SEAGO

Section 208

Water Quality Management Plan

February 23, 2012

Acknowledgements

Upper Adobe Canyon, Santa Rita Mountains, Santa Cruz County, Arizona

Contributions:

This document was made possible through contributions from the following agencies, funding sources, groups, and individuals –

- The U.S. Environmental Protection Agency (EPA) – funding through the American Recovery and Reinvestment Act of 2009 ($30,980)
- The Arizona Department of Environmental Quality (ADEQ) – Linda Taunt, Diana Marsh, Edwina Vogan
- The SEAGO Environmental Review Committee – 29 individuals from SEAGO member entities, watershed groups, and other key stakeholders
- Susan Buchan – former SEAGO Environmental Planner
- Randy Heiss – SEAGO Executive Director

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CHAPTER 1, EXECUTIVE SUMMARY

OVERVIEW

The SEAGO 208 Water Quality Management Plan (SEAGO 208 Plan) establishes strategies and processes to provide regional coordination in developing wastewater treatment facilities and for efforts to protect water quality. The SEAGO 208 Plan is essentially an agreement between SEAGO, entities operating wastewater utilities within the region, the Arizona Department of Environmental Quality (ADEQ), and the U.S. Environmental Protection Agency (EPA) to implement these strategies and processes. It is referred to as the SEAGO 208 Plan because it fulfills water quality planning requirements established in Section 208 of the federal Clean Water Act. The purpose of this planning effort is to update the existing SEAGO 208 Plan to:

- Assure adequate wastewater facilities in the SEAGO region;
- Take advantage of economies of scale, treatment efficiencies, new and better treatment technology, and conservation practices where possible;
- Identify and address water quality and wastewater issues; and
- Improve effectiveness and efficiency of 208 Plan Consistency Reviews.

The previous SEAGO 208 Plan, adopted in 1994, was primarily an inventory of then-existing wastewater treatment facilities in the region and the 20-year capacity projections for those facilities. As new facilities were proposed or capacity projections needed modification, a "plan amendment" was required to update the regional plan. The plan amendment process is both time-consuming, costly and of questionable value, especially when it involves a city, town, or sanitary district. Expansion of a public wastewater treatment facility requires multiple public processes including planning and zoning hearings and approval of capital expenditures by the governing body for design and construction. The requirement for a separate 208 amendment often resulted in a large amount of expended effort with little to no public participation because the project was already well publicized and approved through other processes.

The new SEAGO 208 Plan incorporates a Strategic Plan of goals with strategies and tactics to achieve those goals. For example, the expansion of an existing treatment facility will not trigger a plan amendment if it is found consistent with the goals and strategies in the 208 Plan. Only those proposed actions that are not found consistent with the Strategic Plan will require a plan amendment as outlined in Chapter 6, Plan Implementation.

The planning effort encourages and tries to assure the development and maintenance of sufficient, efficient, cost effective, reliable, and sustainable wastewater treatment and disposal systems. The new Plan includes strategies that encourage the use of sustainability and resource conservation practices and address water quality problems from sources other than wastewater treatment and disposal. The SEAGO 208 Plan also encourages local land use decision makers to consider the goals of the SEAGO 208

Plan when making planning and zoning decisions that involve development, wastewater management, and stormwater impacts.

Consistency Reviews

Federal and state regulations require that certain proposed actions related to wastewater facilities must be consistent with the SEAGO 208 Plan. According to state regulations, the following actions can only be approved if ADEQ determines that the proposal is consistent with the SEAGO 208 Plan:

- Permitting the proposed construction or expansion of a sewage treatment facility with combined flows over 24,000 gallons per day (gpd) [1]
- Discharges to surface waters that require an individual Arizona Pollutant Discharge Elimination System (AZPDES) permit [2]
- Provision of a grant or loan through the Water Infrastructure Finance Authority (WIFA) [3] A.A.C. R18-15-202.B.8

State regulations do not require a 208 consistency determination for on-site wastewater systems (e.g. septic systems) under 3,000 gpd, on-site systems if combined flows would be under 24,000 gpd, sewer collections systems, subdivisions served by on-site systems, or reclaimed water systems.

Although consistency determinations (e.g., Consistency Reviews) *are not* required by regulation for developments such as subdivisions that rely on-site systems, ADEQ 208 staff will work with SEAGO to complete a preliminary 208 review of these to determine whether the proposal is consistent with the 208 Plan strategies (e.g. Wastewater Treatment Options Table), if it is within an existing Service or Planning Area, and to coordinate with county and municipal officials in the region.

Similarly, 208 Consistency Review may be necessary when approving small satellite treatment plants, or community systems to assure that strategies in the 208 Plan are implemented (e.g. high priority areas for sewer lines, coordination with Designated Management Agencies, economies of scale, the Wastewater Options Table in Chapter 6, etc).

To assist the readers in understanding the acronyms and terminology used in this document, a Glossary of Terms is provided as **Appendix C**.

Issues and the Strategic Plan

The major water quality and wastewater issues were identified to initiate plan development by a stakeholder group representing the municipalities in the SEAGO region and other interested parties. The issues and strategies developed in this plan are summarized below:

[1] A.A.C. R18-9-A201(B)(6)(a) & A.A.C. R18-5-303(1)
[2] A.A.C. R18-9-A903(6)
[3] A.A.C. R18-15-202.B.8

Issue 1 – Strategies to assure adequate future wastewater treatment facilities:

A. Designated Management Agencies and Wastewater Management Utilities – The Clean Water Act requires each CWA 208 Plan identify entities that have the legal, institutional, financial, and managerial capabilities to carry out aspects of the 208 Plan. These public entities include local, regional, or state agencies and political subdivisions. In the SEAGO 208 Plan, a wastewater treatment facility operated by a public entity must be able to demonstrate that it has the legal, institutional, financial, and managerial capabilities and resources to construct, operate, and maintain the wastewater facilities it is proposing, or is already operating, and be certified as a Designated Management Agency (DMA).

   Non-public entities that are wastewater providers (e.g. a private utility) cannot be approved as a "DMA" because they are not an agency or political subdivision. However, ADEQ will still require the entity to demonstrate that it has the same capabilities to function as a DMA within its Certificated Area of Convenience and Necessity as approved by the Arizona Corporation Commission. If ADEQ finds adequate demonstration, the entity would be approved as a Wastewater Management Utility (WMU) under the SEAGO 208 Plan.

   Approval of some large developments or expansion of some wastewater facilities would be contingent on being certified as a DMA or approved as a WMU. Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 1.1.A.).

B. Expansion Triggers and Capacity Assurance – The expansion design phase for wastewater facilities will be triggered by the expected flow of wastewater coming into the plant compared to the facility's design capacity approved under its Aquifer Protection Permit (see equation below).

Design Phase Trigger Equation

Operational Flow (entering facility)	+	Expected New Flows (planned sewer extensions)	+	Capacity Assurance (promised to developers)	=	85% of Approved (Design Capacity)

   As discussed in Chapter 6, new capacity assurance procedures and local ordinances are needed so that a wastewater treatment plant's capacity is not committed indefinitely to proposed developments that will no longer be built. Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 1.1.A.). SEAGO will work closely with ADEQ to ensure that state rules and policies are also met.

Issue 2 – Determining best options for wastewater treatment

A. Wastewater Treatment Options Table - Criteria for determining options for a proposed development or replacement wastewater system is established in the Wastewater Treatment Options Table in Chapter 6. A second *guidance* table provides criteria for determining whether a development should connect to a sewer based on the distance from the sewer lines. Both tables will be used for 208 Consistency Reviews. However, additional local ordinances will be needed to implement the criteria in these tables (beyond existing consistency requirements) for wastewater facilities (e.g. on-site systems, dry sewer collection systems, connections to sewers when available). Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 1.1.C.).

B. Cost-effectiveness, Economies of Scale, Treatment Efficiencies, and Sustainability and Resource Conservation - Proposed wastewater treatment facilities should demonstrate the best cost-effective technologies. Facility design should consider sustainability and resource conservation, economies of scale, and treatment efficiencies even though these are not required in regulations. For example, in some cases it may be less expensive and more effective in the long-term for the utility to expand an existing wastewater treatment system, rather than create new smaller facilities. Reuse of gray water, effluent, and biosolids should be included in the design, when appropriate. The facility should be designed to have a low impact on the surrounding community and to conserve resources (i.e. low impacts, low energy, "green" infrastructure). New technologies should be considered, such as the regional reuse of biosolids to create electricity. Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 4.1.B.).

C. High Priority Areas for Sewer Lines and Sensitive Areas - Some areas are not suitable for on-site wastewater septic systems according to current Aquifer Protection Permit regulations due to high groundwater, floodways, or other concerns. These could be considered "sensitive areas." There may be other areas in the SEAGO region where older wastewater systems have begun to fail. Also, some wells in the region are nearing the Aquifer Water Quality Standard for nitrate (10 mg/L), making these areas unsuitable for additional nitrogen loading from septic systems. SEAGO intends to develop a GIS database to track these areas in order to encourage development of centralized wastewater treatment facilities rather than the use of conventional on-site septic systems. Where densities are too low to justify centralized treatment, alternative treatment technologies to reduce nitrogen should be considered. Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategies 1.1.B. and 1.1.C.).

Issue 3 – Communication and Coordination Strategies:

A. The SEAGO Environmental Review Committee (ERC) - The purpose of the ERC is to improve coordination and communication within the region and with ADEQ to assure that new and

replacement wastewater facilities and systems are consistent with the regional 208 Plan. The ERC will help support the public review process portion of 208 Consistency Reviews and will also help implement other strategies in this Plan. The ERC may include representatives from the Designated Management Agencies, Wastewater Management Utilities, and other interested stakeholders. Formalization of the ERC as a standing committee pursuant to the SEAGO Bylaws is recommended (see Chapter 5, Strategy 3.1.A.).

B. Memorandums of Understanding (MOU) and Intergovernmental Agreements (IGA) - Additional MOUs and IGAs may be needed to implement this plan and minimize potential conflicts as wastewater treatment plants, sewer collection systems, service areas, and planning areas are modified. Formal understandings may be needed to assure long-term, cost effective wastewater services to an area. For example, if new development is on the fringe of a municipal service area but adjacent to the service area of a neighboring municipality's treatment facility, an IGA could be developed to have service provided by the neighboring municipality if it is more cost effective.

C. SEAGO Website – In order to help direct development of wastewater treatment facilities in the region and to facilitate 208 Consistency Reviews, SEAGO will be posting information to its existing website. This website will incorporate and integrate information from existing facilities and GIS databases developed over time in response to the strategies contained in this Plan. This information will then be available to a broad audience - developers, community members, and other agencies. It is anticipated that this website will initially provide the following information:

- The inventory of public and private wastewater treatment facilities: location, design capacity, existing disposal methods;
- A record of Consistency Reviews performed, which may include information on the proposal such as location, capacity, change in service or planning area, treatment and disposal methods, AZPDES discharge location(s), subdivision information, etc.;
- The Wastewater Treatment Options Table;
- Existing wastewater treatment facilities service areas and planning areas; and
- Other information that may support Consistency Reviews.

Over time, should funding become available to do so, the website may be expanded to include the following additional information (see Chapter 5, Strategies 1.1.B., 1.1.C., 2.1.A., 4.1.A., and 5.1.B.):

- Sensitive areas, where on-site wastewater treatment systems may not be appropriate;
- High priority areas for sewer lines;
- Surface waters classified as "impaired" or "outstanding Arizona waters (OAWs)";
- Surface waters with established Total Maximum Daily Loads;
- Wells sampled for nitrate, highlighting wells near or exceeding 10 mg/L (the Aquifer Water Quality Standard); and
- A listing of funding sources for water quality management projects.

The website will eventually replace the facility maps and information presently in **Appendix B** because this information will become outdated over time. Information at this website will be updated annually based on Consistency Reviews, approved facilities, and other information provided by ADEQ.

Issue 4 – Public Support Strategies:

A. Improve Educational Opportunities – Increasing public awareness about water quality issues through outreach and education would encourage citizen involvement. Citizens would become educated about a wide range of water quality issues, including wastewater treatment issues, the harmful effects of improper disposal of chemicals, drugs, grease and other products unsuitable for sewer disposal, the adverse impacts of sediment discharged in stormwater from unpermitted grading and development activities, the proper care and maintenance of septic systems and more. Local, state, and federal agency members can assist with their knowledge and resources. Through these educational endeavors, citizen support needed to create or expand wastewater treatment facilities may be improved. Fostering partnerships with local, state, and federal agencies, and academic institutions to develop local outreach and education programs is a recommended strategy under several of the goals in Chapter 5.

B. Incentives to Connect to Sewer Collection Lines - Once sewer collection lines are available to an area, property owners should connect to these centralized collection and treatment systems, especially where there are failing on-site systems. Clear incentives and ordinances are recommended to avoid disputes if individuals are expected to discontinue using existing wastewater treatment and pay to connect to centralized sewer (see Chapter 5, Strategy 1.1.C.). These ordinances and incentives should be established when an area becomes a service area, a planning area, or a "high priority area for sewer lines."

Issue 5 – Impaired Surface Waters and Wells Not Meeting Aquifer Water Quality Standards Strategies:

A. Stormwater Best Management Practices - Stormwater runoff from certain sources often contains many toxic and pathogenic pollutants. Stormwater can also cause extensive damage from flooding to soil erosion. Stormwater management practices would mitigate further pollutant loading to streams, canals, lakes, and rivers. Partnerships and efforts (see discussion above) can help provide landowner education about stormwater Best Management Practices. Practices that retain rainwater on the property can reduce stormwater impacts, provide water for landscaping and help recharge the aquifer. Expanding education efforts and development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategies 2.2.A., 2.2.C., and 5.1.A.).

B. Agricultural Best Management Practices - Agricultural Best Management Practices for crop production and livestock grazing need to be further encouraged to mitigate pollutant loading to surface water and groundwater. Increased collaboration, education, and development of model

ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 2.2.B.).

C. Consider Impacts to Impaired Waters - The review of proposed developments and wastewater facilities needs to consider potential impacts to:

- A surface water assessed as "impaired" or "not attaining uses";
- Adopted Total Maximum Daily Load (TMDL) allocations to an impaired surface water; and
- Groundwater quality if nearby wells are at or near an Aquifer Water Quality Standard (e.g., nitrates near or above 10 mg/L).

Development of model ordinances for consideration by local jurisdictions is recommended as a strategy to address this issue (see Chapter 5, Strategy 2.2.A.).

Issue 6 – 208 Process Inefficiencies Strategies:

A. 208 Review Process - The 208 review process is being revised to avoid past inefficiencies and reduce costs. The new process, including the public review component, is described in Chapter 6. The process efficiency is supported by the development and use of the Wastewater Treatment Options Table, the SEAGO ERC, the SEAGO Website, and other strategies in this plan.

B. Quarterly Reporting to AOEQ - SEAGO will report quarterly to ADEQ concerning progress on implementing the 208 Plan. The report will include any barriers to accomplishing objectives, recommendations concerning strategy modifications, and highlights of any achievements.

C. Annual Updates - The SEAGO website information will need to be updated annually based on the Consistency Reviews performed and other information that may become available.

D. 208 Plan Revisions Process - The 208 Plan should be reviewed and revised (if needed) every five years using the process described in Chapter 6. Revisions could also be done during interim years, if needed. Revisions would be required for changes in:

- Strategic plan goals, objectives, or strategies (Chapter 5)
- The processes described in Chapter 6 (if significant)
- The Wastewater Treatment Options Table (in Chapter 6)

Unlike requirements under the previous SEAGO 208 Plan, this improved and updated 208 Plan will not need to be revised to approve new or expansion of wastewater treatment facilities. A comparison of the plan amendment conditions under the previous SEAGO 208 Plan and the current 208 Plan is presented in Table 1.1. Although a Consistency Review will still be required for these conditions, the process for such is much less burdensome and costly for the applicant than amending this Plan (see Chapter 6, and Table 6.1).

Table 1.1 – Comparison of Plan Amendment Conditions

Condition	Previous 208 Plan	Current 208 Plan
New Designated Planning Agency (DPA)	Yes	Yes
New Designated Management Agency (DMA) or Wastewater Management Utility (WMU) approval	Yes	Yes
New or renewed Arizona Pollutant Discharge Elimination System (AZPDES) or Aquifer Protection Permits (APP)	Yes	No
Changes in DMA or WMU Service Areas or Planning Areas	Yes	No
Proposed construction and permitting of a Wastewater Treatment Plant (WWTP)	Yes	No
Expansion of existing WWTPs	Yes	No
Changes in or adoption of site specific water quality standards or Total Maximum Daily Loads (TMDL)	Yes	No
Proposed subdivision or planned community	Yes	No

Plan Implementation

This plan will be implemented by instituting the processes, criteria, and tools described in Chapter 6. Where 208 Consistency Reviews are required, the processes and criteria are also established in Chapter 6.

To adequately implement several strategies of this plan, additional local ordinances are recommended to provide additional regulatory authority. Another impediment to full plan implementation is a lack of funding mechanisms. For example, many of the tactics underlying certain strategies in this plan involve the development and deployment of GIS data and mapping capabilities beyond SEAGO's current capacity to carry out. While SEAGO will pursue funding to implement the strategies in this plan, the availability of such funding is not assured.

CHAPTER 2, AUTHORITY & PURPOSE

AUTHORITY

There have been numerous water pollution control laws to reduce or eliminate pollution in interstate waters and improve sanitary conditions of groundwater and surface water starting with the Water Pollution Control Act of 1948. This original act has been amended a number of times. The Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) stipulated broad national objectives to restore and maintain the chemical, physical, and biological integrity of the Nation's waters and established many of the control programs still in effect today.

The 1972 law, commonly referred to as the Clean Water Act (CWA) provided the legal framework for regulating and minimizing water pollution in the U.S. through the following outcomes:

- Established the basic structure for regulating pollutants discharges into the waters of the United States – the National Pollutant Discharge Elimination System (NPDES) permit program and the Section 404 Dredge and Fill program;
- Gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry;
- Maintained existing requirements to set water quality standards for regulated contaminants in surface waters;
- Made it unlawful for any person to discharge any regulated pollutant from a point source into navigable waters, unless a NPDES permit was obtained under its provisions;
- Funded the construction of sewage treatment plants under the construction grants program;
- Recognized the need for planning to address the critical problems posed by nonpoint source pollution.

The CWA recognized the advantages of allowing states and tribal nations to set criteria for water quality appropriate to their location, taking into account local environmental conditions, the effects of geological formations, and prevalent regional industries. The Act also established the mechanism for providing funding and planning to states, regions and municipalities for adequate wastewater infrastructure and for the protection of riparian areas, wetlands, and critical habitat through pollutant discharge permitting.

Amendments to the CWA passed in 1987 placed increased emphasis on control of nonpoint source pollution and expanded the NPDES permit program to include municipal and industrial storm water discharge. EPA delegated the NPDES program to Arizona in December, 2002. The state program is referred to as the Arizona Pollutant Discharge Elimination System (AZPDES) permit program.

In 1986, Arizona passed the Environmental Quality Act (EQA -HB 2518) which established the Aquifer Protection Permit Program. The program requires permits for the discharge of pollutants to any land or vadose zone when there is a reasonable expectation that the pollutant will reach an aquifer. The APP

program also protects all aquifers in the state for drinking water purposes. The program defines specific instances when a permit is required, classes of activities that require a more general permit, and discharges that are exempt from permitting. The EQA manages nonpoint source pollution through implementation of Best Management Practices (BMPs).

Other programs that address water quality in the state include the Safe Drinking Water Act (SDWA), located in Title 18, Chapter 4, of the Arizona Administrative Code and the Water Quality Assurance Revolving Fund. The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. The SDWA establishes standards for allowable levels of contaminants as set by the EPA, and also allows incorporation of state-specific drinking water rules.

The 1986 amendments to the SDWA placed more stringent requirements on drinking water supply systems for treatment, monitoring, and reporting. The 1996 amendments greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water. This approach ensures the quality of drinking water by protecting it from source to tap.

The Water Quality Assurance Revolving Fund (WQARF) was created under the EQA in 1986 and authorizes the ADEQ to identify, assess and remediate surface water, groundwater, and soils contaminated with hazardous substances. The fund is dependent upon legislative appropriations, cost recovery from responsible parties, corporate income tax and special fees. The program identifies sites that are most in need of cleanup and adds them to the WQARF Registry. Sites on the Registry receive first consideration for distribution of funds. There are currently 35 sites on the WQARF Registry. The only site in the SEAGO region is Klondyke Tailings which was placed on the WQARF Registry in September 1998.

A detailed explanation of Federal and State laws, regulations, and ordinances governing water quality is contained in **Appendix A.**

The U.S. Environmental Protection Agency (EPA) is the agency of the Federal government empowered with enforcement authority for the CWA. Additional changes and amendments enacted in subsequent years have further defined the scope of the law, including the relationship between the (EPA) and the states. In Arizona, the state agency designated to carry out the requirements of the CWA is the Arizona Department of Environmental Quality (ADEQ). As part of the Regional Water Quality Management Planning Program, ADEQ has the following responsibilities:

- Serving as the state-planning agency for water quality.
- Coordinating with the five Councils of Governments (COGs), and three counties - La Paz, Mohave, and Yuma Counties, that serve as Designated Planning Agencies (DPAs) whose role is to coordinate water quality planning for their member entities or geographic jurisdiction.

- Overseeing coordination of water quality management plan amendments and updates.
- Ensuring that proposed construction of wastewater treatment facilities and water quality protection permits conform to the regional 208 Plan in accordance with the state's Continuing Planning Process.

In 1976, the **S**outh**E**astern **A**rizona **G**overnments **O**rganization (SEAGO), a non-profit regional Council of Governments (COG), was designated by the Governor as the Designated Planning Agency (DPA) for the four-county region covering Cochise, Graham, Greenlee and Santa Cruz counties. As mentioned above, ADEQ is the coordinating agency for the DPAs in specific regions of the state, who in turn coordinate planning for their member entities. The responsibilities of DPAs include:

- Oversee the implementation of the water quality management plan and coordinate necessary amendments;
- Ensure that proposed construction of wastewater treatment facilities and water quality permits conform to the regional 208 Plan in accordance with the state's Continuing Planning Process;
- Identify existing and proposed wastewater treatment facilities to meet the anticipated municipal and industrial waste treatment needs of an area over a 20-year period;
- Provide general planning guidance for nonpoint source pollution, sludge, storm water and other activities that might impact water quality; and
- Facilitate public participation in the regional planning process.

DPAs also author and update the regional 208 Water Quality Management Plan on an as-needed basis, however, this document for the SEAGO region was last revised nearly seventeen years ago (1994). Since that time, the SEAGO region has experienced significant population growth and shifting demographics, suburban/exurban sprawl, a changing regional economic base, and has expanded its membership to include the southern/central portion of the San Carlos Apache Reservation.

DPAs are also responsible for establishing a regional 208 Review Committee comprised of a representative sample of the COG members' government officials, staff, and private citizens concerned with water quality in the area. This body is tasked with initial review of development and expansion proposals for wastewater treatment facilities, as well as input to revisions of the regional 208 Water Quality Management Plan.

SEAGO's 208 Review Committee is referred to as the Environmental Review Committee or the 'ERC'. The ERC is part of a more simplified and efficient process of 208 review. Using the guidelines outlined in later chapters, the ERC has the responsibility to review wastewater projects and make a consistency recommendation to ADEQ. In the event it is determined that a proposal triggers the necessity for an amendment to the regional 208 Plan, SEAGO and the ERC initiate and preside over the public input portion of the amendment process. A complete overview of the amendment process is detailed fully in Chapter Six of this document.

Designated Management Agencies (DMAs) are entities that have been designated in a regional 208 Water Quality Management Plan to manage sewage treatment facilities and sewage collection systems in their respective service areas. The Clean Water Act requires each CWA 208 Plan identify entities that have the legal, institutional, financial and managerial capabilities to carry out aspects of the 208 Plan. These public entities include local, regional, or state agencies and political subdivisions. A more detailed description of DMAs is provided in Chapter 6. An entity seeking DMA approval must demonstrate it has the authority and capability to serve in this capacity. In Arizona, DMAs are predominantly municipalities, but DMAs can also be sanitary sewer districts, wastewater improvement districts, and in one case, a county (Pima). However, Arizona Revised Statutes §11-264 limits county-owned wastewater treatment facilities to:

"Any county with a population between five hundred thousand and one million persons according to the most recent United States decennial census may purchase, construct or operate a sewage system, including the collection, transportation, pumping, treatment and disposal of sewage, and charge fees and levy taxes therefor."

As of this writing, none of the four counties in the SEAGO region is likely to meet the statutory population requirements within the next twenty years, even if there were available funding and political will to pursue development of county owned and operated WWTPs.

Not all wastewater providers will be municipal or public facilities. The SEAGO area, as well as the state of Arizona, has seen a dramatic increase in the last decade of private wastewater entities. Private utilities that serve as domestic wastewater providers are generally regulated by the Arizona Corporation Commission (ACC). These non-public entities that are wastewater providers (e.g. a private utility) cannot be approved as a "DMA" because they are not an agency or political subdivision. However, ADEQ still requires the entity to demonstrate that it has the same legal, institutional, financial and managerial capabilities to function as a DMA within its Certificated Area of Convenience and Necessity as approved by the ACC. If ADEQ finds adequate demonstration, the entity would be approved as a Wastewater Management Utility (WMU) under the SEAGO 208 Plan.

PURPOSE

The purpose of the SEAGO Section 208 Water Quality Management Plan (hereinafter "the SEAGO Plan") is to implement Section 208 of the CWA, which requires development of area wide water quality management plans. The purpose of the water quality management planning process as described in the CWA is to provide:

> "A consistent national approach for maintaining, improving and protecting water quality while allowing states to implement the most effective individual programs".

The purpose of the SEAGO Plan is not to create another administrative obstacle or impose a financial burden on an entity wishing to maintain improve or protect water quality. Rather, the Plan should echo the purpose described in the CWA, except on a regional level. Therefore, the purpose of this Plan is:

> "To provide a consistent regional approach for maintaining, improving and protecting water quality in the SEAGO Planning Area".

In the process of rewriting the SEAGO Plan, the ERC determined that because of the varying characteristics of the region, a "watershed planning" approach could help to ensure consistent water quality management planning for the SEAGO region. Watershed planning is described in more detail below.

WATERSHED PLANNING

The Clean Water Act and the Safe Drinking Water Act both champion the concept of the "watershed planning", an approach based on hydrological conditions versus political boundaries. The U.S. Environmental Protection Agency (EPA) defines a watershed as such:

> *"A watershed is the area of land where all of the water that is under it or drains off of it goes into the same place"*

The EPA also references the definition of John Wesley Powell, scientist geographer, who defined a watershed as:

> *"…that area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community."*

FIGURE 2.1

Source: Ottawa Gatineau Watershed Atlas

As illustrated in Figure 2.1 above, watershed water quantity and quality can be impacted by many sources: precipitation, feeder bodies such as lakes and ponds, sub basin inflows, waste water treatment discharges from communities and developments. In addition, vegetation, soil conditions and local topography may affect water quality within water sheds by their effect on erosion an runoff to surface waters, and the filtering effects (or lack thereof) of certain soil types, geological formations and subterranean features. The characteristics of the SEAGO planning area will be detailed more fully in Chapter 3.

Below ground, numerous basins and aquifers, the geologic formations that allow for the storage of groundwater may be found in a single watershed. These formations provide water to naturally occurring seeps and springs, and are penetrated when man-made wells are drilled to provide groundwater for agricultural, industrial, municipal and residential uses.

While the surface limits of some watercourses (rivers, streams) define political boundaries, (such as the Colorado River creating the western border of Arizona with California), watershed regions below ground are rarely seen as an actual boundary, even though the activities in one part of the watershed may eventually impact both the quality of surface waters, and ground water throughout the watershed. Thus, watershed boundaries rarely have any resonance with geopolitical borders above ground; however; conditions at one portion of a watershed have the potential to negatively or positively impact the watershed as a whole, regardless of whether the entire watershed is under one governmental entity.

Although SEAGO is only authorized as a DPA for the four county region of Cochise, Graham, Greenlee and Santa Cruz, the watersheds within the region transcend local, state, and even international boundaries. The value of this approach is well understood, and necessitates that SEAGO will work to foster an integrated, cooperative approach to long term watershed planning with its neighbors.

RELATED INFORMATION

A link to the full text of the Clean Water Act is provided in **Appendix A.**

The previous (1994) version of the SEAGO regional 208 Area Wide Water Quality Management Plan is available for viewing at: http://www.seago.org/environment/wqmp.html

For more information on the role of Arizona's Councils of Governments see: http://www.mag.maricopa.gov/archive/AZ-COGs/index_Working-03.asp

A draft of the 2008 AZ Amended Drinking Water Quality Rules currently being amended to provide uniformity between the Federal and State standards, is available at: http://www.azdeq.gov/environ/water/dw/download/dw_rules.pdf

For additional information on the Arizona Water Quality Assurance Revolving Fund (WQARF) and Superfund sites in the State of Arizona: http://www.azdeq.gov/environ/waste/sps/program.html

CHAPTER 3, AREA WATERSHEDS

THE SEAGO REGION

Figure 3.1

There are six Councils of Governments (COGs) in the State of Arizona responsible for a range of regional planning efforts. However, there are five COGs and three counties – Mohave, La Paz and Yuma responsible for water quality management planning. SEAGO is the COG for a planning region consisting of four counties in the southeast corner of Arizona: Santa Cruz, Cochise, Graham and Greenlee and also includes the Southern portion of the San Carlos Apache Reservation that lies within Graham County (see Figure 3.1). The SEAGO area includes fourteen incorporated cities and towns; the balance of the land is unincorporated and primarily very rural in nature. Santa Cruz and Cochise counties share a southern border with the state of Sonora in Mexico, and eastern Cochise and Greenlee Counties share a border with New Mexico.

