
Final Letter Report
Lake Tahoe Wastewater Infrastructure Partnership
Sewer Agency Rate Financial Analysis



**US Army Corps
of Engineers** ®
Sacramento District

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Acronyms and Abbreviations

AMSA	Association of Metropolitan Sewerage Agencies
CIP	Capital Improvement Program
COP	Certificates of Participation
Corps	U.S. Army Corps of Engineers
cu.ft.	cubic feet
DCSID	Douglas County Sewer Improvement District, No. 1
EID	EI Dorado Irrigation District
EIP	Environmental Improvement Program
EPA	Environmental Protection Agency
GID	General Improvement District
G.O.	General Obligation
HDR	HDR Engineering, Inc.
IVGID	Incline Village General Improvement District
NTPUD	North Tahoe Public Utility District
OMR&R	Operation, Maintenance, Repair & Replacement
Partnership	Lake Tahoe Wastewater Partnership
PUD	Public Utilities District
SDCs	system development charges
SNPLMA	Southern Nevada Public Lands Management Act
SRF	State Revolving Fund
STPUD	South Tahoe Public Utility District
TTSA	Tahoe-Truckee Sanitation Agency
w/	with
w/o	without

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1.0 Purpose: This letter report presents results of an analysis of sewer rates within the Lake Tahoe Basin. The report was prepared in conformity with a workplan developed by the Lake Tahoe Wastewater Infrastructure Partnership (Partnership)¹. This report analyzes service rates of wastewater utilities in the Lake Tahoe Basin and compares those rates with other wastewater utilities in the Tahoe area, the western region of the United States as well as the nation. Potential financial and rate setting implications associated with pursuit of an infrastructure capital program is also addressed in this report.

2.0 Background: The Lake Tahoe Basin is implementing a basin wide Environmental Improvement Program (EIP) designed to arrest identified environmental thresholds that is budgeted in excess of \$1.5 billion over a timeframe in excess of 15 years. Projects within the EIP will be executed by a variety of private, non-profit, local, state and Federal agencies. Projects include planning, design, construction, and operation phases. Additionally, these same organizations will be simultaneously executing non-EIP projects in the basin. The Lake Tahoe Basin includes a complex permitting system, multi-agency and overlapping agency jurisdiction, an active public, limited project field execution season, and ultimately, a limited program implementation horizon. Except for one project, this EIP does not address the impact of ageing infrastructure.

The Lake Tahoe Basin Framework Study Wastewater Collection System Overflow/Release Reduction Evaluation (April 2003) concluded that a capital replacement program would be required to efficiently upgrade infrastructure to prevent increased risk of sewer failure. As indicated above, replacement of these lines are largely not included as part of the EIP but could fit under a potential future EIP category of Operation, Maintenance, Repair & Replacement (OMR&R).

¹ Understanding the basis and assumptions of the Workplan is fundamental to the origin of the Lake Tahoe Wastewater Infrastructure Partnership. While this understanding is important, a discussion of the Workplan is not provided in this letter report.

This report addresses the probable financial and rate setting implications associated with infrastructure projects intended to maintain, improve and/or expand upon the systems of the Tahoe Basin wastewater utilities.

The work described in this letter report is authorized under Section 234 of the 1996 Water Resources Development Act, as amended. This authorization provides for interagency coordination in support of civil work efforts in multi-agency environments. Further work is planned under Section 503 of the 1996 Water Resources Development Act, as amended. Section 503 provides for planning and technical assistance for the Lake Tahoe watershed. This process would not have been possible without the contribution from the many members of the public utility districts and management/regulatory communities.

3.0 Methodology: The analysis of the financial and rate impacts of infrastructure projects within the Lake Tahoe Basin was approached systematically based upon professional judgment and guided by overall objectives provided by the U.S. Army Corps of Engineers (Corps). The stated objectives of the analysis included four tasks associated with infrastructure financing for the eight sewer agencies serving the basin. These tasks were as follows:

- Benchmark Tahoe Basin Sewer Agency Rates Against Comparable Sewer Utilities
- Residential Sewer Rates
- Commercial Sewer Rates
- Identify Potential Funding Sources for Infrastructure Projects
- Probable Rate Impacts and Associated Rate Setting Concepts
- Identify/Estimate the Incremental Cost of Effluent Export

This work was performed by Joe McGrath of HDR Engineering, Inc. (HDR) in coordination with the Corps. Mr. McGrath's experience in the utility industry spans over 25 years as a private and public utility employee as well as a consultant to both types of utilities. Mr. McGrath has extensive experience in the areas of utility rates and regulatory proceedings, cost of service analysis, rate design, load research and forecasting as a result of having managed the rate department of a private utility operating in the States of Washington and Oregon for over 10 years prior to joining HDR.

The Tahoe Basin sewer agencies reviewed as a part of this study included:

- South Tahoe Public Utility District (STPUD)
- North Tahoe Public Utility District (NTPUD)
- Incline Village General Improvement District (IVGID)
- Douglas County Sewer Improvement District No. 1 (DCSID)
- Tahoe Douglas District
- Tahoe City Public Utilities District (Tahoe City PUD)
- Kingsbury General Improvement District (Kingsbury GID)
- Round Hill General Improvement District (Round Hill GID)

4.0 Findings: The findings address the stated objectives.

4.1 Benchmark Tahoe Basin Sewer Agency Rates: The first task of the study was to benchmark the eight Tahoe Basin sewer agencies' rates against other comparable sewer utilities. All eight of the Tahoe Basin sewer agencies examined in this analysis are required, for environmental reasons, to export (transport) their wastewater out of the basin. This extraordinary requirement to export wastewater carries a significantly higher cost burden that is evident when comparing the Tahoe Basin utility's prevailing rates with other sewer utilities in nearby areas, as well as the western U.S. and nationally.

4.1.1 Residential Sewer Rates: Current residential rate information is presented from each of the eight Tahoe Basin agencies in Table 1.

