RECLAMATION

Managing Water in the West

Environmental Assessment

WaterSMART Grant FY2013: Vadose Zone Recharge Wells City of Goodyear

Maricopa County, Arizona

U.S. Department of the Interior
Bureau of Reclamation
Phoenix Area Office

August 2014

Mission Statements

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian Tribes and our commitments to island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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ABBREVIATIONS AND ACRONYMS

ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
af/yr	acre-feet per year
AMA	Active Management Area
AOI	Area of Impact
APP	Aquifer Protection Permit
AWQS	Aquifer Water Quality Standard
AZPDES	Arizona Pollutant Discharge Elimination System
bgs	Below ground surface
BWA	Buckeye Waterlogged Area
CAGRD	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
City	City of Goodyear
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
F	Fahrenheit
LTSC	Long-term storage credit
MAU	Middle Alluvium Unit
MCL	maximum contaminant level
$\mu g/m^3$	micrograms per cubic meter
µg/L	micrograms per liter
mg/L	milligrams per liter
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
PGA	Phoenix Goodyear Airport
pH	measure of the acidity or basicity of a solution.
PM	particulate matter
PM_{10}	particulate matter with a diameter of 10 microns
$PM_{2.5}$	particulate matter with a diameter of 2.5 microns
ppb	parts per billion
ppm	parts per million
Reclamation	U.S. Bureau of Reclamation
TDS	total dissolved solids
UAU	Upper Alluvium Unit
USF	Underground Storage Facility
VIP	Vadose Injection Project
WQARF	Water Quality Assurance Revolving Fund
WRF	Water Reclamation Facility
WSRV	West Salt River Valley

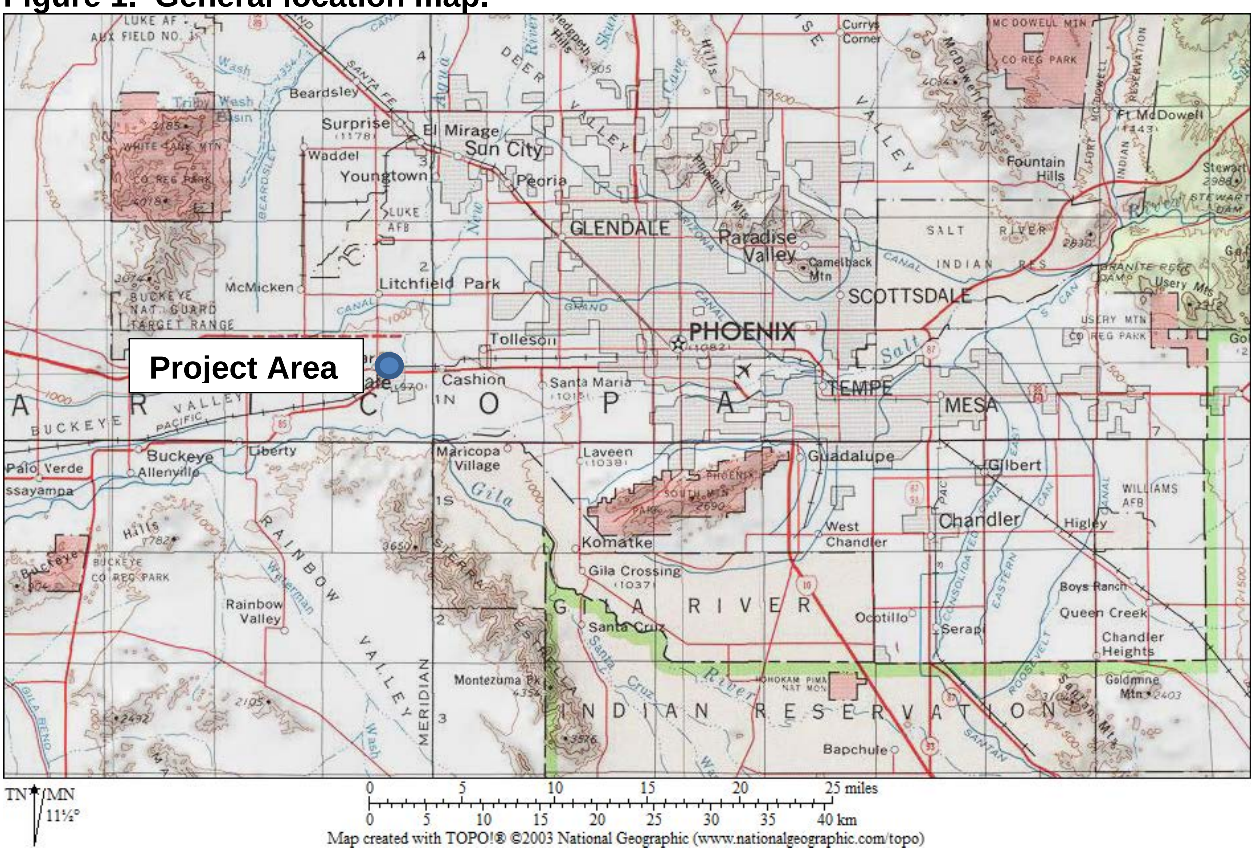
CHAPTER 1 - PURPOSE OF AND NEED

1.1 Background and Project Location

The City of Goodyear (City) currently relies upon recovery of previously stored Central Arizona Project (CAP) water to serve its potable water customers and does not recharge its reclaimed water. At present, the City's 10,742 acre-feet per year (af/yr) CAP water allocation is stored at Central Arizona Water Conservation District (CAWCD) Underground Storage Facilities (USFs) located outside the City. The City is shifting from pumping its stored CAP water allocation from the aquifer to direct delivery and treatment within the service area. In the interim, however, storing its reclaimed water underground to earn long-term storage credits (LTSCs) for future recovery would allow the City to more effectively meet its sustained yield obligation and provide a hedge against potential future water shortages.

To meet its long-term water supply goals, the City is applying to the Arizona Department of Water Resources for a constructed USF permit to recharge A+ quality reclaimed water at the proposed Vadose Injection Project (VIP). The proposed VIP USF would be located on existing City-owned road and utility easements along West Yuma Road and North Estrella Parkway (Figures 1 and 2). Reclaimed water would be delivered from the 157th Avenue Water Reclamation Facility (WRF) to the VIP USF through existing underground infrastructure.

Figure 1. General location map.



Development of the proposed VIP would require funding in excess of levels currently allocated to the project by the City. To obviate any potential funding shortages, the City has applied for a $300,000 grant from the Bureau of Reclamation's (Reclamation) Fiscal Year 2013 WaterSMART Water and Energy Efficiency Grants program. This grant money would supplement $1,865,350 allocated by the City to implement the VIP.