The region is sparsely populated, with a total planning area population of 224,423 (2010 US Census Bureau). Cochise and Santa Cruz Counties are expected to experience significant population growth in the next two decades. Graham County growth projections are more moderate, and Greenlee projections forecast no increase (-1.7%) in population. Regional population growth projections over the 20-year planning horizon are illustrated in Table 3.1 below:

Table 3.1 – SEAGO 20-Year Population Projections

County	2010	2030	Estimated % change
Cochise	131,346	187,725	43%
Graham *	37,220	44,556	19.7%
Greenlee	8,437	8,289	-1.7%
Santa Cruz	47,420	71,033	49.7%
Total	**224,423**	**311,603**	**38.8%**

**Includes the San Carlos Indian reservation*
Source: Arizona Dept of Economic Security Research Administration, Population Statistics Unit; April 1, 2010 Census

Land ownership varies by county, with a mix of state and federal government lands, tribal lands, and privately held acreage. Although Cochise County has a relatively low proportion of publicly held land when compared to other Arizona counties, Greenlee County has a very high proportion of public land. The proportions of public lands for each county in the SEAGO region is presented in Table 3.2 below:

Table 3.2 – Public-Private Land Distribution in the SEAGO Region

County	Privately Owned	National Forest/BLM	State Trust	Tribal	Military/Other
Cochise	40%	22%	35%	-	3%
Graham	9.9%	38%	14%	36%	-
Greenlee	8%	77%	15%	-	-
Santa Cruz	37.5%	54.6%	7.8%	-	-

Source: AZ Department of Commerce; AZ State Parks

Topography

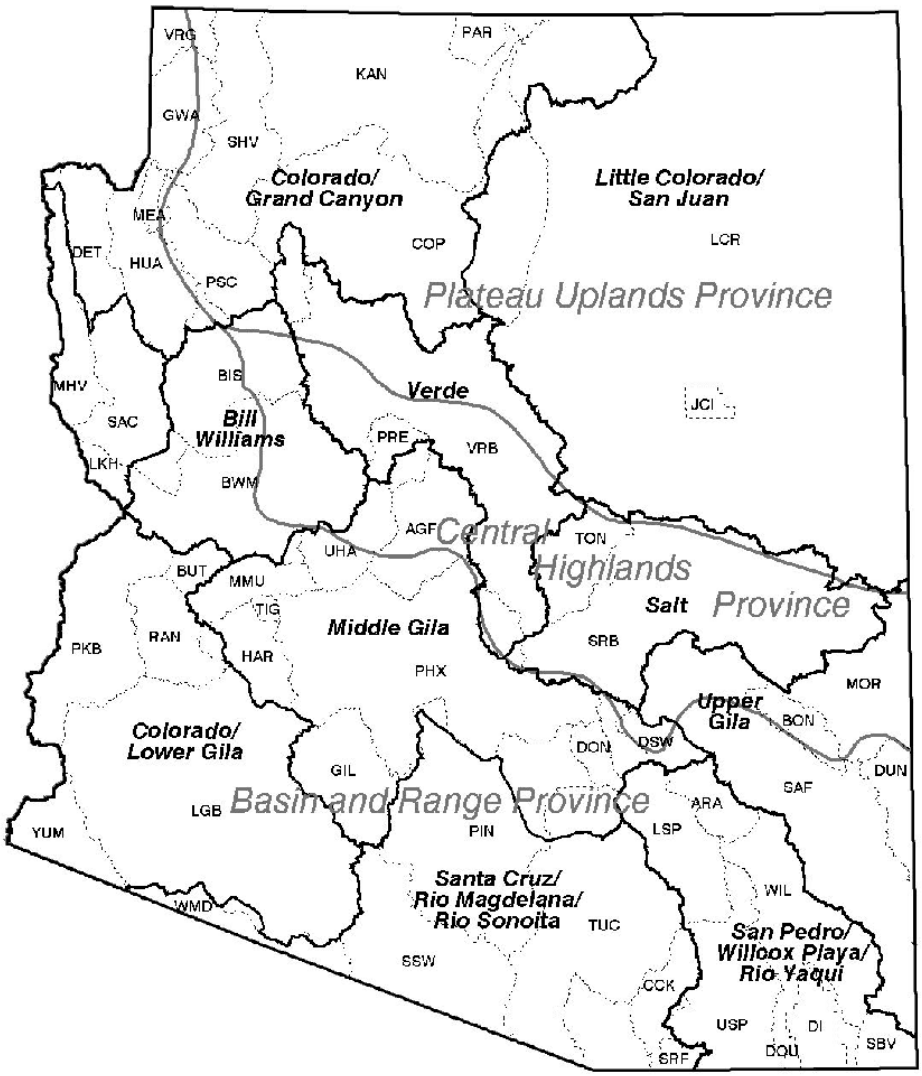
The land area within these geopolitical boundaries is vast – over 13,884 square miles, an area equivalent to the size of Rhode Island, Connecticut, and Delaware combined. It lies in the physiographic [1] province known as "Basin and Range". Centered on the state of Nevada and extending from southern Oregon to western Texas, the Basin and Range Province is an immense region of faulted mountains and flat valley floors. It has no counterpart elsewhere in the United States. The province was created about 20 million years ago as the Earth's crust stretched, thinned, and then broke into mountain blocks that partially rotated from their originally positions. Mountains of late Precambrian and Paleozoic rock continue to erode and fill the intervening valleys with fresh sediment [2].

As shown in Figure 3.2, there are several distinct sub-regions within the region. The far northern reaches of the SEAGO region are located in the Central Highlands physiographic sub region; however, most of the planning area is located in the physiographic sub region known as the Mexican Highlands. This area is characterized by northwest-southeast trending mountain ranges separated by broad alluvial valleys. The valley elevations are approximately 2,000 to 4,000 feet above sea level; the highest summits in the region are from 9,000 to 10,000 feet in altitude. Mt. Graham, the highest peak in the SEAGO region, stands at 10,696 feet.

This wide variance in altitudes causes fluctuations in temperatures and precipitation that in turn create a number of vertically stratified ecosystems, each unique to its altitude and marked by unique flora and fauna. These ranges are sometimes referred to as "Sky Islands" [3]. As a result, the mountain ecosystems are isolated from each other, and species can develop in parallel with those on other ranges, or may be inhabited by species completely adapted to one specific range or "island". The SEAGO region is also at the crossroads between the Sonoran and Chihuahuan deserts, and the temperate and subtropical weather zones. This convergence of varied climates, vegetative zones, and topography provides habitat for a diversity of flora and fauna found few other places on earth. Within the region are many known wildlife corridors used by species moving from range to range, often traversing rivers, streams and watersheds.

[1] Physiographic regions are broad subdivisions based on terrain, rock type, and geologic structure and history.
[2] US Geological Survey, 2010
[3] Sky Islands are mountain ranges isolated by lower regions where other ecosystems are located.

Figure 3.2



Climate & Precipitation

The SEAGO planning region includes three distinct climate zones: the highlands, the warm steppes, and desert. Deserts and steppes are characterized by limited, seasonal precipitation; especially in the deserts. Much of the moisture that falls in these regions during seasonal rains evaporates; surface runoff and subsurface storage seldom occur, except during periods of significant steady rainfall during the winter months (January and February) and during the summer "monsoons" (episodes of intense thunderstorms and humidity, with periodic heavy rainfall, typically occurring July to September). Vegetative cover consists mostly of creosote, cacti and sagebrush on the deserts and mesquite, pinion-juniper-oak woodlands and various grasses on the steppes. The highlands often receive sufficient precipitation during the year to support moderately dense vegetation and may provide substantial runoff to the surrounding aquifers and watersheds.

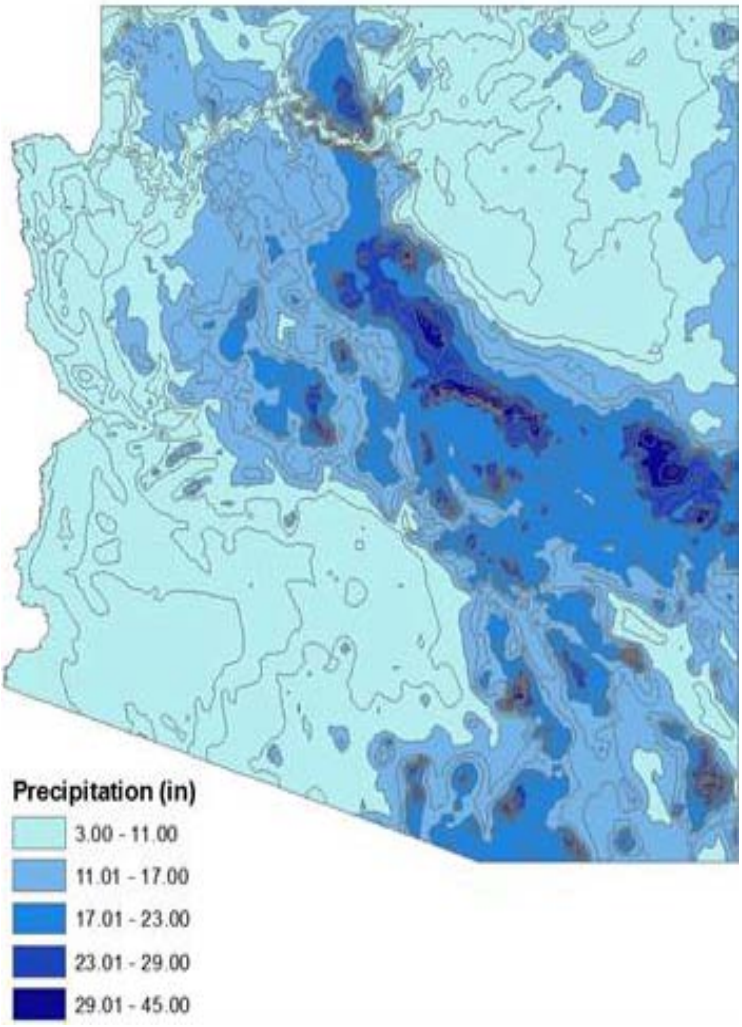


Figure 3.3

There is a single desert zone in the planning area, from northeast Cochise County extending diagonally from roughly the SE to the NE corner of Graham County. Highland climate zones are located primarily in northern Graham and Greenlee County, and in higher elevations and mountain ranges throughout the remainder of the planning area. Steppe regions cover most of the lower elevations of the region, and are slightly more cool, wet and humid throughout the year than the warm deserts but they still generally are characterized as being hot and arid. These regions are close to the highlands with mild day and cool nighttime temperatures. The temperature variation between day and night in the cooler months often exceeds 22 C (40 F).

As shown if Figure 3.3, precipitation throughout the region averages from 3-11 inches per year in the desert climate zones to upward of 30 inches on some mountain peaks. Most of the precipitation falls as rain; however, light snows are not uncommon during the winter months and amounts of 6-12" occur in the highlands. The peaks of the Huachuca, Chiricahua and Pinaleño Mountain ranges often remain snow covered until April.

Water Supply and Demand

Local aquifers are the primary water supply for the planning area for municipal, industrial and agricultural use. Approximately 15% of the cultural water demand is served by surface water, with the remaining demand supplied by groundwater across all sectors. Most of the surface water is for agricultural use, and includes diversion from the San Pedro River, Aravaipa Creek and the Gila River. A small amount of municipal demand is supplied by effluent, although this source is likely to increase as future demands increase.

Regional Watersheds

The SEAGO planning area contains three main watershed areas: the Upper Gila, San Pedro/Willcox Playa, and Santa Cruz. Each watershed is composed of several sub surface groundwater basins and numerous surfaces waters, ranging in size from small springs to major rivers.

The Upper Gila

The Gila River is the largest tributary of the Colorado River, extending east to west across 649 miles from the headwaters in Southeastern New Mexico to the mouth of the river near Yuma, AZ. In Sierra County, New Mexico, the river's two source tributaries, the East and West Gila Rivers, converge in the Black Range of the Mogollan Mountains west of the Continental Divide, flow through the Gila Wilderness, and enter the SEAGO planning area near the town of Duncan, AZ. The River continues westward through Safford, AZ, skirting the southern slope of the Gila Mountains, where it converges with the San Pedro River. The Gila continues beyond the SEAGO planning area boundaries, where it passes south of Phoenix, converging with its major tributary, the Salt River, and a minor tributary, the Aqua Fria River. The Gila continues in a southwesterly route across the state and eventually empties into the Colorado River at the confluence near Yuma.

The watershed is often divided into three sections: the Upper, Middle and Lower Gila. The SEAGO planning area contains most of the Upper Gila Watershed within the state of Arizona. This portion of the watershed drains 7,430 square miles and is contains the Morenci, Duncan Valley, Bonita Creek, and Safford groundwater basin boundaries.

Population and Economy

The major population centers of the Upper Gila region are the communities of Safford, Clifton, Thatcher, Morenci, and Duncan. Safford, the largest urbanized area, serves as the Graham County seat and the center of commerce for much of the region. The principal economic activities in the watershed are agriculture (principally cotton, hay, grains, and vegetables), ranching, mining, retail sales and services. Other economic contributors include the Apache Gold Casino and Hotel, Mt. Graham Regional Medical Center, Eastern Arizona College, Safford State Prison, Safford Federal Prison, Discovery Park and a recently completed major Mormon Temple.

The area has experienced recent growth in residential subdivisions, as an influx of new residents from colder climates and more urban parts of the country continue to choose to retire in Arizona. As presented in Table 3.3, the April 1, 2010 Census figures for municipalities and unincorporated areas of the SEAGO planning areas indicate the majority of residents continue to live in unincorporated areas without municipal infrastructure such as public water supplies and wastewater treatment plants:

Table 3.3 – Graham and Greenlee County Population

GRAHAM COUNTY		GREENLEE COUNTY	
Town of Pima	2,387	Clifton	3,311
City of Safford	9,566	Duncan	696
Town of Thatcher	4,865	Unincorporated	4,430
Unincorporated	20,402		
Total	**37,220**	**Total**	**8,437**

Source: 2010 Census

Population growth is expected to continue through 2030 in Graham County, with census block projections in the double digits; however, Greenlee County population is expected to remain essentially stagnant over the next two decades Table 3.4 shows the projected growth in these counties over the 20-year planning horizon:

Table 3.4 – Graham and Greenlee 20-Year Population Projections

CCD (Census County Division)	2010 Projection	2030 Projection	Percent Change*	Communities Within CCD
Bonita-Klondyke	2620	3116	19%	Bonita
Pima	4381	5399	23%	Pima
Safford	25,241	29,762	18%	Safford, Thatcher
San Carlos	5200	6728	29%	San Carlos
San Carlos Apache Reservation	5127	6074	18%	Bylas, Peridot
Clifton	5343	5395	1%	Clifton, Morenci
Duncan	2866	2894	.01%	Duncan, Virden

Source: AZ Dept of Economic Security, Research Administration, Population Statistics Unit, 12/01/06.
**All numbers are rounded to nearest whole percentage point*

Surface Waters

The Upper Gila Watershed has two factors that contribute strongly to surface flow. The basin's location at the eastern edge of the state places it more strongly into monsoonal flows during the monsoon season of July to September when afternoon thunderstorms routinely build. Additionally, the high elevations of the White Mountains north of Clifton-Morenci and the isolated ranges to the south, including the Pinaleños and the Chiricahuas, draw precipitation in the winter months in the form of snow. Steady snowmelts in the spring months allow recharge of local aquifers and the consistent feeding of perennial streams in the area through springs and seeps [4].

Table 3.5 below provides the classifications of Upper Gila surface waters:

[4] ADEQ, Upper Gila Ambient Surface Water Quality for Rivers and Streams of the Upper Gila Basin, Water Year 2000

Table 3.5 – Upper Gila Surface Water Classifications

Surface Waters	Totals (miles or acres)	Attaining all uses (miles or acres)	Impaired (miles or acres)	Inconclusive (miles or acres)
Upper Gila Streams	310 miles	70	42	198
Upper Gila Lakes	168 acres	0	120	48

Source: Arizona's 2004 Integrated 305(b) Assessment and 303(d) Listing Report

The Gila River

Figure 3.4

An average of about 160,000 acre-feet annually (AFA) of Gila River water flows into Arizona from New Mexico and over 40% of this flow typically occurs in the winter. Tributary inflows from the San Francisco River are significant, typically over 150,000 AFA. Inflow to the San Carlos Reservoir from the Gila and San Carlos Rivers averages about 310,000 AFA (ADWR, 2006). The major tributaries of the Gila within the Planning area include the San Francisco River, Eagle Creek, Bonita Creek, San Simon Creek, and the San Carlos River.

The Gila River extends 43 miles through the Upper Gila Watershed (see Figure 3.4). Flow is intermittent as the Gila enters Arizona from New Mexico through the Duncan-Virden Valley; during periods of low flow, all of the water above Duncan, Arizona, may be diverted for irrigation; any flow in the Gila River at Duncan when upstream diversions are occurring is attributed to groundwater inflow. Springs appear along the Gila River above Duncan discharging water from the older alluvial fill into the river. There are more diversions for irrigation below Duncan; however, groundwater contributes very little to flow for approximately 15 miles.

The river maintains a 35-mile perennial stretch approximately 20 miles downstream from the Arizona-New Mexico border due to inflows from the San Francisco River, Bonita Creek, and Eagle Creek, as well as several hot springs and seeps that arise from deep fractures. The river gains in flow as it passes through the Safford Valley primarily due to groundwater inflow. However, even with these additional inflows, the Gila again becomes intermittent throughout the Safford Valley because of heavy agricultural pumping. The San Carlos Reservoir, just outside the SEAGO region near Globe is formed by Coolidge Dam, and is the only major reservoir on the Gila, however, smaller stock ponds and fire control reservoirs exist. There are several small structures along the river that detain flow for agricultural uses, but the river is free-flowing in most of the planning area.

There are three active stream gages on the Gila River. The maximum annual flow recorded was at a gage near Solomon with a flow of 1.56 million AF in 1993. Median flow at this gage is approximately 273,000 AF.

The San Francisco River

The San Francisco River is a perennial stream with a number of hot springs located above Clifton. Average annual discharge is 154,931 acre-feet at the U.S. Geological Survey gauging station at Clifton. The river originates in Arizona, then flows southeast across the AZ-NM border before turning southwest and reentering Arizona. At 33 miles in length, it is the largest tributary of the Upper Gila River.

The San Carlos River

The San Carlos River flows through the San Carlos Apache Reservation in the northern portion of Graham County. The Coolidge Dam, located near Peridot, AZ restricts the flow and forms San Carlos Lake. When full, this lake is one of the largest bodies of surface water in Arizona, and is a recreational destination for known for its boating and fishing.

Eagle Creek

Eagle Creek, a perennial stream, flows into the Gila River about two miles downstream of the mouth of the San Francisco River. There is a series of small hot springs within the canyon of Eagle Creek near the Phelps Dodge Corporation pumping plant. In 1944, Phelps Dodge Corporation made an agreement with the Salt River Valley Water Users Association to divert up to 14,000 acre-feet of water annually from the Black River, a tributary to the Salt River. The water is pumped from the Black River over the watershed divide into Eagle Creek, where it is pumped to Morenci for mining operations (Hem, 1950). Average annual flows at the USGS Eagle Creek station (above the mine pumping station) are 41,260 acre-feet annually.

Bonita Creek

Bonita Creek is perennial in its lower reaches. Average annual discharge is 5,425 acre-feet at the USGS Bonita Creek Station near Morenci, with most flow (58%) occurring during the winter months. The City of Safford operates an infiltration galley along Bonita Creek and conveys water to Safford for municipal use.

Springs

The largest spring in the planning area is Warm Springs, located in the Safford Basin, at the headwaters of the San Carlos River, with a measured discharge of almost 3,400 gpm. There are also a number of large springs downstream of Pima near the Gila River (USGS, 2006c). In total, there are 22 major springs (> 10 gpm) in the Safford Basin, two major springs in the Duncan Valley Basin, and a single major spring occurs in the Bonita Creek Basin. There are also numerous seeps through fractures occurring throughout the watershed. Numerous regional spring and seeps flow from deep below the surface, and emerge as geothermal hot springs. They provide public bathing and soaking opportunities at recreational sites and health spas throughout the planning area.

Environmentally Sensitive Areas

There are three ADEQ designated "Outstanding Waters of Arizona" (formerly "Unique Waters") within the Upper Gila Watershed – Bonita Creek, Cave Creek (near Portal), and KP Creek (in the Blue Mountains of Greenlee County). Outstanding Waters are recognized as having unique resource value and serve as habitat for threatened or endangered species. These waters are subject to legal protection from degradation from discharges and pollutants.

The 23,000 acre Gila Box Riparian National Conservation Area includes parts of the Gila and San Francisco Rivers, and Bonita and Eagle Creeks. It was protected by Congress in 1990, and it one of only two such riparian areas in the Nation, both of which occur in the SEAGO planning area. The other is the San Pedro RNCA, described later in this document.

The Upper Gila also contains six Natural Resource Areas (NRAs): The Upper Gila River NRA, Upper Blue River NRA, Mule Creek NRA, Cottonwood NRA, and the Cave Creek NRA. These areas are offered special protections due to the presence of unique habitat or threatened species within their boundaries. Particular scrutiny is given to development proposals that may adversely affect water quality in these areas.

Impairments

The ADEQ monitors and labels surface waters or portions of surface waters that do not meet the established allowable TMDLs set for that body of water. There are three of tiers of labeling, increasing in severity as repeated sampling reveals continued non-attainment of the TMDL guidelines:

- Non-attaining
- Impaired
- Non-Attaining/Impaired (EPA)

Table 3.6 shows the surface waters that are listed as impaired within SEAGO portion of the Upper Gila Watershed.

Threats

While the mining industries in the planning area are beginning to expand, (though subject to frequent expansion and reduction cycles based on the price of precious metals), they are currently subject to stringent environmental review. However, there are hundreds of small orphaned or abandoned mines found on Federal, State and private lands throughout the watershed. In its heyday, during the late 1800s until the middle of the last century, the area was a major mining center, and the largest producer of copper in the world. Many of these small abandoned mines dot the landscape today and are often located above washes and streams. Surface runoff and erosion from mine waste and tailings is the principal anthropomorphic non-point source of pollutants in the area.

Table 3.6 – Impaired Waters Within the Upper Gila Watershed

Upper Gila Watershed (SEAGO portion)			
Blue River From Strayhorse Creek to San Francisco River 15040004-025B	25.4 mi	*E. coli* (**2006**)	To initiate in 2009.
Cave Creek From headwaters to South Fork Cave Creek 15040006-852A	7.5 mi	Selenium[(t)] (2004)	Initiated TMDL in 2006. To complete in 2009.
Gila River From New Mexico border to Bitter Cr 15040002-004	16.3 mi	*E. coli* and suspended sediment (**2006)**	Initiated TMDL in 2006. To complete in 2009.
Gila River From Bonita Creek to Yuma Wash 15040005-022	5.8 mi	*E. coli* (2004)	Initiated TMDL in 2006. To complete in 2009.
Gila River From Bar Creek to San Francisco River 15040002-001	15.2 mi	Selenium[(t)] (2004)	Initiated TMDL in 2006. To complete in 2009.
San Francisco River From Blue River to Limestone Gulch 15040004-003	18.7 mi	*E. coli* (**2006)**	To initiate TMDL in 2009. To complete in 2011.
Gila River From Bonita Creek to Yuma Wash 15040005-022	6 mi	*Suspended Sediment Concentration*	Initiated in 2006. To complete in 2009.

Source: 2006/2008 ADEQ/EPA 303 (d) Impaired Waters List

Agricultural activities, such as cotton and alfalfa growing, are prevalent in the Upper Gila watershed. Fertilizers containing high levels of nitrates are routinely applied to fields, causing elevated levels of nitrates to enter surface waters as runoff during flood irrigation or thunderstorms. Additionally, substantial diversions of surface water are common via irrigation canals and small diversion structures. These abrupt diversions reduce area wetlands, and create stress on the flora and fauna that rely on these riparian ecosystems remaining viable.

The Gila Watershed Partnership, with ADEQ's support, has brought together a San Francisco/Blue Rivers community watershed council to conduct a two-year study of E. coli exceedances on those rivers. A partnership with the U of A Maricopa Water Quality Lab has made it possible for the Frisco-Blue group to have their water samples analyzed for human and bovine genetic markers, and they are in the process of creating analytical models for those genotype results along with other data they are gathering. The monsoon-season tests show a preponderance of human contribution to the overall E. coli picture with a very small contribution from cattle. The team has just completed wide-ranging "baseline" sampling in the watershed, all of which is also being tested for human and bovine markers.

There are no sanitary facilities in the recreational areas used for hunting, fishing and camping; there are also no plans to construct such facilities. Planning and funding for the identification of appropriate sites for constructing public restrooms may be warranted by the final results of this study. Other possible sources of organic pollutants include cesspools and failing private septic systems, which are unregulated and unmonitored until property changes ownership, at which time an assessment of the system must be conducted.

Finally, the growth in rural subdivisions, that allow a private septic system and well on any parcel of one acre or more ("dry lot"), must be considered in any discussion of potential threats to surface or ground water in the region. These developments are often far from municipal wastewater treatment facilities, and developers are hesitant to incur the expense of installing onsite "package plants" prior to selling lots.

Little is known or understood of how nutrients discharging into leach fields are dissipated by soils, specifically how much purification occurs prior to the effluent reaching surface or sub surface water sources. While public wastewater treatment facilities monitor operations daily and are able to treat effluent to Grade A quality, private systems have no such controls and may be in a failed state for extended periods before being detected.

Groundwater

Groundwater supplies the vast majority of the cultural demand in the Upper Gila -ADEQ's Ambient groundwater Monitoring Program basin sampling is ongoing and has not been completed in all parts of the state. However, in the SEAGO planning area, as of August 2009, sampling reports had been completed in the San Simon, Willcox, Gila Valley, Upper San Pedro, Lower San Pedro, and Duncan Valley Basins.

Groundwater Basins

The Morenci, Duncan Valley and Bonita Creek groundwater basins are sub basins that contribute flow to the Safford Basin. They are comprised of volcanic or sedimentary rock. Ground water flows in all basins are towards the Gila River.

The Morenci Basin is characterized by steep canyons, mesas and mountains with numerous streams and washes. The basin consists mainly of volcanic rocks. Groundwater is found primarily in alluvial deposits along major water courses and groundwater flow is to the south along the San Francisco River drainage. Groundwater recharge has been estimated at 15,000 AFA and groundwater in storage at 3,000,000 AF. Water quality data shows metal contamination in the vicinity of the Morenci Mine [5].

The Duncan Valley basin is a sedimentary rock formation. Annual groundwater recharge estimates vary widely from 6,000 AF [6] to 14,200 AF annually [7]. Storage capacity is estimated at between 9,000,000 [8] to

[5] ADWR, 2009
[6] Freethey & Anderson, 1986
[7] ADWR 2009
[8] Freethey & Anderson, 1986

19,000,000 AF [9]. Arsenic and fluoride concentrations exceeding drinking water standards have been measured at a number of wells in this basin.

The portion of the Bonita Creek Basin located within the San Carlos Indian Reservation is characterized by a broad valley bordered by the Nantac Rim and the Gila Mountains. The valley consists of basin fill material with volcanic intrusions where most wells are drilled. The lower part of the basin is characterized by volcanic flows, agglomerates and tuffs embedded with small sedimentary lenses. In this part of the basin, alluvial deposits along the creek are the main aquifer. Groundwater flow is toward the southeast. Groundwater recharge has been estimated at 9,000 AFA and groundwater in storage estimates vary from 1 to 2 million acre-feet (maf). Water quality data are lacking. The City of Safford operates an infiltration galley along Bonita Creek and conveys water to Safford for municipal use [10].

The Safford Basin is a relatively large, alluvial filled depression bordered by elongated mountain ranges. Basin fill is the major aquifer in all three sub-basins of the Safford Basin. In the San Simon Valley Sub-basin a clay deposit, known as the Blue Clay, unit separates the upper and lower basin-fill aquifers and may be as much as 600 feet thick. Groundwater is found under artesian conditions in the lower aquifer and is generally unconfined in the upper aquifer. Groundwater flow in the sub-basin is toward the north along the San Simon River drainage but also flows toward agricultural pumping centers. As with the other sub-basins, groundwater in the lower basin fill is generally found under artesian conditions. Groundwater flow in the sub-basin is toward the Gila River drainage.

Groundwater recharge for the entire basin is estimated at 105,000 AF/year. Groundwater discharge is to agricultural and municipal pumping, primarily in the Gila Valley Sub-basin, and to spring discharge. Estimates of groundwater in storage range from more than 27,000,000 AF to 69,000,000 AF.

Water quality conditions vary in the basin although fluoride and arsenic concentrations consistently exceed drinking water standards. In the San Simon Valley Sub-basin the upper aquifer generally contains elevated total dissolved solids (TDS) and fluoride concentrations. Groundwater in both the upper and lower basin fill of the Gila Valley Sub-basin may also be high in TDS. In the San Carlos Valley Sub-basin, elevated levels of TDS have been measured in stream alluvium.

Impairments & Threats

Excessive mineralization has been recorded in the Upper Gila Basins with the most common exceedances being Fluoride, Chlorine, Sulfates, and Iron. Other commonly reported exceedances include TDS, Arsenic and Nitrates. Groundwater is threatened by mining contamination, particularly older deposits that may have significant concentrations of pollutants. Agricultural fertilizers have many opportunities to enter the basin systems through irrigation runoff and flooding.

Excessive withdrawals from agriculture (the major user) and population growth may have the effect of concentrating contaminants as storage declines. In the San Simon sub basin; significant declines have

[9] ADWR, AZ Water Commission
[10] ADWR, 2009

been recorded over the last decade. Near Safford, ground water withdrawals have increased in recent drought years when surface water that traditionally supplied fields was insufficient for the growing demand.

