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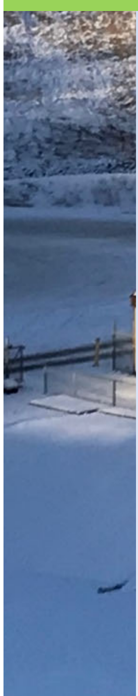
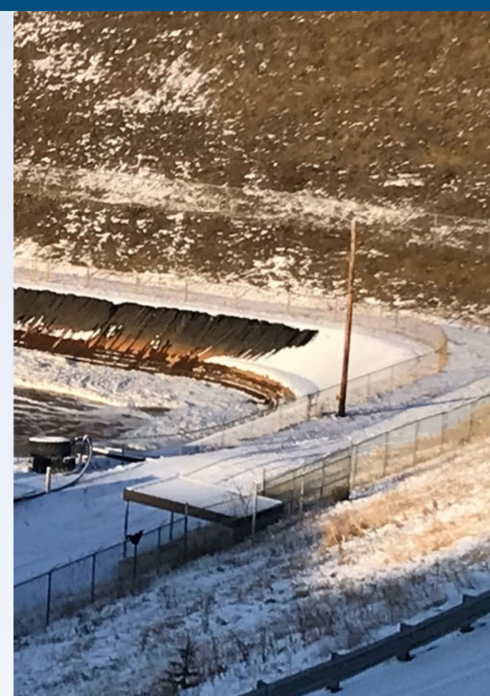


Prepared for:
Municipality of Anchorage
Solid Waste Services

INTEGRATED SOLID WASTE MASTER PLAN



TETRA TECH

November 2019
Amendment No. 1: March 2020
Amendment No. 2: May 2026

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

DEFINITIONS AND ACRONYMS

Term or Acronym	Definition
AAC	Alaska Administrative Code
AB	Assembly Bill
ACAT	Alaska Community Action on Toxics
ACM	Asbestos Containing Materials
AD	Anaerobic Digestion
ADC	Alternative Daily Cover
ADEC	Alaska Department of Environmental Conservation
ALPAR	Alaskans for Litter Prevention and Recycling
AMC	Anchorage Municipal Code
Amsl	Above mean sea level
ARC	Anchorage Recycling Center
ARL	Anchorage Regional Landfill
ARRMS	Automated Refuse Route Management System
AS	Alaska Statute
ASP	Aerated Static Pile
AUF	Airspace Utilization Factor
AWWU	Anchorage Water and Wastewater Utility
BTU	British Thermal Unit
CAA	Clean Air Act
CARB	California Air Resources Board
CBJ	City and Borough of Juneau
C&D	Construction and Demolition
Census Bureau	2010 United States Census Bureau

Term or Acronym	Definition
CEMS	Continuous Emissions Monitoring Systems
40 CFR	Title 40 of the Code of Federal Regulations
CHP	Combined Heat and Power
CMAR	Construction Manager at Risk
C:N	Carbon-to-Nitrogen ratio
CNG	Compressed Natural Gas
CRS	Central Recycling Services
CTS	Central Transfer Station
CUP	Conditional Use Permit
Cy	Cubic Yards
DBOM	Design-Build-Operate-Maintain
DOD	Department of Defense
Doyon	Doyon Utilities, LLC
DSCR	Debt Service Coverage Ratio
EPA	Environmental Protection Agency
EPR	Extended Producer Responsibility
EWMC	Edmonton Waste Management Center
FEMA	Federal Emergency Management Agency
FNSB	Fairbanks North Star Borough
GAC	Geotechnical Advisory Commission
GCCS	Gas Collection and Control System
GGE	Gasoline Gallon Equivalent
GHG	Greenhouse Gas
GMP	Guaranteed Maximum Price

Term or Acronym	Definition
GWP	Global Warming Potential
HDPE	High Density Polyethylene
HELP	Hydrologic Evaluation of Landfill Performance
HHAND	Housing, Homeless, and Neighborhood Development Commissions
HHV	High Heating Value
HHW	Household Hazardous Waste
I-1	Light Industrial District
I-2	Heavy Industrial District
IAL	International Airport Landfill
ISWMP	Integrated Solid Waste Master Plan
JBER	Joint Base Elmendorf-Richardson
K	Methane Generation Rate
KPI	Key Performance Indicator
kW	Kilowatts
LandGEM	Landfill Gas Emission Model
LCFS	Low Carbon Fuel Standard
LCRS	Leachate Collection and Recovery System
LCS	Leachate Collection System
LEL	Lower Explosive Limit
LFG	Landfill Gas
LFGTE	Landfill Gas to Energy
LMOP	Landfill Methane Outreach Program
LNG	Liquefied Natural Gas
Lo	Methane Generation Potential

Term or Acronym	Definition
M	Million
MRI	Merrill Field Airport
Mat-Su	Matanuska-Sustina Borough
Mcy	Million cubic yards
MFL	Merrill Field Landfill
ML&P	Municipal Light and Power
MMBTU	Million BTU
MOA	Municipality of Anchorage
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MSWLFs	Municipal Solid Waste Landfills
MW	Megawatt
NEPA	National Environmental Policy Act
NALA	North Anchorage Land Agreement
NRC	National Recycling Coalition
OCC	Old corrugated cardboard
PAYT	Pay As You Throw
P3	Public-Private Partnership
PCL	Peters Creek (Loretta French Park)
PET	Polyethylene terephthalate
PGM	Processed Green Material
POTW	Publicly Owned Treatment Works
PPA	Power purchase agreement
Ppmv	Parts per million by volume

