APPENDIX F ECONOMIC IMPACT ANALYSIS METHODOLOGY

This report describes the methods and data that underlie the economic impact analysis, as follows:

- Assumptions for direct employment and costs for the proposed action and alternatives
- Details of economic impact modeling
- Assumptions and methods used for all quantitative analysis

Economic impact analysis models provide a quantitative representation of the production relationships between individual economic sectors. Thus, the economic modeling analysis uses information about physical production quantities and the prices and costs for goods and services. The inputs required to run the Impact Analysis for Planning (IMPLAN) model are described in the following narrative. The resulting estimates from the IMPLAN model, by alternative, are in the Pojoaque Basin Regional Water System (RWS) Environmental Impact Statement (EIS), **Chapter 4**, Environmental Consequences, **Section 4.22**, Socioeconomic Resources.

The first portion of the following information describes the methods and assumptions used in the impact analysis. The next portion discusses the general aspects of the IMPLAN model and how it was used to estimate economic impacts.

Economic Impact Analysis Methods and Assumptions

Economic analysis takes one of two forms, depending on the available data. For those activities that generate measurable spending (market values), the analysis estimates economic impact in terms of output (total spending), value added (income), and employment in the regional economy. Through the use of a regional input-output multiplier, an assessment of impacts from proposed project spending and employment was completed.

IMPLAN is a regional economic impact model that provides a mathematical account of the flow of dollars and commodities through a region's economy. This model provides estimates of how a given amount of a particular economic activity translates into jobs and income in the region. These multipliers were applied to changes in final demand resulting from the differing management alternatives in the EIS. The results measure the change in the level of output, employment, and income for those industrial sectors impacted by each action.

Economic impacts are described in terms of direct, indirect, and induced impacts. Direct impacts, such as income and employment, are affected by proposed project activities: spending on construction activities, employment of workers to construct the proposed projects, and operation and maintenance of the finished facilities. Indirect impacts occur when related industries gain from purchases by the directly impacted businesses, such as the purchase of construction equipment from local firms. Induced impacts are the results of spending by employees hired due to the business activity. Together, these are reported as the total impact of the different management alternatives. The economic analysis provides quantitative estimates of employment and economic contributions in the planning area from the proposed construction and operation of the RWS and associated projects. Analysis is focused on the Santa Fe County study area, as defined in **Chapter 3**, Affected Environment, with information provided for Pueblo and non-Pueblo areas of the county, where applicable and available. Although impacts may occur in surrounding counties and throughout the state, most impacts would occur in Santa Fe County, due to the location of the water project.

For all economic modeling presented here, data are estimates, based on best available information. Direct estimated costs for construction materials, employment, and amount of fuel required are provided, based on information in costs sheets developed in support of the Technical Services Center Feasibility Study (Reclamation 2015).

Under all action alternatives, the pace of construction and the level of overlap of construction of various project components could differ from the rate assumed in the analysis. Actual impacts would also vary, based on site-specific differences and such factors as cost and availability of materials and supplies, population change in the planning area, employment levels, and availability of qualified workers in the local area.

Changes in the pace and intensity of construction could result in short-term impacts on the demand for housing and community services. It also could have short-term impacts on the supply of tax revenues from residences or businesses to support community services. This would be due to short-term changes in job opportunities and the resulting change in in-migration or out-migration trends.

Similarly, the degree to which development of the proposed project activities may stimulate additional area growth cannot be quantified at this time and would depend on a variety of factors. In the absence of quantitative data, impacts are described using ranges of potential impacts; alternatively, a qualitative analysis was performed, based on the best available data.

Secondary project spending was estimated using the IMPLAN data (2014). To allow for comparison across project components and years, all model estimates are presented in consistent 2016 dollars. The model represents the area where local direct economic impacts would occur and where all the local secondary impacts would develop (i.e., Santa Fe County). All IMPLAN data displayed are in terms of the estimated impacts in the county study area, based on IMPLAN default estimates of the percentage of local spending. Impacts of the project are also likely to occur in other counties in New Mexico and the region. Actual economic impacts and jobs created would vary, based on such factors as the construction schedule, skill level of employees required, market conditions, and budgetary constraints. Modeling is intended to compare impacts by alternatives, rather than represent a precise forecast of actual economic impacts.

Estimated changes in property value as a result of connection to the RWS were addressed. This was done by reviewing literature related to water users' willingness to pay for water quality improvement and reviewing studies on the change in property value after being connected to a water system.

Costs to individual users are discussed for Santa Fe County and the Pueblos, based on best available data for current water costs and anticipated costs for future water system users. Due to uncertainty of how the costs of the system would be distributed to individual uses, the exact changes in costs could not be predicted for all populations.