Water Rights

Legal availability of water supplies is a complex issue in throughout the SEAGO Planning Area. The right to use Gila River water is governed by the Globe Equity Decree. The Arizona Water Rights Settlement Act of 2004 (P.L. 108-45) includes settlement of the Gila River Indian Community's water rights claims in Title II of the Act. This settlement affects the volume and utilization of groundwater and surface water upstream from the Community in parts of the planning area [11].

Arizona has two general stream adjudications in progress to determine the nature, extent and priority of water rights across the entire river systems of the Gila River and the Little Colorado River. Pertinent to the SEAGO Planning Area, the Gila River Adjudication is being conducted in the Superior court of Arizona in Maricopa County.

The Gila Adjudication was initiated by petitions filed by several parties in the 1970's, including Salt River Project, Phelps Dodge Corporation and the Buckeye Irrigation Company. The petitions were consolidated in 1981 into a single proceeding. The Gila Adjudication includes seven adjudication watersheds; Upper Salt, San Pedro, Agua Fria, Upper Gila, Lower Gila, Verde, and Upper Santa Cruz. The entire Upper Gila and San Pedro adjudication watersheds and part of the Upper Santa Cruz watershed are within the planning area boundaries.

The San Pedro Watershed

The watershed is divided into three parts: the Upper, Middle and Lower. However, only the Upper San Pedro Watershed lies in the planning area, from an area near Benson, approximately 73 miles from where the San Pedro River (see below) enters the US. The Upper watershed drains approximately 2,500 square miles, and is ringed by mountain ranges including the Huachucas and Whetstones, with peaks from 4,500 to 9,800 ft above sea level. There are two watershed divisions, the Sierra Vista and the

[11] ADWR, 2006

Benson sub watersheds. The Narrows, a natural constriction in the San Pedro River Valley located approximately 10 miles downstream from the town of Benson, divides the upper and lower basins, with the portion of the Upper San Pedro Watershed referenced in within the planning area beginning from the Narrows to the International Border with Mexico.

Population and Economy

The major population centers of the Upper San Pedro region are the communities of Sierra Vista, St. David and Benson. Sierra Vista is the largest urbanized area in the SEAGO region, and is home to Fort Huachuca, the home of the U.S. Army Intelligence Center and the U.S. Army Network Enterprise Technology Command (NETCOM)/9th Army Signal Command). The Fort is the largest employer in the area and supports numerous defense contractors and complementary service businesses in Sierra Vista, such as lodging, dining, and retail establishments. Sierra Vista also serves as the retail and commerce center for the region. Benson is a fast growing community along the Interstate 10 corridor, and serves as a major retail center and bedroom community for the City of Tucson as well as the Fort. Other economic contributors include Cochise College, county and city government, ranching, tourism, medical care and the service industry.

The area experienced a housing boom during 2005-2007 (slightly lagging the rest of the state), that resulted in significant residential growth and associated commercial development. As shown in Table 3.7, the April 1, 2010 Census data for municipalities and unincorporated areas of the SEAGO planning areas indicate the majority of Cochise County residents live in incorporated areas served by municipal infrastructure such as public water supplies and wastewater treatment plants. However, some portions of the incorporated cities are not served by municipal wastewater treatment facilities.

Table 3.7 – Cochise County Population

COCHISE COUNTY	
City of Benson	5,105
City of Bisbee	5,575
City of Douglas	17,378
Huachuca City	1,853
City of Sierra Vista	43,888
City of Tombstone	1,380
City of Willcox	3,757
Unincorporated	52,410
Total	**131,346**

Source: 2010 Census

Table 3.8 – Cochise County 20-Year Population Projections

CCD (Census County Division)	2010 Projection	2030 Projection	Percent Change*
Cochise County	146,037	187,725	29%
Benson CCD	12,600	14,940	19%
Benson city	4,769	4,856	2%
St. David CDP	1,940	2,229	15%
Remainder of Benson CCD	5,890	7,855	33%
Bisbee CCD	29,692	38,031	28%
Bisbee city	7,057	8,483	20%
Naco CDP	893	982	10%
Sierra Vista city (part)	2,923	3,957	35%
Sierra Vista Southeast CDP (part)	15,033	20,024	33%
Remainder of Bisbee CCD	3,786	4,585	21%
Bowie CCD	2,625	3,142	20%
Douglas CCD	25,177	34,080	35%
Douglas city	20,122	28,685	43%
Pirtleville CDP	1,682	1,876	12%
Remainder of Douglas CCD	3,374	3,519	4%
Elfrida CCD	5,397	5,643	5%
Sierra Vista CCD	59,112	78,215	32%
Huachuca City town	1,910	2,145	12%
Sierra Vista city (part)	46,771	63,307	35%
Sierra Vista Southeast CDP (part)	2,973	3,374	13%
Tombstone city	1,718	2,032	18%
Whetstone CDP	3,111	4,228	26%
Remainder of Sierra Vista CCD	2,628	3,129	19%
Willcox CCD	11,435	13,674	20%
Willcox city	4,039	4,491	11%

Source: AZ Dept of Economic Security, Research Administration, Population Statistics Unit, 12/01/06.
**All numbers are rounded to nearest whole percentage point.*

As shown in Table 3.8 above, population growth is expected to continue at a moderate pace in the next 20 years. The area relies on groundwater for its residential and commercial water supply; development is often very heavily scrutinized based on water demand due to the intricate balance between growth and the maintenance of surface flow in the region. This issue is more fully detailed at the end of this section.

Surface Waters

San Pedro River

The San Pedro River headwaters are located in the Mexican state of Sonora, near the mining town of Cananea, approximately 23 miles for the international border with the US, where it enters southeastern Arizona near the community of Palominas in Cochise County. The River flows north passing east of the cities of Sierra Vista and Benson, then continues out of the planning area, flowing northwest past the community of Mammoth and eventually joins the Gila River near Winkelman.

The San Pedro River is perennial (flowing continuously all year) for approximately half of the 62 river miles in the United States portion of the Upper San Pedro River Basin. A major perennial reach is from about a mile south of State Route 90 to about a mile north of Charleston. There is a second, shorter perennial reach in the Hereford area. Perennial flow in the Charleston area is maintained by base flow produced by a bedrock constriction near Charleston. This constriction forces groundwater in the alluvial aquifer to discharge into the San Pedro River [12]. Other perennial reaches result due to a good connection between the regional and near-stream alluvial aquifers. Like many rivers in the southwestern United States, the San Pedro River has two major flow components: runoff and base flow. Runoff occurs after precipitation events or as result of snowmelt, and lasts a few days until all flow is either lost to outflow from the basin or to bank storage along river. The highest annual flows in San Pedro River and its tributaries occur between July and September, and are typically of short duration. Longer duration, lower-discharge peak flows occur in winter. Base flow results from the discharge of groundwater to the stream and sustains stream flow in dry seasons.

The San Pedro has no dams or irrigation structures, and is known as the last free flowing river in the Southwest. It has also been called “the most studied river in the US”, as perennial portions of the river support one of the most ecologically diverse regions in the world. The riparian and aquatic ecosystems of the San Pedro River support at least 13 fish species, approximately 47 amphibian and reptile species, up to 84 mammal species, and over 400 bird species [13]. The Canelo Hills Ladies’ tresses, Huachuca water umbel, bald eagle, sandhill crane, cactus ferruginous pygmy owl, southwestern willow flycatcher, Sonora tiger salamander, Gila chub, Gila topminnow, loach minnow and spikedace are some of the species that have historically been known to depend on surface flow in the San Pedro riparian areas [14].

Babocomari River

The Babocomari River is the major tributary to the San Pedro River within the Upper portion of the basin. The river drains the Mustang Mountains, Canelo Hills, and the north end of the Huachuca Mountains. It enters the San Pedro River just south of Fairbank, Arizona. The “Babo” flows perennially over two reaches for a total of twelve miles [15]. Stream flows are ephemeral over much of the river, except where shallow bedrock forces underground waters to the surface and sustains intermittent or perennial flows along its lower reaches. Stream flow has been measured since 2000 at two USGS gages along the river. Like the San Pedro River, the Babocomari River has experienced reduced base flows in

[12] L. Lacher, 1994
[13] Jackson and others, 1987; Leenhouts and others, 2006; and BLM, 2008
[14] USFWS, 2001; Minckley, W.L. 1987
[15] ADWR, 1990

some areas due to natural and cultural demand factors [16]. Perennial flows have also been identified on some other San Pedro River tributaries in the Upper San Pedro Basin. Miller and Ramsey Canyons in the Huachuca Mountains sustain perennial flows, and the Canelo Hills region (southwest of Elgin) contains many swampy areas known as "cienegas". These surface flows are generally produced by geologic constrictions in the subsurface that force water to the surface [17]. Annual average tributary runoff to the San Pedro River is estimated at 35,800 acre-feet (ac-ft) between the Palominas and the Narrows stream gages [18].

Aravaipa Creek

Aravaipa Creek is the second major tributary of the San Pedro River, joining the river between the towns of Mammoth and Dudleyville. From its headwaters 30 miles north west of the town of Willcox, the creek flows northwest through Aravaipa Valley for about 31 miles before turning west through Aravaipa Canyon and reaching the San Pedro River 32 miles downstream. It drops from an elevation of 4,841 feet near the drainage divide with Sulphur Springs Valley to 2,155 feet at its confluence with the San Pedro River. The creek drains an area of nearly 600 mi2 including parts of Graham and Pinal Counties [19].

Leslie Creek

Leslie Creek runs through the San Bernardino National Wildlife Refuge, located on the U.S.-Mexican border in Cochise County, Arizona, 17 miles east of Douglas. Leslie Creek is an intermittent creek that contains valuable riparian habitat and gallery forest. The USGS operating gage on Leslie Creek near McNeal measures a median annual flow of approximately 750 AF.

Springs

A number of major springs (> 10 gpm) are found in the San Pedro Watershed. Those found in the Upper San Pedro Basin are within the planning area are listed in Table 3.9 below. Many of the springs are located at high elevations in the mountains surrounding the basin and are not monitored on a regular basis. Several minor unmapped springs also occur in the Upper San Pedro Basin. The total number of springs identified by the USGS varies from 79 to 91, depending on the database reference.

[16] Thomas and Pool, 2006
[17] ADWR, 1990
[18] Putman, et al, 1988
[19] USGS, 2008

Table 3.9 – Springs in the Upper San Pedro Basin

Name	Location		Discharge (in gpm)[1]	Date Discharge Measured
Garden Canyon No. 1	312807	1102132	134	2/11/1963
Huachuca Canyon	313103	1102318	108[3]	1958-1963
Unnamed[2]	313044	1102327	100	4/3/1941
Miller Canyon[2]	312516	1101554	97[3]	1973-1977
Garden Canyon No. 2	312728	1102155	76	1/8/1963
Lewis North	313456	1100819	45	6/30/2005
Hooker's Hot	322018	1101421	40	During or prior to 1982
Murray	313425	1101023	26	6/30/2005
Spring No. 3A[2]	313028	1102441	10	4/19/1960
Tree Root[2]	313029	1102442	10	4/19/1960
Spring No. 1	313102	1102315	10	4/3/1941
Unnamed (multiple)	322050	1101422	10	During or prior to 1982

Environmentally Sensitive Areas

As mentioned above, the entire Upper San Pedro Watershed may be viewed as a sensitive resource, due to the unique and diverse habitats contained within its boundaries. The San Pedro Riparian National Conservation Area (SPRNCA) contains nearly 57,000 acres of public land in Cochise County, between the international border and St. David. The riparian area was designated by Congress as a Riparian National Conservation Area on November 18, 1988. The primary purpose for the special designation is to protect and enhance the desert riparian ecosystem, a rare remnant of what was once an extensive network of similar riparian systems throughout the American Southwest.

Impairments

The ADEQ monitors and labels surface waters or portions of surface waters that do not meet the established allowable TMDLs set for that body of water. There are three of tiers of labeling, increasing in severity as repeated sampling reveals continued non-attainment of the TMDL guidelines:

- Non-attaining
- Impaired
- Non-Attaining/Impaired (EPA)

Table 3.10 shows the surface waters that are listed as impaired within the Upper San Pedro Watershed.

Table 3.10 – Impaired Waters Within the Upper San Pedro Watershed

San Pedro Watershed			
Brewery Gulch From headwaters to Mule Gulch 15080301-337	1 mi	Copper[(d)] (2004)	Copper loadings from this tributary will be addressed in the Mule Creek copper TMDL.
Mule Gulch From headwaters to above Lavender Pit 15080301-090A	3 mi	Copper[(d)] (1990)	Ongoing TMDLs to be completed in 2009 to establish site-specific criteria for copper.
Mule Gulch From above Lavender Pit to Bisbee WWTP discharge 15080301-090B	0.8 miles	Copper(d) (1990)	Ongoing TMDLs to be completed in 2009 to establish site-specific criteria for copper.
Mule Gulch From Bisbee WWTP discharge to Highway 80 bridge 15080301-090C	3.8 mi	Cadmium(d), copper(d)(t), low pH, zinc(d) (1990)	Ongoing TMDLs to be completed in 2009 to establish site-specific criteria for copper.
San Pedro River From Babocomari Creek to Dragoon Wash 15050202-003	17 mi	E. coli (2004)	Initiated TMDL in 2006. To complete in 2009.
San Pedro River From Dragoon Wash to Tres Alamos Wash 15050202-002	15.5 mi	Nitrate (1990)	Ongoing Superfund remediation and monitoring. Will initiate TMDL if WQARF cleanup is not effective.
San Pedro River From Aravaipa Creek to Gila River 15050203-001	14.8 mi	E. coli and selenium(t) (2004)	Initiated
Brewery Gulch From headwaters to Mule Gulch 15080301-337	1 mi	Copper[(d)] (2004)	Copper loadings from this tributary will be addressed in the Mule Creek copper TMDL.
Mule Gulch From above Lavender Pit to Bisbee WWTP 15080301-090B	0.8 mi	Low pH (2002)	Initiated in 2000. Complete TMDL after site specific criteria are established (2009).

Source: 2006/2008 ADEQ/EPA 303(d) Impaired Waters List

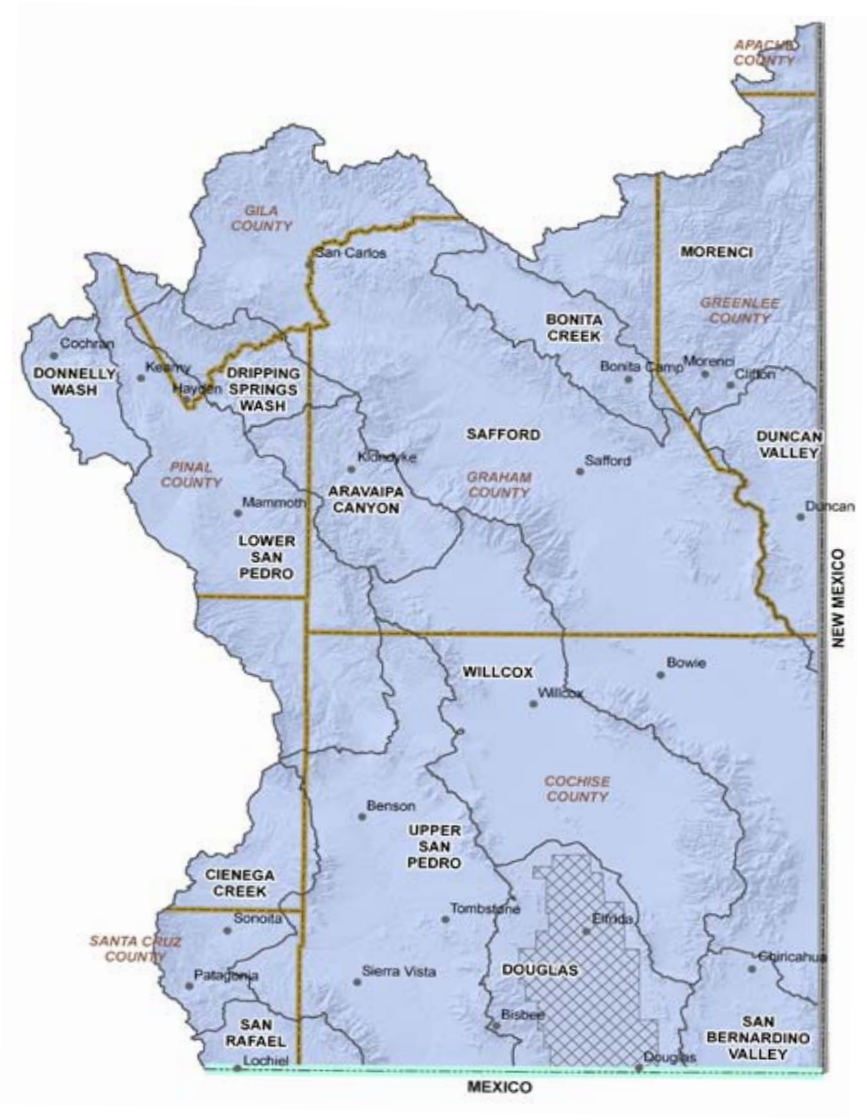
Groundwater

Groundwater Basins

The regional groundwater aquifer, The Upper San Pedro Basin - largely supports perennial flow and the associated riparian ecosystem and is the primary water source for a most of the nearby communities. The Basin is also the primary water source for the Cananea copper mine in Sonora MX, and Fort Huachuca, a major military installation in Arizona and the largest employer of southeastern Arizona. It is the most populous basin in the planning area

The Upper San Pedro basin spans approximately 1,875 square miles and consists of the northwest-trending San Pedro River Valley and surrounding mountains (see Figure 3.5).

Figure 3.5



The Huachuca, Mustang, Whetstone, and Rincon Mountains form the basin's western boundary and the Mule, Dragoon, Little Dragoon, and Winchester Mountains form the eastern boundary. Elevations along the valley floor range from 4,200 feet above sea level at US-Mexico Boundary to 3,300 feet sea level at the Narrows near Benson. The mountains bordering the basin range from 5,000 to nearly 10,000 feet in elevation. The basin contains two sub-basins: the Sierra Vista and the small Allen Flat sub-basin.

Groundwater is found in two major units in the Upper San Pedro basin: the streambed alluvium that forms the San Pedro River's channel and floodplain, and the alluvial basin-fill sediments in the valley. The streambed alluvium is more permeable than the basin-fill, but the alluvium's limited areal extent only makes it an important local aquifer in the central valley along the San Pedro River's floodplain. Groundwater in the basin-fill is found in both unconfined (water table) and confined (artesian) conditions.

Water enters the aquifers by mountain-front recharge and by streambed infiltration. A smaller amount enters the basin as groundwater underflow from Mexico. Mountain-front recharge consists of surface runoff that flows off the bedrock in the mountains. It infiltrates into the permeable basin-fill sediments on the alluvial fans surrounding the mountains, and eventually reaches the water table. Streambed infiltration occurs when surface-water flows in the San Pedro River channel and its tributary washes infiltrate the coarse streambed sands down to the water table.

Groundwater flow direction is from the mountain fronts toward the central valley and to the north. A cone of depression has formed in the Sierra Vista area that has altered flow direction. Groundwater recharge is approximately 35,700 AFA from the mountain fronts, underflow from Mexico and streambed infiltration. Two effluent recharge projects in the basin also recharge the aquifer. Major withdrawal is attributed to municipal and agricultural pumping and from riparian evapotranspiration [20].

The Willcox Basin occupies the northern part of the Sulphur Springs Valley and is hydrologically separate from the southern part of the valley, the Douglas Basin. With the exception of Whitewater Draw in the extreme southern end of the basin, which drains into the Douglas Basin, most of the surface water drainage in the Willcox Basin is to the Willcox Playa. The playa occupies about 50 square miles in the center of the basin and is a remnant of Pleistocene-age Lake Cochise [21].

Groundwater in the Willcox Basin is found in alluvial deposits consisting of stream and lake-bed deposits. Groundwater flow conditions have been altered significantly due to groundwater pumping for agriculture. Several relatively large cones of depression have developed in the basin including one southeast of the Willcox Playa and another north of the City of Willcox. Groundwater recharge has been estimated at 15,000 to 47,000 AFA primarily from mountain front recharge and also from agricultural irrigation and stream channel runoff [22]. Elevated total dissolved solids (TDS) concentrations exist in some areas and fluoride and arsenic concentrations above drinking water standards have been reported in a number of wells.

Impairments and Threats

Threats to the Upper San Pedro Basin, including contamination from mining, municipal, industrial, military, and commercial activities throughout the Basin could potentially threaten groundwater resources; however, the threats are localized. These include releases from the copper mines in Cananea, Mexico, and Bisbee, Arizona; cyanide leaching solution spills into Walnut Gulch; sanitary sewer overflows discharging to tributaries of Greenbush Draw from Naco, Sonora; contamination from septic systems; and industrial contamination from past activities at Apache Powder and Fort Huachuca.

Tailings ponds associated with Freeport McMoRan Copper & Gold, Inc. (previously Phelps Dodge Corporation) mining operations at Bisbee are located in the headwater of a tributary to the San Pedro River. Leaks and spills from these operations can potentially contaminate groundwater. Phelps Dodge has a current application for an Aquifer Protection Permit for the Bisbee tailings area, which is under review as of this writing.

[20] ADWR, 2005
[21] Oram, 1993
[22] USGS, 2006

Mine infrastructure improvements in Cananea have significantly reduced, if not eliminated, releases from Mexico since the late 1980s. But several abandoned mill sites, remnants of historic mining in Tombstone, exist along the San Pedro River. There is no known documentation of water quality associated with these sites, yet the potential for adverse impacts exists [23].

Earth fissures are associated with basin subsidence that accompanies extensive ground water pumping. In the mostly rural Dragoon Road area, Arizona Geological Survey (AZGS) geologists have identified more than 3.5 miles of continuous and discontinuous earth fissures, including nearly 3,000 feet of fissure previously known to underlie the ash and sludge storage ponds at the Apache Station Combustion Waste Disposal Facility operated by Arizona Electric Power Cooperative. The storage ponds are situated at the southwest end of Willcox Playa, just east of South Cochise Stronghold Road. In June 2009, the EPA posted a "High Hazard Potential rating" for the seven facility ponds [24].

U.S. – Mexico Trans-boundary Issues

Particular to the SEAGO region is the fact that its southern border is also the international border with Mexico. Projected population growth rates in the border region exceed anticipated U.S. average growth rates (in some cases by more than 40 percent) for each country. It is undeniable that Mexican communities often lag U.S. jurisdictions' water and wastewater programs and public health standards. Border residents also suffer disproportionately from many environmental health problems, including water-borne diseases and respiratory problems.

A survey of Mexican stakeholders near the U.S.–Mexico border in 2007 quotes Mexican officials, saying: "Water managers desire appropriate meteorological and hydrologic information to improve planning strategies, but access to this information remains limited. Considerable disagreement exists about who should pay for previously free or low-cost water and wastewater treatment. Urban users have little incentive to conserve because of the present flat, low rate and frustration with service. In rural areas, while a majority of ranchers recognize that variable climate and water loss could increasingly jeopardize their lifestyle, they seldom use meteorological information in planning or modify their water consumption."

Mining operations in the Sonoran portion of the basin have made water quality issues an ongoing primary concern. The effects of impaired water discharges from south of the U.S. border can have immediate and significant impacts on the basin. Strategies and efforts over the past decade on both sides of the border to link hydrological, ecological and the social sciences to aid elected officials and decision-makers in managing the basin, its growing population, and the water it so vitally depends upon have involved very diverse stakeholders. There are sustained bi-national efforts and constraints encountered by researchers at the University of Arizona and several NOAA-supported efforts in the basin region; however recent international boundary tensions have the potential to negatively impact or stall progress made to date.

[23] Jim Leenhouts, U.S. Geological Survey, written communication Feb. 2004
[24] www.azgs.az.gov/efc

Effluent flows from Mexico into the United States, known as "fugitive flows" also impact water quality, specifically along the border between the sister communities of Naco, Sonora, and Naco, Arizona. When the monsoon rains occur in late summer, excess influent is shunted to a secondary waste water facility on the west side of Naco, Sonora through a piping system that has deteriorated over time. Sewage leaking from this system enters the U.S. and requires Cochise County Environmental Health officials to "shock" the fugitive flows with chlorine in order to prevent widespread e.coli contamination of soils and surface waters. The ADEQ is typically called to the scene of these flows to assess threats to habitat and public safety.

The Santa Cruz Watershed

The Upper Santa Cruz watershed lies almost completely within Santa Cruz County, covering approximately 1,448 square miles of high plain grasslands and mountains. A small portion of the southernmost extent of the watershed is located in northern Sonora, Mexico. The aquifer systems below the surface consist of small sedimentary basins that form a portion of the border of the Upper Santa Cruz River Watershed. The small basins are fed by surface and ground water from the surrounding mountains. Water quality is affected by the subsurface geology, influent from regional WWTPs, and commercial activities such as mining and agriculture.

The lowest point in the Santa Cruz watershed at 1,037 feet is the confluence of the Santa Cruz and Gila Rivers, south of the Phoenix metropolitan area and about 20 miles
south west of Chandler. The highest point in the U.S. portion of the Santa Cruz Watershed is Mount Wrightson at 9,453 feet, on the eastern border of the watershed.

It is notable that the watershed area includes the only Active Management Area (AMA) in the SEAGO region, a state designation that provides additional oversight on water use and development. The Santa Cruz AMA covers 716 square miles, primarily concentrated around a 45-mile reach of the Santa Cruz River, beginning at the international border and extending to the Santa Cruz/ Pima County line. The goal of the Santa Cruz AMA is to maintain a safe-yield condition and to prevent local water tables from experiencing long term declines. The Assured Water Supply program regulates all AMAs. Details of the AMA requirements follow later in this section.

Population and Economy

Santa Cruz County is the smallest county in Arizona with only 1,238 square miles. The City of Nogales, the county seat, straddles the border, with approximately 20,000 people on the US side and varying estimates of between 200,000-500,000 residents in the greater Ambos Nogales, Sonora area. The two cities are both served by the Nogales International WWTP, located in the U.S. The NIWWTP is the largest in the SEAGO region. Nogales is also the largest international border community in Arizona.

International trade is the most important economic driver in the region, specifically the Mariposa Port of Entry (POE), one the largest produce and livestock crossings in the Country. One third of the fruits and vegetables entering the United States come through the Nogales POE. Additionally, retail trade from Mexican citizens crossing the border to purchase goods and services is an important economic factor. The smaller communities of Sonoita, Tubac, and the incorporated Town of Patagonia are tourist destinations with local art galleries, equestrian events, and restaurants, as well as a major wine producing region in the area near Elgin drawing visitors to the region. Less than 40% of the land in the County is privately owned. The county's natural and cultural resources contribute significantly to tourism-related economic development activities, often centered near surface waters and riparian areas.

While diminutive compared to the geographic expanse of other Arizona counties, Santa Cruz County area has a greater population density and a greater percentage of the residents are served by municipal wastewater treatment facilities (i.e., in Nogales and Patagonia) than the rest of the Planning Area; however most of those living in the unincorporated areas are served by private wells and onsite septic systems. The population of Santa Cruz County is presented in Table 3.11 below:

Table 3.11 – Santa Cruz County Population

SANTA CRUZ COUNTY	
City of Nogales	20,837
Town of Patagonia	913
Unincorporated	25,670
Total	**47,420**

Source: 2010 Census

The Santa Cruz Watershed population is estimated to continue to grow more quickly than other areas in SEAGO during the next twenty years, due to a larger influx of residents from other parts of the country, as well as the expected growth in the metropolitan Tucson area spreading into the area. Table 3.12 provides estimates for the next twenty years, which reflect large double digit growth in many census divisions.*

Table 3.12 – Santa Cruz County 20-Year Population Projections

CCD (Census County Division)	2010 Projection	2030 Projection	Percent Change
Santa Cruz County	50,210	71,033	41%
Nogales CCD	46,746	66,368	42%
Amado CDP	427	693	62%

Nogales city	22,863	26,356	15%
Rio Rico Northeast CDP	4,921	8,013	63%
Rio Rico Northwest CDP	5,408	9,855	82%
Rio Rico Southeast CDP	3,439	6,694	95%
Rio Rico Southwest CDP	5,228	9,543	83%
Tubac CDP	1,184	1,597	35%
Tumacacori-Carmen CDP	762	1,101	44%
Remainder of Nogales CCD	2,516	2,516	0%
Patagonia CCD	3,464	4,665	35%
Elgin CDP	475	767	61%
Patagonia town	962	1,105	15%
Sonoita CDP	1,151	1,722	50%
Remainder of Patagonia CCD	876	1,070	22%

**The population projection information in this report is based on the 2006 estimates of the AZ Department of Economic Security. Recently debate on whether these estimates, calculated in the midst of the housing boom during that year, are artificially high. No formal revision has been issued as of the time of this writing, however, actual growth rates may be lower. This information will be revised in future updates if additional guidance is issued.*

Surface Waters

There are four types of surface water within the watershed: perennial, intermittent, ephemeral and effluent dependent. Perennial, intermittent and ephemeral flows have been discussed previously in this document; however, the Santa Cruz water shed has the only surface waters in within the planning area that are effluent dependent. Effluent dependent streams consist of treated effluent discharged under permit issued by ADEQ. An effluent dependent stream would cease to flow if anthropogenic sources were to stop discharging. "Effluent dominated" (or effluent dependent) streams are those water bodies that contain more that 50% effluent [25].

The Santa Cruz River

The headwaters of the Santa Cruz begin in the grasslands just south of and between Patagonia and Canelo, AZ, approximately 10 miles north of the International border. The river flows due south into Mexico before turning west, then north in a 35 mile horseshoe shaped stretch before flowing north and returning again to the U.S. The river then continues northward for 65 miles from Nogales to Tucson, where it eventually joins the Gila River. The river valley is flanked by the Patagonia and Santa Rita mountains in the east and the Tumacacori Mountains in the west. The riparian areas surrounding the river create critical habitat for a number of threatened and endanger species, much like the San Pedro River to the East.