1.2 Purpose and Need

The City's purpose and need for developing the VIP is to more effectively manage its water resources and meet projected future water demand. In 2013, the service area population was approximately 40,800 people with a water demand of 8,715 acre-feet. Based on a water production and population based trends projected out to 2035, approximately 29,500 af/yr of water will be needed to serve an estimated service area population of approximately 128,500 residents, exceeding the City's current annual water supply by approximately 20,065 af/yr. Recharging reclaimed water through the proposed VIP USF would provide additional stored water to bolster the City's future water supply portfolio.

The purpose of this environmental assessment (EA) is to describe and address potential environmental impacts resulting from the City's use of $300,000 in Federal funding provided under the WaterSMART 2013 program to construct vadose zone wells at the proposed VIP USF. The EA was prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality regulations implementing NEPA (40 CFR 1500-1508), and Department of the Interior NEPA regulations (43 CFR 46). Reclamation is the lead Federal agency and the City is a cooperating agency as defined in 43 CFR 46.225-46.230.

Established in February 2010, the WaterSMART program facilitates the work of all bureaus of the Department of the Interior to pursue a sustainable water supply for the nation. It establishes a framework to provide Federal leadership and assistance on the efficient use of water, integrating water and energy policies to support the sustainable use of all natural resources, and coordinating the water conservation activities of the various Interior offices. Reclamation plays a leading role in the WaterSMART program as the Department's water management agency.

CHAPTER 2 – DESCRIPTION OF THE ALTERNATIVES

2.1 No Action

Under the No Action alternative, the WaterSMART 2013 program would not contribute funding to the proposed VIP. The City would develop the VIP as originally proposed, but it may have to construct fewer vadose zone recharge wells or defer installation of some wells until additional funding is available at a later date. The same construction and operation related activities would occur; however, they might occur later in time commensurate with additional funding, or within a reduced project area if additional funding cannot be allocated.

2.2 Proposed Action

Federal funding under the WaterSMART 2013 program would supplement funding allocated by the City to implement the first two years of Phase 1 of the proposed project. Following the phased approach shown in Table 1, an increasing number of VIP wells would be installed and used to recharge an increasing volume of reclaimed water generated by the 157th Avenue WRF during the 20-year (2015-2035) USF permit period. Eventually 15 vadose zone recharge wells would be installed at the proposed VIP USF (Figure 2). The current capacity of the 157th Avenue WRF is 4.0 million gallons per day (4,480 af/yr), and by 2035 the WRF is projected to produce 8,300 af/yr of reclaimed water for recharge (Goodyear 2014a).

Table 1. Well construction and operation phases.

Phase	Recharge Volume[1] (af/yr)	Total Number of Wells[2]	Years Operating in Phase
1	5,000	9	5
2	6,000	11	5
3	7,000	13	4
4	8,300	15	6

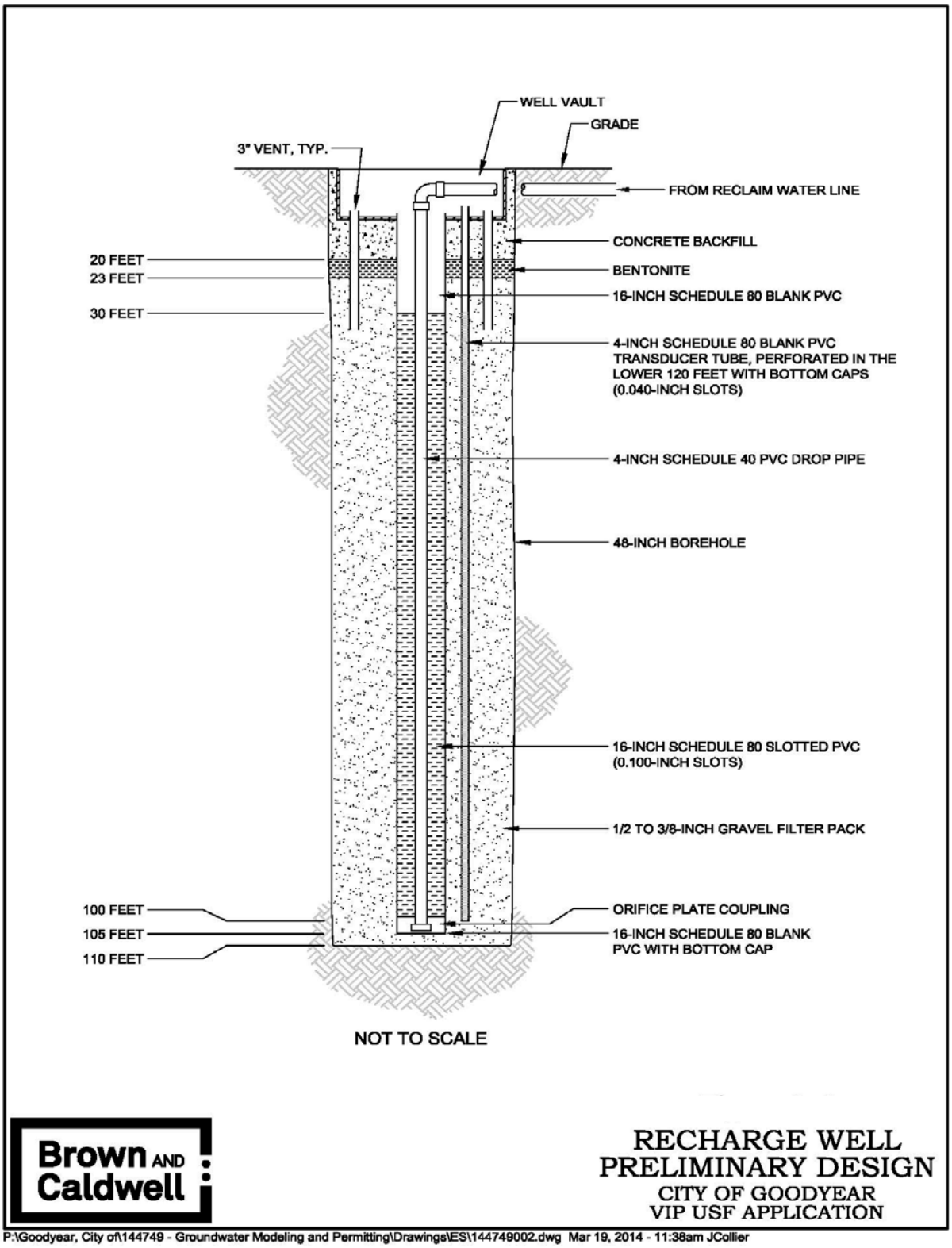
[1] Anticipated increases in recharge volume due to population growth.
[2] Up to two additional wells are planned as monitoring wells.