Term or Acronym	Definition
Psig	Pounds per square inch gage
RACM	Regulated Asbestos-Containing Material
RCA	Regulatory Commission of Alaska
RCRA	Resource Conservation and Recovery Act
RCU	Refuse Collections Utility
RDF	Refuse Derived Fuel
RGS	Renewable Gas Standard
RNG	Renewable Natural Gas
RRC	Resource Recovery Center
Scf	Standard cubic foot
Scfm	Standard cubic foot per minute
SEM	Surface Emissions Monitoring
SMM	Sustainable Materials Management Program
SPU	Seattle’s Public Utilities
SWF	Municipal Solid Waste Facility
SW&R	Division of Solid Waste and Recycling
SWIFR	Solid Waste Infrastructure for Recycling
SWRAC	Solid Waste & Recycling Advisory Committee
SWS	Solid Waste Services
SWU	City of Fargo’s Solid Waste Utility
Tarps	Geosynthetic Fabric or Panel Products
TBD	To Be Determined
TOC	Total Organic Carbon
TPD	Tons Per Day

Term or Acronym	Definition
TPH	Tons Per Hour
TR	Transition District
TRP	The Recycling Partnerships
U.S.	United States
WMF	Waste Management Facility
WTE	Waste-to-Energy

1.0 EXECUTIVE SUMMARY

This Addendum is an interim planning document that builds on the 2019 Municipality of Anchorage (MOA) Integrated Solid Waste Master Plan (ISWMP). It provides informational updates on several SWS-owned and/or -managed facilities and operations and refines near-term actions to preserve landfill life, enhance safety and customer service, and increase diversion. The Addendum also identifies priority projects and programs, near-term planning and budgeting needs and bridges the ISWMP recommendations and SWS's next major planning cycle.

Anchorage serves nearly 300,000 residents and generates approximately 300,000 tons of waste per year. The Anchorage Regional Landfill (ARL) is the only Municipal Solid Waste (MSW) landfill within the MOA and has a permitted total capacity of 27.1 million tons. The MOA's Solid Waste Services (SWS) utility provides municipal refuse collection within the former City of Anchorage boundaries (about 20% of the MOA population) while the private sector serves the remainder. Three transfer stations (Girdwood, Central Transfer Station [CTS], and ARL transfer station) consolidate and move roughly 80% of ARL tonnage to the landfill, with CTS transferring the majority.

This Addendum identifies near-term priority projects and recommended program enhancements for the SWS that deliver the greatest near-term risk reduction, capacity preservation and regulatory compliance. These priority projects and programs include:

- Implementing ARL Tipping Building Replacement project to improve customer safety and reduce liability risk.
- Budgeting for and continuing to provide post-closure maintenance and monitoring for closed landfills, particularly for the Merrill Field Landfill, to meet regulatory requirements and provide environmental protection.
- Expanding organics collection and drop-off programs, scaling compost capacity, and strengthening outreach and public sector recycling programs to increase diversion and reduce per capita disposal.
- Improving material/resource recovery operations and facilities to increase diversion.
- Expanding landfill gas (LFG) beneficial uses such as LFG-to-energy improvements that would increase power generation capabilities and considering medium-British thermal unit (BTU) uses such as compressed natural gas (CNG) vehicle fuel or leachate treatment to provide viable contingencies if LFG-to-energy expansion is delayed.
- Improving leachate management with interim landfill capping, mechanical evaporation and advanced leachate treatment to meet increasingly stringent regulatory requirements and reduce increasing costs.

ISWMP medium-term actions (years 5–10) include initiating permitting and environmental review for potential ARL expansion, scaling commercial organics education and construction and demolition (C&D) reuse programs, Organics pilot programs including dehydration and food-to-farm, and advancing feasibility studies and pilot demonstrations of biological and thermal alternative technologies that could reduce landfill disposal depending on the technology and feedstock integration.

Siting and permit activities for landfill expansion are recommended to begin between 20 and 25 years prior to projected ARL capacity exhaustion. Long-term planning (years 11+) includes this and continued efforts to support waste diversion.

Implementation of priorities should be coordinated through SWS. Clear decision milestones tied to funding and permitting (such as final investment decisions for LFG expansion, and initiation of ARL expansion permitting) should be established and monitored. Next steps recommended are to formally adopt the Addendum as an interim planning framework, establish project leads, develop updated cost estimates to present-day dollars, prepare a financing plan, and proceed with conceptual design, complete detailed engineering plans for landfill and material recovery improvements, and scale organics diversion pilots with measurable key performance indicators (KPIs).

Table 0-1 below outlines the current list of projects, the section referenced within this document, along with the anticipated cost.

Table 0-1: Summary of Anticipated Project Costs

Planned Projects	Referenced Section	Projected Total Project Costs
Hazardous Waste Disposal Cell - future project	5.0	TBD
Waste to Energy - future project	6.0	TBD
Merril Gas Collection System SD.25003	7.0	$ 2,275,500
Merrill Leachate System	7.0	$ 2,060,540
Merrill Gas collection	7.0	$ 5,000,000
CTS Cart Storage	8.0	$ 2,000,000
ARL Recycling	8.2	$ 1,500,000
MRF/ Recycle Center SD.22006	8.3	$ 2,038,876
MRF Recycle Center - Roof	8.3	$ 2,200,000
MRF Recycle Center - interior	8.3	$ 1,000,000
ARL Gas Collection System	9.0	$ 16,129,975
ARL Gas Pipeline Upgrade - yr 1	9.0	$ 3,100,000
ARL Gas Pipeline Upgrade - yr 2	9.0	$ 4,400,000
ARL Gas Pipeline Upgrade - yr 3	9.0	$ 500,000
ARL Gas Pipeline Upgrade - yr 4	9.0	$ 660,000
ARL Gas Pipeline Upgrade - yr 5	9.0	$ 1,300,000
ARL Leachate System	10.0	$ 6,132,884
ARL Leachate Water Treatment	10.0	$ 18,000,000
ARL Leachate Avoidance	10.0	$ 3,500,000

2.0 INTRODUCTION

2.1. INTRODUCTION

This Addendum was prepared by Tetra Tech for the Municipality of Anchorage (MOA) Solid Waste Services (SWS) to supplement the existing 2019 ISWMP and is not a complete revision to the ISWMP. By focusing on a few critical SWS activities, SWS can address urgent needs cost-effectively between master plan cycles. Specifically, this Addendum focuses on operational improvements, environmental controls, and closed-site stewardship, and proposes high-level, implementable options with next steps for strategic engineering, permitting, monitoring, and budgeting to align with long-term operational goals (longer landfill life, public health and environmental protection, improved customer service, and overall efficiency).