Prior to development, the Santa Cruz River was locally perennial in its southernmost reach from its headwaters in the San Rafael Valley, to near Tubac, forming a series of cienegas (marshes). North of Tubac, a few relatively short perennial sections existed including reaches near the mission of San Xavier del Bac south of Tucson and at "A" Mountain near downtown Tucson. From the Nine-Mile water hole

[25] Univ. of Arizona NEMO Santa Cruz Watershed Plan

north of the confluence of the Santa Cruz River and the Rillito River in Tucson, to its confluence with the Gila River, the Santa Cruz River was historically dry except during floods [26]. Current data indicates 48 miles of the river (4%) within the watershed is perennial, 926 miles (89%) has intermittent flow, and the remaining 68 miles (7%) has been contained by the Central Arizona Project in a flood control project near Tucson. The only stream gage is on the Santa Cruz River is near Lochiel on the Us Mexican border.

Results of an extensive water quality sampling program for the Upper Santa Cruz River was completed by the Sonoran Institute in 2009. Exceedance of Cadmium were noted near Tubac [27]. Other pollutants were sampled and exceedance of E. Coli were noted on some stretches of the river.

Santa Cruz River flow is effluent dependent in certain sections, with effluent from the Nogales International WWTP impacting flow maintenance. Research shows that the underlying aquifer levels are also impacted by effluent released from the NIWWTP [28]. Effluent is likely to become even more important to maintaining adequate flows as a method to balance increased direct withdrawals as the population of the area, and thus the number of private unregulated wells increase. The construction of the Los Alisos WWTP south of Nogales, Sonora is anticipated to diminish inflows from Mexico to the NIWWTP by approximately 5 million gallons per day (MGD) initially, then expanding to 7.5 MGD shortly after completion of construction in 2012. The Los Alisos WWTP will discharge into the Los Alisos River, located in a separate watershed some 20 miles south of Nogales.

Sonoita Creek

The major tributary of the Santa Cruz River within the planning area is Sonoita Creek, which runs east-west starting from near route 83 north of Sonoita to its confluence with the Santa Cruz Rivers. The total reach is 37 miles with two perennial stretches – one nearly ten mile stretch from the source flowing southwest and two reaches totaling about 15 miles above and below Patagonia Lake, formed when the creek was dammed in 1968 (see below). The creek is fed by surface and underground springs and by effluent from the Patagonia waste water treatment plant.

Josephine Creek

The creek is ephemeral along its entire reach, beginning near Mt. Wrightson in the Coronado National Forest and flowing in a southwestward direction where it converges with the Santa Cruz River. Major sources of flow are mountain runoff and precipitation, with some spring inflows.

Other Washes and Streams

Other significant streams include Nogales Wash, Potrero Creek, Agua Fria Wash, Peck Canyon Wash, and Sopori Wash, an intermittent tributary of the Santa Cruz River located on the northern border of Santa Cruz County.

Patagonia Lake

[26] Tellman and others, 1997
[27] www.sonoraninstitute.org
[28] AZ Water Atlas

The 1968 damming of Sonoita Creek just west of Patagonia created Patagonia Lake, a 2½ mile long, 250 acre recreational lake. In 1975 the area became an Arizona State Park, and is a popular site for fishing, boating and swimming. Located inside the park is the recently established Sonoita Creek State Natural Area, Arizona's first major state natural area. The lake is habitat for bass, crappie, bluegill, and catfish, and is stocked with rainbow trout during the winter.

Parker Canyon Lake

Parker Canyon Lake is a 130 acre lake constructed in 1966 by Arizona Game and Fish Department. It is located just east of the community of Canelo on the southwestern border of Cochise County. It is a recreational area for fishing and camping. Primary in flows are from runoff of the Huachuca Mountains near Sierra Vista, and spring seepage. Exceedances of Mercury beyond the maximum TMDL levels have been recorded at the lake, and an ongoing sampling program is being developed to monitor the lake in the future.

Pena Blanca Lake

Pena Blanca Lake was built in 1957 by the Arizona Game and Fish Department, primarily for recreational use, and is popular with tourists seeking relief from summer heat (the lake is located 4,000 above sea level). It is of modest size, spanning 49 acres of in the Pajarito Mountain foothills NW of Nogales, and 17 miles north of the Mexican border.

A survey conducted in 1994 determined that the mercury level in the largemouth bass was 1.44 parts per million, almost 5 times the level considered to be safe. High levels of methyl mercury were determined to be present in all of the fish species present in the lake. In 1995, the public was cautioned to avoid consumption of fish from the lake (which had been stocked regularly by AZ Game and Fish) due to elevated levels of Mercury and Arsenic. A major decontamination project was undertaken in 2008-2009 that involved draining the lake, eradication of invasive species (non-native bullfrogs) and the removal of contaminated sediments. About 200,000 cubic yards of mercury-contaminated soil were removed from the lake bottom and buried in cells in an area to the west of the lake [29]. The lake was then allowed to refill and restocked with rainbow trout.

Note: There are 25 mapped lakes and other water features in the Santa Cruz Watershed. Mining Tailing Pond #1330 and Pond #1329 are the largest surface water features with areas of 1,289 acres and 493 acres, respectively. The largest water body that is not a tailing pond is Patagonia Lake which covers 250 acres. Tailings ponds and fluid discharges from mining operations are regulated under the ADEQ Aquifer Protection Permit Program.

Springs

There are ten major springs in the watershed with locations near Arivaca, in mountains east of Tucson, and west of Amado in the Santa Cruz AMA. The major springs are not located within the planning area, and therefore not detailed here. The spring with the largest discharge is Sopori Spring, located west of

[29] Tom Johnson, Green Valley Hiking Club Library Summary, February 2010

Amado. Other small springs dot the watershed, including Cottonwood Spring, and Monkey Springs near the headwaters of Sonoita Creek.

Impairments & Threats

ADEQ monitors and labels surface waters or portions of surface waters that do not meet the established allowable TMDLs set for that body of water. Waters that do not meet TMDLs on repeated tests are listed on the Impaired Waters list maintained by ADEQ. Table 3.13 lists the surface waters on ADEQ/EPA 303(d) 2006/2008 Impaired Waters List within the SEAGO portion of the Upper Santa Cruz Watershed.

Table 3.13 – Impaired Waters Within the Santa Cruz Watershed

Santa Cruz Watershed			
Nogales Wash From Mexico border to Potrero Creek 15050301-011	6.2 mi	Ammonia (2004), chlorine (1996), copper[(d)] (2004), *E. coli* (1998)	Necessity of TMDL development will be based on outcome of current international remediation activities on infrastructure in Mexico.
Santa Cruz River From Mexico border to Nogales Intl WWTP discharge 15050301-010	17 mi	*E. coli* (2004)	Will initiate TMDL when stream flow returns. (Current drought.)
Sonoita Creek From 750 feet below Patagonia WWTP discharge to Santa Cruz R. 15050301-013C	18.6 mi	Zinc[(d)] (2004), low dissolved oxygen (**2006**)	To initiate in 2006 and complete in 2009.
Parker Canyon Lake 15050301-1040	130 a	Mercury in fish tissue (2004)	Initiated in 2006. To complete in 2009.
Rose Canyon Lake 15050302-1260	7 a	Low pH (2004)	Initiate in 2009. To complete in 2011.

Two primary threats to the surface waters exist in relation to water quality: mining and development near riparian areas. Although mining operation discharges and storage ponds are heavily regulated, many of the mines in the area were developed before such regulations were enacted, and continue to leach hazardous substances in to ground and surface waters. Heavy metal pollution threatens fish and wildlife that rely on riparian habitat to survive. This is especially true during migration periods, when birds and animals in transit rely on surface waters for sustenance as they cross the arid desert.

Intensive growth in residential and commercial development also threatens the surface waters of the Santa Cruz watershed. The damming of surface waters during the 1950s and 60s altered surface flow, depriving areas that had evolved with perennial flows of essential moisture. As water flows lessen, so do the diluting effects of adequate flows that are reliable year round. E.coli from animal feces and malfunctioning septic tanks and cesspools may become more concentrated in the lesser flows, thereby creating new threats to ecosystems and public health. The desirability of living near green spaces

surrounding surface waters tends to heighten development density in these areas, along with higher concentrations of associated pollutants being discharged in proximity to waterways.

Wastewater treatment plants, once seen as major contributors to pollutants, have emerged as one part of the solution for maintaining perennial flows in stressed and depleted waters. Effluent that is treated to sufficient quality for discharge are now contributing to year round flow on portions of the Santa Cruz River and Sonoita Creek. As more residents hook into these systems, treated effluent will become increasingly available to safely augment surface waters in the region.

Ground Water

Portions of the Cienega and Santa Cruz groundwater basins and the entire San Rafael Basin are located in the Santa Cruz watershed and are within the planning area.

San Rafael Basin

The San Rafael Basin covers 229 square miles and is composed of large cattle ranches and public lands situated along the Arizona/Mexican border between the cities of Nogales and Sierra Vista. Most of the landscape is short grass prairie, characterized by a high-elevation mountain range with Madrean oak-sycamore-cottonwood woodland vegetation interspersed.

The mountains surrounding the Santa Cruz Watershed are composed of metamorphic, sedimentary, and intrusive igneous rock extending beneath the alluvial material that fills the basin from thousands of years of erosion. (Pima County, 2006). This relatively impermeable material provides a physical boundary that forms the area's ground water basins. Over time, erosion or weathering of the mountainous areas have resulted in the deposition of alluvium up to 7,000 feet thick in areas south and southeast of Tucson.

There is an estimated 4 to 5 million AF stored in the aquifer [30]. A drop of 10 to 15 feet in area well levels over the last decade may be caused by cultural demand, or by natural fluctuations due to the deep alluvial soils in the area. Approximately 73% of land is federally owned and managed by the United States Forest Service, and is used for recreation and cattle grazing. Precipitation data for the basin area shows rainfall as high as 38 inches at the Huachuca Mountains along the eastern basin boundary and as low as 18 inches in the San Rafael Valley [31]. The majority of public-supply, household, agricultural, and industrial water needs in the Santa Cruz Watershed are fulfilled by groundwater.

Impairments & Threats

Threats include mining and development, as with the surface waters of the area; additional pollutants have also been identified from sewage flowing from the area near Nogales, Sonora towards its sister city of Nogales, AZ. Many of these pollutants have been addressed by treatment at the Nogales International Wastewater Treatment Plant, which treats wastewater from both communities.

[30] Freethey and Anderson 1986, Arizona Water Commission
[31] ADWR

Historical mining operations are one of the major threats to groundwater health, as many mine sites continue to seep contaminants. The mineral rich geologic formations found throughout the area may also contribute metals to the groundwater. Site specific studies need to be conducted to determine to what extent pollutants are anthropomorphic (especially mining-related) or natural (geologic).

Depletion is also a threat to ground water basin water quality in the area, as pollutants are less diluted upon entering the aquifer, and thereby exist in levels that can threaten public health. This is especially true when well water is used as the main drinking water supply. Residents in the watershed depend almost completely upon groundwater to meet all of the cultural demand in the area.

International border issues germane to the San Pedro Watershed and the Santa Cruz Watershed are discussed in the Impairments & Threats section of the San Pedro Watershed description.

For a complete report of the impaired watersheds in Arizona see the 2006/2008 STATUS OF AMBIENT SURFACE WATER QUALITY IN ARIZONA:

www.azdeq.gov/environ/water/assessment/download/2008/binder1.pdf

EPA added waters to this list as of November 2009. See chart:

http://www.epa.gov/region09/water/tmdl/303d-pdf/AZ-List-Added-Waters.pdf

CHAPTER 4, WATER QUALITY MANAGEMENT PRACTICES AND FACILITIES

This section identifies types of wastewater, commonly utilized technologies and guidelines for wastewater management, including the following subsections:

- Point and non-point pollution
- Groundwater and surface water monitoring
- Permit requirements
- On-site wastewater disposal systems (e.g., septic tanks)
- Centralized (municipal and private) wastewater treatment technologies

Point Source Pollution

Point-source pollution is pollution that can be traced back to a single origin or source such as a sewage treatment plant discharge. Point source pollution is often loosely defined as "any source that comes out of a pipe." Both A.R.S. 49-201(28) and Section 502(14) of the Clean Water Act define point source pollution as:

> *"any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include agricultural storm water discharges and return flows from irrigated agriculture."*

Point source pollution is often more easily monitored and assessed, as it generally emanates from a monitored source "point" that has measureable discharges and regular monitoring as a condition of operation. For the purpose of this plan, "point source" will be defined as *those activities for which some type of permit or authorization is issued prior to discharge.*

Major point sources in the SEAGO Planning Area are wastewater treatment plants (WWTPs), both municipal and privately owned. Other point sources include industrial sites (e.g. mines, steam electric generating facilities) that often include tailings ponds or wastewater treatment facilities to address pollutants that arise from mining extraction and processing activities. For a list and map of permitted WWTPs in the planning region by county, see **Appendix B**.

Non-Point Source Pollution

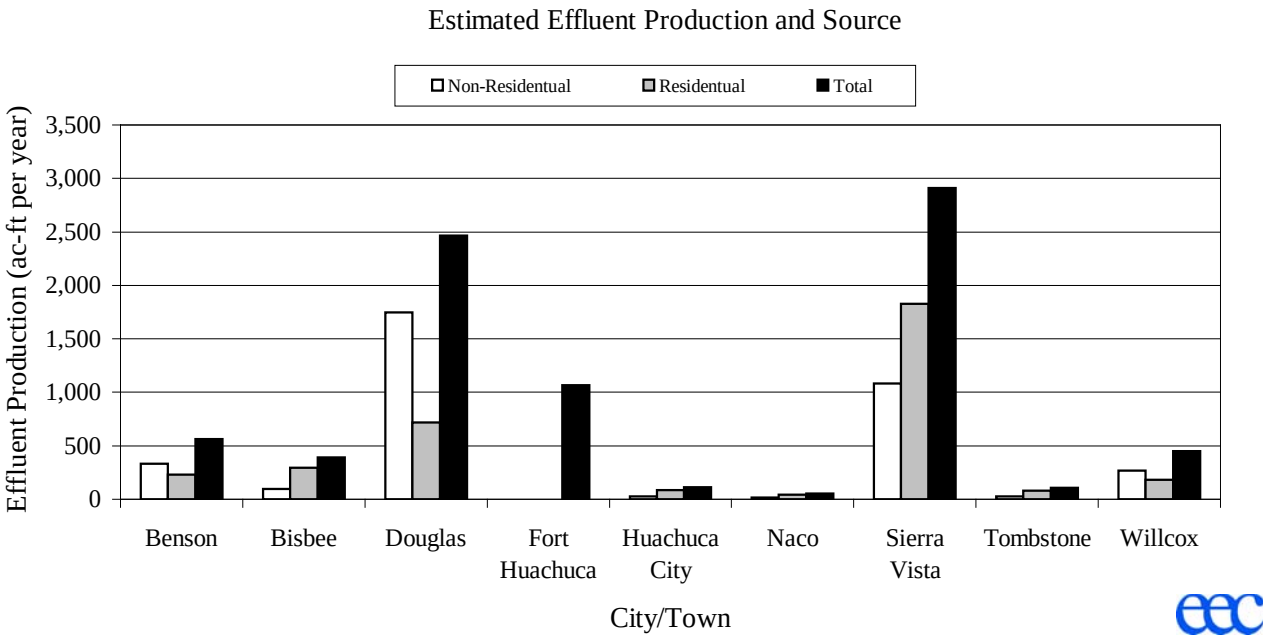
Non-point source pollution includes all pollutants carried from diffuse sources into surface and ground waters via rainfall, runoff, irrigation, snow melt, and ground infiltration.

The U.S. EPA has compiled the following list of common non-point source pollutants:

- Excess fertilizers, herbicides, and insecticides from agricultural lands and residential areas;
- Oil, grease, and toxic chemicals from urban runoff and energy production;

- Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks;
- Salt from irrigation practices and acid drainage from abandoned mines;
- Bacteria and nutrients from livestock, pet wastes and faulty septic systems;
- Atmospheric deposition and hydromodification [1]

Table 4.1 – Estimated Effluent Production in Cochise County



Source: Cochise County Water Resources Inventory, EEC, 2002

Sources of non-point source pollution may become so numerous they constitute a measureable quantity of pollution with effects similar to that of a point source. One example is that of a densely developed residential subdivision that utilizes individual septic systems for wastewater treatment. If enough housing units are constructed in one location, the combined discharges may enter a groundwater aquifer or surface waters in concentrations or quantities to cause concern. The exact number of systems it might take to cause environmental degradation is dependent on several factors such as soil type, slope, usage of individual systems, and proximity of the aquifer or surface waters; however, as rural areas without centralized wastewater treatment systems develop, it is important to consider at what point the density of individual system triggers the need for centralized wastewater treatment. A discussion of how to strategically plan for triggers to address this issue follows in Chapter V.

Non-point source pollution is difficult to assess due to the non-specific release points, movement of runoff, remoteness of sources (or releases), and erratic timing of events and circumstances that convey contaminants (i.e. major storms or movement of livestock). However, non-point source pollutants have

[1] Hydromodification is the alteration of the natural flow of water through a landscape.

been repeatedly shown to have harmful effects on drinking water supplies, recreation, fisheries, and wildlife.

Non-point source pollutants represent some of the most recalcitrant and easily obscured sources of water pollution, especially for rural regions without storm water conveyance infrastructure. Much of the SEAGO Planning Area lacks storm water conveyance systems, and adequate drainage structures along roadways. There is also no central repository of data on non-point sources for the region, making tracking extremely difficult. Coordinated programs for SEAGO members documenting best practices regarding storm water management and GIS tracking of non-point pollution locations would greatly enhance water quality management and planning throughout the region.

REGULATORY FRAMEWORK

Monitoring of Surface Water Quality

The Arizona Department of Environmental Quality (ADEQ) is tasked with monitoring surface and groundwater quality on non-tribal lands throughout Arizona and reporting this data as required by the Clean Water Act. Arizona's Integrated 305(b) Assessment and 303(d) Listing Report describes the status of surface water in Arizona in relation to state water quality standards. The report also contains a list of Arizona's impaired surface waters, including a list of surface waters requiring the development of a Total Maximum Daily Load (the 303(d) List). The report fulfills requirements of the federal Clean Water Act sections 305(b) (assessments), 303(d) (impaired water identification), and 314 (status of lake water quality). Waters that have an exceedance of one or more pollutants or parameters of concern are placed on the "impaired waters list". Waters where analytical results meet all surface water quality standards for the waterbody's designated uses, are labeled "Attaining All Uses". Still other waters may be labeled "Inconclusive" based on insufficient sampling or mixed testing results precluding a full assessment of its designated uses.

In 2007, ADEQ divided the state into three "Monitoring Regions" – the Upper, Central, and Lower Regions, and scheduled comprehensive monitoring on a three year cycle, one region each year. The entire SEAGO planning area falls into the Lower Monitoring Region, and the most recent monitoring year was 2009. In a monitoring year, sampling locations are selected based on several criteria, including: targeted sites to fill data gaps for assessment purposes, long-term sites for trend analysis; and probabilistic sites to determine water quality conditions for similar type locations and conditions. Within a monitoring year, each site is generally visited quarterly for sampling.

Assessment includes the following ADEQ field measurements:

- pH
- Total Dissolved Solids
- Dissolved Oxygen Concentration
- Dissolved Oxygen Percent Saturation

- Air and Water Temperature
- Specific Conductivity
- Turbidity
- Discharge or flow
- Bacteria Concentrations

Water Samples are analyzed by state-licensed environmental laboratories for:

- General Chemistry
- Major Cations and Anions
- Nutrient Concentrations
- Total Metal Concentrations
- Dissolved Metal Concentrations

When a surface water is found to be impaired, a Total Maximum Daily Load (TMDL) study is developed to determine the maximum amount (concentration) of a chemical, element, or nutrient that can be carried by a surface water body, on a daily basis, without causing an exceedance of surface water quality standards. TMDLs are developed by the ADEQ and must be approved by the EPA. Each TMDL is developed specific to the location, basin geology, surrounding uses and environmental factors, such as critical habitats. The allowable "load" has two parts: wasteload allocation (WLA) which is apportioned among the point source discharges in the watershed and load allocation (LA) which accounts for all the non-point pollution sources in the watershed.

Monitoring of Groundwater Quality

The ADEQ also conducts a groundwater monitoring program for the 51 groundwater basins found throughout the state. Studies are done on a basin-by-basin approach. In a selected basin, samples are collected from a variety of wells (e.g., private, irrigation, production) and analyzed for various pollutants including: Safe Drinking Water Act (SDWA) inorganic analyses and oxygen and hydrogen. Samples for radiochemistry and radon analysis are also frequently collected while Volatile Organic Compounds (VOCs), currently-registered pesticides, banned pesticides, perchlorate, and other types of samples are collected in areas where these pollutants are likely to be encountered. The groundwater sampling program provides general basin-side information about water quality to residents using private wells that do not have the benefit of the regular sampling required at public water supplies.

PERMITTING

Discharges to groundwater and surface water require permits issued by the ADEQ. Discharges below ground are regulated with Aquifer Protection Permits (APPs) while surface water discharges require an Arizona Pollutant Discharge Elimination System (AZPDES) permit. Responsibilities of the applicant range from simple notification to a full engineering review, depending on the type of required permit. Permit types range from individual site-specific permits to general permits that may cover a geographic region

or area. General permits are typically issued to a category of discharges, or for operations that have similar types of discharges and pose little environmental risk. Individual permits are issued for operations that pose significant environmental risk, or when an operation currently under a general permit expands or exceeds the pre-set limits for that type of general permit.

Surface Water

In December 2001, Arizona was authorized by the EPA to operate the National Pollutant Discharge Elimination System Permit Program (NPDES) (section 402 of the Clean Water Act) at the state level. Known as Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program, all facilities that discharge pollutants from a point source into waters of the United States are required to obtain or seek coverage under an AZPDES permit. The original delegation included individual permits, general permits, federal facilities, and pretreatment. In March 2004, EPA also delegated the biosolids program to ADEQ. Most areas of the SEAGO region fall under state jurisdiction, however, the EPA continues to regulate and permit discharges on all Native American lands. As such, the portion of the San Carlos Apache Reservation lying within Graham County and the SEAGO planning area will continue to be subject to EPA oversight.

AZPDES permits are also issued as either general permits or individual permits. Individual permits are facility or activity specific and contain effluent limits and conditions based on surface water quality standards and effluent limitations to ensure that discharges meet standards of the receiving water. AZPDES permits are issued to municipalities, industrial facilities and other entities and regulate the volume of discharge and pollutant concentrations so as to protect water quality in the receiving water.

A general permit may be issued to cover a discharge over a common geographic area if the facilities involved:

- Are the same or substantially similar types of operations;
- Discharge the same types of wastes;
- Require the same effluent limitations or operating conditions; and/or;
- Require the same or similar monitoring requirement.

ADEQ has issued several general AZPDES permits including: the Construction Stormwater General Permit; Multi-sector General Permit for Stormwater Discharges from Industrial Facilities; and the DeMinimis Discharges General Permit. See A.R.S. Title § 49, Chapter 2, Article 3.1, and A.A.C. Title 18, Chapter 9, Articles 9 and 10 for statutes and rules related to the AZPDES program.

Groundwater

The ADEQ requires an Aquifer Protection Permit (APP) under the following circumstances:

"If you own or operate a facility that discharges a pollutant either directly to an aquifer or to the land surface or the vadose zone (the area between an aquifer and the land surface) in such a manner that there is a reasonable probability that the pollutant will reach an aquifer."

APPs are issued as either individual or general permits. The following facilities are considered to be "discharging" and require permits, unless exempted or ADEQ determines that there will be no migration of pollutants directly to the aquifer or to the vadose zone:

- Surface impoundments, pits, ponds, and lagoons
- Solid waste disposal facilities (generally regulated by the solid waste management, except for mining overburden and wall rock that has not been subject to mine leaching operations
- Injection wells
- Land treatment facilities
- Facilities adding pollutants to a salt dome, salt beds, or salt formations, drywells, underground caves, or mines
- Mine tailings piles and ponds
- Mine leaching operations
- Septic tank systems
- Underground water storage facilities (if wastewater - effluent is used)
- Sewage or wastewater treatment facilities

Some types of facilities or activities are exempt from the APP process. For a complete list of exemptions, see http://www.azdeq.gov/environ/water/permits/download/exemptions.pdf

More detailed information on the permitting process and all types of ADEQ permit types is available online at: http://www.azdeq.gov/function/permits/index.html

See A.R.S. Title 49, Chapter 2, Article 3, and A.A.C. Title 18, Chapter 9, Articles 1, 2, 3, and 4 for statutes and rules related to APPs. Rules for the reclaimed water program are found in A.A.C. Title 18, Chapter 9, Articles 6 and 7.

WASTEWATER TREATMENT PROCESSES

Wastewater treatment processes are designed to address: 1) the type and quantity of influent; and 2) the amount of treatment required to produce effluent of a quality required by the necessary permits for the planned disposal.

There are four levels of wastewater treatment: primary, secondary, tertiary, and advanced treatment. Below is a brief discussion of each and technologies commonly used in each category. All new and expanding wastewater treatment facilities must treat wastewater to the secondary level at a minimum, prior to discharge.

Raw sewage is separated into sludge and liquid (treated effluent) via the treatment process. The ADEQ defines sewage sludge as:

a. Solid, semi-solid, or liquid residue that is generated during the treatment of domestic sewage in a treatment works, and;

b. Includes domestic septage, scum, or solids that are removed in primary, secondary, or advanced wastewater treatment processes, and any material derived from sewage sludge, but;

c. Does not include ash that is generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screenings that are generated during preliminary treatment of domestic sewage in a treatment works.

Under AZPDES, the biosolids program deals with wastewater treatment plants that treat domestic sewage. The biosolids regulations are in A.A.C. Title 18, Chapter 9, Article 10 and contain requirements for the treatment, transportation, land application, and management of biosolids.

It is illegal to incinerate biosolids in Arizona, and application, composting, and other activities using biosolids may require a permit. For more information, please see: http://www.azdeq.gov/environ/water/permits/bio.html

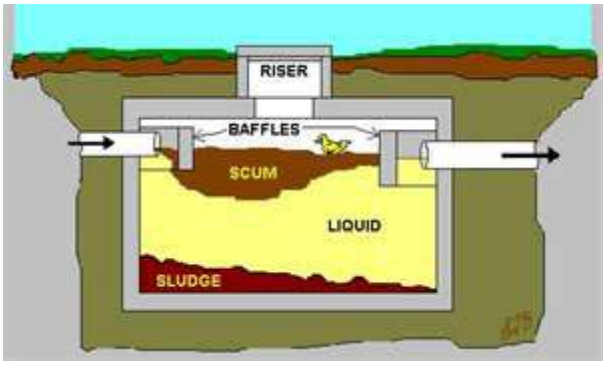
Wastewater treatment technologies can be extremely involved and a complete discussion is beyond the scope of this document; however, the following sections provide a brief overview of the stages of wastewater treatment and of some of the technologies currently being utilized in the SEAGO Planning Area:

Onsite Wastewater Treatment Systems

In 2001 and 2005, Arizona adopted extensive regulations regarding onsite disposal systems [2]. A.A.C. R18-9-A316 requires inspection of systems within six months of the transfer of ownership (the sale or exchange of the property). Also, A.A.C. R18-9-A309(A)(4) prohibits the use of cesspools for the disposal of sewage. These regulations provide for specific design guidelines and setbacks for onsite systems, which should result in fewer failures in the future. These regulations may also provide opportunities for regional tracking and identification of areas of failing systems or cesspools. Model ordinances could be developed, which if adopted by local jurisdictions, could require repair or replacement of substandard or failing systems. Figure 4.1 below shows a typical onsite wastewater treatment system.

[2] A.A.C. R18-9-A301-317

Figure 4.1



Primary Wastewater Treatment

Primary treatment involves sedimentation, or the settling of solids, as well as removing suspended grit and solids through screening or coarse filtering. The filtering/screening process typically removes 30 to 50 percent of the suspended solid materials in raw wastewater. Most primary treatment is done by screening large suspended solids first, then detaining the raw sewage for a period of time sufficient to allow settling to separate the heavier suspended materials. This process is usually followed by a secondary treatment.

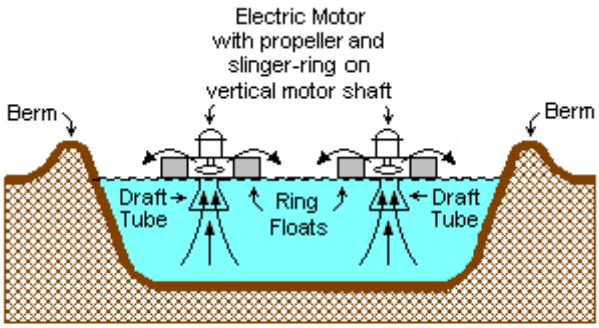
Secondary Wastewater Treatment

Secondary treatment typically involves biological processes that follow the primary sediment removal (e.g. sedimentation) treatment of raw wastewater. Sedimentation must precede all biological filtration (secondary treatment) operations in order for the secondary treatments to be effective. Often, additional screening and filtering occurs during the secondary treatment phase if needed. Common secondary treatment processes used in the SEAGO region include aeration, activated sludge processes, and oxidation ditches.

Aerated Basins and Lagoons

There are two types of aerated basins or lagoons: suspended mixed and facultative lagoons. As implied by the name, aeration is the introduction of air into effluent through surface or underwater diffusers. The introduction of oxygen into the sludge promotes breakdown by enhancing the actions of the aerobic bacteria present in the influent. Figure 4.2 shows a typical aerated basin.