The wells would be spaced approximately 300 to 500 feet apart. Each vadose zone well would be drilled to a depth of 100 feet below ground surface (bgs), with a borehole diameter of 48 inches. A 16-inch diameter polyvinyl chloride (PVC) well casing with a slotted interval between approximately 30 and 100 feet would be installed inside the well shaft. The space between the borehole wall and well casing would be filled with a gravel filter pack. A 4-inch inductor (PVC drop pipe) would convey water from the surface piping system into the bottom of the well. The discharge rate into the well would be regulated by a valve within the well vault and an orifice plate installed at the end of the inductor. To monitor water levels, the recharge well design includes a sounding tube for use in taking manual water level readings and a pressure transducer tube in which a continuously recording instrument may be installed (Goodyear 2014a). The well design is depicted in Figure 3. Installation of the wells during the first year of Phase 1 would require approximately 10 to 15 days. During construction, temporary road closures affecting one travel lane on Yuma Road and Estrella Parkway are possible within the project area. Traffic would be routed around closured lanes.

An existing buried pipeline would convey reclaimed water from the 157th Avenue WRF to each of the 15 individual bgs wellheads. Each wellhead would include a flow meter, a hydraulic flow control valve, and an automated gate valve. The wellheads would be enclosed in 6-foot by 6-foot concrete vault located at and below the ground surface.

Figure 2. Vadose zone well locations

Figure 3. Well design.



CHAPTER 3 - ENVIRONMENTAL CONSEQUENCES

Resources which could be affected by the proposed project and are of primary concern include the following: Air quality, geology, water resources, and cultural resources. This section describes the existing conditions of these resources within the project area and the potential environmental consequences resulting from the construction and operation of the proposed recharge project. The consequences of the No Action alternative also are described for each of the resources identified above, as a basis for comparing the potential impacts of the proposed project. Other resources such as biological resources, land use, and socioeconomic resources are not expected to be affected and are not discussed in detail in this EA.

Cumulative impacts, or effects, are the impacts on the environment which result from the incremental impacts of the proposed project when added to the impacts of other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions (40 CFR 1508.7). Cumulative impacts can result from individually minor, but collectively significant, actions taking place over time. The geographical area impacted as a result of these other actions may differ depending upon the affected resource. The impacts also may vary temporally—at different times—depending upon the timing of the proposed action in relation to other present and reasonably foreseeable future actions. Although smaller areas might be more appropriate for some resources (such as cultural resources), for the discussion of cumulative impacts this EA utilizes the projected maximum area of impact (AOI) resulting from ground water level rise. The ADWR permit application for constructing a USF requires a delineation of the project's AOI, which is defined as the area within which a 1-foot or more rise in the ground water table is projected to occur over the 20-year life of the facility permit. The AOI identified in the City's USF permit application is shown in Figure 4.

The primary past and present actions in the impact area involve active agriculture as well as the urbanization of former agricultural lands. "Reasonably foreseeable future actions" are defined as actions that are not speculative—they have been approved, are included in short- to medium-term planning and budget documents prepared by government agencies or other entities, or are likely to occur given trends (Environmental Protection Agency [EPA] 1999). The most likely future actions within the project area include development of any remaining vadose zone wells up to the maximum number of wells proposed, as allowed in the constructed USF permit, and the system's long-term operation, consistent with the City's constructed USF and Aquifer Protection Permit (APP) permits. The City's General Plan 2025 (Goodyear 2014b) indicates vacant land and agricultural fields in the vicinity of the proposed VIP would eventually develop into suburban residential areas and business and commerce centers. Southeast of the VIP, vacant land near the Phoenix Goodyear Airport (PGA) likely will support more intensive business and employment uses such as office, industrial, and business parks.

3.1 AIR QUALITY

3.3.1 Affected Environment

Air quality is determined by the ambient concentrations of pollutants that are known to have detrimental effects on public health and the environment. In accordance with Section 109 of the Clean Air Act (CAA), the EPA has promulgated National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide, particulate matter (PM_{10} and $PM_{2.5}$), ozone, sulfur dioxide, and lead (Table 2). Areas with air quality that do not meet the standards are designated as "nonattainment areas." Designation of nonattainment submits an area to regulatory control of pollutant emissions so that attainment of the NAAQS can be achieved within a designated time period.

The project area is located within an area designated as attaining the NAAQS for nitrogen oxide, sulfur dioxide, lead, and $PM_{2.5}$. The project area is included in the Maricopa County CO maintenance area, and is within the portion of Maricopa County designated as nonattainment for PM_{10} (serious) and ozone (8-hour standard) NAAQS.

Exposure to air pollutants emitted from construction activity could affect sensitive human receptors. Sensitive receptor locations include hospitals, schools, convalescent facilities, and residential areas such as those that abut the project area. The potential for adverse air quality impacts on sensitive receptors is correlated to the intensity and duration of exposure. Air quality impacts typically associated with construction activities are transient; therefore, an adverse impact is most likely to occur when a sensitive receptor is acutely exposed to emissions. Acute exposure may result from a single high emission source or the additive emissions of multiple sources.

Climate change refers to significant change in measures of climate (particularly temperature and precipitation) that occur over long periods of time. Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs). The CEQ (2010) defines GHGs as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Globally, sources of human-induced emissions of GHGs include mainly burning of fossil fuels for power generation and transportation, with significant contributions from clearing of forests, agricultural practices, and other similar activities. In the study area, principal local sources of GHGs include combustion emissions from industry and vehicles used in farming, construction, and personal and commercial transportation

3.1.2 Environmental Consequences

No Action

In the absence of funding provided under the WaterSMART program, the same construction-related land-disturbing activities would occur; however, these activities would occur on fewer sites or later in time once sufficient additional funding is allocated by the City to fully implement the VIP. The piecemeal construction could result in multiple equipment mobilizations and

construction activities and potentially result in somewhat more fossil fuel use, as well as generation of dust and other emissions sporadically over a longer period of time, rather than constantly over a shorter period of time.