Table 1 Tahoe Basin Sewer Utility - Residential Rates		
Utilities	Monthly Rate	Annual Amount
STPUD	\$ 24.99	\$ 299.88
NTPUD ^a	\$ 8.25	\$ 315.00
IVGID	\$ 27.39	\$ 328.68
DCSID	\$ 30.08	\$ 361.00
Tahoe Douglas District	\$ 33.00	\$ 396.00
Tahoe City PUD ^a	\$ 15.85	\$ 406.00

Table 1 Tahoe Basin Sewer Utility - Residential Rates		
Utilities	Monthly Rate	Annual Amount
Kingsbury GID	\$ 36.00	\$ 432.00
Round Hill GID	\$ 42.00	\$ 504.00
Average Rate - Tahoe Basin	\$ 27.20	\$ 380.35
Notes: ^a Includes charge from Tahoe-Truckee Sanitation Agency		

In the case of DCSID, the utility has already planned for and approved, annual increases in the coming years to address projected financial requirements. Those increases will, in turn, affect the future rates of the utilities that they provide treatment and export services to (i.e., Tahoe-Douglas District, Kingsbury and Round Hill GIDs).

The range of rates in Table 1 is rather broad considering all utilities operate in the same general geographic area and have similar waste export requirements. However, each utility's ability to address its financial operating requirements through rates is a function of a number of funding variables and choices. For example, rate levels will be affected by each utility's ability to secure non-rate funding from grants, connection fees, general fund transfers and other revenue, as well as securing a share of local property tax revenue.

As was noted above, past financing and funding sources also have a direct impact on the rate levels for each agency (i.e., certain projects are grant funded or funded with low interest loans), but more importantly, the level of funding for future capital projects and maintaining the existing system infrastructure also has a direct impact upon the rate levels of each utility. The choices that each utility makes with respect to debt versus cash financing of needed capital projects affects rates since cash funding burdens current rates more heavily than the time delay provided from debt financing. Finally, the sheer number of customers served (economies of scale), volume of wastewater processed, service area geography and the unique nature of the system configuration needed to provide the service in that area are just a few of the other variables that can affect a utility's rates.

To place Tahoe Basin sewer rates in perspective, several nearby Tahoe area sewer utility residential rates, as well as western U.S. and national residential averages were obtained. These are summarized below in Table 2.

Table 2		
Sewer Utility Rate Levels		
Utilities	Monthly Rate	Annual Amount
Tahoe Area Utilities		
Indian Hills General Improvement District	\$ 17.60	\$ 211.20
Minden-Gardnerville Sanitation District	\$ 12.00	\$ 144.00
City of Reno	\$ 21.80	\$ 261.60
Carson City	\$ 11.88	\$ 142.56
City of Placerville	\$ 29.64	\$ 355.68
Placer County - Auburn	\$ 54.60	\$ 655.20
Placer County - Granite Bay	\$ 40.50	\$ 486.00
El Dorado Irrigation District - Basic	\$ 23.00	\$ 276.00
El Dorado Irrigation District - Volumetric ^a	\$ 21.50	\$ 258.00
El Dorado Irrigation District - Total		\$ 534.00
Nevada Utilities^b		
City of Las Vegas	\$ 11.57	\$ 138.80
Clark County Sanitation District	\$ 14.31	\$ 171.72
City of Henderson	\$ 15.52	\$ 186.18
California Utilities		
City of Sacramento	\$ 8.78	\$ 105.36
Orange County Sewer District	\$ 10.17	\$ 122.00
Union Sanitary District	\$ 15.92	\$ 191.00
City of Los Angeles	\$ 20.00	\$ 240.00

Table 2 Sewer Utility Rate Levels		
Utilities	Monthly Rate	Annual Amount
Contra Costa Sewer District	\$ 22.50	\$ 270.00
Sacramento County	\$ 13.40	\$ 160.80
City of San Diego	\$ 27.07	\$ 324.84
San Francisco Public Utilities District	\$ 24.92	\$ 299.04
San Bernardino Metropolitan Water District	\$ 14.60	\$ 175.20
Fairfield-Suisun Sewer District	\$ 17.84	\$ 214.08
South Bayside System Authority	\$ 19.57	\$ 234.84
Palo Alto Regional Water Control Plant	\$ 14.00	\$ 168.00
City of Sunnyvale	\$ 16.92	\$ 202.98
National Average^b	\$ 19.38	\$ 232.59
State of California Average^c	\$ 21.50	\$ 258.00
Notes: ^a Assumes a winter monthly water use of 1,250 cu. ft. ^b Association of Metropolitan Sewage Agencies 2002 Financial Survey ^c 2004 Black & Veatch Corp., California Sewer and Water Charge Survey		

These statistics indicate that all residential Tahoe Basin sewer customers pay rates that exceed, and in some cases significantly exceed, a number of Tahoe region utilities, along with selected western U.S. utilities and the national average. The eight Tahoe Basin utilities have the highest rates, despite subsidies such as grants and property taxes that might be available to them to help lower rates.

The table also contains some exceptions to this interpretation. Tahoe area utilities such as the City of Placerville, Placer County Utilities as well as El Dorado Irrigation District (EID) have rates that reflect the impact of new infrastructure projects that are either being developed or plan to be developed in the near future. In these

cases, rates provide a significant portion of the project funding, thereby requiring rates that equal or exceed in some cases, what Tahoe Basin utilities now pay. Since these utilities have small customer bases, the funding need pushes rates up, which is a situation that many Tahoe Basin utilities could experience as well if significant new infrastructure is required.

While local, regional and national comparisons are helpful, it was considered appropriate to this task to also examine rates in a comparable environmentally sensitive area, given the concerns and requirements in the Tahoe Basin. Environmentally sensitive areas generally create a need for more expensive infrastructure investments since there is a greater degree of complexity involved in adequately addressing the conditions that exist in that area. While there are a number of areas that could be examined, the Summit County area of Colorado was selected given some similarity to the Tahoe Basin.

