shall be the maximum supportable fees as identified in the

ORDINANCE #04-24

AN ORDINANCE OF THE MAYOR AND COUNCIL OF THE CITY OF SURPRISE, ARIZONA, REPEALING CHAPTERS 15.08 AND 15.12 AND SECTIONS 13.04.280, 13.04.290, 13.04.300, 13.04.310, 13.04.320, 13.08.660, 13.08.670, 13.08.680, 13.08.690 AND 13.08.700 OF SURPRISE MUNICIPAL CODE; AND ADDING CHAPTER 15.10 ADOPTING THE NEW DEVELOPMENT FEE STUDY AND DEVELOPMENT FEES.

WHEREAS, an updated Development Fee Study has been completed that addresses development fee levels within the City of Surprise, and;

WHEREAS, the Mayor and City Council's direction to staff has always been that new development should pay for itself, and;

WHEREAS, the fees contained in the new Development Fee are in accordance with the costs associated with providing the corresponding capital improvements, and;

WHEREAS, this Ordinance #04-24 will adopt by reference the new Development Fee Study and clean up a number of existing sections related to development fees;

NOW, THEREFORE, BE IT ORDAINED by the Mayor and City Council of the City of Surprise that:

Section 1. Chapters 15.08 and 15.12, and Sections 13.04.280, 13.04.290, 13.04.300, 13.04.310, 13.04.320, 13.08.660, 13.08.670, 13.08.680, 13.08.690 and 13.08.700 of the Surprise Municipal Code are hereby repealed.

Section 2. Article VI of Chapter 13.04 of the Surprise Municipal Code is hereby renumbered Article V.

Section 3. The following Chapter 15.10 is hereby added to the Surprise Municipal Code.

Chapter 15.10

DEVELOPMENT FEES & INFILL INCENTIVE DISTRICTS

Sections:

15.10.010 Definitions.

Appendix E
Communication with ADEQ Regarding Permitting

**SPA No.2 Water Reclamation Facility
 Aquifer Protection Permit (APP)
 Pre-Application Meeting**

<u>Name</u>	<u>Company</u>	<u>Phone No.</u>	<u>Email Address</u>
Duong Do	PACE	714-514-8812	ddo@P-A-C-E
Travis Hills	Lennar Communities	480 345 0077	Travis.Hills@lennar.com
Kaamil H. Patighi	ADEQ	602 771-4578	khp@ev.state.az.us
Tito Comparan	ADEQ-APP	602-771-4577	tgc@ev.state.az.us
14/04 SCOTT M. SWITZER	LENNAR COMMUNITIES	602-345-0072	SCOTT.SWITZER@LENNAR.CO
Marvin Glotfelty	Clear Creek Associates	602-294-9600	mglotfelty@clearcreekassoc
Dan Hanson	CLEAR CREEK ASSOCIATES	602/294-9600	dhanson@clearcreekassoc
STEVE OWEN	PERC	(480) 557-8525	sowen@percwater.com
Marcy Mullins	ADEQ reuse	(602) 771-4464	mmm@ev.state.az.us

THE ARIZONA REPUBLIC

PUBLIC HEARING ON THE DRAFT MAG 208 WATER QUALITY MANAGEMENT PLAN AMENDMENTS FOR THE EXPANSION OF THE CENTRAL BUCKEYE WASTEWATER TREATMENT PLANT AND CITY OF SURPRISE SPECIAL PLANNING AREA 2 REGIONAL WATER RECLAMATION FACILITY

Tuesday, July 12, 2005 at 4:00 p.m.

MAG Office, Suite 200 - Saguaro Room
302 North 1st Avenue Phoenix, Arizona 85003

The Maricopa Association of Governments (MAG) will conduct a public hearing on the Draft MAG 208 Plan Amendments for the Expansion of the Central Buckeye Wastewater Treatment Plant and the City of Surprise Special Planning Area 2 Regional Water Reclamation Facility. The purpose of the hearing is to receive public comments on the draft amendments.

