TABLE 5-4

SUMMARY OF COLLECTION SYSTEM TECHNOLOGIES

TECHNOLOGY	RELIABILITY	FLEXIBILITY	ENERGY USE	LAND REQUIREMENTS	PUBLIC ACCEPTANCE	IMPLEMENTATION	RELATIVE CAPITAL COSTS	RELATIVE O&M COSTS	SELECTED FOR FURTHER EVALUATION
Gravity Sewers and Pumping Stations	Very reliable. Longest track record and widely used. Pumping stations do require electricity, but generators are typically provided.	Can be expanded to serve additional areas. Initial flows not critical.	Pumping stations require energy and typically have emergency generators to keep system operational.	Sewer typically located in street. Land may be required for pumping stations. Easements may be required for sewers.	Well-known technology. Deep excavations can cause traffic disruption. Low chance of backups into structures.	Most difficult implementation due to deeper excavations and the need for constant slope.	Moderate. Installation cost depends upon topography in area. Pumping stations or deep lines can increase costs.	Moderate since pumping stations must be maintained. Sewer line requires little maintenance.	Yes, due to wide use, simplicity, reliability of technology and low maintenance requirements.
Pressure Sewers and Grinder Pumps	Reliable. Large number of grinder pumps and dependence on electricity limit reliability.	Can easily be expanded to serve additional areas within head limitations of system. Initial flows not critical.	Pumps require energy for operation. System cannot be operated during power failures unless each pump has standby power.	Sewers typically located in street or road ROWs. No land requirements. Easements may be required for sewers.	Each home or group must have a pump. Power outage can cause backup into structures and reduce potential public acceptance.	Easier installation due to shallower excavations and less critical slopes.	Moderate. Pipelines installed at minimum depth. Pump required at each home or group of homes.	Moderate since grinder pumps must be maintained. Seasonal homes require flushing.	Yes, due to adaptability in areas of varying topography and low construction costs.
Septic Tank Effluent Pump (STEP) System	Somewhat reliable. Large number of STEP pumps and dependence on electricity limit reliability.	Can be expanded within pressure limitations of pump. Initial flows somewhat critical.	Pumps require energy for operation. System cannot be operated during power failure unless each pumping station has standby power.	Sewers typically in street. Land requirements for septic tanks and pumps may be on individual properties. Easements may be required for sewers.	Each home must have a pump and septic tank. Odor potential may reduce public acceptance.	Easier installation due to shallower excavations and less critical slopes. May impact nitrogen removal at the WWTF.	Moderate. Pumps required at each home. Lines installed at minimal depth.	High due to maintenance of pumps and operator training. Septic tanks must be pumped periodically.	No, based on solids handling requirements, special equipment at connection points and integrity of existing septic tanks cited, and impacts on nitrogen removal at WWTF.
Septic Tank Effluent Gravity (STEG) System.	Very reliable but less widely used. System does not require mechanical components.	Can be expanded. Initial flows not critical.	Sewers do not require energy. Pumping stations require energy and typically have generators to keep system operational.	Sewers typically in street. Land requirements for septic tanks and pumps may be on individual properties. Easements may be required for sewers.	Each home must have a septic tank. Odor potential may lower acceptance. Chance of backup is minimal.	Easier installation due to shallower excavations, but constant slopes must be maintained. Not feasible where septic tank elevations are low. May impact nitrogen removal at the WWTF.	Moderate. Pipelines installed at shallow depths. Pumping stations can increase costs.	Moderate. Sewer line requires little maintenance. Septic tanks must be pumped periodically. Pumping stations must be maintained.	No, based on the solids handling requirements, special equipment at connection points and integrity of existing septic tanks cited, and impacts on nitrogen removal at WWTF.
Vacuum Sewers	Reliable. Maintaining vacuum pressure limits the reliability of the system, however no power is required at individual properties for valve pits.	Difficult to expand. Initial flows must be accurately estimated and expansion is limited. More difficult to make future connections if not planned ahead.	Energy is required to maintain vacuum at stations. Power typically supplied by generator during outages. Power not required at valve pits.	Sewers in street or road ROWs. Land will be required for vacuum stations. Easements may be required for sewers.	Valve pits are required at each property and vents are required on each gravity lateral reducing public acceptance. Multiple connections per valve pit create potential for backups.	Shallower excavations than gravity sewers; however, more complex system with critical design features that must be installed properly for the system to function properly. High level of testing required during sewer installation.	High. Large number of vacuum stations may be required and valve pits are required.	High. Valve pits and vacuum stations must be maintained. Additional operating training will be required.	No, topography and distance between homes and size of services areas will make this cost prohibitive. O&M is expected to be greater than other technologies.