Opinion on Potential Centennial Project Costs and Revenues

Executive Summary.

This financial investigation of potential costs and revenues was undertaken because to date there is no full cost estimate for the project. The opinion paper is sponsored by the Bear River Awakening (www.bearriver.us), a project of the American River Watershed Institute (www.arwi.us). Otis Wollan is the principal author of the opinion paper, with input and feedback from many members of the community, the Foothills Water Network, and the water consulting community.

The study and opinion finds that financial information on the dam project provided by NID is inconsistent, lacking detail, and does not embrace the full potential extent of the project costs. Hence, current cost projections are unrealistically low, and NID's revenue projections are confusing and conflicting. NID has been inconsistent in statements of the need for and purpose of the project. All project purposes and operations may not be compatible. The financial viability of the project must be analyzed for each proposed project purpose or combination of purposes. In the case of Centennial, stated project purposes include hydropower generation, water supply for Lincoln growth, flood control, out-of-District water sales, protection from the impacts of Climate Change, operational flexibility, Delta ecosystem services, and recreation.

This full-cost analysis shows that project costs may reach or exceed one billion dollars, over three times NID's most recent project cost estimate posted on the website, and over seven times NID's total project cost estimate of $160 million from just two years ago. An overview of revenue potential shows that NID has few revenue sources except its tax and ratepayer base and perhaps hydroelectric sales. Tax and ratepayers are ultimately responsible for project debt. The opinion paper profiles NID's current operating budgets and assesses the potential impact to ratepayers and the community.

Methods and sources include cross referencing NID reports and documents, public statements and budgets. Interviews with industry and stakeholder experts were conducted and cross referenced between sources. Industry standard line items were identified from NID reports and literature about similar projects.

The purpose of releasing this opinion paper is to demonstrate the need for a complete itemized cost and revenue analysis for the project life-cycle so tax and ratepayers and decision makers know how much the project will cost over time, how it will be paid for and specifically who will

benefit. Conducting a high level full cost and revenue estimate will inform NID tax and ratepayers and NID Board and staff decisions about the full financial risk of early project expenditures and actions. Evaluating the full range of alternatives to the project, and the purpose and need for the project is required in both the Environmental Impact Report and Environmental Impact Statement process.

How much will Centennial Dam cost?

NID has been inconsistent to date in its forecasts of project costs. In 2015 when the project was first proposed, NID General Manager Rem Scherzinger stated the total project cost was estimated to be $160 million. In 2016 just weeks before the release of NID's cost study of the four dam options under consideration, Scherzinger stated the costs would not exceed $200 million. The June 2016 cost study showed the costs of just the dam ranged from $260 million to $339 million and the studies identified specific cost items not included in the estimate. In the Fall of 2016, NID released the cost study of replacing the Dog Bar Bridge, which profiled four options ranging from $45-75 million, with the preferred option being $55 million. Thus costs had grown by November 2016 to minimally $325 million. The NID website still states the cost will be between $200-300 million.

In NID's cost estimates, many major cost items are missing, including:

- Numerous cost items noted as missing in NID's own cost estimate documents, including "NID project administration, reservoir clearing, land acquisition, legal, permitting, environmental review studies, and mitigation" (from Addendum, see page 18);
- Mitigation costs for environmental losses of the river and oak woodland canyonlands;
- Mitigation costs for the loss of Native American heritage sites, including village and burial sites;
- Construction costs in 2016 dollars need to be adjusted to 2022 construction start date, which California Water Commission has determined should be estimated at 3.5% per year;
- Cost of bond debt financing is the highest cost item of the project over time. NID does not have reserve funds for the project and issued $30 million in bonds in early 2016 to pay for capital improvements, operations, and Centennial Dam studies and land acquisition. At the end of the spreadsheet, two scenarios are included for the cost of bond debt financing. Scenario 1 uses 4.5% 30-year AAA-rated municipal bond rates. Scenario two uses 5.5% 30-year AAA-rated municipal bond rates.

The following table of the projected costs, uses NID sources and estimates for many of the cost items that have not yet been provided by the District. The table includes a notes page which comments on each line item. The total project cost in 2016 dollars is then projected out to

2022, which is the estimated construction start date using the inflation cost escalator required by the California Water Commission. The project financing scenarios are then calculated based on the inflation adjusted 2022 project costs.

Opinion of Potential Costs of Centennial Reservoir Project		
Project element	***cost***	***notes***
Dam construction costs		from NID OPPC study: http://nidwater.com/wp-content/uploads/2016/07/071916_ENG_Item2.pdf
Dam Construction RCC, Axis 2	$259,203,000	
Coffer dam/diversion works	$500,000	Orange highlighted items are noted in NID's study as "excluded from this OPCC, but should be considered by NID", or "design elements that need to be considered and further developed by NID". Estimates derived from numerous sources (see full Opinion Paper "Notes on Spreadsheet" section).
spillway	1,000,000	
reservoir clearing	750,000	
NID project admin & mgt	1,500,000	
land acquisition	23,000,000	
Hydroelectric Elements		
FERC license	1,500,000	Environmental studies extended to Camp Far West
hydro diversion works	2,000,000	Hydroelectric generation was omitted in NID's latest OPPC study, but has consistently been cited as a revenue source; estimates provided.
hydroelectric facility	50,000,000	
transmission lines	1,000,000	
Dog Bar Bridge Replacement		
new Dog Bar Bridge	54,000,000	preferred option, from NID study
bridge right of way acquisition	2,000,000	estimate, noted missing in NID study
Permits and Reports		
Geotech report	2,000,000	includes need for further studies (from OPPC)
CEQA EIR	2,500,000	HDR consutling contract for CEQA EIR
NEPA EIS	2,500,000	ESA consulting costs through ACE for NEPA EIS
SWRCB water right permit	500,000	application in and paid
SWRCB power permit	500,000	application in, but not paid
Army Corps permitting	500,000	404, 401
Legal	2,500,000	EIR/EIS legal challenges; SWRCB protests/hearing
Mitigations		
Environmental mitigation	50,000,000	2200 acres @$10k/acre with ratio 2:1 & 7 river miles
UAIC cultural mitigation	30,000,000	based on UAIC staff estimate, studies & site losses
Recreation mitigation	2,000,000	replace Placer County Campground + Dog Bar
Growth impact mitigation	2,000,000	project is growth inducing
Traffic impact mitigation	1,000,000	Bridge re-alignment commuter traffic mitigation
Misc: Public relations, media	1,000,000	$300,000 spent in 2016
2016 subtotal	***$492,453,000***	
2017 Subtotal	*$509,688,855*	California Water Commission inflation cost escalator of 3.5%/yr 2016 to 2022, compounded annually.
2018 Subtotal	*$527,527,965*	
2017 Subtotal	*$545,991,444*	
2020 Subtotal	*$565,101,144*	
2021 Subtotal	*$584,879,684*	
Total Cost 2022	**$605,350,473**	
Scenario 1 financing at 4.5%	*$ 498,849,418*	AAA muni bonds 30-yr term interest at 4.5%
Scenario 1 TOTAL COST	***$ 1,104,199,891***	Annual costs $36,806,664
Scenario 2 financing at 5.5%	$ 632,010,353	AAA muni bonds 30-yr term interest at 5.5%
Scenario 2 TOTAL COST	***$ 1,237,360,826***	Annual costs $41,245,356

