



1.0 Leachate Water System

Asset Management Plan



December 2013

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STATE OF INFRASTRUCTURE

1.1 Inventory

The Municipality's leachate water system consists of a network of force mains, pipes, maintenance holes, chambers, pumping station and a leachate water treatment plant.

The current inventory is broken down in Figure 1.1. The source of the information is the Asset Inventory Registry.

For analysis, the Municipality relied on internal knowledge of the system, contract documents, and Engineering reports.

Figure 1.1: Leachate Water Inventory Summary

Asset Type	Asset Component	2012 Inventory
	Force mains 75mm	163m
Linear	Local Sewers 450mm 200mm 150mm	73m 2,553m 400m
	Maintenance Holes	16
	Valves & Chambers	6
	Pumping Station Structures	1
	Storage Tanks	4
Facilities	Wastewater Treatment Plants	1
	Wastewater Treatment Equipment	93
	Pumping Station Equipment	14



1.2 Valuation

The historical cost of the leachate water system is shown at 2007 values. This is the year when the collection system was upgraded to a waste water processing facility. The historical cost is shown without inflation apart from leachate collection assets that were part of the 1991 Landfill acquisition and upgrade project; these assets have been inflated using CPI figures to 2007 values.

The estimated replacement value of the system is based on 2007 values, inflated using CPI figures to 2012 values. The estimated current replacement value (2012) of the leachate system is \$1,749,862 or \$672 per household in McDougall. The replacement cost is lower than the historical value of the system because it contains assets no longer used by the Municipality for leachate collection as the leachate water is now treated; these assets will not be replaced.

Figure 1. 2 below shows the breakdown of historical and replacement costs.

Asset Type	Asset Component	Historical Cost 2007	Replacement Value 2012	Percent of Replacement
	Force mains 75mm	\$2,854	\$3,105	0.2%
	Local Sewers 450mm 200mm 150mm	\$26,974 \$170,518 \$42,805	\$29,348 \$185,524 \$46,572	1.7% 10.6% 2.7%
Linear	Maintenance Holes	\$109,051	\$32,109	1.8%
	Valves & Chambers	\$21,008	\$22,857	1.3%
	Value Sub Total	\$373,211	\$319,515	18.3%
Facilities	Pumping Station Structures	\$29,361	\$13,822	0.8%
	Storage Tanks	\$92,213	not being replaced	0.0%
	Wastewater Treatment Plants	\$987,000	\$1,073,856	61.4%
	Wastewater Treatment Equipment	\$259,224	\$284,283	16.2%
	Pumping Station Equipment	\$81,757	\$58,384	3.3%
	Value Sub Total	\$1,449,554	\$1,430,346	81.7%
Total Valu	e	\$1,822,765	\$1,749,861	100%

Figure 1.2: Leachate Water System Historical & Replacement Value

Municipality of McDougall-Leachate Water Asset Management Plan

1.3 Condition Assessment

The condition report in Figure 1.3 was developed by Municipal Staff with consideration of current legislative requirements, and Engineering reports. The Municipality chose to rely on Municipal Staff and Engineering reports in determining the condition of the system due to the number of external variables and high degree of internal knowledge of the system. Condition assessment criteria are available in the Appendix 1.0. Assets rated C in the pie chart below include minor leachate equipment that is scheduled for renewal in the next 10 years.

Asset Type	Asset Component	Condition
	Force mains 75mm	В
	Local Sewers	
Lincar	450mm	A
Linear	150mm	A
	Maintenance Holes	В
	Valves & Chambers	А
	Pumping Station Structures	А
	Storage Tanks	А
Facilities	Wastewater Treatment Plants	В
	Wastewater Treatment Equipment	В
	Pumping Station Equipment	A

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Figure	1.3: Leachate	Water System	n Hiah Level	Condition	Assessment
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1.4 Lifecycle Activities

The leachate assets can be split into four categories of life with corresponding asset management activities. These activities are described in Figure 1.4.

Activity	Definition	Life Remaining
Minor Maintenance	Planned activities: inspections, monitoring, cleaning, flushing, testing, etc.	75-100%
Major Maintenance	Unplanned maintenance & repair: repairing water main breaks, repairing valves, replacing pipes, etc.	
Rehabilitation	Upgrades & rehabilitation: lining pipes, refurbishing equipment, etc.	25 - 50%
Replacement	End of asset life: decommission, remove old asset and install a new asset that does the same job	0 -25 %

Figure 1.4: Leachate Water System Lifecycle Activities

1.5 Life Expectancy

There are numerous direct and indirect variables that affect the useful lives of water assets such as climate, soil condition, and installation practices. With this in mind, the Municipality chose to rely on Municipal Staff and Engineering reports in gauging useful life and life remaining for McDougall's leachate water system.