The Central Buckeye Wastewater Treatment Plant is identified in the current MAG 208 Plan as the "Town of Buckeye Wastewater Treatment Plant" with a capacity of 2.0 million gallons per day (mgd) and an Arizona Pollutant Discharge Elimination System (AZPDES) permit discharge. The proposed facility expansion would increase capacity to 16.6 mgd and the facility name would be changed to the "Central Buckeye Wastewater Treatment Plant." The expanded facility would continue to have an AZPDES permit discharge.

The proposed Surprise Special Planning Area 2 Regional Water Reclamation Facility would have a capacity of 10.5 mgd and would be located in the northeast quarter of Section 18 of Township 4 North, Range 1 West. Reclaimed effluent would be disposed of through reuse, recharge and a potential future AZPDES permit discharge to the McMicken Dam Outlet Channel or the Agua Fria River.

Following consideration of comments received, it is anticipated that the MAG Water Quality Advisory Committee will make a recommendation to the MAG Management Committee. On July 13, 2005, the MAG Management Committee is anticipated to make a recommendation to the MAG Regional Council. It is anticipated that the MAG Regional Council will take action on the draft plan amendments on July 27, 2005.

The draft documents will be available for public review at the MAG Office from 8:00 a.m. to 5:00 p.m. Monday through Friday beginning May 27, 2005.

Copies will also be available for review at the Glendale Public Library, 5959 West Brown Street, Mesa Public Library, 64 East First Street, and Phoenix Central Public Library, 1221 North Central Avenue. Public comments are welcome at the hearing, or may be submitted in writing by 4:00 p.m. on July 12, 2005 to MAG staff at the address below.

Contact Person:
Julie Hoffman
302 North 1st Avenue, Suite 200 Phoenix, AZ 85003
Fax: (602) 254-6490
95305-May 26, 2005

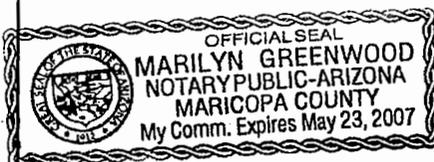
STATE OF ARIZONA }
COUNTY OF MARICOPA } SS.

Tabitha Antoniadis, being first duly sworn, upon oath deposes and says: That she is a legal advertising representative of the Arizona Business Gazette, a newspaper of general circulation in the county of Maricopa, State of Arizona, published at Phoenix, Arizona, by Phoenix Newspapers Inc., which also publishes The Arizona Republic, and that the copy hereto attached is a true copy of the advertisement published in the said paper on the dates as indicated.

The Arizona Republic

May 26, 2005

Sworn to before me this
9TH day of
August A.D. 2005


Notary Public

May 26, 2005

TO: Interested Parties for Water Quality

FROM: Julie Hoffman, Environmental Planner

SUBJECT: PUBLIC HEARING ON THE DRAFT MAG 208 WATER QUALITY MANAGEMENT PLAN AMENDMENTS FOR THE EXPANSION OF THE CENTRAL BUCKEYE WASTEWATER TREATMENT PLANT AND CITY OF SURPRISE SPECIAL PLANNING AREA 2 REGIONAL WATER RECLAMATION FACILITY

Public Hearing

July 12, 2005 at 4:00 p.m.
MAG Office, Saguaro Room
302 N. 1st Avenue, Second Floor
Phoenix, Arizona 85003

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For your information and convenience, a copy of the public hearing notice is enclosed. The draft documents are available for public review at the MAG Office, third floor from 8:00 a.m. to 5:00 p.m. Monday through Friday. Copies are also available for review at the Glendale Public Library, 5959 West Brown Street; Mesa Public Library, 64 East First Street; and Phoenix Central Public Library, 1221 North Central Avenue. For further information or to submit written comments on the draft amendments prior to the hearing, please contact me at (602) 254-6300.

