Nipomo Community Services District

2007 Water and Sewer Replacement Study

Nipomo Community Services District

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Contents

0.0 Executive Summary

Background

The District recognizes the need to collect funds for the replacement of its water and wastewater infrastructure. The replacement fund was established in 1996 via Board adoption of the annual budget.

This study produces a schedule of projected facility replacement needs and their projected future costs, document the condition of District water and wastewater facilities, as reported by District staff, develops strategies and recommendations relative to establishment of replacement funding and timing to assist the District in the process of gaining acceptance by the community and the District Board.

Scope and Methodology

The general methodology is to inventory the existing infrastructure systems, develop unit costs for replacement, estimate the present annual accumulation rate needed to fully fund the future projected replacement costs, and determine impacts on rates or other funding methods to accumulate funds to pay for future replacements.

Existing Systems

Year 2007 replacement costs for system assets were estimated to be:

Water – Town System:	$82,000,000
Wastewater – Town System:	$37,000,000
Water – Blacklake System:	$9,600,000
Wastewater – Blacklake System:	$9,900,000

Replacement Cost Schedule Development and Results

Inventory information is combined with the replacement costs and life expectancies to determine the estimated present replacement cost, the projected future replacement cost, the required annual savings rate to replace each asset, the required present value of accrued annual savings, and the remaining service life as a fraction of total system service life.

The amounts expressed are in terms of present worth dollars, as of December, 2007. The assumed interest rate for savings is 4.5%. The assumed inflation rate is 3.0%.

Three different funding alternatives were quantified:

- Model 1: 20 Year Savings Program. Predicted "single year" costs are "spread" so that 90% of the replacements occurring within ±5 years of the end of service life. These spread costs are funded by setting up a savings program that begins to save for each year's anticipated costs 20 year in advance, saving a constant amount each year.

- Model 2: Service Life Savings Program. Single year costs are funded by saving over each asset's service life. The savings rate for a particular asset remains constant until the asset is replaced. When the asset is replaced the savings rate increases to account for the anticipated future replacement cost increase due to inflation.

- Model 3: Pay-as-you-go Set-Aside Program. Single year costs are "spread" as in Model 1. Each year "set-aside" sufficient funds to cover that year's predicted costs. The resulting set-aside rates will vary from year to year. Because this model is not a "savings" program, no accrued savings are required.

Key results are shown below:

Table 4-2: Budgeted and Modeled Replacement Funding

Fund	Budgeted Replacement Funding			2007 Savings or Set-Aside		
	2005/06	2006/07	2007/08	20-Year Savings (Model 1)	Service Life Savings (Model 2)	Pay-as-you-Go Set-Asides – (Model 3)
#800 – Town Water	$93,678	$88,000	$392,000	$750,000	$950,000	$114,000
#810 – Town Sewer	200,738	256,000	351,000	190,000	540,000	140,000
#820 – Blacklake Water	-	-	-	44,000	171,000	12,000
#830 – Blacklake Sewer	34,000	23,000	40,000	55,000	159,000	43,000
Combined	328,416	367,000	783,000	1,039,000	1,820,000	$309,000

Table 4-4: Actual and Modeled Replacement Fund Balances, 7/1/2007

Fund	Balance 7/1/07	Accrued Savings Required		
		20-Year Savings (Model 1)	Service Life Savings (Model 2)	Pay-as-you-Go Set-Asides (Model 3)
#800 – Town Water	$1,954,212	$6,700,000	$26,000,000	$0
#810 – Town Sewer	2,755,915	2,300,000	8,500,000	0
#820 – Blacklake Water	349,170	470,000	2,300,000	0
#830 – Blacklake Sewer	(26,123)	660,000	1,800,000	0
Combined Total	$5,033,174	10,130,000	38,600,000	$0

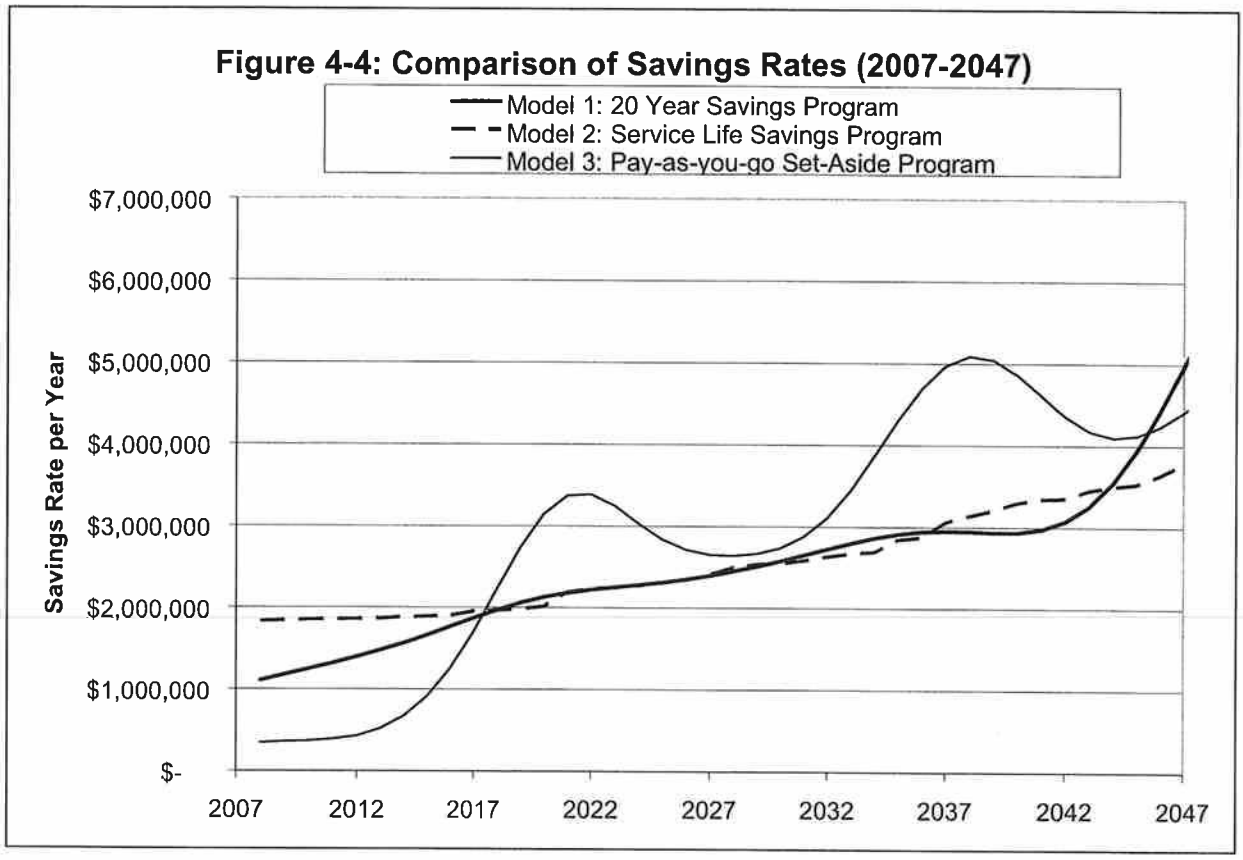


Figure 4-4: Comparison of Savings Rates (2007-2047)
Model 1: 20 Year Savings Program
Model 2: Service Life Savings Program
Model 3: Pay-as-you-go Set-Aside Program
Savings Rate per Year
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$-
2007
2012
2017
2022
2027
2032
2037
2042
2047

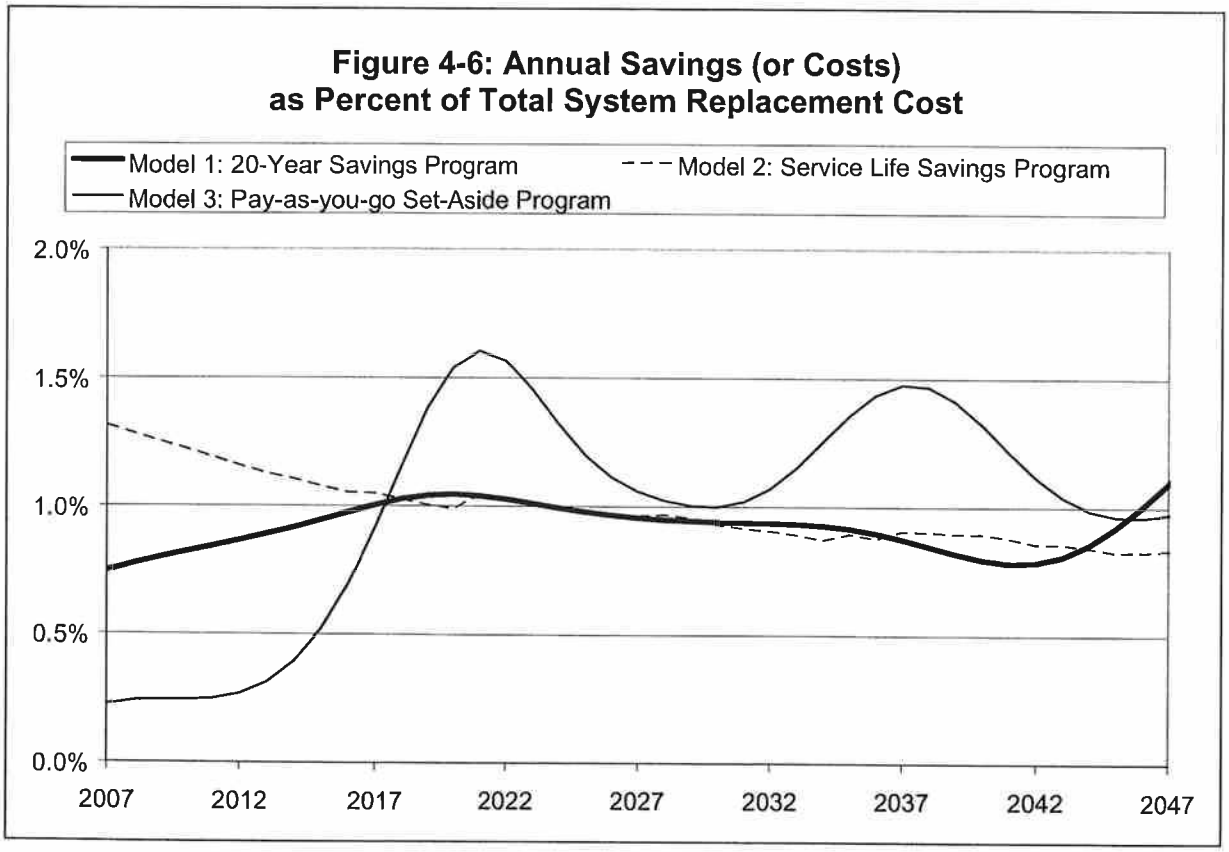


Figure 4-6: Annual Savings (or Costs)
as Percent of Total System Replacement Cost
Model 1: 20-Year Savings Program
Model 2: Service Life Savings Program
Model 3: Pay-as-you-go Set-Aside Program
2.0%
1.5%
1.0%
0.5%
0.0%
2007
2012
2017
2022
2027
2032
2037
2042
2047

Summary Recommendations

Replacement costs are expected to rise significantly within the next 15 to 20 years. The District can reduce the "shock" of these future cost increases by continuing their asset replacement savings program.

Therefore, the Pay-as-you-go Set-Aside Program (Model 3) is not recommended.

The most equitable savings approach, the Service-Life Savings Program (Model 2), may be impractical to implement at this time because there are insufficient reserves.

Therefore, Boyle recommends that the District adopt the 20-year Savings Program described by Model 1. To implement this approach, the District will need to adopt the annual savings rates noted, and should also adjust these savings rates upward or downward to bring the reserved fund balance in line with the required balance. The funding approaches detailed below will accomplish this realignment within 10 years.

Table 6-6: Recommended Adjusted 20-year Savings Program for All Divisions

Division	Town Water	Town Wastewater	Blacklake Water	Blacklake Wastewater
Customers	3,428	3,055	589	558
Year	**Per-Customer Recommended Bi-Monthly Savings Rate**			
2007	$68	$8	$22	$44
2008	70	8	24	45
2009	73	9	25	45
2010	76	9	27	46
2011	78	10	29	47
2012	80	10	32	47
2013	83	11	35	48
2014	86	12	39	50
2015	89	13	44	51
2016	92	14	49	53
2017	94	15	56	54

1.0 Introduction

1.1 Background

The Nipomo Community Services District (District) provides water and wastewater (sewer) service to a population of 12,296 persons and is located along Highway 101 in the southern portion of San Luis Obispo County, California. The District is situated approximately halfway between the cities of San Francisco and Los Angeles. The Community Services District was authorized by San Luis Obispo County and formed in 1965. Five directors serve on the District's governing board (Board).

The District provides services for two areas: Town and Blacklake. The Town Systems serve the main area of Nipomo and the Blacklake Systems serve the Blacklake development.

The Town area is characterized as a growing residential community. The Blacklake area is characterized as a predominately developed adult community oriented around the 27-hole Blacklake Golf Course.

The District recognizes the need to collect funds for the replacement of its water and wastewater infrastructure. Each component has an expected life and by planning for the replacement and building reserves for the replacement, the District will avoid or at least significantly reduce the impact of varying funding needs on a year-to-year basis and avoid significant fluctuations in water and wastewater rates to accommodate those funding needs.

The replacement fund was established in 1996 via Board adoption of the annual budget. Funding is allocated annually, based on what the budget can support and Board discretion during the budgeting process. Replacement funding amounts allocated in the 2005/06, 2006/07, and 2007/08 budgets are presented below.

Budgeted Replacement Funding

Fund	2005/06	2006/07	2007/08
#800 – Town Water	$93,678	$88,000	$392,000
#810 – Town Sewer	200,738	256,000	351,000
#820 – Blacklake Water	0	0	0
#830 – Blacklake Sewer	34,000	23,000	40,000

As of July 1, 2007 the above described accounts had funded reserves as shown below:

	Town System	Blacklake System
Water	$1,954,212	$349,170
Wastewater	$2,755,915	($26,123)

The revenue by sources for the District are budgeted as follows:

Table 1-1
2007/2008 Budgeted Operating Revenue

System	Operating Revenue
Water-Town	$2,393,000
Wastewater-Town	$829,000
Water-Blacklake	$378,000
Wastewater-Blacklake	$245,000

What this study does and does not do is listed below:

What Study Does	What Study Does Not Do
▪ Produces a schedule of projected facility replacement needs and their projected future costs.	▪ Determine a specific replacement year for each component
▪ Document the condition of District water and wastewater facilities, as reported by District staff.	▪ Assess the condition of individual facilities
▪ Develop strategies and recommendations relative to establishment of replacement funding and timing.	
▪ Assist the District in the process of gaining acceptance by the community and the District Board.	

1.2 Scope/General Methodology

1.2.1 Definitions of "Replacement"

For purposes of this study the generic term replacement refers to:

a. The reconstruction of existing facilities for which it is no longer cost effective to keep in service. That time or date can vary considerably. For a pump, it may be when the efficiency drops below a pre-determined acceptable level. For a pipeline, it may be when the costs of repair and reliability are excessive. All of us face the same questions with personal automobiles, for example.

b. Major refurbishment of facilities without full replacement. An example would be sliplining an existing pipeline rather than full replacement, thus extending the life to approximately that of a full replacement project. Reasons for doing so may include economics or reduced inconvenience to the public due to less traffic disruption. For purposes of this study, the costs assume replacement rather than refurbishment because the possibility of refurbishment needs evaluation on a case by case basis. However, this assumption is appropriate for budgeting purposes because the refurbishment costs usually are not significantly different than replacement.

c. Normal major refurbishment such as repainting steel reservoirs. These can have significant costs and while they could be considered as normal maintenance, it is convenient to include them in the replacement study.

Sometimes the term "replacement" becomes further blurred when after years of service, a facility is replaced and enlarged to accommodate growth or changed requirements. In such cases, the total cost may be split between the replacement fund and other capital budgets. In fact, state law requires a nexus between project costs and the costs of serving new development. Stated another way, developers should not have to fund pure replacement projects.

1.2.2 Scope of Work

The Scope of this study includes the following:

- Analyze the useful and remaining life of system components.
- Breakdown the costs for rehabilitation and replacement of components in the water and wastewater systems. This includes developing a schedule for replacement.
- Prepare alternative plans to achieve funding goals.
- Prepare recommendations for the District pertaining to the rehabilitation and replacement of the District's systems. Also include recommendations relative to gaining acceptance by the community and the District Board.

1.2.3 General Methodology

The general methodology is to:

A. Inventory the existing infrastructure systems, including the age of facilities and other information regarding the condition of the facilities, as reported by District staff. Sources of data included the Geographic Information System (GIS) database of District water and sewer facilities, readily available replacement records, and interviews with District staff.

B. Develop unit costs for replacement.

C. Estimate the present annual accumulation rate needed to fully fund the future projected replacement costs.

D. Determine impacts on rates or other funding methods to accumulate funds to pay for future replacements.

1.3 Acknowledgments

Boyle Engineering Corporation wishes to acknowledge the assistance of the following persons at the Nipomo Community Services District:

- Bruce Buel — General Manager
- Lisa Bognuda — Assistant Administrator
- Peter Sevcik, PE — District Engineer
- Tina Greitens — Utility Superintendent
- Dan Migliazzo — Utility Field Supervisor
- Butch Simmons — Inspector

2.0 Existing Systems

2.1 Water – Town Systems

The Town System (water) serves 3,428 customers over an area of approximately 4 sq. miles. The water system has one pressure zone. The pressure zone contains:

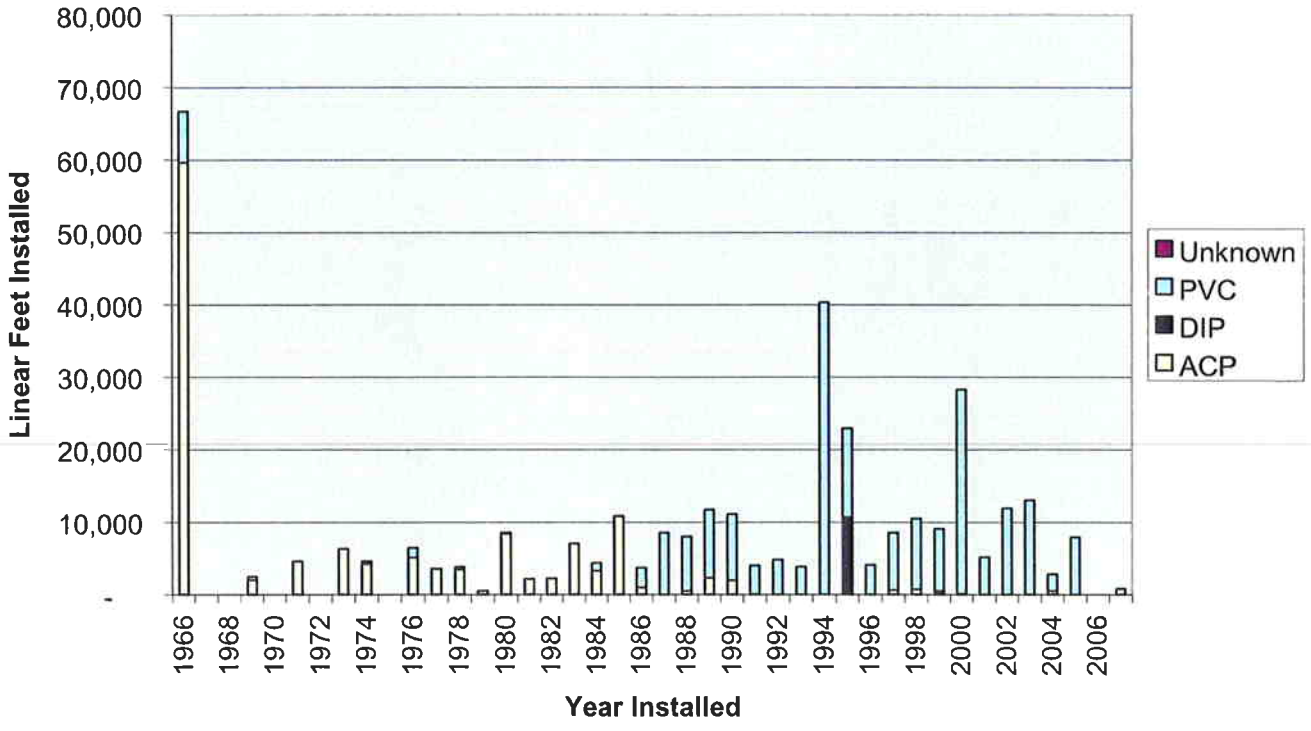
- Two storage facilities, Quad Tanks and Standpipe, which total 4 million gallons (MG) of storage.
- Seven active wells, which include disinfection by injecting liquid sodium hypochlorite solution into the well discharge. The seven wells are as follows:
  - Eureka Well
  - Via Concha Well
  - Bevington Well
  - Olympic Well
  - Sundale Well
  - Knollwood Well
  - Church Well
- The wells range in depth from 240 feet to 730 feet. Water is pumped from these wells using electrically powered submersible motors, electrically powered vertical turbine motors and a natural gas engine.
- A distribution system comprised of 6-, 8-, 10-, 12-, and 16-inch diameter pipes, which total approximately 415,079 feet, according to the District's Geographic Information System (GIS) database.

In general, the Town Water System components have been installed between 1966 and the current time. The operations personnel report the following:

- Good overall condition
- Pumps and motors may need replacement
- Electrical panels may need updating or replacement
- Tanks may need to be re-inspected, repaired, and re-coated

The distribution system was first installed using mostly asbestos-cement pipe. During later expansions the predominant material has shifted to PVC, as shown below.

Figure 2-1: Town Water Pipe Assets by Material and Installation Year



2.2 Water – Blacklake System

The Blacklake System (water) serves 589 customers over an area of approximately 0.7 sq. miles. The water system has one pressure zone and contains:

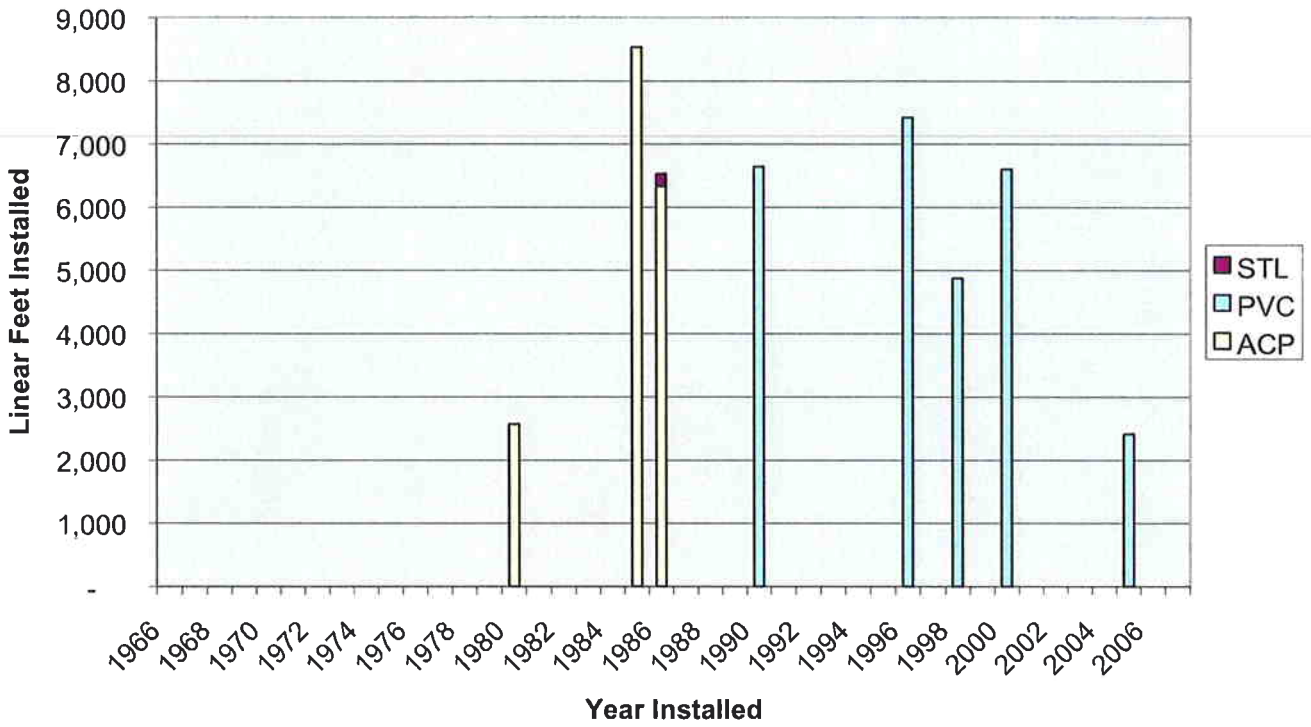
- One storage facility, Blacklake Tank, with a capacity of 0.4 MG.
- A transfer pump.
- Two active wells:
  - Blacklake #3
  - Blacklake #4
- A distribution system comprised of 4-, 6- and 8-inch diameter pipes, which total approximately 47,723 feet, according to the District's GIS.

In general, the Blacklake System components have been installed between 1985 and the current time. The operations personnel report the following:

- All systems are functioning well.
- The tank needs to be recoated.
- The existing booster station is past the end of its useful service life.

The distribution system was first installed using asbestos-cement pipe. Since 1990 PVC has been used, as shown below.

Figure 2-2: Blacklake Water Pipe Assets by Material and Installation Year



2.3 Wastewater (Sewer) – Town System

The Town Wastewater System (Sewer) serves 3,055 customers. The wastewater system contains the following:

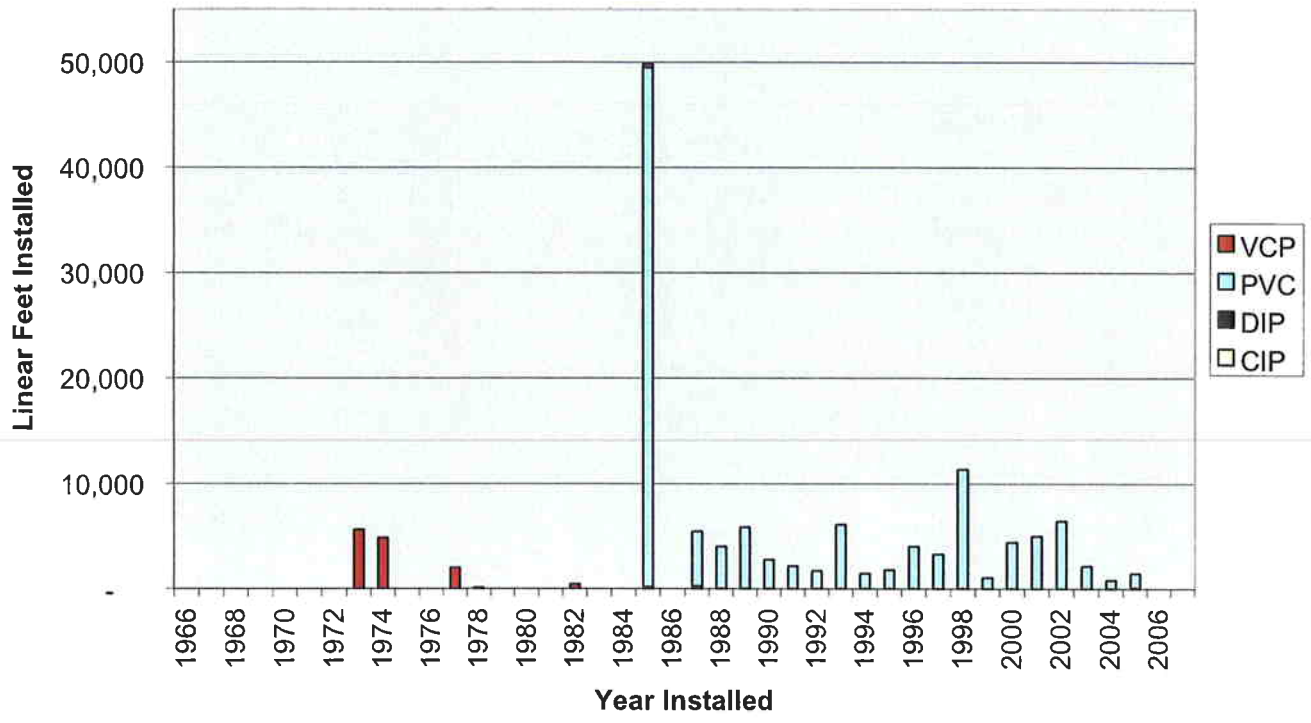
- Wastewater treatment is provided at the District's wastewater treatment plant, located adjacent to Highway 101 at Southland and South Frontage Road. The plant currently is rated at 0.9 MGD. The plant was expanded in 1999. At that time all components were refurbished or replaced, except for ponds 1 and 2. The wastewater treatment facility utilizes a series of aerated lagoons to

achieve the mandated discharge requirements. The wastewater enters the facility at the headworks were it is macerated prior to being pumped to the aerated lagoons for treatment, after which the treated effluent is discharged to the infiltration basins.

- The gravity wastewater pipelines consist of 6-inch to 12-inch diameter pipelines and total approximately 147,141 feet. The wastewater force mains consist of 4-, 6-, and 8-inch diameter pipelines and total 8,602 feet. The lines were installed between 1971 and the current time. Prior to 1985 the sewer system consisted of collection systems connected to community septic tanks.
- The wastewater transmission system includes eleven District-owned lift stations ranging from 110 to 600 gpm. The lift stations are as follows:
  - Influent (Treatment Plant)
  - Honey Grove
  - Nipomo Palms
  - La Mirada
  - Tejas (aka Hazel Lane)
  - Braken/Primrose
  - Gardenia
  - Juniper
  - N. Oak Glen
  - Tefft
  - Maria Vista
- Two additional lift stations that are not owned or operated by the District deliver domestic wastewater to the collection system. These lift stations are noted here, but are not counted as district assets.
  - Galaxy Park
  - Self Help

The collection system was first installed using vitrified clay pipe. Since the system expansion in 1985 PVC has been used almost exclusively, as shown below.

Figure 2-3: Town Sewer Pipe Assets by Material and Installation Year



2.4 Wastewater (Sewer) – Blacklake System

The Blacklake Wastewater System (Sewer) serves 558 customers. The wastewater system contains the following:

- Wastewater treatment is provided at the Blacklake Wastewater Treatment Plant. This treatment facility was constructed in 1986 and expanded in 1998 to its current capacity of 0.2 MGD. The wastewater enters the facility through a bar screen prior to entering the duplex comminutors. Once through the bar screen and comminutors the wastewater flows to the aerated lagoons for treatment. The treated effluent is then chlorinated before being discharged to the golf course irrigation storage pond.

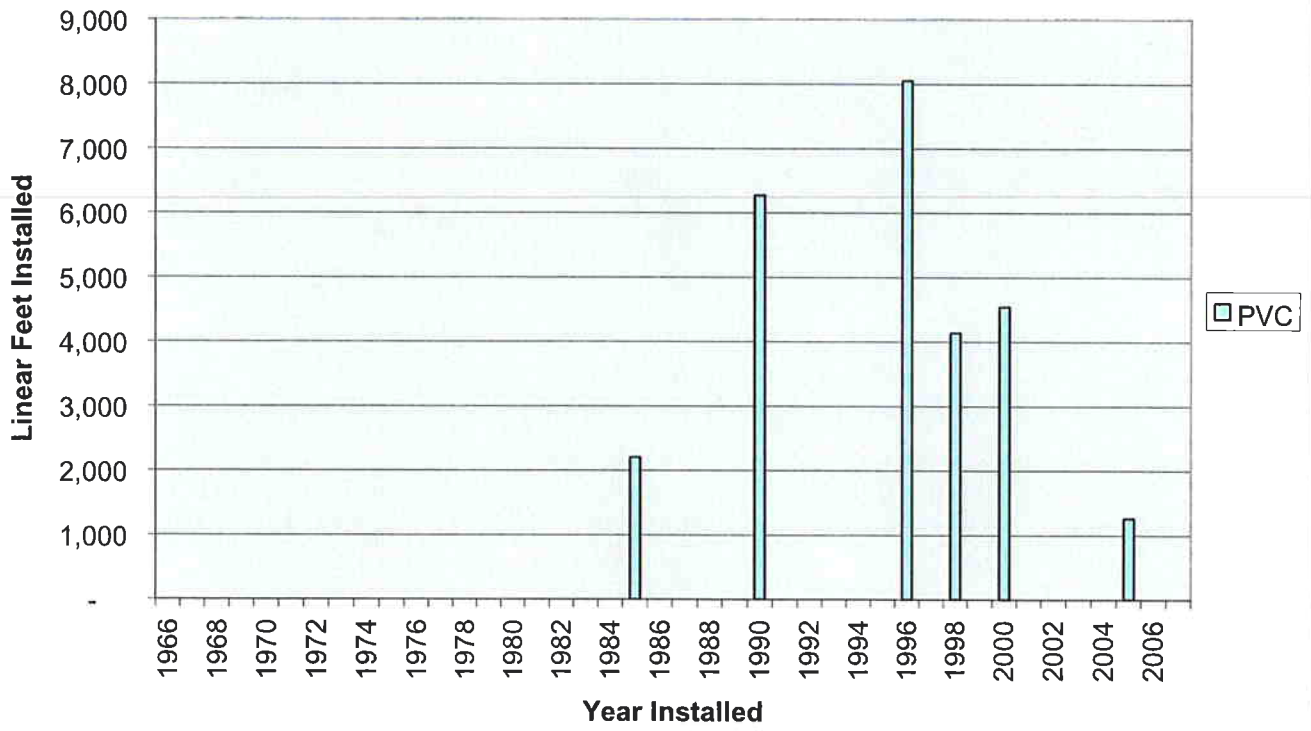
- The gravity wastewater pipelines consist of 6-inch and 8-inch diameter pipelines and total approximately 36,475 feet. The wastewater force mains consist of 4-and 6-inch diameter pipelines and total 2,706 feet. These lines were installed between 1985 and the current time.

  The Blacklake System includes three lift stations as shown below:

- Woodgreen
- The Oaks
- Misty Glen

The collection system was installed using PVC, as shown below.

Figure 2-4: Blacklake Sewer Pipe Assets by Material and Installation Year



2.5 Asset Summaries

Summary inventories of the Town Water System, the Blacklake Water System, the Town Wastewater System and the Blacklake Wastewater System are provided in the following tables. More complete inventories are shown in the Appendices.

These inventories were developed using GIS and accounting data from the District. They are intended for the establishment of replacement funds and not intended as a complete listing for District depreciation purposes.