The 2019 ISWMP provided a 100-year roadmap focusing on extending the service life of ARL, improving customer service, and increasing operational efficiencies. This Addendum will assess existing organics management infrastructure, recycling/diversion programs, and the feasibility of a Materials Recovery Facility (MRF). The Addendum will also review the ongoing Anchorage Regional Landfill (ARL) Tipping Building Replacement Project, the post-closure management of Merrill Field Landfill (MFL) and other closed landfills operated by SWS, and current LFG and leachate management projects and operations at the ARL. The Addendum evaluation will inform SWS as it scopes the next phase of strategic planning and infrastructure development.

2.2. PURPOSE OF THE ADDENDUM

The purpose of this Addendum is to supplement the 2019 ISWMP to reflect current conditions across specific SWS infrastructure and program areas and present high-level recommendations to support near-term decision making going forward. Specific objectives include:

- Assess the status and implications of specific SWS activities at ARL, including ongoing landfill leachate and LFG operations and capital projects as well as the ARL Tipping Building Replacement Project, Waste-to-Energy (WTE), and consideration for a hazardous waste disposal cell at ARL.
- Provide an overview of SWS-managed closed landfills and continuing post-closure care requirements, including Merrill Field Airport, a historic landfill.
- Assess progress made in diverting recyclables and organics, challenges to be addressed and opportunities for enhanced diversion.
- Assess feasibility and operational impacts of repurposing old Central Transfer Station (CTS) for materials recovery and other waste diversion uses.
- Provide an ISWMP Addendum for SWS to further plan for near-term engineering, permitting, monitoring, and capital budgeting effort.

Tetra Tech has prepared this high-level Addendum covering the ARL Tipping Building Replacement Project, MFL and other closed landfills, organics management, recycling programs, CTS and MRF feasibility, and ARL LFG and leachate management updates and high-level recommendations addressing program effectiveness, regulatory compliance, environmental controls, and budgeting priorities with actionable next steps and advisory guidance for SWS to advance targeted engineering studies, permitting, environmental monitoring, and capital planning. This Addendum should also be considered alongside the Municipality of Anchorage Solid Waste Services Strategic Plan (2026–2031), which establishes broader organizational priorities, operational goals, and performance objectives that support implementation of the technical recommendations and initiatives identified herein.

3.0 SUMMARY OF FACILITIES COMPLETED/PROGRAMS IMPLEMENTED SINCE 2019

The SWS ISWMP was published in November 2019. Since its publication, SWS has completed multiple projects and implemented programs to improve operations, ratepayer experience, environmental compliance, and overall efficiency. Notable facility completion and programs implemented since 2019 include the following:

Completed Short-Term Recommendations (1-5 years)

- CTS: the new state-of-the-art facility opened to the public in September 2023
- ARL LFG beneficial use studies and leachate evaporation design: refer to Section 6.0 and 7.4 for current updates on LFG upgrades and leachate evaporation, respectively.

Completed Medium-Term Recommendations (5-10 years)

- Useful life expectancy for the ARL extended to approximately 70 years
- Increased waste diversion through commercial organics education, expanded construction and demolition reuse and recycling, and tire recycling: refer to Section 5.0 for current updates on waste diversion.

Completed Long-term Recommendations (11 years and beyond)

- Began planning and permitting for ARL expansion or alternative technology facility 20 to 25 years before projected capacity is reached.
- Expanded diversion programs by improving residential curbside recycling and increasing bulky item reuse and recycling

Additionally, SWS has made significant strides in the following other activities outside of explicit short, medium, and long-term goals included in the 2019 ISWMP:

- ARL Entrance Building, also known as the Maintenance and Administrative Building, was demolished and replaced with reimbursement through the Federal Emergency Management Agency (FEMA) and the State of Alaska disaster-recovery funds.
- Occupancy timeline: administrative space declared safe in December 2022, shop space declared conditionally safe in March 2023, and full certificate of safety issued in November 2024.
- Leachate lagoon improvements (including a volume increase of 75% of additional pond storage and a relocated truck loading operation for SWS operations) reached substantial completion in early 2026.
- Substantial progress associated with waste-to-energy for the MOA includes siting analysis, Public Relations, Waste Characterization, Waste-Shed Analysis, Air Quality Monitoring, and contract management decisions.

4.0 ARL TIPPING BUILDING REPLACEMENT PROJECT

4.1. DEFINITION AND DESCRIPTION

The ARL, located at 15500 East Eagle River Loop Road, Eagle River, AK 99577, serves the MOA by receiving residential and commercial MSW The site also allows public tipping of self-hauled residential waste at a Tipping Building which was constructed in the late 1980s adjacent to the landfill entrance and requires mostly in-kind replacement with minor infrastructure upgrades to improve customer safety. The current design is out for public bidding now. The project is anticipated to be fully designed, permitted, and constructed by Spring 2027 or earlier. The MOA SWS has an estimated combined design and construction budget of $2,400,000 for replacement of the Tipping Building.