The following key assumptions are applied for socioeconomic impact analysis:

- Total economic output is provided for project components rather than project years due to uncertainty related to timing of construction and of direct costs. Direct costs presented exclude such factors as home office, profit, bonds, insurance, and unassigned items (overhead and premium) and contingencies; therefore, the direct costs are lower than the total anticipated field costs for development, as presented in the feasibility study (Reclamation 2015). As a result, indirect and induced costs as modeled in IMPLAN may not capture the full economic impacts of proposed activities.
- Fuel costs are estimated based on current retail fuel prices from Energy Information Administration data (EIA 2016). Should fuel prices increase, direct and indirect impacts on the local economy from fuel purchases for project activities would be changed.
- The time frame for constructing specific project components and an approximate peak time of their construction is based on the construction time frame provided in the feasibility study (Reclamation 2015). Based on the construction time frame and total direct jobs and indirect and induced jobs from IMPLAN modeling, per year estimates of employment were determined for the construction period. Actual level of employment at a given time would vary, depending on the level of concurrent development of project components and project sites; thus, numbers presented are initial estimates only.
- Employment impacts are estimated and presented in job-years; a job-year is one year of employment, or 2,000 hours. Cumulative job-year impacts across a multi-year analysis do not necessarily equate to the total number of employed persons over that time frame. This is because they can represent one full-time position, multiple part-time positions, or one position over time filled by different employees.
- Cost estimates from the feasibility study cost sheets were used to estimate employment and construction costs. All estimates represent costs associated with a pumping plant at El Rancho; for the purposes of this analysis, the assumption is that costs and employment needs for a pumping plant at the HKM – State Highway 502 South Location would be approximately the same. In addition, cost estimates represent project specification in the 2015 feasibility study. Feasibly study estimates were determined to provide reasonable estimates for overall component costs, based on available information. Due to the high level of uncertainty, no specific estimates were available for detailed components of project operations, such as the cost per individual storage well or per mile of transmission pipe. As such, cost estimates by project component do not vary across alternatives, with the exception of estimates for the water collection source component and use of aquifer storage and recovery (ASR) wells.

- Economic output impacts are presented in constant 2016 dollar terms to allow for comparison between various components, which may occur throughout the multi-year construction period. Nominal dollar value for total economic impacts and project components will vary, depending on the time frame for project development.
- Project cost data provided from the feasibility study used 2014 dollars for input into the IMPLAN model, using 2014 model year data.
- Percent of spending in the local economy was dictated by IMPLAN's Social Accounting Matrix (SAM) model defaults for regional percentage of local spending by sector.
- The analysis assumes current rate of property taxes and distribution.

Groundwater Costs

General estimates for current costs to individuals who use domestic groundwater were developed for the planning area.

To calculate electrical energy used for well pumps, the energy needed to lift and pressurize the water for delivery to the home was divided by the overall efficiency of the pump and motor system. In formula form, this is as follows:

WP = (TDH x GPM)/3,960
Where
WP = Monthly annual water power (horsepower)
TDH = Totally dynamic head
GPM = Average monthly flow (gallons per minute)

Total dynamic head (TDH) is a function of the depth to water and includes a term for friction losses in the piping. Depth to water was not known in this scenario. To simplify calculations, dynamic head is calculated using the well depth (which will always be greater than the depth to water) and piping friction losses are ignored, under the assumption that these two factors approximately cancel out each other. The average depth of 120 feet for the study area is used. Because pressurization head (the pressure at which water is delivered to the piping in the house) is normally expressed using units of pressure, rather than feet of head, pressure is converted to head using a ratio of 2.31 feet of head per pounds per square inch (psi). A rate of 50 psi is assumed as a typical pressurization level for residential water systems supplied by wells.

To calculate TDH, the following equation is used:

TDH = Well Depth + Pressurization Head
TDH= 120 + (2.31 x 50)
TDH = 235.5

To calculate GPM = monthly water consumption (gallons per month) divided by 43,800 (minutes per month):

3,960 = unit constant conversion (feet gallons/minute to horsepower)
GPM= 5,000/43,800
=.1142

Therefore
WP = (235.5 x .1142)/3,960 = .00679

Pumps do not operate at 100 percent efficiency. Energy is lost in the motor and column shaft, and friction is lost through the strainer, suction pipe, and column. The efficiency of pump and motor systems can vary widely, depending on the type of pump and motor, well configuration, and maintenance practices. Representative values for efficiency are not published, but the suggested overall efficiencies of between 0.15 and 0.60 are typical. For modeling best available pump/motor systems, a combined efficiency of 0.60 is used.

EP = WP x 0.746 x 1/eff
where:
EP = Electrical power (kW)
WP = Water power (horsepower)
eff = Overall efficiency of pump and motor system (decimal value, 0 to 1)
EP = .00679 x .746 x 1/.6
EP = .008442

Finally, monthly energy consumption for well pumping is calculated using the following equation:

Pumping Energy (kWh) = EP x 744
where:
744 = Hours per month
Pumping energy = 6.281 (kWh)

Pumping cost 6.281 x .105101 = .6601, or 66 cents per month for 5,000 gallons, or approximately $1.32/month for 10,000 gallons.

