Appendix G
Economics and Preliminary Benefits Analyses

Newlands Project Planning Study
Special Report

Prepared by

Bureau of Reclamation
Mid-Pacific Region
Lahontan Basin Area Office

U.S. Department of the Interior
Bureau of Reclamation

April 2013

Appendix G1
Economic Analysis

Newlands Project Planning Study
Special Report

Prepared by

Bureau of Reclamation
Mid-Pacific Region
Lahontan Basin Area Office

U.S. Department of the Interior
Bureau of Reclamation

April 2013

Contents

Tables

Figures

Abbreviations and Acronyms

ATP	Ability to Pay
GIS	geographic information system
NASS	National Agricultural Statistics Service
O&M	operations and maintenance
PEC	portfolio energy credit
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
TCID	Truckee-Carson Irrigation District

Appendix G1 – Financial and Economic Analysis

This document describes the data and analysis applied to estimate the financial condition of agricultural producers in the Truckee-Carson Irrigation District (TCID) and the related financial health of the district. The purpose of the analysis is to measure TCID's ability to cover the additional costs that may be required to maintain water supply reliability to water right holders within the Project.

Analysis Approach

This analysis applies U.S. Department of the Interior, Bureau of Reclamation (Reclamation) guidelines for estimating Ability to Pay (ATP) as the measure of TCID's financial capacity to absorb additional costs to operate and maintain water deliveries within the Project. ATP is defined as the farm-level payment capacity aggregated to the entire Project, minus district existing obligations, operations and maintenance costs, power costs, and reserve fund requirements. The general analysis process is outlined in Figure 1. As shown, the primary components of the estimated ATP include the following:

- **Water Supply Model** – A water supply model is used to assess the changes in water supply resulting from the alternatives considered in this Study. The output from the water supply model is used as an input to assess changes in payment capacity and hydropower production.

- **Farm Payment Capacity Analysis** – Payment capacity is the estimated residual net farm income of irrigators available for payment of both Federally and non-Federally assessed water costs, after deduction for on-farm production and investment expenses, as well as appropriate allowances for management, equity, and labor. For this analysis, farm crop budgets were prepared representing common crop rotations and several sizes of commercial farming operations within the Project. Available water supply is assessed for each alternative to determine if the changes in irrigation water supply result in changes in payment capacity.

- **Hydropower Model** – TCID operates several hydropower plants that generate power as water is delivered to farms and other water right holders in the Project. Electricity sales from power generation at the two plants provide an important ongoing source of income to TCID. The Water Supply Model provides estimates of power generation at the facilities according to water deliveries within the Carson Division. The

power generation estimates are combined with electricity price information contained in the power sale contracts held by TCID to estimate annual power revenues for each alternative. These revenues are included in the financial analysis to estimate ATP.

- **Financial Model** – The financial model combines financial statements for the most recent five-year period with output from the hydropower model and payment capacity analysis to estimate district-level ATP.

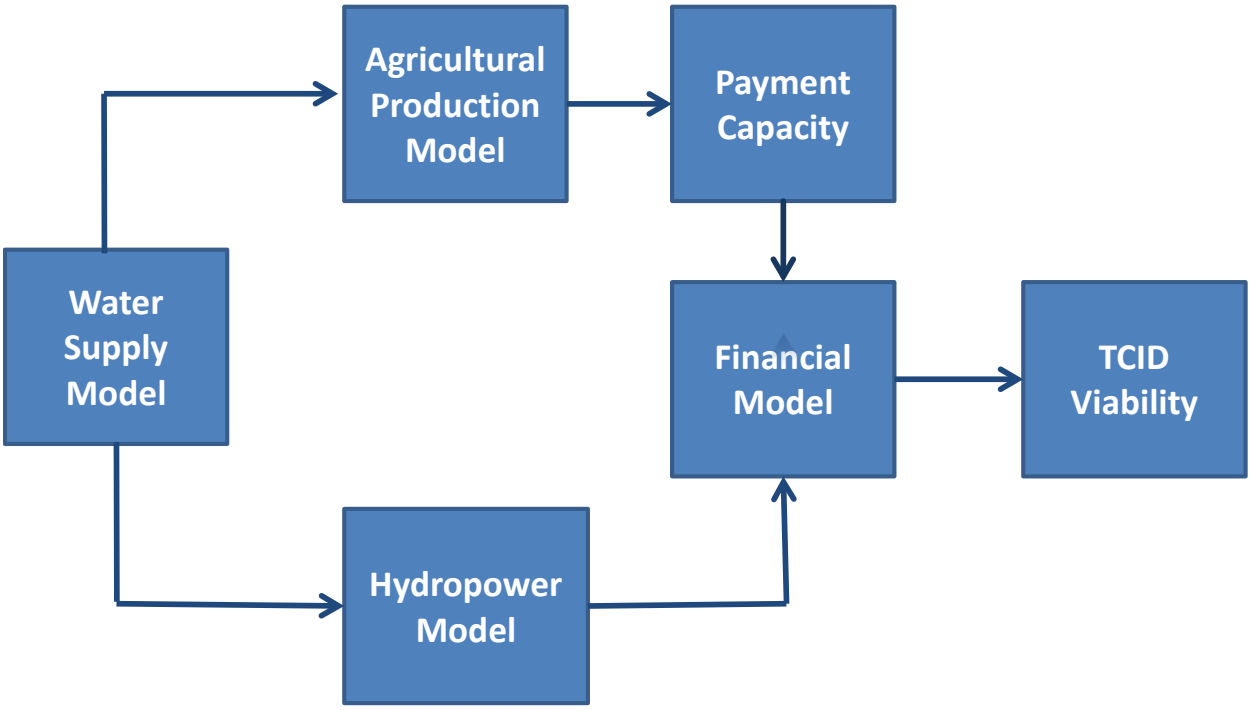

Figure G1-1. Newlands Project Ability to Pay Analysis

The following sections provide additional detail on the payment capacity analysis, hydropower model, and ATP estimation. This is followed by application of the analysis process to each of the project alternatives considered in this Study.