The existing ARL Tipping Building consists of three adjacent, two-story structures joined along a common retaining wall. Each structure contains 50 feet by 13 feet bay on the second (upper) floor. Each bay has an open slot measuring approximately 7 feet by 40 feet; these slots align vertically with the transfer trailer staging area on the ground floor, so trailers positioned below receive material dropped from above. The tipping (upper) floor, where residents deposit waste, sits approximately 15 feet above the transfer (ground) floor. Residents drive their vehicles to the upper level, pull up to a low dividing wall (also known as a pony wall), and manually deposit trash through the slots into the transfer trailers below.

4.2. ROLE IN WASTE MANAGEMENT OPERATIONS

The ARL Tipping Building functions as a public drop-off point and a transfer staging area for municipal waste bound for the landfill working face. Typical daily volumes vary seasonally; the facility regularly processes the equivalent of about three (3) to five (5) transfer trailers (each approximately 120 cubic yards) per day, with higher volumes in spring and summer.

SWS accepts general MSW at this location. Certain waste streams are routed elsewhere on site: household appliances made of metals known as white goods (e.g. dryers, washers, hot water heaters) are collected separately at other ARL locations. Commercial and Demolition debris is charged at a higher rate if not shredded to encourage the market to take their load to a local shredder. If loads enter the landfill shredded, the rate is lower. This new pricing strategy has encouraged more shredded loads resulting in maximizing landfill airspace.

The tipping building operates during ARL's standard hours: Monday-Friday, 7:30 a.m. to 5:00 p.m.; Saturday, 8:00 a.m. to 5:00 p.m.; closed Sundays.

4.3. COMMUNITY USE AND SAFETY CONSIDERATIONS

The Tipping Building is a primary public interface for residents disposing of household MSW. SWS provides onsite staff support to assist residents, enforce tipping procedures, and regulate access. The entrance booth controls public entry to the landfill, household hazardous waste (HHW) area, and tipping building. Typically, between one and two SWS staff are present at the tipping building during operating hours; additional staff are assigned at the ARL entrance booth.

Safety is a high priority. Staff wear high visibility clothing and, seasonally, ice cleats to reduce common hazards such as slips, trips, and falls. Although there have been no substantial public safety incidents in recent decades, the planned ARL Tipping Building replacement will improve the user experience and safety by extending covered pedestrian areas, improving lighting for visibility, and increase the vertical clearance above trailer tipping areas to reduce tripping and tipping hazards.

4.4. INTEGRATION WITH EXISTING FACILITIES

The ARL Tipping Building is integrated with ARL's site operations and waste handling workflow. Second story tipping slots align directly with transfer trailers staged on the ground level, enabling gravity-fed tipping directly into trailers for transport or landfill disposal. The entrance booth coordinates access control and routing between the tipping building, HHW collection, and other site cells (for example, the C&D cell and white goods collection points).

Regulatory approval and oversight for the site is provided through the ARL's Solid Waste Permit No. SW1A00122 issued by the State of Alaska Department of Environmental Conservation (ADEC); the tipping building itself does not have a separate permit.

Tipping fees at the ARL Tipping Building are charged on a per-load basis. Small loads of 1 to 4 cans or bags are assessed at $5 per load, loads up to and including 1 cubic yard are charged at $10 per load, and loads greater than 1 cubic yard are charged at $20 per load. Tipping rates include a $2 Recycling, and a $4 Healthy Spaces surcharge applied to each load. The $2 Recycling surcharge is used to subsidize recycling operations at the Materials Recovery Facility, Girdwood Transfer Station Recycling efforts, Electronics and other public collection events and at the Anchorage Regional Landfill Recycling area, plus curbside SWS operational fees, and disposal fees paid to Smurfit WestRock Recycling that bales and ships the recycling materials to a secondary market on the West Coast. Other waste streams such as white goods are collected in a separate area at the Central Transfer Station and Anchorage Regional Landfill. Used oil can be dropped off for free for up to five gallons per resident per day and is now managed by Republic Services, a third-party contractor managing and operating both Household Hazardous Waste Facilities at the CTS and ARL, and a collection area for lithium batteries at the Girdwood Transfer Station.

5.0 HAZARDOUS WASTE DISPOSAL CELL AT ARL

The feasibility of developing hazardous waste treatment, storage, and/or disposal facilities within the State of Alaska has recently been evaluated by Jacobs Engineering Group, Inc. and the University of Alaska-Anchorage Civil Engineering Department under contract with the University of Alaska, funded by a grant from the U.S. EPA (Jacobs, 2025). ADEC is in the process of obtaining primacy from U.S. EPA for the regulation of hazardous wastes under Resource Conservation and Recovery Act (RCRA) Subtitle C and has adopted hazardous waste regulations under 18 Alaska Administrative Code (AAC) Chapter 63 governing the siting of Hazardous Waste Management facilities.

Based on the Jacobs (2025) evaluation, a generic conceptual facility design was prepared. This design includes a liquids treatment unit, stabilization unit, incineration unit, and 10-acre RCRA Subtitle C landfill unit, supported by appurtenant administrative, laboratory, maintenance, environmental monitoring, stormwater management, and fee collection/load weighing facilities. The conceptual facility layout would not fit directly within available unused areas within the current ARL facility; however, it is possible that the component units of the conceptual facility could be located at separate areas within the ARL facility and that some of the appurtenant supporting facilities could be shared between the current ARL municipal solid waste operation and the proposed hazardous waste treatment, storage, and disposal operation.

The largest of the conceptual proposed hazardous waste management units would be the RCRA Subtitle C landfill, which was conceptually sized at 10 acres (Jacobs, 2025). This unit would be subject to the most stringent of the setback requirements listed in 18 AAC 63.040, Table I. Locations within the current ARL facility boundary that may be adequately sized to include a 10-acre Subtitle C landfill unit may include:

- The northwest corner of the current stockpile area west of the current ARL waste disposal footprint,
- The remainder of the current stockpile area west of the current ARL waste disposal footprint,
- The area south of the current stockpile area west of the current ARL waste disposal footprint and west of the Doyon energy recovery facility, and
- The portion of the current ARL waste disposal footprint designated for Cells 8C and 9B, which have not yet been developed as C&D or MSW disposal cells.