Figure 4.2



A TYPICAL SURFACE – AERATED BASIN

Note: The ring floats are tethered to posts on the berms.

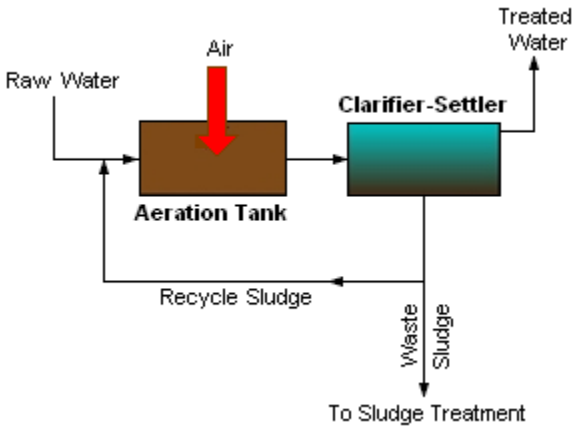
Suspension mixed lagoons, where there is sufficient energy provided by the aeration equipment to keep the sludge in suspension. The advantage of suspension systems is their ability to efficiently convert soluble biodegradable organics in the influent which tend to stay in suspension to a biomass, which is able to settle as sludge. This process typically takes 1-5 days.

Facultative lagoons, where there is insufficient energy provided by the aeration equipment to keep the sludge in suspension and solids settle to the lagoon floor. The biodegradable solids in the settled sludge then degrade anaerobically. Some suspended organic particles may stay in suspension for extended periods of time, thus, facultative lagoons may have longer residence times, and some particulates may not settle completely. Currently, several facilities in the SEAGO Planning Area utilize facultative lagoons. These facilities may be able to be upgraded to suspension mixed lagoons as future needs and funding availability dictate.

Activated Sludge

In activated-sludge processes aeration is combined with the introduction of a biological floc consisting of bacteria and organisms that assist in the breakdown of sludge and the removal of nitrates and entrained gases such as ammonia, carbon dioxides, and nitrogen. The resultant solids settle more easily and generate a liquid component (referred to as "liquor") that has few suspended particulates. One variant on this process is the sequencing batch reactor, which aerates and separates sludge one batch at a time, versus some activated sludge systems that continually process waste. A common activated sludge technology is the sequencing batch reactor (SBR) which combines secondary treatment and settlement. Typically, activated sludge is mixed with raw incoming sewage, and then mixed and aerated. The settled sludge is run off and re-aerated before a proportion is returned to the system to be added to the next incoming raw sewage batch. Figure 4.3 illustrates the typical activated sludge treatment process.

Figure 4.3

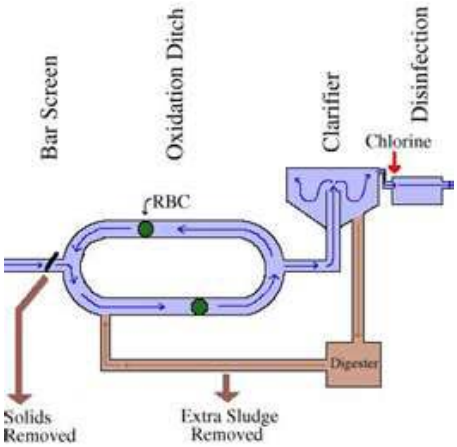


Schematic drawing of the activated sludge process

Oxidation ditches

An oxidation ditch is an extended aeration activated sludge process. A large oval-shaped shallow ditch, lined with an impervious material (e.g. concrete), is used to detain the wastewater. This allows prolonged (>24 hours) exposure to the open air and diffusion of oxygen into the influent. This process maintains conditions that allow aerobic bacteria to further breakdown components of the wastewater over an extended time period. As with standard activated sludge, the resultant solids settle more easily and the liquid effluent contains few particulates. Figure 4.4 shows the oxidation ditch treatment process.

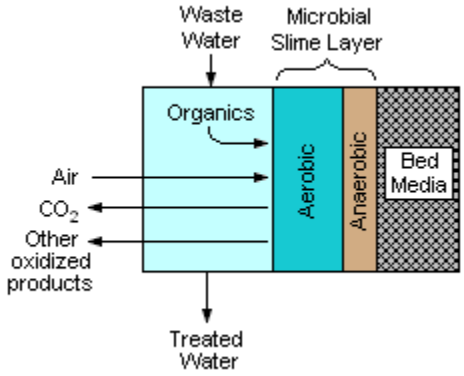
Figure 4.4



Trickling Filters

Trickling filters are one of the oldest and most widely used wastewater treatment processes, and can be adapted to a wide range of facility sizes. A trickling filter consists of a fixed bed of gravel or other suitable media over which wastewater flows and causes a layer of microbial slime (biofilm) to grow, eventually covering the media, and developing an aerobic outer layer and an anaerobic inner slime layer. Pollutants are removed by the biofilm layer through absorption and adsorption processes. Several communities in the SEAGO region use trickling filters. Figure 4.5 shows a cross section of a trickling filter.

Figure 4.5



Cross section of a trickling filter

Tertiary Wastewater Treatment

Tertiary wastewater treatment processes provide a final treatment stage to raise the effluent quality before it is discharged to the receiving surface or groundwater. Tertiary treatments may be used in combination to provide specific desired results and high quality effluent. Sand filtration, carbon filtration, and nutrient removal and disinfection are examples of tertiary processes. Nutrient removal and disinfection, are commonly utilized in the SEAGO planning area by facilities seeking to use reclaimed water for approved end uses. Both are described in the following sections.

Nutrient Removal

Wastewater contains sufficiently high levels of phosphorus and nitrogen, that when released to receiving waters, may cause eutrophication. Eutrophication is a biological condition that results from an excess growth of aquatic weeds and algae (an algal "bloom") that feed on these nutrients. The overpopulation of algae and plants eventually results in their mass die off, and aerobic bacteria begin consuming the decaying algal remains. The bacteria in turn consume large quantities of oxygen formerly available to native plants, fish, and other organisms that perish as a result of the depleted levels of oxygen.

Nitrogen removal involves the biological oxidation of nitrogen from ammonia to form nitrates ("nitrification"), followed by denitrification, which reduces nitrate to nitrogen gas. Nitrogen gas is then released harmlessly to the atmosphere.

Phosphorous is removed through the use of specific bacteria, called polyphosphate accumulating organisms (PAOs). PAOs selectively accumulate large quantities of phosphorus internally, and are then separated from the wastewater. The bacterial by-product of the separation procedure is highly valued as a fertilizer.

Stormwater and agricultural runoff also may contain elevated levels of phosphorus and nitrogen, making nutrient pollution both a point and non-point source concern.

Disinfection

Disinfection kills many of the microorganisms in the influent, some of which pose public health threats and environmental damage. The dosage of chemicals, length of time of contact, and pollutants present in the wastewater to be treated all effect treatment methods. Chlorination is the most widely used method of disinfection in the United States; however, because residual chlorine is toxic to aquatic species, and organic compounds left by chlorination, known as total trihalomethanes, may be carcinogenic to humans, the treated effluent must also be chemically dechlorinated, adding to the complexity and cost of treatment.

Package Plants and Batch Reactors

Package plants are often used by municipalities as satellite plants in outlying areas where densities are high enough to preclude use of on-site systems or as an initial phase of a larger, planned system. These systems often combine at least two stages of the three main treatment stages into one combined stage. In the U.S., package plants are typically used in rural residential areas, RV parks, and remote subdivisions. A common package plant system that combines secondary treatment and settlement is the sequencing batch reactor (SBR). See discussion under secondary treatment earlier in this section.

A major advantage of the package plant system is the ability to treat raw sewage to a much higher effluent quality than an individual onsite septic system, and the ability to centralize wastewater treatment for small commercial or residential developments without access to municipal treatment services. A disadvantage of package plants is their sensitivity to variations in batch composition. Because they operate with a small batch size compared to large wastewater treatment plants, reaction times, chemical inputs, and aeration must be monitored to determine that the effluent is properly processed.

Where package plants are used, there needs to be a capable management entity (e.g., WMU) to carry out necessary maintenance to assure such plants are operating as designed. In rural areas, it may be necessary to form a legal entity with the authority to charge users a fee for the ongoing maintenance and operation of the plant.

Operator Training and Certification

The requirements for certification of Arizona's Operator Certification Program can be found in the Arizona Administrative Code, Title 18, Chapter 5, Article 1. The program is administered by the ADEQ, and establishes guidelines to ensure that only certified operators make decisions about process control or system integrity with the potential to affect public health. The program establishes minimum standards for certification and recertification of the operators of both treatment and distribution systems for community and non-transient non-community public water systems, and collection and treatment of wastewater. Operator certifications are classified into one of four grades by facility type, size, complexity, and population served. The grade corresponds with the level of system complexity, with Grade 1 being the most simple and Grade 4 being the most complex. Operators are required to maintain their certification through participation in continuing professional education workshops and must be re-certified every three years [3].

Sustainability

New wastewater systems are encouraged to incorporate sustainability in the system design whenever economically practicable. Features such as high efficiency rotating equipment, oxygen sensors, and solar panels can significantly reduce the operating costs of wastewater treatment plants. Existing systems can often benefit from these features where retrofitting is possible. Biosolids generated through the treatment process can be converted to soil amendment and fertilizer. Where sufficient quantities exist, biosolids can also be used for energy production.

Planning Considerations

The planning region is predominantly rural in nature, and nearly all of the residents of the unincorporated areas of the region rely on septic systems for onsite wastewater treatment. There are also significant numbers of residents of incorporated cities and towns throughout the Planning Area that live in areas that are not yet served by municipal wastewater treatment plants. The exact number, size, and type of these systems are exceedingly difficult to calculate, as there is no central regional registry for this information. It is also known that failing septic systems and cesspools are still in use in some areas, although there are no complete data sets available on the number or location of these systems.

Because of the sparse population over much of the area, there is not sufficient density of housing units or commercial/industrial developments to support the cost of centralized facilities or advanced treatment technologies. Rapid growth of "wildcat" residential development in some areas has increased onsite system proliferation with no oversight or planning for municipal facility development. Many of these rapidly growing areas are within unincorporated county lands.

[3] ADEQ, 2011

CHAPTER 5, STRATEGIC PLAN

OVERVIEW

As discussed in Chapter Two, SEAGO is the Designated Planning Agency (DPA) for the CWA 208 Water Quality Management planning process in our region. Among other responsibilities, as the DPA, SEAGO acts as a facilitator and coordinator of the planning process including making recommendations on consistency reviews, updating the SEAGO Plan and overseeing amendments, if needed. To assist in implementing the SEAGO Plan and ensure a consistent regional approach, SEAGO has established a 208 Review Committee, referred to as the Environmental Review Committee or the 'ERC'. The ERC will work with ADEQ to perform initial review of development and expansion proposals for wastewater treatment facilities and determine when the public 208 Plan amendment process should be applied to maintain consistency with the overall goals outlined in this chapter. The ERC's findings are shared with ADEQ.

As also discussed in Chapter 2, the SEAGO Plan's purpose, or mission statement, echoes the authorizing CWA mission:

> "To provide a consistent regional approach for maintaining, improving and protecting water quality in the SEAGO Planning Area."

A "**consistent regional approach**" requires:

1) **An Accepted Framework** for decision-making and action. The SEAGO Plan and the goals, objectives, strategies, and tactics contained herein are intended to provide such a framework.

2) **Regional Communication**. As both the Council of Governments and the DPA, SEAGO's role is to coordinate water quality management planning activities within its geographic jurisdiction and to convene stakeholder public meetings to review development proposals for Plan conformance. In this manner, as well as through the use of various media, SEAGO will provide the required regional communication.

3) **Common Values** with regard to protecting water quality. Because it is comprised of a representative sample of the SEAGO member entities government officials, staff, and private citizens concerned with water quality in the area, the ERC is a highly diverse group of individuals. The ERC's high level of diversity helps to ensure that the goals, objectives, strategies, and tactics of the SEAGO Plan are designed to maintain, improve and protect the region's water quality, and also ensure that they are attainable and do not over-reach the authority provided by the CWA.

4) **Willingness to Participate and Cooperate** in regional strategies for handling issues regarding water quality. Due to the desert environment of our region, the availability of clean water is a matter paramount to the quality of life that most citizens cherish. While water quality management goals, objectives, strategies, and tactics must be carefully balanced with economic and property interests, the overarching issue of preserving and protecting the quality of this precious resource helps ensure willing participation and cooperation.

GOALS

All of the above mentioned elements underscore the importance of the collaborative roles of ADEQ, the ERC, and SEAGO. With a focus on these things, the following goals, objectives, strategies, and tactics for the program are established:

GOAL 1

Provide region-wide wastewater treatment that meets all regulatory requirements, is economically sustainable, and utilizes recognized best management practices.

Objective 1.1.

Plan for wastewater treatment facilities and use/development of on-site wastewater treatment systems with a 20-year planning horizon.

Strategy 1.1.A.

Identify wastewater management entities that have the legal, institutional, financial, and managerial capabilities, and the resources to implement the SEAGO Plan.

Tactic: *Develop model ordinances to encourage public wastewater entities (e.g. municipality, sanitary district, Wastewater Improvement District) to become Designated Management Agencies. An entity seeking DMA approval must demonstrate it has the authority and capability to serve in this capacity.*

Tactic: *Develop model ordinances to formalize private wastewater providers (e.g., private utilities) as Wastewater Management Utilities (WMUs). Private wastewater providers must demonstrate the authority, the capabilities and the resources to implement the SEAGO Plan within their proposed delineated service area (e.g., Certificated Area of Convenience and Necessity). Those entities with the necessary authorities, capabilities, and resources will be designated as Wastewater Management Utilities (WMUs).*

Tactic: *Develop model ordinances and processes for a municipality to rescind capacity assurance once given to a developer, or to establish a phased approach to providing capacity assurance.*

Strategy 1.1.B.

Identify sensitive areas undesirable for development or placement of conventional onsite wastewater treatment (septic) systems.

Tactic: *Formulate criteria for "sensitive areas". Examples include:*

- *Areas with shallow groundwater (e.g., < 10 feet seasonally)*
- *Steep slopes (> 15% or 6.5 : 1)*
- *Location of drinking water wells*
- *Impaired surface waters*
- *Wells with high nitrate concentrations (> 10 mg/l)*

- *Areas of known groundwater contamination*
- *Areas within a regulatory floodway* [1]
- *High priority areas (e.g. un-sewered areas with average lot size < ½ acre)*

Tactic: *Create a regional GIS database to map areas that meet the sensitive areas criteria for use by regional planners and permitting entities.*

Strategy 1.1.C.

Provide centralized wastewater treatment guidelines for new development.

Tactic: *Develop model ordinances with density triggers for the development of new centralized wastewater treatment facilities in remote areas or areas that are not served by existing facilities (high priority areas).*

Tactic: *Create regional GIS database to map high priority areas for centralized wastewater treatment facilities.*

Tactic: *For individual on-site wastewater systems installed under the Wastewater Treatment Options Table presented in Chapter 6 of this Plan, and which are within a service area, planning area, or high priority area for sewer lines, develop model ordinances to require that property owners connect to sewer lines when they become available.*

GOAL 2

Minimize and/or prevent pollution discharges to surface and ground waters.

Objective 2.1.

Ensure that discharges from on-site wastewater treatment (septic) systems do not cause or contribute to an exceedance of a surface or aquifer water quality standard.

Strategy 2.1.A.

Identify substandard or failing septic systems in the SEAGO area and find acceptable alternative solutions.

Tactic: *Create regional database to map areas with substandard or failing septic systems in the SEAGO region. Database and mapping can aid in developing high priority areas for sewering and treatment.*

Tactic: *Create model ordinances requiring submittal of the on-site system inspection report required by A.A.C. R18-9-A316 to the local permitting authority and repair of deficiencies or replacement of the failing on-site system within one year of the date of the inspection report.*

[1] A.R.S §48-3601 (8) defines "Floodway" as the area of a river or other watercourse and the adjacent land areas necessary in order to discharge the one hundred-year flood without cumulatively increasing the water surface elevation more than one foot. A.R.S. §48-3609 C. dictates that waste disposal systems shall not be installed wholly or partially in a regulatory floodway.

Strategy 2.1.B.

Improve education and outreach pertaining to septic system management.

Tactic: *Provide outreach and educational opportunities and materials – revise if necessary, or create new material. Partners include: UA Cooperative Extension, Rural Water Association, Watershed Groups, and local realtors.*

Objective 2.2.

Promote programs to reduce pollutant loadings to surface waters.

Strategy 2.2.A.

Encourage review of developments for consideration of potential stormwater impacts to surface waters, especially those that are impaired, have a TMDL allocation or are within a Nitrogen Management Area.

Tactic: *Develop model ordinances that encourage low impact development and protection of water resources.*

Tactic: *Develop model ordinances to encourage stormwater management to retain/recharge to the maximum extent practicable.*

Strategy 2.2.B

Encourage use of agricultural best management practices to reduce pollutant loadings.

Tactic: *Collaborate with watershed groups for issue focus.*

Tactic: *Educate farmers and ranchers in implementation of agricultural and livestock grazing BMPs to reduce targeted pollutant discharges to surface waters and groundwater.*

Tactic: *Identify grant funds, loans, or other incentives for implementing BMPs**;** collaborate with watershed groups on grant proposals.*

Strategy 2.2.C.

Educate public about water pollution and ways to reduce pollutants.

Tactic: *Identify needs and gaps in existing programs (e.g. lack of public knowledge about the harmful effects of improper disposal of chemicals, drugs, grease and other products unsuitable for sewer disposal, the adverse impacts of sediment discharged in stormwater from unpermitted grading and development activities, or the proper care and maintenance of septic systems).*

Tactic: *Research funding sources for regional water quality educational activities.*

Tactic: *Partner with local, state, federal agencies, academic institutions and Watershed groups to develop local outreach and education programs.*

GOAL 3

Foster regional coordination and public involvement, and provide a continuing planning process to support plan implementation.

Objective 3.1.

Encourage coordination and cooperation among programs, agencies, and other partners.

Strategy 3.1.A.

Re-engage and maintain involvement of the ERC.

Tactic: *Formalize ERC as a standing committee pursuant to SEAGO's Bylaws.*

Tactic: *Hold ERC meetings at a minimum of a bi-annual basis, or as needed, with subsequent reports presented to the SEAGO Administrative Council and Executive Board.*

Strategy 3.1.B.

Use Consistency Review Process to provide a more efficient and consistent regional approach to evaluating proposals. This should minimize the need for amendments to the SEAGO Plan.

Tactic: *Facilitate ERC consistency review of applications and provide comments to ADEQ.*

Tactic: *Ensure that consistency reviews are coordinated with affected parties and key stakeholders so that review is thorough and timely.*

Strategy 3.1.C.

Encourage cooperation in regional planning through Memorandums of Understanding (MOUs) and Intergovernmental Agreements (IGAs) amongst SEAGO member entities.

Tactic: *Facilitate discussions between adjacent communities that may benefit from joint planning of facilities or cross-boundary service agreements.*

GOAL 4

Seek to make all water quality projects in the SEAGO region cost effective.

Objective 4.1

Reduce the costs of developing, operating, and maintaining water quality projects and systems.

Strategy 4.1.A.

Increase the amount of funding made available to SEAGO members for water quality improvement projects.

Tactic: *Create, update, and make available listing of potential funding sources.*

Tactic: *Use the Environmental Review Committee (ERC) as a conduit to facilitate and coordinate information about funding opportunities.*

Tactic: *Identify opportunities to coordinate water quality projects with other planning projects in the region (i.e., community development, housing, transportation, and economic development).*

Tactic: *Identify grants, loans, or other sources of funds to replace substandard or failing septic systems.*

Strategy 4.1.B.

Expand development proposal submission requirements.

Tactic: *Develop model ordinances to require wastewater treatment proposals to include information on treatment efficiencies, cost effectiveness, economies of scale, and resource conservation strategies.*

GOAL 5

Encourage practices that support water sustainability, waste reduction, and energy production (e.g. graywater use, rainwater harvesting, recharge basins, conservation measures and biomass energy production).

Objective 5.1.

Support county and local ordinances regarding water sustainability.

Strategy 5.1.A.

Maximize efficient water use and recharge.

Tactic: *Develop model ordinances that incentivize low water use fixtures and metered water service connections in future developments through the use of credits.*

Tactic: *Develop model ordinances that incentivize the use of effluent and/or stormwater discharges, and rainwater harvesting in future developments through the use of credits.*

Tactic: *Increase community workshops and educational efforts through partnerships with local, state, federal agencies, academic institutions, and watershed groups to develop local outreach and education programs.*

Strategy 5.1.B.

Investigate the potential and logistics for the development of regional facilities for the long-term use of residual waste, agricultural waste, and biosolids for composting or alternative energy production.

Tactic: *Gather current biosolids and waste management production and future needs data.*

Tactic: *Create regional GIS database to map biosolids production/disposal, solid waste disposal, agricultural, and composting facilities of significance.*

Tactic: *Identify communities/utilities that could collaborate on regional or subregional facilities.*

Tactic: *Survey local electric utilities and seek public-private partnerships to fund the development of facilities and infrastructure for alternative energy production.*

CHAPTER 6, PLAN IMPLEMENTATION

OVERVIEW

The implementation of this Plan will require a variety of tools that were previously unavailable including: local input to consistency reviews, development of model local ordinances, formalization of the ERC, use of a Wastewater Treatment Options Table to guide appropriate actions, development of various GIS databases for tracking facilities and development, expanded partnerships, and most importantly, funding mechanisms. This chapter describes many of these new tools and the processes. A flow diagram illustrating an overview of the 208 Plan Processes is provided in **Appendix D**.

Previous processes have been revised to provide a more streamlined and coordinated approach to implementation of this plan. Improved regional communication and distinct roles and responsibilities are required so that processes can occur in a timely manner and be seamlessly integrated with the permit approval process.

The permit review process requires that a proposal must first be reviewed to be sure that it is consistent with the goals and strategies in this Plan. The Wastewater Treatment Options Table that appears later in this chapter is a tool to assist both ADEQ and SEAGO, and its ERC, in evaluating development proposals. As explained later in this chapter, during this 'Consistency Review' process, the goals and strategies in the strategic plan will be considered.

The Consistency Review process will be much faster if the proposal is consistent with the Plan. Although the Plan's strategies, tables, and processes can be revised, such revisions will cause considerable delays in obtaining a permit. Therefore, it will be easier, faster, and less costly to revise the proposal so that it is consistent with the Plan.

If the applicant must be approved as a Designated Management Agency (DMA) or a Waste Management Utility (WMU), the process will be necessarily extended. However, only wastewater treatment facilities with defined service areas and planning areas would be required to put forth this level of effort. Owners or operators of on-site systems will not be required to become DMAs or WMUs.

Local Ordinance Development

Because existing federal and state regulations are inadequate to implement some aspects of this plan, additional local regulations should be considered. Development of model ordinances to provide such authority was included as a tactic in several of the strategies in Chapter 5 and is discussed below. Development of local policies and procedures to implement the ordinances may also be needed. Development of model local ordinances should be carefully and thoughtfully coordinated with ADEQ and other state and federal regulatory agencies as necessary to ensure consistency with state and federal regulations. Examples of the model ordinances identified in Chapter 5 include:

Designated Management Agencies or Wastewater Management Utilities (Strategy 1.1.A.) – Ordinances to require a municipality to be approved as a DMA or a privately-owned wastewater utility as a WMU, and require that they take on the responsibilities of a DMA or WMU will be required for full Plan implementation. Such ordinances should indicate that these requirements must be met before approval of new or expansion of existing wastewater facilities. Additional policies and procedures may be necessary for coordinating approval of a Wastewater Management Utility. (See further discussion of DMAs and WMUs later in this chapter.)

Rescinding Capacity Assurance (Strategy 1.1.A.) – Legal authority and processes do not currently exist for a municipality to rescind capacity assurance once given to a developer, or to establish a phased approach to providing capacity assurance. State APP regulations require capacity assurance to be given, but absent clear, local regulations, the assurance is assumed by ADEQ to be an everlasting contract with the developer.

Wastewater Treatment Options Table (Strategy 1.1.C.) – While proposed wastewater treatment facilities are required to be consistent with the Plan, local ordinances will be necessary to require that property owners connect to sewer lines when they come available when individual on-site wastewater systems have been installed within a service area, planning area, or high priority area for sewer lines under the Wastewater Treatment Options Table presented in this chapter.

Reducing Impact from Failing On-Site Systems (Strategy 2.1.A) – While septic tank inspections are required by Arizona law whenever a property changes ownership, there is nothing in the regulations that requires the new property owner to correct the deficiencies identified in the inspection report or to replace a failing system. As a result, many cesspools or failing on-site systems continue to contribute to the degradation of surface and ground waters. Creation of model ordinances requiring submittal of the on-site system inspection report required by A.A.C. R19-9-A316 to the local permitting authority and repair of deficiencies or replacement of the failing on-site system within one year of the date of the inspection report would eliminate failing systems over time, thus reducing the impact on surface and ground waters.

Impacts to Impaired Waters (Strategy 2.2.A.) – During the permit review process, in order for jurisdictions to consider potential pollutant contributions to surface waters (i.e. streams with TMDLs or assessed by ADEQ as "impaired" or "not attaining" standards), and contributions to an aquifer with wells that exceed an Aquifer Water Quality Standards, local ordinances will be necessary.

Proposal Submission Requirements (Strategy 4.1.B.) – In order to fully implement this Plan, local ordinances, policies, and procedures will be necessary to require wastewater treatment facility proposals to include additional information such as cost-effectiveness, resource conservation strategies, treatment efficiencies, or economies of scale.

Support Water Sustainability (Strategy 5.1.A.) – Model ordinances will be necessary to maximize efficient water use and recharge through incentives for developers to use high efficiency water fixtures and metered water connections, and encourage the use of effluent, stormwater discharges, and rainwater harvesting.

Consistency Review Process

The Consistency Review Process is designed to facilitate regional wastewater coordination by:

- Encouraging communication among government agencies during the application review process
- Consideration of broader potential area-wide impacts than the permit review process
- Encouraging the development of infrastructure that achieves desired economies of scale, conservation of resources and cross-jurisdictional cooperation; and
- Providing earlier opportunities for public involvement in the decision process than the permit review process.

In the past, Consistency Reviews frequently resulted in Plan Amendments and extensive public review, a process that generally cost the developer or municipality $20,000 and took up to a year to complete. This Plan introduces a new process, where the strategic plan and a Wastewater Treatment Options Table provide clear criteria for acceptable wastewater infrastructure development. Some proposals may still need Plan amendments, but they should be rare.

Instead of using the Plan Amendment Process to keep an accurate inventory of wastewater facilities, the inventory will be updated annually based on Consistency Reviews performed throughout the year and through the ERC. A database of existing wastewater facilities is included in this Plan, and a similar database of those applicants seeking Consistency Review will be developed and made available to all interested parties on the SEAGO website. The applicants seeking Consistency Review to obtain permit approval for a new facility will be added to the wastewater facilities database. Those applicants seeking increased treatment capacity or similar changes will have their information updated in the wastewater facilities database. Thus, the inventory will become a tool, not the outcome of planning.

ADEQ will continue to make the official Consistency Review determination when a review is required but now in consultation with SEAGO. Proposals seeking Consistency Reviews will be examined against the Wastewater Treatment Options Table and other strategies in the Plan. A Consistency Review typically occurs during ADEQ's administrative review process of wastewater permit applications and for "certificates of sanitary facilities" for proposed subdivisions.

When proposed wastewater facilities are consistent with the Plan, revisions are not needed, the public review process is reduced, and the process is quickly completed. If proposals are inconsistent with the Plan, they can be revised and resubmitted. This would put the technical review process on hold until revisions are complete. The other option is a complete plan amendment describing why the proposal should be approved despite being inconsistent with the current Plan. If approved, this Plan may also require amendment. A flow diagram illustrating an overview of the Consistency Review process is provided in **Appendix D**.

Not all wastewater permit applications will require Consistency Review. During the early administrative review phase of the permitting process, ADEQ will determine whether a formal Consistency Review is required. Review is dependent on whether combined design flow to a wastewater treatment facility will be above or below 24,000 gallons per day (gpd). In determining the wastewater flows, all wastewater flows on the subject property are considered. Table 6.1 indicates when a request for Consistency Review form must be submitted to ADEQ with the appropriate application form. Unless specifically exempted in Table 6.1, a 208 Consistency Review form should be submitted to ADEQ. Application forms for a Consistency Review can be found at ADEQ's website.[1]

[1] www.azdeq.gov/environ/water/watershed/regional.html

Table 6.1 – Consistency Review Criteria

Review Required	Review Not Required
Individual on-site systems with combined design flow 24,000 gpd or more	Individual on-site systems with combined design flow less than 24,000 gpd
Domestic sewage treatment facilities (including commercial if primarily domestic sewage)	Non domestic sewage treatment facilities (e.g., industrial process wastewater)
Significant modifications to existing wastewater treatment plants with no prior Consistency Review. Significant modifications include: • A change is service or planning area • WWTP design flow increase of 10% or more • New wastewater treatment plant • New treatment or disposal methods • New AZPDES discharge point locations	Minor modifications to existing wastewater treatment plants or operation plans. Minor modifications include: • Proposed development connecting to existing sewer lines and WWTP has adequate capacity • Renewal of AZPDES permit with no new discharge point locations or increase in design flow > 10% • Proposed new components to a sewage collection system only • Minor technical corrections to a permit, such as a change of ownership (unless DMA or WMU involved) (Minor modifications do not include those on the list in the left hand column)
Proposed new wastewater treatment plant	
Proposed subdivisions or phases thereof not previously permitted.	

Public Review Process – The Public Review Process gives the public an opportunity to learn about potential wastewater development and express their concerns during the application review process. Public comments are used to inform the ERC of issues during the Consistency Review. This public review process fulfills federal requirements for public participation established in 40 CFR Part 25. However, public review is not always necessary. If ADEQ determines that the proposal is inconsistent with the Plan before public review and comment, public review will be delayed until the proposal is revised. The criteria for when public review is required are shown in Table 6.2 below.