Payment Capacity Analysis

Payment capacity is a residual payment model where all costs but water are included, with allowances for labor, management and equity. In this analysis, farm enterprise budgets were developed to reflect different commercial farm sizes and crop rotations within the Project. Payment capacity is explicitly estimated only for commercial farms that provide full-time employment opportunities for the owner/operator. There are a growing number of water right acres in the district that are dedicated to noncommercial farm uses (e.g., urban, environmental, and part-time farms). The payment capacity for water

right acres not applied to commercial farming is represented in this Study as the average estimated payment capacity for commercial farms. The implicit assumption is that urban, environmental, and noncommercial water uses have at least the same payment capacity as the average commercial farm. The following sections provide a description of key components of the payment capacity analysis.

Cropping Pattern

There are a variety of crops grown in the Project. However, the most prevalent crops produced on commercial farms consist of alfalfa hay and rotation crops such as grain hay and corn silage. Current crop surveys for the Project are not available. As a result, this Study relied upon geographic information system (GIS) information obtained from the National Agricultural Statistics Service (NASS) identifying crops in the region from 2008 through 2010 to develop cropping pattern estimates. According to the analysis, 65 percent of all irrigated acres were planted to alfalfa, on average, over the three-year period. Other common crops include pasture (15 percent), corn silage (5 percent), and small grains/other hay (11 percent). This analysis assumes that pasture is produced on noncommercial farms only. As a result, commercial farms consist of alfalfa hay grown in rotation with grain hay and corn silage. Two crop rotations were selected:

- **Rotation 1** – 7 years of alfalfa followed by one year of grain hay
- **Rotation 2** – 7 years of alfalfa followed by one year of corn silage and one year of grain hay

Farm Crop Budgets

Published crop budgets for Nevada were considered to be too dated and lacked the necessary level of detail for use in this analysis. As a result, published crop budgets from other regions were used as a starting point. Table G1-1 provides a summary of the crop budgets that were selected for this Study. Where necessary, crop production costs were normalized to current dollars ($2012) using the Farm Prices Paid Index as reported by NASS.

Table G1-1. Payment Capacity Crop Budget Sources

Crop	Crop Budget	Source
Alfalfa Hay	Sample Costs to Establish and Produce Alfalfa Hay, Intermountain Region	University of California Cooperative Extension (2012)
Grain Hay	Sample Costs to Produce Grain Hay, Intermountain Region	University of California Cooperative Extension (2007)
Corn Silage	Costs and Returns Estimate, Corn Silage, Southcentral Idaho	University of Idaho Cooperative Extension (2011)

The crop budgets are primarily used to obtain estimates of fertilizer and herbicide/pesticide costs, custom activities and costs, farm machinery complement, and per acre labor requirements. The farm machinery complement is used at the representative farm level to estimate harvest, nonharvest, and fixed costs associated with owning and operating the equipment. On smaller representative farms, custom harvest is assumed as the estimated costs associated with owning and operating the necessary harvest equipment is not cost-effective. Custom harvest for alfalfa and grain hay is priced at approximately $45/ton according to available information.[1] Some of the key parameters and costs applied to the crop budgets are provided in Table G1-2.

Table G1-2. Crop Budget Inputs and Assumptions

Parameter	Value	Unit	Source
Labor (Supervisor and Machine)	$15.88	hour	USBR, Hourly Wages
Labor (Field)	$9.33	hour	USBR, Hourly Wages
Return to Equity	3%	of farm investment equity and annual operating costs	USBR Payment Capacity Guidelines
Return to Management	10%	of net farm income	USBR Payment Capacity Guidelines
Farmstead	5%	of irrigated land	USBR Payment Capacity Guidelines
Gasoline	$2.99	gallon	Energy Information Administration
Diesel	$3.29	gallon	Energy Information Administration
Interest on short-term debt	7.49%		USBR, National Balance Sheet
Debt-Asset Ratio short-term debt	15.93%		USBR, National Balance Sheet
Interest on long-term debt	6.04%		USBR, National Balance Sheet
Interest on long-term equity (land)	3.00%		USBR, National Balance Sheet

[1] Personal communication with Nevada agricultural producers.

Table G1-2. Crop Budget Inputs and Assumptions (contd.)