Of these locations, only the northwest corner of the current stockpile area appears to be located outside the 18 AAC 63.040, Table I required setback (500 meters or 1,640 feet) from the Glenn Highway right-of-way/east property boundary of the ARL facility. However, even that location would be within the required setback (also 500 meters) from “Any Property Line”, which is another setback requirement of 18 AAC 63.040, Table I. Therefore, it would appear that a variance approval to waive or modify the setback requirements of 18 AAC 63.040, Table I would need to be obtained and/or additional property acquisition would need to be pursued to provide the required setbacks.

Either of the locations within the current stockpile area would require the stockpiled soils to be used and/or relocated to provide an area for the development of the Subtitle C landfill unit. It is possible that the depletion of the stockpile and the progressive development of the Subtitle C landfill unit could be phased to extend the timeframe over which the stockpile would need to be relocated. Development of a Subtitle C landfill unit west of the Doyon energy recovery facility would need to be coordinated with future expansion planned for the Doyon facility and would be immediately adjacent to both the western ARL property line and the Glenn Highway right-of-way.

Development of a RCRA Subtitle C landfill unit within the current Cell 8C/9B footprint would present logistical/design challenges as well. The current perimeter of Cells 8B and 9A are below the surrounding grade of the ARL waste disposal footprint and were graded with the expectation that Cell 8C and 9B leachate would flow into the existing

ARL MSW (i.e., RCRA Subtitle D) leachate collection system. Since the existing landfill cells at ARL are regulated under RCRA Subtitle D, while the hazardous waste disposal cells would be regulated under RCRA Subtitle C, the leachate systems for the units should not be comingled and neither unit should overlie the other. Therefore, stormwater management facilities (conveyance and storage) would need to be provided in between the current Cells 8B/9A and the new RCRA Subtitle C landfill, further reducing the potential footprint for the RCRA Subtitle C landfill. Stormwater collected between the two landfill units would be at an elevation below the surrounding perimeter grade and would need to be pumped up to the surrounding perimeter grade unless sufficient infiltration area between the landfill units was identified and allocated. Development of a RCRA Subtitle C landfill in the Cell 8C/9B area would also reduce the available MSW disposal capacity of the ARL, both due to the reduced footprint of the MSW waste disposal cells and to potential reduced achievable height of the landfill at closure.

Consideration for hazardous waste disposal at the ARL should include evaluation and cost estimation for permitting the disposal unit, acquisition of additional adjacent property(ies) to accommodate setback requirements, addressing design considerations, and removing/reducing effects on existing permitted waste disposal and appurtenant uses on the ARL site.

6.0 WASTE-TO-ENERGY

6.1. DEFINITION AND DESCRIPTION

The Municipality of Anchorage (MOA) is advancing a Waste-to-Energy (WTE) project as a key component of its evolving solid waste program. This effort builds upon completed preliminary feasibility work and ongoing technical studies, including a waste shed analysis, air quality monitoring, waste characterization program, and a WTE siting evaluation.

The transformative facility is intended to support extension of landfill life, reduce management of LFG and leachate, provide a reliable local energy source, and create opportunities for integration with other municipal systems. The project also reflects a broader generational shift toward lifecycle cost management and system resilience.

6.2. PROGRAM STRUCTURE AND GOVERNANCE

MOA has initiated a structured programmatic approach to advance the WTE project, supported by cross-departmental coordination and alignment with municipal decision-making processes. A governance framework is being implemented through SWS, in coordination with municipal legal, finance, procurement, resilience, and planning functions.

This framework is establishing clear project sponsorship, decision authority, and approval pathways, including anticipated Assembly financial approvals. Concurrently, the program is refining project objectives and success metrics, including extended landfill life, diversion performance, net energy export, emissions compliance, ratepayer impacts, and community benefits.

The delivery strategy for this project is centered on a Construction Manager at Risk (CMAR) model with progressive preconstruction services, allowing early contractor involvement, open-book cost development, and risk reduction. In parallel, MOA is evaluating longer-term commercial structures, including potential Design-Build-Operate-Maintain (DBOM) or hybrid approaches.

6.2.1. Procurement and Implementation Phasing

The WTE project is being advanced through a phased implementation framework with defined decision gates.

- Phase 1 – Initiation has been completed and included development of the project charter, initial feasibility analysis, preliminary cost range, and governance structure.
- Phase 2 – Feasibility and Preconstruction (Ongoing) includes, waste characterization, siting analysis, geotechnical investigations, permitting strategy development, interconnection initiation, and financial modeling refinement.
- Phase 3 – Procurement and Commercial Structuring will advance design to approximately 60 percent, initiate major permitting applications, finalize offtake and waste supply agreements, and develop the Guaranteed Maximum Price (GMP) framework.
- Phase 4 – Final Design will complete Issued for Construction documents and finalize commissioning and QA/QC plans.
- Phase 5 – Construction and Commissioning will include early works, major equipment installation, system integration, and performance testing.
- Phase 6 – Operations and Optimization will focus on long-term operations, environmental compliance, performance monitoring, and system optimization.

6.2.2. Critical Path Considerations

Based on ongoing program development, the primary schedule drivers for the WTE project include:

- air permitting review and approval timelines,
- electrical interconnection studies and agreements,
- procurement of long-lead equipment (boiler, turbine-generator, air pollution control systems, cranes), and
- construction constraints associated with winter conditions.

These elements are being incorporated into the integrated master project schedule and will continue to guide sequencing and risk management.

