IV. ALTERNATE SOLUTIONS AND RELATED ESTMATES OF COST

Three plans are considered as solutions to unsatisfactory conditions in the municipal wastewater system, and are summarized as follows;

PLAN A – ADD DETENTION BASIN TO SBR PLANT, UPGRADE PRIMARY LIFT STATION AND IMPLEMENT I/I CORRECTION IN COLLECTION SYSTEM

Plan A retains the existing SBR plant to utilize the following attributes;

- The existing plant has reserve organic load capacity sufficient to carry the anticipated growth of the community during the next twenty years.
- The existing plant can produce an effluent, under average flow conditions, with pollutant levels well within the limits stated in the current discharge permit.
- Concrete structures at the plant and lift station have not discernibly deteriorated and may be expected to function for an additional twenty years.
- The SBR process, utilizing anoxic phase time in the aeration basins, is conducive to ammonia removal, as operating experience has shown.
- Should limits on total phosphorus be included in the discharge permit, the addition of chemicals into the treatment process for removal of these compounds may be easily implemented.
- Total replacement of the two existing lift station pumping units with new pumps is not required if additional pumps of lower capacity and a parallel force main are installed. Further, a reserve 550 gpm pump and motor is currently on hand.

Proposed improvements under Plan A are as listed hereinafter.

Primary Lift Station –

- Construct a trash screen/conveyor/compactor/ bagging system in the 12-inch sewer upstream of the lift station, within a weather protective enclosure.
- Construct a 150 gpm duplex pump lift station, with VFD control, downstream of the trash screen and before the existing lift station, plus a separate 4-inch force main from the lift station to the treatment plant, to pump average day flow.
- Retain the existing submersible pumps with 550 gpm pumps to pump during periods of peak flow. Estimated peak station discharge with four pumps is 1.2 mgd.

Treatment Plant –

- Construct in the area north of the plant site, a 6.0 acre-foot peak flow detention basin with an influent flow diversion structure to permit either all or partial influent flow to be diverted to detention, plus control gates, screens and measuring flumes to control return flow to the treatment plant. Basis for a 6 acre-foot basin is provided in the appendix to this section.
- Remove the existing inlet structure at the plant site.
- Provide and install a new ultraviolet disinfection system in the twin flow channels in the existing building. Equip the system with a UV-intensity monitor/transmitter to monitor, transmit, and record the level of UV radiation generated.

- Construct in the existing 24-foot square basin a coarse bubble diffuser system with duplex centrifugal blowers, and a submersible supernatant pump to convert the basin to a batch type, aerobic sludge digester.
- Install a longer draft tube on the floating aerator in the existing sludge storage basin to enhance mixing, construct a transfer pipe from the storage basin to the 24-foot square basin, and construct a submersible pump in the large basin to remove supernatant.

Collection System –

- Select a special services contractor to smoke test and televise 30,000 feet of existing sewer, followed by repair of defects found in sewers and manholes.

Estimate of Probable Capital and O&M Cost, Plan A

Collection System –	
Smoke test 30,000 lineal feet of sewer @ $1.00/L.ft.	$30,000
Clean & CCTV Inspect 30,000 feet of sewer @ $2.00/L.ft.	60,000
Repairs to sewers and manholes, budgetary estimate	40,000
Contingencies	10,000
Sub-Total Estimated Cost	$140,000
Primary Lift Station –	
Trash Screen w/ Removal Equipment, 1.5 MGD	$180,000
Duplex 150 gpm Pump Station, in place	150,000
Building over pump & trash screen	100,000
Electrical Equipment & Wiring,	80,000
New Force Main, 4-inch, 2500 ft. @ $40/ft.	100,000
Site Work & Fencing,	50,000
Contingencies	60,000
Sub-Total Estimated Cost	$720,000
Treatment Plant –	
Detention Basin, concrete lined, 6.0 Acre-feet volume	$760,000
Clearing, Grubbing and Revegetation	20,000
Inlet Structure w/ diversion gates, weirs, and valves	120,000
Outlet Structure w/ flume, gates, and Valves	90,000
Ultraviolet Disinfection System,1.5 MGD capacity	200,000
Aeration System, Blowers & Supernatant Pump in Basin	160,000
Equipment Modifications & Piping at Sludge Storage Basin	60,000
Electrical Equipment & Wiring	60,000
Remove Existing Inlet Structure	10,000
Land	10,000
Contingencies	130,000
Legal, Fiscal, Admin.	20,000
Sub-Total Estimated Cost	$1,640,000
Engineering	300,000
Total Estimate Plan A Cost	$2,800,000

It should be recognized that given the age of the mechanical equipment, replacement or higher than usual annual repair expense may come about sooner than would be expected

for new equipment. Accordingly, the following estimate of periodic replacement or major repair cost is offered in order that an annual allocation to a replacement/repair fund may be established. The present value of the periodic allocations is computed for comparison of alternative plans. Interest rates are from Appendix C, OMB Circular No. A-94, Revised November 2018. Future costs assume 2% annual inflation.

At Five Years Intervals,		5th Year	10th Year	15th Year	20th Year
Repair Trash Screen Equipment	$8,000				
Repair Sludge Blowers	8,000				
Replace UV Lamps	4,000				
Replace Pump Bearings	5,000				
Total Current Cost	$25,000,	$27,602	$30,475	$33,647	$37,149
At Ten Year Intervals,					
Replace Two Pump Motors	$20,000				
Replace Aerator Motor	5,000				
Total Current Cost	$25,000		$30,475		$37,149

Annual Allocation @ 1.3%interest to generate $27,602 in 5th year = $5,274
Annual Allocation @ 1.4% " " " $60,950 in 10th year = $5,721
Annual Allocation @ 1.45% " " " $33,647 in 15th year = $2,024
Annual Allocation @ 1.5% " " " $74,298 in 20th year = $3,213
Total Annual Allocation $16,232 (or $1,353 per month)

The present worth of an annual allocation of $16,232 in each of twenty years at 1.5% interest is computed to be $278,681.

It is assumed here that the salvage value for the existing plant equipment after another twenty years will be zero by reason of obsolescence, and perhaps lack of replacement parts. The lift station equipment should have a useful physical life of twenty more years, but will also likely be capacity obsolete at the end of the period. .

It is estimated that the annual operation and maintenance (O&M) expense for the wastewater system will reach $400,000 in the first year following completion of the project, and will increase by 2% in each of the following 20 years. Thus, the sum of the annual O&M outlays is $8,564,925 and using a 1.5% interest rate, the present worth of the sum is computed to be $6,588,404. The net present worth of Plan A is computed as;

Net Present Worth (NPW) = Capital Outlay + O&M PW + Replace/Repair PW – Salvage Value PW

NPW = $2,800,000 + $6,588,404 + $278,681 – 0 = $9,667,085