Notes on the spreadsheet:

Dam Construction RCC, Axis 2	This is the lowest cost, preferred option from the NID cost study, called the Opinion of Projected Construction Cost study (OPCC) see page 18. http://nidwater.com/wp-content/uploads/2016/07/071916_ENG_Item2.pdf
Coffer dam/diversion works	Cofferdams and bypass tunnels are required to protect the dam during construction. A minimal coffer dam has been designed as sufficient for diversion into the bypass tunnel if the Roller Compacted Concrete (RCC) method is used. A minimal cost change is noted here, because it was noted as in the OPPC as needing to be "further developed." If a different construction method is chosen, a substantial earthen dam would be constructed upstream of the damsite. Historically, the cofferdam for the Hell Hole dam on the Middle Fork American overtopped and failed in the 1960's, causing huge cost increases to the project. In 1986, the cofferdam for Auburn Dam overtopped, flooding the construction site.
Spillway	Noted in the OPCC as unaddressed, needing cost estimate, see page 18
Reservoir clearing	Based on $3000/acre, this does not include destruction and removal of 25 homes built in the take zone.
NID project admin & mgt	Noted in the OPCC as unaddressed, needing cost estimate, see page 18
Land acquisition	Costs were developed in collaboration with a real estate agent in the Meadow Vista area familiar with the neighborhoods that would be inundated. Costs estimated at 22 additional houses acquired at average cost of $500,000 and 1200 acre private parcels acquired at $10,000 per acre, plus eminent domain costs. $3-4M already spent.

FERC license	A FERC license will be required for the hydroelectric facility, requiring studies extending to Camp Far West. NID in 2014 described the recently revived Parker Dam Project (originally proposed in 1926) as having hydroelectric generation. In 2015, NID re-branded the project Centennial Reservoir and Power Project (with the odd acronym CRAPP) which also had water and power components as indicated in the project name. In early 2016 with the issuance of the Notice of Preparation for the CEQA Environmental Impact Report (EIR), NID again re-branded the project name to "Centennial Reservoir Project", and in this iteration stripped the plan of its hydroelectric component. CEQA calls this "piecemealing" a project, and it is not legal. The EIR must address the entire project, and if it is planned, it must be addressed. The Centennial Dam would clearly be built to later receive turbines for hydropower. A FERC license will be needed for this project, and is included here estimating the area of study needed to complement NID existing FERC license for the Yuba-Bear project. Attempting to split the project and defer a FERC license at this time is risky for two reasons. First, there would be no guarantee that FERC would grant a license to NID in the future. Becoming licensed is the only sensible way to proceed. Second, attempting to defer the hydropower element risks legal challenge as "piecemealing", with legal costs, and more importantly, implicit project delays. NID has more recently stated that their intention is to not have a hydroelectric component in Centennial Dam at all (no revenues), but to instead add capacity to Rollins. It is not clear if this will require a new license, or a re-negotiation of the existing license for Yuba-Bear facilities.
Hydro diversion works	Noted in the OPCC as unaddressed, needing cost estimate, see page 18
Hydroelectric facility	Noted in the OPCC as unaddressed, needing cost estimate, see page 18. This line item was provided in conversation with a hydro engineer from PG&E's Drum Power system who offered the ball park estimate for the installation of two generators, as described in early NID documents. NID has also recently stated that hydropower capacity might be installed at Rollins either in addition to or instead of at Centennial.
Transmission lines	Noted in the OPCC as unaddressed, needing cost estimate, see page 18
New Dog Bar Bridge and access roads	This cost is taken directly from the NID study's preferred option: http://www.centennialreservoir.org/wp-content/uploads/2015/10/Dog-Bar-Road-Realignment-Study-10-14-16.pdf
Bridge right of way acquisition	Estimate, noted missing in the NID study. NID owns the land on the Nevada County side, but all the land required for access, new roads, and widening for traffic mitigation on the Placer County side needs to be purchased.