Parameter	Value	Unit	Source
Property Tax Rate (% of Value)	2.5%		Univ. of Idaho (PNW 346)
Machine Housing (% of Value)	0.75%		Univ. of Idaho (PNW 346)
Insurance Rate (% of Value)	0.7%		Univ. of Idaho (PNW 346)
Land Rent (Cash)	$150.00	acre	Local experts
District Water Assessment	$48.90	acre	TCID
Custom Harvest Alfalfa	$45.00	ton	Local experts

Crop Prices and Yields

In general, NASS reports crop prices and yields at the state or county level for alfalfa and grain (other) hay. Corn silage prices in Nevada are rarely reported, however. Reported yields are averages that include all farm types and management conditions. To reflect commercial farms with the high level of management represented in the crop budgets, the average crop yields were adjusted based upon communication with regional agricultural experts. Table G1-3 provides a summary of the published information for the selected crops from 2007 through 2011 and the crop prices and yields applied in this analysis. As shown, alfalfa and grain hay yields were increased from the most recent five-year reported average. NASS reported yields include a large proportion of production estimates from smaller (noncommercial) farms and were adjusted upward to reflect production on commercial farms. Corn silage yields were not adjusted from the reported values as they corresponded with yield estimates provided by local agricultural producers and experts. The five-year average reported prices for alfalfa and grain hay were applied. Corn silage prices were obtained from regional experts and compared to reported prices in Idaho for corroboration. The applied corn silage price reflects the price for the crop in the field as the buyer (typically a dairy) is generally responsible for harvest.[2]

[2] Harvest costs are not included in the corn silage crop budget.

Table G1-3. Selected Crop Prices and Yields

Year	Alfalfa		Small Grain Hay		Corn Silage	
	Yield (tons/acre)	Price ($/ton)	Yield (tons/acre)	Price ($/ton)	Yield (tons/acre)	Price ($/ton)
2007	4.8	$148.00	3.0	$125.00	25	N/A
2008	4.8	$187.00	3.4	$150.00	26	N/A
2009	5.3	$107.00	3.1	$72.00	24	N/A
2010	5.0	$125.00	3.2	$98.00	25	N/A
2011	4.7	$208.00	N/A	N/A		N/A
Average	4.92	$155.00	3.18	$111.25	25	N/A
Applied	**6.50**	**$155.00**	**4.00**	**$111.25**	**25**	**$35.00**

Source: National Agricultural Statistics Service and personal communication with local agricultural experts.

Farm Machinery Costs

Current farm machinery costs were obtained from the selected crop budgets and from machinery cost data published by the University of Idaho ("Costs of Owning and Operating Farm Machinery in the Pacific Northwest", PNW 346). A farm machinery complement was developed for each representative farm according to the selected crop rotation and farm size. Smaller farms were assumed to rely upon custom operators for some activities such as hay harvest due to the fixed high costs associated with owning some farm equipment. Fuel and repair costs were estimated according to the number of hours that each equipment item was used on each representative farm. Table G1-4 provides a summary of the farm equipment and purchase costs included in this analysis.

Table G1-4. Representative Farm Machinery

Equipment	Useful Life (Hours)	Purchase Price	Years to Trade (Years)
13' Cultipacker	2,500	8,300	10
13' Grain Drill	1,500	30,300	10
160 HP Tractor	12,000	130,000	12
21 foot Offset Disk	2,000	31,500	10
3/4 ton truck	12,000	36,000	7
62 HP Tractor	12,000	55,000	12
62 HP Tractor #2	12,000	55,000	12
Bale Wagon	2,000	149,000	10
Baler Pull Type #1	2,000	66,000	10
Baler Pull Type #2	2,000	66,000	10
Border Disk*	2,500	2,250	20
Grain Drill 20'	2,500	125,000	10
Hay Squeeze	2,000	40,000	10
Plow 4 Bottom Rollover	1,500	16,500	15
Rake - 20' Center	2,500	21,000	10

Table G1-4. Representative Farm Machinery (contd.)

Equipment	Useful Life (Hours)	Purchase Price	Years to Trade (Years)
Subsoiler 5 Shank 10'	2,000	15,250	10
Swather - SP Rotary 16'	3,000	102,000	10
Tandem Disk	2,000	1,700	15

Source: University of Idaho, 2011. The Costs of Owning and Operating Farm Machinery in the Pacific Northwest (PNW 346)

Representative Farm Sizes

Several farm sizes were selected to represent the different commercial operations in the Project. District account information was used to identify the range of farm sizes in the Project. Table G1-5 provides a summary of the range and frequency of farm sizes. As shown, a large portion of the Project consists of smaller farms due to urbanization in the Fallon area.

Table G1-5. Project Farm Size Distribution

Size (Acres)	# of Individual Owners	Percent of Total Acres
0 – 10	2,260	9.5%
10 – 50	328	16.1%
50 – 100	80	11.5%
100 – 200	50	14.0%
200 – 300	22	10.9%
300 – 400	13	9.3%
400 – 500	9	8.2%
500 – 600	4	4.3%
600 – 700	2	2.7%
700 – 800	2	2.9%
800 – 900	0	0.0%
900 – 1000	1	2.0%
1000+	2	8.6%

Key:
TCID = Truckee-Carson Irrigation District

For this analysis, the minimum commercial farm size was selected to be 300 acres. Farms below this size were determined to not support full-time employment or provide the net returns necessary to provide family-level income and were therefore categorized as noncommercial farms. As previously described, the payment capacity for noncommercial farms and nonagricultural water right uses is estimated in this analysis as the average estimated payment

capacity for commercial farms. Table G1-6 provides a summary of the commercial farm sizes applied in this analysis for each of the two selected crop rotations.

Table G1-6. Selected Representative Farm Sizes

Representative Farm	Farm Size (Acres)	Crop Rotation	Percent of Total Commercial Farm Acres
1	300	1	20.7%
2	500	1	12.8%
3	700	1	16.6%
4	300	2	20.7%
5	500	2	12.8%
6	700	2	16.6%

Estimated Payment Capacity

This section provides the estimated baseline payment capacity for each of the representative farms and aggregates payment capacity to the district level by including payment capacity for noncommercial and nonagricultural water right acres. Table G1-7 provides the estimated payment capacity for each of the six representative farms. As shown, payment capacity ranges from $85 per acre (Rep. Farm 1) for a 300 acre farm producing alfalfa and grain hay in rotation to $231 per acre (Rep. Farm 6) for a 700 acre farm producing alfalfa, grain hay, and corn silage in rotation. The acreage weighted average payment capacity is $167 per acre.