In addition to pumping costs, capital costs of constructing a domestic groundwater well and maintaining it are the individual's responsibility under the current system. For a new well, costs include drilling the well hole, installing the casing (a tubular lining that prevents the well hole from collapsing), and adding a well cap (a tight-fitting, vermin-proof top seal) typically $15 to $30 per foot, or $1,500 to $3,000 for a 100-foot-deep well, with additional costs for deeper wells. A complete water system is typically designed (and a total price quoted) after the well is successfully drilled and its depth and water yield is known. The costs could be $1,000 to $8,000 or more if they include costs for such components as the following:

- A well pump to bring the water to the surface
- A pressurized storage tank or tanks (if the well's yield is not enough to meet peak demand)

- Underground piping to take the water to the house
- Electrical wiring to power the system
- A control panel

These additional costs would depend on the size of pump and the distance to the house. This brings the typical total for drilling a well and setting up a private water delivery system to $3,000 to $20,000 (see, for example, Balleau and Silver 2005). Amortized over 30 years, with an interest rate of 3.5 percent, monthly payments for domestic water well capital costs are estimated at an additional $13.50 to $90.00 for domestic well water use.

Well pumps last an average of 15 years, depending on local water quality and sediment levels, and pump cost replacement can cost an average of $1,000-$2,500 or more.

In addition to monthly electricity costs and capital costs for drilling, existing wells may have costs associated with water treatment, due to water quality concerns with groundwater, particularly as related to arsenic (see **Section 3.25.4**, Water Quality). Costs would vary depending on the type of system installed (i.e. reverse osmosis, absorptive media filter, or distillation), and whether a single tap or whole house system was employed. Estimates from the New Mexico Department of Health indicate costs ranging from $90-$1,100 for a single tap system installation and $2,750 to $20,000 for a whole house system. Operations and maintenance costs for these systems would be an additional $90-$500 per year, representing additional monthly costs of $7.70 to $41.67 per year (New Mexico Department of Health 2014). Amortized over 30 years, with an interest rate of 3.5 percent, monthly payments for whole house water filtration systems are estimated at an additional $12.30 to $90 for domestic well water use. Added to operations and maintenance costs, this represents monthly costs of $19.80 to $131.67.

The Aamodt Litigation Settlement Agreement (Settlement Agreement) requirements will result in additional cost for groundwater uses. Section 3.1.5 of the Settlement Agreement requires the well owner to pay the County Water $1,000 for any permit to replace a well. Lastly, 3.1.6 of the Settlement Agreement requires well owners to install a meter. The Office of the State Engineer will require all wells in the basin to install meters regardless of whether the owners are parties to the Settlement Agreement. Meter purchase and installation is estimated at $500.

The IMPLAN Model

IMPLAN is a regional economic model that provides a mathematical accounting of the flow of money, goods, and services through a region's economy. The model provides estimates of how a specific economic activity translates into jobs and income for the region. It includes the ripple impact (also called the multiplier impact) of changes in economic sectors that may not be directly impacted by management actions, but are linked to industries that are directly impacted. In IMPLAN, these ripple impacts are termed indirect impacts (for changes in industries that sell inputs to the industries that are directly impacted) and induced impacts (for changes in household spending as household income increases or decreases due to the changes in production).

This analysis used IMPLAN 2014. All input data were in 2014 dollars, as reported in the feasibility study (Reclamation 2015). Although the proposed project will result in impacts over a multiple year timespan, all values are reported in 2016 dollars to allow for comparison of various project components. All values were adjusted using IMPLAN's reporting year output deflator values.

The current IMPLAN model has 440 economic sectors, 246 of which are represented in the socioeconomic study area. This analysis involved direct changes in economic activity for IMPLAN economic sectors, as well as changes in all other related sectors due to the ripple impact. The IMPLAN production coefficients were modified to reflect the interaction of producing sectors in the socioeconomic study area. As a result, the calibrated model does a better job of generating multipliers and the subsequent impacts that reflect the interaction between the sectors in the socioeconomic study area, compared to a model using unadjusted national coefficients. Key variables used in the IMPLAN model were filled in using data specific to the socioeconomic study area, including employment estimates, labor earnings, and total industry output.

The relationships between economic sectors can be manipulated based on knowledge of the local economy to more closely represent the study area. If these parameters are not known (as is often the case), the relationships can be set either to 100 percent of purchases staying within the study area (default) or to values provided by IMPLAN in SAM. These SAM values are an approximation of relationships, based on economic data from previous years; it can predict the percentage of an economic input that stays within the local economy (producing direct, indirect, and induced impacts in the study area) and the percentage that leaves the study area as imports (having no further impact on the economy of the study area) for each sector. Because relationships between sectors in the study area were not known, the SAM values were used for all models.

The economic input for the model was a monetary value for a specific economic sector, and inputs for multiple sectors can be applied to each scenario. These scenarios are run against the model parameters to provide economic predictions of direct, indirect, and induced impacts on employment, labor income, value added, and output, as well as breakdown of these impacts on each sector.