Table 2. National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour [1]	None	
	35 ppm (40 mg/m^3)	1-hour [1]		
Lead	0.15 µg/m^3 [2]	Rolling 3-Month Average	Same as Primary	
Nitrogen Dioxide	53 ppb [3]	Annual (Arithmetic Average)	Same as Primary	
	100 ppb	1-hour [4]	None	
Particulate Matter (PM_{10})	150 µg/m^3	24-hour [5]	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [6] (Arithmetic Average)	Same as Primary	
	35 µg/m^3	24-hour [7]	Same as Primary	
Ozone	0.075 ppm (2008 std)	8-hour [8]	Same as Primary	
	0.08 ppm (1997 std)	8-hour [9]	Same as Primary	
	0.12 ppm	1-hour [10]	Same as Primary	
Sulfur Dioxide	0.03 ppm [11] (1971 std)	Annual (Arithmetic Average)	0.5 ppm	3-hour [1]
	0.14 ppm [11] (1971 std)	24-hour [1]		
	75 ppb [12]	1-hour	None	

[1] Not to be exceeded more than once per year.
[2] Final rule signed October 15, 2008. The 1978 lead standard (1.5 µg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
[3] The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
[4] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 ppb (effective January 22, 2010).
[5] Not to be exceeded more than once per year on average over 3 years.
[6] To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
[7] To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).
[8] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective May 27, 2008)
[9] (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.
(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
(c) EPA is in the process of reconsidering these standards (set in March 2008).
[10] (a) EPA revoked the 1-hour ozone standard in all areas, although some areas have continuing obligations under that standard ("anti-backsliding").
(b) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is ≤ 1.
[11] The 1971 sulfur dioxide standards remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
[12] Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.

Proposed Action

Pursuant to the Clean Air Act, proposed federal projects located in designated NAAQS nonattainment or maintenance areas are required to conduct a conformity determination if the total direct and indirect emissions for a given criteria pollutant exceeds specific "*de minimis*" threshold rates. If it appears the threshold rate would be exceeded, a conformity determination is undertaken to ensure the project will conform to the State Implementation Plan's objectives of attaining the NAAQS in nonattainment or maintenance areas (i.e., to ensure the proposed project will not: cause or contribute to any new violations of the NAAQS; increase the frequency or severity of any existing violation of any standard in a given area; or delay timely attainment of any standard or interim emission reductions or other State Implementation Plan milestones). The project area is located within an area that is in non-attainment for PM_{10} and ozone, and in a CO maintenance area. To determine whether or not a conformity determination is required for PM_{10}, ozone, or CO, estimates of these emissions resulting from construction-related activities were calculated. Long-term operation of the VIP is not anticipated to result in any additional land disturbance or increased vehicular traffic; therefore, emissions from long-term operations were not calculated.

Table 3 lists the *de minimis* threshold rates for PM_{10}, ozone, and CO, and a conservative (high) estimate of the amount of each pollutant that would result from construction-related activities during the first year of project implementation. Subsequent phases would require installation of fewer wells, resulting in air emissions that are below levels shown in Table 3. Because emission levels that would be generated are well below the *de minimis* thresholds, a conformity determination is not necessary.

Table 3. Phase 1 construction-related air emission estimates/*de minimis* thresholds.

POLLUTANT	ESTIMATED EMISSIONS	DE MINIMIS THRESHOLD
PM10 (serious non-attainment)	0.032 tons	70 tons/year
Ozone (VOC or NOx) (other areas outside an ozone transport region)	0.052 tons (VOC) 0.360 tons (NOx)	100 tons/year
CO (maintenance)	0.140 tons	100 tons/year

Construction-related activities would generate PM as a result of land-disturbing activities, including but not limited to drilling for the wells and stockpiling and transport of excess excavated material. Approximately 0.31 acre of land-disturbance would occur during project implementation. These impacts would be temporary.

Operation of trucks and construction equipment also would generate minor amounts of engine combustion products such carbon dioxide and reactive organic gases, in addition to PM, ozone, and CO. Mobile sources are not subject to emission limitations; however the Contractor would be required to comply with all Federal, State and local air quality regulations, obtain all applicable dust abatement permits and minimize dust generation, and follow best management practices to maintain all motorized equipment in good working order to minimize emissions. The low level of these temporary air pollutant emissions would have a negligible impact on air quality and sensitive receptors. Emission of GHGs from project implementation actions would

be below levels considered relevant to global processes that affect climate change. Operation of the VIP would result in little to no additional air emissions. All power would be supplied by existing transmission lines.

Cumulative Effects

Particulate and gaseous exhaust emissions (including GHGs) from implementation activities associated with proposed project would be cumulative to pollutants emitted from other human sources into the atmosphere, including farming and continued urbanization of open space in the vicinity of the proposed VIP. However, the small quantities of pollutants released during construction and operation of the VIP would have a negligible, short-term cumulative effect on local air quality or global processes that lead to climate change.

3.2 Geology and Soils

3.2.1 Affected Environment

The project area is located within the Basin and Range Physiographic Province, which is characterized by a series of mountain ranges with intervening basins. The range in the general vicinity of the project area is comprised mainly of Proterozoic metamorphic and igneous rocks. The project area falls within the West Salt River Valley (WSRV) sub-basin, which is one of seven groundwater sub-basins that make up the Phoenix Active Management Area (AMA; ADEQ 2014a). This sub-basin is formed of volcanic and carbonate rocks, and unconsolidated to consolidated basin-fill deposits.

The WSRV sub-basin covers approximately 1,326 square miles. It consists of a broad, gently-sloping alluvial plain surrounded by hills and low elevation mountains. Subsurface alluvial deposits within this sub-basin consist of three distinct units, two of which would most likely be affected by the proposed action: the Upper Alluvial Unit (UAU) and the Middle Alluvial Unit (MAU). The UAU consists mainly of gravel, sand, and silt. The composition of the UAU is dominated by gravel and sand near the present-day Salt and Gila rivers and near the margins of the alluvial basins. In other areas, the unit is typically dominated by sand and gravel (ADWR 2010). The thickness of the UAU ranges from zero near basin margins to as much as 800 feet west of Luke Air Force Base (AFB). Generally, the average thickness of this unit in the WSRV is between 200 to 300 feet. At the proposed VIP, the vadose zone occupies the upper 83 feet of the UAU. Underlying the UAU, the MAU consists mainly of clay, silt, mudstone, and gypsiferous mudstone with some interbedded sand and gravel, and is the primary source of ground water. The MAU may be as much as 1,600 feet thick in some parts of the basin.

Substantial land surface subsidence is evident approximately 6 miles north/northwest and 12 miles west of the proposed VIP USF. Minor subsidence is occurring near the proposed VIP (ADWR 2014). Subsidence is generally the result of compaction of alluvium due to lowering of the water table. Collapse and subsequent lowering in elevation of the land surface is generally not recoverable.