Table G1-7. Estimated Payment Capacity by Representative Farm

Rep. Farm	Crop Acres			$/Acre				
	Alfalfa	Grain Hay	Corn Silage	Gross Revenue	Total Costs	Net Revenue	Return to Equity, Mgt., Labor	Payment Capacity
1	263	38	0	$890	$697	$193	$108	$85
2	438	63	0	$890	$559	$330	$146	$185
3	613	88	0	$890	$512	$378	$151	$227
4	233	33	33	$883	$612	$272	$151	$121
5	389	56	56	$883	$530	$354	$157	$197
6	544	78	78	$883	$492	$392	$160	$231

Key:
Mgt. = Management
Rep. = Representative

Table G1-8 provides the total payment capacity for all of the potentially active water rights in the Project. As shown, the total payment capacity for commercial farms is approximately $2.9 million, $167 per acre on average.

Applying the $167 per acre average to noncommercial farms (less than 200 acres), environmental acres, and municipal and industrial (M&I) acres results in a total estimated payment capacity of $10.5 million for the district.

Table G1-8. Estimated District Payment Capacity

Rep. Farm	Acres	Total Payment Capacity
1	3,618	$308,212
2	2,238	$413,022
3	2,903	$659,139
4	3,618	$437,806
5	2,238	$440,955
6	2,903	$671,769
All Commercial Farms	17,517	$2,930,903
Noncommercial Farms	18,297	$3,061,303
Environmental Acres	23,874	$3,994,469
M&I Acres	3,308	$553,477
District Total	62,996	$10,540,152

Key:
M&I = municipal and industrial
Rep. = Representative

Ability to Pay

TCID's ability to pay is computed as follows:

Ability to Pay = Payment Capacity + Hydropower Revenues + Other Revenues + Nonoperating Revenues – District O&M

Estimation of the district level payment capacity was described in the section above. The following sections address hydropower revenues, district operations and maintenance (O&M) costs, ability to pay.

Hydropower Revenues

TCID earns hydropower revenues through operation of power plants that generate electricity as water is released to satisfy deliveries to water rights in the Carson Division. Electricity produced at the New Lahontan power plant is marketed under contract to Sierra Pacific Power Company. Electricity produced at the 26' Drop and Old Lahontan power plants is marketed under contract to Utah Associated Municipal Power System.

Sierra Pacific Power Company Contract

Electricity sales to Sierra Pacific began in 1989 and, under the existing contract, extend through 2018. The contract specifics a "capacity rate" and an "energy rate" for power produced at the New Lahontan power plant. Both rates vary according the winter and summer months and are fixed over the term of the

contract. Table G1-9 provides the capacity and energy rates reported in the contract.

Table G1-9. Sierra Pacific Power Company Contract Rates

Capacity Rate ($/MWh)		Energy Rate ($/MWh)	
Winter	Summer	Winter	Summer
$18.65	$17.54	$62.49	$62.13

Key:
MWh = megawatt hours

Utah Associated Municipal Power System Contract

Electricity sales to Utah Associated began in 2005 and extend through 2014 under the existing contract. The power rate is increased by 1 percent annually. In addition to the payments for power produced, TCID retains 50 percent of the portfolio energy credits (PEC) which are currently sold to Barrick Gold. Table G1-10 provides a summary of the power rates established by the contract. PEC sales amounted to $31,579 in 2012 according to information provided by the TCID.

Table G1-10. Sierra Pacific Power Company Contract Rates

Year	Rate ($/MWh)
2005	$45.00
2006	$45.45
2007	$45.90
2008	$46.36
2009	$46.83
2010	$47.30
2011	$47.77
2012	$48.25
2013	$48.73
2014	$49.22

Key:
MWh = megawatt hours

Power Generation and Revenues

Electricity at the plants is produced primarily during the irrigation season (April through October) as water is released from Lahontan Reservoir to satisfy irrigation and other demands. Table G1-11 provides a summary of power revenues from the facilities for the 2007 through 2011 period. As shown, average total power revenues were approximately $1.3 million over the period.

Table G1-11. District Power Revenues, 2007 – 2011

Year	Power Revenues ($)
2007	$1,599,314
2008	$1,115,618
2009	$969,009
2010	$1,246,341
2011	$1,599,130
Average	$1,305,882

Source: TCID Financial Statements, 2007 – 2011

District O&M and Nonoperating Revenues

District O&M costs reflect the costs that TCID incurs in distributing water and operating the power plants. In this Study, financial statements from the most recent five-year period are used to estimate district O&M. Table G1-12 provides a summary of TCID's reported income statements for 2007 through 2011 and the values applied to the baseline ATP estimate. As shown, total revenues have generally increased over the period, primarily as a result of increased O&M assessment fees. Before 2008, the assessment fee had remained fixed at $33.90 per acre for a number of years. In 2008, the fee was raised to $38.70 per acre. The assessment fee was further increased in 2009 and 2010 to $46.40 per acre and $48.90 per acre, respectively, in addition to an administrative fee and minimum charge per account. Despite the increase in assessment revenues, operating income has remained negative due, in part, to O&M expenses for irrigation and drainage services that greatly exceed assessment revenues. While hydropower revenues have been able to make up some of the difference, nonoperating revenues such as interest income from lease of TCID's electric business (excluding hydropower facilities) to Sierra Pacific Power Company. The lease currently provides the district with more than $1 million in annual revenues. TCID experienced negative net revenues in 2008 through 2010 primarily as a result of high administrative expenses associated with ongoing litigation.