6.3. TECHNICAL AND SITE DEVELOPMENT EFFORTS

6.3.1. Waste Supply and Characterization

Ongoing efforts, such as an update to existing waste shed and waste characterization studies, are quantifying available MSW throughput, seasonal variability, and incorporating future diversion and recycling policy assumptions. Composition analysis will identify key parameters such as moisture content, heating value, organics, metals, and other fractions that influence combustion performance, emissions control design, and residue handling which will establish bankable inputs for facility sizing, technology selection, permitting, and financial modeling.

6.3.2. Siting and ARL Integration

A WTE siting study, focused on identifying potential facility locations within or adjacent to ARL will be completed near-term. Facility footprint, setbacks, operational compatibility with landfill activities, traffic and haul routing, safety zones, and constructability under Anchorage conditions will be considered.

Concurrent engineering due diligence includes geotechnical and seismic investigations tailored to Alaska-specific design requirements, as well as utility assessments addressing electrical interconnection, water supply, wastewater handling, communications, and stormwater management. These activities are advancing the project toward a Basis of Design.

6.3.3. Technology Validation

Existing pre-feasibility and technology assessment work is being leveraged and updated to reflect current regulatory, financial, and operational conditions. Technology screening is focusing on proven systems capable of handling feedstock variability while maintaining reliable performance in Arctic conditions. Evaluation criteria include operational resilience, staffing requirements, maintenance expectations, residue handling, and demonstrated emissions compliance.

6.4. GRID INTERCONNECTION, POWER OFFTAKE, AND THERMAL USE

6.4.1. Interconnection and Power Strategy

Coordination with Railbelt Utilities has been initiated to define WTE system interconnection, which is anticipated to be a primary schedule driver for project completion. Outcomes of early-stage discussions on substation proximity, system capacity, required upgrades, interconnection queue considerations, and curtailment risks will be critical for design and project integration.

In parallel, power offtake structures, including potential power purchase agreements, municipal load-serving strategies, and hybrid approaches are being evaluated. Preliminary modeling of net electrical output and parasitic loads is being refined to support these discussions.

6.4.2. Thermal Utilization Opportunities

Combined heat and power (CHP) opportunities are being identified to enhance overall system efficiency and revenue potential of WTE. Potential applications under consideration include district energy, industrial heat users, greenhouse operations, snowmelt systems, and integration with leachate or process water systems. Design flexibility to accommodate future thermal offtake will be considered through concept development.

6.5. PERMITTING AND ENVIRONMENTAL COMPLIANCE

6.5.1. Solid Waste Permitting Integration

Understanding of permitting efforts needed to integrate the proposed WTE facility into existing ARL solid waste permitting framework are actively being tabulated. Potential modification or authorization of existing permits, consistent with Alaska solid waste regulations, may require completion of informed design reports and operating plans.

6.5.2. Air Permitting (Critical Path)

Completion of air permitting activities is recognized as a critical path for project implementation. MOA is developing an air permitting roadmap that identifies applicable federal and state requirements, emissions control strategies, modeling needs, and anticipated review timelines.

The emissions control concept under development addresses nitrogen oxides, acid gases, particulate matter, mercury, dioxins/furans, and other regulated constituents, along with continuous emissions monitoring system (CEMS) integration and stack testing requirements.

6.5.3. Water, Wastewater, and Residue Management

Planning is underway to understand project integration with existing ARL processes, including leachate management, process water use, and stormwater controls. Residue management strategies are being developed, including handling and disposition of bottom ash and fly ash, beneficial use evaluation, and required testing protocols.

6.5.4. National Environmental Policy Act Considerations

MOA is screening potential National Environmental Policy Act (NEPA) triggers associated with federal funding or approvals to ensure that any required federal environmental review processes are incorporated into the project schedule and begin early in the overall project process.

6.6. FINANCIAL AND COMMERCIAL CONSIDERATIONS

6.6.1. Planning-Level Financial Framework

The WTE project financial framework has been developed at a planning level based on the completed feasibility analysis and subsequent refinements. Under the current conceptual case, total capital cost is estimated at approximately $750 million, with a $100 million offset associated with avoided publicly owned treatment works (POTW) incinerator reinvestment, resulting in a net financed amount of approximately $650 million.

At 30-year municipal bond financing near 5 percent, annual debt service is estimated at approximately $42 million to $43 million per year. Projected annual gross revenue, including tipping fees, metals recovery, biosolids co-processing, and energy-related revenues, is approximately $50.9 million, with an additional $4 million per year in avoided leachate hauling costs. After estimated operating expenses of approximately $13.5 million, net available for debt service is approximately $41.4 million, corresponding to a debt service coverage ratio (DSCR) of approximately 0.97 to 1.00.

6.6.2. Rate Sensitivity and Funding Strategy

The current planning-level analysis indicates a gap to achieve a target DSCR of 1.25. Under a single-variable approach, this would correspond to a tipping fee increase on the order of $45 to $50 per ton, or approximately $7 to $8 per month per household.

Ongoing financial evaluation is therefore focused on a blended strategy incorporating moderate tipping adjustments, optimization of power offtake terms, potential wastewater enterprise participation, thermal energy monetization, and pursuit of grant funding. Sensitivity analysis indicates that each $50 million in grant funding reduces annual debt service by approximately $3.25 million, significantly reducing ratepayer impacts.

6.6.3. Community Economics Context

The WTE project is being considered in the context of long-term system costs, including avoided landfill expansion, reduced leachate production and hauling, reduced methane non-compliance, and avoidance of anticipated municipal wastewater solids incineration capital. These avoided costs are integral to understanding the project’s long-term value to the Municipality and its ratepayers.

6.6.4. Stakeholder Engagement and Social License

MOA has initiated a stakeholder engagement approach that will continue throughout project development and completion. This includes public outreach, coordination with regulatory agencies, and consultation with potentially affected Tribal and ANCSA entities.

