Environmental Assessment for Replacement of the Somerton Wastewater Treatment Facility

Somerton, Arizona

Prepared for:

U.S. Environmental Protection Agency
Region 9
75 Hawthorne
San Francisco, CA 94105

Prepared by:

Border Environment Cooperation Commission
Blvd. Tomas Fernandez, No. 8069
Fracc. Los Parques
Ciudad Juarez, Chihuahua, C.P. 32470 Mexico

and

The Louis Berger Group, Inc.
810 West San Mateo Road, Suite 200-A
Santa Fe, NM 87505
(505) 989-7788

March 2002

Table of Contents

Section **Page**

FIGURES

TABLES

EXECUTIVE SUMMARY

The City of Somerton is proposing to reconstruct the existing Wastewater Treatment Plant (WWTP), which is currently unable to adequately treat wastewater and has experienced recurrent NPDES permit violations. The WWTP uses a series of three lagoons to treat wastewater generated within the incorporated limits of the City of Somerton, Arizona. Alternatives analyzed in this EA include the No Action alternative (Alternative A), renovation and expansion of the existing lagoon system (Alternative B), and construction of a Sequencing Batch Reactor (SBR) biological treatment facility (Alternative C). The selected action alternative may be designed to treat up to 1.4 million gallons per day (MGD) to effectively and efficiently treat current wastewater volumes and to accommodate anticipated future growth in the Somerton area[1]. The proposed action would be constructed on the existing WWTP site.

The no action alternative would allow current adverse environmental conditions associated with the operation of the existing WWTP facility to persist, including discharge of effluent into the Yuma Main Drain that consistently contravenes NPDES permit requirements for BOD_5 and TSS, generation of offensive odors that affect residents in the vicinity of the WWTP, and potential public safety concerns resulting from the use of gaseous chlorine for disinfection. It is anticipated that the existing facility will reach capacity within 5 years.

The action alternatives would eliminate several existing problems and improve environmental conditions associated with the WWTP operation. Alternative B would eliminate adverse effects to groundwater, surface water quality, public health and safety and reduce odor generation. This alternative would potentially have minor adverse effects upon land use, soils, and wildlife. Alternative C would alleviate or greatly reduce existing adverse environmental impacts associated with the operation of the Somerton WWTP. Potential negative or adverse effects associated with Alternative C included temporary generation of dust (PM_{10} emissions), construction traffic and noise, increased energy use and utility costs, generation of benthic lagoon wastes (sludge), and the use of liquid hypochlorite as a disinfectant agent. The NPDES permit requirements would be more stringent for an SBR facility compared to the existing lagoon system.

Dust, traffic, and noise effects would be minimized through the implementation of appropriate practices and technologies during construction. An equitable, phased increase in utility fees would prevent significant adverse effects to individual users. Benthic lagoon deposits do not meet the criteria for hazardous waste, and the City of Somerton would investigate disposal options to determine which method is the most environmentally sound and cost-effective solution in the long term. The City would obtain concurrence from Arizona SHPO prior to construction to prevent adverse effects to cultural and historic resources. Analyses of sodium hypochlorite indicate that the designation of a mixing zone in the Yuma Main Drain would mitigate potential adverse effects of chlorinated effluent upon aquatic organisms. Additional mitigation measures to prevent potential adverse effects of chlorine upon surface waters are presented in this

[1] This design capacity was calculated using projected population growth rates for the City of Somerton and for areas currently outside the city limits. For the purposes of this environmental assessment, the analysis of potential environmental impacts is based on the maximum design capacity of 1.4 MGD although a smaller wastewater treatment facility may be constructed initially.

EA and would be finalized with concurrence from the EPA and ADEQ. The City of Somerton has prepared a General Plan to guide future growth in an orderly, sustainable manner. The objectives and policies identified in the General Plan will ensure that the City can adequately support the anticipated population growth rate of 4% per year, and that such growth will not result in any significant adverse environmental impacts. With these mitigation measures, Alternative C would have a postive effect on environmental conditions and would not result in any potentially significant adverse impacts.

LIST OF ACRONYMS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
APP	Aquifer Protection Permit
BECC	Border Environment Cooperation Commission
BOD_5	5-day Biological Oxygen Demand
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
FONSI	Finding of No Significant Impact
GMA	Groundwater Management Act
IBWC	International Boundary and Water Commission
MGD	Million of Gallons Per Day
MG/Kg	Milligrams Per Kilogram
MG/L	Milligrams Per Liter
NADBank	North American Development Bank
NAFTA	North American Free Trade Agreement
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
PPM	Parts Per Million
TDS	Total Dissolved Solids
TRC	Total Residual Chlorine

TSS	Total Suspended Solids
µg/L	Micrograms Per Liter
WWTP	Somerton Wastewater Treatment Plant

1.0 INTRODUCTION

1.1 Legal Framework

In November 1993, the United States and Mexico signed the BECC—NADBank agreement, creating an international environmental infrastructure program to address water, wastewater, solid waste, and other issues which threaten the quality of water and soil in the border region (EPA 2000).

The Border Environment Cooperation Commission (BECC) is an international organization that helps border states, localities, and the private sector develop and find financing for environmental infrastructure projects along the U.S./Mexico border. The main role of the BECC is to assist states and local communities in developing projects, analyzing the environmental and financial aspects of projects, evaluating the social and economic benefits of projects, and providing certification for funding opportunities through the North American Development Bank (NADBank) (EPA 2000). The NADBank is an international financial institution that can provide loans, loan guarantees and other assistance to projects certified by the BECC (EPA 2000).

The U.S. Environmental Protection Agency (EPA) is charged with ensuring environmental quality and therefore plays a key role in the development of environmental infrastructure within the U.S. EPA also administers construction grants for border projects, and works as a partner with BECC and NADBank to ensure that EPA infrastructure funds are used for high-quality projects.

The BECC certification process requires that a certified project comply with the applicable state and federal environmental assessment requirements. After the project is certified by the BECC, it will be eligible for Border Environmental Infrastructure (BEIF) from the NADBank.

To meet the environmental assessment requirements for BECC compliance, EPA must follow their regulatory provisions for compliance with the National Environmental Policy Act (NEPA) found at 40 CFR Part 6 when making decisions regarding the use of border funds. This environmental assessment has been prepared in accordance with those provisions and satisfies the required environmental analyses for BECC certification.

1.2 Brief Description of the Proposed Action

The proposed action involves the reconstruction of the Somerton Wastewater Treatment Plant (WWTP), which currently consists of a series of three lagoons to sequentially treat wastewater generated within the incorporated limits of the City of Somerton, Arizona. Potential alternatives for WWTP replacement include the renovation and expansion of the existing lagoon system and the construction of a Sequencing Batch Reactor (SBR) biological treatment facility. The selected alternative would be designed to treat 1.4 million gallons per day (MGD) to efficiently and effectively treat current wastewater volumes and to accommodate anticipated future growth in the City. Reconstruction would occur on the existing WWTP site that is owned by the City of Somerton. The new facility would continue to discharge effluent into the adjacent Yuma Main Drain.

1.3 Project Location

The City of Somerton, Arizona is located in the southwest corner of Yuma County, approximately ten miles southwest of the City of Yuma, six miles east of the Colorado River, and twelve miles north of the Arizona/Mexico border (Figure 1). The proposed project would occur on the existing Somerton WWTP site, which is situated adjacent to the Yuma Main Drain southwest of Somerton (Figure 1). The WWTP

facility encompasses 14 acres, and is managed by the City of Somerton Department of Public Works. The legal description of the parcel is as follows: "The West 650 feet of the NE 1/4 Section 4, Township 10 South, Range 24 West, Gila and Salt River Base and Meridian; EXCEPTING THEREOF the North 1340.1 feet of the West 650 feet of the said NE 1/4 Section 4, Township 10 South, Range 24 West, Gila and Salt River Base and Meridian." The WWTP site is approximately 1,500 feet west of the nearest residences, which are located along the City boundary.

In order to support continued population growth, the City anticipates the need to continue annexing adjacent lands. Given population projections over the 20-year design period, it is anticipated that the City may need to annex up to 540 acres. Considering potential future annexations, the project service area could extend beyond the existing incorporated city limits to include annexed lands. Based upon conversations with Somerton officials, the most likely lands to be annexed are located to the north and northwest of the current City boundary.

1.4 Description of the Existing Wastewater Treatment Facilities

The Somerton wastewater treatment system currently consists of three facultative lagoons and appurtenant structures that encompass a total of 14 acres (Figure 2). The facility, which was originally constructed in the 1950s, was upgraded in the early 1980s with the installation of an aeration system and a chlorine contact tank. The three lagoons have a design process capacity of 0.8 MGD, although system degradation has reduced this capacity (BECC, 2000). Wastewater generated within the City of Somerton is collected and conveyed to the WWTP via 81,000 feet of gravity mains, 21,000 feet of force mains, and seven pump stations. All force mains tie into a 10-inch pipe that discharges raw sewage into Lagoon 1. Wastewater flows from Lagoon 1 to Lagoon 2, and then from Lagoon 2 to Lagoon 3 through a series of 10-inch pipes. Treated wastewater from Lagoon 3 flows to the chlorine contact tank for disinfection with gaseous chlorine. Chlorine is stored in 150-pound gas cylinders in a shed at the WWTP site. Currently, the facility uses approximately 20 pounds of chlorine per day for disinfection. Treated effluent is then conveyed over a V-notch weir and through a 10-inch pipeline that discharges into the adjacent Yuma Main Drain.

Figure 1. Location of Somerton, Arizona and the Somerton Wastewater Treatment Plant

Figure 2. Existing Somerton Wastewater Treatment Plant

The Somerton WWTP received an APP permit (#100791) from ADEQ on June 8, 2001 (Lori Hilderbrand, ADEQ, personal communication). The current National Pollutant Discharge Elimination System (NPDES) permit for the WWTP, issued by the EPA in 1997, relaxed effluent requirements for both the 30-day average:7-day average BOD_5 (from 30:45 mg/L to 45:65 mg/L) and the 30-day TSS (from 30 mg/L to 90 mg/L). The facility is unable to adequately treat current wastewater volumes (0.6 MGD) generated by the City of Somerton, and has been unable to consistently meet NPDES requirements. During the period between January 1998 and July 2001, there were 12 NPDES permit violations relative to BOD_5 and TSS effluent concentrations (Table 1). Based upon discharge monitoring reports, the WWTP has been in contravention of NPDES permit requirements approximately 25% of the time since the NPDES permit was issued. NPDES permit violations have resulted in several U.S. Environmental Protection Agency (EPA) actions against the City of Somerton, including a Findings of Violation, an Order of Compliance, a Consent Agreement, and a Final Order for Compliance (American Pacific Engineering, 1996). As a result of these EPA actions, the City of Somerton initiated engineering analyses to address inadequacies of the wastewater treatment system.

Table 1. History of NPDES Permit Contravention at the Somerton WWTP Between January 1998 and July 2001. Violations of current NPDES permits are in bold.