3.2.2 Environmental Consequences

No Action

In the absence of funding provided under the WaterSMART program, the same construction-related soil-disturbing activities would occur; however, these activities would occur on fewer sites or later in time once sufficient additional funding is allocated by the City to fully implement the VIP. Subsidence rates in the AOI would not be affected by the project.

Proposed Action

The proposed VIP USF would be located within existing City easements on the east side of Estrella Parkway between Van Buren Street to Yuma Road and the south side of Yuma Road between Estrella Parkway to Bullard Avenue. Approximately 900 square feet of soil, landscaping, and/or road pavement would require clearing at each well site, resulting in a total impact of 0.31 acre. Drilling would remove approximately 47 cubic yards of material (primarily silt, clay, sand, and gravel) from each borehole. Soil extracted from the wells would be hauled to a landfill or to open land at the City's Public Works Operation Center where it would be stockpiled for future use as fill on City projects. The Public Works Operation Center has been used as a repository for fill in the past, so stockpiling this material at the Operation Center would not represent a new land use or treatment.

Following construction, all damaged landscaping and pavement would be repaired or replaced.

Cumulative Impacts

Any net increase in ground water levels as a result of recharging reclaimed water from the 157th Avenue WRF, combined with recharge from other USFs, may have a cumulative effect on reducing the rate and severity of historic and ongoing subsidence.

3.3 Water Resources

3.3.1 Existing Conditions

Municipal Water Supply. The City's current annual water supply includes recovered stored CAP water and limited recovered stored effluent, ground water, and reclaimed water (Table 4). In 2013, this supply exceeded demand by approximately 720 acre-feet. Treated effluent from the 157th Avenue WRF is currently mixed with potable water and used for irrigation at the Goodyear Recreation Complex. In addition, a minor amount of treated effluent is used for dust control at construction sites within the City. These uses are expected to end in late 2014 when the Recreation Complex starts receiving PGA South remediated water. Dust control is no longer a favored use for reclaimed water pursuant to City policy.

In the future, the City will rely on direct delivery and treatment of its CAP water allocation and CAP water leased from the Gila River Indian Community, totaling 17,742 af/yr. The City also

plans to acquire additional renewable water resources in its water portfolio to serve as a hedge against possible water shortages in the future. By 2035, the City projects the service area population will be approximately 128,500 residents with a water demand of 29,500 af/yr.

Table 4. Current City of Goodyear water supply.

Source	Quantity (af/yr)
Recovered CAP LTSC	4,743.27
Annual storage and recovery of CAP water	3631
Reclaimed water	465.7
Recovered effluent	159.8
Ground water	434.81

Ground Water. The project area is located with the Phoenix AMA. Ground water is found almost evenly among the UAU and MAU; however, ground water pumped and served within the boundaries of the City's water service area is pumped mostly from the MAU. Historically, ground water movement in the WSRV was to the south and southwest, generally following the flow direction of surface water. Outflow from the WSRV aquifers occur through alluvial deposits between the White Tank Mountains and the Buckeye Hills. Within the WSRV, ground water flow directions have been altered due to major groundwater withdrawal. Long-term agricultural pumping has caused water level declines of as much as 200 feet (Corkhill et al. 1993). There is an extensive cone of depression located in the center of the WSRV (Luke AFB is at the southern end of the depression) north of the proposed VIP USF. In the vicinity of the proposed VIP, ground water mostly flows west along the Gila River and north towards the cone of depression

Ground water withdrawals within the WSRV sub-basin exceeded recharge by almost 2.6 million acre-feet from 1990 to 2002 (Rascona 2005). From the late 1980s to the late 2000s, the ADWR reported water level declines over the center portion of the WSRV, with water level rises along the eastern and western edges of the sub-basin (ADWR 2012). In the center portion of the sub-basin, there are isolated rises that are often located near USFs. At the site of the proposed VIP, the ground water levels generally have declined 10 to 14 feet since the early 1990s, with current water levels approaching 117 feet bgs (Goodyear 2014a). Depths to ground water vary widely within the sub-basin, with shallower levels being found south of Interstate 10 along the Salt and Gila River drainage.

A possible impact of recharge is raising ground water levels sufficiently such that agricultural land could become waterlogged, potentially affecting agricultural production. The depth to water near the proposed VIP is sufficient to ensure that the projected ground water rise from the proposed VIP USF would not cause agricultural land to become waterlogged, including the area referred to as the Buckeye Waterlogged Area (BWA) (Figure 4). The BWA was recognized in 1988 due to the shallow depth to ground water that occurred along the Gila River in the Buckeye area. State regulation A.R.S. § 45-411.01 allows three irrigation districts within the BWA to conduct dewatering in the area. Since 1997, portions of the BWA have shown significant ground water level decreases (Goodyear 2014a)

The reclaimed water to be recharged under the proposed project is rated as A+ and, as indicated by the monitoring that has been conducted the City, there have been no adverse effects on

underlying aquifer chemistry. Table 5 indicates the water quality for selected constituents of ground water served within the City's water service area and discharged from the 157th Avenue WRF.

Table 5. Quality of local ground water & City's Class A+ reclaimed water.

Parameter	Standard		Units	City of Goodyear 2013 Water Quality	157th WRF Class A+ Effluent Routine Discharge for 2013	
				mg/l (highest detected unless range is given)	Mean	Min-Max
Arsenic	0.010	MCL	mg/l	0.0046	0.0077	<0.006-0.0097
Barium	2	MCL	mg/l		0.094	0.073-1.10
Chromium	0.10	MCL	mg/l	0.037	<0.0075	<0.005-<0.010
Fluoride	4	MCL	mg/l	1	1.2	1.13-1.60
Nitrate as N	10	MCL	mg/l	8	4.1	1.1-7.3
Selenium	0.050	MCL	mg/l		0.0022	<0.001-0.003
Chloride	250	SMCL	mg/l	370	660	550-780
Iron	0.3	SMCL	mg/l	0.555	<0.075	0.05-0.1
Magnesium	n/a	n/a	mg/l	58	71	49-92
Manganese	0.05	SMCL	mg/l		18	13 - <20
Sodium	n/a	n/a	mg/l	200	365	300-423
Sulfate	250	SMCL	mg/l		365	270-473
TDS	500	SMCL	mg/l	1034	1595	1490-1790
Zinc	5	SMCL	mg/l		45	40 - <50
Copper	1.3	AL	mg/l		<0.010	<0.010
pH	6.5-8.5	SMCL	STU	8	7.7	7.6-7.8

AL – Action Level.
MCL – Maximum Contaminant Level (EPA Primary Standard).
n/a – Not applicable.
SMCL – Secondary MCL (taste and aesthetics – not enforceable).
STU – Standard Testing Units.
TDS – Total Dissolved Solids.
mg/L – milligrams per liter equivalent to parts per million.
Sources: Effluent data from Aquifer Protection Permit and Arizona Pollutant Discharge Elimination System reporting.