Table 2-1
Summary of Water System Assets

Facilities	Location Name	Town	Blacklake
Wells			
	Eureka (800 gpm)	x	
	Via Concha (700 gpm)	x	
	Bevington #2 (400 gpm)	x	
	Olympic #2 (145 gpm)	x	
	Church #2 (160 gpm)	x	
	Sundale (1,000 gpm)	x	
	Knollwood	x	
	Dana #1	(pending)	
	Dana #2	(pending)	
	Blacklake #3 (325 gpm)		x
	Blacklake #4 (400 gpm)		x
Reservoirs			
	Quad Tank #1 (0.5 MG)	x	
	Quad Tank #2 (0.5 MG)	x	
	Quad Tank #3 (1.0 MG)	x	
	Quad Tank #4 (1.0 MG)	x	
	Standpipe (1.0 MG)	x	
	Blacklake (0.4 MG)		x
Pipelines			
	2" AC	636	
	2" PVC	44	79
	4" AC	5,004	
	4" PVC	103	1,000
	6" AC	79,985	2,536
	6" PVC	43,909	4,098
	6" Steel		62
	8" AC	33,213	14,893
	8" PVC	123,603	24,932
	8" Steel		122
	10" AC	49,110	
	10" Ductile Iron	386	
	10" PVC	27,302	
	12" AC	503	
	12" Ductile Iron	555	
	12" PVC	23,040	
	14" AC	4,952	
	16" Ductile Iron	10,649	
	16" PVC	12,292	
	Unknown Material and Diameter	793	
	Total Length Per System, LF	**415,079**	**47,723**
	Total Length, LF		**462,802**
Fire Hydrants		585	73
SCADA System		x	x

Table 2-2
Summary of Wastewater System Assets

Facilities	Location Name	Town	Blacklake
Lift Stations			
	Influent (Southland Facility)	x	
	Honey Grove	x	
	Nipomo Palms	x	
	La Mirada	x	
	Tejas	x	
	Braken/Primrose	x	
	Gardenia	x	
	Juniper	x	
	The Oaks		x
	Woodgreen		x
	Misty Glen		x
	N. Oak Glen	x	
	Maria Vista	x	
	Tefft	x	
Treatment Plants			
	Southland WWTF	x	
	Blacklake WWTF		x
Pipelines			
	4" PVC (polyvinyl chloride)	27	
	6" CIP (cast iron)	39	
	6" VCP (vitrified clay)	5,501	
	6" PVC	2,317	4,734
	8" CIP	60	
	8" DIP (ductile iron)	434	
	8" VCP	7,771	
	8" PVC	107,756	30,577
	10" PVC	5,555	
	12" PVC	10,903	1,163
	15" PVC	33	
	Total Length Per System, LF	151,845	36,475
	Total Length, LF		188,320
Force Mains			
	4" PVC	7,318	1,906
	4" DIP	20	
	4" VCP	55	
	6" PVC	983	800
	6" DIP	42	
	8" PVC	81	
	8" DIP	103	
	Total Length Per System, LF	8,602	2,706
	Total Length, LF		16,803

3.0 System Unit Costs and Service Life Expectancy

3.1 General

In presenting unit cost opinions and service life expectancy, it must be remembered that these are somewhat generic and intended to establish reasonable replacement funding levels. There is no representation that these values will coincide with the values for a particular facility. Further, with respect to "service life" there are many facilities whose life has been longer than the numbers shown. However, their reliability or cost effectiveness may have been compromised. The replacement funds are intended to preclude that situation to a reasonable extent.

Tables 3-1 and 3-2 present the unit replacement cost opinions and service life expectancy for the various components of the Town and Blacklake water and wastewater systems.

3.2 Unit Replacement Cost

3.2.1 General

The unit replacement costs presented are based on: (1) recent experience by the District on repair/replacement projects (2) Boyle observations on similar projects or new projects with adjustment factors to better represent the increased work effort when a replacement project occurs. Those factors include, for example, the cost of reconnection of services and the cost of working in existing streets.

The cost represents our opinion of probable construction costs; they include an allowance for engineering design and construction services, where applicable. They are a "tool" to be used in addressing the broad issues; they do not represent a detailed analysis of any one facility or any one specific cost.

3.2.2 Water System

Table 3-1 presents the unit replacement costs for the water systems.

Comments are:

- 'Replacement' for pipelines could be full pipeline replacement including trenching and laying a new pipeline. It also could mean sliplining, pipe-bursting, or other trenchless technology, particularly where there are infrequent water services and few inline valves. The presence of services or valves can alter the preferred methodology. Also, water pipelines (i.e. AC or PVC) typically reach the end of their life due to exterior rather than interior problems.

- Unit costs for pipelines include additional work to reconnect existing services and to replace hydrants.
- Minimum size for water mains is 8". Existing mains that are smaller will be replaced with this minimum size.

3.2.3 Wastewater System

Comments are:

- 'Replacement' for pipelines could either be complete replacement or sliplining or other trenchless technology. The latter is gaining popularity due to the reduction of street/traffic impact; however, it is not applicable when the capacity of the existing line is marginal. In any event, for purposes of this study, the full replacement costs will be used.
- Replacement costs for pipelines reflect the work associated with existing laterals.
- Minimum size for gravity sewers is 8". Existing mains that are smaller will be replaced with this minimum size.
- Replacement costs for the wastewater treatment facilities reflect the costs associated with the replacement and installation of the existing equipment at the facilities.

3.2 Expected Service Life

3.2.1 3.2.1 General

There are no absolutes in expected life of facilities. Variables include:

- Definition of "life" – This definition is at the heart of the need for an infrastructure replacement program. Expected life could be defined as:
  - The time when a component completely fails or is so unreliable that failure has in essence occurred.
  - The time when repairs on a component become so frequent and costly that its retention can not be justified. "Failure" may not be at hand in terms of reliability, but the economics dictate replacement.
  - Some period before the repairs accelerate in frequency or before a component becomes unreliable. This is the "fix-it before it breaks" approach.

- For pumps and similar equipment, the time when the lost efficiency makes it beneficial for replacement. Lost efficiency translates into increased power costs.
- For certain facilities where critical fire protection is required, a time period before any significant failures occur which impact public safety.
- The SRF Replacement Guidelines life expectancy or IRS depreciation life.

- Variability in "life" – The typical "life" periods used in replacement studies, by other purveyors, often are less than what may be experienced in the field. That relates to the need for prudent planning, assuming a conservative approach. Also, if there is any error, it is better to be on the early side of the issue.
- Materials influence "life" – For example, AC pipelines have a tendency to be brittle and their life may be less than actual internal and external corrosion would indicate. On the other hand, PVC pipelines (AWWC 900 for water or D-3034 for wastewater) have longer anticipated lives, although the materials in PVC pipeline construction have not been in existence long enough to know precisely their "life".
- Need to be conservative – For planning purposes, it is better to underestimate useful life when given a choice. That provides fiscal prudence with respect to replacement of facilities. It is important to recognize that for public purveyors any funds collected in excess of true need are retained instead of provided to stockholders as may be the case for private companies. These retained earnings will be reflected in future rates.
- The life expectancies presented represent numbers based on experience with similar systems. However, it should be explained that the term "life" is variable. For purposes of this report "life" is assumed to precede experiencing problems. Realistically, many water or wastewater systems function for a number of years with problems such as line breaks which are simply fixed as they occur and indeed many pipelines have lasted 60 years or more. For planning purposes a more aggressive replacement schedule is assumed. If the District's replacement program actually is less aggressive, then the funds will still be designated for the replacements/repairs – only later than expected.

3.2.2 3.2.2 Water System

Comments are:

- The pipeline systems have the longest life expectancy.
- The wells with mechanical and electrical systems require more frequent replacement.
- Replacement of reservoir coatings is critical because if not done when needed, full reservoir replacement may be required earlier than expected.

3.2.3 3.2.3 Wastewater System

Comments are:

- The corrosive environment for lift stations and wastewater plant equipment reduces life expectancy.
- Manhole life can be extended through the use of one of the lining products, i.e. PVC T-lock, polyurethane coating.

Table 3-1
Replacement Cost Estimates and Probable Service Lives for Non-Pipeline Assets

System / Subsystem / Component / Location	Replacement Cost (2007 $)	Service Life (years)
Water System		
Well Sites		
Well and Casing		
Church #2 Well	$47,000	40
Blacklake #3 Well	$67,000	40
Dana #1 (Cheyene) Well	$67,000	40
Dana #2 (Mandi) Well	$67,000	40
Knollwood Well	$67,000	40
Olympic #2 Well	$67,000	40
Bevington #2 Well	$114,000	40
Blacklake #4 Well	$114,000	40
Via Concha Well	$166,000	40
Sundale Well	$194,000	40
Eureka Well	$222,000	40
Water Pumps		
Church #2 Well	$8,000	15
Blacklake #3 Well	$13,000	15
Dana #1 (Cheyene) Well	$13,000	15
Dana #2 (Mandi) Well	$13,000	15
Knollwood Well	$13,000	15
Olympic #2 Well	$13,000	15
Bevington #2 Well	$19,000	15
Blacklake #4 Well	$19,000	15
Eureka Well	$22,000	15
Via Concha Well	$22,000	15

System / Subsystem / Component / Location	Replacement Cost (2007 $)	Service Life (years)
Sundale Well	$22,000	15
Motors and Engines		
Bevington #2 Well	$28,000	10
Blacklake #3 Well	$20,000	10
Blacklake #4 Well	$28,000	10
Church #2 Well	$12,000	10
Dana #1 (Cheyene) Well	$20,000	10
Dana #2 (Mandi) Well	$20,000	10
Eureka Well	$32,000	10
Knollwood Well	$20,000	10
Olympic #2 Well	$20,000	10
Via Concha Well	$32,000	10
Sundale Well – Natural Gas	$250,000	10
Site Piping – all well locations	$15,000	50
Well Building		
Eureka Well	$11,000	30
Via Concha Well	$11,000	30
Sundale Well	$11,000	30
Bevington #2 Well	$11,000	30
Well Head Meter – all well locations	$6,000	15
Electrical and Controls – all well locations	$15,000	25
Chlorination System – all well locations	$15,000	15
SCADA equipment – all well locations	$6,000	4
Tank Sites		
Replace Tank		
Blacklake Tank	$600,000	50
Quad Tank #1	$750,000	50
Quad Tank #2	$750,000	50
Quad Tank #3	$1,500,000	50
Quad Tank #4	$1,500,000	50
Standpipe	$1,500,000	50
Interior Coating and Repairs		
Blacklake Tank	$120,000	15
Twin Tanks #1	$130,000	15

System / Subsystem / Component / Location	Replacement Cost (2007 $)	Service Life (years)
Twin Tanks #2	$130,000	15
Quad Tank #3	$160,000	15
Quad Tank #4	$160,000	15
Standpipe	$160,000	15
Exterior Coating		
Blacklake Tank	$19,000	10
Twin Tanks #1	$22,000	10
Twin Tanks #2	$22,000	10
Quad Tank #3	$35,000	10
Quad Tank #4	$35,000	10
Standpipe	$35,000	10
Site Piping	$15,000	50
Mixing System - Standpipe	$35,000	25
Cathodic Protection	$25,000	15
SCADA upgrade	$6,000	4
Access Road and Fencing		
Blacklake Tank	$12,000	20
Standpipe	$15,000	20
Twin Tanks #1	$20,000	20
Blacklake Interconnection – Transfer Pump		
Piping	$25,000	25
Pump	$40,000	15
Motor	$40,000	10
Electrical Controls and Generator	$40,000	25
Blacklake Interconnection – Booster Station		
Piping	$120,000	25
Pump	$170,000	15
Motor	$170,000	10
Electrical Controls and Generator	$170,000	25
SCADA System Upgrade		
Blacklake	$5,000	4
Town	$15,000	4
SCADA System Replacement		
Blacklake	$40,000	10
Town	$120,000	10

System / Subsystem / Component / Location	Replacement Cost (2007 $)	Service Life (years)
Wastewater		
Lift Stations		
Wet Well Replacement	$144,000	50
Site Piping, lids, etc.	$25,000	25
Electrical and Controls	$6,000	25
SCADA upgrade	$6,000	4
Pumps		
Tefft	$28,000	10
other locations	$20,000	10
Motors		
Tefft	$42,000	10
other locations	$30,000	10
Wastewater Treatment Plants		
Flow Meter		
Blacklake WWTF	$20,000	15
Southland WWTF	$55,000	15
Piping and valves		
Blacklake WWTF	$50,000	25
Southland WWTF	$200,000	25
Grinder		
Blacklake WWTF (2 @)	$20,000	10
Southland WWTF (2 @)	$44,000	10
Lift Station Pump		
Blacklake WWTF (2 @)	$20,000	10
Southland WWTF (2 @)	$28,000	10
Lift Station Motors		
Blacklake WWTF (2 @)	$15,000	10
Southland WWTF (2 @)	$20,000	10
Pond Liners		
Blacklake WWTF - 3 ponds @	$51,000	15
Southland WWTF - 4 ponds @	$146,000	15
Electrical and Controls		
Blacklake WWTF	$50,000	25
Southland WWTF	$480,000	25

System / Subsystem / Component / Location	Replacement Cost (2007 $)	Service Life (years)
Aerator Electrical Connections (per aerator)	$3,000	25
Aerators (each)	$6,000	15
Auto-Sampler	$5,000	15
Backup Power	$80,000	25
SCADA System		
System Upgrade		
Blacklake	$5,000	4
Town	$15,000	4
Replace System		
Blacklake	$40,000	10
Town	$120,000	10

Table 3-2
Replacement Cost Estimates and Probable Service Lives for Pipeline Assets

Service Life (in years)	
80	PVC Pipelines
55	AC Pipelines
80	DIP and CIP Pipelines
Water Pipeline Unit Cost (includes pavement repair, new services, new hydrants, valves, engineering, and contingency.)	
Diameter (inches)	Unit Cost ($/foot in 2007)
6	160
8	160
10	170
12	240
14	260
16	310
18	330
20	400
24	450
Sewer Pipeline Unit Cost (includes manholes)	
Diameter (inches)	Unit Cost ($/foot in 2007)
Force Mains	
6	150
8	160
10	170
12	240
Gravity Mains	
6	210
8	210
10	240
12	270
15	310
18	360
21	420
24	470
27	540
30	610
36	760

4.0 Replacement Schedules and Costs

4.1 Overview

In this section, the inventory information from **Section 2** is combined with the replacement costs and life expectancies established in **Section 3** to determine:

- The Estimated Present Replacement Cost (i.e., the cost to replace each asset now);
- The Projected Future Replacement Cost (i.e., the present replacement cost with an inflation rate applied until the end of each asset's "life");
- The Required Annual Savings Rate to replace each asset (i.e., a constant series of annual set-asides accruing interest at an assumed interest rate);
- The Required Present Value of Accrued Annual Savings (i.e., the amount of money which should now be in a savings account allocated for future replacement projects); and
- The Remaining Service Life as a fraction of total system service life.

The amounts expressed are in terms of present worth dollars, as of December, 2007. The assumed interest rate for savings is 4.5%. The assumed inflation rate is 3.0%.

4.2 Funding Programs

Many different approaches to funding asset replacement costs are possible. To assist the District in determining the preferred funding approach, three different funding programs are developed. These programs are described below.

4.2.1 Model 1: 20 Year Savings Program

"Single year" costs are predicted costs which are based on the assumption that each asset will need replacement during the year it reaches the end of its assumed service life. However, single-year costs are not likely to be encountered in actual practice. For example, all the water pipe installed in 1966 with an estimated service life of 55 years will not be replaced in the year 2021. Some pipes will require replacement earlier, and some will require replacement later. Therefore, under Model 1 single year costs are "spread" over a period defined by a normal cumulative probability function with a standard deviation of 3 years. This "spreading" results in 90% of the replacements occurring within ±5 years of the end of service life.

These spread costs are funded by setting up a savings program that begins to save for each year's anticipated costs 20 year in advance. The savings rate is structured so that a constant amount is saved each of those 20 years. Every year the rate of savings increases or decreases depending on the anticipated costs 20 years hence, and the anticipated cost in the present year. The required accumulated savings balance can also increase or decrease year to year.

4.2.2 Model 2: Service Life Savings Program

Under Model 2, single year costs are funded by saving over each asset's service life. For example, if an asset has a service life of 10 years, a 10-year savings program is started the year the asset is placed in service. Likewise, an asset with an 80 year service life will require an 80-year savings program. Therefore, at any particular time the District will be saving for costs anticipated 1 to 80 years hence, at a variety of savings rates. (Note that in order to simplify calculations, single year costs are not "spread" in this model. The resulting long-term savings programs for the assets overlap and result in an aggregated savings program that effectively spreads the annual savings requirements.)

The savings rate for a particular asset remains constant until the asset is replaced. When the asset is replaced the savings rate increases to account for the anticipated future replacement cost increase due to inflation. As can be seen from the Figures 4-2 and 4-3, the savings rate under Model 3 always increases because replacement costs are assumed to always increase due to inflation.

4.2.3 Model 3: Pay-as-you-go Set-Aside Program

Under Model 3 single year costs are "spread" over a period defined by a normal cumulative probability function with a standard deviation of 3 years (as in Model 1). This results in 90% of the replacements occurring within ±5 years of the end of service life.

Each year "set-aside" sufficient funds to cover that year's predicted costs. The resulting set-aside rates will vary from year to year. Because this model is not a "savings" program, no accrued savings are required.

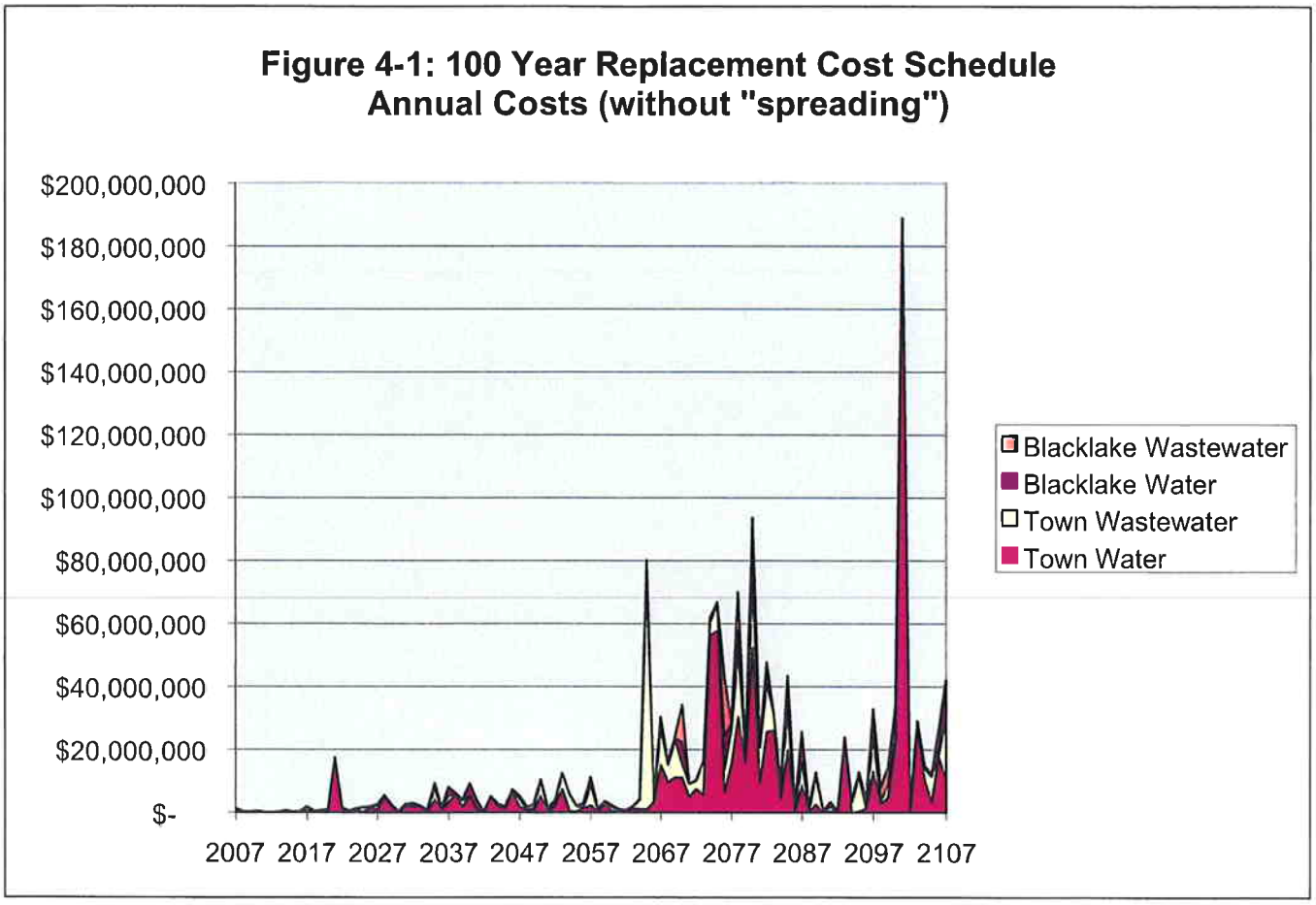
Model 3 may function as a "savings" program if actual replacement costs are less than predicted replacement costs. In this case, the excess funds could then be retained to earn interest and to fund subsequent replacement needs, or reduce subsequent annual set-asides.

The development of these funding models is discussed below.

4.3 Replacement Cost Schedule Development and Results

4.3.1 Single Year Costs

The simplest approach for cost scheduling assumes that each asset will be replaced during the year that it reaches the end of its service life. Under this assumption, the expected replacement cost schedule for the next 50 years is shown below.



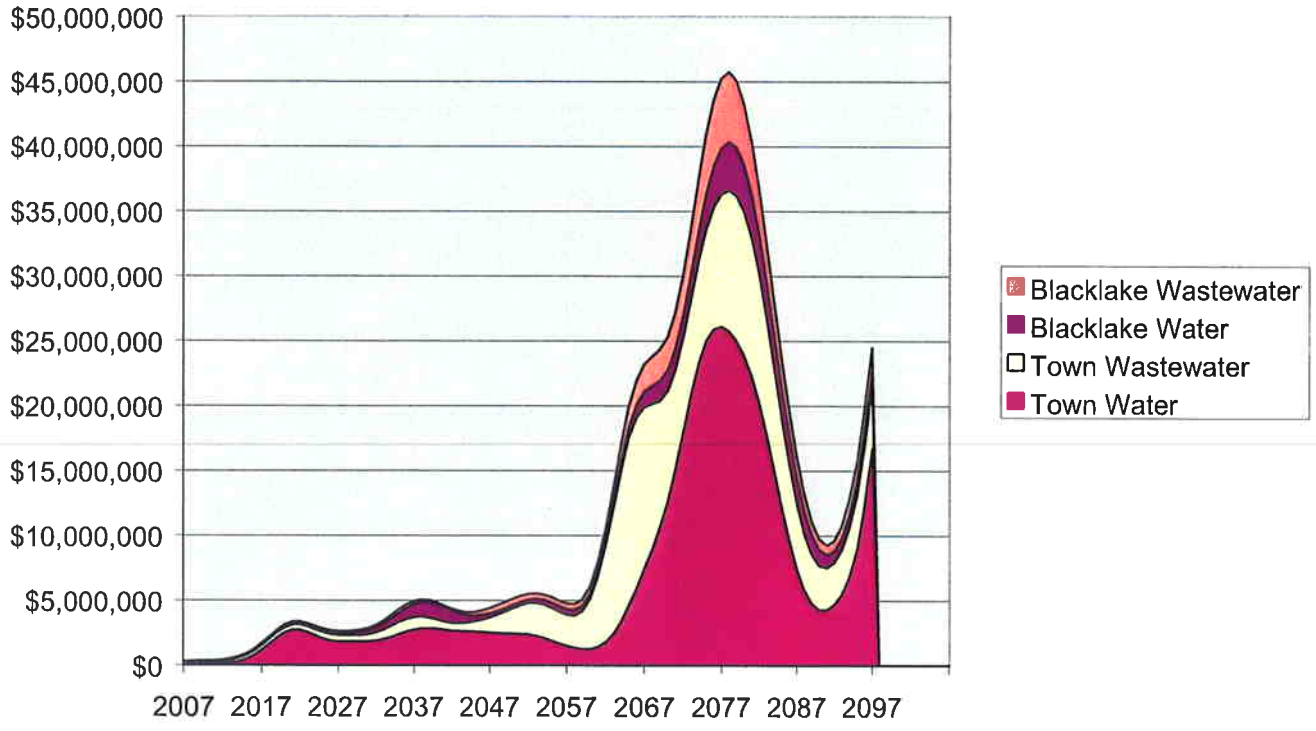
The first large spike in replacement costs in the year 2021 corresponds to the end of the 55 year service life of the ACP water pipes installed in 1966. The next large spike in 2065 corresponds to replacement of the PVC sewer pipes installed in 1985. The increased costs between 2065 and 2085 correspond to replacement of PVC pipes installed between 1985 and 2005.

These costs are used as inputs to Model 2, the Service Life Savings Program.

4.3.2 "Spread" Costs

In reality, some system components will need to be replaced earlier than predicted, while others will not need to be replaced for much longer. To account for this variability in replacement date, replacement costs shown above were averaged using a normal probability distribution with a standard deviation of 3 years. Under this "spread" model, 90% of costs occur within ±5 years of the specified date, resulting in the replacement cost schedule shown below.

Figure 4-2: 100 Year Replacement Cost Schedule - Costs Spread with 10-Year Normal Curve



These "spread" replacement cost schedules show distinct "humps", but the annual costs are lower than the single-year model. (These "10-year spread" cost estimates do not extend past 2097 because the calculations were based on single-year cost estimates through 2107.)

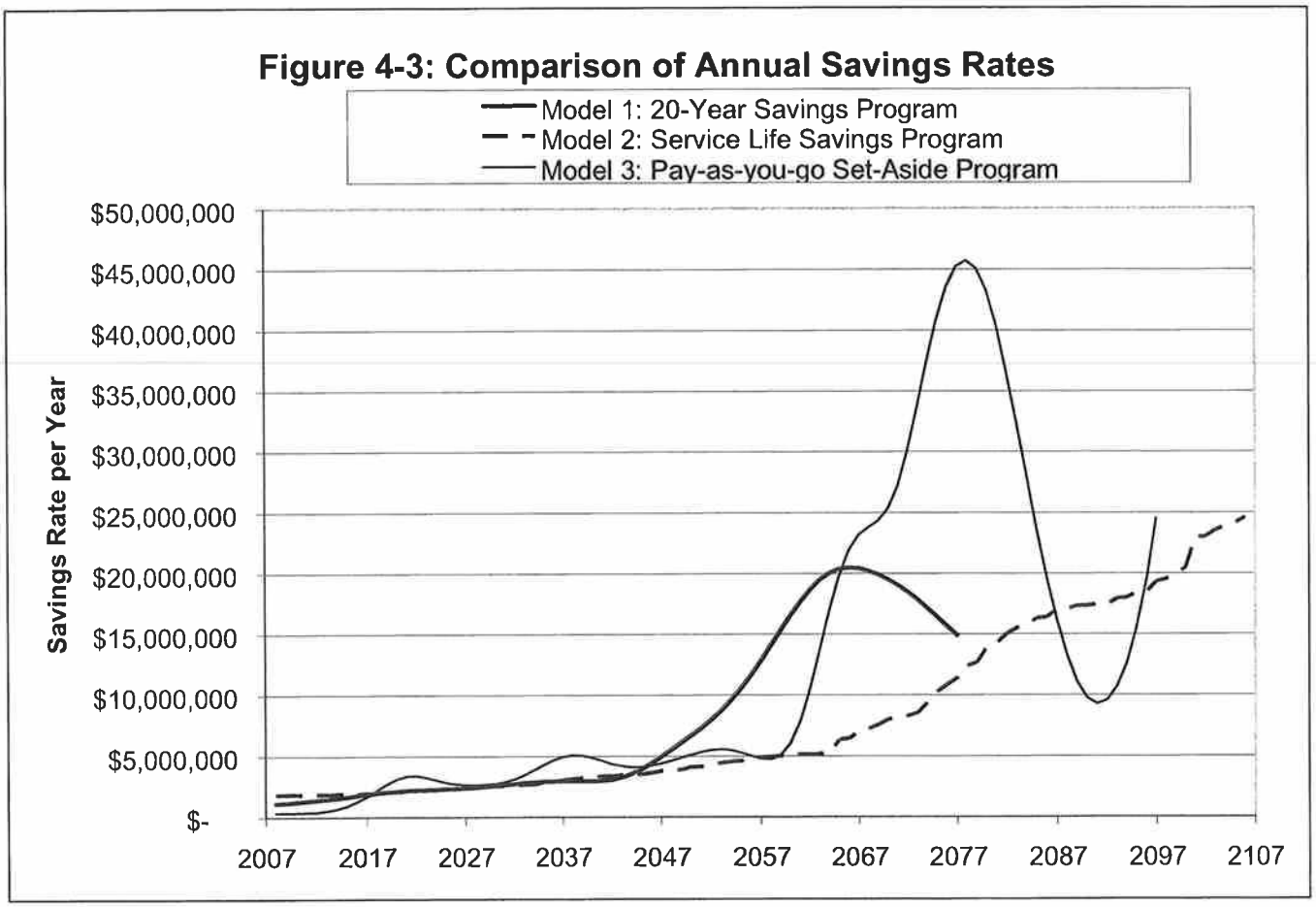
The first significant replacement cost peak is expected to occur around the year 2021 when the asbestos cement (AC) water pipe installed in 1966 is replaced after its 55 year life span. The second peak occurs near 2040 and will be caused by the need to replace AC pipe which was installed in the Town and Blacklake divisions during the late 1980s. The much larger peaks in 2065 and 2080 are the expected replacement of the PVC water and wastewater pipes installed 1985 and 2000.

These "spread" costs are used as inputs to Model 1, the 20-Year Savings Program, and to Model 3, the Pay-as-you-go Set-Aside Program.

4.4 Savings and Set-Aside Schedules

As noted above, three different savings models are presented to either account for the need to build up savings for future replacement of assets, or to set-aside the amount predicted to be needed for asset replacement during the present year. The required savings or set-aside rates for the next 100 years under these models are shown below.

Figure 4-3: Comparison of Annual Savings Rates



Savings rates rise gradually under Model 1, the 20-year Savings Program, for the next 35 year, and then increase fairly rapidly to meet significant replacement costs expected in 2065. Model 2 rises gradually until 2065, and then rises more rapidly. Model 3, the Pay-as-you-go Set-Aside Program represents an estimate of the annual replacement costs and fluctuates more rapidly than the other values.

Of greater interest are the *near term* savings rates and accrued savings balances that are required under these models, as shown below.

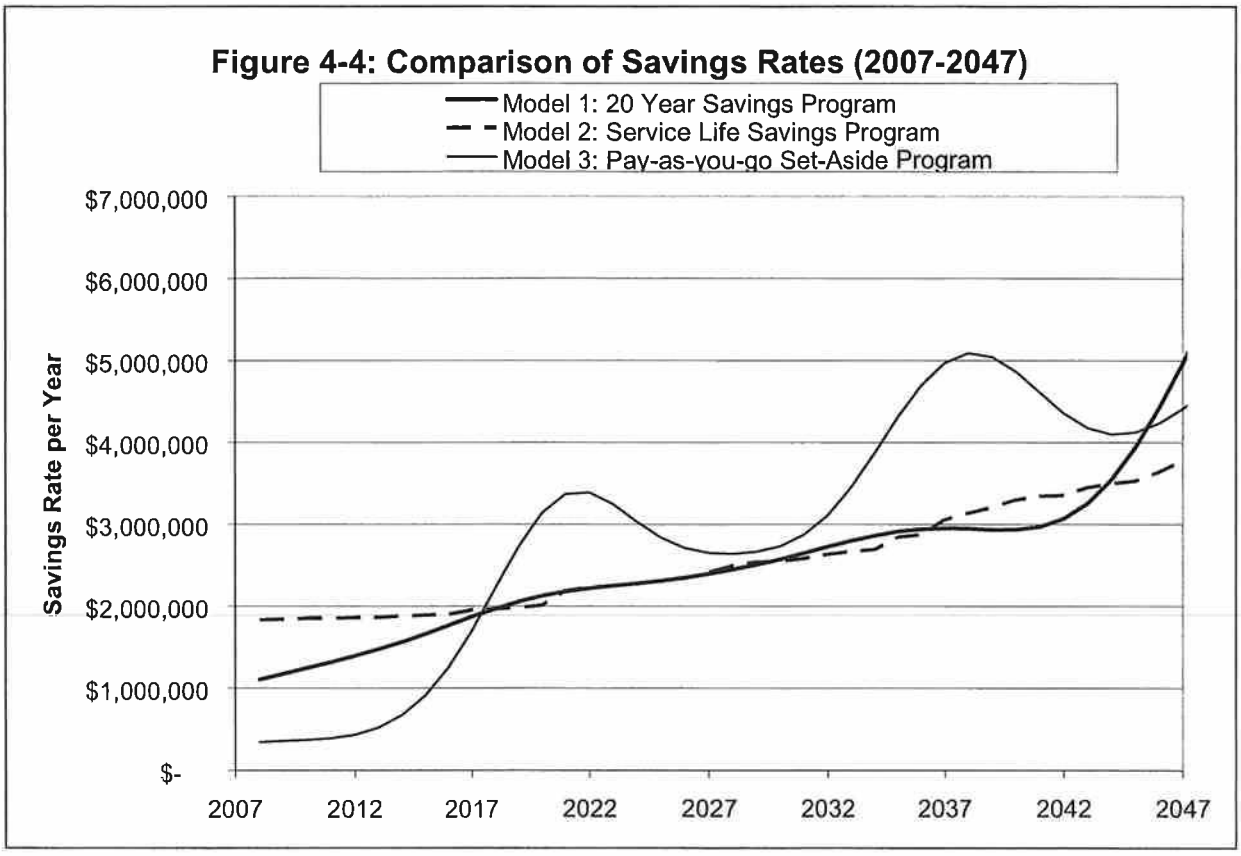


Figure 4-4: Comparison of Savings Rates (2007-2047)
Model 1: 20 Year Savings Program
Model 2: Service Life Savings Program
Model 3: Pay-as-you-go Set-Aside Program
Savings Rate per Year
$7,000,000
$6,000,000
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
$-
2007
2012
2017
2022
2027
2032
2037
2042
2047

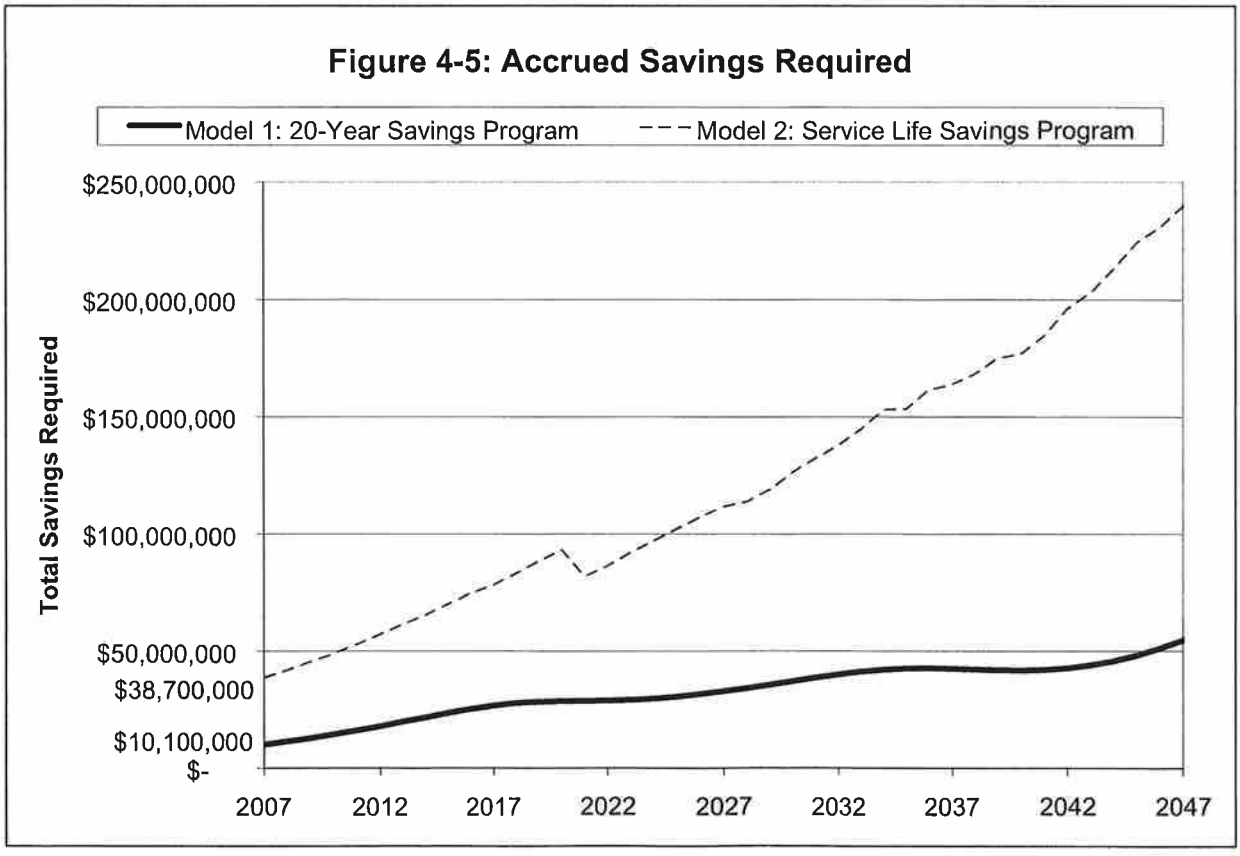


Figure 4-5: Accrued Savings Required
Model 1: 20-Year Savings Program
Model 2: Service Life Savings Program
Total Savings Required
$250,000,000
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$38,700,000
$10,100,000
$-
2007
2012
2017
2022
2027
2032
2037
2042
2047

Under the 20-year Savings Program (Model 1) approximately $10 million should be accrued by the year 2007 for future replacements. Under the Service Life Savings Program (Model 2), approximately $40 million should be accrued by this time. These amounts represent the funds the District would have in savings *if* the savings approaches described had been followed since the systems had been installed. (No accrued savings are shown for the Pay-as-you-go Set-Aside Program (Model 3) because under this program sufficient funds are set aside each year to pay for *that year's* scheduled replacements and no savings accrue.)