Summit County encompasses about 600 square miles (approximately 385,000 acres) with a 2004 population of approximately 28,000. Within the county, the U.S. Forest Service and Bureau of Land Management manage over 312,000 acres of the White River National Forest. Along the western boundary is the Eagles Nest Wilderness area. There is a State Wildlife area and two large reservoirs: Dillon and Green Mountain, both impoundments of the Blue River as it flows north to the Colorado River. The Continental Divide runs along most of the southern and part of the eastern boundary and the Colorado Trail (a non-motorized use trail) loops across the southern portion of the county.

Breckenridge, the county seat, hosts the Breckenridge Ski Area and its associated resort development. Located in the southeast section is Arapaho Basin and Keystone Ski Areas and in the southwest is Copper Mountain Resort. The largest municipality is Frisco along with the towns of Dillon and Silverthorne.

Sewer utilities in the region are required to provide tertiary treatment to address both high levels of ammonia and phosphorous prior to delivery to the Blue River or to the Dillon Reservoir, a source of drinking water for the City of Denver. While different in many ways to the Tahoe Basin, there are some geographic and development similarities that favor their use for comparison purposes, more importantly, there is a strong commitment to environmental stewardship that is evident in the region.

It should be noted that the Water Quality Control Division of the state's Department of Public Health and Environment is a very proactive agency with respect to prevention and elimination of sewage spills and their detrimental impact on the environment. The agency recently fined Colorado Springs Utilities over \$100,000 for

spills that have occurred since January 2004 and intends to enforce the standards throughout the state to prevent adverse environmental impacts.

The rates for various sewer utilities in this region are shown in Table 3.

Table 3 Summit County, Colorado - Wastewater Utility Rates		
Wastewater Utilities	Monthly Rate	Annual Amount
Frisco Sanitation District	\$ 25.00	\$ 300.00
Breckenridge Sanitation District	\$ 19.00	\$ 228.00
Snake River Sewer District	\$ 36.30	\$ 435.60
City of Dillon	\$ 36.00	\$ 432.00
City of Silverthorne	\$ 30.10	\$ 361.20
Dillon Valley Metro District ^a	\$ 50.00	\$ 600.00
Buffalo Mountain Metro District	\$ 24.00	\$ 288.00
Wilderness Sewer District	\$ 24.00	\$ 288.00
Average Rate - Summit County	\$ 27.77	\$ 333.26
Notes: ^a Includes water and sewer service.		
Source: Personal Communication with utility staff. October 2005.		

Summit County rates are also higher than the national average and are not too far removed from the rates charged in the Tahoe Basin. Discussions with the county utilities indicate that the high level of treatment required before delivery to the Dillon Reservoir and Blue River influence rates considerably. The utilities also indicate they do not have access to property tax funding to the degree that the Tahoe utilities have to underwrite operations and help hold down service rates.

Table 4 provides rate ranges from Tables 1, 2 and 3 to assist in the comparability appraisal.

Table 4 Summary of Surveyed Utilities		
Utilities	2004 Low	2004 High
Tahoe Basin Utilities	\$ 299.88	\$ 504.00
Tahoe Area Utilities	\$ 142.56	\$ 655.20
Summit County Utilities	\$ 228.00	\$ 435.60
Nevada	\$ 138.80	\$ 186.18
California	\$ 105.36	\$ 324.84
Arizona	\$ 144.00	\$ 174.72
Oregon	\$ 110.52	\$ 299.40
Utah	\$ 86.40	\$ 276.96
Source: For NV, CA, AZ, OR, UT: AMSA 2002 Financial Survey		

The cost of exporting wastewater out of the basin is a major factor contributing to higher residential sewer rates in the Tahoe Basin, relative to the list of comparables. For STPUD, the cost to export has been identified in a recent, independent analysis. The analysis indicates that customer rates are approximately 38% higher as a result although because of significant property tax subsidies (approximately 32% of revenue), the true cost of export is somewhat obscured. The implied annual cost in rates to each residential customer to export over this specific system amounts to approximately \$82.50. Given that, if STPUD's rates are reduced by \$82.50, its net effective rate is \$217.38.

DCSID provides export service for Tahoe-Douglas District, Round Hill GID and Kingsbury GID along with exporting its own wastewater. The fees to each utility served are volumetric-based and also include treatment prior to export. DCSID provides these services to each utility, but does not distinguish between the cost of treatment and the cost of export when billing them and cannot readily distinguish them at this time. Further complicating the comparability effort is the fact that some of these utility's rates reflect the impact of revenue subsidies more than others.

Refer to Table 5 below for the estimated rate impact of export costs.

Table 5			
Estimated Rate Impact of Export Costs			
Utilities ^a	Annual Total w/Export	Estimated Export Costs	Annual Total w/o Export
STPUD	\$ 299.88	\$ 82.50	\$ 217.38
IVGID	\$ 328.68	\$ 80.00	\$ 248.68
DCSID	\$ 361.00	\$ 100.00	\$ 261.00
Tahoe Douglas District	\$ 396.00	\$ 113.00	\$ 283.00
Tahoe City PUD	\$ 190.20	\$ 57.00	\$ 133.20
Kingsbury GID	\$ 432.00	\$ 123.50	\$ 308.50
Round Hill GID	\$ 504.00	\$ 144.00	\$ 360.00
Average	\$ 358.82	\$ 100.00	\$ 258.82
Notes: ^a NTPUD is not included in the average.			

Regardless of how these export costs are recovered, they represent a significant portion of each utility's operation. For purposes of this rate comparison, these export costs are estimated to represent nearly 40% of each utility's rate or represent between \$113 and \$144 per residential customer for these utilities.