The system is still relatively new and data about life expectancy will be refined with further iterations of the plan as more data about asset performance becomes available. Figure 1.5 shows the useful life of the leachate assets; Figure 1.6 shows the remaining lives and the lifecycle activities that are being applied.

Asset Type	Asset Component	Useful Life
	Force mains 75mm	75
Linear	Local Sewers 450mm 200mm 150mm	75 75 75
	Maintenance Holes	75
	Valves & Chambers	75
	Pumping Station Structures	75
	Storage Tanks	100
Facilities	Wastewater Treatment Plants	35
	Wastewater Treatment Equipment	21
	Pumping Station Equipment	50

Figure 1.5: Leachate Water System Useful Life





DESIRED LEVEL OF SERVICE

1.6 Target Levels of Service

The service levels in this plan are defined by two overarching performance measures community and operational.

Community Levels of Service: Community levels of service indicate how the community perceives the service and determines whether or not the service is valuable to the public.

Operational Levels of Service: Operational levels of service are the technical activities that bring community levels of service into action. They include resource allocations to create and maintain service levels that users expect and value.

Figures 1.7 and 1.8 cover both leachate and sanitary waste (waste water). These Figures identify target levels of service, and current performance relative to the measures identified. Future demand drivers, forecasts and effects were discussed in the Asset Management Plan Introduction Section 8.0 which includes all assets covered in the plan. Levels of service definitions are available in the Appendix 2.0.

Performance Measure	Level of Service Objective	Performance Measure Process	2012 Performance Measured	Desired Level of Service
	-			-
Purpose	Waste and leachate water is collected, treated and disposed of in accordance with all applicable legislation.	Number of contamination cases.	0 Contamination cases.	0 Contamination cases.
Reliability	Minimize equipment failure and blockages in piping.	Number of equipment failures Number of blockages	0 Equipment failures. 0 Blockages.	0 Equipment failures. 0 Blockages.
Safety	Provide users with a safe collection of waste and leachate water.	Number of pipe line breaks per 100km. Repair time after pipe breaks. Customer service request response time.	0 Pipe line breaks per 100km. No breaks. Completed within 24 hours in 2012	 0 Pipe line breaks per 100km. 12 hour repair time after pipe breaks. 12 hour response time.
Quality	Waste and leachate water system is operating effectively.	Number of customer service requests regarding quality of collection.	0 Customer service requests regarding quality of collection.	1 Customer service requests regarding quality collection.
Capacity	Supply enough piping and mains for collecting and expelling leachate and waste water.	Occurrences of inflow and filtration volumes surpassing limits. Number of backups.	0 Inflow and filtration incidents. 0 Backups.	0 Inflow and filtration incidents. 0 Backups.

Figure 1.7: Waste Water Community Levels of Service 2012

Performance Measure	Level of Service Objective	Performance Measure Process	2012 Performance Measured	Desired Level of Service
Operations	Waste and leachate water is treated in accordance with legislated	Number of inspections.	All inspections and sampling completed daily.	Daily inspections and samplings (M.O.E. regulation).
	standards.	Waste and leachate water flushing and cleanings.	2012 flushing and cleanings completed.	Annual flushing and cleaning (M.O.E. regulation).
Maintenance	Respond to customer service requests and provide scheduled maintenance.	Work related to customer requests and scheduled maintenance completion times.	All maintenance completed within 24 hours of beginning/notice.	All maintenance completed within 12 hours of beginning/notice.
Renewal	Useful lives of infrastructure should be increasing with the replacement of components.	Infrastructure useful lives.	Average useful life is increasing with renewals. Average Asset Life: Waste Water: 54% Leachate Water: 67%	Infrastructure components are replaced before the end of the assets' lifecycle.
Upgrade/New	MOE does not permit McDougall to add any users to the Septic System; deemed at capacity. Wastewater treatment assets at the landfill meet solid waste inflow.	Capacity of the Leachate collection assets.	Leachate collection assets exceed inflow.	Wastewater treatment infrastructure at the landfill is sufficient for amount of solid waste.