The analysis for the EIS focused on impacts of the proposed construction, which falls within the "other new non-residential construction" sector in IMPLAN. The assumptions made to provide these inputs are discussed in detail below.

Employment and Income

Direct estimated costs for construction materials, employment, and amount of fuel required are provided based on information in cost sheets developed in support of the Technical Services Center Feasibility Study (Reclamation 2015; see **Table F-1**, Summary Comparison of RWS Action Alternatives Direct Costs (costs in October 2014 dollars)). This information is based on preliminary project data. The feasibility level field cost estimates were intended to capture the most current pricing (as of October 2014) for materials, wages and salaries, accepted productivity standards, typical construction practices, procurement methods, current construction economic conditions, and site conditions for the current level of design. The cost estimates were prepared with less than complete designs and have inherent levels of risk and uncertainties.

Direct cost estimates were available for project components as modeled in the 2015 feasibility study, rather than for specific project components laid out in *Proposed Action and Alternatives* in **Chapter 2**. The specific details for project components may have been altered from those proposed in the feasibility study (e.g., number of storage tanks) and, furthermore, may be modified prior to project implementation. As such, it was determined that cost estimates for the following proponents would remain similar across all action alternatives:

- Water treatment plant construction costs and employment
- Supervisory control and data acquisition (SCADA) construction costs and employment
- Distribution pipe construction costs and employment
- Pumping plants construction costs and employment
- Storage tank construction and employment

Costs by alternative are presented for the cost of primary water source collection, including riverside intake, infiltration gallery, and horizontal radial well collector methods in **Table F-1**. Direct construction employment and cost estimates are based on the initial project feasibility study (Reclamation 2015) and the draft AMEC Foster Wheeler ASR cost estimates (2016). The estimates provided here are totals for project components, not annual averages. The degree to which project elements would be fully implemented would depend upon the available budget; if project components are not fully implemented, total economic contributions would be decreased. Under Alternative E, Reclamation has proposed a reduction of labor and construction at 73.5 percent of the total estimated in the feasibility study. This is the result of delay of some project components in the short-term construction period analyzed here. Specifically, supplementary water transmission and distribution systems and associated structures would be constructed as needed to supply those individuals and communities as they connect to the operational RWS. When constructed, these structures would represent additional economic contributions as well as short term construction impacts. Timing of this activity has not been determined, but would likely occur following the initial construction period.

Initial construction schedule estimates are included, along with peak period of construction, as applicable. Under all Alternatives, exact timing of construction and level of employment at a given time would vary, based on the number of teams working on a given component and overlapping of component construction. Phasing the location of some project components would result in phased site-specific impacts from construction. The specific employment levels would in turn impact the overall timing of project spending; highest spending and highest levels of economic contributions are generally within the peak period of construction.

Alternative B also provides four backup options to supplement water availability, including use of ASR wells or conjunctive use wells. Economic impacts for the backup options are not captured in the overall project costs discussed above. Estimates for total costs for a high and low cost scenario are provided based on the draft ASR report (AMEC Foster Wheeler 2016).

Table F-1. Summary Comparison of RWS Action Alternatives Direct Costs (costs in October 2014 dollars)

Economic Indicator Component	Alternative B	Alternative C	Alternative D	Alternative E
Firm reliable water supply				
Firm reliable water supply	Estimated ASR capital costs : Low $12,966,000 High $38,781,000 Estimated annual O&M costs: Low: $150,700 High: $3,428,900	N/A	N/A	N/A
Primary source water collection	Side channel surface diversion structure	Parallel river interceptor drain	Infiltration gallery	Horizontal radial well collectors
Construction time frame and estimated peak construction period	14 months construction time frame March 2018-March 2020 2019 peak construction	12 months construction time frame March 2018-September 2019 2019 peak construction	12 months construction time frame March 2018- October 2019 2019 peak construction	12 months construction time frame March 2018- October 2019 2019 peak construction
Direct employment	Riverside intake:14	Same as Alternative D	Infiltration gallery: 14	Horizontal radial well collectors: 23
Direct labor costs	Riverside intake: $1,175,000	Same as Alternative D	Infiltration gallery: $1,366,200	Horizontal radial well collectors: $1,973,800
Direct construction costs	Riverside intake: $1,225,000	Same as Alternative D	Infiltration gallery: $858,300	Horizontal radial well collectors: $1,561,500

Table F-1. Summary Comparison of RWS Action Alternatives Direct Costs (costs in October 2014 dollars) (cont.)

