Technical and Physical Feasibility Fact Sheet

Alternative 26: Domestic Wastewater

Acknowledgements: This fact sheet was written by Sue E. Umshler, Esq., P.E. as part of the "Evaluation of Alternative Actions for Technical, Physical, Hydrological, Environmental, Economic, Social, Cultural, and Legal Feasibility and Water Quality Issues and Legal Overview" contracted to Daniel B. Stephens & Associates, Inc. The format and organization of the fact sheet and definition of the alternative were developed by the Water Assembly.

1. Definition of Alternative

A-26: Expand use of centralized wastewater collection and treatment systems into all areas of urban and suburban development within the water planning region.

As further defined by the Water Assembly:

> Certain areas of the region rely on septic tank systems which do not adequately purify the water before it returns to ground water. Technical limits such as distance and pipeline size make implementation costly. In addition to posing a water quality risk, widespread use of septic tanks often realize a near-zero return flow, or recharge, to the aquifer, resulting in a much higher proportion of consumptive use, as opposed to localized treatment systems, where the water can be contained and reused or returned to surface water.

2. Summary of Alternative Analysis

This alternative is technically and physically feasible and can result in a reduction of potential pollution sources for groundwater aquifers. It does require significant infrastructure to build and/or expand existing wastewater treatment plants and to construct pipelines to collect the wastewater from the facilities currently using septic tanks. This infrastructure is costly, and the time needed to implement this alternative depends on the septic tank locations, the treatment facility location, the funding methods, requisite easements, and resource availability for design and construction.

Assuming that the septic tank is located in a shallow water table valley area near the river (as is the case with a large portion of existing septic tanks in the urban area of the Middle Rio Grande region), there is little effect on water demand or water supply quantities and therefore no water saved or lost from the existing consumption and depletion cycle. However, there could be a significant benefit in the protection of groundwater quality from degradation by inadequately treated wastewater. Once collected and treated, the effluent could be returned to surface water streams, be used for aquifer replenishment, and/or be treated to sufficient quality for direct reuse (see A-27). Constructed wetlands can provide aesthetic benefits to a community, but would require augmentation with conventional processes, such as disinfection, to meet current wastewater treatment requirements.

If the treated wastewater is reused, it could result in decreasing demand by pumping or diversion reductions equivalent to the recycled quantities, thus having a positive geologic benefit (reduced depletion of groundwater). Treatment costs may be higher to attain levels acceptable for a reuse or recharge project (see A-27, *Reuse Treated Effluent*).

There may be no net change to surface ecosystems since the water is already being diverted or pumped and then replaced to the vadose zone from the septic tanks and related drain fields. Removal of septic tanks should not impact ecosystems unless the septic systems have failed and are causing contamination of surface water courses and associated riparian areas and/or contamination of the groundwater that feeds the river systems. In such a case, removal should result in a positive benefit by reducing pollution and nutrient loads into those ecosystems, as well as protecting soil ecosystems. If the treated effluent is returned to the river, there would be more water available to the Rio Grande silvery minnow and the associated riparian areas used by the willow flycatcher, an endangered species. However, if the treated effluent is sent to a reuse application, it would not be available for these purposes.

3. Alternative Evaluation

3.1 Technical Feasibility

Enabling New Technologies and Status

- No new technologies would be required.
- Current technologies exist to collect and treat wastewater to applicable standards.

Infrastructure Development Requirements

The following infrastructure would be needed for this alternative:

- Pipelines to collect wastewater from current septic tanks
- Potential pump stations to lift water if gravity were flow not available
- New or expanded wastewater treatment plants to treat wastewater to current federal and state standards
- Administrative processes to support the infrastructure project, such as permitting, easement acquisition, sampling, monitoring, and reporting.
- Individual connections to central system

Total Time to Implement

- Total time needed depends upon:
  - Septic tank locations
  - Wastewater treatment plant location in relation to septic tanks (pipeline length and location; pump station location[s])
  - Existing and projected capacity in existing plants
  - Acquisition time for funding (grants, loans, rate increases, etc.)
  - Easement acquisition and public outreach to approve locations
  - Resource procurement such as design and construction personnel and materials
- Implementation could be accomplished in phases as it becomes economically feasible to connect developing areas to centralized treatment infrastructure.

3.1.1 Physical and Hydrological Impacts

Effect on Water Demand

If wastewater were only being collected, there would be no change to demand.

Effect on Water Supply (surface and groundwater)

- There would be no net change from initial collection and treatment, as it is applied to water already being diverted from a surface source or pumped from a groundwater aquifer.

- An increase in supply could occur if treated effluent is used to replenish the groundwater aquifer placed in a surface source that serves as supply, or reused to decrease diversion and pumping for that demand and if a significant part of the septic tank effluent had previously been lost to evapotranspiration, (See A-27, *Reuse Treated Effluent*).

Water Saved/Lost (consumption and depletions)

No effect for collection alone, but perhaps some savings for reuse.

Impacts to Water Quality (and mitigations)

- Significant reductions in the number of multiple dispersed point sources of inadequately treated wastewater potentially moving into the vadose zone and thence to the groundwater aquifer. Volume estimates of reduction range from 1.6 to 3.0 million gallons per day (mgd) (5.0 to 9.2 acre-feet per day) in 2003 and 5.2 to 8.4 mgd (16 to 25.8 acre-feet per day) in 2050.

- Treatment must meet applicable state and federal requirements to protect receiving bodies of water, soils, and/or aquifers from the concentration of a pollutant into a new single point source.

- If reuse is contemplated, higher standards of treatment may be required (see A-27).

Watershed/Geologic Impacts

- If reuse is instigated, this alternative could protect the geologic structure of the aquifer by reducing groundwater pumping.

- If returned to streamflows or used in aquifer replenishment, release points must be carefully chosen and monitored to prevent adverse geologic impacts such as erosion or the introduction of water with disparate water quality at sensitive recharge areas.

3.1.2 Environmental Impacts

Impact to Ecosystems

- There may be no net change, just shifting of water use and effluent release locations.
- Should reduce potential pollution if adequate treatment is achieved.
- Constructed wetlands provide inadequate treatment of raw sewage.

Implications to Endangered Species

- Could result in additional water supply to river system if treated effluent is returned to the river.
- Could result in more water available for riparian areas if aquifer replenishment and recharge programs are instituted near the river, affecting areas used by the willow flycatcher.

3.2 Financial Feasibility

3.2.1 Initial Cost to Implement

Capital costs are shown in Table 26-1 for both 2003 and 2050.

Table 26-1. Initial Cost to Implement, 2003 and 2050

Infrastructure Needed	2003 (millions of $)	2050 (millions of $)
Treatment plant (build or expand)	12.8 to 60.0	182.4 to 736.5
Pipeline(s) and pump stations	3.5 to 12.6	50.2 to 154.7
Administrative costs: permits, easements, etc.	2.9 to 12.0	41.0 to 147.3
Individual connection to system	48.0 to 96.0	684.0 to 1,179.0
Total capital costs	67.2 to 180.6	957.4 to 2,216.9

3.2.2 Potential Funding Source

- Rate increase or utility connection charges
- Bureau of Reclamation Title XVI program, Reclamation, Recycling and Water Conservation
- State/federal grants

- State/federal loans
- Private loans
- Revenue bonds
- Effluent sales income

3.2.3 Ongoing Cost for Operation and Maintenance

Annual operation and maintenance costs would range from $3.3 to $11.7 million in 2003 and from $46.5 to $144.1 million in 2050.

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