In the case of NTPUD, its low system rate, without consideration of Tahoe-Truckee Sanitation Agency (TTSA) treatment costs, reflects the impact of property taxes, fund transfers and non-rate related revenues used to underwrite operations (over 80%). NTPUD indicated that roughly one third of its overall operations are export related, but this does not automatically translate into a rate adjustment that can be applied for comparison purposes. Accordingly, NTPUD rates should not be used in the comparison since they are so significantly influenced by funding from non-rate related sources.

Tahoe City PUD's system rates are also influenced by property tax subsidies although not as significantly as NTPUD. TTSA also provides treatment for its customers. In this instance, approximately 30% of Tahoe City PUD's rate is estimated

to be related to export cost, which amount to approximately \$57 per residential customer per year.

Finally, IVGID treats and exports its wastewater at a cost that represents approximately 35% of prevailing service rates. Export only costs are estimated at roughly \$80 per residential customer.

Absent export cost, Tahoe Basin sewer utility rates are far more comparable to the industry survey averages. As the data in Table 5 suggests, the average for all eight utilities is in line with western U.S. and national rates although the range is a bit broader.

After the export costs are excluded, it appears that the rates for the Tahoe Basin utilities would be fairly comparable to several Tahoe area utilities as well. However, it is important to remember that rates can be influenced by a host of variables that do not provide for easy comparability. During development of this task, a number of western region sewer utilities were contacted regarding their rates. Many utilities are similar in size to the Tahoe Basin utilities. Their small size, combined with the significant cost of replacing and upgrading facilities and equipment, create tremendous upward pressure on rates unless alternative funding sources such as grants and property taxes can be accessed.

For the Tahoe Basin utilities in California, efforts to take away local property tax money is a particularly relevant example of funding pressures faced by these specific utilities. The California State Legislative Analyst's Office is proposing that sewer districts fund all of their services through fees and shift their property taxes to the state. The Governor has proposed similar actions that would take local property tax money away from sewer districts and other local governments to help solve the State's budget deficit. While special legislation exists that exempts the Tahoe Basin utilities from such tax shifts, the burden is still on the utilities to protect against such maneuvers. This somewhat precarious funding environment is particularly important to appreciate when these utilities attempt to be more proactive in their efforts to properly maintain their systems in order to minimize/control/prevent leaks or failures within their service area.

4.1.2 Commercial Sewer Rates: The discussion above focused on residential sewer rates because for a large number of utilities, the flat monthly rate form is preferred for this type of customer and provides a certain level of comparison in this instance. Commercial rates, because of the larger volume of water involved, are more likely to have a volumetric component that is more difficult to develop representative comparisons across utilities.

For example, commercial rates can be structured with a flat monthly basic charge

along with a volume component that can stay flat for all volume, decline with greater volume or increase with greater volume. These rates may also assume a base amount of usage included with the monthly basic charge but not in all cases. Large commercial customer rates may also have a capacity component to recover the cost of providing sufficient water handling capacity during peak operations. Finally, contract rates are tailored specifically for certain customers that can provide incentives or are structured for economic benefit, rather than strict cost recovery, given area wide considerations.

The variety of approaches to commercial rate designs can make straightforward, annual bill comparison even more misleading than the residential comparison developed above. As noted in that discussion, rates can be influenced by a host of variables. Compounding those variables with various types of rate structure approaches make commercial rate comparisons far more difficult and even less conclusive than those suggested by the residential statistics developed above.

4.2. Identify Potential Project Funding Sources for Infrastructure Projects: Each of the Tahoe Basin utilities funds its operations through a variety of revenue sources. Direct funding sources consist of items such as user fees (rates), service charges, connection fees, reserves, earnings on investments, charges for miscellaneous services and transfers from other enterprise operations within the jurisdiction. These sources are often augmented by property tax allocations, grants, low interest State loans, long term debt and cash provided from accrual of depreciation expenses.

The mix of funding from these various sources will depend upon the quantity available as well as the choices utility management makes as to how to address agency capital requirements. For example, STPUD operates under the working assumption that roughly 32% of its revenue will be supplied from county property taxes since service and connection charge revenue is insufficient to fund sewer operations. NTPUD, whose service rates are significantly lower than the other agency's, funds its operations with a combination of service charges (18%), property tax revenue (38%) and net transfers from other enterprise funds (39%). In contrast, IVGID operations are funded largely from service and connection fees. A monthly Capital Improvement Program (CIP) fee, contributions, depreciation and a small amount of debt help address capital requirements. Provided below is a brief overview of various forms of potential funding for capital projects.

USER FEES/RATES – The basic building block of capital improvement funding is user fees or rates. Funds can be provided to directly off-set capital projects, or user fees/rates can be used to pay for debt service related to capital projects. A balancing of the use of rates and long-term debt will help to minimize rates over time.

GRANTS - In the past, several agencies have made judicious use of the Environmental Protection Agency (EPA) and other federal agency grants to fund development and repair of wastewater facilities. For example, the replacement of STPUD's export line cost in excess of \$37 million. Roughly 30% was funded from grants provided by the federal government. Given the current Federal deficit, it is doubtful that significant grant funds will be available in the near future or for some time to come. The California State Water Resources Control Board does provide grants and has the Small Community Wastewater Grant Program to fund construction of publicly owned wastewater treatment and collection facilities. The grants are awarded on a need/hardship basis.

REVENUE BONDS – Revenue bonds are a form of long-term financing in which the bonds are backed by the user rates (revenues) of the utility. Revenue bonds often contain debt covenants that require the utility to maintain its rates at a sufficient level to assure repayment of the debt.