Geotech report	Substantial payments have been made already in this ongoing study
CEQA EIR	HDR is the consulting firm for the CEQA Environmental Impact Report
NEPA EIR	ESA is the consulting firm contracted by the Army Corps of Engineers, who are the lead agency for NEPA Environmental Impact Study. NID will pay the consulting contract costs.
SWRCB water rights permit	The application is filed by NID and this fee paid.
SWRCB power permit	The application is filed by NID, but the fee has not been paid.
Army Corps Permitting	This estimates further costs associated with permits
Legal	This is a very low estimate, anticipating eminent domain proceedings, EIR and EIS law suits challenging in court the efficacy of NID's environmental documents, water rights protests and hearings, and possible challenges through the initiative and/or referendum electoral processes.
Environmental mitigation	Mitigation will be required for the loss of riverine and woodland habitat. Los Vaqueros reservoir had mitigation ratio of 12:1, meaning 12 mitigation acres had to be purchased for each acre flooded. The Bear is high quality river habitat, and 2200 acres of high value oak woodlands and mixed oak/conifer forest. A modest 2:1 ratio was used here. Includes 7 miles river frontage both sides, and replacement acreage at a cost of $10,000/acre.
UAIC cultural mitigation	The reservoir would inundate hundreds of Native American cultural sites, including over a dozen village sites and several burial sites. UAIC staff in conversation noted that projects of similar size and scale have cost upwards of $30,000,000 for mitigations, with the required studies taking 3-4 years.
Recreation mitigation	Placer County's Bear River Campground, Bear River Day Use area, and Bear River Group Campgrounds, as well as the Dog Bar area and Ben Taylor area, would all be flooded, and will require recreational mitigations.
Growth impact mitigation	The impacts of growth from the North Auburn area to North Lincoln area will have to be assessed and mitigated.
Traffic impact mitigation	The new bridge will create a major commuter route between GV/Nevada City and Interstate 80 and the Higgins Corner to Interstate 80. These routes will pass schools at Higgins Corner, Weimar Cross Roads, and possibly Meadow Vista, which are already overloaded at school rush hours. This is a direct nexus to the project and will need to be mitigated.

Public relations	NID has already paid a third of a million dollars to a professional public relations firm to promote its project. It is expected that a lot more will need to be spent in the attempt to sell this project to ratepayers and taxpayers.

The spreadsheet addresses two additional cost elements: an inflation cost escalator, and the cost of financing.

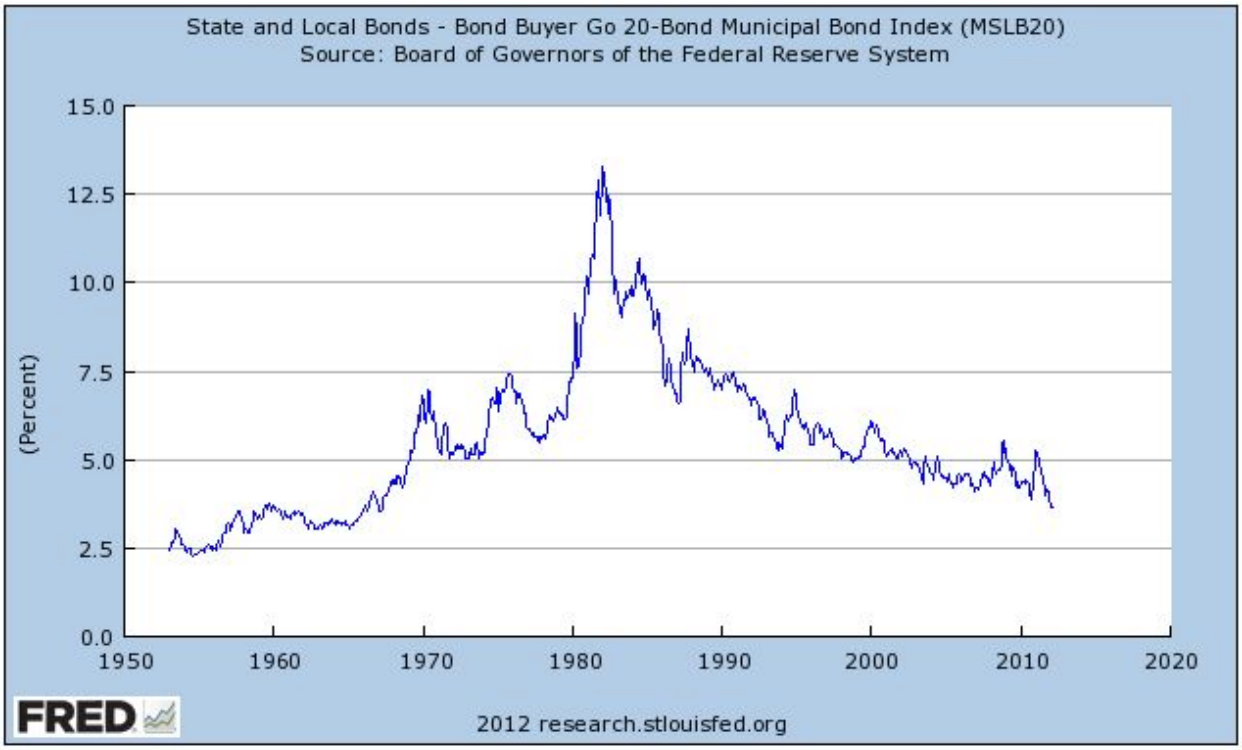
Inflation Cost Escalator. All the estimates, including the NID study costs noted from the OPCC and the Dog Bar Bridge study, are given in 2016 dollars. These costs need to be adjusted to the construction start in order to accurately reflect the project cost. The construction costs inflation escalator determined by the California Water Commission for all of its project applicants, including NID, was used. The rate of inflation for construction projects over the next ten years was determined by the Commission to be 3.5% per year. Construction costs differ from Consumer Price Index inflation, as labor and materials costs in construction have continued to rise even as the CPI hovers closer to zero. The standard is to apply inflation costs as compound costs so an inflation adjustment of 3.5% has been applied to the total for each previous year.