Economic Indicator Component	Alternative B	Alternative C	Alternative D	Alternative E
Water Treatment Plant				
Construction time frame and estimated peak construction period	March 2018-November 2020 Construction time frame 20 months 2019 peak construction			
Direct employment	Water treatment plant: 44 SCADA: 11			
Direct labor costs	Water treatment plant: $3,776,300 SCADA: $1,264,300			
Direct construction costs	Water treatment plant: $1,239,400 SCADA: $99,500			
Short-term storage	Tanks at HKM implementable locations (11 new tanks total)	Tanks at feasibility-level locations (11 new tanks total)	Tanks at feasibility design report locations (16 new tanks total)	Tanks at feasibility design report optimized locations (9 new tanks total)
Construction time frame and estimated peak construction period	Construction timeline varies by location, with construction occurring in phases in different project areas between 2018 and 2022. May 2022-June 2024 Tesuque August 2021-March 2024 Nambé April 2021-March 2024 Pojoaque March 2018-August 2021 San Ildefonso Peak period of construction estimated at 2021			

Table F-1. Summary Comparison of RWS Action Alternatives Direct Costs (costs in October 2014 dollars) (cont.)

Economic Indicator Component	Alternative B	Alternative C	Alternative D	Alternative E
Direct employment	Distribution tanks: 21			
Direct labor costs	Distribution tanks: $1,776,100			
Direct construction costs	Distribution tanks: $454,100			
Transmission and distribution pipelines (pumping plants, pipeline, roads)				
Construction time frame and estimated peak construction period	Construction timeline varies by location, with construction occurring in phases in different project areas between 2018 and 2024. Peak period of construction as follow for different project areas: Santa Fe County May 2022-June 2024 Tesuque August 2021-March 2024 Nambé April 2021-March 2024 Pojoaque March 2018-August 2021 San Ildefonso March 2018-June 2021			
Direct employment*	Pumping plants: 21 Transmission pipeline: 59			
Direct labor costs	Pumping plants: $1,776,100 Transmission pipeline: $3,802,700			
Direct construction costs	Pumping plants: $673,500 Transmission pipeline: $2,028,000			
Electrical power system				
No quantitative project information available				

Table F-1. Summary Comparison of RWS Action Alternatives Direct Costs (costs in October 2014 dollars) (cont.)

Economic Indicator Component	Alternative B	Alternative C	Alternative D	Alternative E
Rio Pojoaque Irrigation Improvement Project	Extend existing barrier dam	Divert water from Indios irrigation canal with extended open conveyance canal	Enhance existing infiltration gallery	Extend existing infiltration gallery
No quantitative project information available				
Rio Tesuque Channel Modification Project	Restore existing incised channel	Relocate channel	Remove sediment	Infiltration gallery
No quantitative project information available				

Source: Reclamation 2015, AMEC Foster Wheeler 2016

*Assumes a construction period of 2018-2023. The exact level of employment at a given time would depend on the level of concurrent development of different site components and different locations. Should more work be conducted concurrently, the total time of employment could be reduced and the level of employees required for the shorter time frame increased. Alternative E Direct costs included here represent total costs based on feasibility study (Reclamation 2015). Costs for the Alternative E construction period analyzed below are calculated based on a reduced level of labor hours and construction supplies based on immediate budgetary constraints.

In addition, fuel consumption for project construction was provided. Cost estimates were determined for fuel costs based on the current diesel price ($2.14) and gasoline price ($1.95), based on January 2016 data from the Energy Information Administration (EIA 2016). Off-road diesel was estimated at the price of diesel minus taxes, based on Energy Information Administration guidance, for a cost of $1.62/gallon (see **Table F-1**). Due to historically low fuel costs, these numbers may be substantially increased, depending on the costs of fuel at the time of construction. Direct and indirect economic costs would be impacted by these fuel costs. Due to the lack of certainty regarding long-term retail fuel costs, no forecasts were used for future fuel prices.

Based on labor and cost estimates above, the output from IMPLAN was obtained for direct, indirect, and induced economic output; see tables below.

Table F-2. IMPLAN Results-Construction

	Employment			
	Alt B Low ASR Cost Scenario	Alt B High ASR Cost Scenario	Alt C and D	Alt E
Direct Impact	234	415	141	111
Indirect Impact	39	88	11	10
Induced Impact	80	127	56	44
Total Impact	353	630	208	164
	Labor Income			
Direct Impact	$14,867,700	$22,622,400	$10,962,200	$8,577,800
Indirect Impact	$1,541,800	$3,510,300	$439,400	$366,0o0
Induced Impact	$3,446,700	$5,476,500	$2,402,400	$1,884,300
Total Impact	$19,856,200	$31,609,200	$13,803,900	$10,828,000
	Total Value Added			
Direct Impact	$16,877,500	$27,348,300	$11,601,700	$9,111,100
Indirect Impact	$2,738,600	$6,203,600	$794,300	$662,000
Induced Impact	$6,273,600	$9,966,300	$4,373,800	$3,430,400
Total Impact	$25,889,700	$43,518,300	$16,769,700	$13,203,600

Source: IMPLAN 2014

Note: $2016 rounded to nearest $100. Alternative E reflects a .735 reduced level of construction and labor hours based on budgetary constraints and delay of construction of some project components.

In addition, the top ten sectors' impacts by each alternative and the anticipated jobs in each sector are displayed by alternative in the tables below.