Table 6.2 – Public Review Process Criteria

Public Review Required	Public Review Not Required
Proposed: • New wastewater treatment plants • Expansion of an existing wastewater treatment plant onto new property • New AZPDES discharge location • New or modification of a service area or planning area • Any project that SEAGO or ADEQ deems to be environmentally sensitive or potentially controversial	All other modifications or expansions of wastewater facilities
Plan Amendment	Administrative Plan changes (see Table 6.6)

The type of public review will vary based on public interest. ADEQ's 208 Program staff will consult with SEAGO and the ERC to determine the level of public review needed for each proposal. Two types of public review and comment are described below in Table 6.3.

Table 6.3 – Level of Public Review

Type of Review	Description of Process
Public Notice and ERC Review	Proposal reviewed by the ERC after a 30-day public notice and comment period. The amount and type of public notice will vary based on the proposed magnitude of change and potential for public impact. At a *minimum*: 1. Public notice would be published on the SEAGO website, and would include: • A brief description of the project • Map of site location, discharge sites, pumping stations, etc. • Instructions on how to submit comments • Where to obtain additional information 2. Additional information about the project will be posted on the SEAGO website and be available for review at SEAGO's offices and the applicant's business address.
Public Hearing	If public interest is apparent based on response during the 30-day public notice and comment period and during the ERC review, a formal public hearing may be held. This will extend the public review process by a minimum of 45 days. A public hearing notice will be published and written notice provided to interested parties who commented during the prior public notice phase. SEAGO or ADEQ's 208 Program staff may decide to expand written public notice to other potentially affected parties. This notice must be given at least 30 days prior to the meeting. The public may make their comments at the hearing or in writing within five (5) days of closing the public hearing.

At the end of the Public Comment Process, the applicant or SEAGO will provide ADEQ with a summary of comments and their recommendations. The ERC is encouraged to seek out ways to integrate this public review with other public review requirements, such as having joint hearings with a county, city or town planning and zoning commission, or for establishment of sanitary districts before the Arizona Corporation Commission, if those opportunities arise. SEAGO may charge a fee for conducting this public review process or for assisting in the development of proposals. Fees will be set by the SEAGO Executive Board. A flow diagram illustrating an overview of the Public Review process is provided in **Appendix D** .

Wastewater Treatment Options Table

Function – The Wastewater Treatment Options Table will be used during Plan Consistency Reviews of new or expanding wastewater treatment facilities and should also be applied during review of new or replacement on-site wastewater systems. In order for a proposed wastewater treatment facility to be consistent with the Plan, it must be consistent with the Wastewater Treatment Options Table. If inconsistent with this table, either the proposal or the table must be revised. Revision of the table would require going through a Plan amendment process described at the end of this chapter.

Although the table addresses on-site systems, current state and federal regulations do not require consistency reviews for many of these systems. Local ordinances will be necessary to require that property owners connect to sewer lines when they come available when individual on-site wastewater systems have been installed within a service area, planning area, or high priority area for sewer lines under the Wastewater Treatment Options Table presented in this chapter.

In selecting the right option, engineering considerations and physical site characteristics must be considered. Also, selected options must meet all current Aquifer Protection Permit (APP) and Arizona Pollutant Discharge Elimination System Permit (AZPDES Permit) rule requirements. A detailed description of each option is presented below, followed by the Wastewater Treatment Options Table.

Option 1 – Connect to an existing wastewater treatment plant (WWTP) with adequate capacity

If economically feasible, and an existing WWTP has adequate capacity, connecting to a sewer line is usually the best choice within a service area, a planning area, or a high priority area for sewer lines. Depending on the proximity and characteristics of a proposed development, connecting to existing wastewater facilities frequently provides economies of scale, treatment efficiencies, resource conservation, and is more cost-effective than other alternatives. Even outside of a service or planning area it may be more cost-effective and resource efficient to connect to an existing wastewater plant than construct new facilities or systems. These opportunities should be evaluated before constructing new wastewater treatment plants or using on-site wastewater treatment (septic systems).

Connection to an existing sewer line may require a change in a service area. This change would require a Consistency Review, including public review. This type of change may also require an Intergovernmental Agreement (lGA) or Memorandum of Understanding (MOU) to institutionalize long-term service agreements. Once approved, the changes would be documented and this Plan would be modified during the next annual update.

Other options may be more cost-efficient when a sewer line is not yet available or a WWTP does not have sufficient capacity. In these cases, new developments should be designed so that connections to sewer lines can easily be accommodated when sewer lines become available.

Option 2 – Modify existing wastewater treatment plant or collection system

Expanding or modifying existing wastewater facilities to take on a new development may also improve treatment efficiency, energy efficiency, resource conservation, or offer economies of scale. As developments are proposed, DMAs and WMUs should look for opportunities to merge WWTPs, expand treatment plants, or create collection systems to take advantage of economies of scale. This is more consistent with this Plan than developing new, smaller treatment plants that are less efficient at removing pollutants.

When inside a service area or high priority area for sewer lines, proposed development should be delayed until adequate capacity is available at the wastewater treatment plant and the sewer lines are available to the property. However, if development cannot be delayed, the "phased approach" in Option 4 and 5 could be considered.

Option 3 – Build new wastewater treatment facilities

Construction of new wastewater treatment facilities is sometimes the best alternative due to physical site conditions and engineering considerations in a given development scenario and/or capacity limitations at existing facilities. New construction also can be the best alternative when the facility is designed to use more effective technologies than existing facilities. In addition, new facilities can be designed and constructed to accommodate future expansion if further growth is anticipated.

New centralized wastewater treatment facilities and collection systems should be designed to take advantage of new technologies and potential economies of scale whenever practicable. For example, new facilities and collections systems can be designed to accept wastewater from older and less efficient facilities or systems located inside or adjacent to an existing or proposed service area.

Similar to Option 2, when inside a service area or high priority area for sewer lines, proposed development should be delayed until adequate capacity is available at the wastewater treatment plant and the sewer lines are available at the property. If development cannot be delayed, the "phased approach" in Option 4 and 5 may be considered.

Option 4 – Build on-site wastewater systems (up to 24,000 gpd)

An on-site wastewater system (septic system) may be the best option in low density developments (2 acres or larger) with no site limiting conditions. These larger systems may also provide for a common collection system that can be hooked up to a centralized sewer when available. This option does not offer the economies of scale, treatment efficiencies, or resource conservation potential of Options 1, 2, or 3. However, on larger properties with good site conditions, on-site systems can be a low-cost and effective alternative. An individual on-site system is an option if all of the following conditions exist:

- Appropriate site conditions (APP Rules, AAC R18-9-A310)
- Not located in a 100-year floodway (Floodplain Use Statutes, A.R.S. 48-3609 (C))
- For lots with both an on-site well and wastewater system, the minimum lot size is 1 acre (Arizona Subdivision Rules, AAC R18-5-404)
- The property is not located within an area identified for connection to a sewage collection system by a wastewater master plan adopted by the county, municipality, or sanitary district (APP Rules, AAC R18-9-A309(A)(5)(a)(iii))

A conventional on-site septic system is an option if all of the following conditions exist:

- Not in a Nitrogen Management Area (APP Rules, AAC R18-9-A317(D))
- Nitrate concentration in groundwater less than 10 mg/L (Aquifer Protection Standard) within ½ mile of the development (requires local ordinance)

If either or both conditions above exist, alternative on-site wastewater systems (APP Rules, ACC R18-9-E303 through E322) are an option if:

- Landowner can demonstrate adequate maintenance will be performed (requires local ordinance)

Phased approach – In service areas or high priority areas for sewer lines, where development or replacement of existing on-site systems cannot be delayed until sewer lines are available (Options 1, 2, and 3), individual septic systems could be allowed using a phased approach if:

- APP rule requirements are met
- Dry sewer line collection system is provided to the properties
- The residents are required to connect to the sewer lines and properly abandon their septic system when the sewer line from the WWTP is extended to their area.

The phased approach will require local ordinances and procedures for notification of new owners when property changes ownership.

Option 5 – Build a satellite plant or communal facility

If the other options are not feasible, one of the following small centralized wastewater treatment facilities must be considered:

- A "satellite plant" is a small privately-owned wastewater treatment facility that services one property, such as a recreational vehicle or mobile/manufactured home park. The facility is larger or uses technologies beyond those of a typical septic system and smaller than most municipal wastewater treatment facilities.
- A communal facility serves multiple properties but may be using rather simple technologies, such as an expanded septic tank and leaching system.

Once again, these small treatment plants and collection systems do not provide the economies of scale and treatment efficiencies provided by larger plants, but are a necessary option in areas where larger centralized facilities are not available and individual on-site systems are not appropriate due to lot size or other limiting site conditions. These systems can be more expensive and more complicated to operate than conventional on-site systems, and therefore, may need to be maintained by a certified operator.

Phased approach – In service areas where development cannot be delayed until sewer lines are available, satellite plants or communal systems could be used during the initial development phase until sewer lines become available. However, local ordinances or written agreements between the owners of the wastewater facility and the wastewater treatment plant will need to be established so that these facilities would become collector systems for the WWTP when the sewer lines become available.

Table 6.4 – Wastewater Treatment Options

NOTE: Selected option must meet all ***current*** Aquifer Protection Permit (APP), Arizona Pollutant discharge Eliminations System Permit (AZPDES), and adopted local ordinance requirements.

	Option 1	Option 2	Option 3	Option 4	Option 5
	Existing WWTP with Adequate Capacity	**Expand WWTP or Collection System**	**New Centralized WWTP and Collection System**	**Individual On-site Wastewater Treatment Systems** (up to 24,000 gpd)	**Satellite Plants or Communal Facilities***
In a Service Area, a Planning Area, or High Priority Area for Sewer Lines*	Connecting to an existing WWTP is generally the best option if feasible.* If sewer lines are not yet available or WWTP capacity insufficient, see Options #2 and #3.	Expanding a WWTP is generally preferable to building new facilities. It is usually more cost effective to delay proposed development until expansion has been completed. However, if unwilling to delay development, an initial phase can be developed (see options #4 and #5.)	Construction of new public service facilities may be the best option, for example if the size of the plant cannot be expanded. New facilities must be provided by the entity assigned the Service Area (or developed under a contact with that entity). If in a High Priority Area, but outside of a Service Area or Planning Area, development of a sanitary district, wastewater improvement district or private utility should be *encouraged.* It is usually more cost-effective in the long- term to delay proposed development until new facilities are complete. However, if unwilling to delay development, an initial phase can be developed under Options #4 and #5.	This option includes septic systems and alternative on-site systems. Both new or replacement individual on-site wastewater systems should be restricted by local ordinance to: • Lots larger than 1 acre with adequate site conditions for the individual on-site wastewater system and a replacement system • Situations where sewer lines are not available If unwilling to delay development until sewer lines are available, individual on-site systems could be used in a "first phase" of development if: • Dry sewer lines are constructed to facilitate connection to a future sewer line; and • A local ordinance requires property owners to connect to sewers when they become available, and a mechanism is in place to notify future property owners of this requirement.	These privately owned facilities may be an option only when sewer lines are not yet available. In a Service Area, this is another alternative to delay development until sewer lines are available under a "first phase" of development if: • There is a written agreement with the WWTP to connect to the collection system when sewer lines become available and properly decommission the treatment system. (This may also require local ordinances.)
All Other Areas	If feasible,* modify the Service Area and connect to the sewer lines. This would require Public review, Consistency Review and possibly revision of the utility's operations plan. (Not a likely option)	If feasible,* modify the Service Area and connect to the sewer lines. This would require Public review, Consistency Review and possibly revision of the utility's operations plan.	If feasible,* establish a Service Area and initiate development of a **new WWTP and collection system.** Establishment of a Service Area may require certification as a DMA or WMU.	A good option on lots larger than 1 acre with no limiting site conditions for conventional systems.	Centralized on-site wastewater treatment facilities include "package plants" and communal septic systems which may be a good option where sewer lines are not available and limiting site conditions restrict use of conventional septic systems. Establishment of a Service Area may require certification as a DMA or WMU.

***Table 6.4 Footnotes:**
"Feasible" means that economical, physical, and technological constraints established in APP and AZPDES Rules are considered.
"WWTP" means Wastewater Treatment Plant.
"Adequate Capacity" means the daily flow would not exceed 100% of the APP Permit design flow for the WWTP.
"Service Area" means an area established as:

- An area with existing sewer lines, including distant collection systems that discharge to a centralized WWTP
- An area that a public service provider has an exclusive right to service through an agreement with the Arizona Corporation Commission
- An area where a city or town has agreed to provide sewer service

"Planning Area" means the area that a Designated Management Agency, or Wastewater Management Utility plans to sewer in the future, but is outside of the service area. Both public and private utilities should have established planning areas.
"High Priority Areas" means an area where providing centralized wastewater treatment is a high priority (see Strategy 1.1.B. and 1.1.C.).
"Higher Density Area" means the average lot size is less than one acre.
"Communal Facility" is a wastewater treatment system used by multiple property owners but is not operated by either a municipal or private utility or considered a public utility.

Options should also consider how to incorporate technologies for reuse of effluent and biosolids, including the use of biosolids for alternative energy , and other strategies outlined in Chapter 5 of this Plan.

Commercial and Industrial Wastewater – Domestic sewage discharges from commercial properties would require Consistency Review and would follow the Wastewater Options Table. However, discharges from non-municipal or industrial processes (e.g., industrial process wastewater) are not covered under the 208 Process or covered by this Plan.

Options Considering Distance to Sewer Lines – Determining which wastewater treatment option is preferable can often be determined by considering the distance to existing sewer lines or the wastewater treatment plant. Such *guidance* is provided in Table 6.5, in which the five options outlined in Table 6.4 are combined into just three options: Septic – An on-site wastewater treatment system, including an alternative on-site system; Tie in – Connect to a wastewater treatment plant, and; Satellite Plant – Construct a small treatment plant. *Table 6.5 should be considered guidance.*

Table 6.5 – Guidance for Selecting Wastewater Treatment Systems Based on Distance

Type of Development	Distance from Existing Sewer Line or WWTP			
	< 300 feet	301 feet – 1 mile	1 mile – 2 miles	> 2 miles
New Single Lot	Tie in	Septic	Septic	Septic
Failed On-site System (Septic System)	Tie in	Replace Septic	Replace Septic	Replace Septic
New Development with Lots > or = 1 acre	Tie in	Septic Tie in if > 50 lots	Septic Tie in if > 100 lots	Septic
New Development with Lots < 1 acre	Tie in	Tie in	Tie in	Satellite Plant

Table 6.5 Footnotes:
"WWTP" means Wastewater Treatment Plant
"Satellite Plant" indicates that the construction of a new wastewater treatment facility should be considered, rather than tying into an existing system.

Designated Management Agencies and Wastewater Management Utilities

Designated Management Agencies (DMAs) – According to the Clean Water Act (Section 208(c)(l), a DMA is an existing or newly-created local, regional, or state agency or political subdivision that has water quality issues, as a result of urban-industrial concentrations or other factors. An incorporated municipality, sanitary district, or wastewater improvement district that will be a public wastewater utility needs to be certified as a DMA. ADEQ and EPA must certify that a proposed DMA has the authority and capacity to carry out the functions of the DMA.

Currently, all of the municipalities within the SEAGO region are recognized as DMAs. It is anticipated that as new developments occur outside of these incorporated communities, these DMAs may expand their boundaries or other entities may wish to become a DMA. There is also one sanitary sewer district in the SEAGO region with DMA designation – the Naco Sanitary District.

Before a new wastewater treatment facility is established and people become dependent on the public wastewater utility, the proposed utility needs to be able to demonstrate that it has the long-term capability to provide adequate services into perpetuity. In doing so the proposed utility is committed to implementing this Plan (Strategy 1.1.A.).

Wastewater Management Utilities (WMUs) – Some privately-owned utilities function as a DMA, but because they are not a government subdivision, they cannot be certified as a DMA. A private utility provides wastewater services to an area approved by the Arizona Corporation Commission (ACC), as outlined in their Certificate of Convenience and Necessity (CCN). To assure wastewater treatment for the long-term, these facilities need to be approved by ADEQ as having the same capabilities, resources, and commitment to this Plan as a DMA. These utilities would be approved as a WMU (Strategy 1.1.A.).

For example, when a privately-owned public utility serves multiple landowners and may need to expand facilities or collection systems to provide service to all properties in its designated service area, it needs to take on many of the functions of a DMA. The larger the facility and collection system, the more a private utility needs to be able to demonstrate legal, financial, and managerial capabilities before establishment or expansion of facilities is approved.

Existing and proposed WMUs must have approved service areas, planning areas, and provide 20-year plans for growth. They must coordinate with neighboring DMAs and WMUs to provide wastewater facilities to high priority areas and to implement other strategies in this Plan.

Not all privately-owned public wastewater treatment facilities need to be a WMU. For example, a facility serving one owner such as a recreational vehicle park, mobile/manufactured vehicle park, motel, hotel, or shopping center might not be functioning as a WMU and likely would not be able to fulfill the requirements of a WMU. A wastewater facility serving all lots within a small subdivision would also not be functioning as a DMA. However, before this private facility can expand its service or collection system beyond its defined neighborhood, it needs to be approved as a WMU.

Functions of a DMA – Pursuant to the CWA, Section 208(c)(2), a DMA must be able to:

- Carry out appropriate portions of an regional 208 Plan
- Manage effectively waste treatment facilities and related facilities in conformance with the 208 Plan (see note below about related facilities)

- Design, construct, operate, and maintain new and existing wastewater treatment facilities, directly or by contract, as required by any plan established to fulfill Section 208 planning requirements (see note below about any plan)
- Accept and utilize grants or other funds from any source for waste treatment management purposes
- Raise revenues, including assessment of waste treatment changes
- Incur short-term and long-term indebtedness
- Assure in the implementation of the regional 208 Plan that each participating community pays its proportionate share of treatment costs
- Refuse to receive any wastes from any municipality or subdivision which does not comply with any provisions of an approved plan established to fulfill Section 208 planning requirements (see note below about an approved plan)
- Accept industrial wastes for treatment

To clarify this list:

> "Related facilities" would include collection systems and effluent/biosolid disposal methods.
> "An approved plan" or "any plan" established to fulfill Section 208 planning requirements would include both this Plan and any adopted wastewater plans of a DMA or WMU submitted in response to this Plan's requirements.
> "Accept industrial wastes for treatment" also indicates that the entity needs the ability to require pre-treatment of wastewater entering the collection system.

The Code of Federal Regulations further requires that DMAs must be able to demonstrate the legal, financial, and managerial capabilities to implement both this Plan and any plans the DMA submits in response to this Plan.

Responsibilities of a DMA or WMU – Becoming a DMA or WMU requires making a commitment to implement the strategies in the SEAGO 208 Plan and help revise future Plans. Each DMA or WMU has the opportunity to have a voting member on the SEAGO ERC.

Strategies in a 208 Plan must also address nonpoint source issues and controls and help implement load reductions established in a TMDL. Therefore, becoming a DMA or WMU requires making a commitment to help manage and control of nonpoint source pollution, which includes pollutants carried by stormwater and pollutants associated with activities such as agriculture, construction, urban development, roads, mining, recreation, and septic systems. The DMA or WMU is also making a commitment to participating in the development and implementation of a TMDL Implementation Plan (TIP) or other watershed improvement plan.

Incentives for Certification - If ordinances and policies are established, all potential DMAs and WMUs must demonstrate the legal, financial, and managerial capabilities and desire to implement this Plan within their Service Areas before new or expanded wastewater treatment facilities would be approved (Strategy 1.1.A.). In return, they will be given voting representation on the SEAGO ERC.

Certification – The process for certification of a DMA or WMU is described below:

1. The utility petitions SEAGO (the DPA) and ADEQ to be recognized as a DMA or WMU. Such petition would include documentation provided by legal counsel of the legal, financial, and managerial capability to provide services, and a willingness to participate in Plan implementation.
2. The SEAGO ERC holds at least one public hearing in the county (or counties) within which the proposed utility intends to operate.
3. The ERC submits a summary of public comments received and its responses to the comments to ADEQ.
4. The proposal is forwarded to the Statewide Water Quality Work Group meeting for recommendation of approval.
5. ADEQ, as the Governor's designee for the 208 Program, reviews the proposal and if complete, approves the designation.
6. If the utility is approved as a proposed DMA, ADEQ submits all pertinent information to EPA for approval. According to Section 208(c)(1), EPA then has 120 days to accept the designation or find that the entity does not possess adequate authority. Upon EPA's acceptance of the designation, the Plan is automatically revised to reflect a new DMA. If the utility is a proposed WMU, only the approval of ADEQ is required.

A flow diagram illustrating an overview of the DMA and WMU Approval Process is provided in **Appendix D**. Approval of a new DMA or WMU would be considered an automatic update of the Plan, and website information and databases will need to be updated (see the following Plan Amendment Process discussion).

De-designation of a DMA or WMU – ADEQ can withdraw or modify the designations if:

- The agency requests such cancellation in writing
- The agency fails to meet its management or planning requirements as specified in grant agreements, contracts, or memorandums of understanding (MOUs)
- The agency no longer has the resources or commitment to continue water quality management or planning activities within its designated boundaries

When the DMA or WMU is de-designated, ADEQ assumes the roles and responsibilities for that area. However, de-designation of a DMA or WMU is not that easy. None of the counties in the SEAGO region have the authority and resources to manage a wastewater treatment facility. The purpose of establishing a DMA or WMU before construction or expansion of a facility is to assure that it has the resources and capability to provide these services and to fulfill planning responsibilities into perpetuity.

208 Plan Amendments

Adoption of Plan amendments requires a formal public review process and approval by ADEQ and EPA. SEAGO and the ERC will review and may revise this plan every five years; however, revisions can be requested at any time. Conditions requiring plan amendments are shown in Table 6.6.

Table 6.6 – 208 Plan Amendment Criteria

Plan Amendment Required	Plan Amendment not Required
Changes in goals, objectives, strategies, or tactics	Changes in responsible parties in the strategic plan
Changes in the Wastewater Treatment Options Table	New or modifications to facility operations plan
Changes in processes established in this Chapter • Consistency Review Process • Public Review Process • DMA/WMU Approval Process • Plan Amendment Process	New or modifications in wastewater treatment plants, subdivisions, or other proposals
New DMA or WMU*	Administrative Plan changes not affecting the goals, objectives, strategies, Wastewater Treatment Options Table, or processes established in this Chapter.

Table 6.6 Footnote:
* Approval of a new DMA or WMU, or an appointment of a new Designated Planning Agency by ADEQ, would be considered an automatic revision of this Plan. These revisions would follow the approval process described in the previous subsection rather than the process described here.

This process replaces the Plan Amendment Process used in the past. Unlike the prior 208 Plan Amendment Process, this Plan will not need to be revised to approve a proposed subdivision, planned community, new wastewater treatment plant, or other development. New developments and wastewater treatment plants would go through the Consistency Review Process and Public Review Process as described in the previous sections of this Chapter, to assure conformity with the Plan and to allow affected parties to voice their concerns.

Amendment Process – The Plan amendment process is described below:

- Plan Amendment Request Form is submitted to ADEQ. Any entity, including ADEQ, may request a Plan Amendment.
- Letter of Support - The ERC should provide a letter of support for initiating the plan amendment process.
- Initial Review - ADEQ and the DPA or its agent completes an initial review and makes recommendations to the entity requesting the amendment.
- Public Review occurs in three ways:
    - Public Hearing
        - ✓ At least one formal local public hearing must be held in the region. Additional public hearings may be added based on public interest. ADEQ may choose to make a presentation as part of the hearing.
        - ✓ Public notice must be given at least 45 days prior to the hearing.
        - ✓ Amendment materials must be available for public review at least 30 days prior to the hearing.
        - ✓ The party requesting the amendment is responsible for preparing a hearing transcript and responsiveness summary of comments.
    - Presentation of the amendment and amended Plan for approval by the SEAGO Executive Board (the DPA).
    - Presentation of the amendment and amended Plan at the Water Quality Management Working Group, with any recommendations from the Working Group going to ADEQ.

- Submission of the amendment and amended Plan to ADEQ for approval, including a summary of concerns raised and recommendations offered during public review, and a letter of support from the SEAGO Executive Board.
- If certified by ADEQ, the U.S. Environmental Protection Agency is sent a copy of the Plan amendment and has 30 days to review and respond. If no response is received from EPA within 30 days, ADEQ will assume that the amendment is approved and will incorporate it into the State Water Quality Management Plan. Plan amendments that affect state programs only (e.g., APP, reclaimed water) are complete upon ADEQ certification and do not need to be sent to EPA for review and approval.
- Implementation of the Plan and incorporation of changes in the information available on the SEAGO website.

A flow diagram illustrating an overview of the 208 Plan Amendment process is provided in **Appendix D** . SEAGO may charge fees for conducting the Plan Amendment Process. Any fees will be set by the SEAGO Executive Board. Additional information about 208 Consistency Reviews, 208 Plan Amendments, and application forms can be obtained at: www.azdeq.gov/environ/water/watershed/regional.html

SEAGO Website Information

The SEAGO website will incorporate and integrate information from individual wastewater facilities so that information is readily accessible to developers, planners and other interested parties. It will provide an inventory of wastewater systems in the region and a record of Consistency Reviews performed. At a minimum, the website will provide the following information:

- The current version of the SEAGO 208 Plan
- The inventory of public and private wastewater treatment facilities: location, design capacity, existing use
- A record of Consistency Reviews performed, which may include information on the proposal such as location, capacity, change in service or planning area, treatment and disposal methods, AZPDES discharge point, subdivision information, etc.
- The Wastewater Treatment Options Table
- Other information that may support Consistency Reviews
- Existing wastewater treatment facilities service areas and planning areas

Over time, should funding become available to do so, the website may be expanded to include the following additional information:

- Sensitive areas, where on-site wastewater treatment systems may not be appropriate
- High priority areas for sewer lines
- Surface waters classified as "impaired" and classified as “outstanding Arizona waters”
- Surface waters with established Total Maximum Daily Loads
- Wells sampled for nitrate, highlighting wells near or exceeding 10 mg/L (the Arizona Aquifer Water Quality Standard)

APPENDIX A – LEGAL AUTHORITIES

Regional water quality management planning and wastewater treatment and disposal practices must conform to established water quality rules and laws. This Appendix expands the information provided in Chapter 2 by describing state and federal regulations affecting water quality management. Copies of the regulations discussed in this section can be downloaded from the internet at the sites shown in the table below.

Table A.1 – Websites for Laws and Regulations

Program	Regulation	Website
Animal Feeding Operations	AAC R18-0-D901 thru D905	http://www.azsos.gov/public_services/Title_18/18-09.htm
Arizona Aquifer Protection Permit Program (APP)	AAC R18-9-201 thru E323	http://www.azsos.gov/public_services/Title_18/18-09.htm
	ARS, Title 49, Article 3.1	http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=49
AZPDES Permits	AAC R18-9-A901 thru C905	http://www.azsos.gov/public_services/Title_18/18-09.htm
	ARS, Title 49, Article 3.1	http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=49
Biosolids and Sludge	AAC R18-9-1001 thru 1015	http://www.azsos.gov/public_services/Title_18/18-09.htm
County Planning & Zoning	ARS 11-826 thru 833	http://www.azleg.state.az.us/ArizonaRevisedStatutes.asp?Title=11
General Water Quality	Federal Clean Water Act	http://epw.senate.gov/water.pdf
Gray Water	AAC R18-9-719	http://www.azsos.gov/public_services/Title_18/18-09.htm
NPDES Permits	Clean Water Act Section 402	http://www.epa.gov/owow/wetlands/laws/section402.html
Municipal Separate Stormwater Systems (MS4)	40 CFR - 122.26 (large & medium); 122.32 (small systems)	http://www.access.gpo.gov/nara/cfr/waisidx_02/40cfr122_02.html
	AAC R18-9-902(B)(8)	http://www.azsos.gov/public_services/Title_18/18-09.htm
Reclaimed Water – conveyances	AAC R18-9-601 thru 603	http://www.azsos.gov/public_services/Title_18/18-09.htm
Reclaimed Water – reuse	AAC R18-9-701 thru 720	http://www.azsos.gov/public_services/Title_18/18-09.htm
	ARS, Title 49, Article 3, 49-254.02	http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=49
Regional Water Quality Planning	Clean Water Act Section 208	http://epw.senate.gov/water.pdf
	CFR Title 40 Section 130	http://ecfr.gpoaccess.gov
	AAC R18-5-301 thru 303	http://www.azsos.gov/public_services/title_18/18-05.htm
Sanitary Districts & Domestic Wastewater Improvement Districts	ARS 48-1011 thru 1020 ARS 48-2001 thru 2032	http://www.azleg.gov/ArizonaRevisedStatutes.asp?Title=48
Subdivision Certification	AAC R18-5-401 thru 410	http://www.azsos.gov/public_services/title_18/18-05.htm
	ARS Title 49, Article 1, 49-104(B)(11)	http://www.azleg.gov/FormatDocument.asp?inDoc=/ars/49/00104.htm&Title=49&DocType=ARS
Water Quality Standards, 1. Surface Water 2. Reclaimed water 3. Groundwater 4. Impaired water ID	AAC 1. R18-11-101 thru 123 2. R18-11-301 thru 309 3. R18-11-501 thru 506 4. R18-11-601 thru 606	http://www.azsos.gov/public_services/Title_18/18-11.htm

AAC = Arizona Administrative Code
ARS = Arizona Revised Statutes
CFR = Code of Federal Regulations

Laws Governing Regional Wastewater Planning

Clean Water Act and Federal Regulations – As discussed in Chapter 2, regional water quality management planning is required under Section 208 of the federal Clean Water Act. ADEQ's 208 Program facilitates the review of infrastructure projects to assure they are consistent with the certified regional water quality management plan. The processes developed to implement Section 208 encourage the identification of water quality problems and implementation of strategies to address these problems. Public participation and collaboration among public and private sectors is promoted during all stages of plan development and implementation.