To factor out the effect of inflation, annual replacement costs and accumulated savings as a fraction of total system replacement cost are shown below. As can be seen, all three models require a savings rate equal to approximately 1% of the total system replacement cost. Model 1 requires accumulated savings of between 7% and 15% of total replacement cost, while Model 2 requires accumulated savings of between 30% and 55% of total replacement cost.

Figure 4-6: Annual Savings (or Costs) as Percent of Total System Replacement Cost

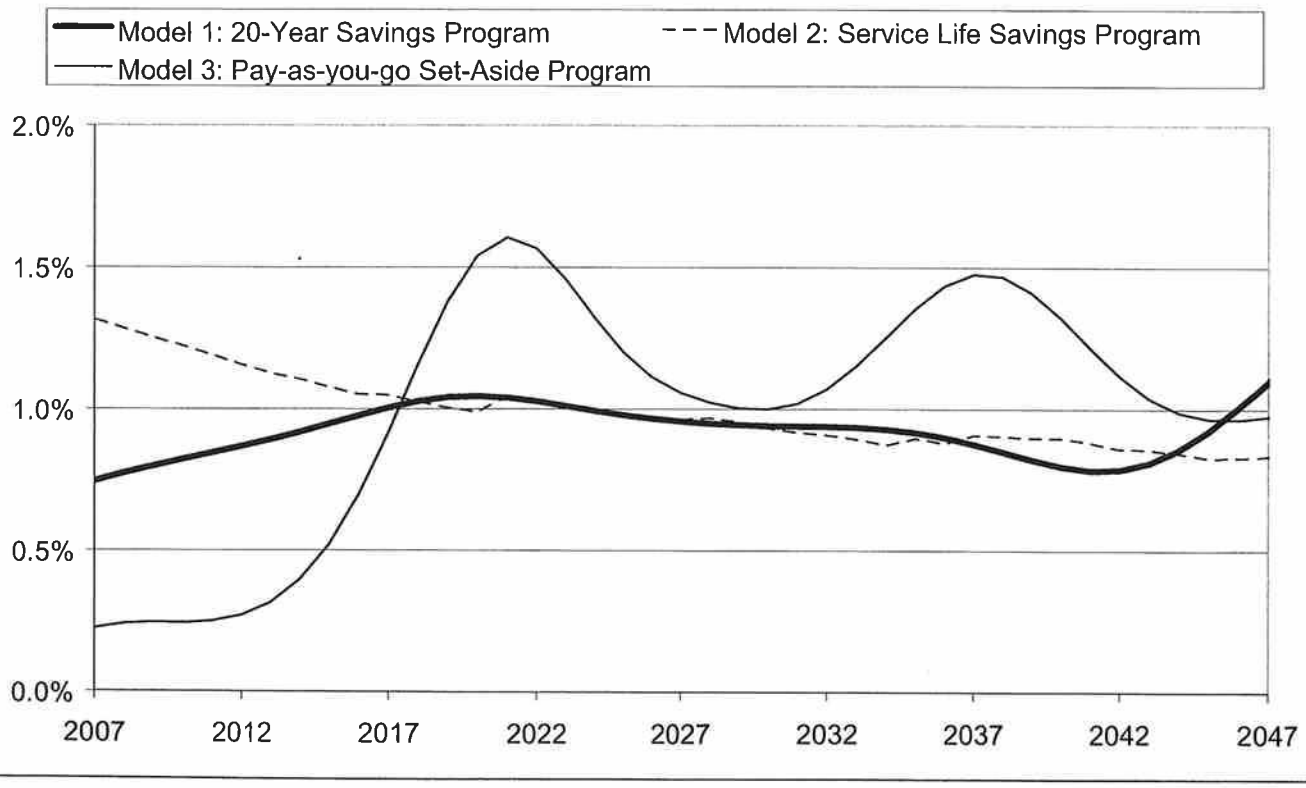
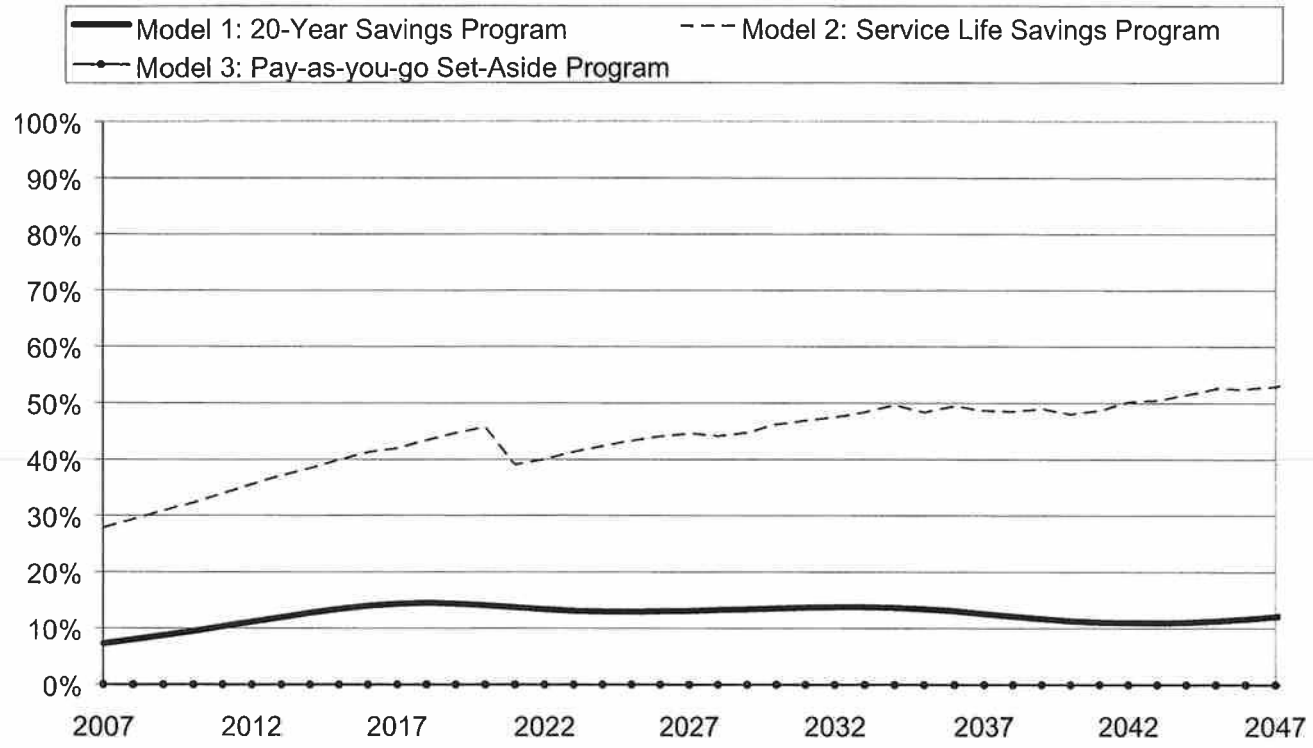


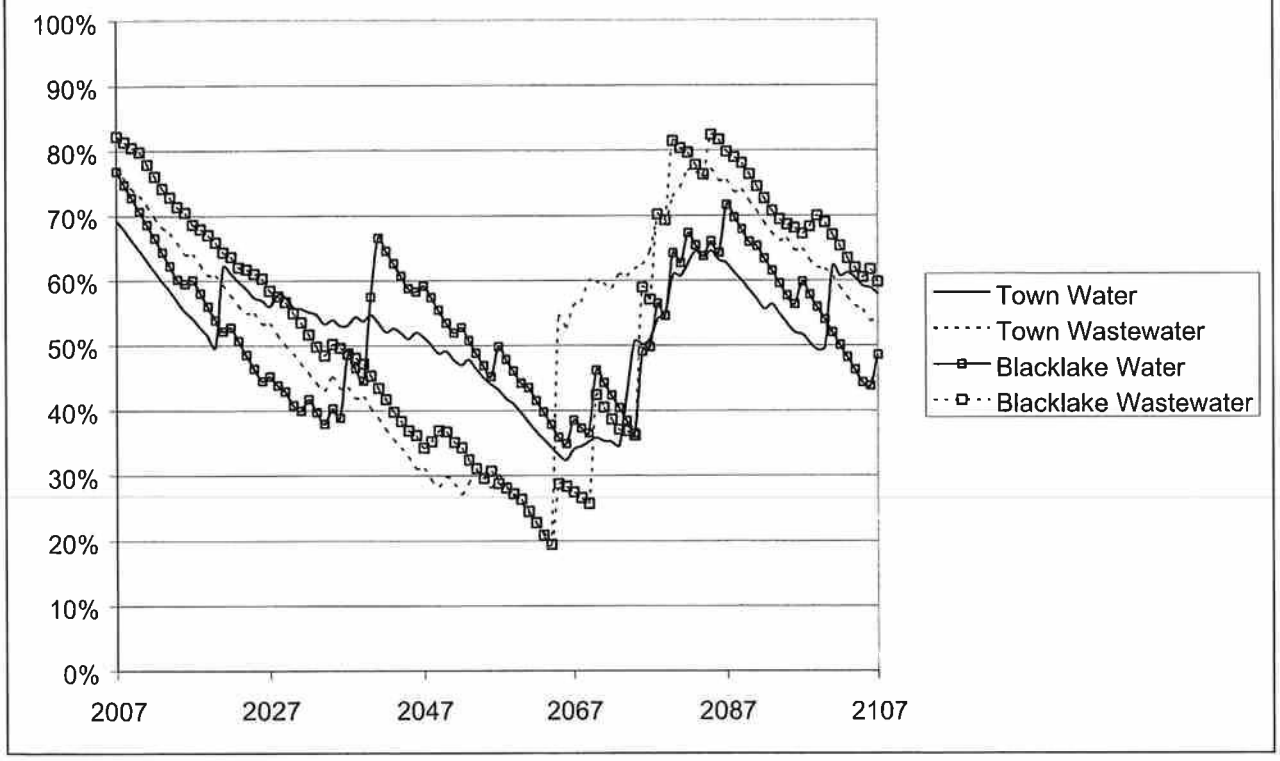
Figure 4-7: Accumulated Savings as Percent of Total System Replacement Cost

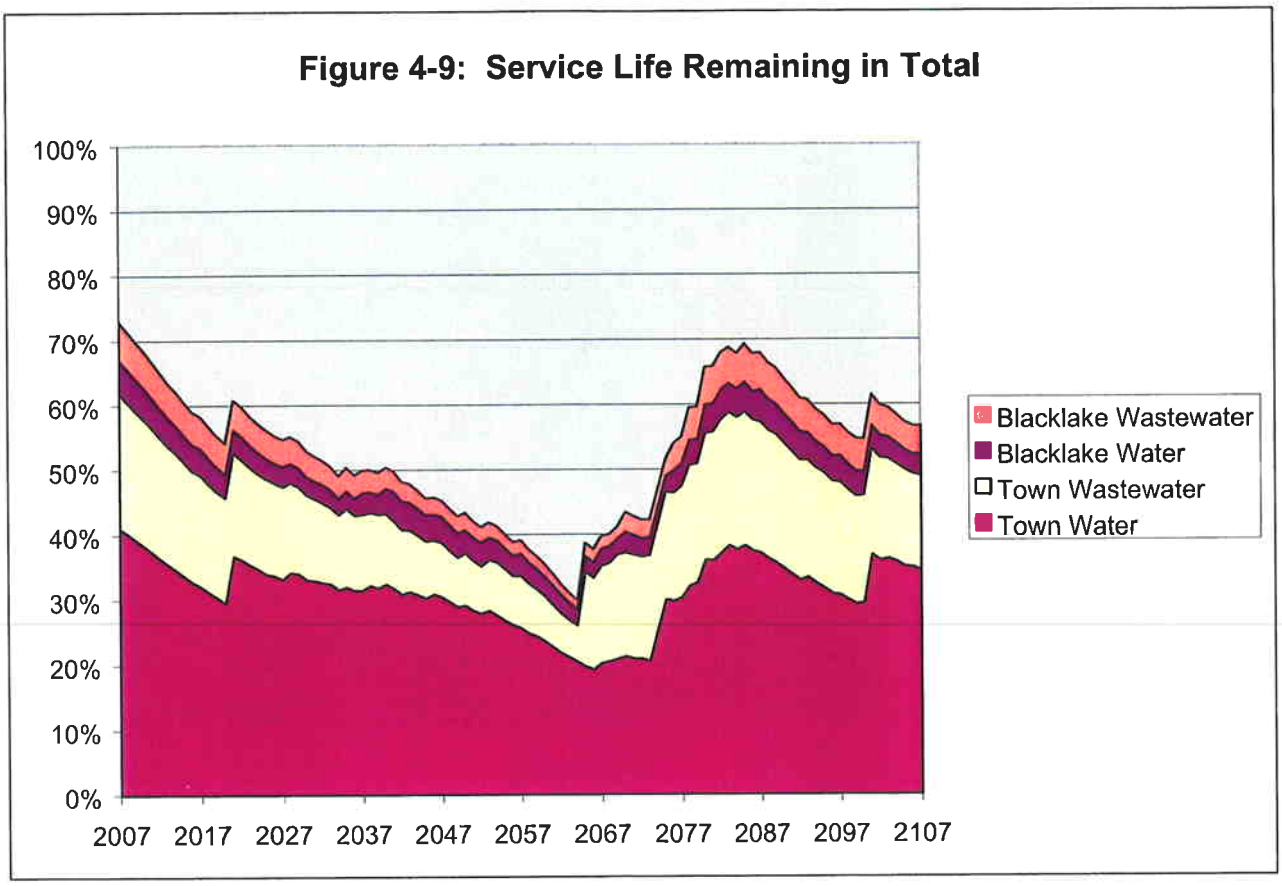


The amount of Service Life remaining within each division, and within the combined system, is shown below. These calculation were performed assuming each asset is replaced at the end of its service life (i.e., no cost "spreading" was applied) and each asset "ages" in a linear manner. For example, the calculations assume that an asset with a 20-year service life will be replaced exactly 20 years after being placed in service, and that after 15 years 25% of its Service Life remains. Therefore the curves are more erratic than expected in actual practice. However, several observations can be made regarding the "age" of the system:

- The assets are relatively "young". Each division has between 70% and 83% of its overall Service Life remaining.
- Significant renewals are anticipated where the curves show a sharp upward movement. The Town Water division can expect to see significant renewals around the year 2020, and the Blacklake Water division can expect significant renewals around the year 2040.
- The 20-year period starting in approximately 2065 will see significant renewal of the system as a whole

Figure 4-8: Fraction of Service Life Remaining by Division





A spreadsheet detailing these calculations is contained in Appendix F.

Key findings for the separate divisions are summarized below.

4.5 Water – Town System

- 2007 Replacement Cost: $82,000,000

Year	Pay-as-you-go Set-Aside Program (Model 3)	20-Year Savings Program (Model 1)		Service Life Savings Program (Model 2)	
	Annual Set-Aside Rate	Annual Savings Rate	Required Value of Accrued Savings	Annual Savings Rate	Required Value of Accrued Savings
2007	$114,000	$750,000	$6,700,000	$950,000	$26,000,000
2008	120,000	800,000	7,700,000	$960,000	$28,000,000
2009	120,000	850,000	8,900,000	$960,000	$30,000,000
2010	117,000	910,000	10,200,000	$960,000	$32,000,000
2011	125,000	960,000	11,600,000	$960,000	$35,000,000
2012	148,000	1,010,000	13,000,000	$960,000	$37,000,000
2013	203,000	1,070,000	14,600,000	$960,000	$40,000,000
2014	312,000	1,120,000	16,100,000	$970,000	$43,000,000
2015	500,000	1,180,000	17,600,000	$970,000	$45,000,000
2016	793,000	1,240,000	18,900,000	$970,000	$48,000,000
2017	1,195,000	1,290,000	20,000,000	$990,000	$51,000,000

4.6 Water – Blacklake System

- 2007 Replacement Cost: $9,600,000

Year	Pay-as-you-go Set-Aside Program (Model 3)	20-Year Savings Program (Model 1)		Service Life Savings Program (Model 2)	
	Annual Set-Aside Rate	Annual Savings Rate	Required Value of Accrued Savings	Annual Savings Rate	Required Value of Accrued Savings
2007	$12,000	$44,000	$470,000	$171,000	$2,300,000
2008	13,000	49,000	530,000	171,000	2,600,000
2009	14,000	55,000	610,000	171,000	2,900,000
2010	16,000	61,000	690,000	171,000	3,200,000
2011	21,000	69,000	780,000	172,000	3,500,000
2012	29,000	78,000	880,000	172,000	3,900,000
2013	40,000	89,000	980,000	172,000	4,200,000
2014	55,000	103,000	1,100,000	172,000	4,600,000
2015	70,000	119,000	1,220,000	172,000	5,000,000
2016	83,000	139,000	1,360,000	177,000	5,200,000
2017	92,000	163,000	1,520,000	186,000	5,200,000

4.7 Wastewater – Town System

- 2007 Replacement Cost: $37,000,000

Year	Pay-as-you-go Set-Aside Program (Model 3)	20-Year Savings Program (Model 1)		Service Life Savings Program (Model 2)	
	Annual Set-Aside Rate	Annual Savings Rate	Required Value of Accrued Savings	Annual Savings Rate	Required Value of Accrued Savings
2007	$140,000	$190,000	$2,300,000	$540,000	$8,500,000
2008	160,000	200,000	2,500,000	540,000	9,400,000
2009	170,000	210,000	2,600,000	550,000	10,300,000
2010	180,000	220,000	2,800,000	560,000	11,000,000
2011	190,000	230,000	3,000,000	560,000	12,000,000
2012	200,000	240,000	3,200,000	560,000	13,100,000
2013	220,000	250,000	3,300,000	560,000	14,100,000
2014	250,000	270,000	3,500,000	570,000	14,900,000
2015	280,000	290,000	3,700,000	580,000	16,000,000
2016	300,000	310,000	3,900,000	580,000	17,300,000
2017	330,000	330,000	4,100,000	610,000	17,700,000

4.8 Wastewater – Blacklake System

- 2007 Replacement Cost: $9,900,000

Year	Pay-as-you-go Set-Aside Program (Model 3)	20-Year Savings Program (Model 1)		Service Life Savings Program (Model 2)	
	Annual Set-Aside Rate	Annual Savings Rate	Required Value of Accrued Savings	Annual Savings Rate	Required Value of Accrued Savings
2007	$43,000	$55,000	$660,000	$159,000	$1,800,000
2008	51,000	58,000	700,000	162,000	2,000,000
2009	55,000	61,000	740,000	165,000	2,100,000
2010	56,000	63,000	790,000	168,000	2,300,000
2011	55,000	65,000	840,000	168,000	2,500,000
2012	55,000	68,000	890,000	168,000	2,800,000
2013	56,000	71,000	950,000	168,000	3,100,000
2014	61,000	75,000	1,020,000	170,000	3,400,000
2015	69,000	80,000	1,080,000	171,000	3,600,000
2016	78,000	86,000	1,140,000	175,000	3,900,000
2017	88,000	91,000	1,200,000	175,000	4,200,000

4.9 Discussion – Projections vs. Recent Costs and Savings

The projected replacement costs and required savings and set-asides listed above are compared to recent expenses from District Replacement Funds, annual allocations to these funds, and current balances in these funds.

Table 4-1: Recent and Predicted Replacement Costs

Fund	Replacement Costs				Predicted 2007 "Spread" Costs (used in Model 1 and Model 3)
	2005/06 (actual)	2006/07 (estimated)	2007/08 (budgeted)	3-year Average	
#800 – Town Water	$150,322	$50,000	$392,000	$197,441	$114,000
#810 – Town Sewer	114,937	0	351,000	155,312	140,000
#820 – Blacklake Water	27,638	50,000	-	38,819	12,000
#830 – Blacklake Sewer	238,839	0	40,000	92,946	43,000
Combined Total	$531,736	$100,000	$783,000	$471,579	$309,000

This table shows that predicted 2007 replacement costs are in line with recent actual, estimated, and budgeted costs, and may underestimate actual costs slightly. This "reality check" provides assurance that the underlying cost estimates and service life assumptions used in this study are reasonable.

Table 4-2: Budgeted and Modeled Replacement Funding

Fund	Budgeted Replacement Funding			2007 Savings or Set-Aside		
	2005/06	2006/07	2007/08	20-Year Savings (Model 1)	Service Life Savings (Model 2)	Pay-as-you-Go Set-Asides (Model 3)
#800 – Town Water	$93,678	$88,000	$392,000	$750,000	$950,000	$114,000
#810 – Town Sewer	200,738	256,000	351,000	190,000	540,000	140,000
#820 – Blacklake Water	-	-	-	44,000	171,000	12,000
#830 – Blacklake Sewer	34,000	23,000	40,000	55,000	159,000	43,000
Combined	328,416	367,000	783,000	1,039,000	1,820,000	$309,000

Examination of this table leads to the following observations:

- Recent Town Water replacement *funding* rates are in line with the Pay-as-you-go Program, but are far short of the annual savings needed for either the 20-year Savings Program or the Service-Life Savings Program.

- Recent Town Sewer replacement *funding* rates exceed the Pay-as-you-go Program and the 20-year Savings Program, but are insufficient to be considered a Service-Life Savings Program.
- There have been no additional funds allocated for Blacklake Water asset replacement within the last three fiscal years.
- Recent Blacklake Sewer replacement funding rates are slightly below the Pay-as-you-go Program and the 20-year Savings Program, and significantly lower than the Service-Life Savings Program.
- Looking at all four systems together, funding allocated in 2005/06 and in 2006/07 was very close to the Pay-as-you-go Program. The 2007/08 budget rate approaches the 20-year Savings Program, but is far below the savings rate needed for the Service-Life Savings Program.

Table 4-3: Modeled Replacement Funding as percent of 2007/08 Operating Budget

Fund	2007/2008 Budgeted Operating Revenue	Annual Replacement Funding as Percent of Operating Revenue		
		20-Year Savings (Model 1)	Service Life Savings (Model 2)	Pay-as-you-Go Set-Asides (Model 3)
#800 – Town Water	$2,393,000	31%	40%	5%
#810 – Town Sewer	829,000	23%	65%	17%
#820 – Blacklake Water	378,000	12%	45%	3%
#830 – Blacklake Sewer	245,000	22%	65%	18%
Combined	$3,845,000	27%	47%	8%

Examination of this table leads to the following observations:

- When taken as a combined system, replacement funding levels for 2007 should equal between 8% and 47% of the system's operating budget.
- The sewer divisions' replacement funding needs are larger in comparison to their operating budgets than the water divisions' replacement funding needs.
- At the present time the Pay-as-you-go Program (Model 3) requires a lower set-aside rate than the savings programs.

Because the 20-Year Savings Program and the Service-Life Savings Program make use of interest earned on accrued savings, the preceding discussion of savings rates is incomplete without a consideration of accrued savings. This information is provided below.

Table 4-4: Actual and Modeled Replacement Fund Balances, 7/1/2007

Fund	Balance 7/1/07	Accrued Savings Required		
		20-Year Savings (Model 1)	Service Life Savings (Model 2)	Pay-as-you-Go Set-Asides (Model 3)
#800 – Town Water	$1,954,212	$6,700,000	$26,000,000	$0
#810 – Town Sewer	2,755,915	2,300,000	8,500,000	0
#820 – Blacklake Water	349,170	470,000	2,300,000	0
#830 – Blacklake Sewer	(26,123)	660,000	1,800,000	0
Combined Total	$5,033,174	10,130,000	38,600,000	$0

As a combined total, the balances shown are insufficient for either of the two savings programs noted. When considered separately, this conclusion remains valid, with the exception of the Town Sewer system. More than sufficient funds are accrued to adopt the 20-year Savings Program for the Town Sewer System, although insufficient funds are available to adopt the Service Life Savings Program.

5.0 Funding Alternatives

5.1 General

This section discusses the funding programs described above, presents advantages and disadvantages, and provides a sensitivity analysis.

5.1.1 Comparison of the Funding Programs

The funding programs are summarized and compared in the following table.

Table 5-1: Funding Model Comparison

Consideration	20-Year Savings Savings Program (Model 1)	Service Life Savings Program (Model 2)	Pay-as-you-Go Set-Aside Program (Model 3)
Annual Savings or Set-Aside Rate - Initial Rate	Medium	High	Low
Annual Savings or Set-Aside Rate - Variability	Medium variability. Required savings rate is at times higher than Model 2 savings rate.	Low variability, but the rate always rises.	High variability. In some years the required set-aside will exceed Model 1 and Model 2 savings rates.
Accumulated Savings Required	Medium	High	(None)
Cost Allocation	Allocated to users during last 20 years of service life.	Allocated to users over full service life.	None - "pay as you go" aspect allocates cost to all existing users of the system.

5.1.2 Sensitivity Analysis

The funding models are based on the following assumptions:

1. 2007 Replacement Cost as estimated elsewhere in this report.
2. Service Life in years as estimated elsewhere in this report.
3. The Inflation Rate which is applied to replacement costs is assumed to be a constant value of 3.00%.
4. The Return on Savings which is applied to saved funds is assumed to be a constant value of 4.50%.

5. "Single year" costs in Models 1 and 3 are "spread" over a period defined by a normal cumulative probability function with a standard deviation of 3 years.

To determine the sensitivity of the models' results to these assumptions, each of these assumptions (except Replacement Cost) was increased by 10% of its value and the results of the "perturbed" model are compared to the original model. (Service Life values were increased by whole year increments, or at least one year.) Results are shown in Appendix C and discussed below.

Replacement Cost was not subjected to sensitivity analysis because the model is linear with regards to this variable. In other words, a 10% across-the-board increase in the Replacement Cost assumption would translate into a 10% increase in all costs for all models.

Key results of the sensitivity analysis include:

- As expected, extending the assumed Service Life for all assets will generally lower costs. However, because each component is replaced later, inflation will increase the eventual cost of replacement. Models 1 and 3 are more sensitive to changes in Service Life because the "shape" of the replacement cost schedule will change. ("Peaks" may become "valleys" and vice versa.) Under Model 2 a 10% increase in Service Life will translate into a fairly consistent 10% drop in required savings rate for the next 50 years.

- As expected, an increase in the assumed Inflation Rate will result in higher costs. Model 1 is less sensitive than Model 2 to a change in inflation rate, although under both models annual savings rates will be between 20% and 25% higher in 2060 than under the original assumption. Model 3 is least sensitive to changes in Inflation Rate.

- As expected, an increase in the assumed Return-on-Savings Rate will generally lower costs. If Model 1 is used, then a 10% increase in the assumed Return-on-Savings Rate results in a 5% decrease in the required savings rate. If Model 2 is used, a 10% increase in the assumed Return-on-Savings Rate will result in required savings rates 11% to 16% lower than the original analysis.

- Increasing the "spread" (i.e., the uncertainty in replacement year for individual components) by 10% has a negligible (-1% to +2%) impact on Model 1 savings rates, no impact on Model 2 (because "spread" is not used). The effect on Model 3 will be to make any particular year's cost between 5% lower and 14% higher than under the original analysis, but the overall effect is negligible.

6.0 Conclusions and Recommendations

6.1 Conclusions

The three funding programs presented in this report offer a range of approaches to the challenge of providing sufficient funds to replace system components when they reach the end of their service lives. Key findings are summarized below.

Table 6-1: Implications the Savings or Set-Aside Programs

Savings or Set-Aside Approach	Reasons for Adopting this Model	Implications of Adopting this Model
20-Year Savings Program (Model 1) Save 20 years in advance of expected costs.	A 20 year planning horizon may be sufficient for planning purposes.	A moderate, but fluctuating, annual savings rate will be required. The required savings rate is somewhat higher than currently budgeted. A moderate increase in reserves is needed. The required reserves are less than Model 2.
Service-Life Savings Program (Model 2) Begin saving for each asset's eventual replacement as soon as the asset is installed.	This approach spreads the cost of replacement over the life of each asset.	Annual savings rates are more stable than Model 1. A significant increase in reserves and annual saving rates are required.
Pay-as-you-go Set Aside program (Model 3 Use conservative predictions of service life, and assumptions of service life variability, to set aside sufficient funds each year for anticipated replacement needs.	Use of conservative assumptions will result in a build-up of reserves over time.	Highly variable annual set-aside rates. No reserve required.

6.2 Recommendations

Replacement costs are expected to rise significantly within the next 15 to 20 years. The District can reduce the "shock" of these future cost increases by continuing their asset replacement savings program.

Therefore, the Pay-as-you-go Set-Aside Program (Model 3) is not recommended. However, short-term budgetary considerations may preclude annual contributions to a "savings" program. Therefore, the Pay-as-you-go Set-Aside Program may provide a lower bound for a prudent set-aside program. Should the pay-as-you-go approach be adopted, it will be important to accurately predict needed replacement costs in the immediate future.

The most equitable savings approach, the Service-Life Savings Program (Model 2), may be impractical to implement at this time because there are insufficient reserves. However, if over time sufficient reserves accrue, the more stable funding approach of Model 2 should be adopted.

Therefore, Boyle recommends that the District adopt the 20-year Savings Program described by Model 1. To implement this approach, the District will need to adopt the annual savings rates noted, and should also adjust these savings rates upward or downward to bring the reserved fund balance in line with the required balance. The funding approaches detailed below will accomplish this realignment within 10 years.

Table 6-2: Adjusted 20-year Savings Program (Model 1) for Town Water Division

Year	Projected Replacement Costs	Model 1 Annual Savings Rate	Required Reserve Balance	Projected Reserve Balance	Catch-Up Adjustment	Total Adjusted Savings Rate
2007	$114,000	$750,000	$6,700,000	$1,954,212*	$645,000	$1,395,000
2008	120,000	800,000	7,700,000	3,323,152	645,000	1,445,000
2009	120,000	850,000	8,900,000	4,797,693	645,000	1,495,000
2010	117,000	910,000	10,200,000	6,388,590	645,000	1,555,000
2011	125,000	960,000	11,600,000	8,114,076	645,000	1,605,000
2012	148,000	1,010,000	13,000,000	9,959,210	645,000	1,655,000
2013	203,000	1,070,000	14,600,000	11,914,374	645,000	1,715,000
2014	312,000	1,120,000	16,100,000	13,962,521	645,000	1,765,000
2015	500,000	1,180,000	17,600,000	16,043,834	645,000	1,825,000
2016	793,000	1,240,000	18,900,000	18,090,807	645,000	1,885,000
2017	1,195,000	1,290,000	20,000,000	19,996,893	645,000	1,935,000

* Balance 7/1/2007.

Table 6-3: Adjusted 20-year Savings Program (Model 1) for Town Wastewater Division

Year	Projected Replacement Costs	Model 1 Annual Savings Rate	Required Reserve Balance	Projected Reserve Balance	Catch-Up Adjustment	Total Adjusted Savings Rate
2007	$140,000	$190,000	$2,300,000	$2,755,915*	$(50,000)	$140,000
2008	$160,000	$200,000	$2,500,000	2,879,931	(50,000)	$150,000
2009	$170,000	$210,000	$2,600,000	2,999,528	(50,000)	$160,000
2010	$180,000	$220,000	$2,800,000	3,124,507	(50,000)	$170,000
2011	$190,000	$230,000	$3,000,000	3,255,110	(50,000)	$180,000
2012	$200,000	$240,000	$3,200,000	3,391,590	(50,000)	$190,000
2013	$220,000	$250,000	$3,300,000	3,534,211	(50,000)	$200,000
2014	$250,000	$270,000	$3,500,000	3,673,251	(50,000)	$220,000
2015	$280,000	$290,000	$3,700,000	3,808,547	(50,000)	$240,000
2016	$300,000	$310,000	$3,900,000	3,939,932	(50,000)	$260,000
2017	$330,000	$330,000	$4,100,000	4,077,228	(50,000)	$280,000

* Balance 7/1/2007.

Table 6-4: Adjusted 20-year Savings Program (Model 1) for Blacklake Water Division

Year	Projected Replacement Costs	Model 1 Annual Savings Rate	Required Reserve Balance	Projected Reserve Balance	Catch-Up Adjustment	Total Adjusted Savings Rate
2007	$12,000	$44,000	$470,000	$349,170*	$35,000	$79,000
2008	13,000	49,000	530,000	431,883	35,000	84,000
2009	14,000	55,000	610,000	522,317	35,000	90,000
2010	16,000	61,000	690,000	621,822	35,000	96,000
2011	21,000	69,000	780,000	729,804	35,000	104,000
2012	29,000	78,000	880,000	845,645	35,000	113,000
2013	40,000	89,000	980,000	967,699	35,000	124,000
2014	55,000	103,000	1,100,000	1,095,245	35,000	138,000
2015	70,000	119,000	1,220,000	1,227,531	35,000	154,000
2016	83,000	139,000	1,360,000	1,366,770	35,000	174,000
2017	92,000	163,000	1,520,000	1,519,275	35,000	198,000

* Balance 7/1/2007.

Table 6-5: Adjusted 20-year Savings Program (Model 1) for Blacklake Wastewater Division

Year	Projected Replacement Costs	Model 1 Annual Savings Rate	Required Reserve Balance	Projected Reserve Balance	Catch-Up Adjustment	Total Adjusted Savings Rate
2007	$43,000	$55,000	$660,000	$(26,123)	$91,000	$146,000
2008	51,000	58,000	700,000	75,701	91,000	149,000
2009	55,000	61,000	740,000	177,108	91,000	152,000
2010	56,000	63,000	790,000	282,078	91,000	154,000
2011	55,000	65,000	840,000	392,771	91,000	156,000
2012	55,000	68,000	890,000	511,446	91,000	159,000
2013	56,000	71,000	950,000	638,461	91,000	162,000
2014	61,000	75,000	1,020,000	773,192	91,000	166,000
2015	69,000	80,000	1,080,000	912,986	91,000	171,000
2016	78,000	86,000	1,140,000	1,056,070	91,000	177,000
2017	88,000	91,000	1,200,000	1,202,593	91,000	182,000

* Balance 7/1/2007.

