DRAFT

Regional Wastewater Treatment and Septage Study
EXECUTIVE SUMMARY

Matanuska-Susitna Borough
In cooperation with:
City of Palmer
City of Wasilla

Prepared by:

HDR ALASKA
2525 C. Street, Suite 305
Anchorage, AK 99503
(907) 644-2000

Project Contact:
Jennifer Gastrock, P.E.
jennifer.gastrock@hdrinc.com

GV Jones & Associates, Inc.
Water and Wastewater Process Engineers
1200 E. 76th Ave., Unit 1207
Anchorage, AK 99518
(907) 346-4123

Project Contact:
Greg Jones, P.E.
greg@gvjones.com

HDL Hattenburg Dilley & Linnell
Engineering Consultants
3335 Arctic Ave., Suite 100
Anchorage, AK 99503
(907) 564-2120

Project Contact:
Scott Hattenburg, P.E.
shattenburg@hdlalaska.com

Regional Wastewater & Septage Study
Executive Summary

Matanuska-Susitna Borough, Alaska

Prepared for:

Matanuska-Susitna Borough, Alaska
City of Palmer, Alaska
City of Wasilla, Alaska

Prepared by:

HATTENBURG DILLEY & LINNELL, LLC.
3335 Arctic Blvd, Suite 100
Anchorage, AK 99503

GV JONES & ASSOCIATES, INC.
1200 E. 76th Ave., Unit 1207
Anchorage, AK 99518

HDR ALASKA, INC.
2525 C. Street, Suite 305
Anchorage, AK 99503

APRIL 2010

ES.1 BACKGROUND

The Cities of Palmer and Wasilla currently operate independent wastewater collection and treatment utilities. Due to forecast growth within the service areas, and a changing regulatory environment, these cities must improve their respective systems, or face regulatory action. The City of Palmer (Palmer) has until December 31, 2011 to come into regulatory compliance with NPDES permit limits for ammonia and total suspended solids (TSS). The City of Wasilla (Wasilla) struggles with ADEC regulatory limits for nitrates and can not increase plant capacity because of its groundwater discharge. Septage haulers operating within the Matanuska-Susitna Borough (Borough) face escalating costs because there is no way to treat and dispose of septage in the Borough. Septage is currently driven to and disposed of in Anchorage's wastewater system. The study team, consisting of Hattenburg Dilley and Linnell (HDL), HDR Alaska (HDR), and G.V. Jones and Associates (G.V. Jones) was retained in January of 2009 to help the Borough and the two Cities address these challenges from a regional approach.

ES.2 PURPOSE

The purpose of this study is to address the short term regulatory compliance and capacity needs of the Palmer and Wasilla wastewater treatment plants and to address the long-term regional needs for a wastewater and septage treatment system in the Core Area of the Borough between Palmer and Wasilla. Construction of a wastewater collection and treatment system within the Core Area would allow for growth, higher density development and would reduce potential groundwater contamination from on-site septic systems. The existing municipal wastewater treatment systems for Palmer and Wasilla have limited capacity to meet the needs of future growth within the core area and the Borough has no facility for accepting or treating septage generated within the Borough. Wasilla, Palmer and the Borough need to determine if there is an economic advantage to joining together in a regional solution that will address the needs of the three entities.

ES.3 BASIS OF DESIGN

Early in the study process, the study team evaluated many wastewater treatment process types in depth and forecasted wastewater flows for a 50-year planning period. A technical memorandum detailing design objectives and possible wastewater treatment processes was presented to the entities on April 21, 2009. After consultation with the Borough, Palmer and Wasilla, the wastewater process types were refined to the top three candidates for detailed analysis and costing. Those candidates were Lagoon Activated Sludge (LAS), Conventional Activated Sludge (CAS) and the Membrane Bioreactor (MBR) system. A 4.0 million gallon per day (MGD) average daily flow (ADF) plant size was selected for the regional solution because it provided a reasonable design life for pricing, and avoided major portions of the treatment train lying dormant until the higher flows were realized. The 4.0 MGD plant size represents the year 2022 flow.

Early in the study, Palmer also suggested analysis of a 2.0 MGD near term alternative to allow time for a regional solution to be implemented. Wasilla also suggested a similar analysis of a 1.0 MGD near term alternative which is the approximate capacity of their subsurface disposal system.

Along with the flow rates presented for wastewater, septage production rates were projected out to a potential 30-year flow rate. The study team consensus was to base alternatives on a design flow rate of 170,000 gpd. The size and location of a potential septage receiving/pretreatment facility is based on this estimate.