Specific regulations in the Code of Federal Regulations (Title 40, Section 130) establish how regional water quality management planning will be conducted.

State Water Quality Management Planning Rules – How regional water quality management will be conducted in Arizona is established in a set of brief rules (A.A.C. R18-5-301 through 303) and the Continuing Planning Process adopted by ADEQ in 1993. The Continuing Planning Process establishes how state water quality programs will be coordinated and water quality goals will be achieved. ADEQ plans to revise portions of the Continuing Planning Process to adjust to the new model 208 planning process developed for this Plan.

Laws Governing Wastewater and Agriculture Permits

The federal Clean Water Act strives to restore and maintain the chemical, physical, and biological integrity of the nation's waters by controlling discharges of pollutants. The basic means to achieve the goals of the Clean Water Act is through a system of water quality standards, permits and discharge limitations. Two primary laws, the federal Clean Water Act and the Arizona Aquifer Protection Program, impact sewage treatment facilities through required permits.

Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program – The National Pollutant Discharge Elimination System (NDPES) Program requires permits for activities that discharge pollutants to waters of the United States. This program is established under Section 402 of the Clean Water Act. EPA has delegated authority to ADEQ to operate the NPDES program, which in Arizona is referred to as the Arizona Pollutant Discharge Elimination System (AZPDES) Permit Program. All facilities that discharge pollutants from any point source into a surface water are required to obtain or seek coverage under an AZPDES permit. The program includes individual permits, and general permits for construction, deminimus discharges, and municipal (MS4) and industrial storm water (Multi-Sector General Permit) discharges.

Individual Permits – A wastewater treatment plant that discharges to a surface water requires an individual permit, which lasts no more than five years. The permit addresses effluent limitations, monitoring requirements, reporting requirements, and other special conditions such as best management practices. Applications for new discharges must be made no later than 180 days before the discharge begins. Applications for permit renewals (for existing dischargers) must be made at least 180 days before the existing permit expires. Facilities must be consistent with the appropriate 208 Plan in order to receive a permit. R18-9-A903(6).

Multi-Sector General Permit –Industrial sites that discharge stormwater associated with industrial activity are required to have a Multi-Sector General Permit. A Stormwater Pollution Prevention Plan (SWPPP) must be developed for the industrial activities identified in the Multi-Sector General Permit. The SWPPP includes best management practices that would be implemented to reduce soil erosion, and contain or minimize the pollutants that might be released to surface waters.

The industry also must implement the appropriate sector-specific requirements for wastewater treatment works (a Sector T industry) which are (one of the following):

- Treatment works treating domestic sewage, or any other sewage sludge or wastewater treatment device or system used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated to the disposal of sewage sludge.
- Located within the confines of a facility with a design flow of 1.0 million gallons per day (MGD) or more.
- Required to have an approved pretreatment program under 40 CFR Part 403.

Construction General Permit – Storm water discharges associated with construction activities (clearing, grading, or excavating) which disturb one acre or more must obtain an AZPDES Construction General Permit. Permit coverage also is required for construction activities that will disturb less than one acre of land if the project is part of a larger common plan of development or sale and the entire project will ultimately disturb one or more acres.

If new clearing, grading, or excavating activities will occur, then a Stormwater Pollution Prevention Plan must be prepared and implemented during the course of construction. The SWPPP must identify such elements as the project scope, anticipated acreage of land disturbance, and the best management practices that would be implemented to reduce soil erosion, and contain or minimize the pollutants that might be released to surface waters.

Pretreatment – As part of an AZPDES Permit, publicly-owned treatment works (POTWs) that discharge five million gallons per day or greater, must provide a pretreatment program to control pollutants discharged to its sewer system from identified Significant Industrial Users. Significant Industrial Users are those businesses that have discharges that significantly impact the sanitary sewage conveyance system or treatment facilities, either because of the discharge amount or certain pollutants in the discharge. Usually the Pretreatment Plan involves permitting the industrial users, discharge limits for certain pollutants, required monitoring and reporting from the industrial user, and enforcement authority for violations. ADEQ must approve the pretreatment plan or its amendments.

Municipal Separate Storm Sewer Systems (MS4s) – State and federal regulations require some municipalities to obtain a permit for their municipal stormwater discharges. These regulations stemmed from national studies, and local findings within Arizona, that showed runoff from urban areas greatly impairs stream ecology and the health of aquatic life. While many of the water courses in Arizona are ephemeral or intermittent, these national regulations still apply.

ADEQ has authority to determine that a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, manmade channels, and storm drains) constitutes an MS4, even if not owned or operated by a municipality.

Aquifer Protection Program – In Arizona, the Aquifer Protection Permit Program is the major regulatory program aimed at protecting groundwater quality from the disposal of pollutants on land or in subsurface excavations. An APP is needed for any facility that discharges a pollutant to an aquifer, or to the land surface or vadose zone in such a way that the pollutant might reach the aquifer (A.R.S. § 49-241(A)). Arizona law also establishes a list of facilities considered to be discharging and therefore require an APP (A.R.S. § 49-241(B):

- Surface impoundments, pits, ponds, and lagoons;
- Solid waste disposal facilities, except for mining overburden and wall rock that has not been subject to mine leaching operations;
- Injection wells;
- Land treatment facilities;
- Septic tank systems;
- Point source discharges to navigable waters;
- Sewage or wastewater treatment facilities.
- Wetlands designed and constructed to treat municipal and domestic wastewater for underground storage.

The APP program issues both individual and general permits. On-site wastewater (septic) treatment systems are covered by general permits. Larger on-site wastewater systems, from 3,000 to less than 24,000 gallons per day, also usually obtain a general permit. Permitting for most on-site wastewater treatment general permits is delegated to the counties.

Proposed wastewater treatment plants must be consistent with the appropriate 208 Plan in order to receive an individual permit (R18-9-A201(B)(6)). A person constructing a new on-site wastewater septic system must connect to a sewage collection system if the on-site wastewater treatment facility is located within an area identified for connection to a sewage collection system in a 208 Plan (R18-9-A309(A)(5)).

Nitrogen Management Area – An area designated by ADEQ where prescribed measures to control nitrogen will be enforced because cumulative discharges of nitrogen threaten to cause or have caused an exceedance of the Aquifer Water Quality Standard for nitrate (10 mg/L).

Within a Nitrogen Management Area:

- An on-site wastewater treatment facility (including septic systems) must employ one or more alternative technologies allowed under APP rules that achieve a discharge level containing not more than 15 mg/L of total nitrogen.
- Delegated authority for wastewater permits to the county may be rescinded.
- Agricultural operation must use the best control measure necessary to reduce nitrogen discharge.
- ADEQ may require the owner or operator of an impoundment liner to reassess its performance.
- Entities must comply with any special provisions established to reduce nitrogen loading to groundwater.

Nitrogen Management General Permits – The application of nitrogen fertilizer and operation of a concentrated animal feeding operation also regulated under a general APP Permit (R18-9-401 thru 404). These rules indicate best management practices applicable to controlling nitrogen impacts to ground water.

Grazing General Permit – An entity who engages in livestock grazing and applies any voluntary best management practices to maintain soil cover and prevent accelerated erosion, nitrogen discharges, and bacterial impacts to surface water is issued a Surface Water Quality General Grazing Permit (R18-9-501).

Laws Governing Waste Residuals

Reuse of effluent – Arizona has regulations that apply to the facility generating wastewater that will be reused and to the site where the reclaimed water is used or applied. Reclaimed water is water that has been treated or processed by a wastewater treatment plant or an on-site wastewater treatment facility. The facility providing the reclaimed water must have an individual APP indicating the class of reclaimed water it generates (R18-9-703(A)). The APP requires the facility to monitor the effluent quality to ensure that the effluent limitations for the particular reclaimed water class are met.

Reclaimed Water Quality Standards (R18-11-301 through 309) establishes five classes of reclaimed water expressed as a combination of minimum treatment requirements and a limited set of numeric reclaimed water quality criteria.

- Class A reclaimed water is required for reuse applications where there is a relatively high risk of human exposure to potential pathogens in the reclaimed water.
- Class B or C reclaimed water is acceptable for uses where the potential for human exposure is lower.
- Class A+ and Class B+ reclaimed water have received treatment to produce water with a total nitrogen concentration of less than 10 mg/l. These categories of reclaimed water will minimize concerns over nitrate contamination of groundwater beneath sites where reclaimed water is applied. As a result, the general permits for the direct reuse of Class A+ and Class B+ reclaimed water do not include nitrogen management as a condition of the reuse.

Reusing reclaimed water is governed by various general permits (R18-9-708).

Ground Water Recharge – Injecting treated effluent into the vadose zone or aquifer would require an APP General Permit. The type of permit would depend on the method of recharge and the available uses of the recharged water (A.R.S. § 49-245.02). APP rules also establish the requirements for recharge/disposal through wetlands.

Gray Water – "Gray water" means wastewater collected separately from a sewage flow that originates from a clothes washer, bathtub, shower, and sink, but does not include wastewater from a kitchen sink, dishwasher or toilet. Use of gray water and harvesting rainwater for watering landscape, instead of using potable water, is encouraged as a way to conserve limited water resources in an arid climate. The use of gray water is regulated under an APP general permit (R18-9-719).

Biosolids and Sewage Sludge – Sewage sludge is the solid, semisolid or liquid residue that is generated during the treatment of domestic sewage in a wastewater treatment plant. Biosolids is that part of sewage sludge that is placed on, or applied to the land to use the beneficial properties of the material as a soil amendment, conditioner, or fertilizer. Use and disposal of sewage sludge and biosolids is regulated under AZPDES Permit requirements. Treated biosolids produced by a facility can be applied to agricultural fields, mining reclamation, or landscaping provided that all applicable regulations are followed.

In Arizona, sewage sludge that is not applied as biosolids must be disposed of through a surface disposal site (e.g., landfill) that complies with 40 CFR 503, Subpart C, and obtains an APP. Grit and other materials generated during preliminary treatment are considered solid waste and must be disposed of accordingly.

Biosolids processing facilities are also subject to rules governing hazardous waste (Resource Conservation and Recovery Act (RCRA)). In Arizona, RCRA is implemented by ADEQ's Waste Programs Division, which is responsible for permitting facilities that treat, store or dispose of hazardous waste and for approving solid waste facility plans.

Laws Governing Location

Subdivision Approval – Prior to sale or lease of subdivided lands, the Arizona Department of Real Estate requires ADEQ to issue a Certificate of Approval for Subdivisions (ARS §49-104(B)(11)). To issue this certification, ADEQ must determine that the subdivision will have adequate drinking water, wastewater disposal, and refuse disposal as established in A.A.C R18-5-401 through 411.

If the proposed subdivisions will use on-site wastewater treatment systems, the applicant must demonstrate through geology, soils, and design reports that all lots have acceptable site conditions and adequate lot sizes. The County Health Department must also provide a statement of agreement to the use of individual on-site systems. Where the on-site wastewater system is to be installed on each lot is the lot owner responsibility when they build the system.

If the subdivision is to connect to a wastewater treatment plant, Treatment Plant Capacity Assurance statement must be provided by the treatment plant. This statement must affirm that service to the subdivision will not cause the design flow of the facility to be exceeded nor any permit limits for the facility to be exceeded. If the subdivision's sewage collection system will not discharge directly to a wastewater treatment facility, Capacity Assurance for Sewage Collection System must provide from the operator of the collection system(s).

Clean Water Act Section 404 Permits and 401 Certification – Section 404 of the Clean Water Act identifies conditions for when a permit is required for placing fill or dredged material into waters of the United States. The U.S. Army Corp of Engineers is responsible for administering the 404 permit program. If a federal permit is required for a project, a state-issued Clean Water Act section 401 certification of the permit will be required. The U.S. Army Corps of Engineers includes the conditions of the Clean Water Act 401 certification as requirements of its Section 404 permit to ensure that the permitted activities do not result in a violation of the State's surface water quality standards.

Particular Surface Waters – Listing as an impaired water or as an Outstanding Arizona Water, or having a Total Maximum Daily Load established by ADEQ may impact permits by limiting the amount of certain pollutants that can be discharged to the surface water.

Impaired Waters – Under Section 303 of the Clean Water Act, states are required to adopt surface water quality standards that preserve and protect the quality of navigable waters. Section 303(d) of the Clean Water Act requires that the Department identify and list waters that do not meet one or more of the surface water quality standards. Waters that do not meet an applicable water quality standard are impaired (A.R.S. § 49-232). No further degradation of water quality is permitted in impaired surface water (A.A.C. R18-11-107). This must be considered for AZPDES permitted discharges to the surface water and APP permitted discharges to the ground that might impact surface water quality.

Total Maximum Daily Load (TMDL) – Based on the 303(d) impaired waters list, the Clean Water Act requires that a Total Maximum Daily Load (TMDL) analysis be conducted. A TMDL is the maximum daily amount of the pollutant loads from natural sources, non-point sources and point-source discharges of the pollutant that can be carried by a surface water without causing an exceedance of a water quality standard (A.R.S. § 49-234). TMDLs are one of the required elements that must be included in 208 Plans or referenced as part of the Plans.

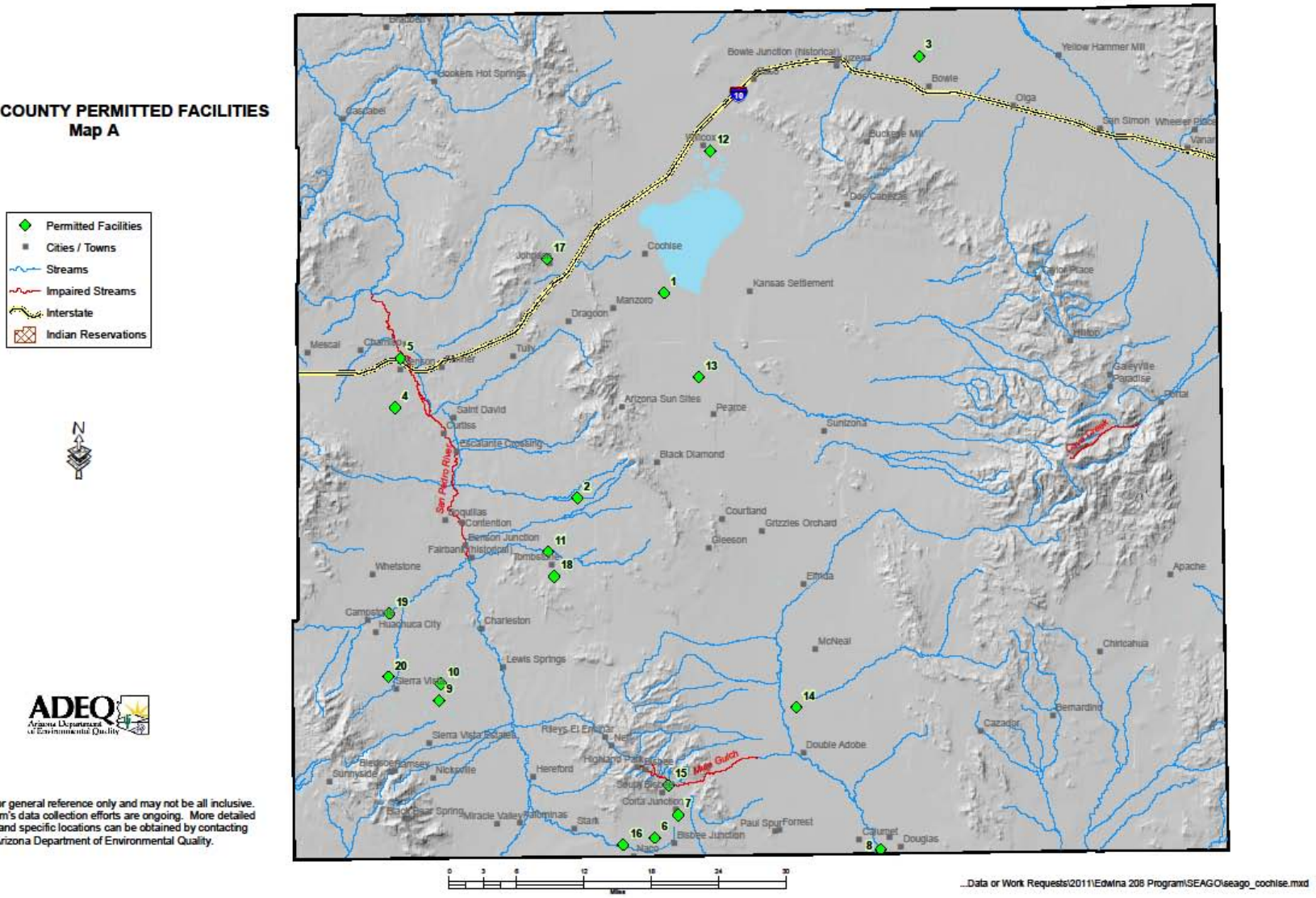
Outstanding Arizona Water (OAW) – ADEQ can classify a surface water as an OAW because of its unique attributes, such as the geology, flora and fauna, water quality, aesthetic value, or the wilderness characteristic of the surface water, or an endangered or threatened species is associated with the surface water and the existing water quality is essential to the species.

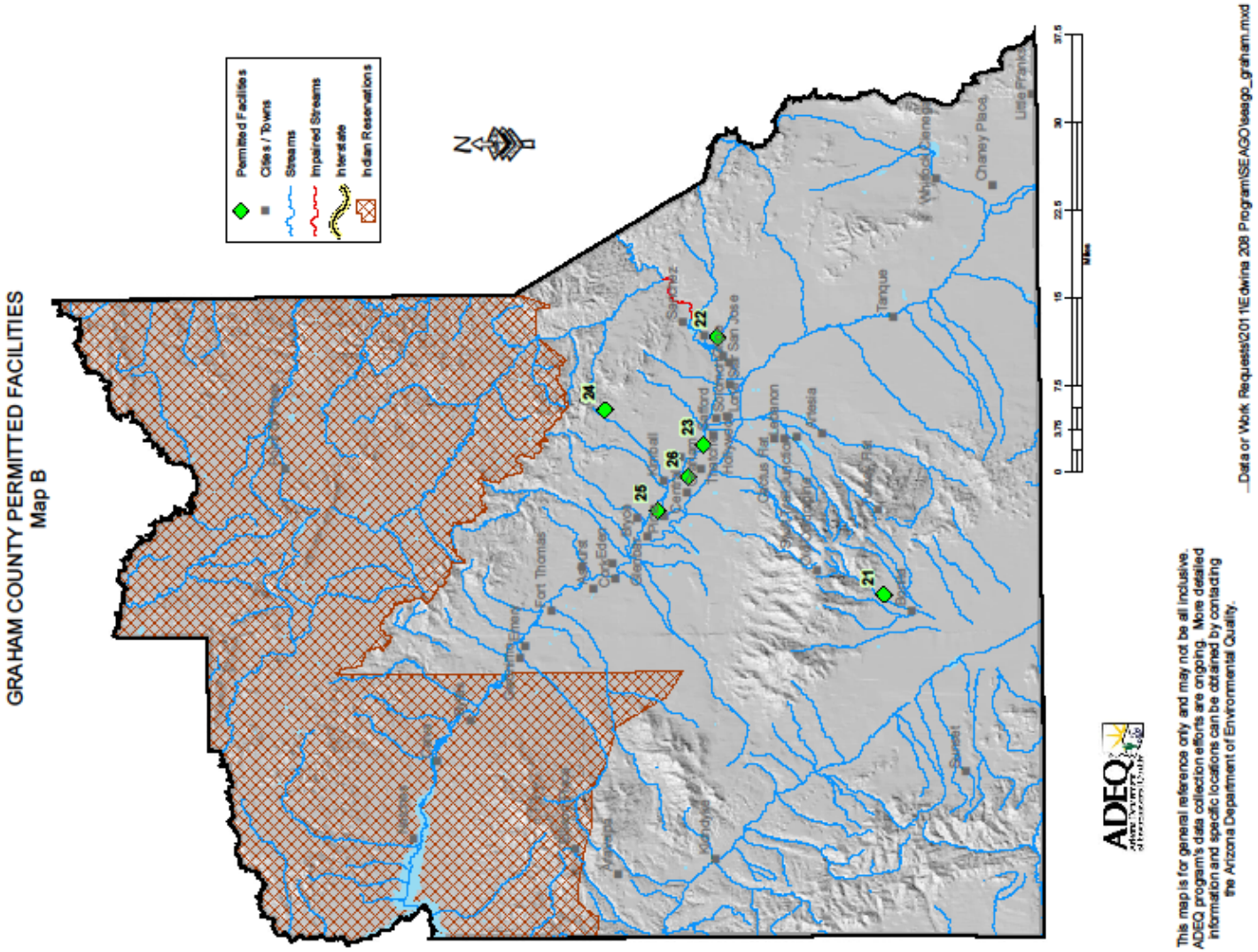
Floodplains – Under ARS § 48-3609(C) and the Arizona Department of Water Resources interpretation, waste disposal systems must not be installed in a regulatory floodway, which ADWR defines as the area officially declared a floodway by a county flood control district or incorporated community.

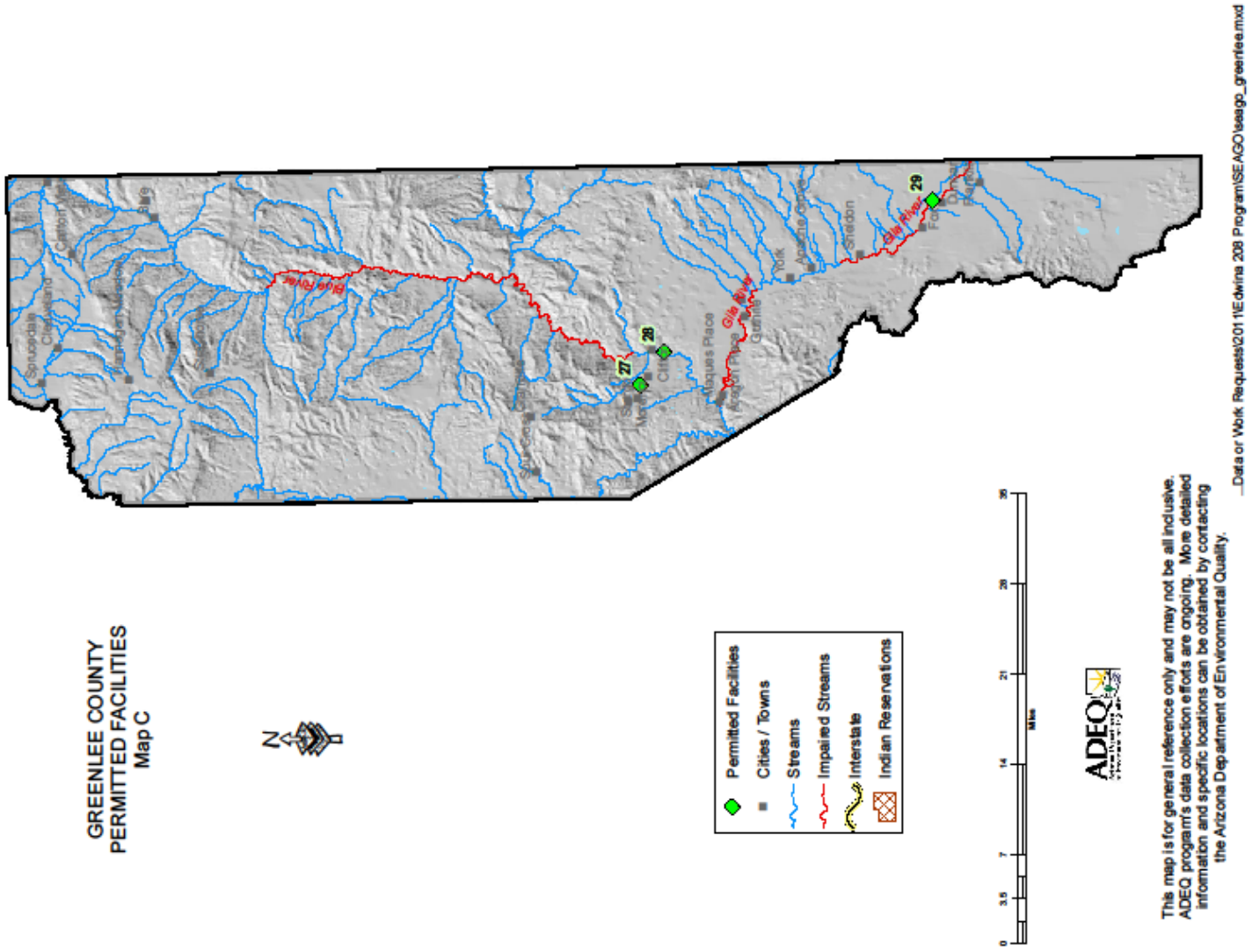
APPENDIX B – PERMITTED FACILITIES

MAP ID	FAC ID	FACILITY NAME	CITY	COUNTY	DESCRIPTION	APP Permit No.	AZPDES Permit No.	Type 2 Class Type	Type 3 Permit Type
A	1	ARIZONA ELECTRIC POWER COOP - APACHE GENERA	COCHISE	COCHISE	POWER PLANT	101494			
A	2	BACHMANN SPRINGS WWTP	TOMBSTONE	COCHISE	WWTP (DOMESTIC)	TERMINATED			
A	3	BOWIE POWER STATION	BOWIE	COCHISE	POWER PLANT	502603			
A	4	CITY OF BENSON - WHETSTONE RANCH WRF	BENSON	COCHISE	WWTP (DOMESTIC)	105502			
A	5	CITY OF BENSON WWTP	BENSON	COCHISE	WWTP (DOMESTIC)	100829	AZ0026026	B+	
A	6	CITY OF BISBEE - SAN JOSE WWTP	BISBEE	COCHISE	WWTP (DOMESTIC)	100983	AZ0026077		Agent
A	7	CITY OF BISBEE - WARREN WWTP	BISBEE	COCHISE	WWTP (DOMESTIC)	CLOSED			
A	8	CITY OF DOUGLAS WWTP	DOUGLAS	COCHISE	WWTP (DOMESTIC)	100831			
A	9	CITY OF SIERRA VISTA - TRIBUTE WWTP	SIERRA VISTA	COCHISE	WWTP (DOMESTIC)	106122	AZ0025984		
A	10	CITY OF SIERRA VISTA WWTP	SIERRA VISTA	COCHISE	WWTP (DOMESTIC)	101489			
A	11	CITY OF TOMBSTONE WWTP	TOMBSTONE	COCHISE	WWTP (DOMESTIC)	100834	AZ0025577		
A	12	CITY OF WILLCOX WWTP	WILCOX	COCHISE	WWTP (DOMESTIC)	102778	AZ0025771		
A	13	CLEAR SPRINGS UTILITIES - SUNSITES WWTP	SUNSITES	COCHISE	WWTP (DOMESTIC)	100824			
A	14	FIESTA CANNING	MCNEAL	COCHISE	AGRICULTURE	105536			
A	15	FREEPORT-MCMORAN WARREN-MULE GULCH	BISBEE	COCHISE	MINING	103568			
A	16	NACO SANITARY DISTRICT WWTP	NACO	COCHISE	WWTP (DOMESTIC)	100833			
A	17	NORD RESOURCES CORP - JOHNSON CAMP MINE	DRAGOON	COCHISE	MINING	100514			
A	18	TOMBSTONE CONTENTION MINE	TOMBSTONE	COCHISE	MINING	102806			
A	19	TOWN OF HUACHUCA CITY SEWER PONDS	HUACHUCA CITY	COCHISE	WWTP (DOMESTIC)	100832			
A	20	US ARMY - FORT HUACHUCA WWTP	SIERRA VISTA	COCHISE	WWTP (DOMESTIC)	100840		B+	
B	21	ARIZONA STATE PRISON COMPLEX - FT GRANT	FORT GRANT	GRAHAM	WWTP (DOMESTIC)	102341			
B	22	ARIZONA STATE PRISON COMPLEX - SAFFORD	SAFFORD	GRAHAM	WWTP (DOMESTIC)	100292		C	
B	23	CITY OF SAFFORD - GILA RESOURCES WRP	SAFFORD	GRAHAM	WWTP (DOMESTIC)	100806	AZ0024911	A+	Agent
B	24	FREEPORT-MCMORAN SAFFORD MINE	SAFFORD	GRAHAM	MINING	100534			
B	25	TOWN OF PIMA WWTP	PIMA	GRAHAM	WWTP (DOMESTIC)	100805		C	
B	26	TOWN OF THATCHER WWTP	THATCHER	GRAHAM	WWTP (DOMESTIC)	100807		C	Agent
C	27	FREEPORT-MCMORAN MORENCI MINE	MORENCI	GREENLEE	MINING	100193			
C	28	TOWN OF CLIFTON WWTP	CLIFTON	GREENLEE	WWTP (DOMESTIC)	100973			
C	29	TOWN OF DUNCAN WWTP	DUNCAN	GREENLEE	WWTP (DOMESTIC)	101558			
D	30	BACA FLOAT WATER COMPANY WWTP	TUBAC	SANTA CRUZ	WWTP (DOMESTIC)	102959			
D	31	CONN-SELMER (previously United Musical Instruments)	NOGALES	SANTA CRUZ	INDUSTRIAL	100311			
D	32	KINO SPRINGS UNIT #1 WWTP	NOGALES	SANTA CRUZ	WWTP (DOMESTIC)	501319			
D	33	IBWC/NOGALES INTERNATIONAL WWTP	NOGALES	SANTA CRUZ	WWTP (DOMESTIC)	100620	AZ0025607		
D	34	RIO RICO WWTP	RIO RICO	SANTA CRUZ	WWTP (DOMESTIC)	101731			
D	35	TOWN OF PATAGONIA WWTP	PATAGONIA	SANTA CRUZ	WWTP (DOMESTIC)	105267	AZ0025011		