	2001	2000	1999	1998
January	**30 day BOD_5 = 86**	No violations	No violations	No violations
February	**30 day BOD_5 = 57**	No violations	**30 day BOD_5 = 65**	**30 day BOD_5 = 52**
March	No violations	**30 day BOD_5 = 51**	No violations	No violations
April	No violations	No violations	**TSS % removal = 35**	No violations
May	No violations	No violations	**30 day BOD_5 = 66**	No violations
June	No violations	No violations	No violations	No violations
July	No violations	**7 day BOD_5 = 174**	No violations	No violations
August	NA	No violations	**TSS % removal = 50**	No violations
September	NA	No violations	**TSS % removal = 52**	No violations
October	NA	No violations	**30 day BOD_5 = 52**	No violations
November	NA	No violations	No violations	No violations
December	NA	**30 day BOD_5 = 63**	No violations	No violations

(Source: City of Somerton Discharge Monitoring Reports)

As there is no preliminary treatment facility at the WWTP, deposited solids have accumulated in the lagoons over time. Surveys of lagoon depths conducted on July 18, 2000 indicated average water depths of 3.3, 3.3, and 3.7 feet in Lagoons 1, 2, and 3, respectively (BECC, 2000). Original lagoon design depths were 5.0 feet, indicating deposits of 1.7 feet of benthic solids in Lagoons 1 and 2, and 1.3 feet in Lagoon 3. The accumulation of benthic solids has reduced the effective system capacity by approximately 36% (BECC, 2000). Additionally, construction of an effluent weir reduced the hydraulic gradient, and a dye study conducted in July 2000 indicated that the actual wastewater retention time in the lagoons was at 37.9% of the theoretical hydraulic efficiency for the Somerton facility (BECC, 2000). In conjunction with the deposition of benthic solids, short retention times have reduced the effectiveness of the WWTP. In summary, the factors that are currently limiting lagoon performance include:

- inefficient lagoon geometry and accumulated benthic solids have reduced lagoon volumes, wastewater detention time, and BOD_5 removal;
- benthic solids have a high dissolved oxygen demand that reduces dissolved oxygen available for aerobic digestion;
- thermal currents and wind action mix aerobic and anaerobic layers in the lagoons and upset metabolic activities;
- limited water depths and associated photic zones do not contain sufficient dissolved oxygen to accommodate large changes in oxygen demand from algae and bacterial respiration;
- there is limited settling and removal of algae during the summer months due to thermal and wind currents; and
- lagoon turnover during the winter months upsets the treatment process and generates odors.

There are several environmental issues associated with inadequate wastewater treatment and the current design of the Somerton WWTP. First, the WWTP has been unable to consistently meet NPDES permit requirements for TSS and BOD_5 over the past decade, and has been cited by the EPA for these violations. Effluent that does not meet NPDES permit requirements could potentially adversely affect water quality and aquatic biota in the Yuma Main Drain. As the Yuma Main Drain ultimately conveys water to Mexico where it is used for cropland irrigation, deterioration of water quality may pose hazards to human health.

Second, inadequate wastewater treatment creates heavy algal loads and associated anaerobic conditions in the lagoons. When the temperature of the upper layers of pond water drops, then the colder water has a higher density than the lower, warmer waters in contact with benthal sludge on the pond bottom. The densitydifference causes pond turnover. This is more pronounced during the night hours in the absence of solar energy. This phenomena occurs 3 to 4 months a year. Occasionally portions of the pond water column will overturn in the summer months due to density currents, floating solids (methane gas), or abrupt changes in nighttemperatures. As a result, the lagoons frequently generate offensive odors which, while not toxic, are extremely unpleasant for residents living in proximity to the WWTP. These residents have made numerous complaints to City officials, and WWTP odors have negatively influenced the real estate market in this neighborhood.

Third, there is a possibility that the existing lagoons may be leaking untreated wastewater into the ground, which could adversely affect local groundwater quality (BECC, 2000).

1.5 Purpose of and Need for Action

The primary purpose for the proposed project is to improve efficacy of the wastewater treatment system in order to consistently meet NPDES permit requirements. The WWTP has contravened BOD_5 effluent limitations 28% of the time since January 1998 (Table 1). The project is necessary to alleviate existing adverse environmental effects associated with the Somerton WWTP. These effects include potential contamination of surface waters, generation of offensive odors, and risks to human health and safety. As the Yuma Main Drain conveys water to Mexico, the proposed action also provides potential beneficial transboundary effects. The project is also being driven by guidelines presented in the Arizona Department of Environmental Quality's Engineering Bulletin #11, *Minimum Requirements for Design, Submission of Plans, and Specifications of Sewerage Works,* which encourage communities to initiate planning for future WWTP capacity when an existing facility reaches 80% capacity.

A secondary purpose for this action is to increase capacity of the Somerton WWTP, as it is anticipated that the existing facility will reach capacity in approximately two years. Increasing the system capacity to 1.4 MGD would allow for the effective treatment of increased wastewater volumes associated with future population growth in Somerton (Partners for Strategic Action, 2001). Calculations presented in the engineering report (BECC, 2000), based upon current wastewater generation rates of 80 gallons per capita per day (gcd) and an estimated year 2020 population of 16,116, result in estimated annual average daily flows in 2020 of 1.29 MGD. The new facility would ensure that the City could provide public services necessary to service new residents.

1.6 Purpose and Scope of the Environmental Assessment

This Environmental Assessment (EA) is a stand-alone document that satisfies the requirements of the National Environmental Policy Act (NEPA) of 1969, the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Parts 1500–1508), EPA regulations (40 CFR Part 6), and the Border Environment Cooperation Commission (BECC). The primary purpose of the EA is to gather information and conduct sufficient analyses to determine whether an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI) should be prepared. An EIS is required when it is anticipated that a project would result in significant adverse environmental impacts, while a FONSI is prepared when no significant adverse impacts are anticipated. CEQ regulations include the following definition and requirements for an Environmental Assessment:

> "(a) A concise public document for which a Federal agency is responsible that serves to:
>
> (1) briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact;
>
> (2) aid an agency's compliance with the Act [NEPA] when no environmental impact statement is necessary; and
>
> (3) facilitate preparation of a statement [EIS] when one is necessary.
>
> (b) Shall include brief discussions of the need for the proposal, of alternatives as required by section 102 (2)(E), of the environmental impacts of the proposed action and alternatives, and a listing of agencies and persons contacted."

NEPA guidelines require that an EA evaluate the "no action" alternative in addition to the proposed action alternatives. In this EA, the no action alternative (Alternative A) assumes no changes to the existing WWTP facility, and provides a basis for comparison of the environmental consequences of the two action alternatives (Alternatives B and C). The action alternatives represent different technologies for replacing the WWTP, and are described in Section 2.0 Alternatives of this document. As NEPA requires integration of the various project-planning aspects, this EA relies extensively on information presented in the engineering reports prepared for the Somerton WWTP (BECC, 2000; BECC, 2001), as well as personal communication with the engineers. This EA assesses the potential consequences of Alternatives A, B, and C upon local and regional environmental resources. General resource categories analyzed in this EA include:

- Land Use
- Topography, Geology, and Soils
- ? Aesthetics
- ? Hazardous and Solid Waste

- Water Resources
- Biological Resources
- Socioeconomic Resources
- Air Quality
- Cultural Resources
- Noise

? Public Health and Safety
? Environmental Justice
? Energy
? Cumulative and Transboundary Effects
? Indirect Effects

1.7 Relevant U.S. and Binational Agencies

Arizona Department of Environmental Quality (ADEQ)

ADEQ was established in 1986 through the Arizona Environmental Quality Act. ADEQ is dedicated to ensuring effluent discharges comply with all state and federal laws, and enforces the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Resource Conservation and Recovery Act (RCRA), and other environmental programs in Arizona. The agency is also responsible for surface and groundwater quality standards, and has established programs to control point and nonpoint pollution discharges. ADEQ requires facilities discharging effluent, such as the Somerton WWTP, to obtain an Aquifer Protection Permit (APP).

Arizona Department of Water Resources (ADWR)

In 1980, Arizona established the Groundwater Management Act (GMA) to control overdraft of groundwater supplies. Pursuant to the GMA, ADWR was created to administer state water laws, explore methods of augmenting water supplies to meet future demands, and develop policies promoting conservation and equitable distribution of water.

Border Environment Cooperation Commission (BECC)

The North American Free Trade Agreement (NAFTA) produced a side agreement related to the environment (the Border Funding Agreement) between the United States and Mexico. The signing of this agreement led to the creation of three binational institutions to address water, wastewater, and solid waste concerns: 1) the North American Commission on Environmental Cooperation (NACEC); 2) BECC; and 3) the North American Development Bank (NADBank). BECC is responsible for addressing environmental problems along the United States–Mexico border.

The primary purpose of BECC is to help preserve, protect, and enhance the environment of the border region in order to advance the well–being of the people of the United States and Mexico. In keeping with its mission, the BECC is responsible for evaluating the feasibility, efficiency, and effectiveness of proposed water, wastewater, and solid waste infrastructure projects within a 100 km region along both sides of the U.S.-Mexico border. Projects must comply with criteria established by the BECC. A project would then be eligible for possible funding from the NADBank. The certification criteria established by BECC are classified as follows (BECC, 1996):

- human health and the environment;
- technical feasibility;
- financial feasibility and project management;

- community participation; and
- sustainable development.

City of Somerton

The City of Somerton, Arizona owns the WWTP, which provides wastewater treatment for its residents. The City of Somerton is the promoter of the project for purposes of BECC certification. The proposed action would accommodate anticipated population growth and would allow the City to implement annexation plans.

North American Development Bank (NADBank)

NADBank was created as part of the Border Funding Agreement. The functions of NADBank are to use a small amount of federal capital to leverage a large volume of private–sector lending; to make effective use of local grants and loans from federal and state sources; and to involve financial participation of local citizens. NADBank provides financing for projects certified by BECC, and assists BECC in fulfilling the dual goals of community investment and environmental protection.

U.S. Environmental Protection Agency (EPA)

The EPA is a federal agency responsible for establishing and enforcing water-quality standards, providing guidance for maintaining or improving water quality, and providing funds to assist U.S. and Mexican border communities to construct drinking water and wastewater infrastructure projects. The EPA is responsible for issuing NPDES permits for the discharge of treated effluent in Arizona. The agency is aware of operational problems with the Somerton WWTP, and has initiated enforcement actions against the City in the past.

Yuma County

The Yuma County Health Department is an agency that seeks to reduce potential public health problems associated with human exposure to contaminated waters.

2.0 ALTERNATIVES

Descriptions of the no action alternative (Alternative A) and two action alternatives (Alternatives B and C) are presented below. Technical information presented in this section was obtained from *Replacement of the Wastewater Treatment Facility* (BECC, 2000) and *Engineering Analysis and Design for the Wastewater Treatment Facility for the City of Somerton, Arizona* (BECC, 2001). The action alternatives would be designed to increase the effective capacity of the Somerton WWTP to 1.4 million gallons (MG). This would facilitate effective and efficient treatment of wastewater generated by the City of Somerton over a 20-year design period. Design criteria and specifications for a new facility, based upon current APP and anticipated NPDES requirements, are presented in Table 2.

Table 2. Specifications for New Somerton WWTP Facility.

Design Year	2020
Design Flows	
Average Daily Flow–Annual	1.29 MGD
Average Daily Flow–Maximum Month	1.40 MGD
Sustained High Flow (4-hour duration)	2.80 MGD
Peak Flow Rate (15-minute duration)	4.30 MGD
Design Loadings	
Average BOD_5	200 mg/l
Average TSS	200 mg/l
Average TKN	30 mg/l
Strong BOD_5[1]	250 mg/l
Strong TSS[1]	250 mg/l
Strong TKN[1]	40 mg/l
NPDES Effluent Limits	
BOD_5	30 mg/l
TSS	30 mg/l
TN	10 mg/l
Settleable Solids	1 ml/l
Fecal Coliform Bacteria	75 CFU/100 ml
Anticipated Performance	
BOD_5	15 mg/l
TSS	15 mg/l
Fecal Coliform Bacteria	< 75 CFU/100 ml
TN	< 10 mg/l
NH3-N	1 mg/l
Wastewater Temperature (°C)	
Summer	27°C
Winter	18°C

[1] Strong denotes wastewater characteristics that are expected 10% of the time.

(Source: BECC, 2001)

2.1 Alternative A–No Action

The no action alternative is presented to provide a reference for comparison of the potential environmental consequences associated with each of the action alternatives. Under the no action alternative, no renovation of existing facilities or construction of new facilities would occur. The Somerton Public Works Department would continue to conduct daily operations and periodic facility maintenance (i.e. dredging Lagoon 1, replacing pumps, etc.) as necessary to maintain WWTP functionality. New gravity lines, force mains, and pump stations would likely be necessary to accommodate continued population growth and development within the City of Somerton. Gaseous chlorine would continue to be used for disinfection. Based on the current mean wastewater generation rate of 80 gallons per capita per day, even conservative estimates of population growth suggest that the existing Somerton WWTP will reach capacity within five years.