STATE REVOLVING FUND/LOW INTEREST LOANS - State Revolving Fund (SRF) loans are low-interest loans made by the State. The terms of the loans are typically for 20 years and the interest rate generally ranges from 2.5% to 3.5%. SRF loan funds are limited, but they are available to help fund projects related to publicly-owned wastewater treatment facilities, local sewers, sewer interceptors, and water reclamation facilities, as well as, nonpoint source pollution control projects. Other agencies have used the availability of grants to secure low interest (under 2%) grant receivable lines of credit from local institutions to help bridge funding needs and advance ongoing infrastructure projects until grant fund receivables arrive.

SYSTEM DEVELOPMENT CHARGES - System development charges (SDCs) or impact fees are a common funding method for "growth related" capital infrastructure. SDCs can be applied directly against growth related capital projects, or applied against growth-related debt service. SDCs can not be used to meet operation and maintenance expenses.

CERTIFICATES OF PARTICIPATION - Several Tahoe agencies have employed Certificates of Participation (COP) at times to secure sufficient long-term funding for capital projects. COP's are sold to investors who rely on the good credit quality of the State that the utility is operating in, rather than secured against tangible assets or revenues from operations. These instruments make large amounts of capital available to the utilities at a point in time. These funds are usually held in reserve and periodically drawn on to address capital improvement projects.

CAPITAL LEASES - Capital leases are another form of long-term funding, similar in some respects to COP's, that agencies can and have availed themselves of as well. Both capital leases and COP's represent a form of long term debt that is different from

General Obligation (G.O.) bonds in that they can help agencies comply with or avoid constitutional debt limitations that arise with the use of G.O. bonds.

GENERAL OBLIGATION BONDS – G.O. bonds are a higher quality form of debt since they are backed by the full faith and credit of the institution issuing them. They provide capital at a lower cost, relative to leases and COP's, but are limited by an agency's overall credit strength and leverage position.

While all of these forms of financing are available to Tahoe Basin utilities, the amount secured by each can be affected by numerous factors, choices and considerations unique to an individual agency. Ultimately, the mix of funds secured by each agency over time can have a significant impact on how infrastructure is developed, maintained and replaced, both today and in the future, as well as the financial burden each agencies customers' will be forced to bear in conducting that activity.

4.3 Probable Rate Impacts and Associated Rate Setting Concepts: Although there are numerous funding options for the Tahoe Basin agencies to consider, gauging their impact on rates is less complicated than it may appear. The reason is that despite the options, the various forms of debt, (loans, bonds, COP's, leases) all carry interest rates that are fairly closely aligned, while the use of grants, reserves, transfers and property taxes all help reduce the potential impact on rates by directly offsetting rate revenue funding requirements.

Accordingly, rates are impacted when the choice is between debt financing, in its various forms, and rate funding. Debt funding, when accessible, delays the immediate impact of large project costs by spreading the burden over the life of the assets whereas rate funding has an immediate and potentially significant impact on customers.

Each of the Tahoe Basin agencies were surveyed about their approach to capital plan funding. The table below summarizes their current position on the use of rate revenue versus other forms in paying for capital projects.

While the responses varied based upon preferences, available options and prior years funding choices, the rate impact between using a form of debt versus rates to fund capital projects can be estimated for each utility using representative assumptions of debt costs (5%/year for 20 years) and the percentage of debt assumed (0%, 50%, 100%) and customer base size.

Table 7 summarizes the estimated rate impacts associated with annually funding \$100,000 of capital improvement costs by each agency's residential class. The annual cost to fund \$100,000 of project costs for each debt to rate mixture does not change but the impact on each agency's residential rate varies significantly because of the number

Table 6 Capital Project Funding Survey Responses						
Utilities ^a	Rate Revenue	Property Taxes	Grants	Reserves	Bonds/Loans	Transfers
NTPUD	No	Yes	Yes	Yes	Yes	Yes
IVGID	Yes	No	Yes	Yes	Yes	Yes
DCSID	Yes	No	Yes	No	No	No
Tahoe City PUD	No	Yes	Yes	Yes	Yes	Yes
Round Hill GID	Yes	No	No	No	No	No

Notes: ^a No response received from STPUD, Tahoe Douglas District and Kingsbury GID.

of residential customers. For an agency such as STPUD, which has 10 times as many residential customers as some of the smaller agencies, the rate impacts under each funding approach can appear modest in comparison to the prevailing residential rate (STPUD's \$8.79 impact on a \$299.88 annual bill is roughly 2.9%). Smaller agency rates can be impacted much more significantly, simply because of the size (or lack thereof) of the residential customer base (Round Hill GID's \$96.15 impact on a \$504.00 annual bill is roughly 17.8%).

The estimated rate impact of the three alternatives displayed in Table 7, or any alternative mix of debt and rate funding, needs to be placed in the proper perspective before conclusions are drawn. The table does not suggest that every \$100,000 of an agencies capital improvement program carries these impacts. Rather, the estimate is based upon the assumption that the portion of the capital improvement budget that is:

- Assigned for recovery from residential customers, and
- Not funded from alternative sources that do not require rate revenue to support it (grants, transfers, property taxes, reserves, depreciation accruals etc.) would have this affect on rates.

Each of the Tahoe Basin agencies, as well as most utilities, provides service to a mix of residential, commercial and industrial customers. Whereas residential wastewater service is typically provided on a flat, per customer fee, as it is by the Tahoe

Table 7				
Estimated Impact of Annual CIP Funding on Tahoe Agency Residential Rates				
Utilities	Current Annual Rate	Per \$100,000 of Capital Project Cost		
		100% Rate Funded	50%-50% Rate & Bond Funded	100% Bond Funded
Financial Revenue Requirement Impact		\$ 100,000	\$ 54,000	\$ 8,000
STUPD	\$ 299.88	\$ 8.79	\$ 4.75	\$ 0.70
NTPUD	\$ 315.00	\$ 29.59	\$ 15.98	\$ 2.37
IVGID	\$ 328.68	\$ 34.19	\$ 18.46	\$ 2.74
DCSID	\$ 361.00	\$ 34.19	\$ 18.46	\$ 2.74
Tahoe Douglas District	\$ 396.00	\$ 83.33	\$ 45.00	\$ 6.67
Tahoe City PUD	\$ 406.20	\$ 21.37	\$ 11.54	\$ 1.71
Kingsbury GID	\$ 432.00	\$ 66.89	\$ 36.12	\$ 5.35
Round Hill GID	\$ 504.00	\$ 96.15	\$ 51.92	\$ 7.69

Basin agencies, commercial and industrial accounts will often be charged both a base fee, which includes a specific amount of volume, as well as a volumetric based charge, for volumes in excess of the base.