ES.4 SUMMARY OF ALTERNATIVES

Based on the findings of the technical memorandum and suggestions by the entities involved in the study, the following alternatives and flow rates were advanced for detailed analysis and costing:

Near Term Alternatives

- Lagoon Activated Sludge Upgrade at the Palmer WWTP (2.0 MGD)
- Lagoon Activated Sludge Upgrade at the Wasilla WWTP (1.0 MGD)

Long Term Regional Alternatives

- Improve City of Palmer WWTP Further to Accept Regional Flows (4.0 MGD)
- Construct New Regional WWTP at a Central Location (4.0 MGD)

Near Term Upgrades

Near Term upgrades provide regulatory permit compliance and capacity increases so each City can accept larger incoming flows.

Palmer Near Term

Under this scenario, Palmer would upgrade its existing wastewater treatment plant to 2.0 MGD ADF. Upgrades to the treatment system would consist of converting Lagoon 1 into an extended aeration activated sludge process, referred to in the report as "Lagoon Activated Sludge." These upgrades include:

- Installation of additional headworks screw pumps, comminution and screening equipment
- Construction of separate reactor zones in Lagoon 1 using baffling to facilitate nitrification and denitrification
- Installation of additional aeration capacity to maintain completely mixed conditions in Lagoon 1
- Construction of an earthen dike to shorten the process basin length, and facilitate a shorter reaction time
- Installation of a floating, semi-permeable, insulated lagoon cover and a new lagoon liner
- Construction of secondary clarifiers within a large temperature controlled enclosure
- Installation of a granular media filtration unit to provide tertiary quality effluent
- Installation of additional UV disinfection capacity to handle increased flows
- Aerobic digestion of settled waste solids within the existing Lagoon 3

Upgrades will provide Palmer with capacity to the year 2026 at current projected population growth rates. The total project cost (including administration, construction, design, contingency, and inflation) for the proposed upgrades is **$43,716,100.** The estimated annual

O&M cost for the Palmer near term LAS upgrades operating at an ADF of 2.0 MGD is **$1,354,000** per year**.**

Wasilla Near Term Upgrades

Under this scenario, Wasilla would upgrade its existing wastewater treatment facility to 1.0 MGD ADF of Septic Tank Effluent Pump (STEP) effluent using an LAS system similar to Palmer's near term project. These upgrades include:

- Construction of separate reactor zones in one lagoon using baffling to facilitate nitrification and denitrification
- Installation of additional aeration capacity to maintain completely mixed conditions within the existing lagoons
- Construction of an earthen dike to shorten the process basin length, and facilitate a shorter reaction time
- Installation of a floating, semi-permeable, insulated lagoon cover and a new lagoon liner
- Construction of secondary clarifiers inside a large temperature controlled enclosure
- Installation of a granular media filtration unit to provide tertiary quality effluent before ultimate disposal to the effluent drain fields
- Construction of additional aerobic sludge digestion capacity to handle increased septage flows from Wasilla

Upgrades will provide Wasilla with capacity to the year 2016 at current projected population growth rates. The total project cost (including administration, construction, design, contingency, and inflation) for the proposed upgrades is **$25,505,400.** The estimated annual O&M cost for the Wasilla near term LAS upgrades operating at an ADF of 1.0 MGD is **$982,000 per year**, excluding septage truck operations.

Long Term Regional Solutions

Upgrades presented as "Long Term" are intended to provide adequate initial capacity to treat wastewater for approximately 10-15 years, depending on actual growth rates. This time period was chosen due to the overwhelming cost of constructing and operating a larger scale plant with redundant parallel trains while flows are not adequate to fully utilize the design capacity. For the purpose of pricing, regional plant concepts were based on 4.0 MGD capacity with parallel train redundancy. Regional concepts also allow modular expansion beyond 4.0 MGD. A summary of the long term upgrades is presented in the following paragraphs.