The recommended savings rates are converted to a per-customer basis below to show the potential impact to bi-monthly utility rates.

Table 6-6: Recommended Adjusted 20-year Savings Program for All Divisions

Division	Town Water	Town Wastewater	Blacklake Water	Blacklake Wastewater
Customers	3,428	3,055	589	558
Year	**Per-Customer Recommended Bi-Monthly Savings Rate**			
2007	$68	$8	$22	$44
2008	70	8	24	45
2009	73	9	25	45
2010	76	9	27	46
2011	78	10	29	47
2012	80	10	32	47
2013	83	11	35	48
2014	86	12	39	50
2015	89	13	44	51
2016	92	14	49	53
2017	94	15	56	54

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7.0 Information Sources

Nipomo Community Services District, 2008, Geographic Information System database.

Nipomo Community Services District, 2005, 2006, and 2007, District Budget.

The Reed Group, 2007, Nipomo Community Services District, Town Sewer System Financial Plan, User Rates, and Capacity Charges, August 24, 2007.

The Reed Group, 2007, Nipomo Community Services District, Blacklake Sewer System Financial Plan and User Rates, August 24, 2007.

The Reed Group, 2007, Nipomo Community Services District, Combined Water System Financial Plan and User Rates, September 14, 2007.

Reed, Robert, 2008, personal communication, March 4, 2008.

Errata and Clarifications

Errata

Location of Error	Correction
ES-1, last line	"20 year in advance" should be "20 years in advance"
ES-17 and ES-18	"Twin Tanks #1" and "Twin Tanks #2" should be referred to as "Quad Tanks #1" and "Quad Tanks #2".
ES-23, last line	"for the next 50 years" should be "for the next 100 years".

Clarifications

Location of Item	Clarification
ES-11	Well production rates noted are estimated values at the time of installation. Actual production rates may be less.
ES-17 and ES-18	Replacement of SCADA equipment every 4 years applies to periodic system upgrades. Replacement of SCADA equipment every 10 years applies to system replacement at the end of its service life.
ES-42 to ES-44	Tables 6-2 through 6-5. The final column (Total Adjusted Savings Rate) is the sum of the 3rd column (Model 1 Annual Savings Rate) and Column 6 (Catch-Up Adjustment). This is the savings rate that will allow the District to accrue sufficient reserves to implement the Model 1 savings approach within 10 years.

Acronyms

Acronym	Explanation
ACP	Asbestos Cement Pipe
AWWC 900	American Water Works (Association) C-900 water pipe standard for PVC pipe used for municipal water supply
D-3034	American Society for Standards and Measurement (ASTM) standard for PVC pipe for gravity sewers
DIP	Ductile Iron Pipe
GUI	Graphical User Interface
IRS	Internal Revenue Service
SCADA	Supervisory Control And Data Acquisition. The primary purpose of SCADA is to monitor, control and alarm plant or regional operating systems from a central location.
SRF	State Revolving (Loan) Fund
STL	Steel (pipe material code from the District's database)
TDH	Total Dynamic Head = sum of pressure, velocity, and elevation energy components in a pumped fluid. Used to select pumps for specific applications. Each pump has a characteristic "pump curve" that relates flow rate to TDH.
VCP	Vitrified Clay Pipe
WWTP	Wastewater Treatment Plant

Nipomo Community Services District

2007 Water and Sewer Replacement Study

Appendices

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April 2008

BOYLE

1194 Pacific Street, Suite 204, San Luis Obispo, CA 93401

Appendix A – Asset Inventories

Table A-1
Inventory of Non-Pipe Facilities

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Water	Eureka Well	Well and Casing	727 feet deep	1979
Town	Water	Eureka Well	Pump	890 gpm	2006
Town	Water	Eureka Well	Motor/Engine	200 hp	2006
Town	Water	Eureka Well	Electrical and Controls		2006
Town	Water	Eureka Well	Chlorination System		
Town	Water	Eureka Well	Well Building		
Town	Water	Eureka Well	Site Piping		
Town	Water	Via Concha Well	Well and Casing	760 feet deep	1992
Town	Water	Via Concha Well	Pump	750 gpm	1992
Town	Water	Via Concha Well	Motor/Engine	150 hp	2007
Town	Water	Via Concha Well	Electrical and Controls		2007
Town	Water	Via Concha Well	Chlorination System		
Town	Water	Via Concha Well	Well Building		
Town	Water	Via Concha Well	Site Piping		
Town	Water	Bevington #2 Well	Well and Casing	520 feet deep	1985
Town	Water	Bevington #2 Well	Pump	370 gpm	1997
Town	Water	Bevington #2 Well	Motor/Engine	100 hp	2007
Town	Water	Bevington #2 Well	Electrical and Controls		1985
Town	Water	Bevington #2 Well	Chlorination System		
Town	Water	Bevington #2 Well	Well Building		1985
Town	Water	Bevington #2 Well	Site Piping		
Town	Water	Olympic #2 Well	Well and Casing	465 feet deep	1985
Town	Water	Olympic #2 Well	Pump	130 gpm	2007

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Water	Olympic #2 Well	Motor/Engine	30 hp	2007
Town	Water	Olympic #2 Well	Electrical and Controls		1985
Town	Water	Olympic #2 Well	Chlorination System		
Town	Water	Olympic #2 Well	Site Piping		
Town	Water	Church #2 Well	Well and Casing	240 feet deep	1995
Town	Water	Church #2 Well	Pump	100 gpm	2003
Town	Water	Church #2 Well	Motor/Engine	20 hp	2003
Town	Water	Church #2 Well	Electrical and Controls		1985
Town	Water	Church #2 Well	Chlorination System		
Town	Water	Church #2 Well	Site Piping		
Town	Water	Sundale Well	Well and Casing	680 feet deep	1998
Town	Water	Sundale Well	Pump	1000 gpm	2007
Town	Water	Sundale Well	Natural Gas Engine	350 hp	2007
Town	Water	Sundale Well	Electrical and Controls		1999
Town	Water	Sundale Well	Chlorination System		
Town	Water	Sundale Well	Well Building		
Town	Water	Sundale Well	Site Piping		
Town	Water	Knollwood Well	Well and Casing	620 feet deep	2001
Town	Water	Knollwood Well	Pump	240 gpm	2006
Town	Water	Knollwood Well	Motor/Engine		2006
Town	Water	Knollwood Well	Electrical and Controls		
Town	Water	Knollwood Well	Chlorination System		
Town	Water	Knollwood Well	Site Piping		
Town	Water	Dana #1 (Cheyene) Well	Well and Casing	460 feet deep	

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Water	Dana #1 (Cheyene) Well	Pump	100 gpm	
Town	Water	Dana #1 (Cheyene) Well	Motor/Engine		
Town	Water	Dana #2 (Mandi) Well	Well and Casing	468 feet deep	
Town	Water	Dana #2 (Mandi) Well	Pump	100 gpm	
Town	Water	Dana #2 (Mandi) Well	Motor/Engine		
Town	Water	Quad Tanks #1	Tank	0.5 MG	1978
Town	Water	Quad Tanks #1	Exterior Coating		
Town	Water	Quad Tanks #1	Interior Coating		
Town	Water	Quad Tanks #1	Restraint System		n/a
Town	Water	Quad Tanks #1	Cathodic Protection		
Town	Water	Quad Tanks #1	Access Road and Fencing		
Town	Water	Quad Tanks #1	SCADA		
Town	Water	Quad Tanks #1	Site Piping		
Town	Water	Quad Tanks #2	Tank	0.5 MG	1978
Town	Water	Quad Tanks #2	Exterior Coating		
Town	Water	Quad Tanks #2	Interior Coating		
Town	Water	Quad Tanks #2	Restraint System		n/a
Town	Water	Quad Tanks #2	Cathodic Protection		
Town	Water	Quad Tanks #2	SCADA		
Town	Water	Standpipe	Tank	1.0 MG	
Town	Water	Standpipe	Exterior Coating		1993
Town	Water	Standpipe	Interior Coating		1993
Town	Water	Standpipe	Restraint System		
Town	Water	Standpipe	Cathodic Protection		
Town	Water	Standpipe	Access Road and Fencing		
Town	Water	Standpipe	SCADA		

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Water	Standpipe	Site Piping		
Town	Water	Standpipe	Mixing System		
Town	Water	Quad Tank #3	Tank	1.0 MG	2000
Town	Water	Quad Tank #3	Exterior Coating		1999
Town	Water	Quad Tank #3	Interior Coating		1999
Town	Water	Quad Tank #3	Restraint System		2000
Town	Water	Quad Tank #3	Cathodic Protection		
Town	Water	Quad Tank #3	SCADA		
Town	Water	Quad Tank #4	Tank	1.0 MG	2003
Town	Water	Quad Tank #4	Exterior Coating		2003
Town	Water	Quad Tank #4	Interior Coating		2003
Town	Water	Quad Tank #4	Restraint System		2003
Town	Water	Quad Tank #4	Cathodic Protection		
Town	Water	Quad Tank #4	SCADA		
Blacklake	Water	Blacklake #3 Well	Well and Casing	465 feet deep	1988
Blacklake	Water	Blacklake #3 Well	Pump	165 gpm	2006
Blacklake	Water	Blacklake #3 Well	Motor/Engine	30 hp	2006
Blacklake	Water	Blacklake #3 Well	Electrical and Controls		1984
Blacklake	Water	Blacklake #3 Well	Chlorination System		
Blacklake	Water	Blacklake #3 Well	Well Head Meter		2003?
Blacklake	Water	Blacklake #3 Well	Site Piping		
Blacklake	Water	Blacklake #4 Well	Well and Casing	530 feet deep	1989
Blacklake	Water	Blacklake #4 Well	Pump	358 gpm	2007
Blacklake	Water	Blacklake #4 Well	Motor/Engine	50 hp	2007
Blacklake	Water	Blacklake #4 Well	Electrical and Controls		2007
Blacklake	Water	Blacklake #4 Well	Chlorination System		
Blacklake	Water	Blacklake #4 Well	Well Head Meter		2003?
Blacklake	Water	Blacklake #4 Well	Site Piping		

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Blacklake	Water	Blacklake Tank	Tank	0.4 MG	
Blacklake	Water	Blacklake Tank	Exterior Coating		1987
Blacklake	Water	Blacklake Tank	Interior Coating		2001
Blacklake	Water	Blacklake Tank	Restraint System		n/a
Blacklake	Water	Blacklake Tank	Cathodic Protection		2006
Blacklake	Water	Blacklake Tank	Access Road and Fencing		
Blacklake	Water	Blacklake Tank	SCADA		
Blacklake	Water	Blacklake Tank	Site Piping		
Blacklake	Water	Interconnection	Pump	475 gpm	2007
Blacklake	Water	Interconnection	Motor/Engine	50 hp	2007
Blacklake	Water	Interconnection	Electrical and Controls		2007
Blacklake	Water	Generator			
T & BL	W & S	SCADA	Central Control Unit		2004
Town	Wastewater	Southland WWTF	Wet Well		
Town	Wastewater	Southland WWTF	Meter		
Town	Wastewater	Southland WWTF	Grinder		
Town	Wastewater	Southland WWTF	Lift Station Pump	2400 gpm @ 45 ft TDH	
Town	Wastewater	Southland WWTF	Lift Station Motor	35 hp	
Town	Wastewater	Southland WWTF	Electrical Controls		
Town	Wastewater	Southland WWTF	Piping and valves		
Town	Wastewater	Southland WWTF	Aerators	14 (110 hp total)	2005
Town	Wastewater	Southland WWTF	Aerator Electrical		2005
Town	Wastewater	Southland WWTF	Aeration Ponds	4	
Town	Wastewater	Southland WWTF	Pond Liners		
Town	Wastewater	Southland WWTF	Drying Beds	1	
Town	Wastewater	Southland WWTF	Auto-Sampler	1	

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Wastewater	Southland WWTF	Infiltration Basins	8 ponds @ 1.8 acres	
Town	Wastewater	Southland WWTF	Generator		
Town	Wastewater	Tefft St. LS	Wet Well		2005
Town	Wastewater	Tefft St. LS	Pump	430 gpm	2005
Town	Wastewater	Tefft St. LS	Motor		2005
Town	Wastewater	Tefft St. LS	Electrical and Controls		2005
Town	Wastewater	Tefft St. LS	Backup Power		
Town	Wastewater	Tefft St. LS	SCADA		
Town	Wastewater	Tefft St. LS	Site Piping, lids, etc.		
Town	Wastewater	Nipomo Palms LS	Wet Well		
Town	Wastewater	Nipomo Palms LS	Pump	175 gpm	
Town	Wastewater	Nipomo Palms LS	Motor	7.5 hp	
Town	Wastewater	Nipomo Palms LS	Electrical and Controls		2/28/2007
Town	Wastewater	Nipomo Palms LS	SCADA		
Town	Wastewater	Nipomo Palms LS	Site Piping, lids, etc.		
Town	Wastewater	North Oak Glen LS	Wet Well		
Town	Wastewater	North Oak Glen LS	Pump	175 gpm	1999
Town	Wastewater	North Oak Glen LS	Motor	5 hp	
Town	Wastewater	North Oak Glen LS	Electrical and Controls		2007
Town	Wastewater	North Oak Glen LS	SCADA		
Town	Wastewater	North Oak Glen LS	Site Piping, lids, etc.		
Town	Wastewater	Bracken/Primrose LS	Wet Well		
Town	Wastewater	Bracken/Primrose LS	Pump	110 gpm	2003
Town	Wastewater	Bracken/Primrose LS	Motor	7.5 hp	2003

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Wastewater	Bracken/Primrose LS	Electrical and Controls		
Town	Wastewater	Bracken/Primrose LS	SCADA		
Town	Wastewater	Bracken/Primrose LS	Site Piping, lids, etc.		
Town	Wastewater	La Mirada LS	Wet Well		
Town	Wastewater	La Mirada LS	Pump	190 gpm	
Town	Wastewater	La Mirada LS	Motor	5.0 hp	
Town	Wastewater	La Mirada LS	Electrical and Controls		2007
Town	Wastewater	La Mirada LS	SCADA		
Town	Wastewater	La Mirada LS	Site Piping, lids, etc.		
Town	Wastewater	Juniper LS	Wet Well		
Town	Wastewater	Juniper LS	Pump	110 gpm	2004
Town	Wastewater	Juniper LS	Motor	10 hp	
Town	Wastewater	Juniper LS	Electrical and Controls		
Town	Wastewater	Juniper LS	SCADA		
Town	Wastewater	Juniper LS	Site Piping, lids, etc.		
Town	Wastewater	Gardenia LS	Wet Well		
Town	Wastewater	Gardenia LS	Pump	110 gpm	2007
Town	Wastewater	Gardenia LS	Motor	7.5 hp	
Town	Wastewater	Gardenia LS	Electrical and Controls		
Town	Wastewater	Gardenia LS	SCADA		
Town	Wastewater	Gardenia LS	Site Piping, lids, etc.		
Town	Wastewater	Hazel Ln/Tejas LS	Wet Well		1999
Town	Wastewater	Hazel Ln/Tejas LS	Pump	112 gpm	1999
Town	Wastewater	Hazel Ln/Tejas LS	Motor	10 hp	1999
Town	Wastewater	Hazel Ln/Tejas LS	Electrical and Controls		1999
Town	Wastewater	Hazel Ln/Tejas LS	SCADA		

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
Town	Wastewater	Hazel Ln/Tejas LS	Site Piping, lids, etc.		
Town	Wastewater	Honey Grove LS	Wet Well		2001
Town	Wastewater	Honey Grove LS	Pump		2001
Town	Wastewater	Honey Grove LS	Motor		2001
Town	Wastewater	Honey Grove LS	Electrical and Controls		2001
Town	Wastewater	Honey Grove LS	SCADA		
Town	Wastewater	Honey Grove LS	Site Piping, lids, etc.		
Town	Wastewater	Maria Vista LS	Wet Well		2007
Town	Wastewater	Maria Vista LS	Pump		2007
Town	Wastewater	Maria Vista LS	Motor		2007
Town	Wastewater	Maria Vista LS	Electrical and Controls		2007
Town	Wastewater	Maria Vista LS	Backup Power		
Town	Wastewater	Maria Vista LS	SCADA		
Town	Wastewater	Maria Vista LS	Site Piping, lids, etc.		
BlackLake	Wastewater	Blacklake WWTF	Wet Well		
BlackLake	Wastewater	Blacklake WWTF	Flow Meter		2005
BlackLake	Wastewater	Blacklake WWTF	Grinder		2005
BlackLake	Wastewater	Blacklake WWTF	Electrical Controls		
BlackLake	Wastewater	Blacklake WWTF	Connecting Piping		
BlackLake	Wastewater	Blacklake WWTF	Aerators	5	2006
BlackLake	Wastewater	Blacklake WWTF	Aerator Electrical		2006
BlackLake	Wastewater	Blacklake WWTF	Ponds		
BlackLake	Wastewater	Blacklake WWTF	Pond #1 Liner		
BlackLake	Wastewater	Blacklake WWTF	Pond #2 Liner		2005
BlackLake	Wastewater	Blacklake WWTF	Pond #3 Liner		2007
BlackLake	Wastewater	Blacklake WWTF	Backup Power		
BlackLake	Wastewater	Misty Glen LS	Wet Well		2006
BlackLake	Wastewater	Misty Glen LS	Pump		2006
BlackLake	Wastewater	Misty Glen LS	Motor		2006

Division	System	Sub-System	Component	Size or Capacity	Date Installed, Last Refurbished, or Last Replaced
BlackLake	Wastewater	Misty Glen LS	Electrical and Controls		2006
BlackLake	Wastewater	Misty Glen LS	SCADA		
BlackLake	Wastewater	Misty Glen LS	Site Piping, lids, etc.		
BlackLake	Wastewater	Woodgreen LS	Wet Well		1998
BlackLake	Wastewater	Woodgreen LS	Pump	175 gpm	
BlackLake	Wastewater	Woodgreen LS	Motor	10 hp	
BlackLake	Wastewater	Woodgreen LS	Electrical and Controls		
BlackLake	Wastewater	Woodgreen LS	SCADA		
BlackLake	Wastewater	Woodgreen LS	Site Piping, lids, etc.		
BlackLake	Wastewater	The Oaks LS	Wet Well		1999
BlackLake	Wastewater	The Oaks LS	Pump	175 gpm	
BlackLake	Wastewater	The Oaks LS	Motor	4.7 hp	
BlackLake	Wastewater	The Oaks LS	Electrical and Controls		
BlackLake	Wastewater	The Oaks LS	Backup Power		
BlackLake	Wastewater	The Oaks LS	SCADA		
BlackLake	Wastewater	The Oaks LS	Site Piping, lids, etc.		

Table A-2
Inventory of Pipe Facilities (Gravity Mains and Distribution Mains)

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Blacklake	Sewer	1985	6	PVC	1,039
			12	PVC	1,163
		1990	6	PVC	723
			8	PVC	5,551
		1996	6	PVC	1,089
			8	PVC	6,962
		1998	6	PVC	1,884
			8	PVC	2,251
		2000	8	PVC	4,542
		2005	8	PVC	1,261
		*Unknown Year	8	PVC	10,011
	Sewer Total				36,475
	Water	1980	6	ACP	157
			8	ACP	2,410
		1985	6	ACP	2,037
			8	ACP	6,494
		1986	6	ACP	343
				STL	62
			8	ACP	5,989
				PVC	15
				STL	122
		1990	8	PVC	6,637
		1996	4	PVC	1,000
			6	PVC	1,947
			8	PVC	4,472
		1998	6	PVC	1,617
			8	PVC	3,260
		2000	6	PVC	461
			8	PVC	6,138
		2005	2	PVC	79
			6	PVC	73
			8	PVC	2,255
		*Unknown Year	8	PVC	2,156
	Water Total				47,723
Blacklake Total					84,198

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Sewer	1973	6	VCP	4,068
			8	VCP	1,540
		1974	6	VCP	1,166
			8	VCP	3,646
		1977	8	VCP	2,003
		1978	8	PVC	106
		1982	6	VCP	267
			8	VCP	170
		1985	8	DIP	185
				PVC	34,928
				VCP	349
			10	PVC	5,555
			12	PVC	8,766
			15	PVC	33
		1987	8	DIP	249
				PVC	5,192
		1988	8	PVC	4,020
		1989	4	PVC	27
			8	PVC	5,802
		1990	8	PVC	2,749
		1991	8	PVC	1,641
			12	PVC	516
		1992	8	PVC	1,686
		1993	8	PVC	5,637
			12	PVC	441
		1994	8	PVC	1,432
		1995	6	PVC	149
			8	PVC	1,614
		1996	6	PVC	418
			8	PVC	3,583
		1997	8	PVC	3,272
		1998	8	PVC	11,322
		1999	8	PVC	1,064
		2000	6	PVC	463
			8	PVC	3,932
		2001	6	PVC	87
			8	PVC	4,890
		2002	6	PVC	745
			8	PVC	5,662
		2003	8	PVC	2,160

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Sewer	2004	8	PVC	813
		2005	6	CIP	39
			8	CIP	60
				PVC	1,360
		*Unknown Year	6	PVC	455
			8	PVC	4,894
				VCP	63
			12	PVC	1,179
Town	Sewer Total				140,395
Town	Water	1966	6	ACP	23,764
				PVC	88
			8	ACP	11,811
				PVC	441
			10	ACP	24,046
			12	PVC	6,506
			16	PVC	57
		1969	6	ACP	2,007
				PVC	432
		1971	4	ACP	194
			6	ACP	4,406
		1972	6	ACP	10
		1973	4	ACP	201
			6	ACP	6,118
		1974	6	ACP	4,214
				PVC	377
			10	ACP	10
		1976	8	ACP	3,780
			10	ACP	1,333
				PVC	1,339
		1977	6	ACP	3,564
			10	ACP	20
		1978	6	ACP	2,256
				PVC	365
			8	ACP	1,082
			10	ACP	126
		1979	6	ACP	491
		1980	6	ACP	2,394
			8	ACP	5,508
			10	ACP	10

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Water	(cont.) 1980	12	ACP	484
				PVC	144
		1981	2	ACP	10
			6	ACP	1,475
			8	ACP	671
		1982	6	ACP	10
			8	ACP	634
			10	ACP	1,607
		1983	6	ACP	2,077
			14	ACP	4,923
		1984	6	ACP	849
			8	ACP	1,553
				PVC	835
			10	ACP	903
				PVC	237
		1985	2	ACP	627
			4	ACP	4,609
			6	ACP	5,559
				PVC	20
			10	ACP	8
				PVC	10
		1986	6	ACP	968
				PVC	2,757
		1987	6	PVC	1,205
			8	PVC	7,341
		1988	6	ACP	43
				PVC	5,879
			8	PVC	1,618
			10	ACP	447
		1989	4	PVC	23
			6	ACP	2,221
				PVC	6,426
			8	ACP	11
				PVC	2,938
			10	ACP	97
		1990	4	PVC	23
			6	ACP	1,836
				PVC	4,507
			8	ACP	124
				PVC	3,957

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Water	(cont.) 1990	10	ACP	28
				PVC	630
		1991	6	PVC	2,309
			8	PVC	1,636
			10	ACP	57
		1992	6	PVC	3,267
			8	PVC	1,541
			10	PVC	8
		1993	6	PVC	1,065
			8	PVC	1,901
			10	PVC	886
		1994	6	PVC	1,032
			8	PVC	34,143
			10	PVC	5,123
		1995	6	PVC	101
			8	PVC	65
			10	DIP	10
			12	DIP	65
			16	DIP	10,649
				PVC	12,038
		1996	4	PVC	19
			6	ACP	19
				PVC	757
			8	PVC	3,296
		1997	6	ACP	93
				PVC	2,414
			8	ACP	551
				PVC	5,179
			10	PVC	309
		1998	6	ACP	684
				PVC	4,851
			8	ACP	20
				PVC	4,912
		1999	6	ACP	249
				PVC	893
			8	ACP	10
				PVC	3,254
			10	PVC	2,857
			12	DIP	240
				PVC	1,559

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Water	2000	6	ACP	54
				PVC	193
			8	ACP	44
				PVC	16,013
			10	ACP	50
				PVC	4,158
			12	PVC	7,811
		2001	6	ACP	16
				PVC	661
			8	ACP	29
				PVC	4,430
		2002	6	PVC	69
			8	PVC	7,745
			10	DIP	30
				PVC	4,057
		2003	4	PVC	38
			6	PVC	250
			8	PVC	10,085
			10	PVC	2,285
			12	PVC	348
		2004	8	ACP	471
				PVC	2,125
			10	ACP	10
			16	PVC	197
		2005	2	PVC	44
			6	PVC	30
			8	PVC	733
			10	ACP	22
				PVC	2,989
			12	PVC	4,091
		2007	6	PVC	521
			8	PVC	280
		*Unknown Year	6	ACP	13,610
				PVC	3,439
			8	ACP	6,917
				PVC	9,134
			10	ACP	20,338
				DIP	346
				PVC	2,414

Area	System	Year Installed	Diameter (inch)	Material	Length (ft)
Town	Water		12	ACP	19
				DIP	249
				PVC	2,581
			14	ACP	29
			*Unknown dia.	*Unknown mat.	793
Town	Water Total				415,079
Town Total					566,925
Grand Total					651,122

* For calculation of replacement costs and scheduling, if pipe lengths were available from the GIS database, but installation year, diameter, or material were unknown, the lengths were allocated among dates, diameters, and materials proportionately to the lengths for which these data were known.

Appendix B – Cost Schedule Calculations

In this appendix the methods used in projecting the replacement cost schedule are discussed. An explanation of the values calculated is provided, followed by a simplified example.

Explanation of the Values Calculated

For each asset the following values are estimated:

- The Estimated Present Replacement Cost (i.e., the cost to replace each asset now);
- The Projected Future Replacement Cost (i.e., the present replacement cost with an inflation rate applied until the end of each asset's "life");
- The Required Annual Savings Rate to replace each asset (i.e., a constant series of annual set-asides accruing interest at an assumed interest rate); and
- The Required Present Value of Accrued Annual Savings (i.e., the amount of money which should now be in a savings account allocated for future replacement projects).

The amounts expressed are in terms of present worth dollars. The assumed interest rate for savings is 4.5%. The assumed inflation rate is 3%.

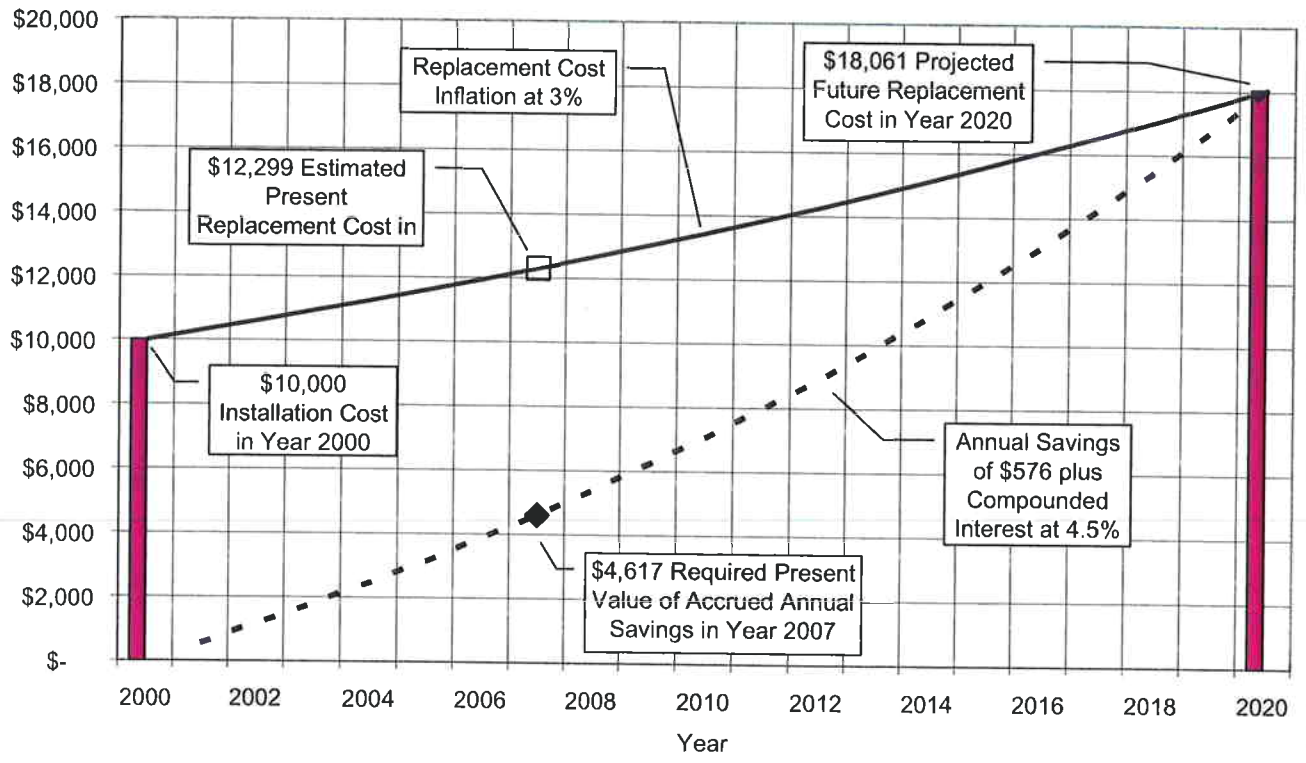
These calculations are illustrated below for an item which was installed in the year 2000, with a replacement cost of $10,000, with a 20 year service life for which a 20-year savings program is used. Key results are:

- The Estimated Present Replacement Cost = $12,299 in 2007;
- The Projected Future Replacement Cost = $18,061 in 2020;
- The Required Annual Savings Rate = $576 per year (@4.5% interest); and
- The Required Present Value of Accrued Annual Savings = $4,617 in 2007.

Note that the 20-year savings program is not a requirement. The owners could have initiated a shorter-term savings program, in which case they would need to be saving more than $576 per year.

Also note that the savings program sets aside a fixed amount each year toward a single future cost.

Figure B-1: Example Replacement Cost Calculations
$10,000 Asset, Installed in Year 2000, 20 year Service Life



Three Models for Cost Scheduling

The simplest approach for cost scheduling assumes that each asset will be replaced during the year that it reaches the end of its service life. In reality, some system components will need to be replaced earlier than predicted, while others will not need to be replaced for much longer. To account for this variability in replacement date, and the need to build up savings for the eventual replacement of assets, three different savings models are used:

- Savings Model 1: Spread Costs – 20 Year Savings
  Assume that 90% of the predicted need for replacement occurs within ±5 years of the "end of service life" date, and is distributed according to the "Normal" curve. Save for each year's predicted replacement expenses over a 20-year period.

- Savings Model 2: Fully Fund each Asset over its Service Life
  Assume that each asset will be replaced at the end of its predicted service life – no earlier and no later. Fund the replacement of each asset over that asset's service life.

- Savings Model 3: Save the "Normalized" Predicted Replacement Cost
  Assume that 90% of the predicted need for replacement occurs within ±5 years of the "end of service life" date, and is distributed according to the "Normal" curve. Each year set aside sufficient funds to cover that year's predicted costs.

The difference between these models is illustrated below with a simplified example.

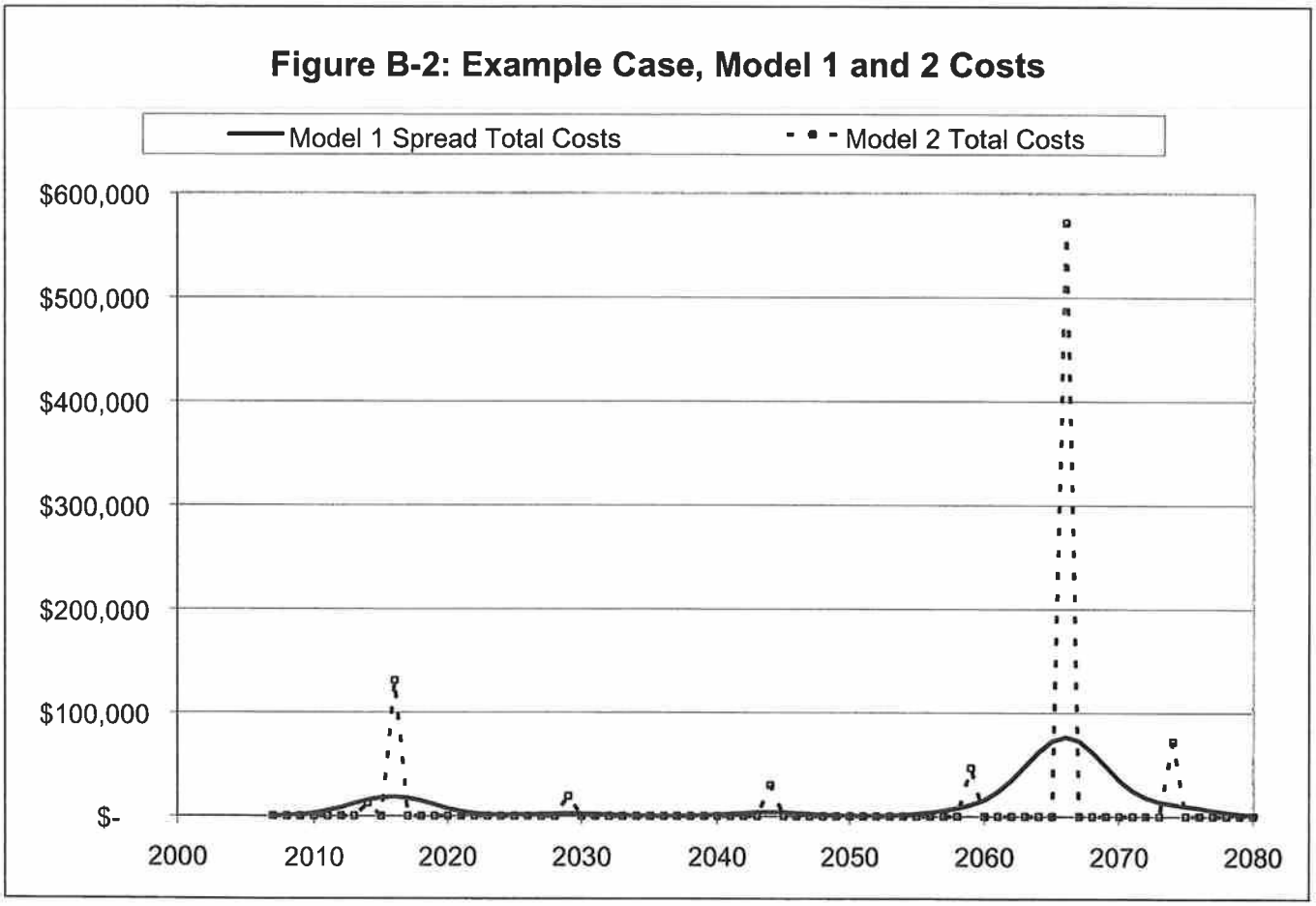
Simplified Example

In this example there are two assets:

- A pump with a 2007 replacement cost of $10,000 with a 15 year service life last replaced in 1999, and
- A pipeline with a 2007 replacement cost of $100,000 with a 50 year service life installed in 1966.