Cost of financing. The cost of financing is the biggest cost of the project. NID acquiring the highest AAA-rated bonds with the most favorable rates was assumed, though that is speculative. The cost of the project was calculated over 30 years, though again that is speculative, as shorter durations of debt are becoming the norm. Two scenarios were generated. Most financial analysts predict interest rates will rise slowly and steadily in the future, with interest rates in 2022 ranging from a low of 4.5% to 5.5%. Scenarios are generated for AAA-rated 30-year municipal bonds; bonds with a lower rating will have higher interest rates. Interest rates are at historic lows not seen since the 1950's. One scenario projects a 4.5% interest rate, which is an average of bonds issued in 2016. It is unlikely that current rates will remain this low into the future. It is unlikely that the rate in 2022 will be this low. The second scenario used 5.5% interest rate. Note that the difference between 4.5% and 5.5% is approximately $125 million. A one point raise in the interest rate has significant impact on the affordability of a project.

NID needs to analyze the cost of financing and make its assumptions clear. What interest rate in 2022 will make the project unaffordable? What duration of the debt instrument, 20-year or 30-year bonds, will make the cash flow demand unaffordable? Twenty year bonds while somewhat less expensive over the shorter course of the loan have significantly higher payments. Ratepayers and taxpayers can relate to these financial discussions, as most have purchased homes with mortgages, and have had to make these decisions of affordability for their own

family. NID needs to be transparent and inclusive of the cost of financing in its cost studies, as ultimately it will be the cost to the ratepayers.

A profile of interest costs for municipal bonds is shown below for a 70-year period. Note that the rates shown in the table are for 20-year bonds, which have a lower interest rate than 30-year bonds. Fifty year bonds are higher still. Scenarios used 30-year bonds after having generated scenarios based on 20-year bonds, on the assumption that the lower annual costs of the 30-year bonds would be more affordable for NID ratepayers.



Interest rates are presently at 70-year lows, and are expected to rise steadily over the next decade, according to financial market professionals. What will be the interest rate in 2022?

Additional cost elements NOT on the spreadsheet

There are several additional project cost elements not included in the spreadsheet. Although these items are very difficult to estimate, they need to be estimated by NID in order to determine the full cost of the project even if the uncertainty is large. These elements are:

- **Cost of making South Sutter Water District (SSWD) whole.** This is a major issue, and underlies why SSWD is protesting the NID water right application before the State Water Resources Control Board. In short, Camp Far West (CFW) reservoir (100,000 acre-feet

capacity is located downstream from the proposed Centennial Reservoir, and currently fills and spills in roughly half the water years. If Centennial (110,000 acre-feet capacity) is built upstream, it is obvious that there will be no Bear River water for Camp Far West (CFW) in half the water years, and CFW relies on Wolf Creek and neighboring creek catchment only, which will not fill the reservoir. NID is claiming it can divert this water, taking it from SSWD, because it has prior water rights based on the proposed 1926 Parker Dam. Making SSWD whole will cost NID a lot of water each year, which needs to be monetized and included in the cost of doing business at Centennial Reservoir. (See the white paper *Case Study: Camp Far West Reservoir Spill as an indicator of water supply availability in the Bear River system for Centennial Reservoir* available at: http://www.savebearriver.com/uploads/4/7/3/8/47384675/otiswollan-parkerdam_campfarwestspills.pdf)

- **Costs of indirect effects.** NID diversion of Camp Far West water threatens to deplete groundwater in the American River Subbasin. Placer County and Placer County Water Agency filed protests to NID's application for water rights for this reason. Camp Far West was constructed in the 1960's to end the overdraught of the groundwater caused by agricultural well production exceeding groundwater recharge rates. By supplying farmers with Camp Far West surface water, sufficient well pumping was retired to stabilize the groundwater levels in the subbasin. The cities of Lincoln and Roseville, as well as many private parcels are supplied by wells. How will NID make the users of the American River Subbasin whole, when their reservoir diversion returns the Subbasin to an overdraft condition? This impact needs to be monetized and included in the NID cost analysis.
- **Unforeseen cost growth.** NID's OPCC cost study noted an additional element: "Potential cost growth during construction due to unexpected changes and unforeseen conditions is also excluded from this OPCC but should be considered in NID's future budget planning for the project." (see quotation from OPCC on page 1865b)
- **Opportunity costs of flood control.** NID listed "flood control" as a project benefit in its application for Proposition 1 funding. If the project has flood control benefits, it will be required to maintain a flood pool, that is, a low reservoir level, in order to capture peak flood flows. Flood control benefits come at the expense of water supply and hydropower. What is the loss of water supply and power supply benefit by the dedication of reservoir space to flood control? NID needs to evaluate the cost of providing flood control and other conflicting benefits in its financial analysis.
- **Total cost of site clearance.** In addition to land clearing of the reservoir site, 25 homes, many of which will have to be seized through eminent domain, will have to be demolished and removed. This presumably includes utilities like septic tanks and leach fields, and potentially toxic materials like former informal garbage dumping areas, buried fuel tanks, etc. The extent of potentially hazardous materials and debris removal needs to be identified in NID's cost analysis.

How will NID pay for Centennial Dam?

NID has not released a revenue plan; their collective comments to date on potential revenue streams are incomplete and inconsistent. NID has stated at various time that it will receive funds from a number of sources: hydro revenue, water sales, state funding from Proposition 1, recreation, "private investors," state revolving loan funds, public funding through bonds, and most recently, federal infrastructure spending. Each of these sources of revenue raise different questions, have different implications, and determine how the reservoir will look and function.

Hydro revenue. While the previous concept plan was named the Centennial Reservoir and Power Project (CRAPP), the current design, rebranded simply Centennial Reservoir does not include hydroelectric generation. NID says it intends to retrofit the dam in the future with hydro power. But for now, not including hydroelectric generations means the dam will have no revenue from hydropower. If retrofitted, the dam would generate two 10 megawatt power generators as described in the CRAPP plan. The future of hydropower is not lucrative, as today it competes with solar power and alternative peaking technology which is growing rapidly as it becomes financially viable, and is eroding the peaking power price potential of hydropower. Twenty megawatts is a small amount of generation, and even if sold at the current market's peak power prices, will pay for only a small fraction of the facility. A more recent proposal would add a 13 megawatt generator to Rollins Reservoir, and would generate peak power, using Centennial Reservoir as the plant's afterbay. However, the market for newly constructed hydro projects has effectively collapsed, with PG&E even stopping progress on facilities that are currently on process. Placer County Water Agency's (PCWA) current five year projection for revenues from their 245 megawatt peaking power facility is not encouraging, noting projections for continued low cost natural gas and growth in solar exceeding expectations by 140%. NID is proposing to enter the hydro market at a very risky time. Hydro revenues will cover only a small part of the billion dollar Centennial Reservoir project, and may not actually break even.