**PUBLIC HEARING ON THE DRAFT MAG 208 WATER QUALITY MANAGEMENT PLAN
AMENDMENTS FOR THE EXPANSION OF THE CENTRAL BUCKEYE WASTEWATER
TREATMENT PLANT AND CITY OF SURPRISE SPECIAL PLANNING AREA 2 REGIONAL
WATER RECLAMATION FACILITY**

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MAG Office, Suite 200 - Saguaro Room
302 North 1st Avenue
Phoenix, Arizona 85003

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Contact Person: Julie Hoffman
302 North 1st Avenue, Suite 300
Phoenix, AZ 85003
Fax: (602) 254-6490

Maricopa Association of Governments
Received

AUG 12 2005

MARICOPA ASSOCIATION OF GOVERNMENTS
WATER QUALITY ADVISORY COMMITTEE AND PUBLIC HEARING
ON THE DRAFT MAG 208 WATER QUALITY MANAGEMENT PLAN
AMENDMENTS FOR THE EXPANSION OF THE CENTRAL BUCKEYE WWT
AND CITY OF SURPRISE SPECIAL PLANNING AREA 2 REGIONAL WRF

Phoenix, Arizona
July 12, 2005
4:05 p.m.

Glennie
Reporting Services

5333 North 7th Street
Suite B110
Phoenix, Arizona 85014-2840

(602) 266-6535 Phone
(602) 266-9661 Fax

Prepared by:
Cecelia Brookman, RPR
Arizona Certified Court
Reporter No. 50154

Prepared for:

MAG

(Original)

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THE PUBLIC HEARING

was taken on July 12, 2005, commencing at 4:05 p.m., at the offices of the Maricopa Association of Governments, 302 North First Avenue, Suite 200, Saguaro Room, Phoenix, Arizona, before CECELIA BROOKMAN, a Certified Court Reporter, Certificate No. 50154, for the State of Arizona.

Mr. Roger Klingler for the City of Scottsdale acted as the Chairman.

Members attending were Greg Stack, City of Avondale; Robert Goff, City of Chandler, appearing telephonically, for Jacqueline Strong; Lonnie Frost, Town of Gilbert; Chris Ochs, City of Glendale; David Iwanski, City of Goodyear; Bill Haney, appearing telephonically, City of Mesa; Steven Bontrager, appearing telephonically, City of Peoria; Robert Hollander, City of Phoenix, Rich Williams, Sr., City of Surprise; David McNeil, City of Tempe; Dale Bodiya for John Power, Maricopa County; Patrick Clay, U of A Cooperative Extension; Eugene Jensen, citizen representative.

Also present were Brenda Day, Maricopa Association of Governments; Doug Kobrick, CDM; Richard Rhoads, PERC; Julie Hoffman, Maricopa Association of Governments; Joe Giudice, Town of Buckeye; Lucky Roberts, Town of Buckeye; Jessica Marlow, CDM; Rachel Aja,

1 Homebuilders Association of Central Arizona; Mark
2 Edelman, Richmond American Homes of Arizona; Guy
3 Carpenter, HDR Endineering; Scott Switzer, Lennar
4 Communities; Dave Imoshita, Pulte Homes; Edwina Vogan,
5 Arizona Department of Enviornmental Quality; Julie Finke,
6 Arizona Department of Environmental Quality.
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1 CHMN. KLINGLER: Good afternoon, thank you
2 for attending our meeting.

3 I'd like to call the meeting to order. We
4 do have a quorum, and I would like to double-check here
5 with folks. Just remember that we need to speak into the
6 microphone. We are expecting some folks that are going
7 to join us by audio conference or videoconference and
8 they can only hear you if you speak into the mike, and
9 let's again, as we do, go around the table and introduce
10 ourselves so everybody knows who is here. Let's start at
11 Rich and go around.