Palmer LAS Regional WWTP

One of the regional solutions is to upgrade the Palmer WWTP using LAS. This 4.0 MGD upgrade would consist of converting both Lagoons 1 and 2 to the activated sludge process. Improvements would produce tertiary quality effluent for continued discharge to the Matanuska River. 4.0 MGD upgrades would include:

- Installation of additional headworks pumping, comminution and screening capacity
- Installation of primary clarifiers to remove settleable solids prior to them entering the lagoons

- Installation of anaerobic digestion units for sludge stabilization and potential biogas generation to be used in a cogeneration process
- Conversion of Lagoon 2 to an LAS process
- Construction of a third secondary clarifier
- Construction of additional granular media filtration capacity
- Construction of a new UV disinfection unit

While LAS systems are not widely used in the State of Alaska, it is a proven technology in cold weather climates in the lower 48. This option is the least expandable of the three regional solutions when flows increase past the 4.0 MGD threshold because more land will be required and new lagoons constructed at considerable cost, or the treatment process will need to be changed to something other than lagoons.

The upgrades will provide treatment capacity to year 2022, based on population projections in the study. The total project cost for the Palmer 4.0 MGD LAS upgrade including a septage receiving station located off-site is **$96,740,600.** The expected annual O&M cost at 4.0 MGD is estimated to be approximately **$3,525,300** including septage receiving off-site**.**

In addition to Palmer WWTP upgrades, a large diameter sewage conveyance pipeline would need to be constructed between the Wasilla WWTP and the Palmer Southwest Utility Extension (SWX) sewer main near the Mat-Su Regional Medical Center. This conveyance pipeline would be approximately 5.1 miles in length and would include three lift stations capable of pumping 2.0 MDG ADF from Wasilla. It would also require lift station capacity upgrades to the Palmer SWX system. The total project cost (including administration, construction, design, contingency, and inflation) for the Wasilla conveyance system and the Palmer SWX upgrades is estimated to be **$22,446,000.**

Centrally Located Regional WWTP

The other option is to construct a new centrally located regional WWTP somewhere between the two cities. A number of different sites were evaluated for construction of a centrally located treatment plant. Several criteria were used to screen candidate locations including:

- Proximity to permittable receiving waters
- Central location to the combined service area
- Low elevation to maximize the use of gravity sewer and reduce pumping costs
- Land availability (at least a 20 acre tract of undeveloped land)

After studying a number of potential locations, two candidate sites were selected for further analysis. The sites are:

Site A – A gravel pit located to the south west of the Glenn/Parks Interchange. This site is currently owned by Arctic Devco, the developers of "The Ranch" subdivision. The outfall would be a surface discharge to a large privately-owned (same owner as the WWTP site) wetland located on the flats south of Site A. The large 600 acre private parcel abuts the PHFSGR and would need to be purchased or leased. Sewage conveyance from Wasilla to Site A would consist of approximately 22,500 L.F. of sewer main with two lift stations; approximately 6,000 L.F. of sewer main between Woodworth Loop near the Mat-Su Regional Medical Center and Site A; reversing the

flow in the 5 miles of the Palmer SWX system including conversion of gravity sewers to force mains, and upgrading lift station and piping capacity. The total project cost (including administration, construction, design, contingency, and inflation) of conveying wastewater to Regional Site A is estimated to be **$29,644,800.**

Site B - Site B is located at a gravel pit south of Palmer between the Glenn Highway and the Matanuska River. Private property in the site area is owned by Granite Construction, Inc. and Agg Pro. For purposes of the study, the Agg Pro property has been illustrated, however, either of the properties have favorable qualities for a wastewater treatment plant. The outfall from this location would be to the floodplain of the Matanuska River. Sewage conveyance to Site B would consist of approximately 5.1 miles of new sewer main with three lift stations between the Wasilla WWTP and the Palmer SWX; reversing of flow through approximately 3.6 miles of the Palmer SWX system between the Palmer WWTP and Site B including conversion of gravity sewer to force mains and lift station capacity upgrades; constructing lift station capacity upgrades between the Mat-Su Regional Medical Center and Site B to handle the additional flow from Wasilla; constructing approximately 1,600 L.F. of new sewer main from the Palmer SWX system to Site B. The total project cost (including administration, construction, design, contingency, and inflation) of conveying wastewater to Regional WWTP Site B is estimated to be **$24,737,500.**

Centrally Located CAS Regional WWTP

A centrally-located CAS treatment option would consist of the following:

- Preliminary screening to remove large items (rocks, rags, etc.) and grit removal
- Primary clarification to remove settleable solids prior to them entering process basins, and also to aid in potential biogas generation
- Secondary treatment configured with anoxic reactors to facilitate sludge settleability and aeration efficiencies
- Secondary clarification for gravity biosolids separation
- Granular media filtration units to produce tertiary quality effluent
- UV disinfection prior to effluent discharge
- Anaerobic digestion for sludge stabilization and potential biogas generation

This option would require the construction of buildings to house the reactor basins, headworks and clarifiers. These buildings are needed to maintain the wastewater temperatures during the long, cold Alaskan winters. CAS is a proven wastewater treatment technology and is used throughout the lower 48 and in Alaska. Anchorage Water and Wastewater Utility's (AWWU) Eagle River Alaska WWTP is a tertiary plant that discharges into salmon migrating habitat. If planned properly, CAS allows for easy modular expansion beyond 4.0 MGD.