Water sales. NID has historically been vocally very proud of its policy not to sell water outside of the district boundaries. This long standing policy would have to change, which was based on a commitment that the water resources of the Yuba River and Bear River were reserved to serve NID customers, not downstate populations. Even if NID changed its long standing and popular policy, mountain county water sales are intermittent, sold mostly in the driest years during drought conditions to needy South Bay and Southern California water agencies. It is difficult to achieve a continuous and dependable revenue stream through out-of-District water sales. In addition, water sales can inhibit hydropower sales (and vice versa) in that the producer needs to demonstrate that the water in the sale is in addition to the water normally released in hydroelectric production; reserved water can be dedicated to one or the other sources of revenue, but rarely both.

State funding from Proposition 1. NID has applied for state grant monies under three sections of Proposition 1, totaling $150 million. $50 million of that application is for flood control for the Delta under extreme flows, and is a stretch as a legitimate state investment for flood control benefits, as the reserved amount is a very tiny fraction of the huge flood flows into the Delta. The balance of the grant requests have strong stipulations regarding the health of the Delta ecosystem, and even NID board members have said these funds likely have "too many strings attached" to be helpful grants to NID. The funds are highly competitive, with over $12 billion in projects vying for $2.7 billion in funds. This is an example of dam cross-purposes; if NID commits to providing flood control as stated in the CWC application, they will have to operate Centennial with a rule curve defining a flood reservation further reducing the water available to NID customers, or for water sales or hydro production.

State revolving loan funds. NID General Manager Rem Scherzinger has referred to potential funding for Centennial Dam from California State Revolving Funds. There are two State Revolving Funds: the California Water Recycling Fund and the Drinking Water State Revolving Fund. The California Water Recycling Fund is dedicated to wastewater projects, and Centennial Dam does not qualify for funding. The California Drinking Water State Revolving Fund states in its "Policy for Implementing the Drinking Water State Revolving Fund" in Part XI. Construction Financing Section B. Eligible Construction Costs Number 2. Ineligible Costs Item b. "Construction of dams or rehabilitation of dams." DWR staff reported the State Revolving Fund process is very prescriptive, and agencies interested in applying for funding have to be screened and put on an eligible project list before starting the long and detailed process of application. NID is not on the list, nor has NID ever submitted an application. There is no potential funding available to NID through State Revolving Funds, and NID should delete any reference to possible future funding from these sources.

Recreation. NID already loses roughly a quarter of a million dollars yearly in their existing recreation program. And, the NID recreation includes reservoirs like Faucherie with high value camping and Rollins with high quality speed boating. The NID Board has acknowledged that its recreation program is essentially a public service, and reliably loses money every year. Centennial, with its 5 mph boating speed limit (due to erosion on steep canyon sides) and extreme water level fluctuations of up to 130 feet annually, has very limited recreational potential, and no profit potential to help pay down debt. Surrounded by high quality recreational options, few if any will choose to visit Centennial with its draw down "bathtub ring" that will occur during the peak recreation season.

Private investors. The possibility of investors from the private sector has been put forward by NID's management and board. It is unlikely that private funds will be in the form of a loan, as public bond funding traditionally has lower rates over longer time periods than private loan funding. In other words, private loans cost more than public funding mechanisms. So what are these "private investors" investing in? Are they purchasing the water right? Some kind of development rights? Private investment in public utility resources is a very tricky policy area,

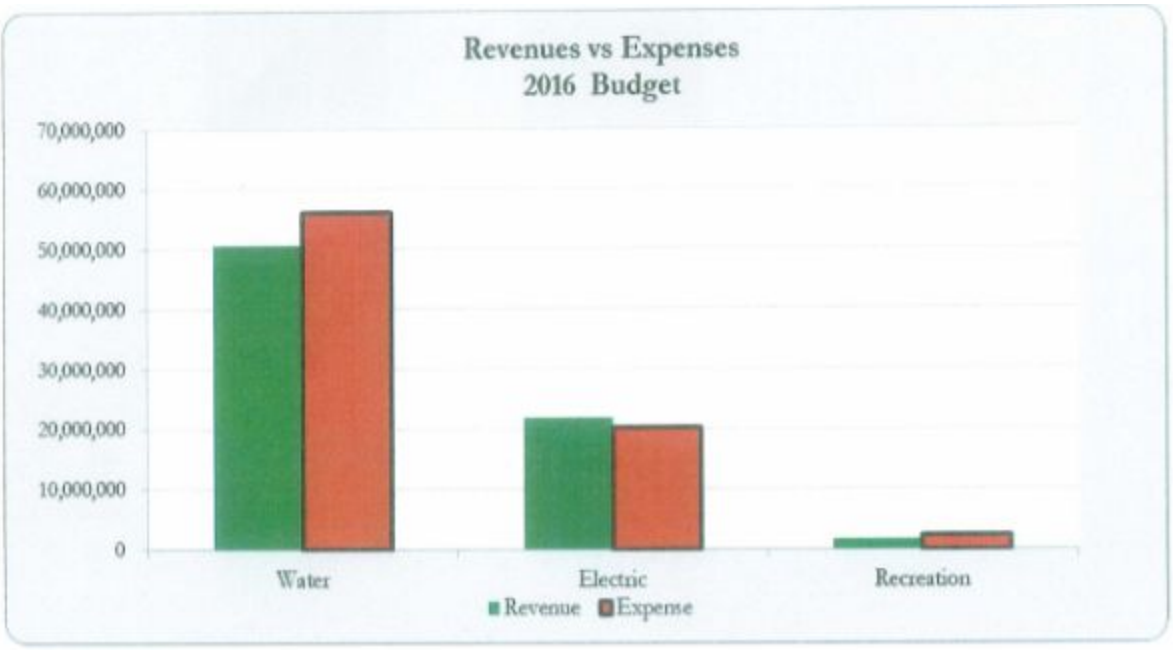
and demands public scrutiny. NID needs to be completely transparent with the public for any possibility of the use of private funding for the public asset of water supply.