Annual cost recovery of both an agency's operating costs, as well as its capital improvement investments, is periodically determined through a comprehensive rate study. The comprehensive rate study will often include a cost of service analysis which determines a classes' annual revenue obligation, based upon measurements of how that class burdens the utility with its service obligations, relative to the other classes.

This is an important aspect of the rate setting process that is often overlooked or underappreciated with regard to its effect on rates and the potential for certain classes to end up subsidizing other classes in the cost recovery effort. The basic intent of a cost

of service analysis is to take a utility's income statement, which identifies its overall annual revenue requirements and develop a separate income statement for each class of service such that, when the income statements are combined, they sum to the original income statement.

The analysis is complex since it requires the utility to both examine how it incurs its costs as well as determine the degree to which the various types of customers are involved in causing those costs to be incurred. To the extent those costs are properly associated with a particular type of customer, the more accurate the rate design can be.

The rate setting process also needs to reflect the dynamics that occur within utility operations over time. How the utility incurs its costs, which classes of service are contributing to those costs and to what degree they will change over time. Changes can occur quickly at times, but the nature of the industry is such that, usually, a cost of service review every three to five years is sufficient to enable rates to track operations appropriately.

With the rate study in hand, the process of final rate development begins. Often this process incorporates other considerations that may not reflect pure cost of service concepts. However, once final rates are established, the amount the residential class is actually asked to annually contribute toward recovery of a particular agency's capital improvement plan that is not already funded from other sources, will have the impact on the agency residential rates indicated in Table 7.

It is important to note that it is in this final stage that the issue of rate-induced, interclass subsidies is likely to be created, either by intent or by consequence. The cost of service analysis identifies the cost to provide service to each class or type of customer. If rates are designed to recover those costs, then each class is being required to pay for its proper share of system operations and equity is achieved.

In a situation where that is not the case, interclass subsidies exist and question the degree to which customers on the system are being treated fairly/equitably from a rates perspective.

When one looks at rate levels themselves, it is impossible to determine whether one type of customer is subsidizing another on a particular system. Only when you know what each customer is required to pay, relative to what is being charged, can the issue of subsidy be appropriately evaluated.

In most situations, the rate design process properly targets the overall revenue needs of the utility but getting to the point where each customer class pays its appropriate share becomes more difficult. The reason for this is that there are other factors, such as the impact that suggested rate changes could have on customers

financially, particularly if the indicated changes are significant, as well as where a class' rate levels are today relative to where the cost of service would suggest they be.

If the suggested rate change is significant, it can often be too difficult to implement with a single rate adjustment. Accordingly, a gradual movement toward cost of service based rates is often adopted. Unfortunately, interclass subsidies can often exist on a system for some time in these situations, particularly when overall rate revenues are sufficient to fund operations for an extended period of time, thereby enabling the utility to avoid changing rates, periodic cost analysis is not conducted and/or where appropriate rate structure/design changes are not pursued.

While there is often concern about how a customer will be affected financially when significant rate changes are contemplated, the impact that such a change will have on a customer's consumption behavior also warrants consideration.

Rates represent the traditional method by which a utility recovers its costs but it is also the key communication device whereby customers are told what their consumption decisions cost the utility to provide. This communication is often referred to as the "price signal" that rates send to consumers. Conceptually, an appropriate price signal indicates to customers the true cost to provide the service. From that point, the consumer's decision on when to consume and how much to consume is motivated by their willingness and ability to pay for those services relative to the cost of acceptable alternatives.

This "rate" situation is no different than evaluating the value of any other purchase decision, be it with respect to the price of groceries, gasoline or clothing etc. except that utility services are often considered so basic a necessity as to preclude much debate about the price and availability of alternatives. This perspective is created in part by the basic construct of the industry where service is often provided in a "monopoly" environment with few apparent alternatives.

In reality, alternatives may be available but they may not be immediately obtainable or have an initial investment hurdle that complicates acquisition. For this reason, utility services are often considered an "inelastic" commodity in that price changes, and sometimes significant price changes, have little impact on consumption because consumers cannot immediately or significantly modify their consumption in reaction to either moderate or significant price/rate changes.

This perspective is supported by utility industry elasticity studies although most have been conducted in the power industry. These studies indicate elasticity coefficients in the 10% to 20% range with residential customers reacting at the lower levels of the range, industrial customers at the high end and commercial customers in the middle. The coefficients represent the degree to which a particular class of customer can react

to price changes. In these studies, the coefficient represents the amount of change expected with a 100% increase in rates. In other words, the elasticity studies indicate that a doubling of service rates would likely lower residential consumption by about 10% while industrial customers could lower consumption by as much as 20% in some cases (The California Urban Water Conservation Council, 1997).

Applying these power industry elasticity measurements to the wastewater industry should be done with some caution given differences in available alternatives and their impact on consumer's consumption decisions in the wake of price changes. The power industry has a number of readily available alternatives such as natural gas, oil, solar, wind, geothermal and battery technologies, to name a few, that can be obtained by consumers to address their power requirements. As such, their elasticity measurements, while commonly considered to be relatively inelastic, may still be far more elastic than those that could be logically conferred upon wastewater services.