COCHISE COUNTY PERMITTED FACILITIES
Map A




GRAHAM COUNTY PERMITTED FACILITIES
Map B
Permitted Facilities
Cities / Towns
Streams
Impaired Streams
Interstate
Indian Reservations
N
Miles
0
3.75
7.5
15
22.5
30
37.5
21
22
23
24
25
26
Safford
Thatcher
Pima
Fort Thomas
Central
Tanque
Artesia
Sunset
Data or Work Requests\2011\Edwina 208 Program\SEAGO\seago_graham.mxd
This map is for general reference only and may not be all inclusive. ADEQ program's data collection efforts are ongoing. More detailed information and specific locations can be obtained by contacting the Arizona Department of Environmental Quality.
ADEQ


GREENLEE COUNTY
PERMITTED FACILITIES
Map C
N
Permitted Facilities
Cities / Towns
Streams
Impaired Streams
Interstate
Indian Reservations
0
3.5
7
14
21
28
35
Miles
ADEQ
This map is for general reference only and may not be all inclusive. ADEQ program's data collection efforts are ongoing. More detailed information and specific locations can be obtained by contacting the Arizona Department of Environmental Quality.
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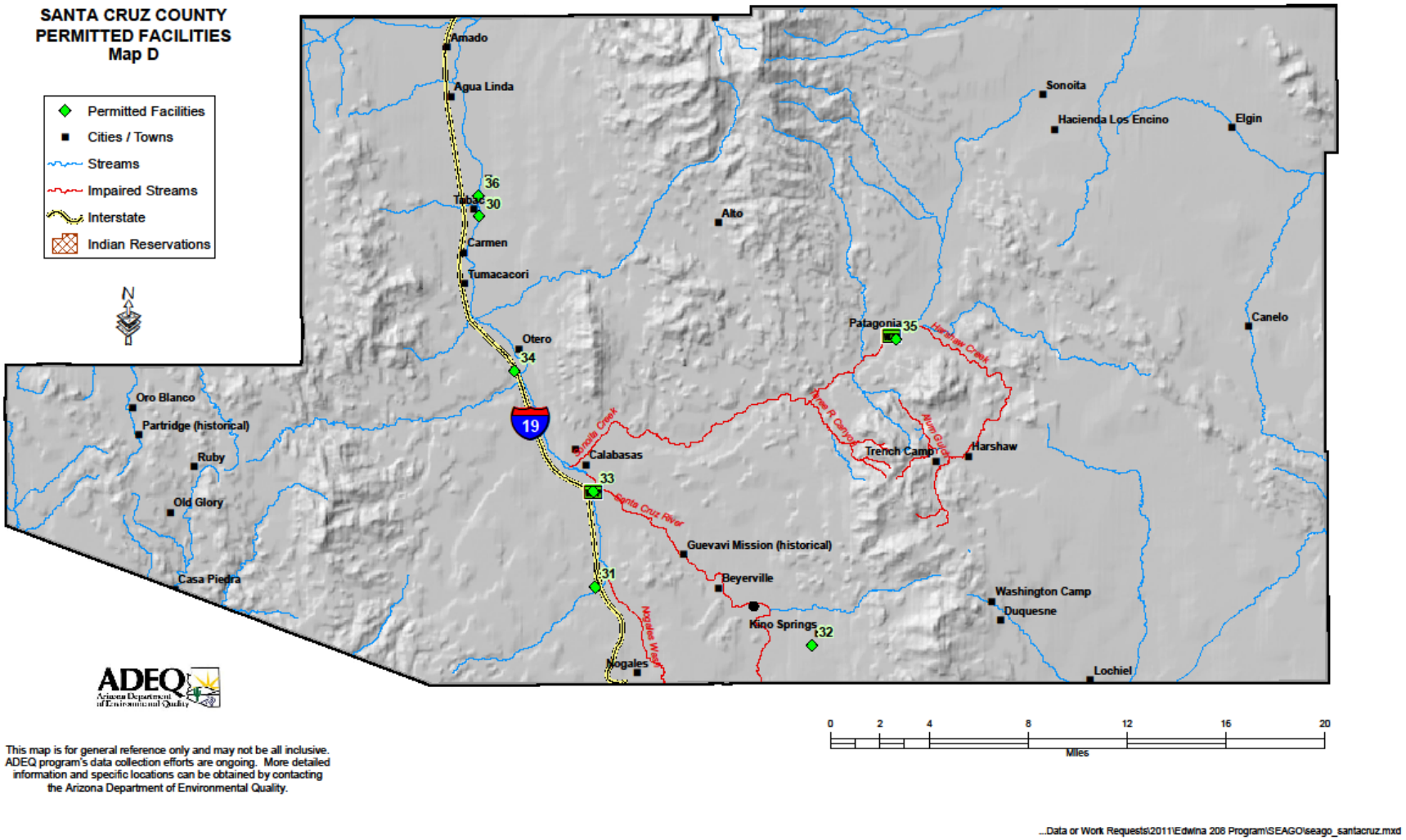
Blue River
Gila River
Clifton
Morenci
Duncan
Solomon
Safford
Thatcher
Pima
Fort Thomas
27
28
29



This map is for general reference only and may not be all inclusive. ADEQ program's data collection efforts are ongoing. More detailed information and specific locations can be obtained by contacting the Arizona Department of Environmental Quality.

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APPENDIX B - EXISTING DOMESTIC WASTEWATER TREATMENT PLANTS AND PERMITS

MUNICIPAL WASTEWATER TREATMENT FACILITIES - SEAGO REGION							
Map Number	Facility name	Owner	Facility Type	Design Capacity (gpd)	Current Avg. Flow (gpd)	Last Modification (year)	Planned Expansion / Modification (year)
COCHISE COUNTY							
BENSON							
A	Benson WWTP	City of Benson	activated sludge/ aeration	1.2 million	380,000-500,000	WWTP rebuilt (2002); Whetstone Ranch Hookup (2008)	None Planned
BISBEE							
A	Bisbee/San Jose WWTP	City of Bisbee	single batch reactor	1.22 million	400,000	San Jose Plant opened 2009; Old Mule Gultch Plant now a lift station and influent storage facility; Warren lagoons closed	Negotiations for hooking in Naco Hwy Border Patrol station underway; Tin Town and San Jose hookups anticipated
DOUGLAS							
A	Douglas WWTP	City of Douglas	activated sludge/ aeration	2 million	1.8 million	Under consent order to upgrade to 2.6 million gpd and repair plant by July 2011	Securing funding for major upgrade and repair; WWTP needs expected to increase to 4.6M gpd by 2030
FORT HUACHUCA							
A	WWTP#2	US Army; Fort Huachuca	oxidation ditch; dewatering and treated effluent recharge system	2 million	829,000	WWTP upgrade (2002); addition of oxidation ditch; Huachuca City conveyance system 2009-11	None Planned

Map Number	Facility name	Owner	Facility Type	Design Capacity (gpd)	Current Avg. Flow (gpd)	Last Modification (year)	Planned Expansion / Modification (year)
HUACHUCA CITY							
A	No Plant-Storage Pond system	Huachuca City	N/A	N/A	220,000	Huachuca City to Fort Huachuca sewage conveyance system 2009-12	Continued Conveyance to Fort Huachuca Plant #3
NACO							
A	Naco WWTP	Naco Water District	oxidation lagoons	60,000	600,000	Built 1975 for a larger projected population; generally in good working order	Facility is underutilized; no plans for expansion or connection with Naco, Sonora
SIERRA VISTA							
A	Sierra Vista Environmental Operations Park	City of Sierra Vista	tertiary treatment/ recharge	4 million	3.0 million	New Facility constructed 2009	Adequate for anitcipated flows through 2030
TOMBSTONE							
A	Tombstone WWTP	City of Tombstone	oxidation ditch and clarifiers	N/A	255,000	unknown	Second oxidation ditch is planned
WILLCOX							
A	Willcox WWTP	City of Willcox	facultative lagoon	681,000	283,000	Built 1959; enlarged 1967 &1969	Closure of the north lagoon/construction of oxidation ditch increasing capacity to .800 MGD
GRAHAM COUNTY							
PIMA							
B	Pima WWTP	Town of Pima	Single lagoon	130,000	36,000	Built 1930s; lift station added 2005	Replacement/Upgrade funding being sought from WIFA and USDA

Map Number	Facility name	Owner	Facility Type	Design Capacity (gpd)	Current Avg. Flow (gpd)	Last Modification (year)	Planned Expansion / Modification (year)
SAFFORD							
B	Safford Prison Department of Corrections WWTF	AZ Dept. of Corrections	oxidation lagoons	457,000	121,000	unknown	No plans on record
B	Safford WWTP	City of Safford	Oxidation ditches with nitrification/ denitrification and clarifiers	2 million	900,000 - 1 million	Built in 2001	None Planned; plant running at 50% capacity
THATCHER							
B	Thatcher WWTP	Town of Thatcher	Aeriated lagoons with wetland	800,000	435,000	Built 1998; replaced old Daley Estates and Reay Lane WWTPs	Collection system expansion funding being sought from WIFA
GREENLEE COUNTY							
CLIFTON							
C	Clifton WWTP	Town of Clifton	Trickling filter w/Secondary treatment	268,000	80,000	Built 1930s; lift station added 2005	Replacement/Upgrade funding being sought from WIFA and USDA
DUNCAN							
C	Duncan WWTP	Town of Duncan	Evaporation Pond; Secondary treatment	80,000	39,900	Built in 1950s; upgraded in 1980s	No plans on record

Map Number	Facility name	Owner	Facility Type	Design Capacity (gpd)	Current Avg. Flow (gpd)	Last Modification (year)	Planned Expansion / Modification (year)
SANTA CRUZ COUNTY							
PATAGONIA							
D	Patagonia WWTP	Town of Patagonia	Anoxic tack with denitrification, aeration basins, chlorination / dechlorination	110,000	60,000	New Facility brought online 2005	In compliance with no future upgrades planned at this time
NOGALES							
D	Nogales International WWTP	City of Nogales & International Boundary and Water Commission	Activated sludge/ oxidation ditches	17.2 million Expandable to 20 million	15.75 million	Opened June 2009	Serves both Nogales AZ and Nogales, Sonora. No planned upgrades at present

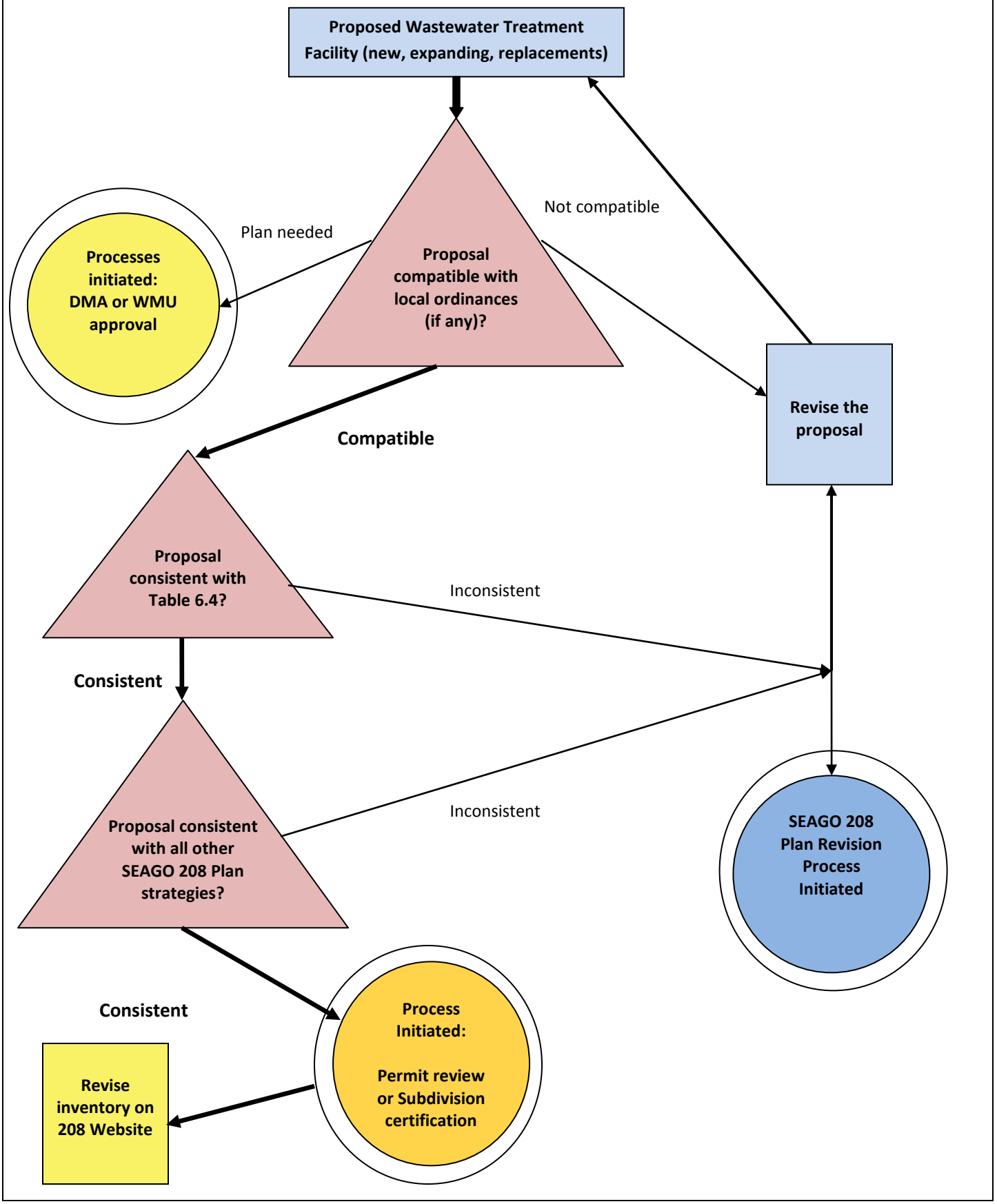
APPENDIX C – GLOSSARY OF TERMS

TERM	DEFINITION
208 Plan	A regional water quality management plan developed in accordance with Section 208 of the Federal Water Pollution Control Act Amendments of 1972 (P.L. 92-500) – AKA the "Clean Water Act"
A.A.C.	Arizona Administrative Code (State rules)
ADEQ	Arizona Department of Environmental Quality
APP	Aquifer Protection Permit. A state permit required to discharge a pollutant to an aquifer or to the land surface if reasonable probability that the pollutant will reach an aquifer.
A.R.S.	Arizona Revised Statutes (State laws)
AZPDES	Arizona Pollutant Discharge Elimination System. A state permit required to discharge pollutants to a surface water. ADEQ was delegated the federal NPDES permitting program in December 2002
BMP	Best Management Practices
Capacity	See constructed capacity, design capacity, APP approved capacity, and capacity assurance
Capacity Assurance	Assurance given in writing to a developer that a wastewater treatment plant has sufficient permitted capacity to accept wastewater from a proposed development. • Capacity assurance cannot exceed 100% of the capacity approved in the APP • Capacity assurance is required for subdivisions and other APP 4.01 General Permits if estimated combined design flow is more than 3,000 gpd.
CFR	Code of Federal Regulations
CWA	Clean Water Act (Federal Water Pollution Control Act Amendments of 1972 [P.L. 92-500])
Design Capacity	The engineered design flow capacity of a facility, considering peak flows and a safety margin
Design Flow	Daily flow rate a facility is designed to accommodate on a sustained basis while satisfying all APP discharge limitations, treatment, and operational requirements. It incorporates peaking and safety factors to ensure sustained and reliable operation. • Operationally, it is the estimated daily flow from discharges to the plant, based on number and types of connections
DMA	Designated Management Agency. A local government subdivision that is certified by ADEQ as having adequate resources and capabilities to design, operate, and maintain wastewater facilities and the desire to implement portions of the 208 Plan. Currently all municipalities in the Cochise, Graham, Greenlee and Santa Cruz Counties are certified as DMAs. (See also Wastewater Management Utility)
DPA	Designated Planning Agency. The regional or state agency responsible for overseeing 208 planning. The SouthEastern Arizona Governments Organization (SEAGO) is the DPA for Cochise, Graham, Greenlee and Santa Cruz Counties.
EPA	U.S. Environmental Protection Agency
ERC	Environmental Review Committee
Flow	See operational flow, design flow, and AZPDES discharge limit
gpd	Gallons per day
Goal	Within a strategic plan, a goal is the desired outcome in broad and inclusive terms
Gray Water	Wastewater collected from clothes washer, bathtub, shower, and sink (excluding kitchen sink, and excludes sewage flow from other sources
IGA	Intergovernmental Agreement (A formal agreement between two or more government agencies)
Impaired Water	A surface water that is listed by ADEQ or EPA as not meeting water quality standards or its designated uses
MGD	Million gallons per day
MOU	Memorandum of Understanding (A formal agreement between two or more governmental or non-governmental entities)

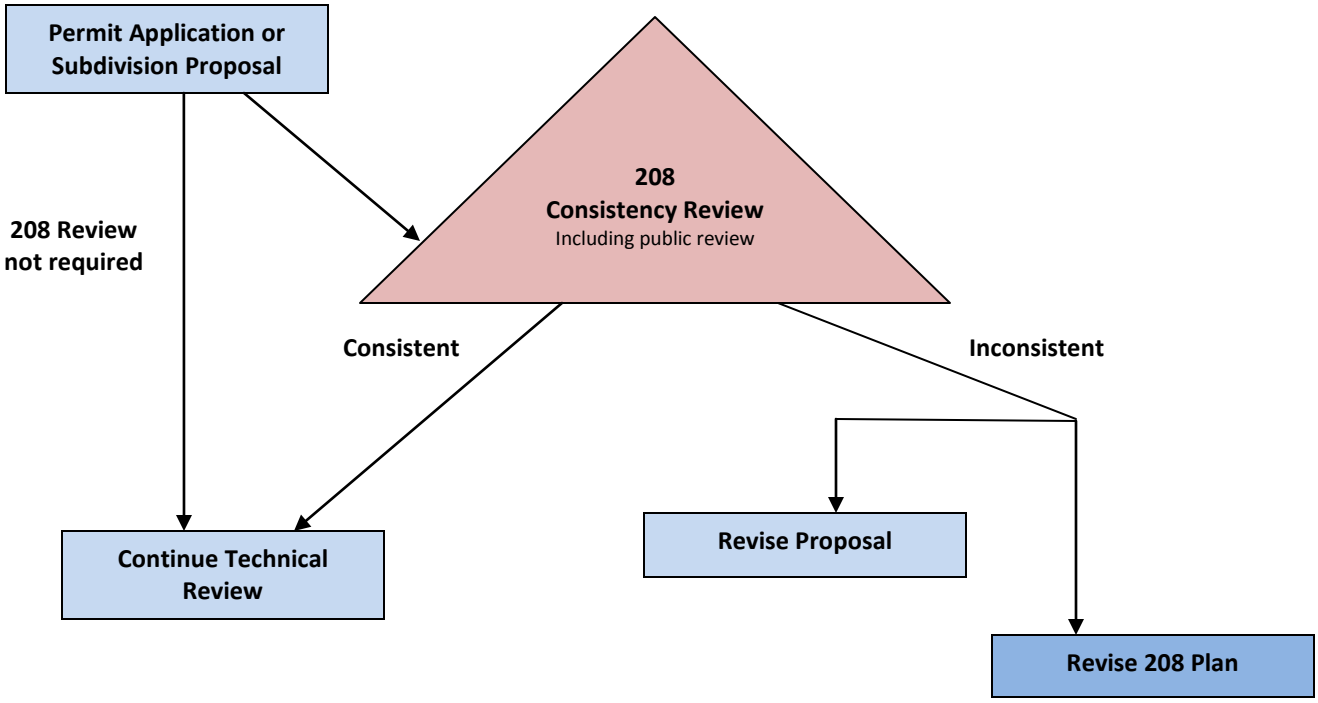
TERM	DEFINITION
Nitrogen Management Area	An area designated by ADEQ with specific prescribed measures to control nitrogen sources that threaten to cause or have caused an exceedance of the Aquifer Water Quality Standard for nitrate (10 mg/L).
Objective	In a strategic plan, the broad changes needed to achieve a goal
On-site Wastewater Treatment System	A conventional septic tank system or alternative system installed to treat and dispose of wastewater predominantly of human origin, generated at the site.
Operational Flow	The maximum monthly average measured flow into a wastewater treatment plant, based on the last 12 months of flow
Reclaimed Water	Sewage that has been treated by wastewater treatment plant or on-site wastewater treatment facility
SEAGO	SouthEastern Arizona Governments Organization
Septic System	A type of on-site wastewater treatment system usually composed of a septic tank and a leaching system. Also referred to as a conventional system. (See alternative system)
Sewage	Untreated wastes from toilets, baths, sinks, lavatories, laundries, and other plumbing fixtures, and waste pumped from septic tanks (see also gray water)
Sewage Collection System	A system of pipelines, pumping stations, and other structures and devices to collect and convey sewage to the sewage treatment facility or an on-site wastewater treatment facility serving more than a single family dwelling.
Sewage Treatment Facility	A wastewater treatment plant or system and its disposal works. This facility definition excludes an on-site wastewater treatment facility, a sewage collection system, or reclaimed water distribution system. (See also "treatment works")
Strategy	In a strategic plan, the specific actions needed to accomplish an objective or goal
TMDL	Total Maximum Daily Load. The calculated maximum load of a water quality parameter which can be carried by a surface water on a daily basis without causing an exceedance of a surface water quality standard. Required if surface water is listed as "impaired."
Treatment Works	A plant, device, unit process, or other works used for treating, stabilizing, or holding municipal or domestic sewage in a sewage treatment facility or on-site wastewater treatment facility. (Broad and inclusive term used for wastewater treatment facilities.)
Wastewater Management Utility	A privately-owned centralized wastewater treatment facility and a collection system that provides services to multiple properties and may expand these services or facilities in the future. To be a WMU, ADEQ must certify that the entity has the resources, capability, and desire to function as a DMA
WIFA	Arizona's Water Infrastructure Finance Authority, a state program for grants and loans for construction of wastewater and drinking water facilities
WWTP	Wastewater treatment plant

Many of these terms are defined AAC R 18-9-101 or other state rules. The definitions here are intended to be consistent with rule language.

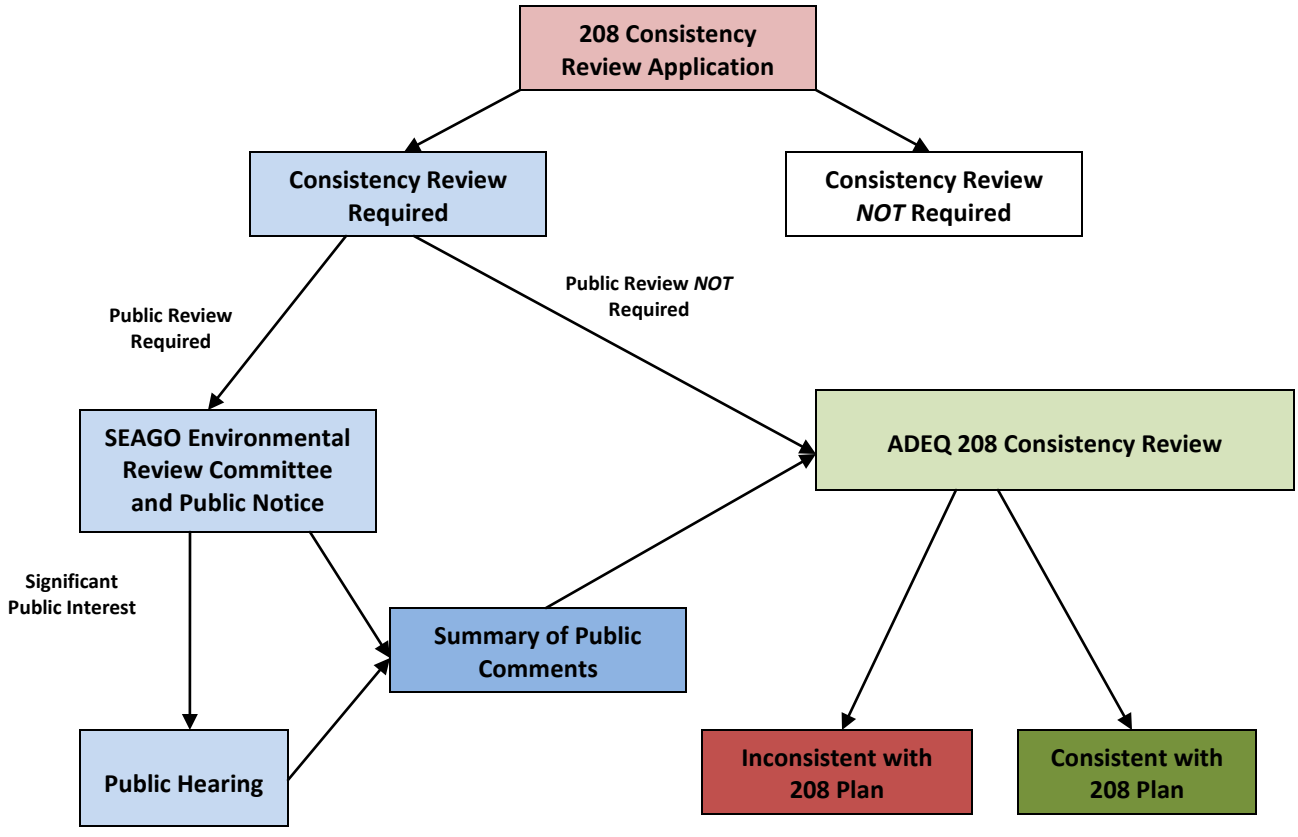
Overview of 208 Plan Processes (See Page 6-1)



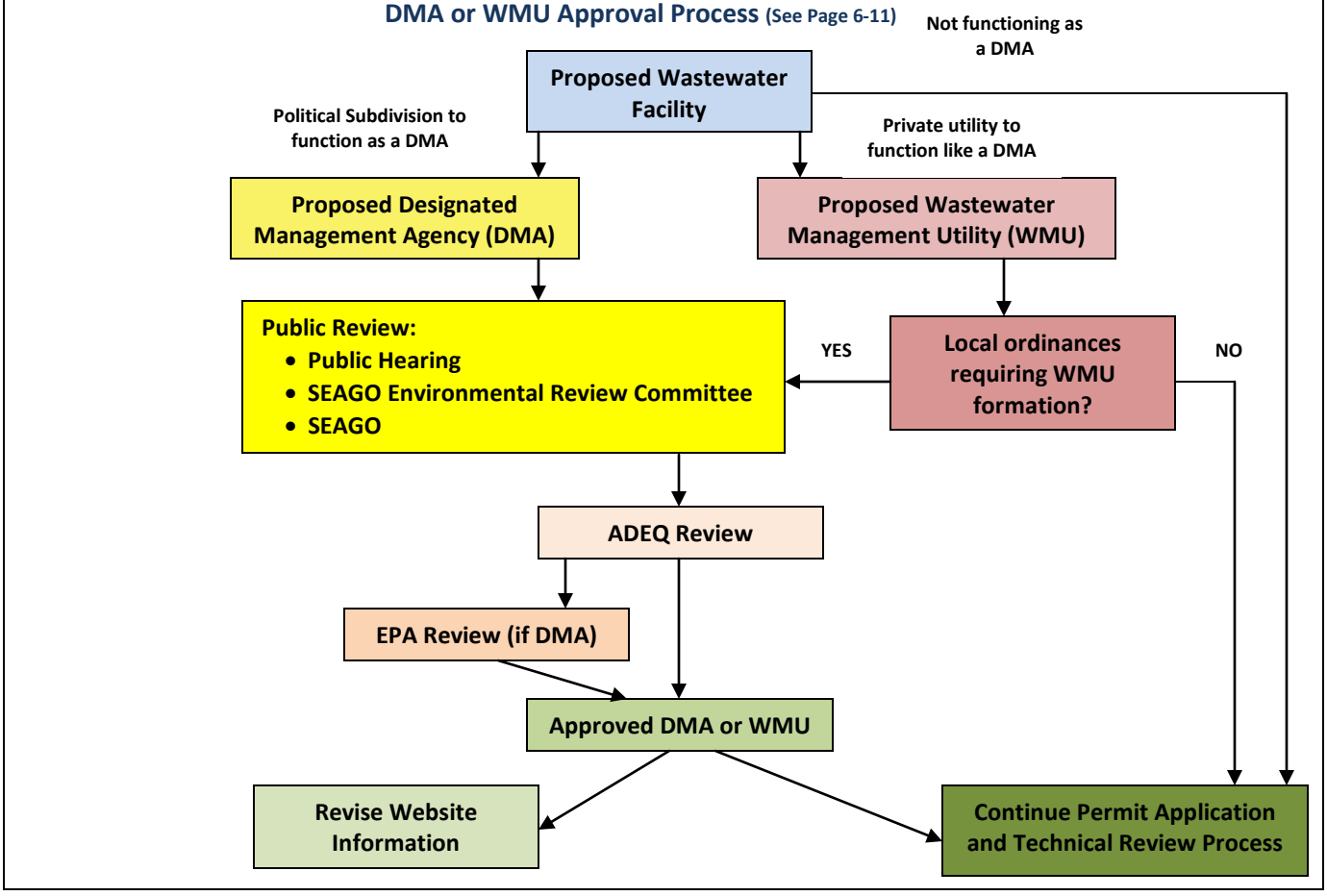
208 Consistency Review Process (See Page 6-2 and Table 6.1)



208 Public Review Process (See Page 6-4 and Tables 6.2 and 6.3)



DMA or WMU Approval Process (See Page 6-11)



208 Plan Revision Process (See Page 6-13 and Table 6.6)