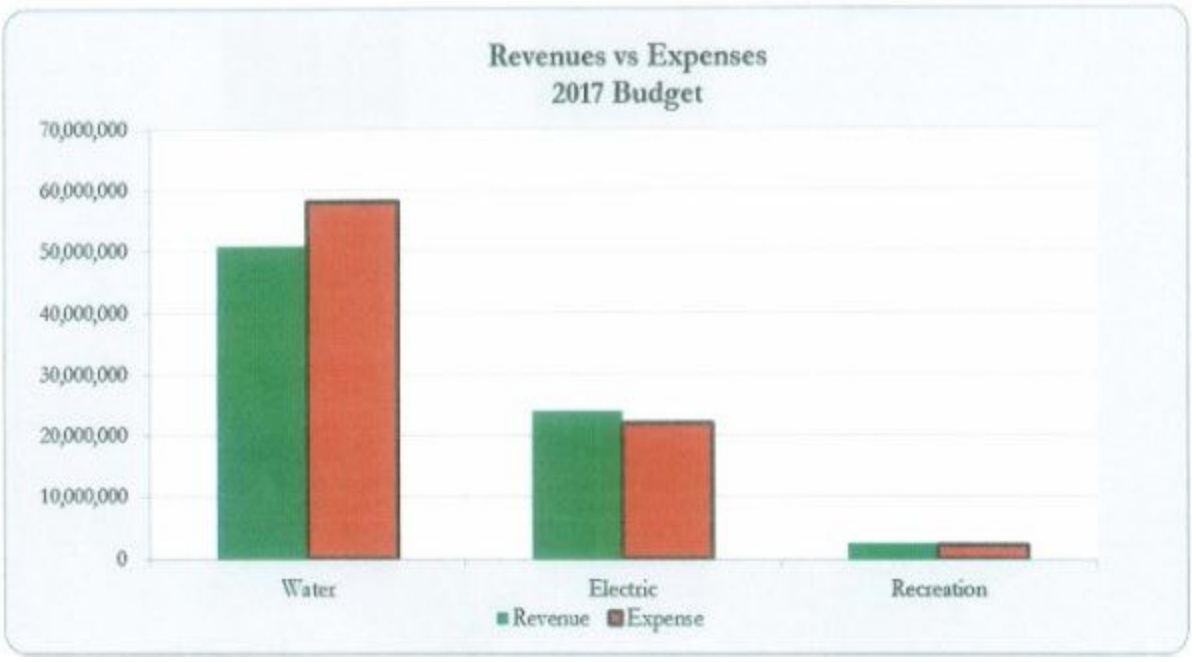
Public funding. Traditionally, large-scale public utilities have used the sale of bonds to fund facility construction. Ultimately, it is the taxpayers and ratepayers who are responsible for the repayment of the debt. Under the sale of public bonds, board members are contractually obligated to raise rates to whatever level is required to retire the debt to the bankers issuing the bonds. How will NID customers repay a billion dollar debt?

Federal Infrastructure funding. Most recently, the idea of federal infrastructure funding is being floated. In the feeding frenzy of the first months of the new administration, it is difficult to assess how realistic this funding avenue is. Beyond the irony of the current majority's about face on infrastructure funding, it is difficult to imagine Washington investing in a climate change project in California. This source of funds is truly a wild card, and only time will tell.

What is affordable for NID?

A short profile of NID's financial condition is useful in evaluating what is affordable for this local utility district. As a public utility district, the budget for NID is quite stable, and simple enough to be understandable. NID has three divisions: water division, power division, and recreation division. A look at the three division budgets over two years shows how predictable these divisions are. Fundamentally, in the water division, there is a known amount of water delivered at minimally fluctuating prices to a stable number of customers who have pretty consistent patterns of consumption. In the power division, there is a known capacity of generation with a long-term stable purchasing contract with PG&E; fluctuations occur when there is drought and capacity is not reached. The recreation division is tiny by comparison at less than $1.5 million, and dependably loses a quarter of a million dollars per year. Here is what two years looks like for the three divisions, from NID's November 9, 2016 Board budget presentation:





Note the stability of the budgets from year to year. In a thumbnail sketch of the three divisions:
Water division hovers at roughly $50 million, and loses $3-6 million every year;
Hydro division hovers at roughly $20 million, and generates $2-4 million per year;
Recreation division reliably loses a quarter of a million dollars each year.
Combined the entire three division operation loses several million dollars each year.
Fortunately for NID, the District has a revenue stream from tax dollars that brings in $10 million per year. Overall, the business is steady, sustainable, and predictable. Drought will reduce water

revenues, as it did in 2015, increasing water division deficit by $3-4 million in one year. Spikes in the price of electricity can generate increased revenues by several million dollars. But over a few years, the push and pull of conditions evens out, with the help of tax revenue.
But, one has to ask, what would the impact of a one billion dollar project with annual additional costs of $35-50 million have on this organization (depending on interest rates and term of debt)? The NID boat currently floats, but with that much new weight on the deck, there is a high risk that the boat will flip and the public enterprise goes upside down. The question of affordability is key to the sustainable future of the organization.