12 MR. WILLIAMS: Rich Williams, City of
13 Surprise.

14 MR. IWANSKI: Dave Iwanski, City of
15 Goodyear.

16 MR. JENSEN: Gene Jensen, citizen
17 representative.

18 MR. McNEIL: Dave McNeil, City of Tempe.

19 MR. HOLLANDER: Robert Hollander, City of
20 Phoenix.

21 CHMN. KLINGLER: Roger Klingler, City of
22 Scottsdale.

23 MR. OCHS: Chris Ochs, City of Glendale.

24 MR. STACK: Greg Stack, City of Avondale.

25 MR. FROST: Lonnie Frost, Town of Gilbert.

1 MR. CLAY: Patrick Clay, University of
2 Arizona Cooperative Extension.

3 CHMN. KLINGLER: Do we have anybody, Jackie
4 or Bill joining us?

5 MR. GOFF: This is Bob Goff from Chandler.

6 MR. HANEY: Bill Haney from Mesa. I have to
7 excuse myself probably about 25 till.

8 CHMN. KLINGLER: We'll see if you're excused
9 Bill, the Chair will rule on that. Thank you for joining
10 us there.

11 We do have an item, our number two item on
12 the agenda is for agencies' report on any activities of
13 interest occurring, if they would have anything to
14 report, go to that today.

15 (No response.)

16 CHMN. KLINGLER: Hearing none, let's go to
17 our call to the audience. So it's an opportunity for any
18 citizen to comment on any items that are not scheduled on
19 today's agenda that fall under the jurisdiction of MAG or
20 on items on the agenda for discussion but not for action.
21 This is the only opportunity for comment on non action
22 items.

23 Because of state law the committee may not
24 discuss or take action on any items not scheduled on the
25 agenda. For members of the audience who wish to speak,

1 cards are available. Does anyone want to speak from the
2 audience that turned in a card?

3 (No response.)

4 CHMN. KLINGLER: Hearing none, let's proceed
5 to the next item of business, which is the approval of
6 our minutes from the last meeting of May 19th. Those
7 minutes were distributed in advance and I've had an
8 opportunity to review them. Are there any comments, any
9 changes or additions to the minutes, or corrections?

10 (No response.)

11 CHMN. KLINGLER: Hearing none, the Chair
12 will entertain a motion for approval.

13 MR. FROST: Move to approve.

14 CHMN. KLINGLER: Move to approve. Is there
15 a second?

16 MR. WILLIAMS: Second.

17 CHMN. KLINGLER: Seconded. Any further
18 discussion?

19 (No response.)

20 CHMN. KLINGLER: All in favor, please say
21 aye.

22 (Chorus of ayes.)

23 CHMN. KLINGLER: Proposed, nay.

24 (No response.)

25 CHMN. KLINGLER: Motion carries unanimously.

1 Let's just open our public hearing on the
2 draft MAG 208 plan amendment for the expansion of the
3 central Buckeye wastewater treatment plant and the City
4 of Surprise Special Planning Area 2 water reclamation
5 facility. We'll begin with a briefing on each draft
6 amendment, and following the briefing, hearing
7 participants are invited to make comments for the public
8 record.

9 A court reporter is present to provide an
10 official record of the hearing. Written comments are
11 also welcome. For those wishing to speak on any of the
12 draft amendments please fill out a yellow card
13 available --

14 MR. BONTRAGER: Steven Bontrager, City of
15 Peoria.

16 CHMN. KLINGLER: Welcome, Steve.

17 MR. BONTRAGER: Thank you.

18 CHMN. KLINGLER: Any member of the audience
19 fill out a yellow card and hand it to MAG staff. First
20 we'll have Doug Kobrick of CDM provide a briefing on the
21 draft central Buckeye expansion amendment. Doug.

22 MR. KOBRICK: Thank you. This is the same
23 presentation basically you saw from me before, at the
24 previous meeting.