There are no known hazardous contaminants in the vadose zone underneath the proposed VIP which would be leached out of the aquifer. The initial water reaching the aquifer would likely contain higher concentrations of total dissolved solids leached from the vadose zone. However, these concentrations are anticipated to decrease quickly over time as the minerals are leached from the vadose zone. This leaching process has been observed at other permitted USFs in the WSRV (Goodyear 2014a).

Two National Priority List Superfund sites occur within the VIP AOI. The PGA North and PGA South Superfund sites are located approximately 2 miles and 1.25 miles northeast and east of the proposed VIP, respectively (Figure 4). Soil and ground water at the PGA North site are contaminated with trichloroethene (TCE) and perchlorate. At the PGA South site, Perchloroethene, chromium, and TCE have contaminated ground water. Both sites are currently undergoing remediation.

There also is a Water Quality Assurance Revolving Fund (WQARF) site within the VIP AOI. The Western Avenue WQARF site is located over two miles to the east/southeast of the proposed VIP (Figure 4). Ground water at the site is contaminated with tetrachloroethene (PCE). Sampling in 2013 indicated the highest concentration of PCE in ground water at the site was 7.8 micrograms per liter (µg/L); PCE levels were below the Aquifer Water Quality Standard (AWQS) of 5.0 µg/L at the other monitoring wells (ADEQ 2014). Concentrations of PCE are expected to decrease to levels below the AWQS in less than 10 years (ADEQ 2014).

Surface Water. The major sources of surface water in the Phoenix AMA include the Gila River and its four principal tributaries—the Salt, Verde, Agua Fria, and Hassayampa rivers. The Agua Fria River channel, which is located about 2.9 miles east of the project area, is ephemeral south of New Waddell Dam, flowing generally in a southerly direction only during storm events or when releases are made at New Waddell Dam. The project area consists mostly of residential development with scattered agricultural fields; there are no desert washes or ephemeral streams within the general project vicinity other than Bullard Wash and the Gila River channel which it feeds.

3.3.2 Environmental Consequences

No Action

Under the No Action alternative, funding limitations could force the City to construct fewer vadose zone wells. In the event that future water demand exceeds supply, the City would be forced to rely upon pumping local ground water to make up the difference. The City can only use its ground water under existing statute by either recovering previously recharged water or paying Central Arizona Groundwater Replenishment District (CAGRD) to acquire and store water. If a deficit in renewable supplies forces the City to use up LTSCs that were accrued from recharge at CAWCD USFs, the City may have to pay replenishment costs to CAGRD to acquire additional water.

Proposed Action

Under the proposed action, 15 vadose zone wells would be constructed and put into service according to the schedule shown in Table 1. The City would have an initial capacity to recharge up to 5,000 af/yr using the newly completed wells, gradually increasing to 8,300 af/yr using all 15 wells. This is essentially the maximum annual storage allowed by the USF permit. The total design capacity of the facility (maximum amount that can be recharged during the 20-year VIP USF permit period) is 132,800 acre-feet. The projected maximum AOI, within which a one-foot or more rise in the groundwater level would occur over the life of the project, extends from the proposed VIP approximately 4.9 to 12.3 miles out, depending on direction (Figure 4). The water

would tend to "mound," with the maximum rise of approximately 60 feet (depth to water of 20 feet) occurring directly underneath the proposed VIP. By 2035, the mounding effect is expected to flatten somewhat, with the ground water rise reduce to approximately 48 feet, or approximately 40 feet bgs at the proposed VIP (Goodyear 2014a).

Recharge operations could temporarily impact wells near the recharge facilities. As groundwater levels rise, wells within the impact area could draw in more fines, resulting in turbid or muddy pumped water. This would depend upon the well's distance from the recharge facility, the well's screen length and depth, the size of the pump in the well, and whether or not the well was constructed with a gravel pack around the well screen. Depending upon the purpose(s) for which the water is being used and the length of time it takes for the water to clear up, there could be some minor damage to property and/or inconvenience to those using the well water, especially if it is used for domestic purposes. These temporary impacts would be more likely to occur with small capacity wells rather than large production (irrigation) wells. According to ADWR well registry data, there are 254 wells within one mile of the proposed VIP. The majority of these wells (158) are used for monitoring purposes. A significant number of these monitor wells are to monitor potential water quality contamination from the PGA Superfund sites (Goodyear 2014a).

As part of its constructed USF permitting process, ADWR requires permit applicants to show that no unreasonable harm will occur to other land and water users within the AOI from the proposed recharge project. The USF permit establishes a Monitoring Plan that the City must implement, which will indicate if/when groundwater levels of three monitoring wells rise to within 20 feet bgs.

The 157th Avenue WRF is designed and operated to produce reclaimed water compatible for both reuse and discharge. The quality of water used for recharge from the WRF will be regulated under an Arizona Department of Environmental Quality (ADEQ) APP. One of the down-gradient monitoring wells identified in the USF permit is identified in the APP as the point of compliance, and is to be used for all the water quality-related sampling/monitoring. Because the location of this monitoring well is in such close proximity to the recharge activities, any potential quality or quantity concerns associated with the recharge facility or its operations should be detected early enough to prevent serious damage to the recharge facilities, structures or equipment within the project area, or the underlying ground water.

The monitoring requirements of the APP, related to the vadose zone wellfield, include but are not limited to the following:

- Water flow to the vadose zone wells;
- Quality of water discharged from the WRF;
- Static water levels of the monitoring wells; and
- Quality of the ground water at the monitoring well

The APP establishes alert levels and discharge limits for each constituent/parameter that must be monitored. These requirements provide for early detection of any changes to ground water quality that could result in violations of water quality standards. Similarly for water quantity

aspects, the USF will establish an alert level regarding ground water rise within the vadose zone wells that exceed 20 feet bgs, as well as an operation prohibition level above which water within the designated monitoring well cannot rise. These two requirements ensure the ground water table will not rise above pre-established levels, to prevent damage to other property within the AOI.