There is also the realization within these elasticity studies that consumers have both a short term and long term elasticity measure. In the short term, because some alternatives may require investments in new technologies or require physical equipment change out, the elasticity measure is low because the economics (investment payback) cannot support the change. However, at some point, the consumer decides the change is supportable. Whether that is the result of the most current rate change or the sum of several is unclear but at that point, the elasticity measurement is higher because a significant change in consumption is caused by investment in equipment that affects product consumption levels.

Again, since much of the elasticity analysis in the utility industry is not directly focused on the wastewater industry it is difficult to convey the same interpretations. Consumers of wastewater services have much more limited options and those available will likely require significant investment by the affected consumer. Therefore, while consumer's ability to react to significant changes in wastewater rates may be considered highly inelastic, it should not be considered completely inelastic.

Consumers do react to price and the reaction to significant rate increases may be to explore different service providers or formation of a new sanitation district. Whether it will yield the desired benefit will depend on the particular circumstances but at some point, any rate can motivate consumers to modify their behavior.

4.4 Identify/Estimate the Incremental Cost of Effluent Export: As indicated in the Task 1 discussion, the cost to Tahoe Basin Sewer utilities of meeting their requirement to export wastewater out of the basin is unavoidable and not significant. While growth in the area limited by the Tahoe Regional Planning Agency, replacement and upgrading

of wastewater export capacity will be required over time to maintain operating standards and assure future service capabilities.

Since wastewater export in the basin is provided by a number of entities, the cost to provide the next unit of export or the incremental cost of export to a particular customer is as unique as the utility providing the service. Fortunately, there are several excellent examples to review in this regard.

Replacement of the entire 26-mile STPUD export line, which was conducted over a period of years, was recently completed. The prior facility had aged and become leak prone. The project cost was in excess of \$37 million with over 70% coming from local funding sources such as customer rates and property tax revenue. The cost per mile for this improvement was roughly \$1.4 million.

While existing customers have responsibility to pay for the system, new customers are likely to pay the incremental cost of service, including export, when connecting to the Tahoe Basin sewer system. For example, presently, the cost a new residential customer pays to connect to the system falls somewhere between \$9,000 to \$12,000, depending upon the number of in-home discharge facilities.

This fee addresses the impact the new customer places on the entire system, including the export facilities. Analysis of STPUD's existing sewer rates indicates they are 38% higher because of export requirements, despite significant property tax subsidies. New customers will help pay for system costs, including export, through rates as well as property taxes in addition to the upfront connection fee payment.

The implied incremental cost of export reflected in the connection fee amounts to approximately \$2,500 to \$3,300 per customer on the STPUD system. However, with over 30% of that export system already paid for through federal grants and the new customer contributing to cost recovery through subsequent property taxes, the true incremental cost is much higher. Accordingly, the implied cost range above is adjusted to reflect these significant considerations to derive an estimated incremental export cost range of \$5,000 to \$6,000 per customer on the South Tahoe system.

IVGID is similar to STPUD in that it too has its own export line (approximately 20 miles long) and charges a connection fee amount that is similar to STPUD's. Presently, IVGID charges new residential customers around \$9,000 to \$10,000 to connect to both its water and wastewater systems.

In terms of size, the water and wastewater utilities are about the same such that the implied cost to connect to the wastewater system is about \$5,000. With approximately 35% of the system dedicated to export, the implied cost of incremental export amounts to about \$1,750 to \$2,000.

Again, consideration needs to be given to subsidies that underwrite system costs. While IVGID's rates include a CIP charge component, they indicate in their survey that they expect their CIP to be subsidized by nearly 70%. Therefore, the incremental cost estimate above needs to be increased to reflect the impact subsidies are having on system operations. Accordingly, a cost range of \$3,500 - \$4,000 is more reflective of the true incremental cost of export on this system.

For DCSID and the utilities it serves, their small size plays an important part in the level of rates paid by customers as well as in determining the portion associated with export. New residential customers connecting to the DCSID system pay a fee based upon basic capacity requirements as well as for fixtures installed.

The average residential connection fee amounts to about \$3,500. Of this amount, \$800 represents the basic system capacity component with the remainder being the charge for various fixtures installed (showers, tubs and toilets etc.). Since DCSID provides both treatment and export, a new customer's connection charge contributes toward cost recovery of both systems as well as the sewer network at large.

It is noted that Tahoe Douglas District and Kingsbury GID have connection charges of \$2,500 and \$3,000+ respectively. Since each system depends upon DCSID for treatment and export, a portion of these connection fees is needed to address the cost to use DCSID's system. Since DCSID does not clearly distinguish between treatment and export costs on its system or in its charges to the agencies it serves, and the level of charges can be influenced by revenue subsidies, an estimate of incremental export cost was derived. The estimate assumes export costs continue to represent about 40% of basic operations which implies that the incremental cost of export incorporated in connection fees for this export system falls in the range of \$1,000 to \$1,500 per customer.

As with the other agency's connection fees, an adjustment is required to address the impact of subsidies. For DCSID and the agencies it serves, their small size dictates that subsidies will have a more significant impact on each customer than would be the case on a system the size of STPUD. Accordingly, for these systems, a range of \$3,500 to \$4,000 is a more appropriate estimate of the true incremental export costs.

NTPUD and Tahoe City PUD export raw wastewater to the TTSA for treatment. Since TTSA bills these agencies' customers directly for their services, the cost of export as well as the system at large would be addressed in the connection charge.

As noted earlier, Tahoe City PUD's operations are heavily subsidized, which significantly influences their service rates and masks their system cost profile. Currently, Tahoe City PUD charges new residential customers a \$1,000 sewer connection fee which addresses export as well as overall system costs.

NTPUD operations are also subsidized although the subsidies have a smaller impact on service rates and their system cost profile. NTPUD's sewer connection fee stands at \$2,000 for new residential customers.

Given the impact of subsidies, it is reasonable to assume that NTPUD's true export costs would fall within the ranges identified above for the other Tahoe Basin agencies.