A regional CAS plant would provide capacity to the year 2022, at current projected population growth rates. The total project cost (including administration, construction, design, contingency, and inflation) of a centrally located regional 4.0 MGD CAS plant including septage receiving/pretreatment is **$107,605,000.** Expected annual O&M costs for a regional CAS WWTP at 4.0 MGD are estimated to be approximately **$3,558,700** including septage receiving**.**

Centrally Located MBR Regional WWTP

A centrally located membrane bioreactor (MBR) plant would include the following:

- 2-stage screening process consisting of coarse and fine screening plus grit removal
- Primary clarification to remove settleable solids prior to them entering process basins, and also to aid in potential biogas generation
- Secondary treatment configured for optimum sludge settleability and aeration energy efficiency
- Secondary biosolids separation through the use of membranes
- UV disinfection prior to effluent discharge
- Anaerobic digestion for sludge stabilization and potential biogas generation

The size of process buildings for this option is much smaller than those required for the CAS process. This is due in large part by the use of membranes for secondary biosolids separation, as they require smaller reactor basins and eliminate the use of tertiary filters and gravity clarifiers. MBR is also a proven wastewater treatment technology and is generally regarded as "state of the art" in terms of treatment processes. MBR allows easy modular upgrades beyond a flow rate of 4.0 MGD.

A regional MBR plant would provide capacity to the year 2022, at current projected population growth rates. The total project cost (including administration, construction, design, contingency, and inflation) of a centrally located regional 4.0 MGD MBR plant including septage receiving/pretreatment is **$101,418,800.** Expected annual O&M costs for a regional MBR WWTP at 4.0 MGD are estimated to be approximately **$4,008,600** including septage receiving**.**

Septage Receiving and Pretreatment

The final goal of this study was to address septage handling within the Borough. Landfill leachate handling and treatment was also included in the initial phase of the study, however, conversations with the Borough's Central Landfill manager indicate that they intend to develop their own landfill leachate handling plan. Three options for septage receiving and pretreatment were evaluated during this study. These options include:

Septage Option 1 - Septage Receiving and Treatment at the Central Landfill

This option would consist of on-site treatment of septage. It would require a new treatment and disposal system separate from the existing Palmer and Wasilla or new regional WWTPs. This option was not advanced further because the cost of building a separate treatment facility is cost prohibitive and not consistent with the Borough's plans at the landfill.

Septage Option 2 – Septage Receiving at a Central Location Not at the Regional WWTP

This option consists of a septage receiving station providing pre-treatment located away from the site of a regional WWTP. The facility would be built near an existing or new sewer main. Septage received at the station would then be screened and mixed with wastewater in the collection system and treated at the regional WWTP. Locations considered include near Palmer's Lift Station 4 near the Glenn Highway, or near the Mat-Su Regional Medical Center.

Septage Option 3 – Septage Receiving Co-Located with the Regional WWTP

This option consists of a septage receiving station co-located at the site of a regional WWTP. This option would be feasible only for the centrally located regional WWTPs, as septage truck traffic along Inner/Outer Springer Loop Road near the Palmer WWTP is not publicly acceptable according to Palmer.

The process for pre-treatment of septage is essentially the same for either Alternative 2 or 3, and consists of:

- Coarse screening at the truck emptying area to remove large items
- Flow attenuation to avoid overloading downstream processes
- Additional fine screening and grit removal with discharge to a storage tank
- Metering of septage into wastewater stream to avoid upsetting the wastewater treatment process with high nutrient loadings
- Trucking of screenings and grit to the Borough Central Landfill

The septage receiving station developed for this study consists of a dual bay septage receiving area with hot water wash stations. The site requires space for trucks to pull through the site without the need to turn around. Improvements would be designed for ease of expandability just as in the other regional treatment options.