25 This is a proposed 208 plan amendment for

1 the central Buckeye wastewater treatment plant formerly
2 known as the Buckeye wastewater treatment plant.

3 Basically, the central Buckeye service area
4 is what used to be referred to as the core area of
5 Buckeye. It's the existing town as we know it, and
6 surrounding area, approximately both MAG RAZs 278, 279.
7 It's everything north of the Gila River and most of
8 everything south of I-10, except for the Sundance area,
9 and it spans from approximately State Route 85 on the
10 west all the way over to the corporate boundary with the
11 City of Goodyear on the east side of Buckeye.

12 You will note there are a couple of other
13 treatment plants in the area. The green shaded area is
14 the Sundance planning area. There is a treatment plant
15 already in existence that serves the Sundance project
16 there. A little further to the north is the Verrado
17 wastewater treatment plant operated by Arizona American.
18 It serves the Verrado project. To the west is another
19 planning area for another proposed treatment plant, the
20 Palo Verde Road wastewater treatment plant.

21 These are the population and flow
22 projections for the central Buckeye service area for the
23 next 20 years. You'll note that the cumulative
24 population at the end of the 20-year period will be about
25 165,000 people, up from somewhere around 12,000 right

1 now. So a tremendous amount of growth expected in this
2 area, and it will continue after this planning period is
3 over as well.

4 So a large increase in flow. Converting
5 that into MGD you can see that using 100 gallons per
6 capita per day, we wind up with projected flow of 16.6
7 MGD at the end of the planning period.

8 There's a phased expansion strategy for this
9 treatment plant. Right now the plant gets about one-half
10 of an MGD, about 500,000 gallons per day of effluent
11 flow. You can see obviously there's going to be a large
12 jump in flow to 16.6. Right now there's an expansion to
13 .97 MGD that is complete and is in the start-up phases
14 right now, already constructed.

15 This layout shows the .97 MGD facility.
16 Basically, it amounts to some modifications of the
17 previously existing oxidation ditch, the construction of
18 a new secondary clarifier, the abandonment of the
19 existing sludge drawing beds, replacing them with a belt
20 filter press for dewatering the biosolids from the plant,
21 and some upgrades to the chlorine contact system.

22 The next step in our phased expansion
23 strategy is to take the plant to one and a half MGD but
24 we're making a stop along the way. One and a half MGD
25 interim capacity, which will be in-service temporarily,

1 and we're accomplishing that by building some of the
2 portions of the 4 MGD plant early, and combining them
3 with the .97 MGD plant to yield one and a half MGD of
4 capacity. That project is already in motion. That's
5 within the previously existing two MGD planning for the
6 City of Buckeye so we didn't require an amendment for
7 that capacity. The project that we have completed design
8 on now takes the plant adds 3 MGD to the plant, taking it
9 to 4 MGD.

10 This shows the layout for the one and a half
11 MGD plant. Basically what we're doing is constructing
12 the anoxic cells of our future anoxic, oxic
13 denitrification process early so we can combine them with
14 the existing oxidation ditch and achieve a higher flow of
15 denitrification of the plant. It requires a fair amount
16 of temporary piping and pumping, but basically it's early
17 construction of the anoxic basins.

18 When we go to 4 MGD we'll be adding an
19 entirely new 3 MGD train, and this summarizes the
20 treatment processes. There will be new headworks for the
21 3 MGD. Secondary treatment will consist of our inflow
22 process for denitrification. We went beyond the
23 conventional MLE process of our inflow because of the
24 high input nitrogen concentration that had been monitored
25 in Buckeye, and we're seeing, in some of the other

1 treatment facilities in the area, on the order of total
2 kilo nitrogen from around 50 to 60, so that kind of
3 leaves the realm of MLE effectiveness. So we've upgraded
4 our inflow tertiary treatment with aquadisk type filters.
5 We're going to intervene with the chlorine disinfection
6 hyperchlorite facility, additional belt filter presses
7 for solids dewatering. The sludge will be disposed of at
8 a licensed landfill and the effluent will be discharged.
9 The plant has a discharge permit to the Gila River and
10 you see two alternatives there, an outfall pipe or a
11 Buckeye irrigation district ditch. The town is very
12 close to completing arrangements with the BID to make use
13 of the ditch as the disposal point for the effluent from
14 the plant.