For this example, the expected replacement costs which can be expected are shown below for Models 1 and 2. (Model 3 makes us of the same cost spreading as Model 1.)

Figure B-2: Example Case, Model 1 and 2 Costs

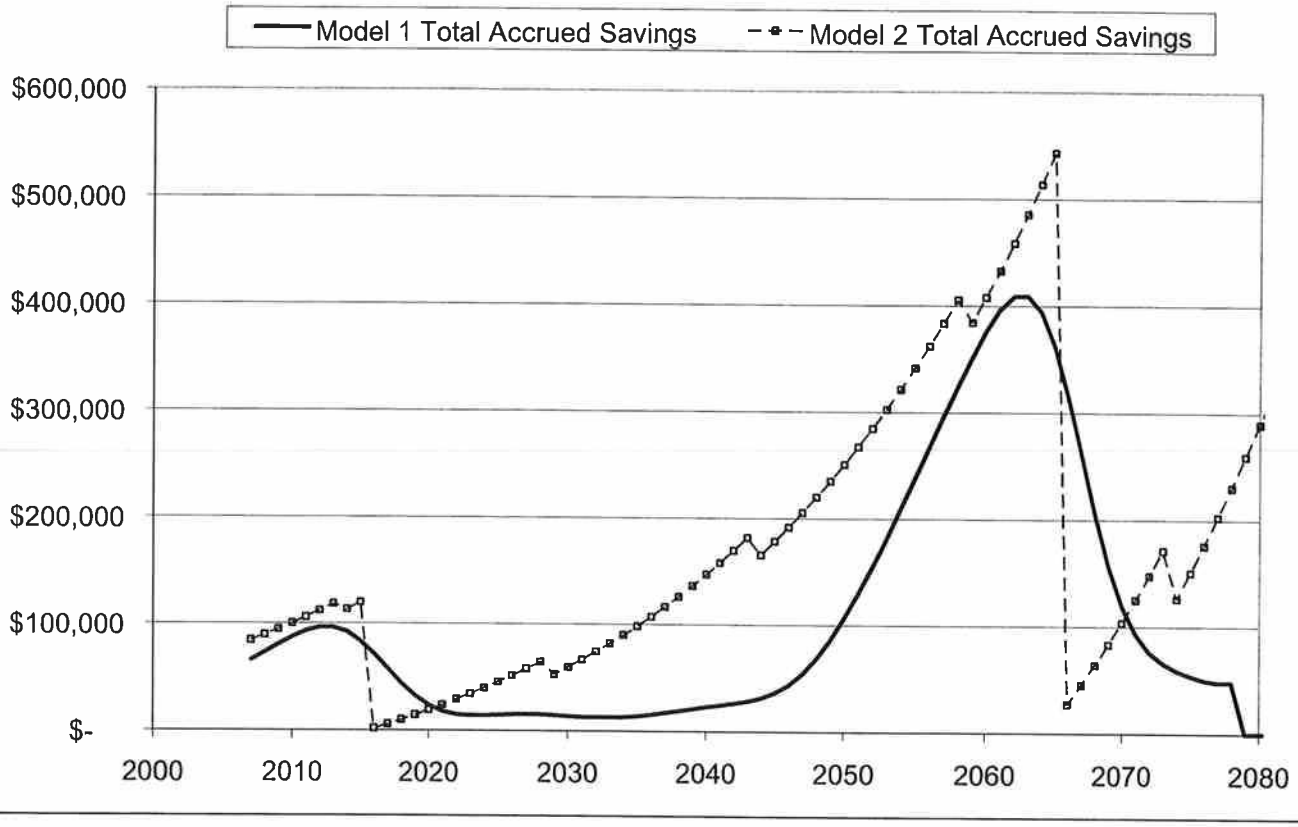


The large Model 2 costs shown in 2016 and 2066 are for the next two replacements of the pipeline with the 50-year service life. The smaller Model 2 costs are for the replacement of the pump every 15 years. The Model 2 curve incorporates both costs and "spreads" each cost over approximately 10 years.

Now we need a way to save in advance of these future costs so that sufficient funds are available when needed. Under Model 1 we save for all costs expected to occur within the next 20 years using a 20-year savings program. Under Model 2 we begin saving for each asset's replacement the year it is installed or

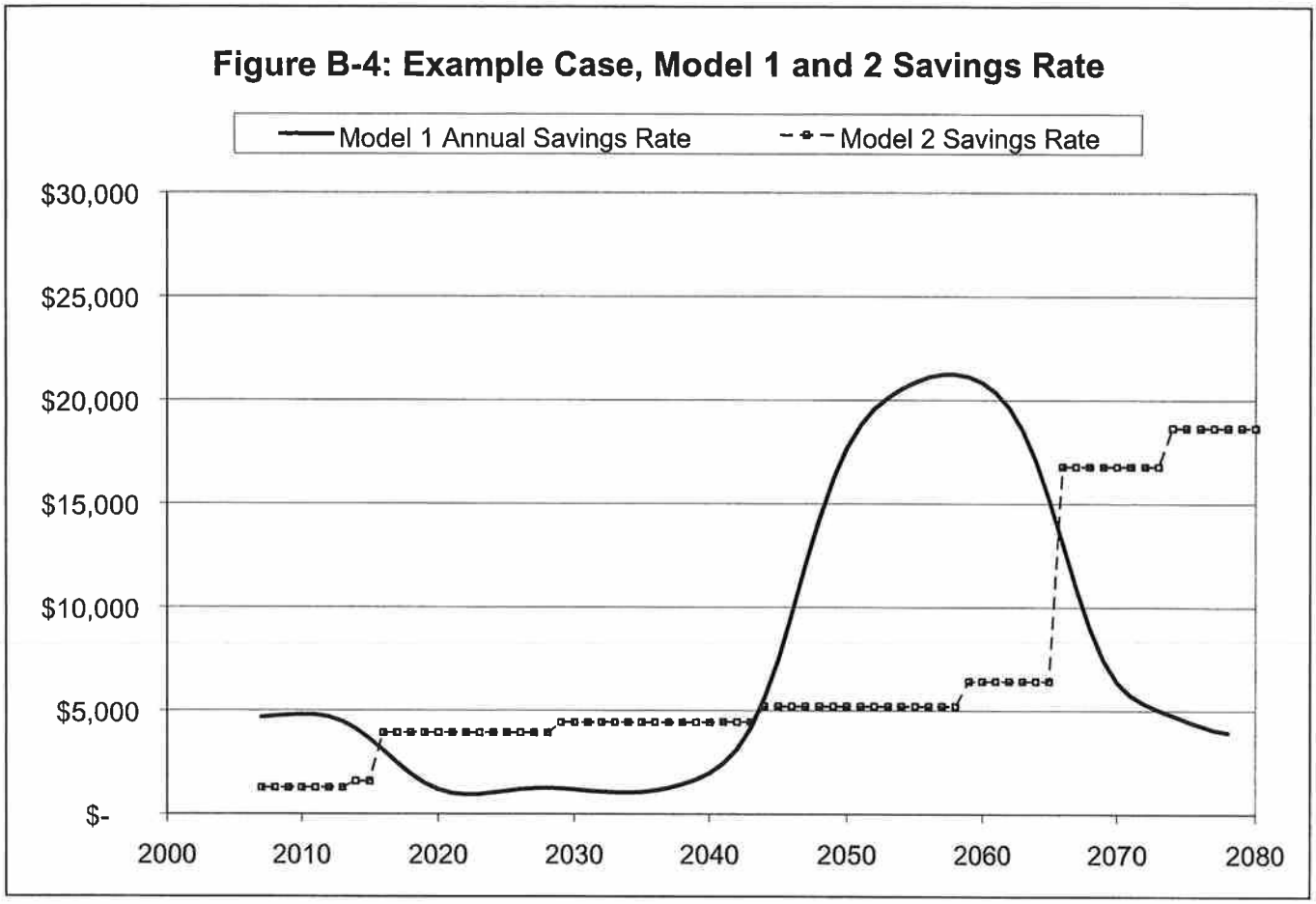
replaced. Under either case we require that accrued savings equals the expected costs for any particular year. The differences in required accrued savings is illustrated below.

Figure B-3: Example Case, Model 1 and 2 Accrued Savings



As can be seen, generally Model 2 requires a higher accrued savings balance than Model 1, although the accrued balance is predicted to change more quickly. This is intuitive given that Model 2 assumes that each asset will need full replacement during a single year, thereby resulting in steep drops in accrued savings.

Model 1 assumes gradually increasing and decreasing costs, therefore its accrued savings balance changes more gradually. Also note that between the years 2020 and 2040 its balance is significantly lower than Model 2 because saving for the pipe replacement in 2066 does not begin until approximately 2040. The difference in savings rates is illustrated below.



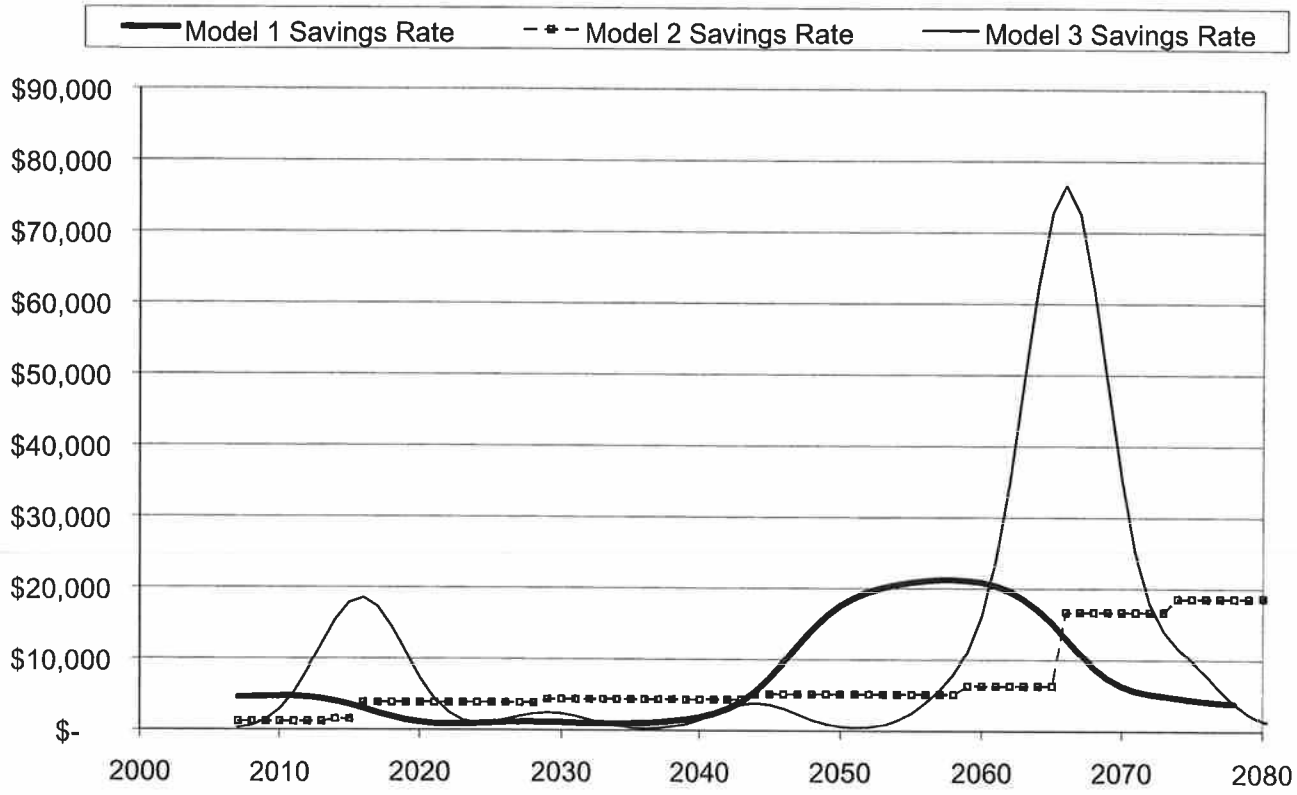
Several observations can be made concerning these savings rates:

- Model 1 savings rates can go up or down from year to year. Model 2 savings rates always increase because replacement costs are always assumed to increase.

- Model 1 savings rates increase approximately 20 years in advance of expected costs. Model 2 savings rates change when an item is replaced.

Note that 3 models are used in the Replacement Study. The third savings model is actually a portion of Model 1. Under Model 3 we assume that the costs are "spread", and that each year we set aside sufficient funds to cover that year's predicted costs. Therefore, the Model 3 savings rate is equal to the Model 1 cost schedule. For completeness, all three models' savings rates are shown below.

Figure B-5: Example Case, Models 1, 2, and 3 Savings Rates



Several observations can be made concerning these savings rates:

- Model 1 savings rates rises in advance of Model 3's savings rate.
- Model 3's savings rate is the most variable.
- Model 2's savings are is the least variable.

❖

Appendix C – Sensitivity Analysis

In this appendix the methods and results of the sensitivity analysis are presented.

Methods

The funding models are based on the following assumptions:

- 2007 Replacement Cost as estimated elsewhere in this report.
- Service Life in years as estimated elsewhere in this report.
- The Inflation Rate which is applied to replacement costs is assumed to be a constant value of 3.00%.
- The Return on Savings which is applied to saved funds is assumed to be a constant value of 4.50%.
- "Single year" costs in Models 1 and 3 are "spread" over a period defined by a normal cumulative probability function with a standard deviation of 3 years.

To determine the sensitivity of the models' results to these assumptions, each of these assumptions (except Replacement Cost) was increased by 10% of its value and the results of the "perturbed" model are compared to the original model. (Service Life values were increased by whole year increments, or at least one year.) Results and discussion follow.

Replacement Cost was not subjected to sensitivity analysis because the model is linear with regards to this variable. In other words, a 10% across-the-board increase in the Replacement Cost assumption would translate into a 10% increase in all costs for all models.

Results

Results of the sensitivity analysis are shown graphically below.

Figure C-1: Model 1 Sensitivity Analysis
Service Life extended by 10%

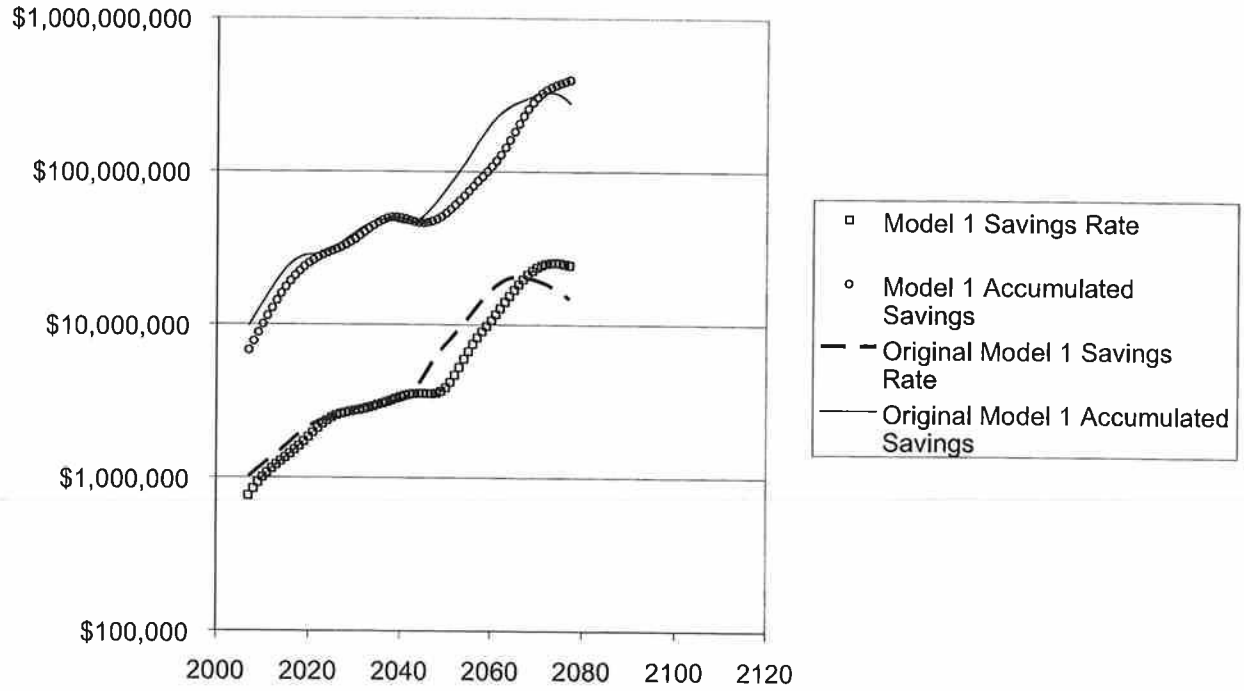


Figure C-2: Model 1 Sensitivity to Service Life Assumption
Percent Difference from Original Results

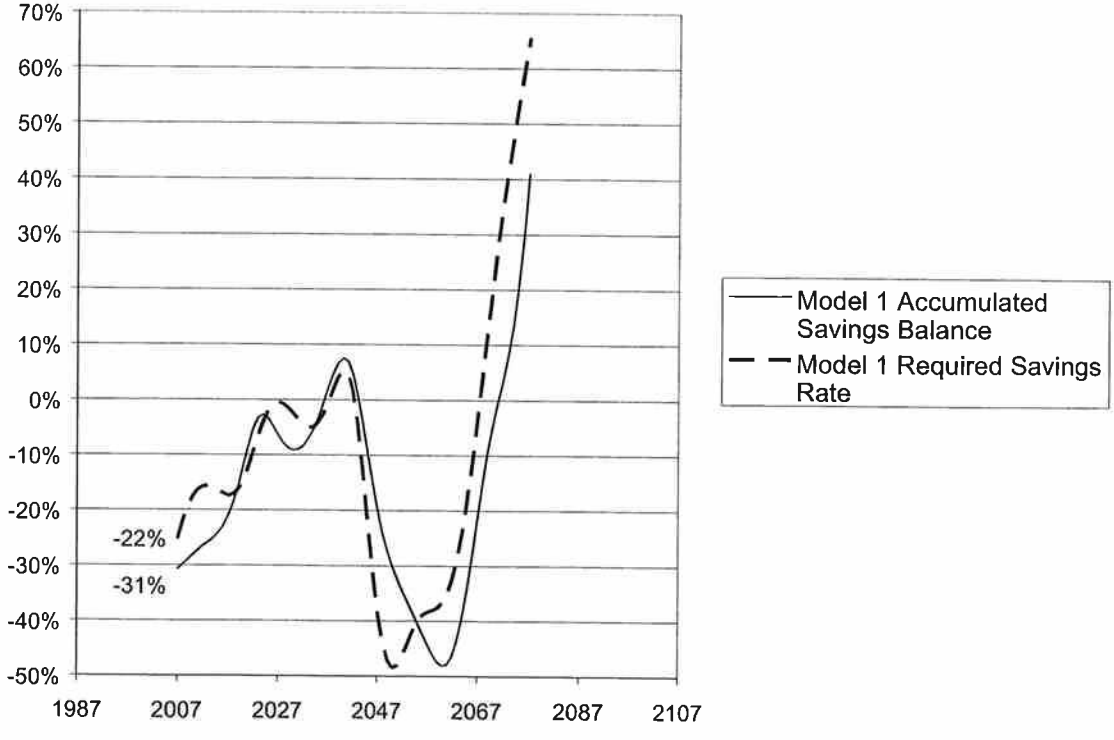


Figure C-3: Model 2 Sensitivity Analysis
Service Life extended by 10%

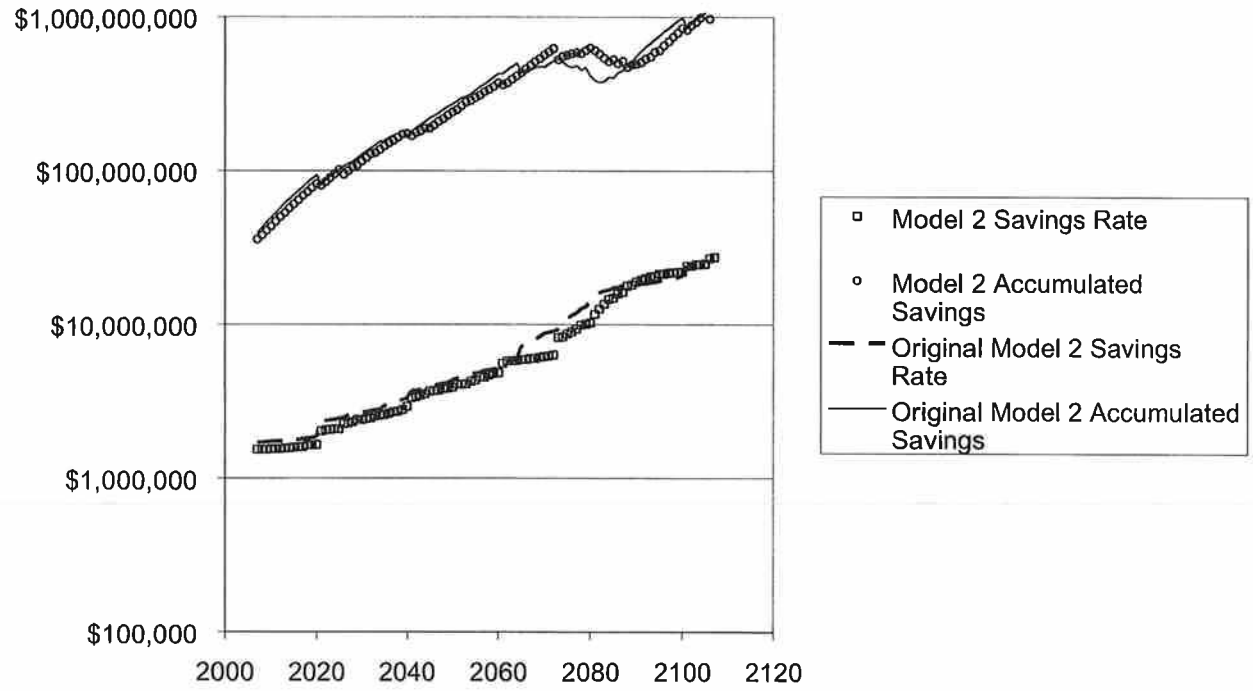


Figure C-4: Model 2 Sensitivity to Service Life Assumption
Percent Difference from Original Results

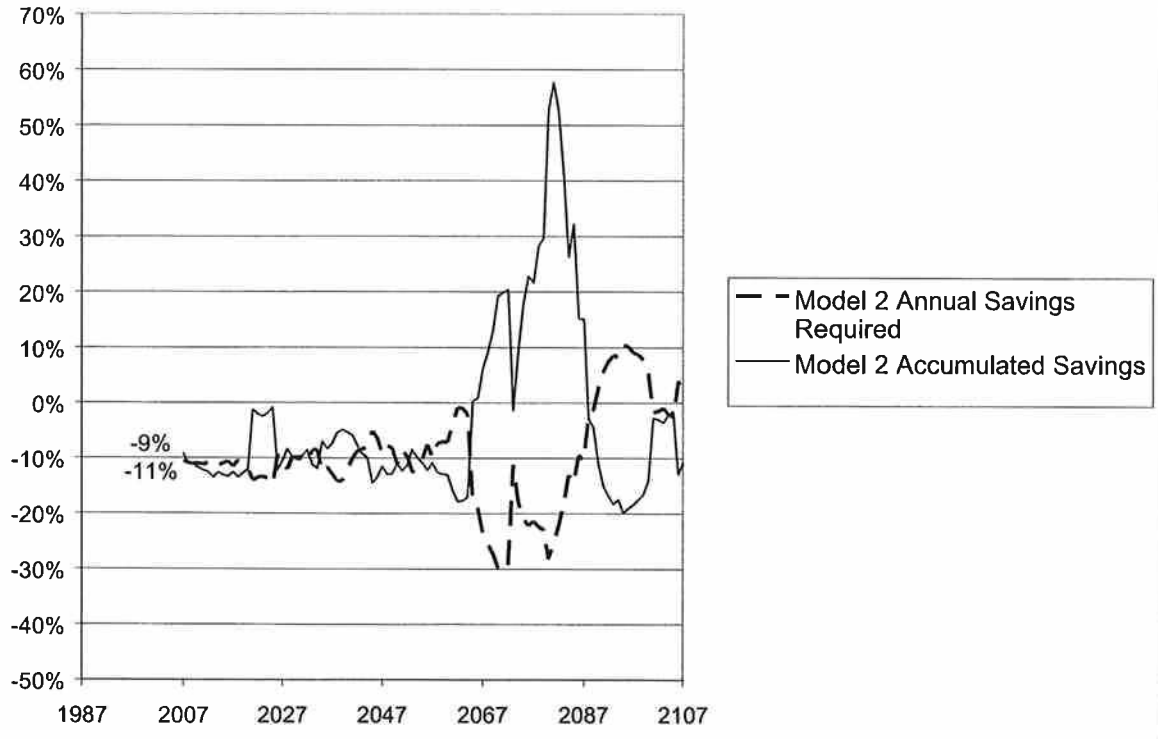


Figure C-5: Model 3 Sensitivity Analysis
Service Life extended by 10%

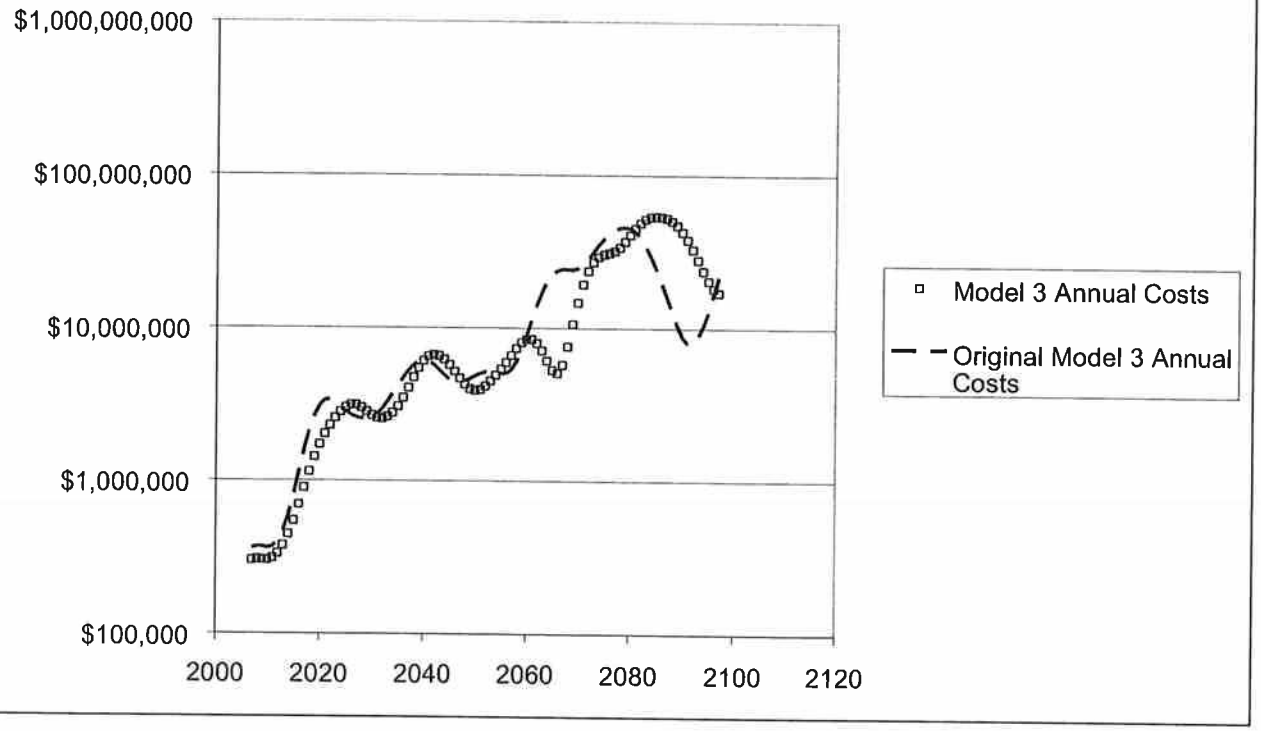


Figure C-6: Model 3 Sensitivity to Service Life Assumption
Difference from Original Results

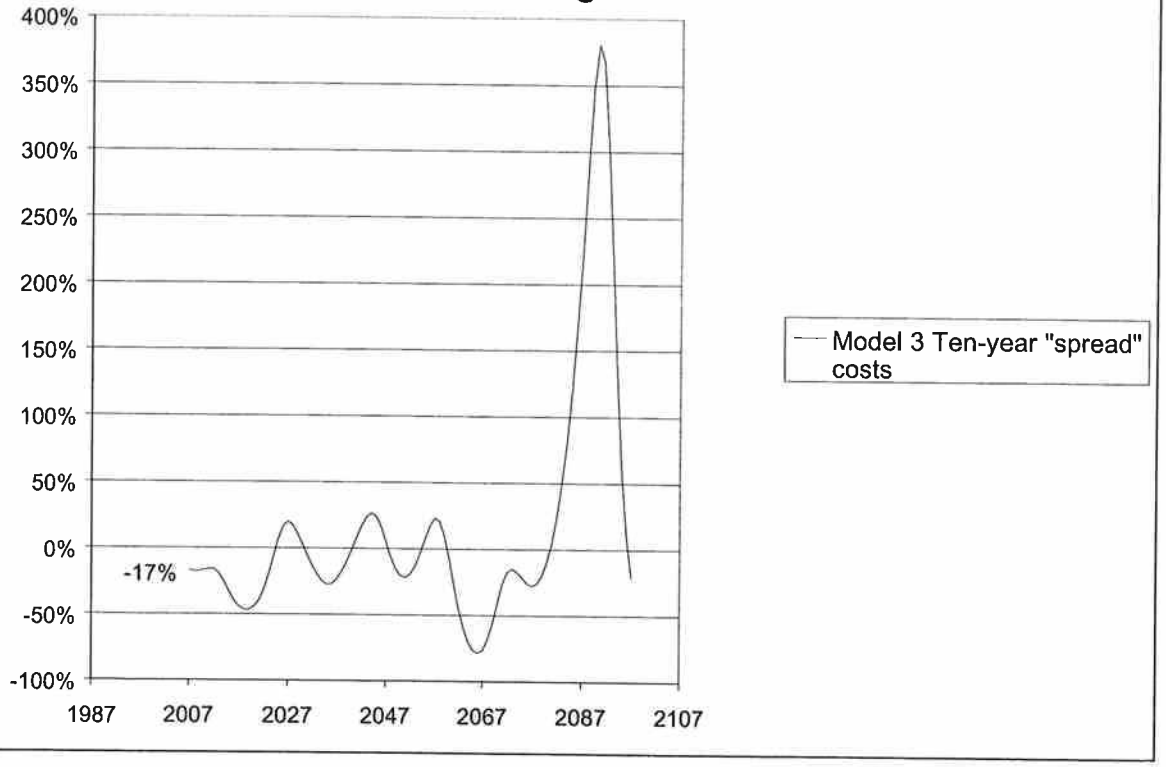


Figure C-7: Model 1 Sensitivity Analysis
Inflation Rate increased by 10% (from 3.0% to 3.3%)

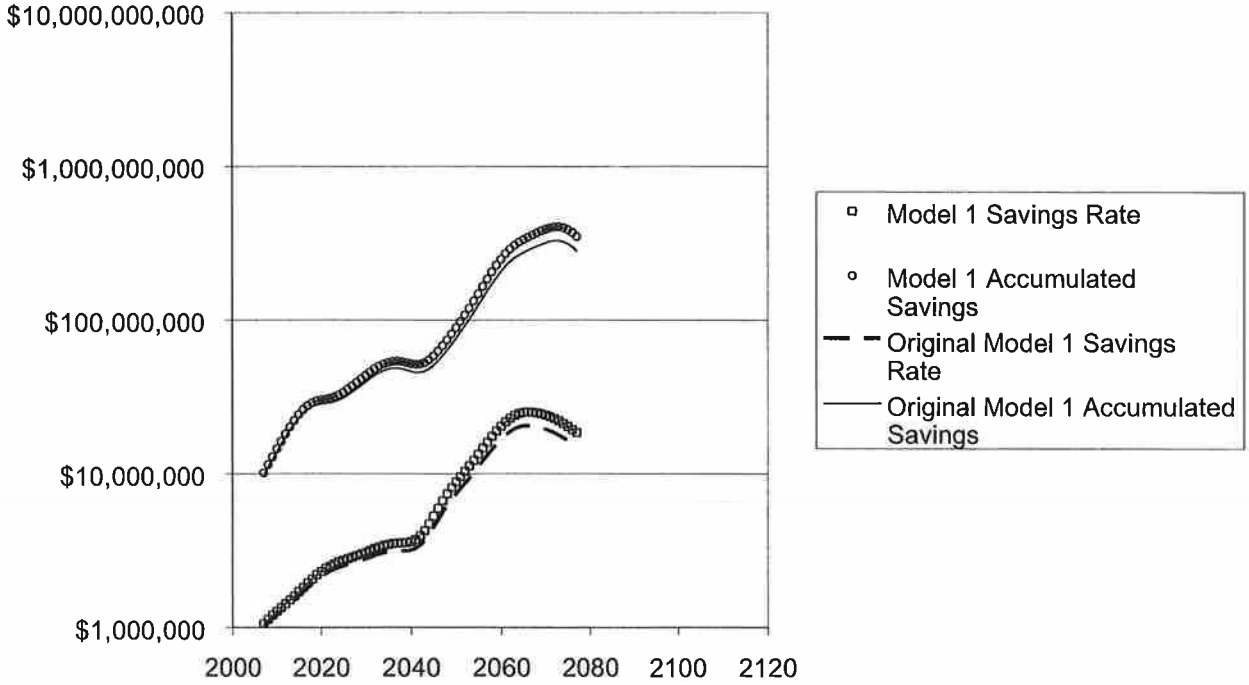


Figure C-8: Model 1 Sensitivity to Inflation Rate Assumption
Percent Difference from Original Results

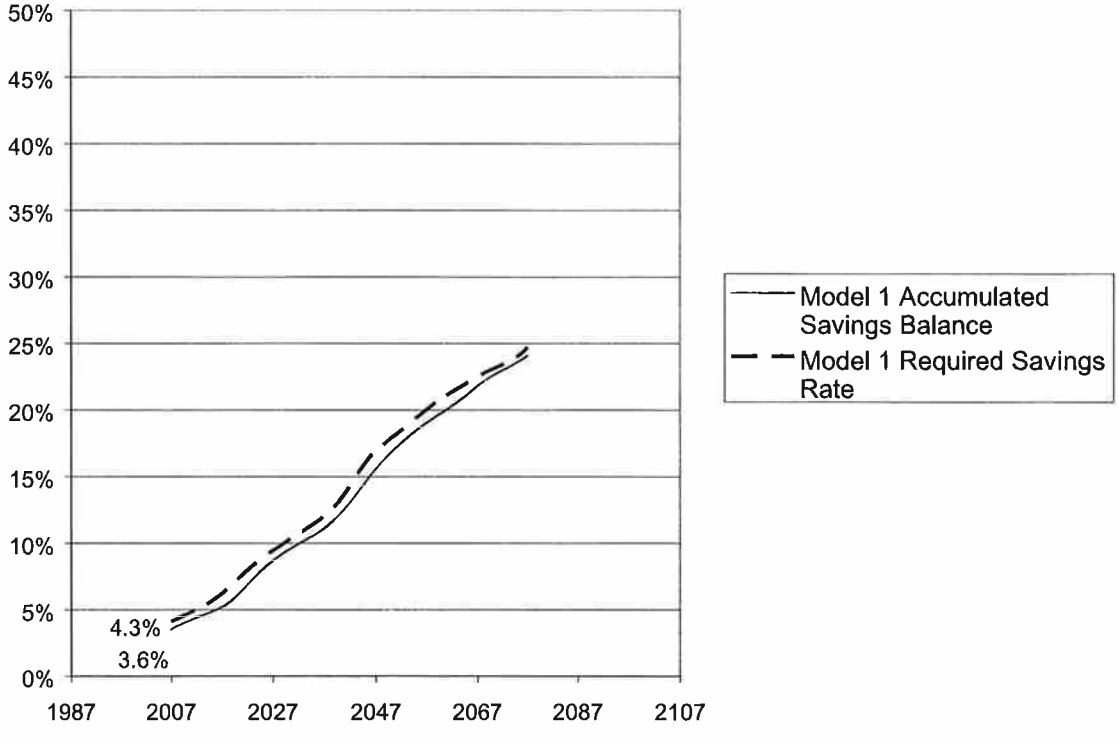


Figure C-9: Model 2 Sensitivity Analysis
Inflation Rate increased by 10% (from 3.0% to 3.3%)