Additional considerations and priorities. NID is facing a much more complicated future than this over-simplified view. NID has a number of very high priority, high cost elements that need consideration before NID engages in an extremely high cost, high risk project like Centennial Reservoir. The list of high priority expenditures for NID include:

- NID has a $300 million capital improvement plan. Study of this program reveals that the capital improvement plan from 2010 looks much the same as the current capital improvement plan. In other words, little progress was made in the past half decade in accomplishing capital improvement goals. The $300 million needs to be firmly built into the overall NID business plan before making decisions on vastly expensive new projects like Centennial Dam.
- NID has an unfunded retirement liability of over $50 million dollars. Addressing the liability of their retired employees has to take priority over new mega-expenditures.
- NID is now taking ownership of the South Yuba flume and canal system from PG&E, which delivers water from Spaulding Reservoir to Scotts Flat Reservoir and provides the water supply for Grass Valley and Nevada City area. This conveyance system has serious levels of deferred maintenance, and serious vulnerability to fire. Up to ten miles of the system needs to be replaced with a tunnel rather than the old flume hanging on the edge of the Bear River Canyon. Replacement tunneling will require tens of millions of dollars, with additional millions of dollars in addressing the deferred maintenance on the rest of the system.
- NID in cooperation with PCWA needs to anticipate PG&E's divestment of the Bear River Canal from Rollins to Western Placer County. Fifty-five percent of NID's water is delivered to Placer County. When PG&E divests this asset (PG&E is currently in the process of acquiring a separate FERC license for this lower section of the Drum Spaulding system to that end) NID and PCWA will need to have the resources to acquire the system. That system is in a state of deferred maintenance as well, and will require millions to repair. Sections of the delivery system should be replaced by tunneling, which would eliminate the most vulnerable sections. PG&E experienced canal failure in 2011 and spent $20 million in emergency repairs to one several hundred foot long section of

canal that failed. In addition to acquisition costs, and replacement tunneling costs, NID and PCWA will need to have reserves of tens of millions of dollars in anticipation of canal failure.

- Thinking in a more strategic way, NID and PCWA should begin to prepare for acquisition of the entire Drum Spaulding system. The PG&E owned system purpose has changed paradigms, and is now critically important for water supply and reliability, rather than electrical generation and profitability. The entire Drum Spaulding system should be in the hands of a Joint Powers Authority (JPA) in an NID/PCWA collaboration. Reserves should be built up for this eventuality.
- NID's water division not so many years ago would consistently lose $5-10 million annually. NID hired a consultant to do a rate study, and the result was a commitment to raise rates 6% per year for five years. The program is almost completed. But from such a circumstance, several conditions likely exist. A system that lost so much money over so many years clearly was under severe financial constraint, and without raising rates, the only way to balance the budget is to defer maintenance. NID should make a thorough study of its deferred maintenance, and commit to making its system safe, reliable, and sustainable first, before committing to expensive new projects. Further, after a series of such high annual rate hikes, the pressure on its customers leaves little room to do more extreme rate hikes for the purpose of generating new revenue. The strong medicine of continual high percentage rate hikes has been administered, and there will be little customer appetite for another round of rate hikes.
- Finally, if NID is serious about addressing climate change, one of the fundamental realizations will be that the cost of doing business will simply be more expensive. Dryer periods will be drier, as we have seen in the past few years. Hotter temperatures will push system operations further toward limits, and under more stressful conditions. Wetter periods will be wetter and more turbulent, as we are seeing this winter of 2016-17. The change from snowpack where soils and facilities are protected by a blanket of snow, to bare earth with torrential rain will cost more to maintain. Culverts and waterbars at current snowpack elevations will be undersized in the future; mass wasting and landslide will be commonplace throughout the watershed. All of this will drive operations costs up.

The affordability of an enormously costly project needs to be done after a planning process that includes long term cost projections of all of these factors, which is a long term analysis that is lacking at NID. The transition from the steadily unfolding, pay-as-you-go past to the upheavals we will experience in the future need to be taken into account. Amid the predictable changes, the uncertainties of climate change bring a level of unpredictability that call for a cautious and frugal approach to the future.

Only after this level of rigorous analysis can NID truly define its actual needs, and its capacities to address those needs. This opinion paper has noted changing purposes for the dam project.

Early descriptions of the need for water for future rapid valley growth have been replaced with claims that existing agricultural water will supply future urban growth. Early descriptions of hydropower production have been dropped. Early descriptions of paying for the project from out-of-District water sales have been curtailed to reflect the long term policy of no out-of-District sale. At times this has looked like a project in search of a purpose. From the ground floor of thoroughly understanding fundamental interests and needs, project options can be defined with clear purpose. And, alternatives to that project can be developed.

Alternatives. Our community is fortunate to be located in one of the most water rich areas in California. Our water systems are robustly developed, with quite literally a million gallons of stored water per customer. The systems are old and inefficient, which provides plenty of opportunity for improvement. On both the supply side and the demand side, there are many ways to attain excellence in the service of delivering ample water to customers. Throughout the past three years, stakeholders have been inquiring whether these many alternatives would not be less costly, and less risky, while not in any way diminishing our quality of life. The federal and state environmental review processes are the appropriate (and legally mandated) time to fully explore these supply and demand side alternatives. The study of the alternatives will require the same rigor as the study of the dam option. And still, there is an additional level of financial analysis that can allow the NID Board and the community to understand the true costs and benefits of all the alternatives.

Maximizing community benefit. Typically our attention is drawn to the scale of the initial investment and revenues that fund solutions to our problems. But it is also important to consider how that money circulates within the community, and how to ensure that the money does not leak out of the local economy, and instead, to have more of it circulate locally. For example, NID has adopted a policy that 20% of the proposed dam project be contracted locally. That means ⅕ of the $500 million construction cost would circulate locally; the other half, the $500 million in financing costs, would export to New York bankers. That means 90% of the billion dollar project would export out of the community.