15 This is a layout that shows the facilities
16 we're adding, a new headworks, second clarifiers, set of
17 anoxic and aeration basins on the west, which is the west
18 in this view; the disk filters just to the south of the
19 clarifiers, belt filter presses further to the south, and
20 then chlorine disinfection on the east side of the plant.

21 As I mentioned, there's quite a bit
22 additional flow anticipated at Buckeye. The concept for
23 future expansions is to continue to construct 3 MGD
24 increments of capacity as time goes on.

25 For starters, we're looking at mirroring the

1 current expansion. If permit requirements change in the
2 future we may have to revisit that, but there's no
3 indication that we will. We are taking a look right now
4 at the potential to add primary clarifiers, and anaerobic
5 digestion in the plant at some point in the future.

6 We're doing the site master plan study
7 that's noted here. We're about halfway through that
8 study. I'm trying to evaluate some of these additional
9 concepts for the future.

10 The projected flow from the plant at the end
11 of the 20-year planning period is 16.6 MGD, and this
12 layout shows how we could accomplish that treatment on
13 the existing site, and some additional land that the town
14 owns to the south of the berm dock ferry that constitutes
15 the treatment plant right now.

16 In addition, the town owns a sizable parcel
17 of land across the street, to the east. It's about
18 another 40 acres on the east side of Buckeye and Seventh
19 Street. So the total plant site amounts to about 46
20 acres, and we believe it's going to be sufficient for all
21 future expansions. As I mentioned, the flow will go
22 beyond 16 MGD ultimately. Could be as high as 40 MGD, we
23 believe, at full buildout.

24 Future treatment process options. As I
25 mentioned, some consideration is being given to adding

1 primaries, or anaerobic digesters. We're evaluating the
 2 feasibility of UV disinfection in place of chlorine. And
 3 in the future, the town will be seeking potential
 4 alternative methods of biosolids disposal besides just
 5 the landfilling option. That could be land application
 6 or other beneficial reuse.

7 At the last meeting there was a question
 8 about the layout for the future plant site so I brought
 9 this board here. I'm going to try to point to the board
 10 without losing contact with the mike here, which may be
 11 difficult. But if you look on what's your right side of
 12 this sheet, you'll see a line of a number of treatment
 13 trains. That's a layout for a 40 MGD plant, adding
 14 33 MGD east of Seventh Street, and keeping the 7 MGD on
 15 the west side of the street. There's sufficient space,
 16 and we reserved space for additional biosolids processes
 17 if we need them, and also for effluent storage and
 18 potential distribution facilities, and effluent pump
 19 station, for example.

20 Effluent quality goals. The plant is being
 21 designed now to be Class A plus water quality, it will
 22 stay that way. As I mentioned right now, the town
 23 discharges its effluent from the treatment plant, but
 24 certainly the goal in the long-term is to make a
 25 beneficial reuse of that water. Biosolids, the current

1 design is to dewater the material to meet landfilling
2 requirements, and the possibility of going to a higher
3 grade product for the future is certainly there. But
4 right now the plan is landfilling.

5 This is a summary of the permitting
6 requirements we're addressing in the project.

7 And summary of our schedule. The one and a
8 half MGD interim capacity is under construction now.
9 Garney Construction is the cement risk firm building the
10 project. The 4 MGD capacity is scheduled for mid 2006.
11 There are some items that need to be resolved to get the
12 CFD in place to fund that project, but they're moving
13 forward. It may be late 2005, mid 2006, but it's still
14 on track for 2006.