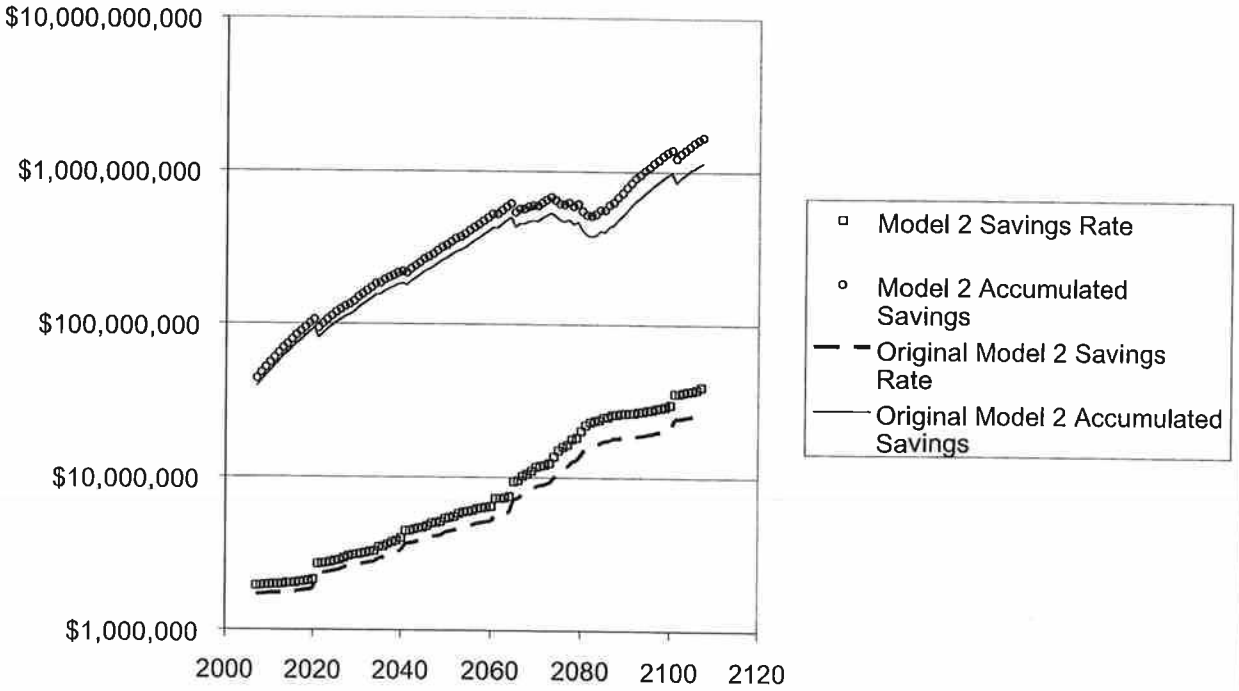


Figure C-10: Model 2 Sensitivity to Inflation Rate Assumption
Percent Difference from Original Results

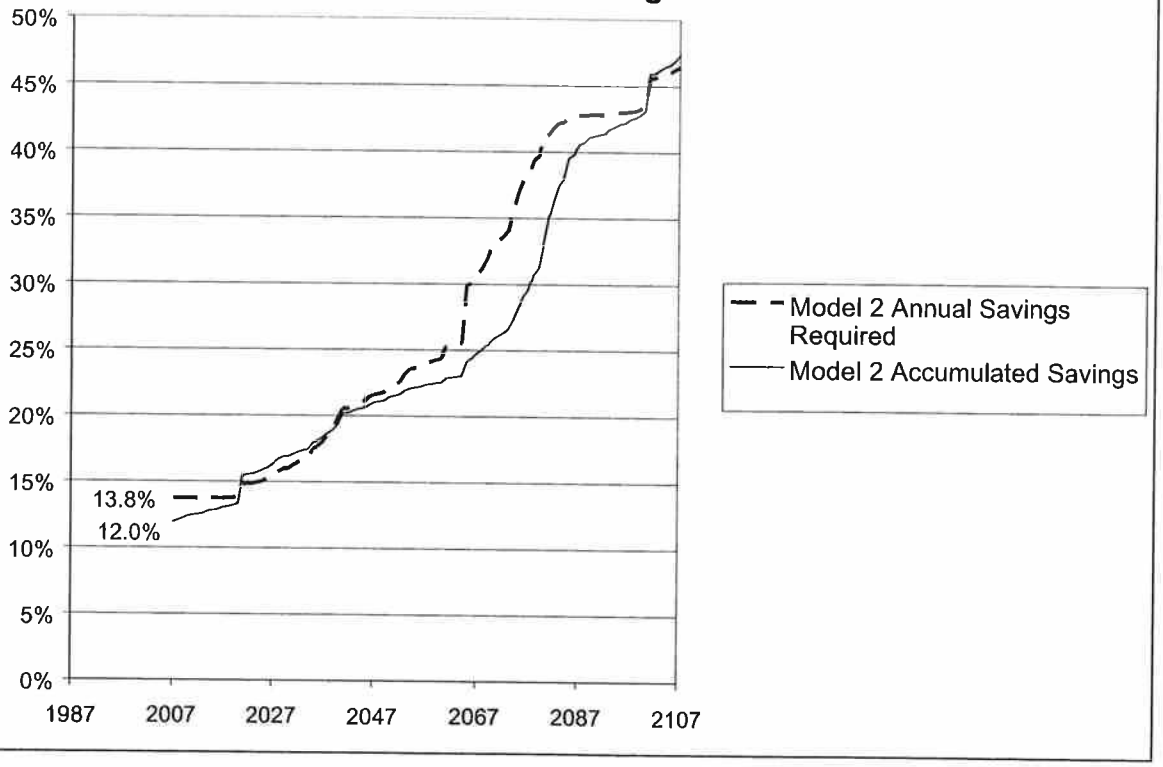


Figure C-11: Model 3 Sensitivity Analysis
Inflation Rate increased by 10% (from 3.0% to 3.3%)

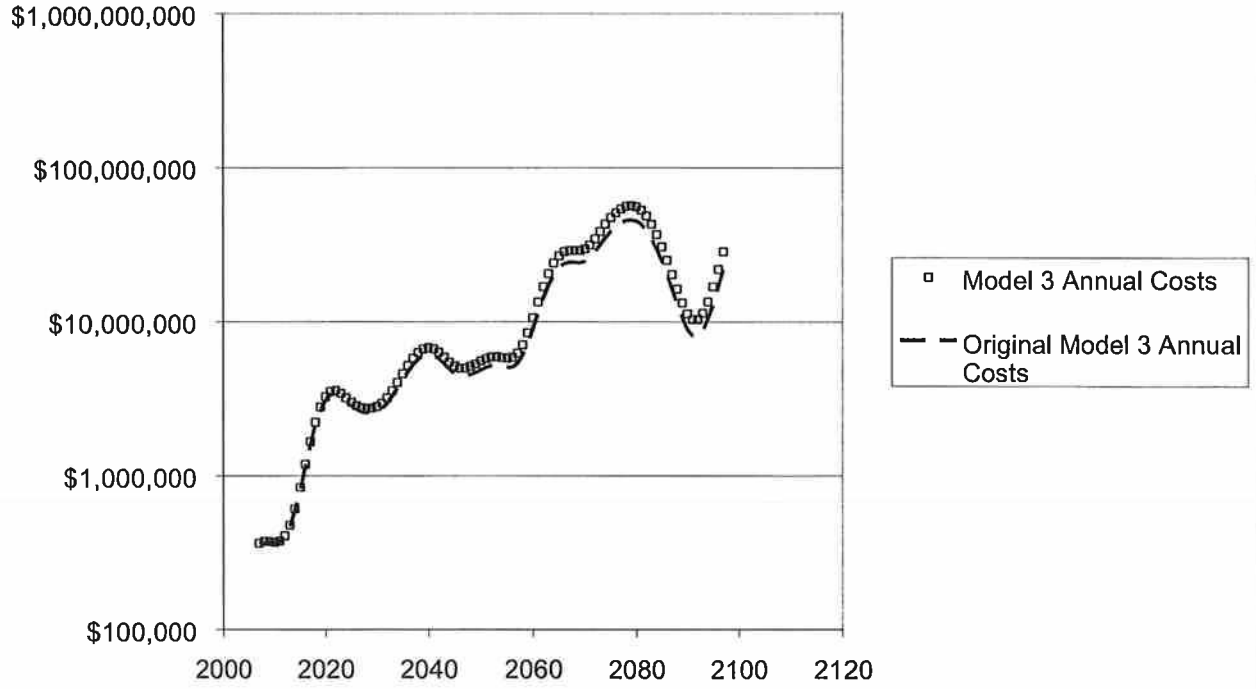


Figure C-12: Model 3 Sensitivity to Inflation Rate Assumption
Difference from Original Results

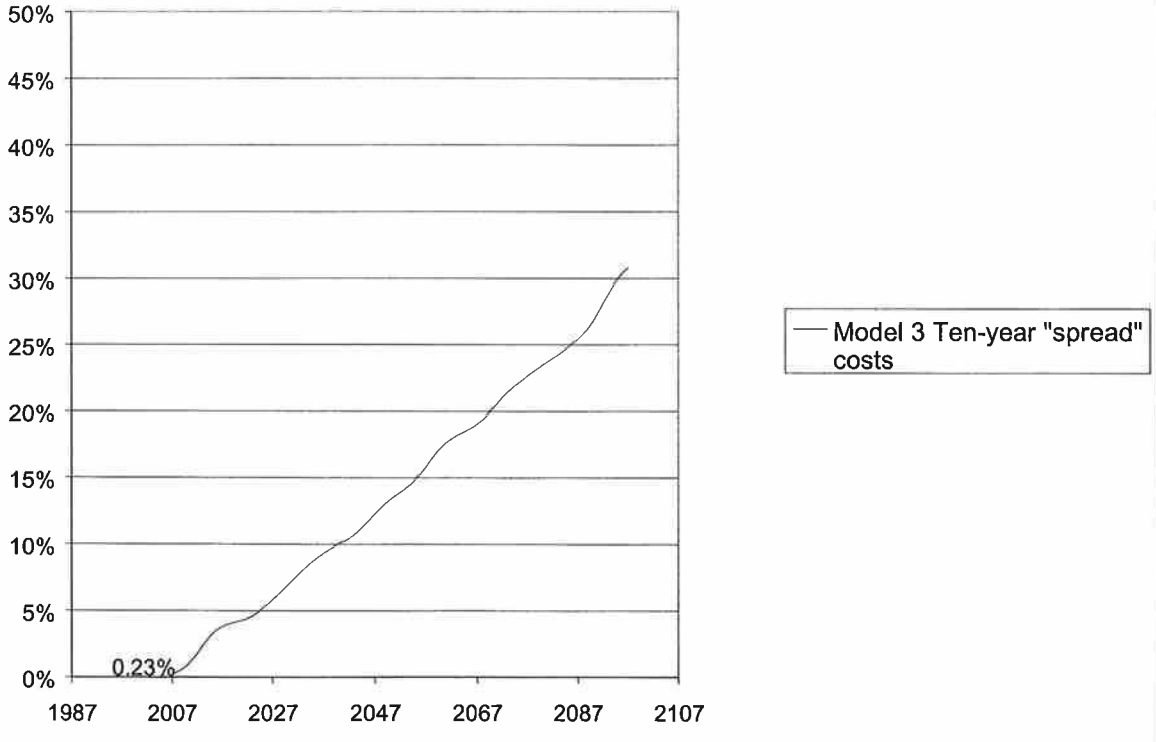


Figure C-13: Model 1 Sensitivity Analysis
Return-on-Savings increased by 10% (from 4.50% to 4.95%)

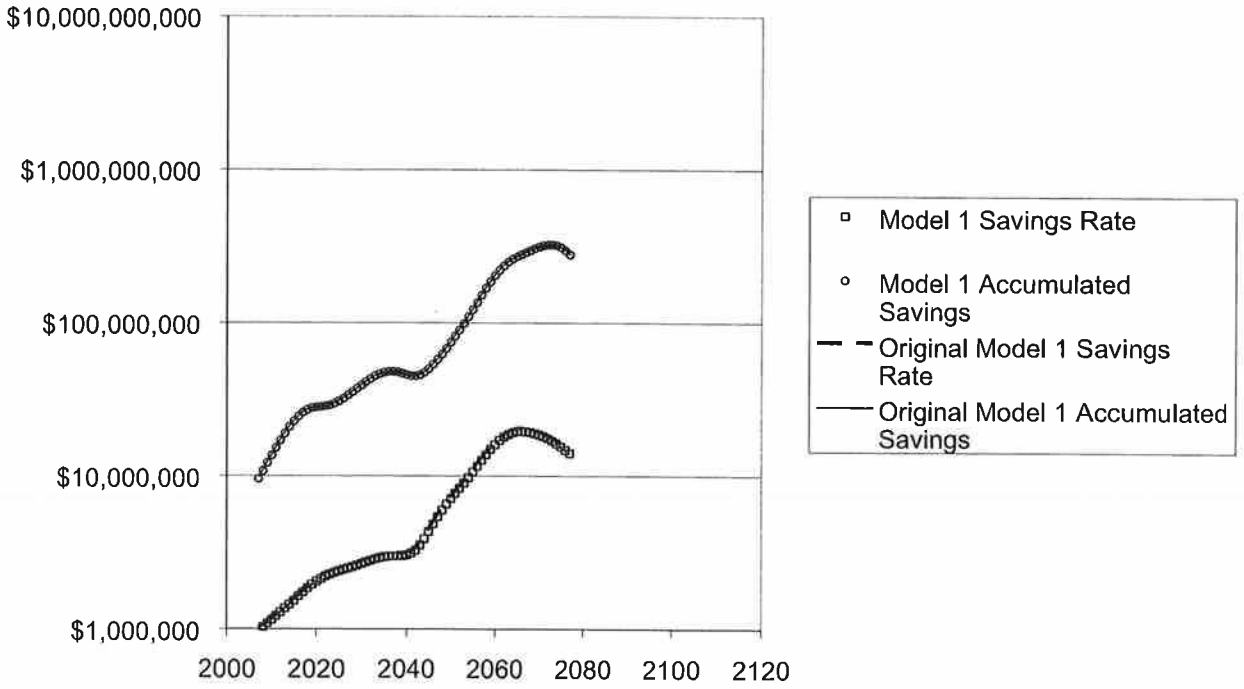


Figure C-14: Model 1 Sensitivity to Return-on-Savings Rate Assumption
Percent Difference from Original Results

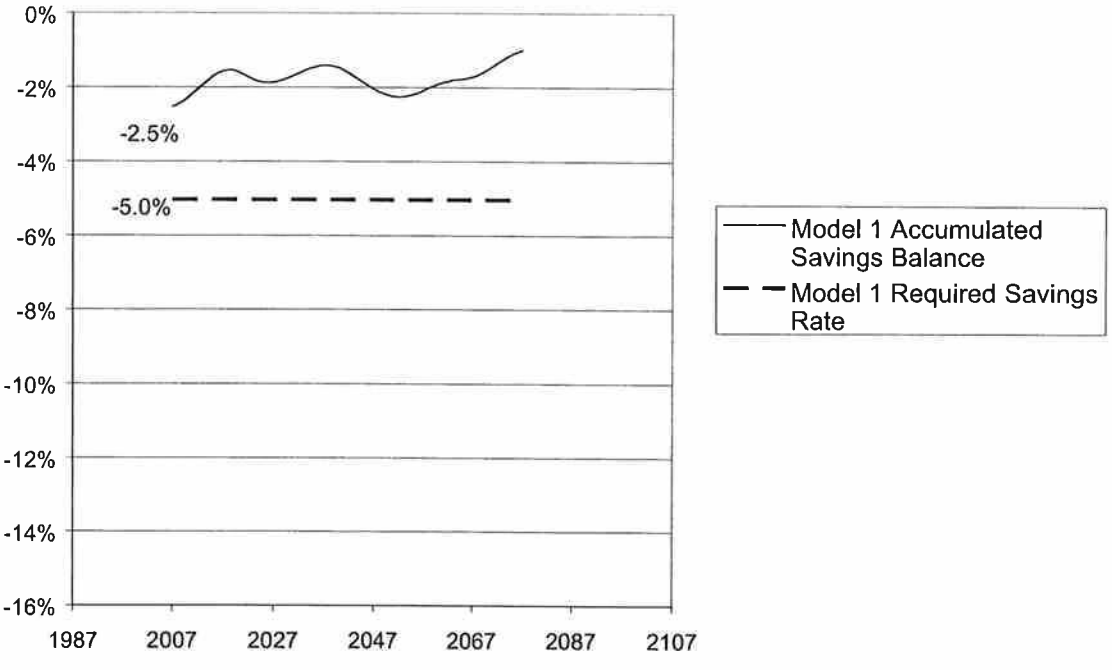


Figure C-15: Model 2 Sensitivity Analysis
Return-on-Savings increased by 10% (from 4.50% to 4.95%)

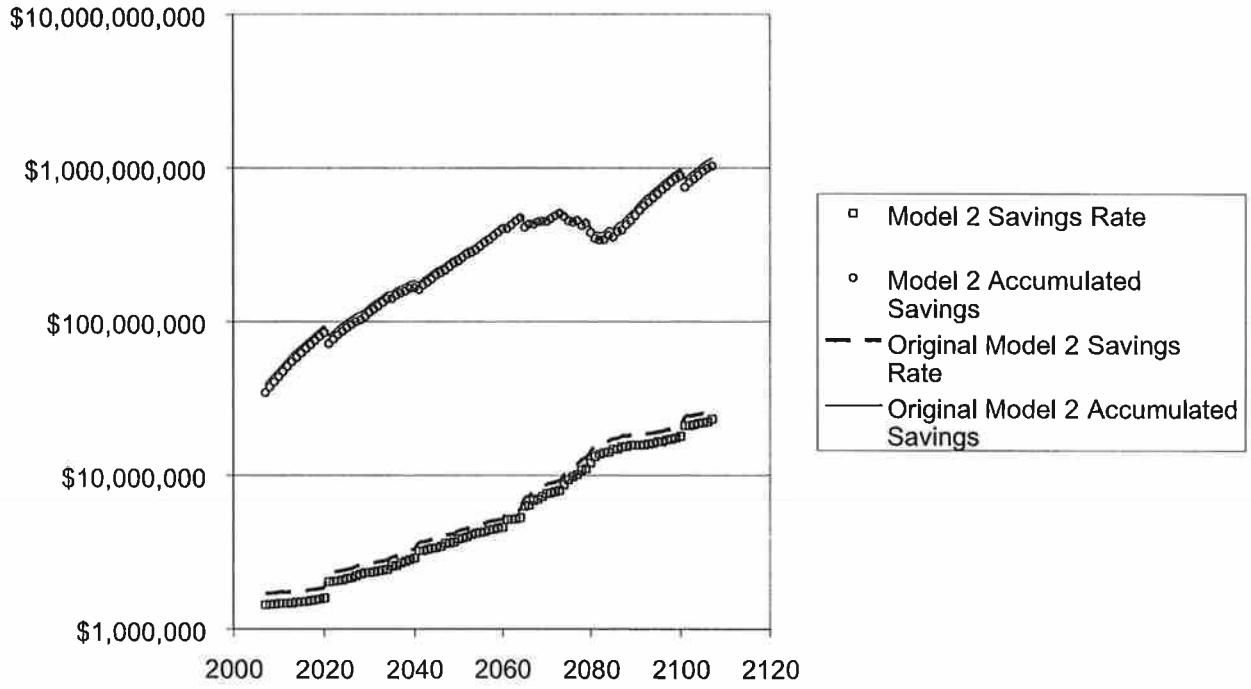


Figure C-16: Model 2 Sensitivity to Return-on-Savings Rate Assumption
Percent Difference from Original Results

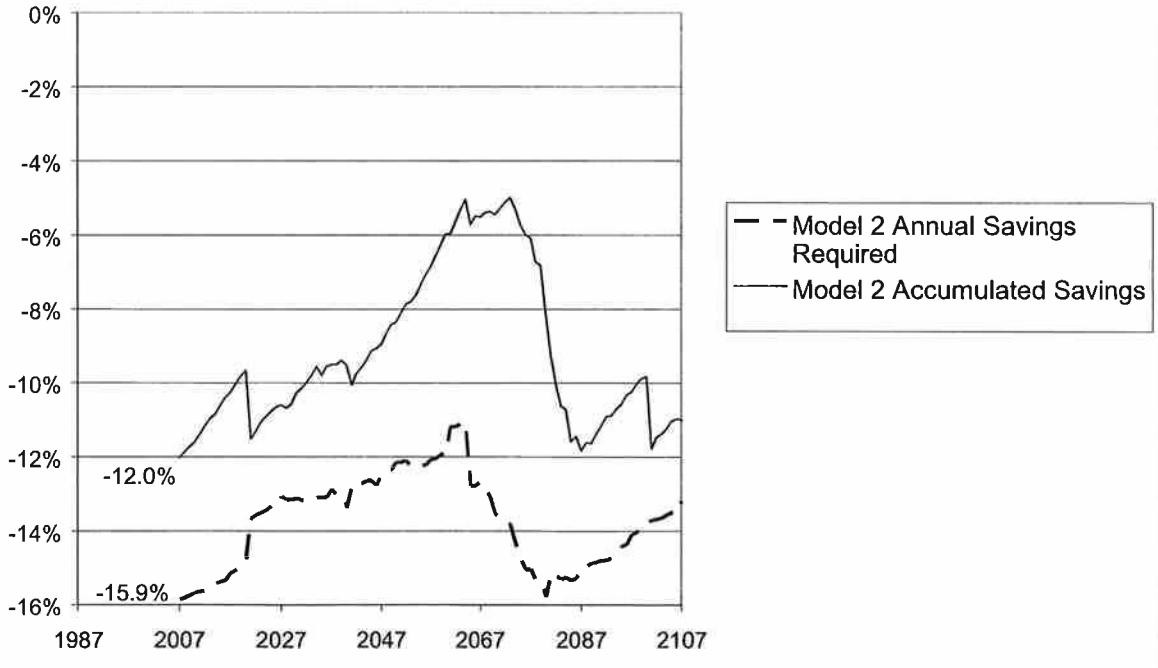


Figure C-17: Model 1 Sensitivity Analysis
"Spread" (Std. Dev.) increased by 10% (from 3.0 to 3.3 yrs)

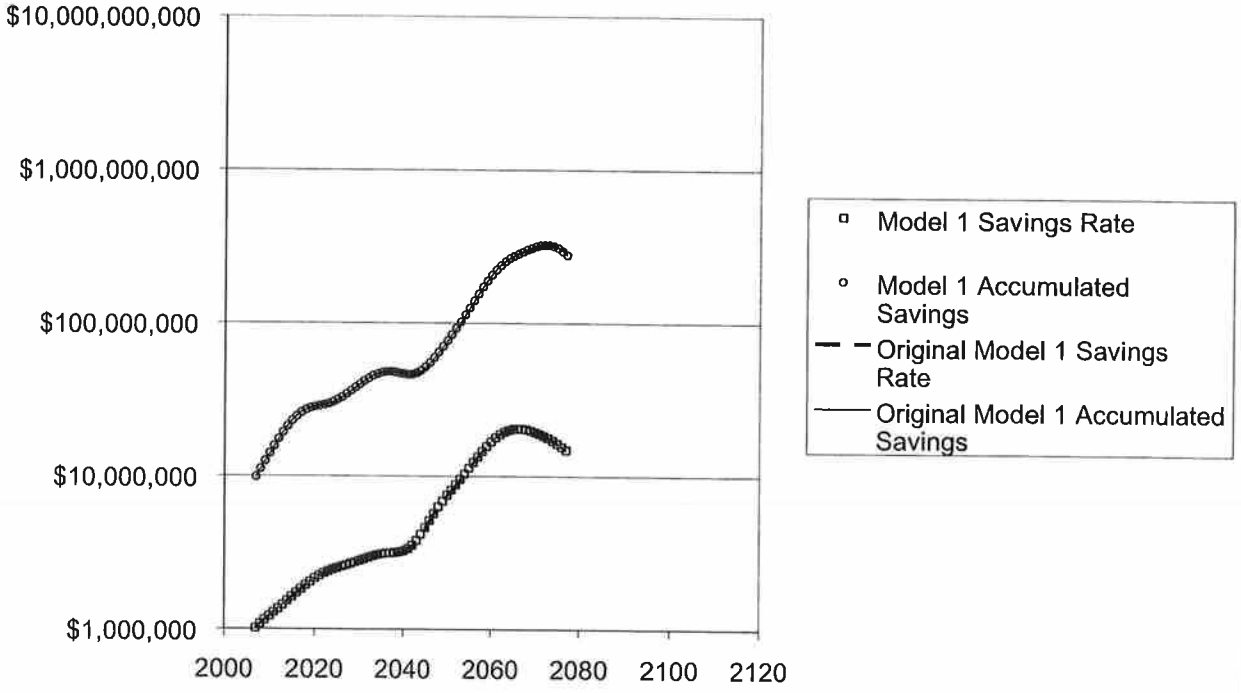


Figure C-18: Model 1 Sensitivity to "Spread" Assumption
Percent Difference from Original Results

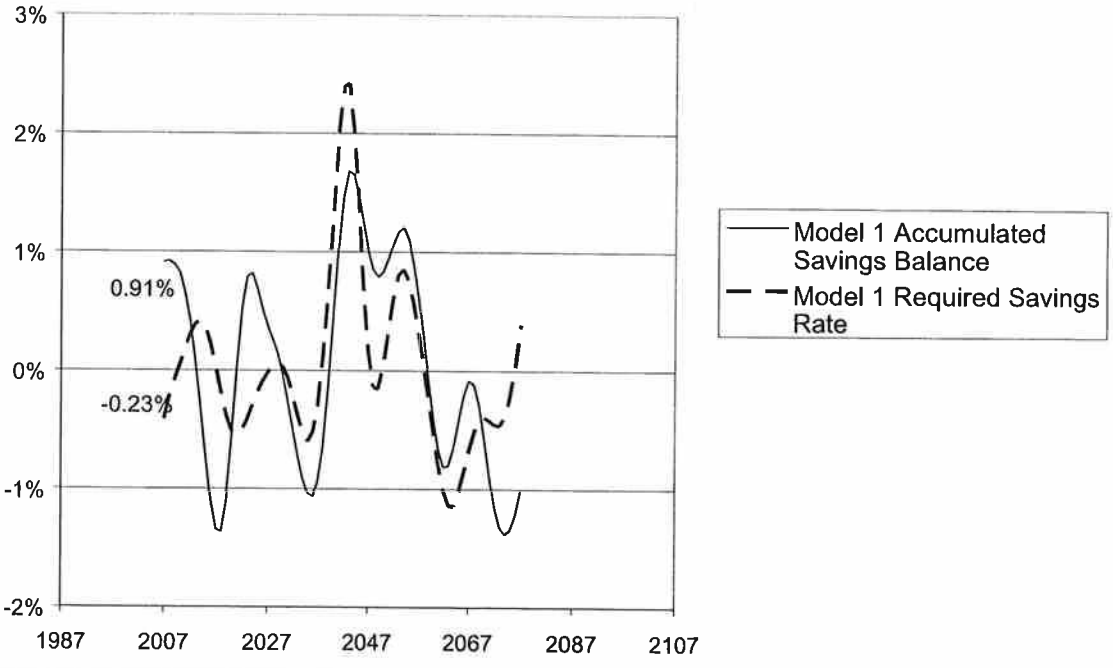


Figure C-19: Model 3 Sensitivity Analysis
"Spread" (Std. Dev.) increased by 10% (from 3.0 to 3.3 yrs)

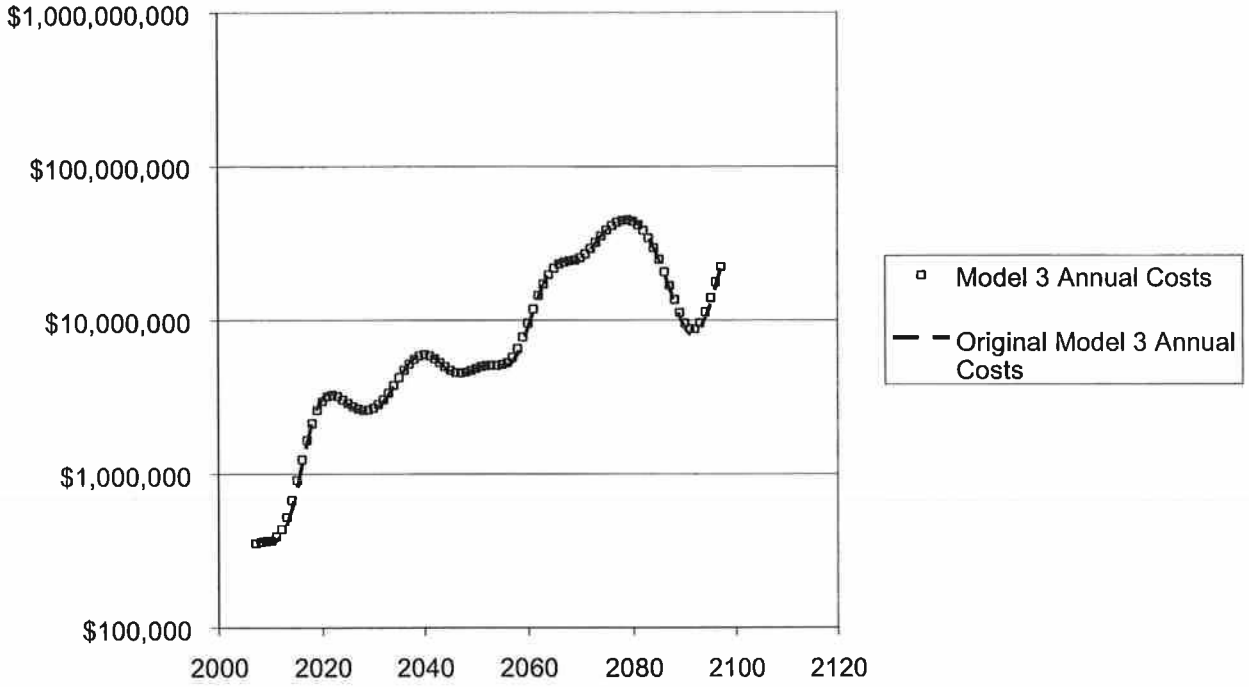
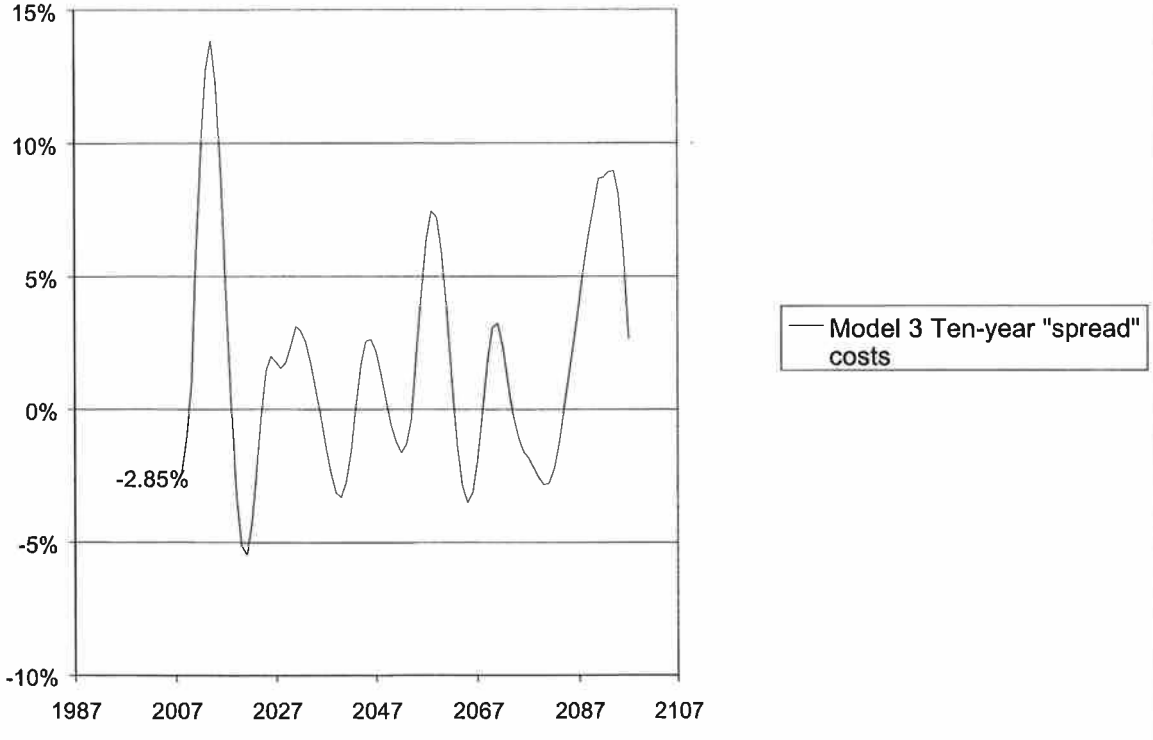


Figure C-20: Model 3 Sensitivity to "Spread" Assumption
Difference from Original Results



Summary

The results are summarized as follows:

Factor	20-Year Savings Program (Model 1)	Service Life Savings Program (Model 2)	Pay-as-you-go Set-Aside Program (Model 3)
Service Life - extended by 10 %, or at least 1 year	Savings rate and accumulated savings balances are generally lower, and peak later, but can sometimes be higher. Peak rates are slightly higher due to inflation. Differences vary from 50% lower to 60% higher than original analysis.	Similar to Model 1. However, savings rates are consistently 10% lower than the original analysis until 2067 when savings rates range from 30% lower to 10% higher than the original analysis.	Annual costs are generally lower, but vary significantly as the "shape" of the cost schedule changes.
Inflation Rate - increased by 10% (from 3.0% to 3.3% per year)	Savings rate and accumulated savings balances are consistently higher. These rates are initially 4% higher than in the original analysis, and are eventually more than 20% higher in 2067 and later.	Savings rate and accumulated savings balances are consistently higher. These rates are initially approximately 13% higher than in the original analysis, and are eventually more than 20% higher in 2047 and later.	Annual costs are consistently higher - initially 0.23% higher than in the original analysis, and are eventually more than 20% higher in 2067 and later.
Return-on-Savings - increased by 10% (from 4.50% to 4.95% per year)	The required savings rate is consistently 5.0% lower than in the original analysis, in all years examined. The accumulated savings balance varies, but is approximately 2% lower than in the original analysis until 2067.	The required savings rate varies, but is between 11% and 16% lower than in the original analysis. The accumulated savings balance varies, but is between 5% and 12% lower than in the original analysis.	Not affected. (Model 3 does not include a savings component.)
"Spread" - standard deviation in the Normal curve cost spreading function increased by 10% (from 3.0 to 3.3 years)	Very little difference (1% less to 25 greater) between the original and the perturbed analysis.	Not affected. (Model 2 does not include a "spread" component.)	Annual costs vary (from 5% lower to 14% higher) when compared to the original analysis.