No adverse impacts to known underground contaminated sites are anticipated to occur as a result of recharging up to 8,300 af/yr of reclaimed water at the proposed VIP USF. Modeling results indicate that ground water levels at the PGA South Superfund site could increase between 8 and 11 feet, but ground water flow direction would remain similar to current conditions. In the northern portion of the plume, the current pump and treat remediation effort could be enhanced because the proposed recharge could cause ground water movement to shift more toward the extraction wells. At the PGA North Superfund site, the projected increase in ground water levels is between approximately 6 and 11 feet with no change in the direction of flow. Hydraulic capture for the extraction wells would be maintained (Goodyear 2014a). At the Western Avenue WQARF site, a projected rise in ground water levels of 9 feet resulting recharge at the VIP USF is not anticipated to impact ongoing attenuation of PCE levels.

The VIP USF would not cause waterlogging in the BWA. Directly south of the proposed VIP USF, the potential groundwater rise in the BWA is projected to be between one and six feet (Figure 4). However, direct impact from the proposed VIP USF would be less than one foot over much of the BWA. With declining ground water levels in the area, the projected depth to water would be deeper than 20 feet bgs (Goodyear 2014a).

The Glendale Landfill is located at the northern boundary of the VIP AOI, approximately 10 miles to the northeast of the proposed USF. The projected rise as a result of the proposed USF is slightly over one foot. The proposed VIP USF is not predicted to cause any unreasonable harm to the landfill considering the distance from the facility and minor increase in the ground water level (Goodyear 2014a).

Cumulative Impacts

There are four constructed USFs within the proposed project's AOI: Avondale Wetlands (20,000 af/yr of CAP, effluent, and Salt River Project water); Glendale (2,300 af/yr of effluent); NAUSP (75,000 af/yr of CAP, effluent, and Salt and Verde river water), and Verrado (500 af/yr of effluent) (ADWR 2014c). The contributions of these four recharge projects were included in the City's analysis of the VIP AOI. Inside of the AOI, the maximum impact to the four permitted USFs would be an additional increase in ground water levels of one to six feet, which is not expected to adversely affect operation of those USFs (Goodyear 2014a). Recharge from the proposed VIP USF would not impact any of the permitted USFs outside AOI.

Recharge resulting from the proposed project, combine with recharge from other USTs, would not affect residential, commercial, or industrial development within the VIP AOI.

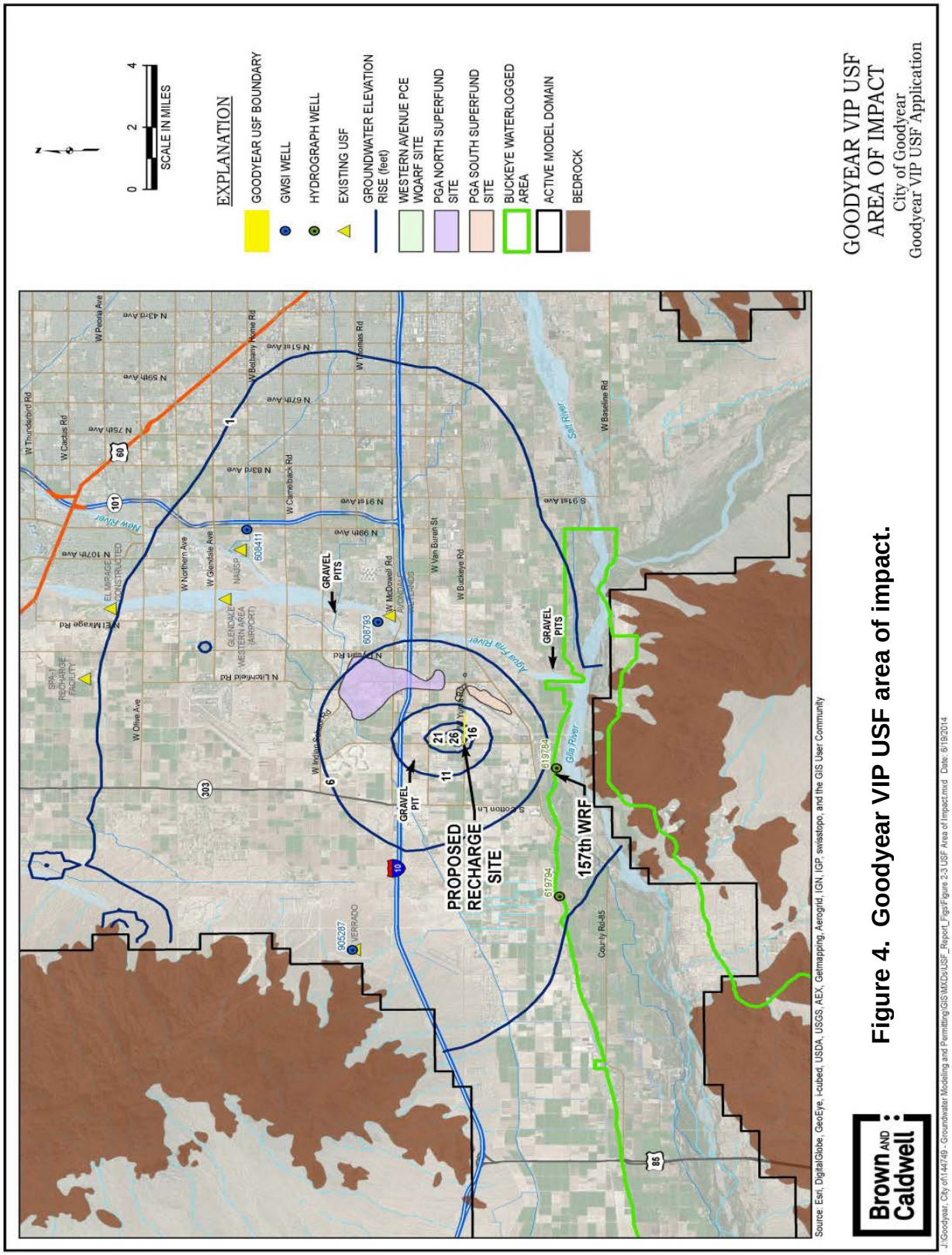


Figure 4. Goodyear VIP USF area of impact.

3.4 Cultural Resources

3.4.1 Existing Conditions

The area of potential effect for the proposed VIP consists of City-owned easements associated with Yuma Road and Estrella Parkway south of Van Buren (Figure 2). Within and adjacent to this area, the ground surface has been substantially modified by road construction and maintenance, utility installation, landscaping, residential development, and agriculture.