15 The seven or perhaps expansion to 10 MGD is
16 in the planning phases right now. We've begun studies
17 and design work for the expansion. Basically, we are
18 going to be designing another 6 MGD there. The town and
19 the group of developers that are funding that project may
20 elect to build just three initially or they may build the
21 full six, depending on how the development proceeds there
22 in that central Buckeye area. As I mentioned, there's
23 considerable room for future expansions as needed, based
24 on the growth of the community.

25 Here's a summary of some of the

1 implementation actions. The town will own and operate
2 and maintain the plant throughout. They'll be in charge
3 of getting all the permits and holding them. They will
4 provide or obtain funding for designing construction.
5 The 4 MGD increment capacity expansion, 2.4 MGD, is being
6 funded by the CSD, it's in the process of being formed
7 right now. The next couple of expansions is probably
8 going to be funded in cash by a consortium of developers
9 working with the town to expand the treatment plant, and
10 beyond that it will have to be worked out on a as-needed
11 basis. The town will pay the costs of O&M for the
12 facility and recoup them from customer rates and charges.
13 There aren't any impacts anticipated on any wastewater
14 utilities or businesses, and the town has received a
15 letter of no objection from Maricopa County, which is the
16 only government jurisdiction adjoining or within three
17 miles of the plant.

18 That concludes my presentation. Any
19 questions?

20 CHMN. KLINGLER: Thank you, Doug. We did
21 have an opportunity at the last meeting to have the
22 committee ask a lot of questions at that point and you
23 expanded on some of those here. What we'd like to do is
24 go through the next presentation, and have any public
25 comments and if you could hang around for after that, if

1 there's any committee comments. We'll move on to the
2 next one right now. Thanks, Doug.

3 That was our Buckeye presentation, and then
4 we're going to talk about the Surprise amendment, and
5 Rich, you wanted to introduce that. Were you going to
6 address the letter that's at folks' desk or did you want
7 the staff to do that too, or is that part of the
8 presentation?

9 MR. WILLIAMS: If staff could address the
10 letter I think that would be appropriate. I just wanted
11 to take a few seconds and restate that the Lennar group
12 and the city are partnering on the Asante project in
13 developing in the new planning area, Special Planning
14 Area 2, as part of our six planning areas that we
15 provided for our city general plan and, too, for better
16 management.

17 Again, I restate we have a wastewater master
18 plan in place. We have an ongoing technology assessment.
19 After the developer phase, which is represented here
20 today, we're working with a larger group of developers
21 for the city to design and construct a regional facility
22 in phases, in nodule phases, two to three million gallons
23 per day, and to again restate that the city will be the
24 permit holder and own and operate the facility once the
25 construction and the performance testing is concluded.

1 CHMN. KLINGLER: Rick, Go ahead with the
2 presentation, then.

3 MR. RHOADS: I'm Rick Rhoads. I'm
4 operations manager for Pacific Environmental Resources
5 Corporation and on behalf of PERC I would like to thank
6 you for the opportunity to make this presentation.

7 SPA 2 regional water reclamation facility
8 will serve the Asante, Desert Oasis, and other
9 developments located in the SPA 2 service area of
10 Surprise. We'll discuss the population and wastewater
11 projections for this area and what type of treatment
12 process and effluent disposal.

13 Phase I of the SPA 2 facility will be
14 financed by Lennar Corporation. Upon completion of the
15 facility, ownership will be conveyed to the City of
16 Surprise. The City of Surprise will operate the facility
17 with city staff or with contract operations.

18 This is a map illustrating the City of
19 Surprise special planning areas. The area in blue is the
20 SPA 2 service area. The SPA 2 regional water reclamation
21 facility will be designed to handle the Asante master
22 planned community, Desert Oasis and other developments
23 within the SPA 2 service area.

