



**Wasatch Front Water Quality Council
And
The Utah Division of Water Quality**

**High Level Estimate for Wastewater Treatment and
Collection Systems
40 Year Forecast**

The purpose of this document is to define a methodology for determining a total cost for sewer system renewal, replacement and expansion, including regulatory changes, for the next 40 years. The planning period will be through 2060. The intent is to produce a defensible cost number, while not completing detailed masterplans for each entity. It is understood that these costs will be based on uniform assumptions and may not reflect individual treatment or collection facility needs accurately. While there will be confidence in the total number, specific details may be over or under stated. It is also understood that life expectancy of treatment and collection facilities varies substantially based on original construction materials and methods, and also on the extent of maintenance, corrosive conditions or unusual wear that may be present.

The results of this study will be presented in a glossy summary document intended for policy makers and backup documentation will be available in a consolidated document for review as needed or requested. There will not be formal detailed report, however as the cost for such a document is not justified.

All of the documents will be publicly available for review. This will be done through either one or multiple online sites.

Following is a summary of the cost methodology that will be used in this document.

Collection System Methodology

Renewal and Replacement of Existing Systems:

1. A survey will be conducted to determine the miles of existing collection system pipe currently in use. This will include all large entities and available smaller districts and town.
2. Each entity will be asked to estimate the approximate centroid date for installation of their current system.

3. A useful life of 70 years for piping systems will be assumed.
4. The centroid date will be used for determining the miles of pipe which will need to be replaced during the next 40 years. As an example, a facility with a centroid date of 1990 would have an average pipe age of 30 years. This means that half is older than 30 years and half is newer than 30 years. As such, in the next 40 years half the piping system will need to be replaced since it will exceed 70 years in age.
5. A cost estimate will be created to determine the cost to replace one mile of pipe with an average pipe size of 10-inch. The pipe system will be 10 feet deep and is located in a roadway. Bypass pumping will be required. Since until you get to large diameter pipe, the majority of the cost is in the excavation/restoration a 10-inch pipe is assumed to be representative of all pipe.
6. Knowing the miles of pipe requiring replacement and a unit price for replacing one mile of pipe, the current replacement cost for the 40-year period can be calculated. This value will be assumed to be uniformly spread over the 40 year period.
7. Since it is unlikely that all facilities will respond or know the amount of piping in the ground (particularly true for small facilities) the percent of population served for those responding compared to the total population served by sewer systems will be calculated. A factored estimate will then be calculated to represent the entire state.

Required New Infrastructure to Support Population Growth

1. An estimate will be needed to determine the amount of piping systems that will be installed by developers vs. the amount that will be installed or upgraded to support new development. If 80% of the system costs will be paid by developers, for example then 20% will have to be paid by public system.
2. From the current information on miles of pipe serving existing population a factored estimate can be completed to determine the miles of future pipe needed to support population growth.
3. Given the split of public/developer paid costs, the miles of public piping systems needed can be calculated.
4. A unit cost for construction of one mile of new piping system will be calculated assuming that the pipe size is 12-inches, installed at a depth of 12 feet in a greenfield development. This would assume no road replacement or bypass pumping.
5. Using the quantity of new public piping required and using the unit price for one mile of system installed, a total current value can be calculated.

Treatment System Methodology

Renewal and Replacement of Existing Mechanical Treatment Plants:

1. A survey will be conducted to determine the capacity of each treatment plant currently in use. This will include all large entities and available smaller districts and town.
2. Each entity will be asked to estimate the age of the plant and current population served. In addition, the remaining capacity available for population growth will also be asked for.
3. A useful life of 30 years for a treatment plant will be assumed as a representative life cycle. Given that most of the mechanical equipment will be replaced more frequently than 30 years, but that concrete and structures last much longer, the 30 year lifecycle cost is adequate. With a 30-year replacement period, all current facilities will be replaced 133% over the 40-year study period.
4. Using a program such as CapDetWorks by Hydromantis, an estimate based on existing size and treatment level will be created to determine the current replacement value of each facility. An assumed flow diagram similar to their current facility flow pattern will be used in the estimate. These estimates will be inflated by an additional 33% and will approximate the current cost of renewal and replacement for existing infrastructure over the 40-year study period.
5. Since existing permit conditions will probably change over time, these possible changes will be estimated separately.
6. Not all facilities will provide information sufficient to complete the estimating process for the entire state. As such, a percent of population served for those responding compared to the total population served by treatment plants will be calculated. A factored estimate will then be calculated to represent the entire state.

Renewal and Replacement of Existing Lagoon Systems

1. Lagoon systems will be evaluated, and a matrix of all systems based on current information assembled.
2. A renewal and replacement assessment will be conducted to evaluate frequency and extent of system needs. Based on this assessment a model lagoon cost analysis will be developed to allow for estimating a total extended cost over 40 years.
3. The model cost will be scaled to reflect size differences and will be applied to all lagoon systems and then the costs will be aggregated to a total. This will represent the current value of lagoon system needs.

Required New Plant Infrastructure to Support Population Growth

1. From the survey, it will be determined what remaining capacity exists to support population growth. The population that can be served with existing plant excess capacity will be added to the current population. This combined population will be subtracted from the forecasted 2060 population to determine the amount of new population needing added treatment capacity.

2. Using a per capita per day flow of 60-70 gallons the total MGD of required capacity for future growth can be determined. This new flow will require new treatment plant design and construction either as an addition to an existing plant or as a completely new facility.
3. Using the estimating program an estimate will be completed to examine the cost for additional treatment. A building block for this estimate will be a 5 MGD facility.
4. Using the total MGD calculated divided by 5 will be used to determine the number of incremental plants required to be constructed. This number of incremental plant projects will be multiplied by the 5 MGD estimate to determine a current cost for additional population growth.

Cost Impact of New Regulatory Requirements

Since this potential cost increase is difficult to estimate or even predict, we will convene a group of experts to forecast a percent of existing capacity needing upgrade. A rough estimate will be developed based on a factored assessment for this work. It will be assumed that all new facilities will be constructed to meet future regulatory requirements.