On the other hand, conservation alternatives are virtually 100% local contractors. Investments in optimizing the existing water system are also close to 100% locally contracted. This approach to economics studies three cycles of money circulation in the community. Local conservation contractors may purchase materials at a locally owned family hardware supply, as we have in this community. Those purchases then go into the wages of the locally employed workers, who then spend their wages at local stores. Often in these local purchase scenarios, half or more of the money is circulated and then recirculated. The end effect is dramatically more economic wealth stays in the community, and is not exported as is done in large scale financed projects. NID, being a local government, should take this next step of studying the extended community benefits for each alternative, in order to truly understand the implications for local wealth from their choices. One tool that has been developed for this kind of analysis is called the “Local

Multiplier 3", from the New Economics Foundation, a U.K. think tank. Information can be found at: http://b.3cdn.net/nefoundation/7c0985cd522f66fb75_o0m6boezu.pdf

Conclusions. The Opinion on Centennial Dam Project Cost and Revenue concludes that an objective and full cost project estimate that includes financing is in the $0.9-1.2 billion range. The study and opinion also concludes that revenue opportunities are limited in large part due to the lack of clarity of purpose for dam operations and disqualifying features of the project.

The purpose of the dam needs to be systematically evaluated. A clear purpose statement meeting clearly defined interests is fundamental in defining and analyzing a proposed project and the broad range of alternatives to the proposed project that may also meet the fundamental interests. The purpose will also determine what the reservoir looks like--- for example, whether it is kept full or drawn down to low water mark on an annual basis. Purposes stated to date include protection from climate change, water supply, hydroelectric generation, out-of-district water sales, water supply for new valley growth, operational flexibility, flood control, recreation, and ecosystem benefits for the Delta. These purposes are often at cross-purposes, with some purposes achieved only at the expense of others.

NID has a host of choices and possibilities and needs to study alternatives and the fundamental interests underlying them. Supply and demand side alternatives include widespread adoption of best management practices to reduce costs, direct system investments to ensure existing infrastructure is sustainable, market incentives to help NID meet its current and projected water demand, and increasing groundwater recharge and wetlands, floodplain, and meadow restoration. Rate modifications should be considered as a component of an alternative to help NID meet its current and projected water demand and water should be priced to cover the full costs of water and to encourage efficiency.

The study and opinion also concludes that NID has a long and expensive list of priorities and needs to address current system conditions and a set of priorities for sensible next steps in its strategic future. The question needs to be asked: does a risky, high cost project like Centennial Dam realistically fit into this future?

About the author. Otis Wollan is President of the American River Watershed Institute (ARWI). He is a former five term Director on the Placer County Water Agency. As Executive Director of Public Officials for Water and Environmental Reform, he was project manager for the California Water Policy Conference for over twenty years. He served many years on the California Urban Water Conservation Council, serving a year as its Chair/Convenor. He was Executive Director of the Committee for Sustainable Agriculture in the 1980's. His private business is Otis Wollan Facilitation, which provides consulting services in facilitation, project management, and organizational development. He has lived in the Bear River watershed for almost fifty years with his wife Jane Mulder, small farming, and raising their three daughters and grandchildren.

Many thanks to the members of our community, the Foothills Water Network, and the many colleagues in the water community over decades for their kind input and feedback on this opinion paper, though the opinions expressed and recommendations are my own.

Addendum

The appended quotation below is taken directly from the NID cost study. These quotations indicate that these cost estimates are still preliminary. In the Network's draft spreadsheet, best estimates were made to complete the cost items specifically mentioned below that were NOT included in the OPCC: "NID project administration, reservoir clearing, land acquisition, legal, permitting, environmental review studies, and mitigation." Our spreadsheet did not attempt to address "potential cost growth during construction due to unexpected changes and unforeseen conditions" which the OPCC recommended that NID consider.

NID Cost Estimates from:July 19, 2016 Memorandum summarizing AECOM consultant study "Centennial Reservoir Project -- Conceptual-Level Opinion of Probable Construction Cost (OPCC)"

Table 6-1. Summary of Comparative Construction Costs

Dam/Axis	OPCC	Relative Cost
RCC Dam (Axis 2)	$259M	1.00
RCC Dam (Axis 6)	$284M	1.10
CFR Dam (Axis 2)	$339M	1.31
CFR Dam (Axis 6)	$325M	1.25

In addition to further development of the dam and foundation designs, other important design elements will need to be considered and further developed as the project is advanced. These design elements, which each significantly affect the overall project cost and schedule, include the following:

- The spillway and outlet works hydraulic designs and reservoir operational requirements.
- Diversion and cofferdam design requirements, including expected operations of Rollins Reservoir during construction. Diversion requirements will depend heavily on the dam type, since an RCC dam can normally withstand overtopping during construction but a CFR dam usually cannot.
- Construction material balance will need to be analyzed and confirmed. Material balance diagrams will need to be prepared for all material sources (on-site and off-site) and destinations within the dam and disposal areas. These analyses will assist in determining required volumes of borrow excavation, material disposal, and stockpile storage, and borrow area yield. The results will support development of a more detailed construction schedule estimate and OPCC.

Allowances are suggested for non-construction project costs including design engineering, construction management, and engineering services during construction. Other expected project costs, which are excluded from this OPCC, but should be considered by NID include NID project administration and management, reservoir clearing, land acquisition, legal, permitting, environmental review studies, and mitigation. Potential cost growth during construction due to unexpected changes and unforeseen conditions is also excluded from this OPCC but should be considered in NID's future budget planning for the project.

The relative OPCC's for the RCC and CFR dams, in 2016 dollars, are summarized below in Table 6-1. As indicated, the RCC dam at either axis has a lower OPCC than the CFR dam. The RCC dam at Axis 2 has the lowest OPCC of the alternatives considered. The CFR dam at Axis 2 has the highest OPCC.

The estimated costs for each alternative should be reviewed and updated as needed based on additional data gathered during the upcoming Phase III geotechnical investigation. Further design and engineering work should be carried out to select a preferred dam type and site and refine the conceptual layout. The OPCC's presented in this technical memorandum are expected to change once the dam foundation and rock borrow conditions are further defined.