Table F-3. IMPLAN Results: Impacts by Top Economic Sector Alternative B-High ASR Estimate

Sector	Description	Total Employment	Total Labor Income	Total Value Added
58	Construction of other new nonresidential structures	393	$20,935,300	$25,488,600
61	Construction of other new residential structures	14	$1,379,800	$1,451,700
402	Retail - Gasoline stores	11	$432,600	$574,400
403	Retail - Clothing and clothing accessories stores	11	$319,700	$627,500
501	Full-service restaurants	9	$253,000	$257,100
407	Retail - Nonstore retailers	9	$106,400	$363,500
440	Real estate	9	$131,300	$1,732,000
395	Wholesale trade	9	$491,100	$988,900
405	Retail - General merchandise stores	8	$230,800	$361,800
502	Limited-service restaurants	7	$166,400	$341,800
Total		480	$24,446,400	$32,187,300

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100

Table F-4. IMPLAN Results: Impacts by Top Economic Sector Alternative B-Low ASR Estimate

Sector	Description	Total Employment	Total Labor Income	Total Value Added
58	Construction of other new nonresidential structures	212	$13,180,600	$15,017,800
61	Construction of other new residential structures	14	$1,379,800	$1,451,700
402	Retail - Gasoline stores	10	$370,800	$492,400
501	Full-service restaurants	6	$153,100	$155,600
403	Retail - Clothing and clothing accessories stores	5	$153,300	$300,800
440	Real estate	5	$74,600	$983,400
407	Retail - Nonstore retailers	4	$51,300	$175,100
395	Wholesale trade	4	$233,400	$470,000
405	Retail - General merchandise stores	4	$128,200	$201,100
502	Limited-service restaurants	4	$103,200	$212,000
Total		268	$15,828,300	$19,459,900

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100

Table F-5. IMPLAN Results- Impacts by Top Economic Sector-Alternatives C and D

Sector	Description	Total Employment	Total Labor Income	Total Value Added
58	Construction of other new nonresidential structures	138	$10,729,500	$11,292,700
402	Retail - Gasoline stores	7	$258,700	$343,500
501	Full-service restaurants	4	$101,500	$103,100
440	Real estate	3	$43,500	$573,800
502	Limited-service restaurants	3	$70,500	$144,800
482	Hospitals	3	$228,300	$263,800
405	Retail - General merchandise stores	2	$69,000	$108,400
485	Individual and family services	2	$41,800	$42,600
400	Retail - Food and beverage stores	2	$72,900	$105,800
475	Offices of physicians	2	$192,600	$186,600
		166	$11,808,300	$13,165,100

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100

Table F-6. IMPLAN Results- Impacts by Top Economic Sector-Alternative E

Sector	Description	Total Employment	Total Labor Income	Total Value Added
58	Construction of other new nonresidential structures	106	$8,379,400	$8,847,800
402	Retail - Gasoline stores	6	$219,200	$291,100
501	Full-service restaurants	3	$79,800	$81,100
440	Real estate	2	$34,600	$ 455,800
502	Limited-service restaurants	2	$ 55,300	$113,700
482	Hospitals	2	$179,000	$206,800
405	Retail - General merchandise stores	2	$ 54,700	$85,800
485	Individual and family services	1	$32,800	$33,400
400	Retail - Food and beverage stores	1	$57,300	$83,100
475	Offices of physicians	1	$ 151,000	$ 146,300
Total		126	$9,243,100	$ 10,344,900

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100. Alternative E reflects a .735 reduced level of construction and labor hours based on budgetary constraints and delay of construction of some project components.

Federal and state taxes would also be generated by project activities. Estimates for local, state, and federal taxes are included in the table below.

Table F-7. IMPLAN Results: Total Federal Taxes

Description	Employee Compensation	Proprietor Income	Tax on Production and Imports	Households	Corporations
Alternative B: low	$2,082,800	$115,900	$118,200	$1,110,900	$323,300
Alternative B: high	$3,136,200	$248,800	$226,100	$1,776,200	$643,300
Alternative C and D	$1,555,900	$41,900	$60,000	$767,600	$157,600
Alternative E	$1,216,600	$34,300	$48,100	$602,300	$126,200

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100. Alternative E reflects a .735 reduced level of construction and labor hours based on budgetary constraints and delay of construction of some project components.

Table F-8. IMPLAN Results: Total State and Local Taxes

Description	Employee Compensation	Tax on Production and Imports	Households	Corporations
Alternative B: low	$98,100	$1,128,400	$348,800	$45,500
Alternative B: high	$147,800	$2,158,300	$557,800	$90,600
Alternatives C and D	$73,300	$572,400	$241,000	$22,200
Alternative E	$57,330	$459,081	$189,116	$17,787

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100. Alternative E reflects a .735 reduced level of construction and labor hours based on budgetary constraints and delay of construction of some project components.

Operations and maintenance positions would also represent direct and indirect economic impacts. Output from IMPLAN models by alternative is displayed below.