The five-year average hydropower revenues ($1,305,882) were applied to the baseline ATP estimate. As shown, no O&M revenues are included in the ATP estimate. The payment capacity estimate is used in the ATP to identify the charges that can be assessed to irrigation. The five-year for each expense category is applied to the ATP estimate. The most current reported interest income from the electric facilities lease to Sierra Pacific was used to account for the annual payment increases per the contract. Due to the sporadic nature of the other non-operating revenue categories, the five-year minimum from land and equipment rentals was applied to ATP. Other non-operating revenue categories were excluded from the analysis.

Table G1-12. TCID Income Statement Summary, 2007 – 2011

	2007	2008	2009	2010	2011	Ability to Pay
Revenues						
Total Hydro	$1,599,314	$1,115,618	$969,009	$1,246,341	$1,599,130	$1,305,882
Total O&M	$2,632,752	$2,506,480	$3,460,571	$3,788,405	$4,007,526	
Subsection (i) revenue credits	$37,500	$37,500	$37,500	$37,500	$37,500	$0
Other	$432,303	$233,779	$453,521	$274,036	$295,968	$337,921
Total	**$4,701,869**	**$3,893,377**	**$4,920,601**	**$5,346,282**	**$5,940,124**	
Expenses						
Total Hydro	$458,024	$397,274	$349,053	$388,449	$399,552	$398,470
O&M Admin	$3,452,324	$2,112,681	$4,534,727	$4,497,000	$3,079,647	$3,535,276
O&M Irrigation	$1,975,909	$3,804,120	$2,691,113	$1,975,268	$2,617,303	$2,612,743
Other	$99,726	$94,348	$98,475	$82,684	$53,333	$85,713
Total	**$5,985,983**	**$6,408,423**	**$7,673,368**	**$6,943,401**	**$6,149,835**	
Operating Income (Loss)	**-$1,284,114**	**-$2,515,046**	**-$2,752,767**	**-$1,597,119**	**-$209,711**	
Non Operating Revenues (Expenses)						
Interest Income	$968,442	$981,732	$919,409	$995,206	$1,002,574	$1,002,574
Interest Expense	-$64	$0	$0	$0	$0	$0
AB380 Fees	$622,794	$107,988	$0	$0	$0	$0
Land and Equipment Sales	$18,900	$513,850	$12,532	$55,545	$37,329	$12,532
Water Right Sales	$157,444	$20,680	$0	$0	$0	$0
Other	$402,254	$38,840	$0	$0	$0	$0
Total	**$2,169,770**	**$1,663,090**	**$931,941**	**$1,050,751**	**$1,039,903**	
Net Revenue	**$885,656**	**-$851,956**	**-$1,820,826**	**-$546,368**	**$830,192**	

Source: TCID Financial Statements, 2007 – 2011.

Estimated Ability to Pay

Table G1-13 provides the baseline ability to pay estimate. As shown, income categories include the estimated payment capacity, hydropower revenue, other operating revenue, interest revenue, and non-operating revenue. Total income applied in the analysis is $13.1 million. Expenses include operating expenses, administrative expenses, and Reclamation contract payments. Total expenses are approximately $6.7 million. The estimated district-level ability to pay is approximately $6.5 million, or $104 per potentially active water right acre.

Table G1-13. Estimated Ability to Pay

Income	
Total Payment Capacity	$10,540,152
Hydropower Revenue	$1,247,196
Other Revenue	$337,921
Interest Revenue	$1,002,574
Other Nonoperating Revenue	$12,532
Total Income	$13,140,375
O&M and Obligations	
Operating Expenses	$3,096,926
Administrative Expenses	$3,535,276
Reclamation Contract Payments	$24,000
Total Expenses	$6,656,202
Ability to Pay ($)	**$6,484,173**

Key:
O&M = operations and maintenance
Reclamation = U.S. Department of the Interior, Bureau of Reclamation

Alternatives Analysis

The alternatives evaluated in this Study affect the total water supply to the Project. As a result, the alternatives may result in changes in ability to pay through changes in payment capacity and hydropower revenues. This Study evaluates seven alternatives relative to a Without-Action Alternative. Table G1-14 provides a summary of the average water supply for each of the alternatives and the average annual percent of water right demand that is satisfied. As shown, the average annual delivery under the Without-Action alternatives is 177,077 acre-feet, which is below the average annual deliveries under the alternatives.

Table G1-14. Average Water Supply by Alternative

Alternative	Average Deliveries (AF)	% of Demand
Without-Action	177,077	90.5%
600	188,778	96.5%
350.a	186,869	95.6%
350.b	190,275	97.3%
350.d	188,250	96.3%
250.a	182,204	95.7%
250.b	188,220	96.2%
250.d	184,963	95.5%

Key:
AF = acre-feet

Crop Yield Adjustments

Due to the estimated reduction in average water deliveries relative to historic deliveries, it is reasonable to expect that average crop yields may decline. This is particularly true for alfalfa which has relatively high water requirements and a long growing season. To account for the changes in water deliveries, the alfalfa yield was adjusted for each of the alternatives. For this Study, alfalfa yields were adjusted proportionally based on the average water supply available from the alternatives relative to average historic water deliveries. According to water supply modeling, the average historic delivery is approximately 94.6 percent of demand within the project. As shown in the table above, the Without-Action alternative has an average reliability of 90.5 percent, or 4.1 percent below the historic average. For this Study, the alfalfa yield applied in the Without-Action alternative is therefore 6.28 tons per acre (6.28 tons per acre = 6.5 tons per acre x 90.5/94.6). Table G1-15 provides the adjusted alfalfa yield applied to each alternative.[3]

[3] As an alternative, it would be possible to assume that farms idle acres in order to maintain full water supply to the remaining acres. Due to the relatively small changes in water deliveries and the irrigation system applied (border check), the assumption of invariant acres in production is considered to be the most appropriate.