Planned engagement activities include public meetings, open houses, and development of accessible materials describing emissions controls, health considerations, traffic impacts, and community benefits. Consideration is also being given to establishing a community advisory group and maintaining transparent reporting mechanisms as the project advances.

6.7. WTE RECOMMENDATION

The MOA is actively advancing ARL WTE through ongoing feasibility refinement, technical studies, and program development. Based on current progress, the project should continue to be advanced through the structured CMAR-based implementation framework, with focus on:

- completion of waste characterization and siting studies,
- refinement of technology selection and Basis of Design,
- advancement of air permitting and interconnection pathways,
- development of a bankable financial and commercial structure, and
- continued stakeholder and agency engagement.

Advancement to full construction authorization should occur only following confirmation of a viable permitting pathway, acceptable ratepayer impacts, secured or well-defined revenue streams, and an executable GMP aligned with the Municipality's financial objectives.

The project remains strategically justified and represents a critical long-term infrastructure objective for the MOA; however, continued disciplined development is required to confirm financial feasibility and optimize implementation. The MOA has transitioned the WTE project from preliminary feasibility into an active program development phase supported by ongoing technical studies and coordinated planning efforts. The near-term focus of this Master Plan update is to support continued advancement of that program toward a bankable, permit-ready, and financeable project.

Through continued refinement of technical inputs, proactive permitting, structured procurement, and a balanced financial strategy, the WTE project has the potential to become a cornerstone element of Anchorage's long-term solid waste system, supporting landfill life extension, infrastructure resilience, and long-term cost stability.

7.0 MERRILL FIELD LANDFILL/OTHER CLOSED LANDFILLS

7.1. OVERVIEW

Of the closed sites, MFL requires the greatest level of ongoing management due to its proximity to commercial buildings along Merrill Field Drive, some buildings are built directly over the old MSW site. MFL is the only closed site with a passive Gas Collection and Control System (GCCS) with a blower and flare system. Regarding PCL and IAL, both sites have minimal infrastructure and are managed primarily through annual LFG migration monitoring. Indoor air monitoring is conducted only at IAL within on-site occupied buildings. No monitoring occurs at the Girdwood Landfill.

7.1.1. Merrill Field Airport (MRI), a Historic Landfill (MFL)

MFL was in operation from the late 1930s through closure in 1987 (SLR, 2008), overlapping with airport operations which date back to approximately 1930. Following the closure of MFL, portions of airport infrastructure and activities have extended onto the former landfill footprint. The site is an unpermitted legacy landfill with a flare, blower, and GCCS to limit migration of LFG to commercial buildings constructed along Merrill Field Drive. LFG monitoring at MFL includes quarterly probe monitoring and periodic indoor air monitoring in buildings located over or adjacent to the landfill footprint to assist in verifying the effectiveness and ongoing performance of the GCCS.

Indoor air monitoring is conducted to evaluate potential LFG intrusion into on-site buildings and to assess compliance with applicable action levels. Methane concentrations are evaluated relative to 25 percent of the lower explosive limit (LEL), equivalent to 1.25 percent methane by volume in air. During each monitoring event, twelve (12) accessible buildings are evaluated for a total of 120 monitoring locations. The original site, MFL, was closed as a landfill, and over time became MRI, along with progress, brought dynamic compaction to the site, affecting the buried MSW and capping almost the entire MSW pile. LFG migrates through electrical outlets and cracks in the building floors, resulting in LEL exceedances. Where indoor air exceedances were identified, interim mitigation actions were implemented through a Mayoral Emergency Procurement process. Ongoing GCCS improvements are intended to further reduce the potential for future impacts.

The GCCS, installed in 1991, included approximately 33 vertical extraction wells, approximately 3,630 linear feet of horizontal collectors, and approximately 5,440 linear feet of buried HDPE header piping, along with a centralized blower and flare system and control center. The existing flare has a rated capacity of 500 standard cubic feet per minute (scfm) at LFG concentrations of 30 to 50 percent methane by volume and a turndown ratio of 5:1. The blower system consists of two electrically driven LFG blowers with a combined flow capacity of approximately 500 scfm, a design vacuum of approximately 21 inches of water column, and a discharge pressure of approximately 15 inches of water column.

Much of the original wellfield infrastructure has been decommissioned over time, and historic wellfield LFG production and composition data are limited. To improve control of LFG migration and address elevated probe readings, MFL is undergoing GCCS upgrades that will continue into 2026. This includes blower upgrades at the flare station and installation of new header piping and LFG vertical extraction wells. Five new wells were installed in 2025, and a new datalogger and SCADA was installed as part of the upgraded controls to support improved monitoring and system performance.

The SWS operates and maintains a leachate collection system at the MFL site to mitigate potential migration of groundwater contaminants to the Chester Creek system. This system consists of a cutoff wall and interception trench system adjacent to East 15th Avenue south of the MFL, which was originally installed in 1996. A portion of the original 1970's system was replaced and incorporates a drain extending into the southeast portion of the MFL and a drain connected to an abandoned 51-inch storm sewer. (HDR, 1995; SLR, 2007; SLR 2008). Additional measures were undertaken in 2005 and 2006 to improve liquids extraction in the area of this system to reduce leachate heads and mitigate liquid seepage along the southern side of the MFL. These measures included an additional interception trench, pumping from a sump pump from portions of the 1970s system that was abandoned in place and not connected to the system installed in 1996, installation of vertical extraction well (RW-1), and installation of new discharge piping in the abandoned 51-inch sewer pipe (SLR, 2007). Liquids collected from this system are managed as leachate and pumped via a lift station offsite for disposal in the Anchorage Water and Wastewater Utility (AWWU) wastewater treatment system (SCS, 2025).