It is important to recognize that all of the agency systems were designed for a much greater population than the current population. As such, capacity constraint is not an immediate concern, particularly with the growth control efforts of the Tahoe Regional Planning Agency. As such, the cost of connection for some of the agencies can be influenced by the age of the system and the benefits of not having to incur costs to significantly expand the system to accommodate new connections.

While incremental cost estimates have been developed for each system, the STPUD system is the only one to recently experience a significant overhaul of its export system. As such, it is much more representative of what the incremental cost of export is likely to be within the region.

For the other agencies, particularly the smaller ones, the impact of an export system overhaul similar to STPUD's would likely yield a much higher per customer incremental cost estimate. This observation is simply a matter of having fewer customers to collect from. However, precisely because of that potential burden to consumers, these agencies may have more funding made available to them to address such a critical problem. Accordingly, while it is difficult to say with certainty what the true incremental cost of export is in the Tahoe Basin, the cost estimate for the STPUD's system is likely to be the best representative example at this time given the recent investment.

5.0 Conclusions: The following summarizes the analysis conclusions.

- Survey/benchmarking investigations indicate that all residential Tahoe Basin sewer customers pay rates that exceed, and in some cases significantly exceed, a number of Tahoe region utilities, along with selected western U.S. utilities and the national average.
- The cost of exporting wastewater out of the basin is a major factor contributing to higher residential sewer rates in the Tahoe Basin, relative to the list of comparables.
- After export costs are excluded, it appears that the residential rates for the Tahoe Basin utilities would be fairly comparable to the national average as well as the Western U.S. and several Tahoe area utilities.

- Rates can be influenced by a host of variables that do not provide for easy comparability. The survey/benchmarking effort identified several Western region sewer utilities, similar in size to the Tahoe Basin utilities that are poised to experience significant rate increases in the coming years. Their smaller size, combined with the significant cost of replacing and upgrading facilities and equipment, creates tremendous upward pressure on rates unless alternative funding sources such as grants and property taxes can be accessed.
- Commercial rate designs, because of their various formats, can make straightforward, annual bill comparison even more misleading than the residential comparison developed in this analysis. As noted in the related discussion, rates can be influenced by a host of variables. Compounding those variables with various types of rate structure approaches make commercial rate comparisons far more difficult and even less conclusive than those suggested by the residential statistics developed above.
- With respect to potential infrastructure funding sources, the mix of funds secured by each agency over time can have a significant impact on how infrastructure is developed, maintained and replaced, both today and in the future, as well as the financial burden each agencies' customers will be forced to bear in conducting that activity.
- Rates are impacted when the choice for infrastructure project funding is between debt financing, in its various forms, and rate funding. Debt funding, when accessible, delays the immediate impact of large project costs by spreading the burden over the life of the assets whereas rate funding has an immediate and potentially significant impact on customers.
- Annual cost recovery of both an agency's operating costs, as well as its capital improvement investments, should be periodically determined through a comprehensive rate study which should include a cost of service analysis.
- With the rate study in hand, the process of final rate development begins. Often this process incorporates other considerations that may not reflect pure cost of service concepts but can lead to development of inter-class subsidies, either by intent or by consequence.
- When examining rate levels, it is impossible to determine whether one type of customer is subsidizing another on a particular system. Only when it is known what each customer is required to pay, relative to what is being charged, can the issue of subsidy be appropriately evaluated.

- While there is often concern about how a customer will be affected financially when significant rate changes are contemplated, the impact that such a change will have on a customer's consumption behavior also warrants consideration.
- Consumers of wastewater services have much more limited alternative service options and those available will likely require significant investment by the affected consumer. Therefore, while consumers' ability to react to significant changes in wastewater rates may be considered highly inelastic, it should not be considered completely inelastic.
- The cost to Tahoe Basin sewer utilities of meeting their requirement to export wastewater out of the basin is unavoidable and not insignificant.
- While it is difficult to say with certainty what the true incremental cost of export is in the Tahoe Basin, the cost estimate for the STPUD system (\$5,000 - \$6,000 per customer) is likely to be the best representative example at this time given their recent investment.

6.0 Recommendations: The following recommendations are made for future Partnership activities as they relate to financial analysis.

- Benchmarking of Tahoe Basin sewer utility residential class rates provides some information on comparability but definitive conclusion about the comparability should not be drawn. Far too many factors affect a final rate to know for certain whether they are truly comparable. The development of any service rate should be supported by a comprehensive examination of the cost to provide that service. Periodic cost of service review (every 3 to 5 years) helps indicate whether a particular rate is in line with cost incurrence and whether adjustments are required to correct that alignment.
- Inter-class subsidies such as determining whether commercial class customers subsidize residential class customers and vice versa or whether new customers are being subsidized by existing customers and vice versa is not possible without knowing how much it costs to provide service to each class or type of customer and whether rates are designed to recover those costs. Incremental costs should be reflected in the charges to new customers, either through hookup fees, different rates, or both. Again, a comprehensive analysis of the cost to provide service to new customers will ensure that any subsidies in this regard are established by intent rather than accident.
- While surveying area and regional sewer utilities for this project, a number of respondents indicated that they had successfully explored outsourcing as a means

of improving and reducing the utilities' cost of operations. Each success was unique to that particular organization, be it for operating areas such as line installations/inspections/ maintenance, system design, meter reading, administrative functions etc., but it is clear that outsourcing is a worthwhile pursuit for some as they attempt to control costs that ultimately affect rates. Accordingly, some exploration of this may be a prudent exercise for Tahoe Basin utilities to consider in the future.

- Explore the opportunities to include infrastructure, rehabilitation, replacement, and spill response in the EIP. Funding for vital CIP projects could then be augmented by Southern Nevada Public Land Management Act (SNPLMA) funds available each year for basin area projects. Achieving greater access to these funds will further system development/ maintenance efforts for all agencies despite recognizing that competition exist for these funds.