Table F-9. IMPLAN Results-Operations and Maintenance

	Employment		
	O&M Alt B: Low ASR Cost Scenario	O&M Alt B: High ASR Cost Scenario	O&M Alt C-E
Direct Impact	9	22	8
Indirect Impact	6	15	5
Induced Impact	5	11	4
Total Impact	19	48	18
		Labor Income	
Direct Impact	$666,000	$1,688,200	$619,000
Indirect Impact	$260,000	$658,900	$241,700
Induced Impact	$193,800	$491,100	$180,100
Total Impact	$1,119,700	$2,838,300	$1,040,700
		Total Value Added	
Direct Impact	$842,400	$2,135,400	$782,900
Indirect Impact	$388,700	$985,300	$361,300
Induced Impact	$352,500	$893,700	$327,700
Total Impact	$1,583,600	$4,014,300	$1,472,000

Source: IMPLAN 2014
Note: $2016 rounded to nearest $100

Residential Property Value

Two forms of impacts on property values have been identified as a result of proposed project activities- direct impacts based on acquisition of property easements for project components, and indirect impacts based on changes to water quality or quality available as a result of connecting to the RWS. Details for both forms of impacts are discussed below.

As discussed in **Section 4.17**, Land Use, use of portions of private property will be required order to support the RWS. The right of an entity to use all or part of the property of another person for some specific purpose is known as an easement. The acquisition of easements for the RWS would follow the direction provided in the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended (Uniform Act). Under the Uniform Act, all property owners whose property would be encumbered by an easement would be notified, have their property appraised, and receive just compensation for the easement based on fair market value. Under the federal rule, the value of the easement will be based on the difference between the value of the whole property before (or without) the easement and the value of the property with the easement in place. Valuation of the easement is variable, based on the level of the impacts of the easement on other surface uses. Easements with a high degree of impacts on other surface uses (such as access roads and irrigation canals) would command a high percentage of the total property value of the property as compensation payment, while those with minimal surface impacts (such as pipelines at the edge of a property) would result in a lesser compensation payment (Sherwood 2014).

The greatest potential for RWS facilities to result in impacts on private property values would be in locations where land is needed to support new facilities. In total, 17-40 acres would be required for permeant RWS facilities. The majority of this land, however, would be located on lands administered by the Bureau of Indian Affairs; only 2-4 acres would be located on private lands and require compensation as described above. Where additional land interests must be obtained to provide water to County customers, it is anticipated that Santa Fe County will acquire the interests necessary for construction, operations and maintenance. Reclamation will acquire and pay market value for permanent easements across private property where needed to construct Pueblo water facilities. Specific compensation amounts would be determined based on site specific appraisal and market values.

During construction of the RWS, there would be additional short-term conflicts with existing residential, commercial, and public land uses from approximately 185 to 192 miles of water transmission and distribution pipelines, including 54 to 56 miles on private lands depending on the alternative (see **Section 4.17**). Most pipeline construction would occur in public rights-of-way and on public land; however, temporary encroachment of construction is possible, in the form of temporary parking for loading and unloading of employees and materials or vehicle maneuvering on one private property. Reclamation will acquire and pay market value for temporary easements across private property where needed to construct Pueblo water facilities. Any activity on private property would occur along the portion of the property next to an existing public right-of-way or within a temporary construction easement; therefore, it would not result in a long-term change in the underlying use of the private property or a substantial change in private property values. Temporary easements would be relinquished upon substantial completion of the RWS construction.

In addition to direct impacts on private property values, proposed RWS elements, which are generally industrial in nature, could result in impacts on adjacent residential land uses. There is lack of consensus in the literature on the degree to which nearby land uses create negative spillover effects on residential values (Matthews 2006). Impacts are likely to vary based on neighborhood characteristics, proximity to development, and level of impacts on noise, light pollution and other components that would be undesirable in residential areas.

Indirect impacts on property value due to change to water quality or quality can be discussed in terms of ecosystem or environmental services. Two common methods used to estimate economic values for ecosystem or environmental services that directly affect real estate prices are hedonic pricing studies and contingent valuation studies. Hedonic pricing recognizes that the price of a home is impacted by internal characteristics of the goods being sold and by external factors affecting it (e.g., surrounding location and local air and water quality). Continent valuation studies examine how much money people would be willing to pay (or willing to accept) to maintain the existence of (or be compensated for the loss of) an environmental feature.

Relevant studies examining hedonic pricing studies and contingent evaluation are summarized in **Table F-10**, below. This information is used in the qualitative discussion of impacts in **Chapter 4**.