Table G1-15. Average Water Supply by Alternative

Alternative	Alfalfa Yield (tons/acre)
Without-Action	6.22
600	6.63
350.a	6.57
350.b	6.68
350.d	6.61
250.a	6.58
250.b	6.61
250.d	6.56

Hydropower Production

Changes in water deliveries associated with the alternatives results in changes in hydropower production at TCID's power plants. Table G1-16 provides the estimates of the average annual total hydropower production and revenues. Hydropower revenues were estimated by applying current contract prices to monthly power production estimates for each alternative. As a result, differences between summer and winter power prices were captured in the analysis.

Table G1-16. Annual Hydropower Production and Revenue

Alternative	Production (MWh)	Revenue ($)
Without-Action	18,467	$1,192,887
600	21,147	$1,372,553
350.a	20,510	$1,329,295
350.b	19,510	$1,270,851
350.d	20,928	$1,357,522
250.a	19,787	$1,281,736
250.b	18,972	$1,234,421
250.d	20,219	$1,310,090

Key:
MWh = megawatt hours

Ability to Pay

The section incorporates the estimated crop yield and hydropower production changes into the ability to pay estimate. As shown, the estimated ability to pay for the Without-Action Alternative is approximately $5.0 million. Ability to pay estimates for the seven alternatives range from $6.9 to $7.4 million. District operating and administrative expenses are assumed to not vary across the alternatives. This may bias the results either positively or negatively. However, it was not possible with available information to objectively adjust the cost categories.

Table G1-17. Estimated Ability to Pay by Alternative

Income	Without-Action	600	350.a	350.b	350.d	250.a	250.b	250.d
Total Payment Capacity	$9,110,675	$11,198,513	$10,893,846	$11,453,474	$11,097,651	$10,946,272	$11,097,651	$10,843,352
Hydropower Revenue	$1,192,887	$1,372,553	$1,329,295	$1,270,851	$1,357,522	$1,281,736	$1,234,421	$1,310,090
Other Revenue	$337,921	$337,921	$337,921	$337,921	$337,921	$337,921	$337,921	$337,921
Interest Revenue	$1,002,574	$1,002,574	$1,002,574	$1,002,574	$1,002,574	$1,002,574	$1,002,574	$1,002,574
Other Nonoperating Revenue	$12,532	$12,532	$12,532	$12,532	$12,532	$12,532	$12,532	$12,532
Total Income	$11,656,590	$13,924,094	$13,576,169	$14,077,352	$13,808,200	$13,581,035	$13,685,099	$13,506,469
O&M and Obligations								
Operating Expenses	$3,096,926	$3,096,926	$3,096,926	$3,096,926	$3,096,926	$3,096,926	$3,096,926	$3,096,926
Administrative Expenses	$3,535,276	$3,535,276	$3,535,276	$3,535,276	$3,535,276	$3,535,276	$3,535,276	$3,535,276
BOR Contract Payments	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000
Total Expenses	$6,656,202	$6,656,202	$6,656,202	$6,656,202	$6,656,202	$6,656,202	$6,656,202	$6,656,202
Ability to Pay ($)	**$5,000,388**	**$7,267,892**	**$6,919,967**	**$7,421,150**	**$7,151,998**	**$6,924,833**	**$7,028,897**	**$6,850,267**

Appendix G2
Preliminary Benefits Estimation

Newlands Project Planning Study
Special Report

Prepared by

Bureau of Reclamation
Mid-Pacific Region
Lahontan Basin Area Office

U.S. Department of the Interior
Bureau of Reclamation

April 2013

Contents

Tables

Figures

Abbreviations and Acronyms

NED	national economic development
P&G	*Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*
TCID	Truckee-Carson Irrigation District
USFWS	U.S. Fish and Wildlife Service

This page left blank intentionally.

Appendix G2– Preliminary Benefits Estimation

This appendix provides a brief description of the methods and information to develop preliminary benefits estimates for the various water use categories addressed in the Newlands Special Study (Study). The approach and estimated benefit value (expressed in dollars per acre-foot) for each of the water use categories is briefly addressed below. The economic analysis presented addresses the potential benefits that may be provided by Study alternatives.

Benefit Accounts

Reclamation derives guidance for water resource project planning and evaluation from the P&G (WRC, 1983). Since their approval in 1983, the P&G have outlined acceptable means for measuring the monetary and nonmonetary effects of Federal water resources projects. The P&G established four accounts to facilitate evaluation and display of alternative water resources plans:

- **National Economic Development (NED)** – Effects on the national economy, expressed in monetary units. NED benefits are the increase in the value of national output of goods and services expressed in dollars. NED figures measure benefits to the Nation, rather than to a particular region.

- **Regional Economic Development** – Regional incidence of economic effects, income transfers, and employment.