Figure 1.8: Waste Water Operational Levels of Service 2012

ASSET MANAGEMENT STRATEGY

1.7 Non Infrastructure Solution – Asset Hierarchy

An asset hierarchy provides a base for planning renewal, maintenance and rehabilitation. The structure allows the Municipality to focus its resources on assets that have been identified as critical assets. These assets have a high consequence of failure but not necessarily high risk of failure. Since not all assets can be maintained at the desired level of service prioritizing work on critical assets over low risk ones ensures that the system is protected against the most severe risks. Implementation of this strategy in the planning process has inherent cost savings and efficiencies. Figure 1.9 identifies critical assets in the leachate system.

Panking	Sorvico Hiorarchy	Service Level	Critical Pick
Канкіну	Service meralicity	Objective	
1	Treatment Plant	Treat leachate water to legislated levels.	Untreated leachate water discharge.
2	Pump Station	Continuously pump leachate water.	Untreated leachate water discharge.
3	Collection Network	Collect and move leachate water through the system.	Leachate water back up & environmental contamination.

Figure 1.9: Critical Assets

1.8 Maintenance & Operations Plan

Maintenance Activities: includes all actions necessary for keeping assets at their operable capacity. These actions were previous discussed in Figure 1.4 relative to useful life remaining.

Reactive Maintenance: unplanned repair work carried out in response to service request, break down or disruption.

Planned Maintenance: identified repair work indicated by the asset's useful life remaining in the Asset Inventory Registry. These activities include inspection, assessing condition based on asset's past performance, scheduling and tracking work to establish a centralized maintenance history and improve service delivery data collection.

Operational Activities: affect service levels by determining day to day servicing of the leachate system. These activities determine leachate water quality, life of equipment, etc.

The Municipality will operate and maintain assets to the desired level of service identified above. These activities will be within approved budgets. Strategies being considered include:

- Annual inspections to determine up to date condition status, maintenance and planned renewals for incorporation into the annual Environment Budget.
- Scheduling maintenance activities in a priority sequence to ensure that the highest risk assets are addressed before lower risk assets.
- Maintaining the Asset Inventory Registry.
- Maintaining service risk and mitigation strategy database.
- Undertaking capital activities through a planned replacement and renewal system.

1.9 Renewal & Replacement Plan

The Municipality will undertake renewal and replacement activities to maintain desired levels of service and minimize infrastructure related risks. The following Figure 1.10 criteria will act as McDougall's guide to determining whether major work on an asset should be considered.

Criteria	Weighting
High consequence of failure	20%
High utilization	20%
Identified in critical asset hierarchy	15%
Total value represents the highest net value to Municipality	10%
Has highest age relative to assets in group	10%
Has high operational or maintenance costs	10%
Replacement cost is less than maintenance and/or operating cost	10%
Where replacement with modern equivalent asset would yield material savings	5%
Total	100%

Figure 1.10: Capital Planning Tool

1.10 Disposal Plan

Disposal includes any activity associated with removing a decommissioned asset from the Municipality. These activities include sale, demolition or relocation to another department. Only leachate equipment assets have been identified in this Plan as requiring disposal. The following procedures are followed by the Municipality when disposing of assets.

Surplus capital assets will be disposed of in the following manner:

- o Disposals will be authorized by C.A.O and Management Staff
- o Competitive bid process through a Request for Quotations
- o Public auction
- o Trade-In

Invitations to bid on capital assets offered for sale by the Municipality will be:

- Posted on the Municipality's website for at least 14 days before the closing date of the invitation to bid
- o Published in at least one edition of the local newspapers

1.11 Procurement Methods

The Municipality will refer to its internal Procurement Policy (By-Law 2007-09) and Tender Policy (By-Law 2007-10) when purchasing new assets. McDougall will endeavor to where possible follow sustainable purchasing strategies and consider costs based on the lifecycle of the asset.

1.12 Risks Involved with the Plan

Optimal Capital Funding vs. Budgeted Capital Funding

The Municipality has adopted this Asset Management Plan to obtain efficiency in operation. The decision to pursue the Plan was based on the following two scenarios in Figure 1.11.

Scenario 1: Optimal funding for capital renewals, maintenance and operation activities required by the leachate assets over the next 10 years is \$485,881Based on 10 years, a budget of \$48,588 would be required annually for optimal leachate funding and capital reserve building.

Scenario 2: Over the last three years the Municipality has spent an annual average of \$44,018 or \$132,054 total operating, maintaining and renewing the system. Based on this average, McDougall projects an average budget of \$46,532 annually with inflation or \$465,325 total over the 11 years. This projection provides enough funding to replace assets up for renewal. In this scenario McDougall relies on reserves contributed from 2014-2019 to fund renewals from 2019 onwards. It does not allow the Municipality to contribute to reserves to prepare for the renewals needed 15-20 years from now.