2.2 Alternative B–Lagoon Upgrade and Expansion

This alternative involves renovation of the existing 0.8 MG lagoon system, and the construction of new lagoons to attain a 1.4 MG total system capacity (Option D; BECC, 2001). Initial activities under Alternative B would include drying out the existing lagoons and removing all benthic solids. Water would be drained from the lagoons and the solids would be allowed to dry in place ("stabilize") until they reached 18% solids consistency. Engineering analyses have estimated there to be a total of 28,800 tons of benthic solids at 18% solids consistency (BECC, 2001). Stabilized solids would be excavated and hauled to a permitted disposal facility. Upon removal of all benthic solids, the lagoon bottoms and dike walls would be sealed with a 60-millimeter thick, high-density polyethylene (HDPE) liner. The lagoon system would require occasional disposal of sludge that is a byproduct of the treatment process. In order to adequately obtain the 1.4 MG capacity necessary for the 20-year design period, this alternative also includes construction of one or more new HDPE-lined lagoons. As the 14-acre WWTP site does not have adequate space for additional lagoons, they would have to be constructed on adjacent agricultural lands. Since these new lagoons could be located to the north, east, or south of the existing facility, engineers have not prepared a schematic layout for this alternative. It is estimated that the City would have to acquire another 15 acres of land to accommodate new lagoons. Sodium hypochlorite would be used to disinfect treated wastewater.

2.3 Alternative C–Sequencing Batch Reactor Biological Treatment Facility

Alternative C involves replacement of the existing lagoon system with a Sequencing Batch Reactor (SBR) biological treatment facility (Option C; BECC, 2001). The SBR facility consists of a pair of 20-foot-tall tanks, each representing a complete mix "reactor" in which all steps of the biological treatment process (equalization, aeration, nitrification, denitrification, and sedimentation) occur sequentially. The system utilizes a fill-and-draw treatment process, in which the reactor is filled during a discrete period and then operated in a batch treatment mode. This is in contrast to the existing conventional lagoon system that operates on a continuous-flow basis and in which the different functions of the treatment process are carried out in separate tanks. The SBR system would efficiently oxidize carbon and meet the APP maximum nitrogen limits of 10 mg/l (Kaumil Parghi, ADEQ, personal communication). This system would also accommodate anticipated variability in daily flow rates and biological oxygen demand (BECC, 2001). The SBR facility has the added advantage of process redundancy–since the tanks operate independently, one tank can provide treatment while the other is off-line. The SBR facility would be constructed in the current location of Lagoon 1 (Figure 3), and this alternative would not require the acquisition of additional lands. The SBR system would also require the disposal of sludge derived from the treatment process. Once the system is functional, Lagoons 2 and 3 would be allowed to dry out and then reclaimed by the City. Sodium hypochlorite would be used to disinfect treated wastewater. This alternative also includes the installation of a 150 kW, 480-volt diesel generator at the WWTP to provide power in the event of an electrical outage.

Figure 3. Alternative C– Sequencing Batch Reactor System

2.4 Alternatives Eliminated From Further Consideration

2.4 Alternatives Eliminated From Further Consideration

Engineering analysis and design for the Somerton WWTP identified and preliminarily analyzed two additional biological treatment alternatives (BECC, 2000). These alternatives included construction of an Oxidation Ditch (Option A) and construction of an Extended Air Activated Sludge Package Plant (Option B). These alternative technologies were eliminated from further consideration as a result of engineering analyses, estimates of construction and maintenance costs, and the need to acquire additional land to support enlarged facility footprints. Neither of these options provided any technical or financial advantages for wastewater treatment relative to Alternatives B and C, and both presented a greater potential for adverse effects by retaining potential odor problems, requiring acquisition of additional land, and changing existing land uses. These options were therefore eliminated from further consideration. Implementation of a filtration system in the existing lagoons was also eliminated from consideration based upon evaluation of anticipated population growth the City of Somerton. Population projections suggest that the existing facility will reach capacity within 5 years. Thus, a filtration system represents a "quick-fix" that would only temporarily solve the NPDES problems, and would not resolve current odors problems. The City of Somerton has decided to pursue a longer-term solution, and has devoted its resources towards planning for a new, larger WWTP facility. Based upon engineering analyses, a filtration system would not have reduced the December 2000 or January 2001 BOD_5 levels into compliance with the NPDES permit.

2.5 Alternative Methods of Disinfection

The City currently uses approximately 20 pounds of gaseous chlorine per day to disinfect treated wastewater. Chlorine disinfection has been extremely effective, and no fecal coliform has been detected in WWTP effluent over a 29-month reporting period (Peter Robinson, Hazen and Sawyer, personal communication). Due to the low level of chlorine usage at the facility, the City is not required to prepare a Risk Management Plan. Construction of a 1.4 MG facility would increase chlorine use to approximately 60 pounds per day. As gaseous chlorine can be toxic, a gas-release scenario was developed to assess potential on-site and off-site impacts associated with a mechanical failure at the WWTP (BECC, 2000). The potential downwind effects of a chlorine plume are presented in Table 3.

Table 3. Potential Effects of an Accidental Chlorine Release From the Somerton WWTP.

Distance from Chlorine Tank (feet)	Chlorine Gas Concentration (ppm)	Potential Impact
46	1,000	Lethal after a few inhalations.
72	500	Potentially lethal depending upon duration of exposure.
190	100	Potentially lethal depending upon duration of exposure.
656	10	Immediately dangerous to life and health.
951	5	Throat, eye, and mucous membrane irritation.
2,207	1.0–3.0	Definitive odor; irritation of eyes and nose.
2,500	0.2–0.5	Detectable odor; no known acute or chronic effects.

(Source: BECC, 2000)

The nearest residences are located approximately 1,500 feet east of the chlorine storage tanks, and this distance would allow for the dilution of chlorine concentrations to non-lethal levels. Assuming a westerly wind of two meters per second and a narrow plume, chlorine concentrations reaching these residences are

estimated at between 1 and 5 ppm. At these concentrations, residents would notice a definite chlorine odor and individuals located in the plume path would experience eye, nose, and throat irritation.

Of greater concern is the safety of chlorine-gas transporters, farmers working in adjacent fields, and WWTP staff. Farm workers could be exposed to chlorine concentrations of between 10 and 100 ppm during an accidental release. As the duration of exposure for lethal effects at these concentrations is 20 minutes and farm workers would likely move away from the gas plume in less than 20 minutes, an accidental release would likely produce intense discomfort and potential health problems for these individuals. While proper and safe handling of chlorine tanks is common practice at the WWTP, gas transporters and plant operators could be exposed to lethal chlorine gas concentrations given their proximity to the tanks. These individuals have the highest risk of significant health problems and death from an accidental release.

Engineering analyses identified four disinfectant technologies that could be implemented with either action alternative (Peter Robinson, Hazen and Sawyer, personal communication). The disinfectant options have tradeoffs relative to risk to overall effectiveness, human health, and potential impacts to surface water resources. The four options include:

- **Gaseous Chlorine**–This option involves the continued use of a gaseous chlorine disinfection system. This method is effective and effluent would contain relatively low chlorine concentrations. This alternative has the highest potential risk to human health and safety. An accidental chlorine gas release poses serious on-site danger risks and off-site nuisance risks. From public perception and worker safety standpoints, the City has determined that this alternative poses an unacceptable level of risk to human health and safety.

- **Gaseous Chlorine with Scrubbers**–This option involves the continued use of a gaseous chlorine disinfection system with the addition of an enclosed chlorine storage shed and the installation of an emergency chlorine gas scrubber system. This method would be effective and effluent would contain relatively low chlorine concentrations. In the event of an accidental release, the chlorine gas would be contained within the shed and scrubbed prior to releasing it to the atmosphere. While this alternative would reduce public health and safety risks, it greatly increases the costs of the WWTP facility. The potential for an accidental gas release would remain (i.e. scrubber malfunction).

- **Ultraviolet Radiation**–This option involves implementation of an ultraviolet radiation (UV) system, which would eliminate the use of any chlorine compounds at the WWTP. Ultraviolet radiation effectively eliminates bacteria, viruses, and other microorganisms, and is effective for disinfecting potable water and filtered, reclaimed water with low TSS concentrations. Average TSS levels in treated effluent at the Somerton WWTP are 10 mg/L. During facility upsets, TSS levels approach 15–20 mg/L. While these levels are within NPDES permit limits, they would prevent effective UV disinfection. Solids provide hiding places for bacteria, viruses, and other microorganisms, and protect them from UV penetration. Under these conditions, effluent from the Somerton WWTP could not meet NPDES requirements for fecal coliform and E. Coli. While eliminating concerns regarding human health and safety, UV radiation would not effectively treat wastewater due to the presence of solids. UV disinfection would be a viable option only if TSS concentrations could be consistently maintained at 3 to 5 mg/L, which would necessitate a filtration facility and would greatly increase the costs of the Somerton WWTP.

- **Bulk Sodium Hypochlorite**–This option involves the replacement of gaseous chlorine with a 12% liquid sodium hypochlorite solution diluted to 6% to minimize hypochlorite degradation. Sodium hypochlorite is extremely efficient and cost-effective, and would eliminate the potential public safety hazards associated with the use of gaseous chlorine. Although the use of sodium hypochlorite results in relatively high levels of total residual chlorine (TRC) in discharged effluent, water-quality standards associated with the Yuma Main Drain do not include limits for TRC (see Section 3.3.32 Surface Waters). This alternative is preferred due to the reduced public perception of off-site risk, and the City has expressed a desire to implement this option since it eliminates health and safety risks to WWTP workers, farmers, and residents (Peter Robinson, Hazen and Sawyer, personal communication).

  One issue associated with sodium hypochlorite is chlorine concentrations in the effluent. Engineering analyses were conducted to quantify anticipated chlorine concentrations in effluent discharged into the Yuma Main Drain. The following information was prepared by Hazen and Sawyer to evaluate the use of sodium hypochlorite at the Somerton WWTP (Peter Robinson, Hazen and Sawyer, personal communication). Current average flows in the Yuma Main Drain are approximately 100 cfs (65 MGD) in the vicinity of Somerton, and 120 cfs at the United States–Mexico border near San Luis, Arizona. It is anticipated that by the year 2020, treated effluent from the Somerton WWTP will comprise approximately 2% of the total flow volumes in the Yuma Main Drain.

  Chlorine concentrations in effluent are measured as milligrams per liter (mg/L) of free chlorine, monochloramine, and organochloramines. The sum of these components, total residual chlorine (TRC), is used as an indicator of both wastewater disinfection and potential toxicity to aquatic organisms. Typical chlorine concentrations in effluent discharged from a municipal wastewater treatment facility that uses sodium hypochlorite are presented in Table 4.

Table 4. Effluent Chlorine Concentrations at the Hollywood, Florida WWTP.

Chlorine Compound	**Concentration in Effluent** (mg/L)
Free Chlorine	0.04
Monochloramine	0.38
Organochloramine	0.31
TRC	0.73

(Source: Peter Robinson, Hazen and Sawyer, personal communication)

The EPA has established a chlorinated effluent limit of 0.01 mg/L for TRC at the edge of a mixing zone in regulated water bodies. Effluent from the Somerton WWTP would be initially diluted by 65 to 1 (Yuma Canal flow to treated effluent) within 100 meters of the outfall over a 3 to 4 minute period. Dilution would reduce TRC levels by 98.5% to 0.01 mg/L, which at the 0.010 mg/L EPA chronic level. TRC decay would further reduce the chlorine concentrations to between 0.005 and 0.008 mg/L, which are below the 0.10 mg/l chronic level.

Pursuant to ADEQ water quality standards for the Yuma Main Drain, there are no limits on chlorine (TRC) for discharged effluent (see Section 3.3.2). Therefore, neither the current NPDES permit nor future permit for the Somerton WWTP will include limits on TRC.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section of the EA describes the existing environmental conditions in the vicinity of the project area, and identifies the potential effects that the three alternatives would likely have on the environment. In addition to these direct effects, the alternative actions could potentially create cumulative and indirect effects. Cumulative and indirect effects are evaluated in Sections 3.14 and 3.15.