A septage plant would provide capacity to the year 2048, at current projected population growth rates. The total project cost (including administration, construction, design, contingency, and inflation) for either a co-located or non co-located regional septage receiving/pretreatment station is **$7,133,000.** Annual operational and maintenance (O&M) costs are estimated to be **$165,000.**

Phasing

Costs provided in this report for regional treatment options are for wastewater treatment and conveyance of 4.0 MGD to a single point. The initial capital costs required for startup of a wastewater treatment plant could be reduced by phasing improvements to provide initial treatment to meet the required permits, adding equipment and processes as needed as flows increase or as permit limits warrant. Phasing of upgrades and improvements would also serve to reduce the burden placed on initial ratepayers and could be more likely to secure funding.

Preferred Alternative

In order to make a proper recommendation for a solution to regional wastewater and septage treatment within the MSB, it is necessary that the full process laid out in the National Environmental Policy Act of 1969 (NEPA) be followed. To help expedite this process and aid in the selection of a preferred alternative the study team has developed a decision matrix consisting of 9 monetary and non-monetary factors which influence the selection of the preferred treatment process. This decision matrix is provided in Section 11.0 of the report.

ES.5 FINDINGS

1. Constructing a regional wastewater and septage treatment facility is technically feasible.

2. Additional environmental studies following the National Environmental Policy Act of 1969 (NEPA) will be required if federal funding is used. The environmental process could take 1 to 3 years, depending on the environmental impacts.

3. Planning, design, permitting, and construction of a regional facility will require approximately 4 years to complete.

4. Based on a forecast ADF of 4.0 MGD, total project cost (including administration, construction, design, contingency, and inflation) of constructing a regional wastewater and septage facility including conveyance piping is estimated to range from $119 million to $132 million - depending on the location and treatment process selected. See Table EX-1.

Table EX-1: Summary of Combined Capital Costs

	WWTP Construction	Conveyance Piping, Wasilla, 4.0 MGD	Conveyance Piping, Palmer, 4.0 MGD	Off-Site Septage Receiving	Total Project Cost
Palmer, Regional	$89,607,600	$19,218,000	$3,228,000	$7,133,000	**$119,186,600**
CAS, Regional	$107,605,000	$19,654,000	$5,083,500	-	**$132,342,500**
MBR, Regional	$101,418,800	$19,654,100	$5,083,600	-	**$126,156,300**

5. The cost of the three entities "going it alone" and treating 4.0 MGD independently versus joining in a regional wastewater and septage treatment solution is estimated to be $107 million versus $119-132 million, respectively. See Table EX-2.

Table EX-2: Summary of Capital Costs for Independent Treatment vs. Regional Treatment

Item	Capital Cost
Independent Treatment	$107,216,100
Regional-LAS	$119,186,600
Regional-CAS	$132,342,500
Regional MBR	$126,156,300

6. The total project cost of a septage receiving/pretreatment facility regardless of whether co-located or non co-located is approximately $7.133 million.

7. The septage facility will require an upgraded wastewater treatment plant regardless of the alternative selected.

8. The septage facility costs are based on locating the facility in close proximity to a large diameter sewer main capable of handling the additional flow.

9. Based on an ADF of 4.0 MGD, annual O&M costs for a regional wastewater and septage facility are estimated to range from approximately $3.5 million to $4.0 million depending on the treatment process selected. The cost of Independent Treatment is approximately $3.0 million. See Table EX-3.

Table EX-3: Regional WWTP O&M Costs (Includes Septage Receiving)

Independent Treatment (2.0 MGD Palmer and 2.0 MGD Wasilla)	**$2,968,360**
Palmer-Regional WWTP (4.0 MGD ADF)	**$3,525,300**
CAS-Regional WWTP (4.0 MGD ADF)	**$3,558,700**
MBR-Regional WWTP (4.0 MGD ADF)	**$4,008,600**

10. The cost to the Wasilla rate payer for constructing and operating a regional wastewater and septage facility, and operating its existing wastewater collection and septage treatment system is estimated to range from a high of $177 per month to a low of $42 per month depending on a range of factors. Those factors include the number of customers and when customers come online, the type of wastewater treatment selected, the location of the plant and the amount of grant funding obtained. Our analysis assumes the existing STEP system at Wasilla will be maintained and new users will connect to a conventional gravity collection system. For this analysis, costs of upgrades have been allocated to each entity based on wastewater flow (50%) and strength (50%). A detailed break down of the ratepayer study can be found in Section 10.3 and Appendix F of this report. Table EX-4 presents a ratepayer matrix showing how different factors affect the cost to the ratepayer

Table EX-4: Estimated Rate Payer Cost Per Month, Dollars, Wasilla*

Grant Funding Received	0%			25%			50%			75%			100%		
WWTP Type	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR
Year 2015	177	192	198	148	159	165	118	126	131	89	93	98	60	59	65
Year 2020	121	130	137	103	110	116	86	90	96	68	70	76	50	50	55
Year 2025	93	100	105	80	85	90	68	71	76	55	56	61	42	42	47

*Costs include operation of existing wastewater collection system (Current rate payer cost is approx. $50/month, set to go up to approx. $65/month).