Figure 1.11: Optimal vs. Budgeted Funding Strategies

What McDougall Cannot Do

The Municipality is able to allocate the additional ~\$2,000 annually to the leachate system for renewals and capital reserve building (Scenario 1). McDougall is able to fund the system and there are no gaps.

Service Consequences

Consequences occur when the Municipality decides not to undertake asset lifecycle activities after considering the strategies above. These consequences may impact users' service experience and are explored in Figure 1.12.

Action	Consequence	Mitigation Strategy
Critical assets will be maintained to higher standards than low risk assets.	 More minor repair work for Municipal Staff Stress on resources Reactive maintenance 	 Regular inspections of minor assets
The Municipality will only stock basic replacement parts for critical assets.	 Long wait times for replacement parts Service interruptions 	 Routine, scheduled preventative maintenance on minor assets in poor condition and intensive monitoring

Figure 1.12: Service Consequences & Mitigation

FINANCING STRATEGY

This section contains the financial requirements of the Asset Management Plan discussed in the previous subsections. The leachate collection system became fully operational in 2010, future financial projections will be improved as more reliable expenditure and asset performance information becomes available. For data confidence information see Appendix 3.0.

1.13 Ten year Leachate System Expenditure Projections

The optimal expenditure forecast for the next 10 years is shown in Figure 1.13. It includes projections for reserve building, operating, renewal, and maintenance activities. Note that all costs are shown with 2% annual inflation on 2010 - 2012 values.

The total renewal and maintenance expenditure excluding asset replacement reserve contributions is \$334,708 or \$129 per McDougall household over the next 11 years. If modest reserve contributions of are included the total, it rises to \$382,395 or \$147 over 11 years. Note neither of these totals includes operating expense which is projected to be between \$9,000 and \$11,000 annually.

For comparative purposes Figure 1.14 shows leachate expenditures from 2010 to 2012. Note that all costs are shown without inflation.









There is a definite change between historical spending and the ten year projections. Over the last three years the Municipality has not replaced or renewed any major leachate assets. Going forward there are projected replacements and renewals beginning in 2014 as asset conditions continue to deteriorate, especially in regards to minor equipment. There is a major spike in 2020 as many of the large assets' lives come up for renewal.

Since the 2010 - 2011 issues associated with beginning a new operation have been worked out; maintenance repairs and rehabilitation are expected to remain at the 2012 level.

In the past the Municipality has not invested in reserves for the system due to unplanned spending on repairs in 2010 and 2011. Looking at future projections the reserve contributions are necessary to maintain service delivery standards in the future.

1.14 Ten year Leachate System Funding Projections

The optimal funding forecast for the next 10 years is shown in Figure 1.15. Funding requirements cover all renewal, maintenance, and operating expenses. The leachate collection system is an integral part of the Landfill; it does not generate its own revenues and therefore is dependent on Landfill revenues that are shared between multiple departments. All revenue allocated to leachate collection has been used to cover expenses and comes solely from Landfill revenues. Note no inflation has been added to leachate budget projections because it is a cost centre.

For comparative purposes Figure 1.16 shows Landfill revenues allocated to leachate collection from 2010 – 2012. These figures are compared against Landfill net income and revenue for the same period. Note that all revenues are shown without inflation.



Figure 1.15: Leachate System Funding Projections

Figure 1.16: Historical Leachate System Funding



1.15 Sustainability of Service Delivery

The key indicator for service delivery sustainability that has been considered in the financing of the leachate system Asset Management Plan is the asset renewal funding ratio. This ratio is the most important indicator. It reveals how much of the capital renewals the Municipality will be able finance and how big the infrastructure gap is.

Asset Renewal Funding Ratio

Asset Renewal Funding Ratio 100%

The ratio above indicates that all renewals are fully funded for the next 10 years with the Asset Management Plan in place. There is no infrastructure gap.