3.1 Land Use

The 14-acre project site is owned by the City of Somerton and is the location of the existing WWTP. Agricultural lands, primarily active irrigated croplands, surround the WWTP. Principal crops grown in the Somerton area include cotton, corn, lettuce, wheat, cauliflower, broccoli, and melons. The Yuma Main Drain, which conveys irrigation returns and wastewater treatment effluent, is adjacent to the WWTP to the west (Figure 1). In the vicinity of the WWTP, the Yuma Main Drain is approximately 10 feet wide and 10 feet deep. The WWTP lies approximately 1,500 feet west of the boundary of the incorporated City of Somerton and the nearest residences. The only other land use in the vicinity of the WWTP includes a commercial facility on Highway 95 approximately 4,000 feet north of the WWTP.

Alternative A

The No Action Alternative would not affect existing land uses. The WWTP would remain in its current condition at the existing location.

Alternative B

This alternative includes construction of new lagoons to accommodate future growth and associated increased wastewater volumes generated within the City of Somerton. It is anticipated that additional lagoons would be constructed adjacent to the existing WWTP, and would therefore necessitate the acquisition and conversion of approximately 25 acres of agricultural lands. Although this alternative would require a land use change in the vicinity of the WWTP, this would not be a significant adverse effect due to the abundance of agricultural lands in the area and the distance of the facility from the nearest residential and commercial land uses.

Alternative C

This alternative would not affect existing land uses. Construction of the SBR facility would occur entirely within the existing WWTP footprint (in Lagoon 1), and would not require acquisition of adjacent lands.

3.2 Topography, Geology, and Soils

The City of Somerton is located within the Yuma Valley at an elevation of 103 feet above sea level. Topography at the WWTP, and in the general Somerton area, is relatively flat with an imperceptible southwest slope toward the Colorado River. Bedrock in the area is greater than 3,200 feet below ground level (Partners for Strategic Action, Inc., 2001). Local soil types generally consist of alluvial silts and clays. The specific soil group in the vicinity of the WWTP is Gadsden clay, a deep, well-drained soil formed in mixed alluvium (USDA Soil Conservation Service, 1977). Most soils in the Yuma Valley that are actively used for agricultural purposes, including Gadsden clay, are designated as Prime Farmland pursuant to the Farmland Protection Policy Act (7 USC 4201) due to their physical and chemical characteristics (USDA Soil Conservation Service, 1980).

Alternative A

This alternative does not involve any construction activities, and therefore would not affect topography, geology, or soils within or adjacent to the WWTP site.

Alternative B

This alternative would not affect geologic resources. Construction of new lagoons would necessitate minor changes in the existing topographic conditions and soils adjacent to the WWTP. Lagoon sites would be excavated and prepared, and earthen berms and/or dikes would be constructed above the existing ground level along the perimeter of the lagoons. It is anticipated that approximately 25 acres of Prime Farmland would be converted under this alternative. Given the abundance of Prime Farmland in the greater Yuma Valley, and particularly in the vicinity of Somerton, this conversion would not represent a significant adverse impact.

Alternative C

This alternative would not affect topography or geology. Soils within the WWTP site may be disturbed during construction of the SBR facility and the reclamation of Lagoons 2 and 3. As soils on the site were previously disturbed during construction of the existing lagoons and associated facilities, no adverse effects on soils are associated with this alternative. No Prime Farmland would be converted under this alternative.

3.3 Water Resources

3.3.1 Groundwater

The Yuma Groundwater Basin, a Basin and Range aquifer in unconsolidated alluvial deposits, lies beneath the City of Somerton (Robson and Banta, 1995). As a result, groundwater is locally abundant but contains relatively high levels of total dissolved solids (TDS). The City of Somerton General Plan indicates that the depth to groundwater varies from 0 to 6 feet in much the area (Partners for Strategic Action, Inc., 2001). In the vicinity of the WWTP, depth to groundwater is approximately 8 feet. Engineering analyses suggest the possibility that untreated wastewater may be currently leaking from the lagoons into the groundwater table (BECC, 2000). If lagoon leakage occurs, and plume migrates into the adjacent Yuma Main Drain, it could adversely affect local groundwater quality.

Somerton currently relies on three groundwater wells with a combined capacity of 5,000 gallons per minute for its entire potable water supply. The City currently uses approximately 600,000 gpd, which is filtered to reduce TDS levels. Records indicate that the water supply has not exceeded allowable levels of organic, inorganic, or radioactive contaminants in recent years (City of Somerton, 2000; City of Somerton, 2001). The City of Somerton has initiated a study on the potential use of groundwater and surface water from the Colorado River to augment the existing potable water supply in the future. The City does not know when this study will be completed.

An Aquifer Protection Permit (APP) must be obtained from the Arizona Department of Environmental Quality (ADEQ) for wastewater treatment facilities (A.R.S. §49-241). APP requirements include that the facility implement the best available demonstrated control technology(BADCT) and that the applicant demonstrate that aquifer water quality standards would not be violated as a result of facility operation and discharge. If water quality already exceeds standards at the time of permit issuance, the aquifer must not be further degraded. On July 25, 2000, Kaumil Parghi, Arizona Department of Environmental Quality, sent an

E-mail to the Louis Berger Group, entitled, "Somerton Permit" which provided guidance to the minimum water quality requirements:

1. Denitrification up to a total nitrogen level of 10 mg/liter.
2. Disinfection up to a fecal coliform level of 75 CFU/100 ml.

Reasons cited by ADEQ for the above minimum quality requirements for obtaining an Aquifer Protection Permit are summarized below:

- New treatment facilities require best available demonstrated control technology (BADCT)
- The Yuma Main Drain to which the treated final effluent is discharged is unlined
- Depth to groundwater at the treatment site is only 8 feet.

Alternative A

This alternative would not change existing groundwater conditions. The facility is currently in compliance with its APP permit.

Alternative B

This alternative would not change existing groundwater conditions. This alternative would include the installation of HDPE liners in the three existing lagoons and any lagoons constructed in the future. The HDPE lining would prevent potential for leakage of untreated wastewater from the lagoons. A new APP permit may or may not be necessary under this scenario. If it were necessary to obtain, the current facilities might not be able to meet the restrictions for TN, nor would this treatment qualify as BADCT.

Alternative C

This alternative would not change existing groundwater conditions. This alternative would remove the lagoon system, and prevent potential for leakage of untreated wastewater. This alternative is treatment that is considered BADCT, and would be able to meet the requirements of a new APP permit.

3.3.2 Surface Waters

The City of Somerton is located approximately 6 miles east of the Colorado River (Figure 1). There are no jurisdictional wetlands or floodplains (FEMA, 1983) within or adjacent to the project site. The only surface water resources in the vicinity include the existing lagoons and the Yuma Main Drain, which is part of the Yuma Project that provides irrigation water to 68,091 acres in Arizona and California (U.S. Bureau of Reclamation, 2001). The Project includes a system of man-made open drains, including the Yuma Main Drain, that convey excess water from irrigated lands and effluent from wastewater treatment facilities in the Yuma Valley to the Boundary Pumping Plant adjacent to the Mexican border. Drainage water from the Boundary Pumping Plant is discharged into a canal that flows into Mexico, where this water is used for irrigation of agricultural lands (U.S. Bureau of Reclamation, 2001).

According to the Arizona Administrative Code (Tile 18, Chapter 11), designated uses for the Yuma Main Drain are limited to agricultural irrigation and agricultural livestock watering. These designated uses do not include any limits relative to chlorine, including TRC, in WWTP effluent. An investigation of water quality

in the Yuma Main Drain indicated the presence of various organic and inorganic compounds, including chlordane, dichlorodiphenyethane, dieldrin, toxaphene, aluminum, arsenic, barium, beryllium, boron, chromium, copper, iron, manganese, selenium, vanadium, and zinc (Baker et al., 1992). This study concluded, "Irrigation drainage waters in the Yuma Main Drain may have the potential to cause significant harmful effects on fish and wildlife resources."

The City of Somerton WWTP currently discharges effluent into the Yuma Main Drain. This discharge is regulated by a NPDES permit issued by the EPA. Since the early 1990s, the Somerton WWTP has contravened NPDES permit limits for BOD_5 and TSS levels approximately 20% of the time (BECC, 2000). These problems are inherent to a wastewater treatment system utilizing shallow facultative oxidation lagoons (see Section 1.4). NPDES analyses of Somerton WWTP effluent indicate that concentrations of metal contaminants are low, and that the effluent quality is typical for a WWTP that primarily treats domestic wastewater with little industrial contribution (BECC, 2000). Based upon a single TCLP Extraction Procedure, arsenic concentration in the effluent (32.3 µg/L) met current APP requirements of 50 µg/L.

Engineering analyses have estimated that current effluent volumes contribute approximately 2% of the existing flows in the Yuma Main Drain. There are no problems associated with the mixing zone, and the nearest downstream community is approximately 12 miles from the effluent outfall.

Alternative A

This alternative would not change existing WWTP operations and/or treatment effectiveness. The facility would continue to contravene NPDES permit requirements relative to BOD_5 and TSS. As wastewater volumes increase in the future, NPDES effluent requirements could be contravened more frequently. Arsenic concentrations would remain at current levels. Under this alternative, effluent from the Somerton WWTP would not be improved.

Alternative B

This alternative would increase the effectiveness and capacity of the WWTP. Delivered wastewater would be adequately treated and the effluent would meet all NPDES permit requirements. This alternative would reduce BOD_5 and TSS levels in WWTP effluent, and may increase the potential for the City to reuse treated effluent. Pursuant to the designated uses of the Yuma Main Drain, the use of sodium hypochlorite for disinfection would not create an adverse impact on the quality of this surface water.

Alternative C

This alternative would increase the effectiveness and capacity of the WWTP. Delivered wastewater would be adequately treated and the effluent would meet all NPDES permit requirements. This alternative would reduce BOD_5 and TSS levels in WWTP effluent, and may increase the potential for the City to reuse treated effluent. Pursuant to the designated uses of the Yuma Main Drain, the use of sodium hypochlorite for disinfection would not create an adverse impact on the quality of this surface water.

3.4 Biological Resources

3.4.1 Vegetation

There is no vegetation on the WWTP site, and there are no natural vegetative communities in the vicinity. The site is limited to the three lagoons (surface water), earthen berms, and appurtenant facilities. Lands surrounding the WWTP have been converted to agricultural. At the time of a field visit in July 2001, lands adjacent to the WWTP were either freshly plowed or cultivated in Bermuda grass and corn. Some aquatic plants grow within the Yuma Main Drain, but they are relatively sparse and do not comprise an aquatic or riparian community.

Alternative A

Under this alternative, the WWTP would remain in its existing form with no construction activities. There would be no effect on vegetation.

Alternative B

This alternative would require disturbance of adjacent agricultural croplands, but would not adversely affect any natural vegetative communities.

Alternative C

This alternative does not require any construction outside the existing WWTP footprint, and would not adversely affect any natural vegetative communities.

3.4.2 Wildlife

Given the existing vegetative conditions and land uses on and adjacent to the Somerton WWTP site, there are no important wildlife habitats in the vicinity of the project area. There are no vegetative communities that could provide habitat for terrestrial wildlife species on the WWTP site. Common bird and small mammal species may use the adjacent agricultural fields. The existing lagoons are used as a resting area for pigeons and a few aquatic birds. The adjacent Yuma Main Drain is occasionally used by aquatic bird species, such as herons, and supports common fish species. A study by the U.S. Fish and Wildlife Service (King and Andrews, 1996) found DDE in all fish and bird samples collected at nine sites in the Yuma Main Drain. While DDE residues were twice as high as the previous decade, they were generally below thresholds associated with chronic poisoning and reproductive problems in fish and wildlife. Fish from sample sites closest to the U.S./Mexico International Boundary had the highest levels of DDE. A contaminant "hot spot" was found at San Luis, and common carp *(Cyprinus carpio)* from this site contained the highest mean levels of aluminum and chromium ever recorded in Arizona. Given the general size and quality of water in the lagoons and the Yuma Main Drain, neither represents high-quality wildlife habitat.