24 By 2020, it's estimated the population of
25 the SPA 2 service area will be approximately 96,600

1 people. That equates to 10.5 million gallons per day in
2 expected flows to that area. The SPA 2 regional water
3 reclamation facility will be designed in phases capable
4 of expanding to accommodate the ultimate buildout of the
5 surrounding development with the ultimate buildout being
6 10.5 MGD, first phase being 1.2 MGD.

7 The SPA 2 site was selected for the
8 following reasons: Wastewater flows by gravity to this
9 facility; there are sufficient setbacks at the site;
10 makes effective use of the land; and it's close to
11 possible discharge locations.

12 Phase I of the facility will be a 1.2 MGD
13 PERC ASP facility, which is a hybrid SBR tertiary
14 treatment using disk filtration and UV disinfection. The
15 facility will meet ADEQ Title 18 Class A plus effluent
16 standards as well as EPA Class B biosolids requirements.

17 The treatment process will be completely
18 enclosed and supplied with odor control equipment. You
19 can see the basins will be underneath the buildings.

20 This slide illustrates the treatment process
21 schematics from the headworks through disinfection
22 process. The SPA 2 water reclamation facility will
23 produce Class A plus effluent meeting Arizona Title 18
24 requirements.

25 This is an overview of the regulatory

1 agencies we are working with to obtain the necessary
2 permits for the facility.

3 This is the anticipated schedule for the
4 facility. The first phase design will be complete in
5 September of this year. Construction will begin December
6 of this year and continue through December of 2006, with
7 start-up commencing in January of 2007.

8 These are the primary and secondary effluent
9 disposal options. Potential irrigation of golf courses
10 and parks; on-site reuse for processed water; potential
11 lake source water; landscaped irrigation; discharge to
12 adjacent recharge basins; underground storage and
13 recovery; and possibly an AZPDES discharging plan.

14 CHMN. KLINGLER: Thank you, Rick, I
15 appreciate it. If you would stand by after the public
16 comment, if there's any questions we'll get to that, I'd
17 appreciate it. Thank you.

18 I'd like to give Brenda the chance to go
19 over the letter that's at your desk.

20 MS. DAY: I wanted to explain real quickly
21 why the letter was handed out. The City of Peoria
22 revised their objection, no objection letter as a
23 jurisdiction within three miles. They wanted to clarify
24 they have no concern with the planning area boundaries
25 for the special planning area facility, just to clear it

1 up. It was mentioned in the initial letter, and a
2 concern with the plan area boundary was mentioned and it
3 turned out that was actually a concern with our October
4 2002 MAG 208 plan map for the City of Surprise. That's
5 what he was referring to. So he just wanted to clarify
6 in this letter here.

7 CHMN. KLINGLER: There's just so many going
8 on in Surprise, even Peoria can't keep up. Thank you,
9 Brenda, appreciate the letter. Thank you for clarifying.

10 What we're going to do next, the public
11 comments are invited on each of these amendments, and
12 right at the beginning of the cards at this point is
13 there anyone in the audience that wants to provide public
14 comment at this public hearing on these two amendments?

15 (No response.)

16 CHMN. KLINGLER: Hearing none then at this
17 time I'd like to officially close the public hearing and
18 request the court reporter end the transcription. Thank
19 you.

20 (TIME NOTED: 4:29 p.m.)

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STATE OF ARIZONA)
)
COUNTY OF MARICOPA)

I, CECELIA BROOKMAN, a Certified Court Reporter, Certificate No. 50154, in the State of Arizona, do hereby certify that the foregoing pages constitute a full, true, and accurate transcript of all proceedings had in the foregoing matter, all done to the best of my skill and ability.

I FURTHER CERTIFY that I am not related to nor employed by any of the parties hereto, and have no interest in the outcome.

WITNESS my hand this 1st day of August, 2005.

Cecelia Brookman

Cecelia Brookman, RPR
Arizona Certified
Court Reporter No. 50154