Discussion

Key results of the sensitivity analysis include:

- As expected, extending the assumed Service Life for all assets will generally lower costs. However, because each component is replaced later, inflation will increase the eventual cost of replacement. Models 1 and 3 are more sensitive to changes in Service Life because the "shape" of the replacement cost schedule will change. ("Peaks" may become "valleys" and vice versa.) Under Model 2 a 10% increase in Service Life will translate into a fairly consistent 10% drop in savings rate for the next 50 years.

- As expected, an increase in the assumed Inflation Rate will result in higher costs. Model 1 is less sensitive than Model 2 to a change in inflation rate, although under both models annual savings rates will be between 20% and 25% higher in 2060 than under the original assumption. Model 3 is least sensitive to changes in Inflation Rate.

- As expected, an increase in the assumed Return-on-Savings Rate will generally lower costs. If Model 1 is used, then a 10% increase in the assumed Return-on-Savings Rate results in a 5% decrease in the required savings rate. If Model 2 is used, a 10% increase in the assumed Return-on-Savings Rate will result in required savings rates 11% to 16% lower than the original analysis.

- Increasing the "spread" (i.e., the uncertainty in replacement year for individual components) by 10% has a negligible (-1% to +2%) impact on Model 1 savings rates, no impact on Model 2 (because "spread" is not used). The effect on Model 3 will be to make any particular year's cost between 5% lower and 14% higher than under the original analysis, but the overall effect is negligible.

Appendix D - Results of Field Inspection and Staff Consultation

In this appendix the methods and results of the field inspection and staff consultation are presented.

Methods

During March and April, 2008, Boyle staff, accompanied by the District Utility Superintendent, visited the sites listed below:

Site	Date Visited	Site	Date Visited
Bevington Well	3/14/08	Honey Grove Lift Station	4/9/08
Blacklake Misty Glen Lift Station	3/14/08	Juniper Sewer Lift Station	3/6/08
		Knollwood Well	3/14/08
Blacklake No 3 Well	3/14/08	La Mirada Lift Station	3/14/08
Blacklake No 4 Well	3/6/08	N Oak Glen Sewer Lift Station	3/6/08
Blacklake Tank	3/14/08	Nipomo Palms Lift Station	3/14/08
Blacklake The Oaks Lift Station	3/14/08	Olympic Well	3/6/08
Blacklake Woodgreen Lift Station	3/14/08	Quad Tanks	3/6/08
		Standpipe Tank	3/14/08
Blacklake WWTP	3/14/08	Sundale Well	3/14/08
Bracken Sewer Lift Station	3/6/08	Tefft Sewer Lift Station	3/6/08
Church Well	3/6/08	Tejas Lift Station	3/6/08
Eureka Well	3/6/08	Via Concha Well	3/6/08
Gardenia Sewer Lift Station	3/6/08		

Photographs were taken and field notes were recorded to summarize the condition of the various components of each system, including information provided by District staff. The purpose was to gain a sense of overall condition. It was not intended as a detailed inspection and as such reservoirs were not entered, for example. The Southland WWTF was not visited because of its planned upgrade.

Results

Field notes and photographs from these visits follow.

Two additional comments (which don't "fit" into the field note format) are: (1) the SCADA doesn't include a G.U.I. (graphical user interface) at the District yard, and (2) some, but not all, of the visited well sites were checked for the presence or absence of an eye wash station.

Field notes and photographs are available from the District office:
148 South Wilson Street
Nipomo, CA 93444

Appendix E - Tank Inspection Summary

Tank	Inspection Letter Date	Summary of Recommendations in Letter
Water Storage Tank #3 (First Anniversary)	9/20/2000	• Epoxy coating has some defects. • Sandblast and recoat floor. Caulk column base-plate. • Do not energize cathodic protection system for one year.
Standpipe	10/18/2004	• Epoxy coating has defects. • Corrosion sites need repair. Metal loss in deepest pits is significant. • Remove bottom sediments biennially. • No seismic damage observed.
Water Storage Tank #1	December 2004	• Coal-tar coating is blistered and cracked in numerous locations. • Metal loss in deepest pits is significant. • Recommends blasting the entire interior and recoating with epoxy within 2 years. • No seismic damage observed.
Water Storage Tank #2	December 2004	• Coal-tar coating is blistered and cracked in numerous locations. • Metal loss in deepest pits is significant. Floor is penetrated in one location. • Recommends blasting the entire interior and recoating with epoxy. Delay will result in additional substantial pitting in floor. • No seismic damage observed.
Water Storage Tank #3	December 2004	• Epoxy coating shows a few small defects. These defects were repaired. Corrosion is insignificant. • Recommends re-inspection again in one year. Sediment removal and touch-up repair should be conducted on a 3-year cycle.
Black Lake Storage Tank	11/15/2006	• Coal-tar coating is blistered and cracked in numerous locations. • Recommends blasting the entire interior and recoating, at a cost of $63,000 to $101,000. • No seismic damage observed.

Documentation from these inspections follow.

Inspection documentation is available from the District office:
148 South Wilson Street
Nipomo, CA 93444

Bruce Buel

From: McEwen, Malcolm [MMcEwen@BoyleEngineering.com]
Sent: Thursday, August 28, 2008 11:15 AM
To: Bruce Buel
Cc: Peter Sevcik; Nunley, Mike
Subject: Model 2 Catch-up Calculations
Attachments: Letter to Bruce Buel Budget Revision 08-28-08.pdf

Hello Bruce,

As requested I have calculated a 5-year "catch-up" savings rate for the Water and Sewer Replacement Funds.

The results are presented in tabular form for all 4 divisions, separately and combined.

I have also prepared 2 charts that show some of the key values for the combined divisions.

Please note that at any given time the "Model 2" funding approach requires between 30% and 70% of the total system value be held in reserve, as shown in the 2nd chart.

Also included is a scope revision request, as we discussed.

All these documents are in draft form. Please let me know if they need to be modified.

Malcolm McEwen, PE
Senior Engineer
(805) 542-9840 x104

BOYLE | AECOM
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San Luis Obispo, CA 93401
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www.boyle.aecom.com

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2007	$ 536,000	$ 951,459	$ -	$ 951,459	$ 1,954,212	$ 25,976,320
2008	$ 206,000	$ 956,788	$ -	$ 956,788	$ 2,835,995	$ 27,933,528
2009	$ 48,801	$ 958,043	$ 5,468,450	$ 6,426,493	$ 9,630,499	$ 30,141,579
2010	$ 49,173	$ 959,198	$ 5,468,450	$ 6,427,648	$ 16,731,591	$ 32,449,933
2011	$ 33,765	$ 960,146	$ 5,468,450	$ 6,428,596	$ 24,168,630	$ 34,878,777
2012	$ 39,415	$ 961,200	$ 5,468,450	$ 6,429,650	$ 31,935,788	$ 37,412,259
2013	$ 91,942	$ 963,604	$ 5,468,450	$ 6,432,054	$ 40,002,453	$ 40,008,323
2014	$ 227,527	$ 969,449	$ -	$ 969,449	$ 42,588,110	$ 42,588,137
2015	$ 51,938	$ 970,828	$ -	$ 970,828	$ 45,467,153	$ 45,465,740
2016	$ 106,991	$ 973,697	$ -	$ 973,697	$ 48,423,697	$ 48,419,222
2017	$ 603,418	$ 989,858	$ -	$ 989,858	$ 51,033,747	$ 51,012,182
2018	$ 267,157	$ 996,721	$ -	$ 996,721	$ 54,104,682	$ 54,074,975
2019	$ 409,193	$ 1,005,660	$ -	$ 1,005,660	$ 57,181,114	$ 57,140,729
2020	$ 22,028	$ 1,006,278	$ -	$ 1,006,278	$ 60,783,797	$ 60,740,948
2021	$ 17,339,088	$ 1,176,329	$ -	$ 1,176,329	$ 47,409,244	$ 47,186,764
2022	$ 746,266	$ 1,195,444	$ -	$ 1,195,444	$ 50,045,632	$ 49,793,166
2023	$ 420,433	$ 1,206,442	$ -	$ 1,206,442	$ 53,137,984	$ 52,862,664
2024	$ 669,998	$ 1,213,775	$ -	$ 1,213,775	$ 56,127,590	$ 55,832,217
2025	$ 308,140	$ 1,220,007	$ -	$ 1,220,007	$ 59,620,098	$ 59,304,921
2026	$ 1,625,781	$ 1,237,786	$ -	$ 1,237,786	$ 61,970,708	$ 61,622,769
2027	$ 939,033	$ 1,262,829	$ -	$ 1,262,829	$ 65,140,013	$ 64,750,246
2028	$ 5,092,445	$ 1,337,363	$ -	$ 1,337,363	$ 64,376,413	$ 63,891,219
2029	$ 1,963,776	$ 1,363,556	$ -	$ 1,363,556	$ 66,734,492	$ 66,200,092
2030	$ -	$ 1,363,556	$ -	$ 1,363,556	$ 71,162,460	$ 70,604,013
2031	$ 2,096,990	$ 1,386,042	$ -	$ 1,386,042	$ 73,716,195	$ 73,109,120
2032	$ 1,887,143	$ 1,410,108	$ -	$ 1,410,108	$ 76,619,843	$ 75,960,301
2033	$ 1,950,227	$ 1,437,975	$ -	$ 1,437,975	$ 79,620,193	$ 78,901,850
2034	$ 203,648	$ 1,439,963	$ -	$ 1,439,963	$ 84,504,215	$ 83,751,470
2035	$ 4,076,904	$ 1,484,407	$ -	$ 1,484,407	$ 85,781,206	$ 84,948,143
2036	$ 1,190,160	$ 1,500,069	$ -	$ 1,500,069	$ 90,018,772	$ 89,131,855
2037	$ 3,293,164	$ 1,568,856	$ -	$ 1,568,856	$ 92,415,908	$ 91,417,196
2038	$ 5,657,932	$ 1,636,515	$ -	$ 1,636,515	$ 92,626,850	$ 91,512,493
2039	$ 1,813,657	$ 1,657,521	$ -	$ 1,657,521	$ 96,713,510	$ 95,527,056
2040	$ 5,396,892	$ 1,710,916	$ -	$ 1,710,916	$ 97,456,633	$ 96,160,991
2041	$ 677,403	$ 1,719,442	$ -	$ 1,719,442	$ 102,961,596	$ 101,598,739
2042	$ 95,671	$ 1,721,581	$ -	$ 1,721,581	$ 109,298,249	$ 107,871,828
2043	$ 4,937,913	$ 1,811,178	$ -	$ 1,811,178	$ 111,171,438	$ 109,587,200
2044	$ 1,899,589	$ 1,839,334	$ -	$ 1,839,334	$ 116,196,667	$ 114,511,716
2045	$ 1,418,459	$ 1,854,300	$ -	$ 1,854,300	$ 121,944,801	$ 120,168,388
2046	$ 6,403,887	$ 1,938,125	$ -	$ 1,938,125	$ 123,053,771	$ 121,109,821
2047	$ 2,064,870	$ 1,990,544	$ -	$ 1,990,544	$ 128,606,439	$ 126,520,234
2048	$ 749,257	$ 2,009,532	$ -	$ 2,009,532	$ 135,744,431	$ 133,544,505
2049	$ 452,659	$ 2,017,531	$ -	$ 2,017,531	$ 143,508,591	$ 141,201,309
2050	$ 5,346,775	$ 2,114,526	$ -	$ 2,114,526	$ 146,829,382	$ 144,316,913
2051	$ 361,711	$ 2,123,337	$ -	$ 2,123,337	$ 155,293,880	$ 152,659,141
2052	$ 2,323,715	$ 2,175,773	$ -	$ 2,175,773	$ 162,232,073	$ 159,423,975

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2053	$ 7,316,918	$ 2,311,612	$ -	$ 2,311,612	$ 164,631,233	$ 161,554,819
2054	$ 476,292	$ 2,317,076	$ -	$ 2,317,076	$ 173,984,691	$ 170,764,129
2055	$ 240,745	$ 2,321,695	$ -	$ 2,321,695	$ 183,999,428	$ 180,629,114
2056	$ 1,516,065	$ 2,345,571	$ -	$ 2,345,571	$ 193,214,458	$ 189,667,530
2057	$ 2,270,863	$ 2,405,576	$ -	$ 2,405,576	$ 202,152,073	$ 198,382,827
2058	$ 425,172	$ 2,412,320	$ -	$ 2,412,320	$ 213,344,618	$ 209,398,709
2059	$ 2,613,984	$ 2,467,669	$ -	$ 2,467,669	$ 222,909,856	$ 218,728,541
2060	$ 502,083	$ 2,477,405	$ -	$ 2,477,405	$ 235,027,605	$ 230,647,957
2061	$ 74,012	$ 2,479,306	$ -	$ 2,479,306	$ 248,120,710	$ 243,541,991
2062	$ -	$ 2,479,306	$ -	$ 2,479,306	$ 261,877,018	$ 257,092,256
2063	$ 1,413,346	$ 2,516,258	$ -	$ 2,516,258	$ 274,877,627	$ 269,838,937
2064	$ 1,176,728	$ 2,532,386	$ -	$ 2,532,386	$ 288,716,736	$ 283,434,451
2065	$ 1,035,987	$ 2,553,105	$ -	$ 2,553,105	$ 303,340,997	$ 297,799,358
2066	$ 3,446,416	$ 2,603,503	$ -	$ 2,603,503	$ 316,265,587	$ 310,421,907
2067	$ 15,110,548	$ 2,872,083	$ -	$ 2,872,083	$ 318,388,317	$ 312,001,006
2068	$ 9,719,071	$ 3,011,035	$ -	$ 3,011,035	$ 326,143,252	$ 319,323,307
2069	$ 11,258,224	$ 3,157,165	$ -	$ 3,157,165	$ 332,860,713	$ 325,581,164
2070	$ 11,022,803	$ 3,296,556	$ -	$ 3,296,556	$ 340,261,543	$ 332,508,751
2071	$ 5,089,995	$ 3,363,991	$ -	$ 3,363,991	$ 353,998,688	$ 345,826,551
2072	$ 7,516,942	$ 3,470,914	$ -	$ 3,470,914	$ 366,038,791	$ 357,387,174
2073	$ 5,683,059	$ 3,550,091	$ -	$ 3,550,091	$ 380,537,323	$ 371,413,643
2074	$ 56,477,884	$ 4,282,954	$ -	$ 4,282,954	$ 345,659,306	$ 335,359,218
2075	$ 57,678,726	$ 5,019,252	$ -	$ 5,019,252	$ 308,780,367	$ 297,247,344
2076	$ 6,599,005	$ 5,112,885	$ -	$ 5,112,885	$ 321,419,443	$ 309,269,588
2077	$ 15,281,792	$ 5,356,390	$ -	$ 5,356,390	$ 326,198,954	$ 313,247,892
2078	$ 30,398,602	$ 5,841,217	$ -	$ 5,841,217	$ 316,583,376	$ 302,542,872
2079	$ 16,194,141	$ 6,054,739	$ -	$ 6,054,739	$ 320,962,689	$ 306,067,232
2080	$ 52,447,061	$ 6,719,969	$ -	$ 6,719,969	$ 289,981,316	$ 273,720,399
2081	$ 9,525,051	$ 6,850,462	$ -	$ 6,850,462	$ 300,664,157	$ 283,535,133
2082	$ 25,718,156	$ 7,237,678	$ -	$ 7,237,678	$ 296,039,261	$ 277,734,790
2083	$ 26,030,128	$ 7,600,319	$ -	$ 7,600,319	$ 291,273,233	$ 271,766,101
2084	$ 4,709,064	$ 7,662,121	$ -	$ 7,662,121	$ 307,678,380	$ 287,228,844
2085	$ 19,880,883	$ 7,920,901	$ -	$ 7,920,901	$ 309,920,367	$ 288,280,176
2086	$ 537,210	$ 7,935,289	$ -	$ 7,935,289	$ 331,621,950	$ 308,992,916
2087	$ 8,531,440	$ 8,131,627	$ -	$ 8,131,627	$ 346,511,047	$ 322,658,534
2088	$ 449,365	$ 8,143,165	$ -	$ 8,143,165	$ 370,164,287	$ 345,226,353
2089	$ 2,483,563	$ 8,207,399	$ -	$ 8,207,399	$ 392,914,849	$ 366,787,583
2090	$ -	$ 8,207,399	$ -	$ 8,207,399	$ 419,172,748	$ 391,869,756
2091	$ 538,939	$ 8,222,100	$ -	$ 8,222,100	$ 446,088,678	$ 417,541,688
2092	$ 370,071	$ 8,230,652	$ -	$ 8,230,652	$ 474,393,628	$ 444,553,087
2093	$ 22,489,230	$ 8,663,526	$ -	$ 8,663,526	$ 482,305,496	$ 450,669,777
2094	$ -	$ 8,663,526	$ -	$ 8,663,526	$ 513,062,627	$ 480,003,301
2095	$ 404,387	$ 8,674,878	$ -	$ 8,674,878	$ 544,811,307	$ 510,252,447
2096	$ 1,416,163	$ 8,712,544	$ -	$ 8,712,544	$ 577,016,262	$ 540,862,893
2097	$ 13,113,528	$ 9,056,444	$ -	$ 9,056,444	$ 599,332,449	$ 561,192,803
2098	$ 2,945,896	$ 9,130,456	$ -	$ 9,130,456	$ 632,897,839	$ 592,964,567

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2099	$ 4,748,637	$ 9,234,652	$ -	$ 9,234,652	$ 666,279,816	$ 624,440,661
2100	$ 23,674,157	$ 9,666,449	$ -	$ 9,666,449	$ 682,689,689	$ 638,516,546
2101	$ 184,422,864	$ 12,002,540	$ -	$ 12,002,540	$ 541,530,515	$ 492,928,365
2102	$ 314,985	$ 12,010,632	$ -	$ 12,010,632	$ 578,135,514	$ 527,337,810
2103	$ 27,184,205	$ 12,517,732	$ -	$ 12,517,732	$ 590,048,437	$ 536,434,917
2104	$ 10,119,300	$ 12,692,210	$ -	$ 12,692,210	$ 619,744,676	$ 563,536,219
2105	$ 3,478,158	$ 12,762,985	$ -	$ 12,762,985	$ 657,492,348	$ 598,680,550
2106	$ 17,579,637	$ 13,005,692	$ -	$ 13,005,692	$ 683,090,815	$ 621,378,857
2107	$ 10,587,929	$ 13,285,474	$ -	$ 13,285,474	$ 717,125,293	$ 652,343,925

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2007	$ 659,000	$ 543,935	$ -	$ 543,935	$ 2,755,915	$ 8,508,614
2008	$ 15,450	$ 544,369	$ -	$ 544,369	$ 3,433,346	$ 9,444,464
2009	$ 112,455	$ 547,389	$ 1,304,650	$ 1,852,039	$ 5,410,772	$ 10,325,874
2010	$ 325,633	$ 555,277	$ 1,304,650	$ 1,859,927	$ 7,272,248	$ 11,036,927
2011	$ 119,304	$ 558,481	$ 1,304,650	$ 1,863,131	$ 9,427,167	$ 11,994,550
2012	$ 17,389	$ 558,969	$ 1,304,650	$ 1,863,619	$ 11,781,483	$ 13,100,528
2013	$ 126,570	$ 562,368	$ 1,304,650	$ 1,867,018	$ 14,136,114	$ 14,147,605
2014	$ 450,134	$ 574,022	$ -	$ 574,022	$ 14,921,959	$ 14,921,789
2015	$ 191,282	$ 579,148	$ -	$ 579,148	$ 16,007,374	$ 16,001,840
2016	$ 19,572	$ 579,697	$ -	$ 579,697	$ 17,313,918	$ 17,307,561
2017	$ 954,181	$ 605,263	$ -	$ 605,263	$ 17,771,363	$ 17,738,004
2018	$ 66,443	$ 607,128	$ -	$ 607,128	$ 19,139,080	$ 19,102,270
2019	$ 151,131	$ 611,187	$ -	$ 611,187	$ 20,487,898	$ 20,445,191
2020	$ 1,003,009	$ 637,006	$ -	$ 637,006	$ 21,072,517	$ 21,000,906
2021	$ 160,335	$ 641,312	$ -	$ 641,312	$ 22,530,617	$ 22,451,284
2022	$ 160,471	$ 645,613	$ -	$ 645,613	$ 24,058,690	$ 23,971,293
2023	$ 170,099	$ 650,181	$ -	$ 650,181	$ 25,650,671	$ 25,554,568
2024	$ 406,601	$ 660,934	$ -	$ 660,934	$ 27,089,027	$ 26,977,362
2025	$ 1,201,918	$ 689,995	$ -	$ 689,995	$ 27,827,160	$ 27,680,102
2026	$ 138,527	$ 693,635	$ -	$ 693,635	$ 29,665,704	$ 29,508,224
2027	$ 1,282,339	$ 727,993	$ -	$ 727,993	$ 30,479,074	$ 30,278,603
2028	$ 27,904	$ 728,776	$ -	$ 728,776	$ 32,584,299	$ 32,373,989
2029	$ 203,107	$ 734,231	$ -	$ 734,231	$ 34,614,756	$ 34,389,282
2030	$ 406,559	$ 744,236	$ -	$ 744,236	$ 36,543,588	$ 36,297,512
2031	$ 215,476	$ 750,022	$ -	$ 750,022	$ 38,756,346	$ 38,493,150
2032	$ 301,504	$ 757,248	$ -	$ 757,248	$ 40,990,201	$ 40,707,611
2033	$ 228,599	$ 763,387	$ -	$ 763,387	$ 43,403,901	$ 43,102,178
2034	$ 550,880	$ 778,278	$ -	$ 778,278	$ 45,619,497	$ 45,288,636
2035	$ 3,422,740	$ 857,869	$ -	$ 857,869	$ 45,146,108	$ 44,717,185
2036	$ 35,348	$ 858,861	$ -	$ 858,861	$ 48,039,844	$ 47,590,583
2037	$ 1,856,856	$ 908,465	$ -	$ 908,465	$ 49,294,127	$ 48,772,813
2038	$ 120,004	$ 911,834	$ -	$ 911,834	$ 52,345,226	$ 51,796,932
2039	$ 2,060,066	$ 953,208	$ -	$ 953,208	$ 53,636,797	$ 53,020,594
2040	$ 39,785	$ 954,325	$ -	$ 954,325	$ 57,007,938	$ 56,362,839
2041	$ 289,582	$ 962,102	$ -	$ 962,102	$ 60,289,110	$ 59,606,854
2042	$ 135,065	$ 965,894	$ -	$ 965,894	$ 63,876,413	$ 63,159,494
2043	$ 307,218	$ 974,144	$ -	$ 974,144	$ 67,461,615	$ 66,703,813
2044	$ 641,824	$ 991,392	$ -	$ 991,392	$ 70,891,569	$ 70,081,641
2045	$ 464,292	$ 1,003,833	$ -	$ 1,003,833	$ 74,666,403	$ 73,807,027
2046	$ 152,017	$ 1,008,101	$ -	$ 1,008,101	$ 78,927,839	$ 78,025,332
2047	$ 2,316,047	$ 1,070,155	$ -	$ 1,070,155	$ 81,281,858	$ 80,273,891
2048	$ 50,398	$ 1,071,570	$ -	$ 1,071,570	$ 86,008,934	$ 84,954,130
2049	$ 972,456	$ 1,092,982	$ -	$ 1,092,982	$ 90,049,046	$ 88,924,401
2050	$ 4,548,323	$ 1,205,837	$ -	$ 1,205,837	$ 90,813,029	$ 89,519,842
2051	$ 1,031,678	$ 1,228,552	$ -	$ 1,228,552	$ 95,151,775	$ 93,776,656
2052	$ 264,712	$ 1,235,488	$ -	$ 1,235,488	$ 100,459,978	$ 99,015,731

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2053	$ 5,225,746	$ 1,307,438	$ -	$ 1,307,438	$ 101,121,203	$ 99,536,778
2054	$ 5,248,722	$ 1,388,125	$ -	$ 1,388,125	$ 101,873,526	$ 100,133,483
2055	$ 1,830,588	$ 1,429,959	$ -	$ 1,429,959	$ 106,121,555	$ 104,259,494
2056	$ 63,843	$ 1,431,751	$ -	$ 1,431,751	$ 112,329,361	$ 110,381,635
2057	$ 6,243,603	$ 1,564,341	$ -	$ 1,564,341	$ 112,775,316	$ 110,601,385
2058	$ 321,995	$ 1,571,756	$ -	$ 1,571,756	$ 119,170,695	$ 116,891,189
2059	$ 492,994	$ 1,584,996	$ -	$ 1,584,996	$ 125,696,704	$ 123,300,784
2060	$ 1,293,411	$ 1,615,756	$ -	$ 1,615,756	$ 131,748,109	$ 129,212,228
2061	$ 523,017	$ 1,629,802	$ -	$ 1,629,802	$ 138,856,899	$ 136,192,226
2062	$ 733,811	$ 1,642,845	$ -	$ 1,642,845	$ 146,088,421	$ 143,290,208
2063	$ 554,869	$ 1,657,746	$ -	$ 1,657,746	$ 153,839,876	$ 150,900,171
2064	$ 3,013,717	$ 1,719,245	$ -	$ 1,719,245	$ 159,545,564	$ 156,409,306
2065	$ 72,890,088	$ 2,700,883	$ -	$ 2,700,883	$ 96,657,448	$ 92,354,248
2066	$ 274,560	$ 2,708,591	$ -	$ 2,708,591	$ 103,562,951	$ 99,058,051
2067	$ 11,570,460	$ 2,918,313	$ -	$ 2,918,313	$ 99,702,460	$ 94,775,680
2068	$ 5,466,249	$ 2,988,842	$ -	$ 2,988,842	$ 101,846,161	$ 96,623,974
2069	$ 11,588,495	$ 3,144,800	$ -	$ 3,144,800	$ 98,127,060	$ 92,506,897
2070	$ 4,208,078	$ 3,202,782	$ -	$ 3,202,782	$ 101,681,607	$ 95,747,946
2071	$ 4,069,808	$ 3,264,235	$ -	$ 3,264,235	$ 105,598,598	$ 99,333,703
2072	$ 2,639,720	$ 3,299,197	$ -	$ 3,299,197	$ 111,158,475	$ 104,575,126
2073	$ 10,363,507	$ 3,440,846	$ -	$ 3,440,846	$ 109,392,784	$ 102,365,160
2074	$ 4,307,125	$ 3,523,600	$ -	$ 3,523,600	$ 113,690,496	$ 106,260,152
2075	$ 8,204,338	$ 3,688,606	$ -	$ 3,688,606	$ 114,456,824	$ 106,519,682
2076	$ 7,130,498	$ 3,783,139	$ -	$ 3,783,139	$ 116,430,263	$ 108,037,164
2077	$ 11,329,849	$ 4,005,945	$ -	$ 4,005,945	$ 114,525,988	$ 105,522,367
2078	$ 20,737,441	$ 4,274,222	$ -	$ 4,274,222	$ 103,408,779	$ 93,719,645
2079	$ 2,859,030	$ 4,323,029	$ -	$ 4,323,029	$ 109,720,710	$ 99,544,562
2080	$ 19,637,875	$ 4,663,106	$ -	$ 4,663,106	$ 99,893,212	$ 88,903,757
2081	$ 11,134,434	$ 4,817,331	$ -	$ 4,817,331	$ 98,288,083	$ 86,642,938
2082	$ 15,086,666	$ 5,034,330	$ -	$ 5,034,330	$ 92,885,256	$ 80,489,315
2083	$ 5,503,061	$ 5,118,160	$ -	$ 5,118,160	$ 96,910,510	$ 83,869,148
2084	$ 3,838,007	$ 5,196,480	$ -	$ 5,196,480	$ 102,863,797	$ 89,153,730
2085	$ 11,529,654	$ 5,414,053	$ -	$ 5,414,053	$ 101,620,700	$ 87,066,316
2086	$ 495,886	$ 5,427,975	$ -	$ 5,427,975	$ 111,369,979	$ 96,146,100
2087	$ 7,555,032	$ 5,630,398	$ -	$ 5,630,398	$ 114,710,362	$ 98,589,876
2088	$ 164,402	$ 5,635,014	$ -	$ 5,635,014	$ 125,596,516	$ 108,745,785
2089	$ 9,031,137	$ 5,816,395	$ -	$ 5,816,395	$ 128,295,355	$ 110,496,798
2090	$ 616,262	$ 5,833,557	$ -	$ 5,833,557	$ 139,548,451	$ 120,931,024
2091	$ 1,269,500	$ 5,867,650	$ -	$ 5,867,650	$ 150,690,325	$ 131,199,487
2092	$ 185,036	$ 5,872,844	$ -	$ 5,872,844	$ 163,423,476	$ 143,050,123
2093	$ 1,346,813	$ 5,909,014	$ -	$ 5,909,014	$ 175,605,639	$ 154,277,688
2094	$ 3,245,564	$ 5,996,748	$ -	$ 5,996,748	$ 186,528,931	$ 164,149,539
2095	$ 10,972,363	$ 6,280,882	$ -	$ 6,280,882	$ 190,513,891	$ 166,830,507
2096	$ 208,259	$ 6,286,728	$ -	$ 6,286,728	$ 205,448,388	$ 180,693,141
2097	$ 10,939,857	$ 6,578,974	$ -	$ 6,578,974	$ 210,628,736	$ 184,454,106
2098	$ 707,015	$ 6,598,823	$ -	$ 6,598,823	$ 226,295,784	$ 198,922,554

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Town Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2099	$ 4,263,154	$6,692,688	$ -	$6,692,688	$ 239,209,800	$210,506,685
2100	$ 8,985,241	$6,904,795	$ -	$6,904,795	$ 248,204,510	$217,988,104
2101	$ 4,522,780	$7,004,377	$ -	$7,004,377	$ 262,170,507	$230,490,300
2102	$ 795,752	$7,026,716	$ -	$7,026,716	$ 280,515,347	$247,386,186
2103	$ 1,810,004	$7,075,325	$ -	$7,075,325	$ 298,722,248	$264,051,479
2104	$ 3,781,371	$7,176,939	$ -	$7,176,939	$ 315,883,281	$279,546,139
2105	$ 8,115,701	$7,362,660	$ -	$7,362,660	$ 329,676,307	$291,509,916
2106	$ 895,626	$7,387,804	$ -	$7,387,804	$ 351,336,371	$311,426,217
2107	$ 18,891,915	$7,861,835	$ -	$7,861,835	$ 356,470,210	$314,268,737

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2007	$ 67,000	$ 170,875	$ -	$ 170,875	$ 349,170	$ 2,341,276
2008	$ 5,150	$ 171,019	$ -	$ 171,019	$ 538,448	$ 2,620,047
2009	$ 15,914	$ 171,393	$ 453,600	$ 624,993	$ 1,199,882	$ 2,900,751
2010	$ -	$ 171,393	$ 453,600	$ 624,993	$ 1,906,994	$ 3,210,390
2011	$ 6,753	$ 171,582	$ 453,600	$ 625,182	$ 2,639,371	$ 3,527,210
2012	$ 5,796	$ 171,745	$ 453,600	$ 625,345	$ 3,405,832	$ 3,859,442
2013	$ -	$ 171,745	$ 453,600	$ 625,345	$ 4,212,581	$ 4,212,590
2014	$ -	$ 171,745	$ -	$ 171,745	$ 4,581,620	$ 4,581,631
2015	$ 7,601	$ 171,959	$ -	$ 171,959	$ 4,959,889	$ 4,959,677
2016	$ 189,192	$ 176,863	$ -	$ 176,863	$ 5,178,714	$ 5,173,367
2017	$ 345,387	$ 186,113	$ -	$ 186,113	$ 5,260,858	$ 5,245,604
2018	$ 16,611	$ 186,540	$ -	$ 186,540	$ 5,675,920	$ 5,659,534
2019	$ 8,555	$ 186,780	$ -	$ 186,780	$ 6,117,967	$ 6,100,592
2020	$ 7,343	$ 186,986	$ -	$ 186,986	$ 6,581,333	$ 6,562,961
2021	$ 57,478	$ 188,463	$ -	$ 188,463	$ 7,016,958	$ 6,996,217
2022	$ 403,514	$ 198,829	$ -	$ 198,829	$ 7,136,984	$ 7,104,477
2023	$ 9,628	$ 199,099	$ -	$ 199,099	$ 7,656,579	$ 7,622,326
2024	$ 8,264	$ 199,331	$ -	$ 199,331	$ 8,201,162	$ 8,165,125
2025	$ -	$ 199,331	$ -	$ 199,331	$ 8,778,516	$ 8,740,857
2026	$ 35,070	$ 200,271	$ -	$ 200,271	$ 9,347,762	$ 9,307,427
2027	$ 496,681	$ 213,539	$ -	$ 213,539	$ 9,494,879	$ 9,438,863
2028	$ 133,941	$ 216,321	$ -	$ 216,321	$ 10,014,263	$ 9,952,820
2029	$ 218,436	$ 220,739	$ -	$ 220,739	$ 10,477,141	$ 10,408,316
2030	$ -	$ 220,739	$ -	$ 220,739	$ 11,179,285	$ 11,107,363
2031	$ 256,132	$ 227,348	$ -	$ 227,348	$ 11,663,799	$ 11,581,734
2032	$ 785,167	$ 245,837	$ -	$ 245,837	$ 11,660,403	$ 11,555,324
2033	$ 25,879	$ 246,502	$ -	$ 246,502	$ 12,416,836	$ 12,306,334
2034	$ 66,639	$ 247,889	$ -	$ 247,889	$ 13,167,999	$ 13,051,075
2035	$ 997,720	$ 257,877	$ -	$ 257,877	$ 13,032,320	$ 12,899,697
2036	$ 148,464	$ 261,770	$ -	$ 261,770	$ 13,743,861	$ 13,601,201
2037	$ 2,745,234	$ 321,707	$ -	$ 321,707	$ 11,953,285	$ 11,741,571
2038	$ -	$ 321,707	$ -	$ 321,707	$ 12,827,367	$ 12,606,126
2039	$ 54,077	$ 322,842	$ -	$ 322,842	$ 13,687,891	$ 13,455,509
2040	$ 3,804,616	$ 360,213	$ -	$ 360,213	$ 10,875,653	$ 10,593,761
2041	$ 2,898,442	$ 388,498	$ -	$ 388,498	$ 8,872,595	$ 8,548,460
2042	$ -	$ 388,498	$ -	$ 388,498	$ 9,677,842	$ 9,339,121
2043	$ 17,390	$ 388,986	$ -	$ 388,986	$ 10,502,446	$ 10,147,972
2044	$ 14,926	$ 389,405	$ -	$ 389,405	$ 11,367,058	$ 10,996,195
2045	$ -	$ 389,405	$ -	$ 389,405	$ 12,285,504	$ 11,897,952
2046	$ 443,384	$ 400,865	$ -	$ 400,865	$ 12,813,871	$ 12,396,904
2047	$ 897,060	$ 424,830	$ -	$ 424,830	$ 12,937,382	$ 12,476,608
2048	$ 57,118	$ 426,337	$ -	$ 426,337	$ 13,907,968	$ 13,424,884
2049	$ -	$ 426,337	$ -	$ 426,337	$ 14,979,349	$ 14,474,526
2050	$ -	$ 426,337	$ -	$ 426,337	$ 16,098,941	$ 15,571,402
2051	$ 161,544	$ 430,539	$ -	$ 430,539	$ 17,111,764	$ 16,556,093
2052	$ 998,341	$ 456,232	$ -	$ 456,232	$ 17,360,214	$ 16,752,690