There are currently nine wildlife and plant species inhabiting Yuma County, Arizona listed as Threatened or Endangered pursuant to the Endangered Species Act (U.S. Fish and Wildlife Service, 2001). These species are listed in Table 3. There are no habitats on or adjacent to the WWTP site that could support any of these species. None of the bird species utilize the lagoons as a water source.

Table 5. Federal Threatened and Endangered Species Found in Yuma County, Arizona.

Common Name	Scientific Name	Status
Bald eagle	*Haliaeetus leucocephalus*	Threatened
Brown Pelican	*Pelecanus occidentalis*	Endangered
Mountain Plover	*Charadrius montanus*	Threatened
Sonoran Pronghorn	*Antilocapra americana sonoriensis*	Endangered
Razorback Sucker	*Xyrauchen texanus*	Endangered
Southwestern Willow Flycatcher	*Empidonax traillii extimus*	Endangered
Yuma Clapper Rail	*Rallus longirostris yumanensis*	Endangered
Cactus Ferruginous Pygmy-Owl	*Glaucidium brasilianum cactorum*	Endangered
Peirson's Milkvetch	*Astragalus magdalenae peirsonii*	Threatened

Alternative A

This alternative would have no effect on wildlife resources. Existing conditions at the WWTP would not change, and effluent discharges would continue to exceed NPDES permit requirements. The lagoons would remain operational and there would not be any disturbance of adjacent agricultural lands.

Alternative B

This alternative would likely have minor positive and negative effects on wildlife resources. New lagoons may provide increased resting areas for those bird species that currently use the existing lagoons. Additionally, the upgraded lagoon system would adequately treat wastewater, thereby improving effluent quality and representing potential positive impacts to aquatic biota in the Yuma Main Drain. Disturbance of adjacent croplands for the new lagoons would likely eliminate habitat for common birds and small mammals that currently use these areas.

Alternative C

This alternative would likely have minor positive and negative effects on wildlife. Removal of the existing lagoons would eliminate resting areas for birds. The SBR system would adequately treat wastewater, improving effluent quality and representing a positive effect to aquatic biota in the Yuma Main Drain. Construction would be entirely within the footprint of the existing facility, and there would be no disturbance of adjacent croplands and associated habitats of common birds and small mammals.

3.5 Socioeconomic Resources

According to the 2000 census, the population of Somerton is 7,266 (Yuma Metropolitan Planning Organization, 2001). The City has experienced relatively high population growth during the past four decades, with an average annual growth rate of 4% that is expected continue through the 20-year design period (Table 6). Population projections for the year 2020 presented in the engineering report (BECC, 2000), which used pre-2000 census data based and a 4% annual growth rate, was 16,116. Estimates using data from the 2000 census and a 4% growth rate resulted in a 2020 population of 14,241 (Table 6). According to the 2000 census, 95.2% of the population was Hispanic or Latino, 3.9% was White, and 0.9% was Native American, Black, and Asian (Yuma Metropolitan Planning Organization, 2001). In 2000, Somerton had 1,967 housing units with an average household size of 3.99 individuals. This was

significantly higher than the Yuma County average of 2.86 persons per household. Eighty-eight percent of the population is under the age of 54.

Table 6. Population of Somerton, Arizona.

Year	Population
1960	1,163
1970	2,225
1980	3,969
1990	5,282
2000	7,266
2010	10,887[1]/10,172[2]
2020	16,116[1]/14,241[2]

[1] Estimates based upon pre-2000 census data and a 4% annual growth rate.

[2] Estimates based upon actual 2000 census data and a 4% annual growth rate.

Given the relatively small size of the incorporated area, which is currently 1.25 mi^2, Somerton has a long history of annexing additional land to support population growth. The first annexation was completed in 1959 and as of February 2001, the city had annexed a total of 565.64 acres (Cliff O'Neill, Community Development Director, personal communication). The City imposed a moratorium on new annexations between 1995 and 1998 as a result of NPDES permit violations (Edmundo Mendez, Director of Public Works, personal communication). Three annexations were completed subsequent to this moratorium, and the City is currently annexing two parcels totaling 180 acres to accommodate continued population growth. Somerton anticipates population growth to continue at approximately 4% annually (Table 4). The City has prepared a General Plan (Partners for Strategic Action, Inc., 2001) to guide future growth and ensure that development is conducted in a sustainable manner.

Somerton's economy is primarily dependent upon agriculture, including the cultivation and processing of citrus fruit and vegetable crops. The City also has small commercial, service, and light-industrial sectors. Sixty-eight percent of the workforce is employed in the agricultural, service, or retail sectors. Major private employers include Housing America Corporation, Sunset Community Health, and King Market. Major public employers include Arizona Department of Economic Security, the City of Somerton, and Somerton School District (Arizona Department of Commerce, 2001). Somerton has historically had a relatively high rate of unemployment as a result of the seasonal agricultural economy. The 2000 census indicated 51.3% unemployment.

The City of Somerton provides a full range of services, including schools, police, fire protection, and sewer and water. There are various other community resources and amenities, including several city parks and a public golf course. The City has maintained community services throughout recent population growth, and is planning for future growth through policies identified in the General Plan (Partners for Strategic Action, Inc., 2001). Somerton has developed several fiscal measures, including impact fees, to offset the costs of continued growth and retain a high level of community services.

Alternative A

There would be no other adverse or beneficial effects upon socioeconomic resources in Somerton as a result of this alternative. This alternative would not permit the City to improve the efficiency and

effectiveness of the WWTP. Inadequacies of the WWTP could potentially adversely affect the City's ability to provide adequate wastewater treatment during future growth.

Alternative B

This alternative would not adversely affect socioeconomic resources in Somerton. Improvements to the WWTP would allow the City to effectively treat current wastewater volumes generated by the City, as well as accommodate anticipated future volumes. This alternative represents a short-term benefit to the economy through necessary construction activities, and may provide a long-term benefit by ensuring adequate infrastructure for future businesses/industries. It is estimated that upgrading and expanding the WWTP would cost approximately $6.0 million (BECC, 2001). While most of the necessary funding would be obtained through grants and loans, it is likely that the City would have to increase water and sewer rates and impose a water/sewer impact fee (Cliff O'Neill, Community Development Director, personal communication). While such fees would represent an economic effect, the sizes of the increased rates and impact fees are not expected to represent a substantial adverse economic impact to local residents. There would be no other adverse or beneficial effects upon socioeconomic resources in Somerton as a result of this alternative.

Alternative C

This alternative would not adversely affect socioeconomic resources in Somerton. Improvements to the WWTP would allow the City to effectively treat current wastewater volumes generated by the City, as well as accommodate anticipated future volumes. This alternative also represents a short-term benefit to the economy through necessary construction activities, and may provide a long-term benefit by ensuring adequate infrastructure for future businesses/industries. It is estimated that upgrading and expanding the wastewater treatment facility would cost approximately $4.4 million. While most of the necessary funding would be obtained through grants and loans, it is likely that the City would have to increase water and sewer rates and impose a water/sewer impact fee (Cliff O'Neill, Community Development Director, personal communication). While such fees represent an economic effect, the sizes of the increased rates and impact fees are not expected to represent a substantial adverse economic impact to local residents. There would be no other adverse or beneficial effects upon socioeconomic resources in Somerton as a result of this alternative.

3.6 Air Quality

The Clean Air Act requires EPA to assist states and localities in establishing ambient air quality monitoring networks and to evaluate local levels of criteria pollutants. Criteria pollutants for which the EPA has established National Ambient Air Quality Standards (NAAQS) include sulfur dioxide, total particulate lead, ozone, nitrogen dioxide, carbon monoxide, and suspended particulate matter with a diameter less than or equal to 10 microns (PM_{10}) and less than or equal to 2.5 microns ($PM_{2.5}$). The Arizona Department of Environmental Quality (ADEQ) monitors criteria pollutants through a network of air quality monitoring sites throughout Arizona. ADEQ prepares annual summaries of the data collected at these sites, and identifies those areas ("non-attainment areas") that exceed NAAQS standards for one or more air pollutants. The Yuma Planning Area (including the City of Somerton) was designated as a non-attainment area for PM_{10} in 1990, primarily due to dust generated by agricultural activities and unpaved roads (ADEQ, 2000). As a result, ADEQ established management practices to reduce particulate emissions within the Yuma Planning Area. These measures have been successful in reducing PM_{10} emissions, and the Yuma Planning Area has been in compliance with NAAQS standards since 1991 (Arizona Department of Environmental Quality, 2001).

Other than standard agricultural activities and vehicle emissions, there are no commercial or industrial generators of air pollution in Somerton. The WWTP currently emits offensive odors that are inherent to the lagoon treatment system, primarily due to the generation of hydrogen sulfide (H_2S). Algal activity in lagoon systems results in aerobic conditions in the upper surface waters. Changes in air temperature, wind conditions, and other natural phenomena cause the water in the lagoons to "turn over." During turnover, water from the lagoon bottom is circulated to the pond surface. This water has been in contact with benthic deposits and is devoid of oxygen (anaerobic), and turnover thereby generates foul odors.

Odors emitted from the WWTP currently affect residences located east of the facility. Residents from this neighborhood have made complaints to the City, and prospective residents have decided not to move into this neighborhood because of WWTP odors. The City currently uses gaseous chlorine to reduce odors generated at the WWTP; however, this has not effectively remedied the problem. While hydrogen sulfide gas can cause death at concentrations >300 parts per million, results of modeling exercises estimate that concentrations reaching the residences are between 0.1 and 1.0 parts per million (BECC, 2000).

Alternative A

This alternative would not affect existing air quality or odors generated by the WWTP. Local residents would continue to experience offensive odors from the facility as a result of the existing lagoon system. The frequency and duration of odors generated by the WWTP may increase in the future as the system is further strained by increased wastewater deliveries associated with future population growth in Somerton.

Alternative B

This alternative would result in both negative and positive effects on air quality. Construction activities associated with upgrading and expanding the lagoon system would generate dust and temporarily increase PM_{10} emissions. As this alternative utilizes a lagoon system, WWTP odors would likely continue to affect local residents but it is not known whether there would be an overall increase or worsening of odor generation. While this alternative would increase the total lagoon surface area and increase the potential for odor generation, odors generated by the new facility would likely be reduced through a combination of a more effective treatment system and improved odor control measures.

Alternative C

In the long term, this alternative would represent a positive effect on local air quality. As with Alternative B, construction activities may result in temporary an increase in PM_{10} emissions. This alternative would include removal of the existing lagoons, which are the ultimate source of the foul odors that currently affect local residents. The system includes an auxiliary diesel generator to provide power in the event of an electrical interruption at the WWTP. While operation of the generator could contribute to air pollution, it is expected that the generator would be used infrequently and would not significantly affect local air quality. Although the SBR tanks would be open to the air, this technology efficiently and effectively treats wastewater and eliminates turnover. Additionally the SBR system would utilize sodium hypochlorite for disinfection and odor control. Ultimately, this alternative would eliminate existing odor problems and improve local air quality for residents living in the vicinity of the WWTP.

3.7 Cultural Resources

No cultural resource surveys have been conducted for this project. There are no designated historic sites or structures, or significant cultural sites or resources within the City of Somerton (Partners for Strategic Action, Inc., 2001). The project site and adjacent lands have been previously disturbed by construction of the WWTP facility and agricultural activities, respectively. Correspondence with the Arizona State Historic Preservation Office (SHPO) indicates the presence of one archaeological site and two historic canals within ¼ mile of the WWTP site (Appendix A).

Alternative A

Given that this alternative does not involve any construction activities, it has no potential to affect cultural resources.

Alternative B

This alternative requires the acquisition of approximately 15 acres for the construction of additional lagoons on lands adjacent to the existing WWTP, and therefore could potentially affect cultural resources. Given the proximity of the site to cultural resources identified by SHPO, this alternative would require archaeological surveys to be completed in consultation with SHPO prior to the initiation of construction activities (Appendix A).