APPENDIX

1.0 CONDITION ASSESSMENT CRITERIA

	Condition	
A	Excellent: no noticeable defects, some aging or wear may be visible. Immediate action is not required	Normal PM
в	Good: Only minor deterioration or defects are evident. Immediate action is not required	Normal PM + Minor M.
с	Fair: Some deterioration or defects are visible; function is still adequate. Analysis of repair and/or replacement options is recommended.	Normal PM + Major M.
D	Critical: Extensive deterioration, barely functional. Immediate action required	Major Repair + Rehab.
F	Failed: No longer functioning. Immediate action required	Rehab. Unlikely = Replace

	Capacity							
Α	System can support over 100% of demand							
В	System can support over 90-99% of demand							
С	System can support over 80-89% of demand							
D	System can support over 70-79% of demand							
F	System can support less than 70% of demand							

	Performance						
Α	Exceeds / Meets all Performance Targets						
В	Minor Performance Deficiencies						
С	Considerable Performance Deficiencies						
D	Major Performance Deficiencies						
F	Does not meet any Performance Targets						

	Reliability						
Α	As Specified by Manufacturer	Never Failed					
в	Random Breakdown	Fails every 20 Years					
с	Occasional Breakdown	Fails every 5 Years					
D	Periodic Breakdown	Falls every 2 Years					
F	Continuous Breakdown	Fails Annually					

2.0 LEVELS OF SERVICE CRITERIA Current Levels of Service

The service levels in this plan are defined by two overarching performance measures: community and operational. These performance measures will enable McDougall to track its progress against targeted outcomes and use those results to improve the Municipality's service delivery.

Community Levels of Service:

Community levels of service indicate how the community perceives the service and determines whether or not the service valuable to the public.

These performance measures include:

Purpose: Does the service satisfy users' needs?

Reliability: Does the service have the capability to maintain its functions on a routine basis?

Safety: Are the users protected from potential risks associated with the service?

Quality: Does the service fulfill its purpose to a high degree of excellence?

Capacity: Is the service at, under or over its capacity?

Operational Levels of Service

Operational levels of service are the technical activities that bring community levels of service into action. They include resource allocations to create and maintain service levels that users expect and value.

These activities affect the annual operating budget as the following performance measures:

Operations: routine activities that provide the service.

Maintenance: routine activities that keep the infrastructure functioning at the desired level of service.

Renewal: non-routine activities that extend the useful life of an infrastructure asset at the desired level of service.

Upgrade: non-routine activities that raise the level of service that the infrastructure can provide.

3.0 DATA CONFIDENCE

Confidence Grade	Description
A Very Reliable	Data is complete and estimated to be accurate $\pm 2\%$.
B Reliable	Data is complete and estimated to be accurate \pm 10%.
C Uncertain	Data is substantially complete but up to 50 % is extrapolated and estimated to be accurate \pm 25%.
D Very Uncertain	Data is over 50% incomplete; most data is extrapolated or estimated. Accuracy is estimated between ± 40%.
E Unknown	Little to no data is available at present.

Data	Confidence Assessment	Source
Operation Expenditure	A	Based on actual spending records. Consideration given to historical records.
Maintenance Expenditure	А	Based on actual spending records. Consideration given to historical records.
Projected Renewals	В	Taken from asset registry, Municipal Water Works Staff recommendations and industry standards
Asset Useful Lives	В	Based on Municipal Water Works Staff recommendations and industry standards

4.0 FUNDING SCENARIOS - OPTIMAL VS. HISTORIC AVERAGE

Leachate Water	Scenario One - Optimal Funding										
Financing	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
REVENUE											
Allocated Revenue from Landfill	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000	48,000
Reserve Draw Down	-	-	-	-	-	-	202	1,047	1,893	2,739	-
TOTAL REVENUE	48,000	48,000	48,000	48,000	48,000	48,000	48,202	49.047	49,893	50,739	48,000
	10,000	10,000	.0,000	10,000	10,000	.0,000	.0,202	.0,0	10,000		10,000
OPERATION EXPENSE											
Operation Expense	9,510	9,696	9,883	10,069	10,255	10,442	10,628	10,815	11,001	11,188	11,374
Debt Repayment - Development Charge											
CAPITAL EXPENSE											
Renewal & Replacement	12,335	12,577	12,818	13,060	13,302	20,124	20,484	20,843	21,202	21,562	13,533
Maintenance, Repairs & Rehabilitation	15,291	15,591	15,891	16,190	16,490	16,790	17,090	17,390	17,690	17,989	18,289
Non Infrastructure Solutions											
Disposal Activities											
Expansion Activities											
RESERVE BULIDING											
Asset Replacement Reserve Contribution	10,865	10,137	9,409	8,680	7,952	644	-	-	-	-	4,803
Calculated Contribution											
Contribution Smoothing %											
Contribution Smoothing \$											
Contributed Reserve	-	10,865	21,002	30,411	39,091	47,043	47,485	46,438	44,545	41,806	41,806
TOTAL EXPENSE	48,000	48,000	48,000	48,000	48,000	48,000	48,202	49,047	49,893	50,739	48,000
NET INCOME (deficit)	-	-	-	-		-	-	-	-	-	-