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2053	$ -	$ 456,232	$ -	$ 456,232	$ 18,618,186	$ 17,983,323
2054	$ -	$ 456,232	$ -	$ 456,232	$ 19,932,766	$ 19,269,335
2055	$ 24,794	$ 456,928	$ -	$ 456,928	$ 21,282,437	$ 20,588,424
2056	$ 106,405	$ 459,805	$ -	$ 459,805	$ 22,614,238	$ 21,885,987
2057	$ 2,748,709	$ 528,076	$ -	$ 528,076	$ 21,435,008	$ 20,602,643
2058	$ -	$ 528,076	$ -	$ 528,076	$ 22,951,423	$ 22,081,602
2059	$ 97,669	$ 530,498	$ -	$ 530,498	$ 24,440,939	$ 23,529,444
2060	$ 23,952	$ 531,170	$ -	$ 531,170	$ 26,071,902	$ 25,118,687
2061	$ 592,095	$ 546,381	$ -	$ 546,381	$ 27,224,010	$ 26,212,006
2062	$ -	$ 546,381	$ -	$ 546,381	$ 29,020,059	$ 27,962,515
2063	$ 94,223	$ 548,876	$ -	$ 548,876	$ 30,805,314	$ 29,697,573
2064	$ 26,958	$ 549,633	$ -	$ 549,633	$ 32,738,962	$ 31,580,581
2065	$ -	$ 549,633	$ -	$ 549,633	$ 34,786,582	$ 33,576,074
2066	$ 523,037	$ 560,700	$ -	$ 560,700	$ 36,414,873	$ 35,138,327
2067	$ 3,146,116	$ 643,184	$ -	$ 643,184	$ 35,579,553	$ 34,159,367
2068	$ 436,921	$ 652,258	$ -	$ 652,258	$ 37,425,322	$ 35,931,745
2069	$ 712,546	$ 666,669	$ -	$ 666,669	$ 39,093,585	$ 37,517,737
2070	$ 7,159,990	$ 757,212	$ -	$ 757,212	$ 34,484,092	$ 32,742,715
2071	$ 39,786	$ 758,329	$ -	$ 758,329	$ 36,788,544	$ 34,967,637
2072	$ 34,150	$ 759,288	$ -	$ 759,288	$ 39,203,334	$ 37,299,485
2073	$ -	$ 759,288	$ -	$ 759,288	$ 41,760,940	$ 39,771,418
2074	$ -	$ 759,288	$ -	$ 759,288	$ 44,433,638	$ 42,354,587
2075	$ 44,780	$ 760,545	$ -	$ 760,545	$ 47,183,141	$ 45,009,219
2076	$ 10,671,379	$ 910,291	$ -	$ 910,291	$ 39,586,257	$ 37,158,024
2077	$ 2,034,880	$ 964,789	$ -	$ 964,789	$ 40,340,964	$ 37,746,509
2078	$ 6,761,769	$ 1,051,573	$ -	$ 1,051,573	$ 36,493,432	$ 33,691,538
2079	$ 50,400	$ 1,052,988	$ -	$ 1,052,988	$ 39,185,608	$ 36,256,151
2080	$ 9,610,315	$ 1,175,184	$ -	$ 1,175,184	$ 32,566,713	$ 29,377,734
2081	$ 338,640	$ 1,183,884	$ -	$ 1,183,884	$ 34,930,733	$ 31,589,160
2082	$ 5,773,544	$ 1,324,722	$ -	$ 1,324,722	$ 32,113,406	$ 28,474,286
2083	$ 56,726	$ 1,326,314	$ -	$ 1,326,314	$ 34,887,783	$ 31,083,238
2084	$ 340,827	$ 1,333,762	$ -	$ 1,333,762	$ 37,510,687	$ 33,527,155
2085	$ 4,044,120	$ 1,384,902	$ -	$ 1,384,902	$ 36,601,770	$ 32,385,538
2086	$ 206,619	$ 1,390,436	$ -	$ 1,390,436	$ 39,495,236	$ 35,083,490
2087	$ 9,470,393	$ 1,587,326	$ -	$ 1,587,326	$ 33,460,885	$ 28,644,861
2088	$ 54,801	$ 1,588,865	$ -	$ 1,588,865	$ 36,572,188	$ 31,537,835
2089	$ 169,334	$ 1,591,936	$ -	$ 1,591,936	$ 39,712,176	$ 34,448,067
2090	$ -	$ 1,591,936	$ -	$ 1,591,936	$ 43,162,798	$ 37,661,803
2091	$ 1,509,028	$ 1,630,874	$ -	$ 1,630,874	$ 45,300,359	$ 39,511,130
2092	$ 61,679	$ 1,632,606	$ -	$ 1,632,606	$ 48,983,270	$ 42,931,716
2093	$ 152,469	$ 1,636,523	$ -	$ 1,636,523	$ 52,745,214	$ 46,417,247
2094	$ -	$ 1,636,523	$ -	$ 1,636,523	$ 56,828,915	$ 50,216,189
2095	$ 80,877	$ 1,638,793	$ -	$ 1,638,793	$ 61,017,878	$ 54,105,207
2096	$ 874,689	$ 1,661,733	$ -	$ 1,661,733	$ 64,625,505	$ 57,377,792
2097	$ 7,379,041	$ 1,855,315	$ -	$ 1,855,315	$ 62,093,415	$ 54,317,262
2098	$ -	$ 1,855,315	$ -	$ 1,855,315	$ 66,826,422	$ 58,700,343

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Water	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings	
2099	$ 91,028	$ 1,857,870	$ -	$ 1,857,870	$ 71,684,057	$ 63,189,634	
2100	$ 78,133	$ 1,860,064	$ -	$ 1,860,064	$ 76,775,474	$ 67,896,509	
2101	$ -	$ 1,860,064	$ -	$ 1,860,064	$ 82,174,137	$ 72,895,618	
2102	$ -	$ 1,860,064	$ -	$ 1,860,064	$ 87,815,739	$ 78,119,687	
2103	$ 102,453	$ 1,862,940	$ -	$ 1,862,940	$ 93,611,766	$ 83,476,387	
2104	$ 87,939	$ 1,865,408	$ -	$ 1,865,408	$ 99,685,709	$ 89,091,657	
2105	$ -	$ 1,865,408	$ -	$ 1,865,408	$ 106,120,918	$ 95,050,134	
2106	$ 2,612,241	$ 1,932,924	$ -	$ 1,932,924	$ 110,304,024	$ 98,664,500	
2107	$ 12,396,018	$ 2,241,125	$ -	$ 2,241,125	$ 105,213,662	$ 92,728,291	

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2007	$ 51,000	$ 158,806	$ -	$ 158,806	$ (26,123)	$ 1,831,541
2008	$ 108,150	$ 161,709	$ -	$ 161,709	$ 33,537	$ 1,971,763
2009	$ 106,090	$ 164,550	$ 420,900	$ 585,450	$ 540,752	$ 2,123,388
2010	$ 128,942	$ 167,669	$ 420,900	$ 588,569	$ 1,051,199	$ 2,261,954
2011	$ -	$ 167,669	$ 420,900	$ 588,569	$ 1,713,558	$ 2,538,956
2012	$ 5,796	$ 167,832	$ 420,900	$ 588,732	$ 2,400,096	$ 2,822,627
2013	$ -	$ 167,832	$ 420,900	$ 588,732	$ 3,123,325	$ 3,125,029
2014	$ 71,333	$ 169,771	$ -	$ 169,771	$ 3,369,953	$ 3,369,707
2015	$ 50,671	$ 171,128	$ -	$ 171,128	$ 3,649,758	$ 3,648,084
2016	$ 137,001	$ 174,806	$ -	$ 174,806	$ 3,859,668	$ 3,854,075
2017	$ -	$ 174,806	$ -	$ 174,806	$ 4,216,025	$ 4,210,180
2018	$ 163,340	$ 179,212	$ -	$ 179,212	$ 4,429,683	$ 4,418,971
2019	$ 142,576	$ 183,031	$ -	$ 183,031	$ 4,677,710	$ 4,662,525
2020	$ 111,609	$ 185,916	$ -	$ 185,916	$ 4,970,880	$ 4,951,997
2021	$ 45,378	$ 187,081	$ -	$ 187,081	$ 5,344,692	$ 5,323,741
2022	$ 186,956	$ 191,951	$ -	$ 191,951	$ 5,598,836	$ 5,571,853
2023	$ 49,746	$ 193,119	$ -	$ 193,119	$ 6,002,848	$ 5,973,430
2024	$ 257,844	$ 199,431	$ -	$ 199,431	$ 6,223,537	$ 6,186,200
2025	$ 204,292	$ 204,454	$ -	$ 204,454	$ 6,512,958	$ 6,468,692
2026	$ 206,914	$ 210,036	$ -	$ 210,036	$ 6,818,615	$ 6,766,523
2027	$ -	$ 210,036	$ -	$ 210,036	$ 7,344,940	$ 7,290,505
2028	$ 195,331	$ 215,279	$ -	$ 215,279	$ 7,705,099	$ 7,642,734
2029	$ 191,610	$ 220,411	$ -	$ 220,411	$ 8,090,547	$ 8,020,013
2030	$ 35,525	$ 221,408	$ -	$ 221,408	$ 8,650,469	$ 8,575,719
2031	$ 93,509	$ 223,605	$ -	$ 223,605	$ 9,179,899	$ 9,099,490
2032	$ 10,469	$ 223,899	$ -	$ 223,899	$ 9,816,499	$ 9,732,165
2033	$ -	$ 223,899	$ -	$ 223,899	$ 10,492,216	$ 10,404,086
2034	$ 128,835	$ 227,401	$ -	$ 227,401	$ 11,073,164	$ 10,977,409
2035	$ 812,214	$ 245,375	$ -	$ 245,375	$ 11,015,659	$ 10,896,812
2036	$ 318,136	$ 253,833	$ -	$ 253,833	$ 11,458,483	$ 11,325,449
2037	$ 247,581	$ 260,194	$ -	$ 260,194	$ 11,998,437	$ 11,852,769
2038	$ 295,009	$ 268,153	$ -	$ 268,153	$ 12,523,577	$ 12,363,037
2039	$ 257,508	$ 275,050	$ -	$ 275,050	$ 13,117,056	$ 12,942,085
2040	$ 13,262	$ 275,422	$ -	$ 275,422	$ 13,981,878	$ 13,798,644
2041	$ -	$ 275,422	$ -	$ 275,422	$ 14,898,878	$ 14,707,399
2042	$ 50,650	$ 276,844	$ -	$ 276,844	$ 15,807,980	$ 15,606,398
2043	$ -	$ 276,844	$ -	$ 276,844	$ 16,808,641	$ 16,597,988
2044	$ 134,335	$ 280,461	$ -	$ 280,461	$ 17,723,776	$ 17,499,864
2045	$ 122,991	$ 283,755	$ -	$ 283,755	$ 18,694,879	$ 18,457,448
2046	$ 373,709	$ 293,837	$ -	$ 293,837	$ 19,469,499	$ 19,210,848
2047	$ -	$ 293,837	$ -	$ 293,837	$ 20,652,686	$ 20,382,396
2048	$ 940,772	$ 314,531	$ -	$ 314,531	$ 20,969,970	$ 20,665,892
2049	$ 1,228,547	$ 341,862	$ -	$ 341,862	$ 21,042,317	$ 20,695,995
2050	$ 602,403	$ 356,862	$ -	$ 356,862	$ 21,759,739	$ 21,382,157
2051	$ 110,144	$ 359,691	$ -	$ 359,691	$ 23,004,661	$ 22,607,131
2052	$ 404,631	$ 370,131	$ -	$ 370,131	$ 24,022,027	$ 23,595,698

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2053	$ -	$ 370,131	$ -	$ 370,131	$ 25,489,806	$ 25,044,292
2054	$ 232,690	$ 376,457	$ -	$ 376,457	$ 26,797,554	$ 26,325,383
2055	$ 165,290	$ 380,883	$ -	$ 380,883	$ 28,236,177	$ 27,738,132
2056	$ 1,255,585	$ 408,597	$ -	$ 408,597	$ 28,678,204	$ 28,128,787
2057	$ -	$ 408,597	$ -	$ 408,597	$ 30,395,707	$ 29,821,566
2058	$ 532,820	$ 422,972	$ -	$ 422,972	$ 31,672,699	$ 31,057,700
2059	$ 465,089	$ 435,428	$ -	$ 435,428	$ 33,087,905	$ 32,432,213
2060	$ 502,993	$ 447,351	$ -	$ 447,351	$ 34,541,349	$ 33,843,692
2061	$ -	$ 447,351	$ -	$ 447,351	$ 36,563,192	$ 35,834,140
2062	$ 91,479	$ 449,920	$ -	$ 449,920	$ 38,587,223	$ 37,822,680
2063	$ -	$ 449,920	$ -	$ 449,920	$ 40,793,814	$ 39,994,866
2064	$ 242,624	$ 456,452	$ -	$ 456,452	$ 42,863,904	$ 42,022,177
2065	$ 6,145,454	$ 542,449	$ -	$ 542,449	$ 39,214,185	$ 38,244,713
2066	$ 846,560	$ 565,067	$ -	$ 565,067	$ 40,722,758	$ 39,686,025
2067	$ 600,944	$ 580,506	$ -	$ 580,506	$ 42,560,967	$ 41,461,448
2068	$ 637,177	$ 597,610	$ -	$ 597,610	$ 44,463,536	$ 43,296,664
2069	$ 625,040	$ 614,350	$ -	$ 614,350	$ 46,481,351	$ 45,244,476
2070	$ 11,806,297	$ 765,436	$ -	$ 765,436	$ 37,566,595	$ 36,116,177
2071	$ -	$ 765,436	$ -	$ 765,436	$ 40,056,973	$ 38,541,285
2072	$ 34,150	$ 766,395	$ -	$ 766,395	$ 42,626,269	$ 41,041,374
2073	$ 218,081	$ 771,517	$ -	$ 771,517	$ 45,132,605	$ 43,471,037
2074	$ 1,224,562	$ 801,831	$ -	$ 801,831	$ 46,776,924	$ 45,008,907
2075	$ 895,597	$ 823,849	$ -	$ 823,849	$ 48,847,211	$ 46,976,624
2076	$ 18,719,576	$ 1,072,031	$ -	$ 1,072,031	$ 33,446,031	$ 31,231,918
2077	$ -	$ 1,072,031	$ -	$ 1,072,031	$ 36,071,375	$ 33,757,627
2078	$ 12,090,760	$ 1,238,720	$ -	$ 1,238,720	$ 26,898,289	$ 24,306,232
2079	$ 840,002	$ 1,261,217	$ -	$ 1,261,217	$ 28,586,682	$ 25,854,472
2080	$ 12,033,313	$ 1,422,066	$ -	$ 1,422,066	$ 19,325,829	$ 16,302,583
2081	$ 677,280	$ 1,438,562	$ -	$ 1,438,562	$ 21,021,509	$ 17,844,978
2082	$ 1,101,471	$ 1,467,253	$ -	$ 1,467,253	$ 22,399,285	$ 19,049,829
2083	$ -	$ 1,467,253	$ -	$ 1,467,253	$ 24,940,532	$ 21,440,351
2084	$ 438,207	$ 1,479,052	$ -	$ 1,479,052	$ 27,170,259	$ 23,500,239
2085	$ 7,898,829	$ 1,603,420	$ -	$ 1,603,420	$ 22,169,665	$ 18,204,530
2086	$ 1,219,053	$ 1,636,309	$ -	$ 1,636,309	$ 23,658,189	$ 19,480,254
2087	$ -	$ 1,636,309	$ -	$ 1,636,309	$ 26,432,750	$ 22,066,808
2088	$ 1,150,812	$ 1,667,201	$ -	$ 1,667,201	$ 28,213,637	$ 23,618,945
2089	$ 1,128,892	$ 1,697,435	$ -	$ 1,697,435	$ 30,128,178	$ 25,295,130
2090	$ 209,297	$ 1,703,311	$ -	$ 1,703,311	$ 33,054,610	$ 27,997,934
2091	$ -	$ 1,703,311	$ -	$ 1,703,311	$ 36,322,027	$ 31,037,802
2092	$ 61,679	$ 1,705,043	$ -	$ 1,705,043	$ 39,676,609	$ 34,152,784
2093	$ -	$ 1,705,043	$ -	$ 1,705,043	$ 43,243,826	$ 37,471,429
2094	$ 759,043	$ 1,725,676	$ -	$ 1,725,676	$ 46,234,086	$ 40,180,369
2095	$ 1,496,231	$ 1,764,703	$ -	$ 1,764,703	$ 48,662,503	$ 42,295,586
2096	$ 1,874,333	$ 1,814,536	$ -	$ 1,814,536	$ 50,874,173	$ 44,168,668
2097	$ 1,458,648	$ 1,852,009	$ -	$ 1,852,009	$ 53,640,212	$ 46,593,801
2098	$ 4,315,738	$ 1,948,103	$ -	$ 1,948,103	$ 53,774,051	$ 46,310,134

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

Blacklake Wastewater	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2099	$ 5,385,835	$2,067,918	$ -	$2,067,918	$ 52,969,024	$ 45,044,022
2100	$ 1,328,253	$2,099,473	$ -	$2,099,473	$ 56,218,326	$ 47,903,725
2101	$ -	$2,099,473	$ -	$2,099,473	$ 60,942,099	$ 52,253,341
2102	$ 298,407	$2,107,850	$ -	$2,107,850	$ 65,588,790	$ 56,500,284
2103	$ -	$2,107,850	$ -	$2,107,850	$ 70,742,989	$ 61,245,500
2104	$ 791,450	$2,129,161	$ -	$2,129,161	$ 75,359,947	$ 65,412,801
2105	$ 724,616	$2,148,567	$ -	$2,148,567	$ 80,271,781	$ 69,856,734
2106	$ 5,746,931	$2,276,870	$ -	$2,276,870	$ 80,516,409	$ 69,498,609
2107	$ -	$2,276,870	$ -	$2,276,870	$ 86,518,976	$ 75,005,375

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

4 Divisions Combined	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2007	$ 1,313,000	$ 1,825,074	$ -	$ 1,825,074	$ 5,033,174	$ 38,657,751
2008	$ 334,750	$ 1,833,885	$ -	$ 1,833,885	$ 6,841,326	$ 41,969,802
2009	$ 283,260	$ 1,841,375	$7,647,600	$ 9,488,975	$ 16,781,905	$ 45,491,593
2010	$ 503,747	$ 1,853,537	$7,647,600	$ 9,501,137	$ 26,962,032	$ 48,959,204
2011	$ 159,822	$ 1,857,879	$7,647,600	$ 9,505,479	$ 37,948,727	$ 52,939,493
2012	$ 68,397	$ 1,859,747	$7,647,600	$ 9,507,347	$ 49,523,199	$ 57,194,856
2013	$ 218,512	$ 1,865,549	$7,647,600	$ 9,513,149	$ 61,474,473	$ 61,493,548
2014	$ 748,993	$ 1,884,987	$ -	$ 1,884,987	$ 65,461,642	$ 65,461,264
2015	$ 301,491	$ 1,893,062	$ -	$ 1,893,062	$ 70,084,175	$ 70,075,341
2016	$ 452,756	$ 1,905,063	$ -	$ 1,905,063	$ 74,775,997	$ 74,754,225
2017	$ 1,902,986	$ 1,956,040	$ -	$ 1,956,040	$ 78,281,993	$ 78,205,970
2018	$ 513,551	$ 1,969,602	$ -	$ 1,969,602	$ 83,349,365	$ 83,255,749
2019	$ 711,455	$ 1,986,658	$ -	$ 1,986,658	$ 88,464,689	$ 88,349,037
2020	$ 1,143,988	$ 2,016,187	$ -	$ 2,016,187	$ 93,408,528	$ 93,256,813
2021	$ 17,602,279	$ 2,193,186	$ -	$ 2,193,186	$ 82,301,511	$ 81,958,006
2022	$ 1,497,207	$ 2,231,837	$ -	$ 2,231,837	$ 86,840,142	$ 86,440,788
2023	$ 649,906	$ 2,248,842	$ -	$ 2,248,842	$ 92,448,082	$ 92,012,988
2024	$ 1,342,707	$ 2,273,471	$ -	$ 2,273,471	$ 97,641,316	$ 97,160,904
2025	$ 1,714,350	$ 2,313,787	$ -	$ 2,313,787	$ 102,738,732	$ 102,194,572
2026	$ 2,006,291	$ 2,341,727	$ -	$ 2,341,727	$ 107,802,788	$ 107,204,944
2027	$ 2,718,053	$ 2,414,397	$ -	$ 2,414,397	$ 112,458,906	$ 111,758,218
2028	$ 5,449,621	$ 2,497,739	$ -	$ 2,497,739	$ 114,680,073	$ 113,860,761
2029	$ 2,576,929	$ 2,538,937	$ -	$ 2,538,937	$ 119,916,936	$ 119,017,704
2030	$ 442,083	$ 2,549,939	$ -	$ 2,549,939	$ 127,535,802	$ 126,584,607
2031	$ 2,662,107	$ 2,587,016	$ -	$ 2,587,016	$ 133,316,239	$ 132,283,494
2032	$ 2,984,283	$ 2,637,090	$ -	$ 2,637,090	$ 139,086,946	$ 137,955,401
2033	$ 2,204,705	$ 2,671,762	$ -	$ 2,671,762	$ 145,933,146	$ 144,714,449
2034	$ 950,001	$ 2,693,530	$ -	$ 2,693,530	$ 154,364,875	$ 153,068,589
2035	$ 9,309,578	$ 2,845,527	$ -	$ 2,845,527	$ 154,975,293	$ 153,461,837
2036	$ 1,692,108	$ 2,874,534	$ -	$ 2,874,534	$ 163,260,961	$ 161,649,088
2037	$ 8,142,835	$ 3,059,222	$ -	$ 3,059,222	$ 165,661,757	$ 163,784,350
2038	$ 6,072,945	$ 3,138,209	$ -	$ 3,138,209	$ 170,323,019	$ 168,278,588
2039	$ 4,185,308	$ 3,208,620	$ -	$ 3,208,620	$ 177,155,255	$ 174,945,245
2040	$ 9,254,555	$ 3,300,876	$ -	$ 3,300,876	$ 179,322,102	$ 176,916,234
2041	$ 3,865,427	$ 3,345,464	$ -	$ 3,345,464	$ 187,022,179	$ 184,461,453
2042	$ 281,386	$ 3,352,817	$ -	$ 3,352,817	$ 198,660,484	$ 195,976,841
2043	$ 5,262,520	$ 3,451,152	$ -	$ 3,451,152	$ 205,944,140	$ 203,036,973
2044	$ 2,690,674	$ 3,500,591	$ -	$ 3,500,591	$ 216,179,070	$ 213,089,416
2045	$ 2,005,743	$ 3,531,293	$ -	$ 3,531,293	$ 227,591,586	$ 224,330,815
2046	$ 7,372,997	$ 3,640,928	$ -	$ 3,640,928	$ 234,264,980	$ 230,742,906
2047	$ 5,277,977	$ 3,779,366	$ -	$ 3,779,366	$ 243,478,364	$ 239,653,129
2048	$ 1,797,546	$ 3,821,970	$ -	$ 3,821,970	$ 256,631,303	$ 252,589,411
2049	$ 2,653,662	$ 3,878,711	$ -	$ 3,878,711	$ 269,579,303	$ 265,296,231
2050	$ 10,497,502	$ 4,103,561	$ -	$ 4,103,561	$ 275,501,092	$ 270,790,313
2051	$ 1,665,077	$ 4,142,121	$ -	$ 4,142,121	$ 290,562,080	$ 285,599,021
2052	$ 3,991,399	$ 4,237,624	$ -	$ 4,237,624	$ 304,074,292	$ 298,788,095

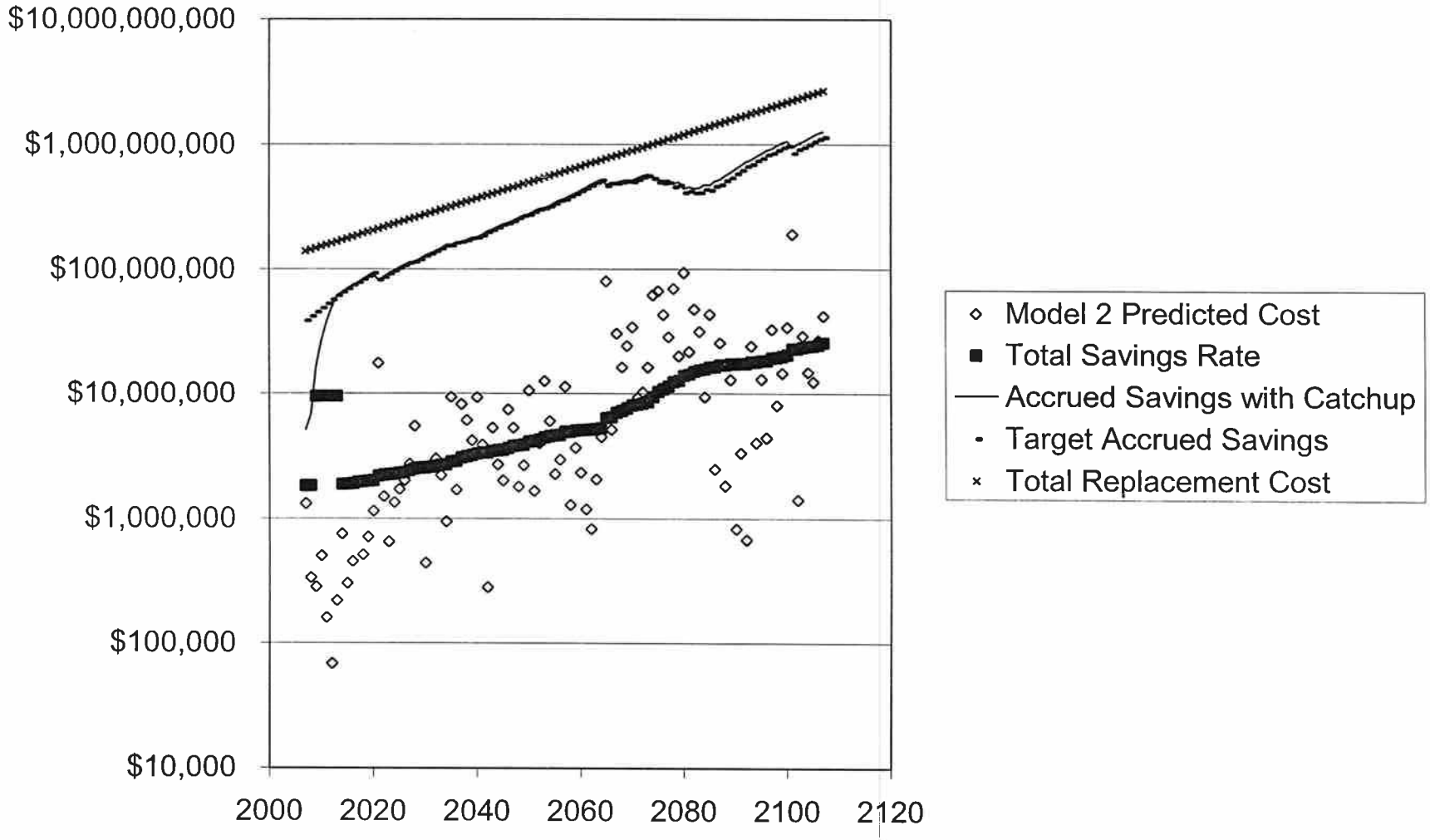
NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

4 Divisions Combined	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2053	$ 12,542,664	$ 4,445,413	$ -	$ 4,445,413	$ 309,860,428	$ 304,119,213
2054	$ 5,957,704	$ 4,537,889	$ -	$ 4,537,889	$ 322,588,538	$ 316,492,330
2055	$ 2,261,416	$ 4,589,466	$ -	$ 4,589,466	$ 339,639,597	$ 333,215,163
2056	$ 2,941,899	$ 4,645,724	$ -	$ 4,645,724	$ 356,836,261	$ 350,063,938
2057	$ 11,263,175	$ 4,906,589	$ -	$ 4,906,589	$ 366,758,104	$ 359,408,421
2058	$ 1,279,987	$ 4,935,124	$ -	$ 4,935,124	$ 387,139,436	$ 379,429,199
2059	$ 3,669,735	$ 5,018,591	$ -	$ 5,018,591	$ 406,135,403	$ 397,990,983
2060	$ 2,322,440	$ 5,071,682	$ -	$ 5,071,682	$ 427,388,965	$ 418,822,564
2061	$ 1,189,124	$ 5,102,840	$ -	$ 5,102,840	$ 450,764,812	$ 441,780,364
2062	$ 825,290	$ 5,118,452	$ -	$ 5,118,452	$ 475,572,721	$ 466,167,658
2063	$ 2,062,438	$ 5,172,800	$ -	$ 5,172,800	$ 500,316,631	$ 490,431,547
2064	$ 4,460,028	$ 5,257,717	$ -	$ 5,257,717	$ 523,865,166	$ 513,446,515
2065	$ 80,071,529	$ 6,346,070	$ -	$ 6,346,070	$ 473,999,213	$ 461,974,393
2066	$ 5,090,574	$ 6,437,861	$ -	$ 6,437,861	$ 496,966,169	$ 484,304,310
2067	$ 30,428,068	$ 7,014,086	$ -	$ 7,014,086	$ 496,231,298	$ 482,397,501
2068	$ 16,259,419	$ 7,249,746	$ -	$ 7,249,746	$ 509,878,271	$ 495,175,690
2069	$ 24,184,304	$ 7,582,985	$ -	$ 7,582,985	$ 516,562,709	$ 500,850,275
2070	$ 34,197,168	$ 8,021,986	$ -	$ 8,021,986	$ 513,993,838	$ 497,115,589
2071	$ 9,199,589	$ 8,151,992	$ -	$ 8,151,992	$ 536,442,803	$ 518,669,177
2072	$ 10,224,962	$ 8,295,793	$ -	$ 8,295,793	$ 559,026,870	$ 540,303,159
2073	$ 16,264,648	$ 8,521,741	$ -	$ 8,521,741	$ 576,823,652	$ 557,021,257
2074	$ 62,009,571	$ 9,367,673	$ -	$ 9,367,673	$ 550,560,364	$ 528,982,863
2075	$ 66,823,441	$ 10,292,253	$ -	$10,292,253	$ 519,267,543	$ 495,752,869
2076	$ 43,120,458	$ 10,878,345	$ -	$10,878,345	$ 510,881,995	$ 485,696,694
2077	$ 28,646,521	$ 11,399,155	$ -	$11,399,155	$ 517,137,280	$ 490,274,394
2078	$ 69,988,572	$ 12,405,732	$ -	$12,405,732	$ 483,383,875	$ 454,260,287
2079	$ 19,943,573	$ 12,691,973	$ -	$12,691,973	$ 498,455,689	$ 467,722,417
2080	$ 93,728,564	$ 13,980,324	$ -	$13,980,324	$ 441,767,070	$ 408,304,473
2081	$ 21,675,405	$ 14,290,238	$ -	$14,290,238	$ 454,904,482	$ 419,612,208
2082	$ 47,679,838	$ 15,063,983	$ -	$15,063,983	$ 443,437,208	$ 405,748,219
2083	$ 31,589,914	$ 15,512,046	$ -	$15,512,046	$ 448,012,057	$ 408,158,838
2084	$ 9,326,106	$ 15,671,415	$ -	$15,671,415	$ 475,223,123	$ 433,409,968
2085	$ 43,353,486	$ 16,323,277	$ -	$16,323,277	$ 470,312,502	$ 425,936,560
2086	$ 2,458,769	$ 16,390,009	$ -	$16,390,009	$ 506,145,355	$ 459,702,760
2087	$ 25,556,865	$ 16,985,660	$ -	$16,985,660	$ 521,115,045	$ 471,960,078
2088	$ 1,819,379	$ 17,034,244	$ -	$17,034,244	$ 560,546,627	$ 509,128,917
2089	$ 12,812,925	$ 17,313,165	$ -	$17,313,165	$ 591,050,558	$ 537,027,578
2090	$ 825,559	$ 17,336,203	$ -	$17,336,203	$ 634,938,606	$ 578,460,518
2091	$ 3,317,467	$ 17,423,936	$ -	$17,423,936	$ 678,401,389	$ 619,290,106
2092	$ 678,464	$ 17,441,145	$ -	$17,441,145	$ 726,476,984	$ 664,687,710
2093	$ 23,988,512	$ 17,914,105	$ -	$17,914,105	$ 753,900,175	$ 688,836,140
2094	$ 4,004,608	$ 18,022,473	$ -	$18,022,473	$ 802,654,560	$ 734,549,399
2095	$ 12,953,859	$ 18,359,256	$ -	$18,359,256	$ 845,005,579	$ 773,483,747
2096	$ 4,373,444	$ 18,475,542	$ -	$18,475,542	$ 897,964,327	$ 823,102,494
2097	$ 32,891,074	$ 19,342,742	$ -	$19,342,742	$ 925,694,812	$ 846,557,973
2098	$ 7,968,649	$ 19,532,696	$ -	$19,532,696	$ 979,794,097	$ 896,897,598

NCSD Water and Sewer Replacement Study - "Model 2" Savings Schedule with "Catch-Up" Contribution

4 Divisions Combined	Model 2 Predicted Cost	Model 2 Savings Rate	Catchup Savings Rate	Total Savings Rate	Predicted Accrued Savings with Catchup	Target Accrued Savings
2099	$ 14,488,654	$ 19,853,129	$ -	$19,853,129	$ 1,030,142,697	$ 943,181,003
2100	$ 34,065,784	$ 20,530,780	$ -	$20,530,780	$ 1,063,887,999	$ 972,304,883
2101	$ 188,945,644	$ 22,966,453	$ -	$22,966,453	$ 946,817,258	$ 848,567,624
2102	$ 1,409,144	$ 23,005,262	$ -	$23,005,262	$ 1,012,055,390	$ 909,343,967
2103	$ 29,096,662	$ 23,563,847	$ -	$23,563,847	$ 1,053,125,441	$ 945,208,283
2104	$ 14,780,059	$ 23,863,718	$ -	$23,863,718	$ 1,110,673,613	$ 997,586,816
2105	$ 12,318,475	$ 24,139,621	$ -	$24,139,621	$ 1,173,561,355	$1,055,097,334
2106	$ 26,834,435	$ 24,603,290	$ -	$24,603,290	$ 1,225,247,619	$1,100,968,183
2107	$ 41,875,862	$ 25,665,304	$ -	$25,665,304	$ 1,265,328,142	$1,134,346,328

4 Divisions Combined



4 Divisions Combined - Costs and Savings as Percent of Replacement Value