Alternative C

Construction of the SBR facilities would occur entirely within the footprint of the existing WWTP. As this alternative would not involve the acquisition or disturbance of new land, SHPO has concluded that it would have no adverse impact upon archaeological or cultural resources.

3.8 Noise

Noise levels in the Somerton area are typical of a small urban community. Passenger and commercial vehicles and adjacent agricultural activities are responsible for most noise. There are no industrial facilities in the area, and the current WWTP does not generate noise. The nearest noise receptors in the vicinity of the WWTP are the residences 1,500 feet to the east. Yuma County recently adopted zoning changes based upon analyses of noise generated by the Yuma Marine Corps Air Station/Yuma International Airport and associated activities. Noise contours were constructed based upon results of these analyses, and all areas subjected to aircraft noise of >65 decibels were rezoned by Yuma County in 2001. (Yuma County Department of Development Services, 2001). Although aircraft noise is occasionally heard in Somerton, the City is located just beyond the limits of the 65-decibel contour and was not subject to the Yuma County zoning changes.

Alternative A

This alternative would not affect current noise levels in Somerton. The WWTP would continue current operations, which do not generate any appreciable noise and do not affect local residents.

Alternative B

This alternative would result in temporary increases in ambient noise levels during construction activities. Noise generated during construction would not adversely affect residents in the vicinity, and no other noise would result from this alternative.

Alternative C

This alternative would result in temporary increases in ambient noise levels during construction activities. Noise generated during construction would not adversely affect residents in the vicinity. Occasionally, the diesel generator may be operated in the event of an electrical outage. The generator unit would be stored in enclosed steel, sound-attenuating enclosure to prevent impacts to residents in the vicinity. No other noise would result from this alternative.

3.9 Aesthetics

The Somerton WWTP site surrounded by agricultural lands that create the basic aesthetic character of the area. The site currently consists of three lagoons, pipes, and some small appurtenant structures surrounded by a chain link fence. The lagoons and structures are approximately five feet above ground level, and the WWTP generally blends into the landscape. It is not visible from any public roadways, and is only slightly visible in the distant views from the nearest residences.

Alternative A

This alternative would have no effect on the aesthetic character of the area. The lagoons and appurtenant structures would remain in their current state.

Alternative B

This alternative would have no adverse effect on aesthetics. The lagoon system and appurtenant structures would continue to be used, and new lagoons would be very similar in character to the existing facilities. The site would remain out of sight from public roadways and only slightly visible in the distance from the nearest residences.

Alternative C

This alternative would include a set of aboveground tanks constructed at current location of Lagoon 1. While the detailed design of the SBR system has not been completed, the tanks would be approximately 20 feet tall. This alternative would therefore change the visual character of the WWTP site, and may be slightly visible in the distance from Highway 95 and remain visible in the distance from the two residences to the east. However, the tanks would not represent an imposing visual presence, and these changes would not adversely affect the aesthetic character of the area.

3.10 Solid and Hazardous Waste

The City of Somerton currently contracts with a private landfill operator for the disposal of domestic solid waste. There are neither generators of hazardous waste nor any hazardous waste disposal facilities within or adjacent to the City. While no wastes are currently generated by the WWTP, constituent analyses were conducted on benthic solids recovered from the bottom of Lagoon 1 to facilitate evaluation of potential disposal methods. Four bottom soil samples were obtained on July 20, 2000, and analyzed for metal levels BECC, 2000). Analytical results were compared to the State of Arizona allowable biosolids pollutant levels (Table 7). Pollutant levels ranged between 10% and 30% of the maximum allowable monthly average pollutant concentrations, which indicates that the sludge is suitable for land application.

Table 7. Levels of Metals (mg/Kg) in Lagoon Bottom Solids From the Somerton WWTP.

Pollutant	Allowable Pollutant Concentrations[1]		Wastewater Lagoon Bottom Sample[2]				Detection Limit
	Maximum	Average	No. 1	No. 2	No. 3	No. 4	
Arsenic	75	41	16.1	BDL	7.8	5.1	0.75
Cadmium	85	39	3.9	BDL	3.9	5.3	1.00
Chromium	3,000	1,500	20.9	12.9	24.0	26.7	1.00
Copper	4,300	--	158	10.4	162	496	1.00
Lead	840	300	34.9	8.3	47.0	76.8	1.00
Mercury	57	17	0.802	BDL	0.759	0.507	0.10
Molybdenum	75	--	24.4	BDL	17.3	11.2	10.0
Nickel	420	420	59.0	9.84	38.7	44.2	1.00
Selenium	100	100	BDL	BDL	BDL	BDL	1.00
Zinc	7,500	2,800	535	34.0	430	607	1.00

[1] Monthly concentrations from the Arizona Administrative Code, Article 15 Land Application of Biosolids.
[2] BDL = below detectable limit.

Alternative A

This alternative would have no effect on solid or hazardous waste. The WWTP would continue to operate in its current manner, and biosolids would not be removed from the lagoons.

Alternative B

This alternative would create non-hazardous solid waste through the removal of 28,800 tons (18% solids consistency) of benthic solids from the WWTP lagoons (BECC, 2001). It is anticipated that lagoon wastes would be hauled to a fully permitted site and land applied at rates in accordance with EPA, State, and local requirements. Currently other stabilized solids from other wastewater treatment facilities are transported to California for land application. Alternatively, stabilized solids could be transported to a sanitary landfill for disposal. The generation and disposal of lagoon wastes associated with this alternative would not be an adverse effect.

Alternative C

This alternative would create non-hazardous solid waste through the removal of benthic solids from the WWTP lagoons and/or the disposal of sludge from the SBR system. Under this alternative, the City would reclaim the lagoons. One option is to simply let the lagoons dry out, leave the remaining biosolids in place, and then cover the lagoons with dirt fill. The other option is to remove the stabilized biosolids from the lagoon prior to filling them with dirt. Should the lagoon wastes be removed, they would either be land-applied in California or disposed of at a permitted private landfill facility.

Waste activated solids generated from the SBR Treatment Works will be stabilized via the aerobic digestion process. The stabilization works consist of two compartments. This arrangement provides flexibility to store and thicken solids. Stabilized liquid solids will be hauled by licensed contractors to permitted land disposal sites. This method of solids disposal is practiced at Yuma and other adjacent cities. The quantity of stabilized solids projected to be generated and hauled by a private contractor are estimated below.

Stabilized Solids
City of Somerton, Arizona

Year	Quantity Generated (lb/day – Dry Wtg.)	Volume – Gallons/Day	
		3% Solids	5% Solids
2002	500	2,000	1,200
2012	800	3,200	1,920
2020	1,000	4,000	2,400

Tanker trucks generally haul 4,000 to 6,000 gallons, depending upon truck size and highway weight limits. Initially 2 to 3 tanker trucks each week will be required to haul stabilized solids.

Solids concentration within the aerobic digester (within limits) can be increased, allowing additional storage when needed. In the event trucks don't show up (weather, strike, etc.), the project includes an emergency sludge drying bed capable of handling 14 days of solids generation. This allows temporary on-site dewatering in the event of a temporary disruption of hauling services.

Neither the generation of lagoon wastes or the disposal of SBR sludge associated with this alternative would represent an adverse effect.

3.11 Public Health and Safety

Chlorine has been used in the wastewater industry since the early 1990s to effectively eliminate waterborne diseases such as cholera and typhoid. The Somerton WWTP currently utilizes gaseous chlorine (20 lb/day) to disinfect effluent prior to discharging it into the Yuma Main Drain. The chlorine is currently stored in 150-pound tanks on the WWTP site. As gaseous chlorine can be lethal at high concentrations, a chlorine gas release scenario has been developed (BECC, 2000). Chlorine gas concentrations reaching the residences would likely be between 1 and 5 ppm. At these concentrations, residents would notice a strong chlorine odor and persons located outdoors would experience eye, mouth, and throat irritation. While the potential for lethal or hazardous chlorine gas concentrations at these residences is minimal, WWTP staff and farmers working in adjacent fields could be exposed to significantly higher concentrations and experience more serious health effects, including death (see Section 2.5).

Unpleasant odors are currently generated by the lagoon system at the WWTP, and these odors do affect local residents. While these odors are not necessarily toxic or harmful, they do adversely affect the quality of life for these residents. During periods of particularly strong odors, there may also be potential health effects for individuals with asthma or other respiratory diseases.

Given the reliance of the City and local residents outside the City limits on groundwater for potable water supply, lagoon leakage into the groundwater table represents a potential hazard to human health. The potential for this leakage has not been adequately studied, and therefore specific adverse effects remain unknown. Frequently, effluent discharged into the Yuma Main Drain does not meet NPDES requirements due to high levels of BOD_5 and TSS.

Alternative A

This alternative would not change current conditions at the WWTP. Odors would continue to be generated by the lagoons. The use of gaseous chlorine would continue to represent a potential threat to human health and safety in the vicinity. Potential for leakage from the lagoons into the groundwater table would continue to exist, and water quality of the Yuma Main Drain would not be improved.

Alternative B

This alternative would rectify some of the health and safety concerns associated with the Somerton WWTP. Odors would likely be reduced as a result of improved treatment effectiveness, although the additional lagoons would create the potential for greater odor generation, particularly during seasonal "turnover." The use of liquid sodium hypochlorite would alleviate potential health and safety concerns associated with the use of gaseous chlorine. Potential for leakage from the lagoons into the groundwater table would be eliminated through the installation of HDPE liners in both existing and future lagoons. Finally, water quality of the Yuma Main Drain would be improved as a result of more effective and efficient wastewater treatment.

Alternative C

This alternative would rectify most of the health and safety concerns associated with the Somerton WWTP. Odors would be greatly reduced through elimination of the lagoons and improved disinfection and odor control. The use of liquid sodium hypochlorite would alleviate potential health and safety concerns associated with the use of gaseous chlorine. All three lagoons, and potential for leakage into the groundwater table, would be eliminated. The effectiveness of the SBR system would improve effluent, representing a beneficial effect to the quality of water in the Yuma Main Drain.

3.12 Environmental Justice

In 1994, President Clinton authorized Executive Order 12898 on Environmental Justice, which focuses on environmental justice in relation to minority populations and low-income populations. The mission of the EPA environmental justice program is "to achieve equal environmental protection so that no segment of the population, regardless of race, ethnicity, culture or income, bears an undue burden of environmental pollution–and to ensure that the benefits of environmental protection are shared by everyone" (EPA, 2001). One primary objective of the EPA program is to "assess the real and perceived impact of EPA's environmental protection programs on the distribution of risks in Region 9" (EPA, 2001).

The City of Somerton is predominantly Hispanic and Latino, with these two ethnic groups comprising more than 95% of the total population and Whites representing only 3.9% of the population. It is estimated that approximately 45% of all households are below poverty level. Any actions that occur in Somerton have the potential to affect minority and low-income residents. The ethnic composition of the residents located nearest the WWTP is unknown, but they are presumed to be Latino or Hispanic given the preponderance of these groups in Somerton.

Alternative A

This alternative would not change existing conditions. Any odors and potential groundwater contamination caused by the existing facility would continue to affect local residents. This alternative would not result in any environmental justice issues.

Alternative B

This alternative would not create any environmental justice issues. Local residents may experience a slight, temporary increase in noise levels during construction of additional lagoons, but would otherwise not be affected. This action may improve the health and safety of local residents by reducing potential for lagoon leakage and odors generated by the WWTP. This alternative would comply with Executive Order 12898.

Alternative C

This alternative would not create any environmental justice issues. Local residents may experience a slight, temporary increase in noise levels during construction of the SBR facility, but would otherwise not be affected. This action would reduce potential for lagoon leakage and odors generated by the WWTP. This alternative would comply with Executive Order 12898.

3.13 Energy

Energy use within the City of Somerton is typical of a small, urban community in this region. Southwest Gas Corporation provides natural gas, and electrical service is provided by APS. The existing WWTP currently consumes approximately 85 brake horsepower (BHP; 1 BHP=1.34 kW), 50 of which is obtained through electrical service and 35 of which is obtained though solar powered aeration and mixing units. Given the current design capacity of 0.8 MG, average energy use at the facility is 106 BHP/MG. The large surface area and relatively shallow depths of the existing lagoons, and the fact that the solar-powered aeration and mixing units do not operate at night, result in an inefficient treatment facility that has consistently contravened NPDES permit requirements (Peter Robinson, Hazen and Sawyer, personal communication).