- **Environmental Quality** – Effects on ecological, cultural, and aesthetic attributes of significant natural and cultural resources that cannot be measured in monetary terms.

- **Other Social Effects** – Urban and community impacts and effects on life, health, and safety.

Economic Valuation Methods

Economic valuation methods generally fall into one of two categories: market valuation or nonmarket valuation. Market values refer to conditions for which a price can be observed, such as for human consumptive uses. Nonmarket valuation methods usually apply to resources for which there is no established market to observe values, such as ecosystem restoration or wildlife conservation. In general, the P&G recommend that the value of goods and services be measured according to willingness to pay as a measure of demand. However, demand functions cannot be practically estimated for many goods and

services because a lack of market data. In lieu of demand function estimation, the P&G recommend the use of actual or simulated market prices, where available, because they represent a close approximation of total value. As recommended in the P&G, economic benefits may be determined by one of five valuation approaches:

- Willingness to pay
- Actual or simulated market prices
- Change in net income
- Cost of the most likely alternative
- Administratively established values

Each of the valuation approaches is briefly described below.

Willingness to Pay Method

The user-value, or willingness to pay, method refers to the value of the resource to the consumer. Willingness to pay refers to the value that a "seller" would obtain if able to charge each individual user a price that captures the full value to the user. Implementation of this approach requires estimation of a demand curve. Three methods are commonly used to estimate a demand curve. The methods include revealed preferences, which rely on market-based data; contingent valuation, which uses surveys to directly elicit consumer benefits; and benefits transfer, which uses estimates from previously completed studies. A well-designed contingent valuation survey represents one possible method to measure willingness to pay in a developing market. However, many economists question the hypothetical nature of the contingent valuation method and prefer measuring revealed preferences when the data are available. Further, conducting a primary revealed preference or contingent valuation study is often prohibitively time-consuming and expensive. Therefore, values from previous economic studies may be used to estimate willingness to pay provided they are relevant to the study area and output being valued.

Actual or Simulated Market Prices Method

In cases when a demand curve cannot be directly estimated, market prices may be used to estimate society's willingness to pay for a good or service. The P&G provide some limited guidance on the use of market prices when the output of the plan is expected to have a significant effect on market price. Prices should be expressed in real terms (inflation adjusted). Real prices should be adjusted, where possible, throughout the planning period to account for expected changes in demand and supply conditions.

Change in Net Income Method

When willingness to pay and market price methods cannot be implemented, the P&G allow estimation of the change in net income to producers associated with a project to obtain an estimate of total value. This method is most frequently applied to circumstances when water supply from the project will be used as an input in a production process model, which measures the change in net income to agricultural producers associated with changes in water supply conditions.

Cost of the Most Likely Alternative Method

In situations when water supply alternatives to a proposed project exist, the cost of the most likely alternative to obtain the same level of output can be used as a proxy measure of NED benefits. It is important to consider alternatives that would realistically be implemented in the absence of the proposed project and to make sure that all alternatives provide a similar level of output. This method is generally considered for benefit categories that cannot be estimated through the market-based methods described above. The cost of the most likely alternative method identifies the cost of obtaining or developing the next unit of a resource to meet a particular objective. The net benefit is estimated by subtracting the cost of developing the potential project from the cost of the alternative unit. For example, for water supply reliability, the cost of the most likely alternative represents the next unit of water supply the water user would purchase or develop if the potential project were not in place. This method assumes that if the preferred alternative is not implemented, the alternative action most likely to take place provides a relevant comparison. If the preferred alternative provides the same output as the most likely alternative at a lower cost, the net benefit of the preferred alternative is equal to the difference in the project costs.

Administratively Established Values

Administratively established values are representative values for specific goods and services that are cooperatively established by the water resources agencies. This method is the least preferred approach to estimating economic benefits identified in the P&G and is only implemented when other options cannot be completed.

Recommended Valuation Approaches

This section describes the recommended methods to value economic benefits associated with the Study alternatives: Project agriculture, Project wetlands/environmental uses, Project M&I uses.

Project Agriculture Uses

To assess the financial condition of Truckee-Carson Irrigation District (TCID), a payment capacity analysis was developed for a representative set of commercial farms (larger than 200 acres). The payment capacity analysis is intended to estimate the financial ability of farms to absorb additional water supply and management costs. In this analysis, the estimated payment capacity

is applied as a preliminary measure of the agricultural benefits of the alternatives. The benefits to noncommercial farms are estimated as the weighted average benefits estimated for commercial farms. This is consistent with the procedures applied in the payment capacity analysis. Table G2-1 provides a summary of the estimated preliminary benefits for Truckee and Carson Division agriculture (both commercial and noncommercial).

Table G2-1. Summary of Preliminary Agricultural Benefits

Alternative	Commercial Farms	Noncommercial Farms	Agricultural Payment Capacity	Estimated Benefits
Without-Action	$2,500,000	$2,600,000	$5,200,000	
600	$3,100,000	$3,300,000	$6,400,000	$1,200,000
350.a	$3,000,000	$3,200,000	$6,200,000	$1,000,000
350.b	$3,200,000	$3,300,000	$6,500,000	$1,300,000
350.d	$3,100,000	$3,200,000	$6,300,000	$1,100,000
250.a	$3,000,000	$3,200,000	$6,200,000	$1,000,000
250.b	$3,100,000	$3,200,000	$6,300,000	$1,100,000
250.d	$3,000,000	$3,100,000	$6,200,000	$1,000,000

Note:
Benefits estimated based on payment capacity analysis described in Appendix G1.