3.4.2 Environmental Consequences

No Action

Under the No Action alternative, no WaterSMART funding would be available; consequently, the extent of VIP development would be reduced or delayed commensurate with the amount of available City funding. This would reduce the area that would be affected by construction and could contain previously undiscovered cultural resources located beneath the ground surface. However, previous studies have indicated that cultural resources are unlikely to occur within areas affected by VIP construction.

Proposed Action

Class I and partial II cultural resource surveys of the area of potential effect were completed by a Reclamation archaeologist. The City-owned easements along Yuma Road and Estrella Parkway were assessed rather than individual well plots to enable the project proponent flexibility to place wells where needed. Although ground visibility was good in much of the potential construction impact area, the entire area has been substantially altered from its natural state and some areas were covered by pavement and landscaping. No cultural resources were reported in the existing literature of the survey area and general vicinity, and the severity of recent ground disturbances likely precludes the presence of intact cultural resources. Consequently, Reclamation determined that the proposed project would have no impact on cultural resources. Reclamation submitted a "no effect" determination to the State Historic Preservation Office on August 13, 2014.

Cumulative Impacts

There would be no cumulative impacts to cultural resources resulting from project implementation activities.

3.5 Resources Not Discussed in Detail

The following resource topics, which are typically included in NEPA documents, are not discussed in detail in this EA: biological resources, land use, and socioeconomic resource. The proposed VIP site has been extensively modified by road construction and maintenance,

installation of utilities, landscaping, and agriculture. It is almost entirely devoid of native vegetation, and no impact to wildlife habitat would occur. In addition, no changes to, or limitations on, land use or ownership would occur as a result of the proposed action; the proposed VIP is located entirely within a parcel of land already owned by the City upon which reclaimed water conveyance infrastructure is already located. There may be some minor increase in temporary construction-related employment; however, it would be for only a brief period of time. The accumulation of LTSCs would assist in reaching and maintaining an adequate water supply as the City continues to develop and expand.

CHAPTER 4 - ENVIRONMENTAL MITIGATION MEASURES

Following are specific mitigation measures that will be implemented by the City as an integral part of this project.

Monitoring and reporting requirements included in the City's VIP USF Permit from ADWR and APP from ADEQ, addressing water quality and quantity issues will be implemented. Results from these monitoring and sampling efforts will be reported on the frequency identified in the permit; additional steps are identified to be taken if established limits are exceeded. Standard City guidelines and specification clauses included in all City's contracts also require the contractor to comply with storm water quality regulations of ADEQ/Maricopa County Environmental Services Department during construction.

Standard specification clauses included in all City's contracts require the contractor to comply with air quality regulations; dust abatement measures will be implemented during construction and operation of the vadose zone wells, to minimize air pollution and dust nuisance.

If previously undiscovered cultural resources are identified during excavation activities, all work will cease until the discovery can be evaluated by a Reclamation archaeologist.

CHAPTER 5 - CONSULTATION AND COORDINATION

In preparing its permit application to ADWR for a constructed USF, the City coordinated with the ADWR and ADEQ. The ADWR provided a copy of the Goodyear VIP constructed USF permit application on its Public Notice of Application in Process website at http://www.azwater.gov/recharge/default.aspx.

Reclamation distributed a Notice of Availability (NOA) regarding the EA for a 30-day public comment period on August 15, 2014. The EA was available at www.usbr.gov/lc/phoenix/. The names of entities that received the NOA are retained in the administrative record.

CHAPTER 6 - ENVIRONMENTAL LAWS/DIRECTIVES CONSIDERED

National Environmental Policy Act. This EA has been prepared in accordance with the requirements of NEPA, Interior's Departmental Manual, and Departmental regulations implementing NEPA found at 43 CFR Part 46 (Vol. 73, 61314-61323). This EA is being made available on Reclamation's Phoenix Area Office website.

Clean Water Act, as amended. The City and its contractor would comply with all applicable conditions and Arizona regulations implementing the Clean Water Act, including but not limited to an AZPDES de minimis general permit for discharging well construction water. There are no waters of the United States in the project area.

Clean Air Act, as amended. Construction-related activities will result in minor temporary air quality degradation. State or local grading/excavation permits will need to be acquired for such activities. Compliance with these permits will ensure NAAQS limits are not exceeded and no significant air quality impacts will occur. Long-term operation of the VIP is not expected to degrade air quality to any measurable extent; only short distance vehicular traffic associated with routine operation and maintenance activities would occur. Best management practices for controlling dust will be employed for both construction-related and maintenance activities. Any applicable grading and/or dust control permits will be acquired as appropriate.

Endangered Species Act of 1973, as amended. No species that are federally listed as threatened or endangered, or proposed for listing are found within the construction impact area for the proposed VIP. There also is no designated critical habitat that would be impacted by the proposed project.

Fish and Wildlife Coordination Act. The proposed action does not constitute a Federal water resource project that impounds, diverts or otherwise modifies a stream or other natural body of water; therefore this Act is not applicable.

National Historic Preservation Act of 1966, as amended. Based upon Class I and partial Class II studies conducted within the project area, adverse impacts to cultural resources are not expected to result from this proposed project. The Arizona State Historic Preservation Officer has concurred with this determination.

Wild and Scenic Rivers Act of 1968. There are no rivers designated or proposed for designation as wild and scenic within or near the project area.

Wilderness Act of 1964, as amended. There are no areas designated or proposed for designation as wilderness areas within or near the project area.

Executive Order 11990, Protection of Wetlands. There are no wetlands found within the project area.

Executive Order 11998, Floodplain Management. The project is located outside the 100-year floodplain. No further action is required with regard to this Executive Order.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The area being used for this project is City owned and maintained. Construction and operation of the VIP USF would not adversely affect minority or low-income populations.

Secretarial Order 3175 (incorporated into Departmental Manual at 512 DM 2) requires that if any Department of the Interior agency actions impact Indian trust assets (ITAs), the agency must explicitly address those impacts in planning and decision-making, and the agency must consult with the tribal government whose trust resources are potentially affected by the Federal action. Reclamation is committed to carrying out its activities in a manner which avoids adverse impacts to ITAs when possible, and to mitigate or compensate for such impacts when it cannot. The project area encompasses City-owned public street rights-of-way. No Indian trust assets have been identified in the project area; consequently, no effects to trust assets are anticipated

Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds. No impact on migratory birds is anticipated. Construction would affect City-owned rights of way associated with two streets. An inspection of the proposed VIP site on July 30, 2014, did not reveal use by nesting migratory birds, including burrowing owls.

CHAPTER 7 - LIST OF PREPARERS

The following individuals prepared or assisted in the preparation of this EA:

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City of Goodyear

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CHAPTER 8 - LITERATURE CITED

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