Alternative A

This alternative would not change the existing facilities, and energy use at the WWTP would remain at current levels.

Alternative B

This alternative would result in increased energy use at the WWTP, due to increased lagoon capacity and the need to replace solar powered aeration and mixing units with more effective electrical units. If the facility relied entirely on electrical service, it would represent a 46% increase in the per MG electrical use compared to the existing facility. At full build-out, this 1.4 MG facility would require a total of 148 BHP (at 106 BHP/MG), a 196% increase over the existing energy use. This increase in energy use at the WWTP would not represent a significant effect given that it represents a very small proportion of energy used by the City of Somerton.

Alternative C

This alternative would result in increased energy use at the WWTP, as operations would be powered entirely by electrical energy. The SBR facility would result in a 46% increase in the per MG electrical use compared to the existing facility. At full build-out, this 1.4 MG facility would use a total of 148 BHP, a 196% increase over the existing energy use. This increase in energy use at the WWTP would

not represent a significant effect given that it represents a very small proportion of energy used by the City of Somerton.

3.14 Cumulative and Transboundary Effects

None of the alternatives would create any cumulative effects. The City has been conducting phased improvements to specific portions of the existing water conveyance system, but there are no other current or planned future projects in the vicinity of the WWTP (Edmundo Mendez, Somerton Department of Public Works, personal communication). The City is seeking to promote compatible land uses within its boundaries, and City officials have indicated that they will limit future development the project area (Cliff O'Neill, Community Development Director, personal communication).

Potential transboundary effects associated with the alternatives would vary. Existing conditions would not change under the No Action alternative, and adverse effects of WWTP effluent on water quality in the Yuma Main Drain would continue. Both action alternatives would have beneficial transboundary effects. These alternatives would improve effluent discharged into the Yuma Main Drain from the Somerton WWTP, and thereby have the potential to improve the quality of water reaching Mexico. There are no other transboundary effects associated with any of the alternatives analyzed in this EA.

3.15 Indirect Effects

The City of Somerton has experienced relatively high rates of growth for several decades, and has annexed lands since the 1950s to meet the demands of population growth. The population grew by 83% between 1980 and 2000 due to immigration from Mexico and the City's development as a bedroom community for Yuma. This growth is primarily a response to local and regional economic opportunities, and has occurred independent of capacity of the City of Somerton public services and community infrastructure.

Population projections for Somerton indicate continued population growth at 4% annually during the 20-year design period. This would increase the total population from 7,266 residents in 2000 to 16,116 residents in 2020. Somerton has prepared a General Plan to guide future development and ensure that growth occurs in an orderly, sustainable manner. The proposed action is necessary to improve the efficiency and effectiveness of the WWTP and thereby meet all NPDES permit requirements. The preferred alternative, while designed to support anticipated population growth in Somerton, would neither cause nor stimulate such growth. As the action would increase capacity of the WWTP and ensure effective service for all City residents throughout the 20-year design period, this EA includes a general discussion of the anticipated effects associated with the potential addition of 5,774 residents. The following discusses the 12 resource categories in relation to anticipated future growth.

3.15.1 Land Use

Based upon existing densities, the City would have to annex approximately 560 acres of adjacent land to support anticipated population growth. The planning area identified in the City of Somerton General Plan includes lands outside the incorporated City limits "for future anticipated annexations and areas of influence" (Partners for Strategic Action, Inc., 2001). While annexations would convert lands from agricultural to urban uses, this conversion would not represent a significant adverse impact given the abundance of agricultural lands throughout the Yuma Valley and the desire of the City to retain and promote future development that is compatible with agricultural activities. The General Plan includes a Future Land Use Plan to guide decisions about development within the City and to ensure that future growth is sustainable and compatible with long-term City objectives. The Future Land Use Plan identifies areas for

residential, commercial, agricultural, public facilities, and community open space and recreation uses. By pursuing the objectives and policies outlined in the General Plan, the City will minimize potential adverse effects to land uses associated with future growth and development.

3.15.2 Topography, Geology, and Soils

Future growth would not affect local topography or geologic resources. Construction associated with new developments could disturb up to 560 acres of soils, but there would be no net gain or loss of soils due to future population growth. Development will convert Prime Farmland soils to non-agricultural uses. Given the abundance of Prime Farmland soil types throughout the Yuma Valley, the conversion of 560 acres adjacent to the City of Somerton would not represent a significant adverse effect. The City does recognize the importance of retaining agricultural uses on these soils, and the Future Land Use Plan does promote development that is compatible with agricultural activities (Partners for Strategic Action, Inc., 2001).

3.15.3 Water Resources

3.15.3.1 Groundwater

The City of Somerton relies solely on groundwater from the Yuma Valley aquifer for its potable water supply. The USGS has estimated that this aquifer contains approximately 49 million acre-feet of water, of which the City currently uses 600,000 gpd or 674 acre-feet per year. Future population growth will increase water demand and it is anticipated that by the year 2020, the City will use approximately 1.3 million gpd (1,440 acre-feet per year). One option to meet future demand would be to increase yields from the aquifer, which could support anticipated population growth in the City. Since groundwater requires filtration, increasing yields would result in increased operational costs. Engineering analyses indicate that annual operational costs would increase from approximately $265,000 in 2000 to $526,000 in 2020. The City is also evaluating the feasibility of augmenting its potable water supply with surface water from the Colorado River. While this would require initial capital costs, the fact that this water would not require filtration would somewhat reduce operational costs.

While Somerton has access to an abundant water supply in the aquifer, the City is committed to water conservation (Partners for Strategic Action, Inc., 2001). The City has prepared a Water Conservation Plan, funded by BECC, to reduce local water demand and consumption. This Plan will ensure efficient use of water resources during future growth. The preferred alternative would also minimize adverse effects of future growth by ensuring new development is supported by the public sewer system, eliminating the need for individual septic fields on lands where the water table is between 1 and 6 feet below ground level.

3.15.3.2 Surface Waters

There are no surface water resources within the Somerton Planning Area, with the exception of irrigation canals and ditches. Future growth will not affect the irrigation canals and ditches. The preferred alternative would provide for adequate treatment of increased wastewater volumes associated with future growth, thereby ensuring that such growth does not adversely affect water quality in the Yuma Main Drain.

As previously noted, Somerton is evaluating the legal and economic feasibility of augmenting its potable water supply with surface water from the Colorado River. Prior to the diversion of any Colorado River water, the City would have to possess the necessary water rights and evaluate the potential environmental consequences of water withdrawal and development of a conveyance system. The process of acquiring surface water to support increased water demand associated with future growth would be conducted in a manner that carefully considers the sustainability and environmental effects of using the Colorado River.

3.15.4 Biological Resources

3.15.4.1 Vegetation

Most lands surrounding Somerton have been previously converted to agricultural uses, and there are no significant natural vegetative communities in the area. Future development will eliminate some croplands, but will not adversely affect native vegetation. Future developments will likely include landscaping with trees and shrubs, which would actually benefit vegetative resources in the area.

3.15.4.2 Wildlife

Given the absence of vegetative communities and the quality of water in the Yuma Main Drain, there are no significant terrestrial or aquatic habitats within the planning area. Future population growth will not adversely affect local wildlife resources, including any species listed as threatened and endangered. Landscaping in new developments may actually create habitat for birds and small mammals.

3.15.5 Socioeconomic Resources

The Somerton General Plan seeks to promote the development of a well-planned, economically strong community throughout future population growth (Partners for Strategic Action, Inc., 2001). This plan identifies policies to achieve orderly, sustainable, directed, and functional community growth. Some policies include promoting a compatible mix of land uses, supporting development of viable commercial centers and activities, conducting fiscal impact analyses for future annexations, developing a safe and efficient multi-modal transportation system, preparing a Capital Improvement Plan, preparing a parks and recreation master plan, and analyzing impact and utility fees. The General Plan identifies community goals and potential tools to meet these goals to ensure that the community can support future growth. These tools largely seek to promote positive aspects of growth, such as economic development, while minimizing potential adverse impacts to the community and associated services and infrastructure. Promulgation of the policies identified in the General Plan (Partners for Strategic Action, Inc., 2001) will ensure that future population growth occurs in an orderly and sustainable manner that does not adversely affect socioeconomic resources.

The City has identified several potential methods of financing public improvements necessary to accommodate future population growth (Partners for Strategic Action, Inc., 2001). These include paying from current revenues, pursuing grants and low-interest loans, issuing revenue and general obligation bonds, imposing development impact fees and user fess, and creating special tax districts. The City will explore these financing options as needed to ensure that public services can support future growth.

3.15.6 Air Quality

Population growth will likely have both positive and negative effects on local air quality. Growth will result in increased traffic and associated automobile emissions. Development of the safe and efficient multi-modal transportation plan identified in the General Plan will help to minimize adverse effects to air quality associated with increased traffic volumes. The Yuma Planning Area was designated a non-attainment area for PM_{10} emissions in 1990 due to dust generated by agricultural activities. ADEQ efforts to reduce PM_{10} emissions have been successful, and the area has been in compliance with NAAQS standards since 1991 (Arizona Department of Environmental Quality, 2001). Elimination of agricultural uses on adjacent lands through the to annexation process will reduce dust generated by agricultural activities. Land use changes necessary to accommodate future population growth will reduce PM_{10} emissions and improve local air quality.

3.15.7 Cultural Resources

Future growth will not adversely affect cultural resources. There are no registered historic sites or structures in the City of Somerton, nor have any archaeological sites been identified (Partners for Strategic Action, Inc., 2001). The City of Somerton will mitigate any potential adverse impacts to cultural resources by conducting the appropriate evaluations during the annexation and development approval and permitting processes.

3.15.8 Noise

Noise levels in the Somerton area will remain typical of a small urban community during future population growth. The basic types of activities in the City are not expected to change significantly, and vehicular traffic and agricultural activities will continue to be responsible for most noise generated in the area. The City will also likely continue to be subjected to noises generated by the Yuma Marine Corps Air Station/Yuma International Airport and associated activities. Construction activities associated with new development will likely result in temporary increases in local noise levels. It is anticipated that the City will closely regulate construction activities so that noise levels do not adversely affect local residences. Typical requirements to minimize construction-related noise impacts include limiting the duration of construction activities in residential neighborhoods to standard working hours (i.e., 8 AM to 5 PM) during weekdays. The City will restrict and monitor construction activities to minimize noise generated by new development.

3.15.9 Visual Resources

The agricultural character of the greater Somerton area will not be affected by future population growth. While the City of Somerton may expand by 560 acres during the 20-year design period, the scope of this expansion is minor relative to the amount of lands that will remain in active agricultural use. Somerton has the character of a small, isolated community, and the City is committed to ensuring that future growth occurs in a manner that is consistent with this character. The General Plan includes several measures, including the Future Land Use Plan and developing parks, and open space, which will ensure that the City retains its small-town aesthetic character during future growth (Partners for Strategic Action, Inc., 2001).

3.15.10 Solid and Hazardous Waste

Future population growth will increase the generation of domestic solid waste within the City. In keeping with Somerton's desire to retain a high level of public services during future growth (Partners for Strategic Action, Inc., 2001), it is anticipated that the City will continue to provide solid waste disposal services for new residents and businesses. Increased volumes of solid waste will likely require renewed contracts with private landfills in the area. The City will comply with all State and County requirements for solid waste disposal, and may have to modify the solid waste disposal fee schedule to pay for increased disposal costs. The increased generation of solid waste associated with population growth will not represent a significant adverse impact. There are currently no generators of hazardous waste in the City of Somerton. While it is unknown whether any generators of hazardous waste will become established in the City over the next 20 years, the City will likely evaluate such activities during permitting and approval processes.