Table F-10. Domestic Water Source Property Value Impacts

Study Citation	Title	Brief Synopsis of Study/Methods	Contingent Valuation	Hedonic Pricing	Notes
Schultz 2007	The Impact of Rural Water Supply Systems on Property Values	Hedonic model, sale price associated with distance to water supply pipelines	-47-64% (out of 68) interested in paying for water connections in ND -30% residents opted out of water connection in NE	-Rural water supply homes were higher than private well homes in NE & ND $59206 well/$71956 water supply ND $222710 well/$228116 water supply NE - no significant connection btw rural water supply and house price w/ Hedonic model	- Homes on municipal water were newer and larger than homes with wells -water scarcity/supply not a major issue in study area
Malone and Barrows 1990	Groundwater pollution's impacts on residential property values, Portage County, WI	Hedonic model to determine nitrate contamination impacts on property values		Nitrate pollution of groundwater had no statistically significant impact on the price of residential property in a study in Portage County, Wisconsin.	
Des Rosiers, Bolduc, and Theriault 1999	Environment and value: Does drinking water quality affect house prices?	Drinking water quality on property values in Charlesbourg. Sharper decline on higher valued properties		Upper third of market property drops in value ranging from 5.2 to 10.3 percent of mean sale price when exposed to water related health problems	Study area: major municipality

Table F-10. Domestic Water Source Property Value Impacts (cont.)

Study Citation	Title	Brief Synopsis of Study/Methods	Contingent Valuation	Hedonic Pricing	Notes
Page and Rabinowitz 1993	Groundwater Contamination: Its impacts on property values and cities	Case study: groundwater contamination negatively affects the value of commercial and industrial properties, but not residential.			
Epp and Al-Ani 1979	The Impact of water quality on rural nonfarm residential property values	Use real estate prices to determine value of improvements in water quality in PA. hedonic model		Water quality significantly affects value of residential properties	
Piper et al. 1997	Household willingness to pay for improved rural water supplies	Estimates willingness to pay for improved rural water supplies in western United States	willing to pay $4.43-$17.29/household/month		Study area: Navajo Nation

Table F-10. Domestic Water Source Property Value Impacts (cont.)

Study Citation	Title	Brief Synopsis of Study/Methods	Contingent Valuation	Hedonic Pricing	Notes
Rubin 2001	White paper: Economic Characteristics of small systems	Comparison between incomes in rural vs. urban and impacts of affording water systems. Rural, more expensive to have water system & spend a higher % of income on utilities.	Rural areas spend all of after-tax income, urban have surplus of $4,000 Conclusion: income level, expenditures & population density important differences in cost and affordability of water service		
Jordan and Elnagheeb 1993	Willingness to pay for improvements in drinking water quality	Willingness to pay for water improvements	For well users: $7.38/month for improvements		

References

AMEC Foster Wheeler. 2016. Comprehensive Study Plan Draft. Pojoaque Basin Regional Water System Hydrogeologic Support Services. February 2016.

Balleau, Peter, and Steven Silver. 2005. "Hydrology and administration of domestic wells in New Mexico." *Natural Resources Journal* 45 (fall 2005).

Des Rosiers, F., A. Bolduc, and M. Thériault. 1999. "Environment and value: Does drinking water quality affect house prices?" *Journal of Property Investment & Finance* 17(5):444-463.

Energy Information Administration (EIA). 2016. U.S. retail fuel costs (January 2016). Internet website: http://www.eia.gov.

Epp, D. J., and K. S. Al-Ani. 1979. "The effect of water quality on rural non-farm residential property values." *American Journal of Agricultural Economics*, August 1979.

IMPLAN. 2014. IMPLAN System data and software 2014. MIG, Inc., 502 2nd Street, Suite 301, Hudson, Wisconsin 54016

Jordan, J., and A. H. Elnagheeb. 1993. "Willingness to pay for improvements in drinking water quality." *Water Resources Research* 29(2), February 1993.

Malone, P., and R. Barrows. 1990. "Ground water pollution's effects on residential property values, Portage County, Wisconsin." *Journal of Soil and Water Conservation* (45)2:346-348.

Matthews, J.W. 2006. The Effect of Proximity to Commercial Uses on Residential Prices. Public Management and Policy Dissertations. Department of Public Management and Policy. Georgia State University. September, 2006.

New Mexico Department of Health. 2014. NM EPHT Drinking Water Quality: Private Wells Treatment. Internet website: https://nmtracking.org/en/environ_exposure/water-qual/private-wells/

Page, W., and H. Rabinowitz. 1993. Groundwater contamination: Its effects on property values and cities." *Journal of the American Planning Association* (59)4: 473–481.

Piper, S and W. E. Martin. 1997. "Household willingness to pay for improved rural water supplies: A comparison of four sites." *Water Resources Research* 33(9):2153-2163. September 1997.

Reclamation (U.S. Bureau of Reclamation). 2015. Feasibility Design Report. Pojoaque Basin Regional Water System Feasibility Design Report. Albuquerque Area Office, Upper Colorado Region, Albuquerque, New Mexico. October 2015.

Rubin, S. J. 2001. Economic Characteristics of Small Systems. White Paper for National Rural Water Association. Duncan, Oklahoma. May 2001.

Sherwood, D. 2014. The Valuation of Easements. Right of Way. November/December 2014; 36-39.

Shultz, S. 2007. The Impact of Rural Water Supply Systems on Property Values. USGS/NIWR 104G Project: # 2005NE83G. Omaha, Nebraska. August, 31, 2007.