****Inflation assumption is 2 %

* All figures shown in CAD \$ **Reserve based on capital needs over next 30 yrs

*** Forecasted revenues & expenditures are based on 2012 actual spending because of instability in first 2 years of operation, 2010-2011

Scenario Two - Historic Funding											
Leachate Water Financing	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
REVENUE											
Allocated Revenue from Landfill	44,018	44,018	44,018	44,018	44,018	44,018	44,018	44,018	44,018	44,018	44,018
Reserve Draw Down	-	-	-	-	-	3,339	4,184	5,030	5,875	6,721	-
TOTAL REVENUE	44,018	44,018	44,018	44,018	44,018	47,357	48,202	49,048	49,893	50,739	44,018
OPERATION EXPENSE											
Operation Expense	9,510	9,696	9,883	10,069	10,255	10,442	10,628	10,815	11,001	11,188	11,374
Debt Repayment - Development Charge											
CAPITAL EXPENSE											
Renewal & Replacement	12,335	12,577	12,818	13,060	13,302	20,124	20,484	20,843	21,202	21,562	13,533
Maintenance, Repairs & Rehabilitation	15,291	15,591	15,891	16,190	16,490	16,790	17,090	17,390	17,690	17,989	18,289
Non Infrastructure Solutions											
Disposal Activities											
Expansion Activities											
RESERVE BULIDING											
Asset Replacement Reserve Contribution	6,882	6,154	5,426	4,698	3,970	-	-	-	-	-	821
Calculated Contribution											
Contribution Smoothing %											
Contribution Smoothing \$											
Contributed Reserve	-	6,882	13,036	18,462	23,160	23,791	19,607	14,577	8,702	1,981	1,981
TOTAL EXPENSE	44,017	44,017	44,017	44,018	44,018	47,356	48,202	49,047	49,893	50,739	44,018
NET INCOME (deficit)			-	-	-	-		-	-		
	-	_	-	-	-	-	-	-	-	-	-

* All figures shown in CAD \$ **Reserve based on capital needs over

next 30 yrs

****Inflation assumption is 2 %

*** Forecasted revenues & expenditures are based on 2012 actual spending because of instability in first 2 years of operation, 2010-2011

5.0 PROJECTED 10 YEAR CAPITAL RENEWAL & REPLACEMENT PROGRAM

Asset Component	Quantity	Unit	Useful Life	Life Remaining	2019 Renewals	2024 Renewals
safety equipment, lab sink, pressure tank, water heater, sanitary accessories	18	each	10	40%	\$ 3,264	
septic system	1	each	30	80%		
chemical feed pumps	6	each	10	40%	\$ 18,000	
chemical injectors & accessories	3	each	10	40%	\$ 1,500	
back pressure relief valves and feed lines	3	each	5	-20%	\$ 1,500	\$ 1,500
submersible mixers	2	each	2	0%	\$ 7,000	\$ 7,000
pressure gages (100mm dia. 12mm bronze threads)	2	each	5	60%	\$ 200	\$ 200
pressure switches	2	each	10	40%	\$ 1,000	
fabricated gates	2	each	30	80%		
course bubble aeration system	2	each	30	80%		
automatic valve for return activated sludge (RAS) wasting	1	each	10	40%	\$ 3,500	
process pumps	3	each	10	40%	\$ 10,500	
blower & motor	2	each	15	60%		\$ 35,000
sensors (pH analyzer, ORP analyzer, aquametrix analyzer & sensor)	8	each	15	60%		\$ 4,500
transmitters (flow transmitters, level arm float switch)	10	each	15	60%		\$ 4,500
analyzers (pH, ORP & DO)	6	each	15	60%		\$ 4,500
flow meters (25, 50 & 75mm)	6	each	20	70%		
gas detectors for methane	1	each	10	40%	\$ 4,500	
wall exhaust fans	1	each	15	60%		\$ 10,880
thermostats	1	each	15	60%		\$ 10,880
louvers	7	each	15	60%		\$ 10,880
leachate water treatment building - repairs	1	each	35	83%	\$ 9,500	
			Total	Program	\$ 60,464	\$ 89,840