3.15.11 Public Health and Safety

Future growth could potentially adversely affect public health and safety. Population growth will necessitate increased levels of police, fire, and emergency medical services. Somerton is committed to maintaining a high quality of community services. The City has anticipated these increased demands in these services, and identified several potential mechanisms to finance such services in the General Plan

(Partners for Strategic Action, Inc., 2001). Increased traffic could also represent potential hazards to public safety. In addition to enlarging the police force responsible for enforcing traffic laws, the creation of an efficient, multi-modal transportation system would also reduce the potential for adverse effects upon public health and safety. Finally, the City is committed to ensuring that future development is well planned, consistent with community goals, and compatible with existing land uses. The General Plan displays the City's commitment to these goals, which will promote public health and safety by ensuring that future development does not adversely affect the community and can be supported by public services.

3.15.12 Environmental Justice

Somerton has a relatively poor (45% of households at or below the poverty level), largely minority (96.1%) population. It is anticipated that most of the future population growth in the City will be associated with immigration from Mexico, and that Latinos and Hispanics will continue to comprise the vast majority of the population. While the City hopes to improve the economic status of its residents, the continued prevalence of low-paying, seasonal agricultural jobs will likely contribute to relatively low-income levels. While activities within the City will affect low-income and/or minority residents due to their prevalence, such activities would not disproportionately affect these groups. Future growth will not result in any environmental justice issues, and policies identified in the General Plan are aimed at improving the economic status of low-income and minority groups.

3.15.13 Energy

Energy use will increase as a result of future population growth. New residents will increase demand for electricity and natural gas in Somerton, and will increase use of gasoline for transportation. The APS has plans to increase electrical generation and infrastructure to support increased growth throughout Arizona over the next decade (APS, 2001). It is anticipated that Southwest Gas will also improve infrastructure as necessary to service anticipated growth throughout the state. The City of Somerton represents a small proportion of the service area for these utility companies, and both companies have developed public information programs to promote energy conservation. Future growth in the City of Somerton will not represent a significant adverse effect upon energy use.

3.15.14 Summary

Somerton has taken a proactive stance toward future development. The General Plan recognizes the need for land use and public service planning to promote sustainable, environmentally sensitive development (Partners for Strategic Action, Inc., 2001). The City's primary goals include facilitating future growth and associated economic development while retaining the local character and level of community service. The proposed WWTP reconstruction fits in with the overall City objectives, as it will provide effective and efficient wastewater treatment with the capacity to accommodate future growth. While not inducing growth or development, the new WWTP will ensure that the City is able to support new residents. The goals and policies identified in the General Plan will ensure that potential adverse impacts associated with anticipated population growth are minimized. The proposed action will not create any significant adverse secondary or indirect effects in Somerton.

4.0 ALTERNATIVES ANALYSIS AND EVALUATION

Alternative A would not alleviate existing environmental concerns associated with the WWTP. The primary issues include an inability to consistently meet NPDES requirements, generation of offensive odors that affect nearby residents, potential adverse effects upon surface water through discharge of effluent that does not meet NPDES requirements, potential health and safety hazards associated with the use of gaseous chlorine, and an ability to proactively plan for anticipated future growth.

Alternative B would resolve current inadequacies in wastewater treatment, and thereby alleviate the contravention of NPDES requirements, the potential adverse effects upon surface waters, health and safety risks associated with the use of gaseous chlorine, while providing for future growth. Alternative B is a lagoon-based system, and therefore retains the potential to generate offensive odors. This alternative would require the acquisition and disturbance of lands outside the existing WWTP site for construction of new lagoons, and could potentially affect cultural resources. This alternative would cost approximately 27% more than Alternative C.

Alternative C would resolve current inadequacies in wastewater treatment, and thereby alleviate the contravention of NPDES requirements, potential adverse effects upon surface waters, and health and safety risks associated with the use of gaseous chlorine. Relative to Alternative B, Alternative C provides the additional benefits of eliminating odor problems, not disturbing additional lands, supporting anticipated future growth, and would also cost 27% less. Alternative C also provides system efficiency and redundancy. As each tank in the SBR system acts as an individual treatment facility, only one tank will be operational until demand requires the second to go on-line. A lagoon-based system does not have this advantage, and lagoons constructed with capacity to facilitate future demand could not efficiently treat lower wastewater volumes. Alternative C would therefore be more efficient at treating wastewater volumes generated in the near future. System redundancy (the ability of one tank to continue to operate effectively when the other goes off-line) provides a safeguard against potential adverse environmental effects during accidental or routine system shutdowns. Alternative B does not provide this safeguard.

From environmental, financial, and risk management perspectives, Alternative C provides several advantages relative to Alternative B and is therefore identified as the preferred alternative.

5.0 MITIGATION MEASURES

NEPA guidance suggests that the evaluation of an action alternative should include consideration of means to reduce, or mitigate, adverse environmental impacts. Mitigation measures are identified to ensure that an action does not create any significant adverse effects. For the preferred alternative presented in this EA, however, the necessity for mitigation measures is somewhat limited because the environmental effects that have been identified are generally beneficial. The following positive effects would be realized by implementing Alternative C:

- elimination of potential for leakage of untreated wastewater from the lagoons into the groundwater table;
- improved effluent quality and compliance with NPDES requirements;
- improved water quality in the Yuma Main Drain with associated effects on aquatic biota;
- upgraded City wastewater infrastructure with associated socioeconomic benefits;
- reduction of offensive odors;
- improved public health and safety through the elimination of potential for lagoon leakage, improved effluent quality, and elimination of gaseous chlorine use at the WWTP; and
- system redundancy, which minimizes the potential for adverse environmental effects associated with sewer shutdown events and/or sewage bypass/overflow.

Potential negative or adverse effects associated with Alternative C could generally be minimized through the implementation of appropriate practices and technologies. Construction activities would be conducted in a manner sensitive to potential environmental impacts. Generation of dust and PM_{10} emissions would be minimized using appropriate and accepted methods. Construction traffic would be minimal, and controlled access to the WWTP site would reduce the potential for adverse effects to transportation resources. Construction activities would be limited to normal weekday working hours to minimize the potential effects to local residents associated with construction noise.

Increased utility costs and impact fees borne by the citizens of Somerton and future developers, respectively, would be necessary to partially finance the proposed project. Although increased utility costs would affect residents and businesses in Somerton, these costs would not create a significant adverse financial burden. The City would ensure that costs are equitably distributed among wastewater users, thereby minimizing the potential for significant adverse impacts to any specific user groups. Higher utility costs and impact fees would likely be phased in over a period of time to spread out the utility fee increases and prevent a substantial immediate jump that could adversely affect certain users.

Benthic lagoon deposits have been characterized as non-hazardous and suitable for land application. The City of Somerton would further investigate disposal options for lagoon benthic deposits to determine whether landfill disposal or land application represents the most environmentally sound and cost-effective solution in the long term.

ADEQ water quality standards for Yuma Main Drain do not include limits on chlorine or TRC in effluent, and there are no chlorine limits on the existing NPDES permit. Detailed analyses indicate that chlorine concentrations in WWTP effluent would quickly be diluted, thereby preventing any adverse effects. No mitigation measures are necessary.

6.0 REFERENCES

6.1 Literature Cited

American Pacific Engineering. 1996. Cost Comparison Analysis for the City of Somerton Wastewater Treatment Facility. 217 pages.

APS. 2001. APS website at http://www.aps.com accessed on August 24, 2001.

Arizona Department of Commerce. 2001. Somerton Community Profile. Arizona Department of Commerce website accessed July 25, 2001 at http://www.azcommerce.com.

Arizona Department of Environmental Quality. 2001. Annual Report 2000. 15 pages.

Baker, D. L., K. A. King, W. G. Kepner, and J. D. Krausmann. 1992. Pre-reconnaissance investigation of water quality, bottom sediment, and biota associated with irrigation drainage in the Yuma Valley, Arizona. U.S. Fish and Wildlife Service Fish-Wildlife Enhancement Program, Phoenix Arizona.

BECC. 2001. Engineering Analyses and Design for the Wastewater Treatment Facility for the City of Somerton, Arizona. Prepared by The Louis Berger Group, Inc. and Hazen and Sawyer Environmental Engineers and Scientists. 27 pages.

BECC. 2000. Replacement of the Wastewater Treatment Facility: Work Tasks 1, 2, 3, and 4. Prepared by The Louis Berger Group, Inc. and Hazen and Sawyer Environmental Engineers and Scientists. 102 pages.

BECC. 1996. Project Certification Criteria. 48 pages.

City of Somerton. 2001. 2000 Drinking Water Consumer Confidence Report PWSID# 44-015.

City of Somerton. 2000. 1999 Drinking Water Consumer Confidence Report PWSID# 44-015.

EPA. 2001. Region 9 Environmental Justice Program web site accessed on August 13, 2001 at http://www.epa.gov/region09/cross_pr/ej/goals.html

FEMA. 1983. Flood Insurance Rate Map for Yuma County, Arizona. Community Panel Number 040099-0875 B.

King K. A. and B. J. Andrews. 1996. Contaminants in Fish and Wildlife Collected from the Lower Colorado River and Irrigation Drains in the Yuma Valley, Arizona. U.S. Fish and Wildlife Service-Arizona Ecological Services Field Office. 22 pages.

Partners for Strategic Action, Inc. 2001. Draft Somerton General Plan. 69 pages.

Robson, S. G. and E. R. Banta. 1995. Ground Water Atlas Of The United States: Arizona, Colorado, New Mexico, Utah. U.S. Geological Survey Publication HA 730-C. 46 pages.

U.S. Bureau of Reclamation. 2001. Information obtained on July 23, 2001 from Bureau of Reclamation website at http://dataweb.usbr.gov/html/yuma.

U.S. Fish and Wildlife Service. 2001. List of Threatened and Endangered Species obtained on July 25, 2001 from the Region 2 website at http://ifw2es.fws.gov/EndangeredSpecies.

Yuma County Department of Development Services. 2001. Map of Yuma County Noise Contours and Rezonings.

Yuma Metropolitan Planning Organization. 2001. Data obtained on July 25, 2001 from YMPO website at http://www.ympo.org.

USDA Soil Conservation Service. 1977. Soil Survey of the Yuma-Wellton Area, Arizona-California. 43 pages.

USDA Soil Conservation Service. 1980. Map of Important Farmland Yuma-Wellton Area, Yuma County, Arizona and Imperial Valley, California. Sheet 2 of 4.

6.2 Agencies and Persons Contacted

Arizona Department of Commerce, July 2001.

Arizona Department of Environmental Quality- Air Quality Section, Shera Zandau, July 2001.

Arizona Department of Environmental Quality- Air Quality Section, Andra Jumiel, July 2001.

Arizona Department of Environmental Quality- Water Quality Section, Don Bell, August 2001

Arizona Department of Environmental Quality- Water Quality Section, Lori Hildebrand, August 2001.

Arizona Department of Environmental Quality- Water Quality Section, Kaumil Parghi, July 2001.

Arizona State Parks- State Historic Preservation Office, Carol Griffith, August 2001.

Border Environment Cooperation Commission, Carlos Quintero, Project Manager, July 2001.

City of Somerton, Cliff O'Neill, Community Development Director, July 2001.

City of Somerton, Edmundo Mendez, Director of Public Works, July 2001.

Hazen and Sawyer Environmental Engineers and Scientists, Peter Robinson, July 2001.

USDA- Natural Resource Conservation Service, Bobbi McDermott, District Conservationist, July 2001.

U.S. Environmental Protection Agency- Region 9, Evelyn Wachtel, Environmental Protection Specialist, July 2001.

U.S. Environmental Protection Agency- Region 9, Gary Wolinsky, Surface Water Quality, August 2001.

U.S. Environmental Protection Agency- Region 9, Jacques Landy, Surface Water Quality- Environmental Engineer, August 2001.

U.S. Environmental Protection Agency- Region 9, Nancy Woo, Water Division Office Chief, July 2001.

Yuma County Department of Development Services, Brad Weekley, July 2001.

APPENDIX A

Correspondence to Arizona SHPO

Call Douglas Liden (415-972-3406) to Obtain this correspondence.