Project Wetlands/Environmental Uses

There are a number of methods available to estimate the NED benefits associated with changes in water supply for environmental uses. Where available, willingness-to-pay estimates from survey-based approaches (e.g., contingent valuation method) can be applied to estimate benefits. In addition, indirect valuation approaches that use revealed behavior such as recreation visitation and expenses can be used to estimate the use value components of environmental water supplies. Implementation of these approaches is beyond the scope of this analysis. Instead, this analysis considers the costs associated with developing alternative sources of environmental water supply to support wetland functions in the Carson Division. The U.S. Fish and Wildlife Service (USFWS) has been purchasing water rights from willing agricultural sellers for many years to augment water supplies to wetlands. Changes in water supply associated with the Study alternatives may result in a corresponding increase or reduction in water right acquisition volume to achieve wetland water supply goals. As a result, the costs associated with the water right purchases are used in this analysis as a preliminary indication of the NED benefits.

Figure G2-1 summarizes identified water right transaction activity within the Carson Division since 2003. As shown, average prices have increased from approximately $500 per acre-foot in 2003 to $1,500 per acre-foot in 2012.[1]

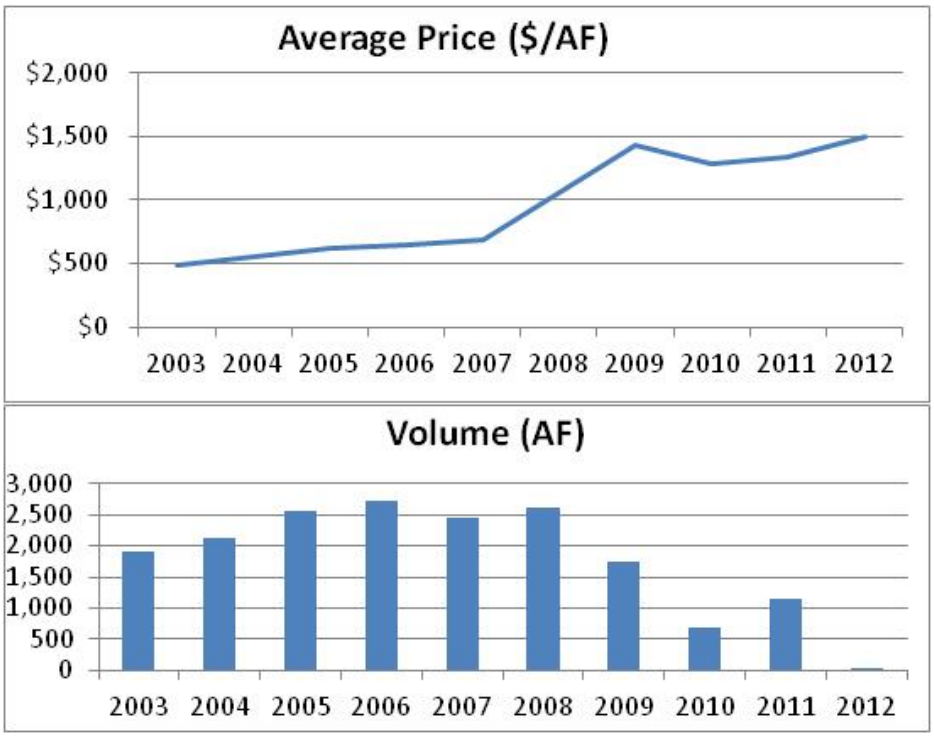

Figure G2-1. Carson Division Market Overview, 2003 – 2012

According to information provided by USFWS (Richard Grimes, personal communication, July 26, 2012), the current price for water rights (sold separately from land) established by the appraisal is $5,250 per acre. Assuming a transferable volume of 2.99 Acre-foot per acre to wetlands, this is equivalent to a unit price of $1,756 per acre-foot, or a value of $81.74 per acre-foot, per year using a 50 year term and a 4 percent discount rate. This value is applied to estimate the NED benefits associated with changes in water supply for wetland uses within the Carson Division.

Project M&I Uses

The P&G recommend the use of the "cost of most likely alternative" approach to estimate the municipal and industrial (M&I) benefits associated with changes in water supply. Other willingness-to-pay approaches may also be applied. This analysis applies observed water right market prices within the Truckee and Carson divisions to estimate M&I NED benefits. This approach is consistent with the "cost of the most likely alternative" approach as agricultural water

[1] Prices are estimated according to the allowed diversion volume for the acquired water rights. Average prices are based upon transactions involving water rights only – land and water right transactions were excluded.

rights are commonly acquired municipal water providers and real estate developers for M&I uses.

Appendix D8 provided a summary of the water right market activity and prices in the Truckee Division. The unit value established in the Truckee Division analysis was $4,000 to $6,000 per acre-foot. This unit value is applied in this analysis to estimate the NED benefits associated with changes in M&I water supply in the Truckee Division (Fernley). This is equivalent to an annual value of $186 to $279 per acre-foot using a 50-year term and a 4 percent discount rate.

The above section provided a summary of water right market activity in the Carson Division. The reported prices are considered to be relevant to M&I water uses within the Carson Division. As a result, the estimated NED benefits associated with changes in M&I water supply in the Carson Division (e.g., Fallon) is $5,250 per acre. Assuming a transferable volume of 3.5 Acre-foot per acre, this is equivalent to a unit price of $1,500 per acre-foot, or $69.83 per acre-foot, per year using a 50-year term and a 4 percent discount rate.