11. The cost to the Palmer rate payer for constructing and operating a regional wastewater and septage facility, and operating its existing wastewater collection system is estimated to range from a high of $137 per month to a low of $40 per month depending on a range of factors. Those factors include the number of customers and when customers come online, the type of wastewater treatment selected, the location of the plant and the amount of grant funding obtained. For this analysis, costs of upgrades have been allocated to each entity based on wastewater flow (50%) and strength (50%). A detailed break down of the ratepayer study can be found in Section 10.3 and Appendix F of this report. Table EX-5

presents a ratepayer matrix showing how different factors affect the cost to the Palmer ratepayer.

Table EX-5: Estimated Rate Payer Cost Per Month, Dollars, Palmer

Grant Funding Received	0%			25%			50%			75%			100%		
WWTP Type	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR
Year 2015	137	148	154	115	124	129	94	99	105	72	74	80	50	50	55
Year 2020	103	130	117	103	94	100	74	78	84	60	62	68	46	46	52
Year 2025	83	88	94	80	76	81	61	64	69	51	52	57	40	40	45

*Costs include operation of existing wastewater collection system (Current rate payer cost is approx. $20/month).

12. The cost to the Borough septage haulers for its share of operating a regional wastewater and septage facility is estimated to range from a high of $182 per load to a low of $54 per load depending on a range of factors. Those factors include the number of wastewater and septage customers and when customers come online, the type of wastewater treatment selected, the location of the plant and the amount of grant funding obtained. For this analysis, costs of upgrades have been allocated to each entity based on wastewater flow (50%) and strength (50%). Table EX-6 presents a ratepayer matrix showing how different factors affect the cost. Rates presented are the tipping fees for septage haulers dumping an average truck load of 3,000 gallons. A detailed break down of the ratepayer study can be found in Section 10.3 and Appendix F of this report.

Table EX-6: Estimated Cost to Dispose of One Load of Septage, Dollars, MSB

Grant Funding Received	0%			25%			50%			75%			100%		
WWTP Type	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR	LAS	CAS	MBR
Year 2015	166	175	182	138	146	152	111	116	122	84	86	92	57	57	62
Year 2020	141	148	155	120	125	132	100	103	110	79	80	87	58	58	64
Year 2025	121	126	132	104	108	114	87	90	96	70	72	77	54	54	59

13. Constructing a 4.0 MGD regional WWTP at Palmer provides the least initial total project cost because of the reuse of access roads, utilities, lagoons, headworks and UV disinfection.

14. Beyond 4.0 MGD, a CAS or MBR plant may be incrementally less expensive to build and/or operate compared to the LAS plant because of the smaller foot print, lower energy consumption and no need for additional land.

15. The MBR process is most able to achieve higher quality final effluent characteristics which may be imposed during future APDES permitting cycles. The CAS and LAS process both rely on the gravity settling characteristics and a granular media filter to separate out solids. While these methods are effective at solids removal, there is a limit to the effective particle size that can be removed while still allowing flow through the system. The MBR relies on a mechanical means of separating solids and has uniform openings which provide more consistent effluent filtration.

ES.6 RECOMMENDATIONS

1. Our preliminary scoring of alternatives in the scoring matrix suggests that a regional CAS or MBR WWTP are the preferred alternatives. We, however, recommend that the Borough and Cities meet, discuss, and adjust the weighting of importance factors based on their priorities, and finalize the selection of the preferred treatment process.

2. Initiate the environmental process as soon as practical upon the selection of a preferred alternative.

3. If Palmer is selected as the regional site, and flows are anticipated to increase significantly beyond 4.0 MGD, consider using the CAS or MBR process to maximize expandability in the future.

For more information on the Regional Wastewater and Septage Treatment Study, please visit the Matanuska-Susitna Borough, Public Works website at:

http://www.matsugov.us/publicworks/project-highlights/engineering-highlights