In 2008, the MFL was evaluated to determine whether rising groundwater levels in the shallow aquifer were being influenced by upward flow from a deeper confined aquifer through an abandoned well. As part of this evaluation, groundwater piezometers were installed to assess subsurface conditions beneath the site. The evaluation concluded that the increased groundwater levels were not caused by upward leakage from the deeper aquifer. Continued periodic monitoring was recommended to better understand shallow groundwater flow patterns and to help define the groundwater divide between the Ship Creek and Chester Creek drainages.

In 2024, SCS installed a pilot dewatering well (DW-01) within the landfill waste mass to remove liquids from the waste mass to reduce liquid levels within MRL's waste that were causing seeps from the slope above East 15th Avenue. It is believed that water accumulates within the waste mass faster than it can drain into the underlying perched aquifer (SWS, 2025). Other recommendations to improve liquid control included developing a snow storage plan to minimize snow melt, adding a flow meter to both dewatering wells, continuing to collect data and observations from DW-01 and completing a Hydrologic Evaluation of Landfill Performance (HELP) model to understand leachate movement across MFL (SCS, 2025).

7.1.2. Other Closed Sites

Limited information is available for the closed PCL and IAL. These sites were both closed by the 1990's and do not include leachate collection systems, GCCS, or any control systems. Monitoring at these sites is limited to annual migration probe monitoring and indoor air monitoring is performed for occupied buildings on-site.

PCL was closed in 1987 and is currently utilized for a horse park and recreation area. PCL has a single LFG monitoring probe (HC-201), which recorded a 0.0 percent methane by volume reading in the latest monitoring event conducted on February 27, 2025 (SCS, 2025). No other readings for HC-201 were provided for consideration. HC-201 is located outside of the perimeter of waste located along the main access road. The latest topography (Shannon & Wilson, 2001) provided for the PCL was dated 1987. It does not appear that any structure monitoring is performed during the routine probe monitoring at the PCL site.

IAL was closed in 1977, has one triple-completion LFG monitoring probe (HC-100 (A, B, and C)), which is reportedly located within the waste mass. In the latest monitoring event for which records were provided, conducted on February 27, 2025, methane concentrations in this probe ranged from 34.1 to 55.6 percent by volume and carbon dioxide concentrations ranged from 27.1 to 44.4 percent by volume. Based on the monitoring report, these values are within the range of historical values for probe HC-100. Structure monitoring at three buildings at IAL were also performed during this event and methane readings did not exceed 25 percent of the LEL for methane (SCS, 2025). The site mapping provided for the IAL site (Shannon and Wilson, 2001) does not include any topography.

7.1.3. Closed Sites Summary

SWS is responsible for post-closure care and monitoring at MFL, PCL, and IAL. Management requirements vary substantially by site. MFL requires the most active management approach due to its proximity to developed areas and includes an active GCCS with blower and flare infrastructure, localized leachate mitigation systems, quarterly LFG probe monitoring, and ongoing system upgrades to improve gas control and monitoring performance. PCL and IAL are managed primarily through annual LFG migration probe monitoring. Indoor air monitoring is conducted only at MFL, where occupied buildings are present. No active GCCS, flares, or leachate collection systems are present at PCL or IAL.

Since no closure funds were designated for these sites, post-closure care activities must be funded out of the SWS's annual operating budget.

8.0 WASTE DIVERSION

Figure 1: SWS Central Transfer Station Receiving Area

Alaska's recycling and waste diversion infrastructure operates under significant structural constraints, including high logistical costs and a lack of available self-sustaining funding. Recycling and composting programs are not self-funded, and the limited availability of markets for recycled materials reduces economic viability for vendors across the state.

SWS is an enterprise utility of the MOA. As such, the enterprise does not benefit from taxpayer funding, it is self-funded. While SWS has two main functions, the Refuse Collection Utility and the Solid Waste Disposal Utility, it also is an active investor in the community through supporting programs such as Citywide Cleanup and other worthwhile programs that support a clean city, and pays a dividend to the MOA general government annually.[1] MOA SWS faces various challenges in continuing to fulfill its mission to provide safe, efficient, and innovative solid waste management for the community of nearly 300,000 people and an area of nearly 2,000 square miles. SWS is at a critical juncture in its ongoing operations and is preparing to transition toward larger-scale, programmatic initiatives. Concurrently, SWS is also experiencing increasing financial pressures resulting from deferred maintenance costs. To support informed planning and decision-marketing, Tetra Tech is providing an update to the 2019 ISWMP to reflect new and relevant information that has emerged over the past five (5) years. These updates are documented and presented in this Addendum to the Waste Diversion section to the existing ISWMP.

To effectively utilize the new SWS CTS and old CTS (now referred to as the SWS MRF) to accomplish associated material recycling and diversion goals, SWS is seeking long-term planning to optimize organics management and waste diversion opportunities. A discussion of the current organics and recycling programs, market conditions, and an evaluation of the CTS are provided throughout this section.

8.1. ORGANICS MANAGEMENT

In 2021, Tetra Tech developed an Organics Management Feasibility Report (December 2021) that provided SWS with a high-level evaluation of potential organics management technologies and candidate site locations. The report was intended to provide information for the consideration of siting organics management facilities and operations within the MOA.

[1] SWS

According to the 2021 Organics Management Feasibility Report and based on Tetra Tech's analysis and current MSW characteristics, approximately 130,000 tons of organics are estimated to be generated annually within the MOA. Using projected diversion and capture rates, the report estimated that a compost facility within the MOA would need to be sized to manage at least 62,000 tons of organic waste per year. The report further concluded that a full-scale composting facility could be developed as a membrane-covered aerated static pile (ASP) composting operation, effectively scaling up the technology demonstrated from a pilot-scale of the membrane-covered ASP.

In the report, two potential locations were identified at the ARL. One potential site is the property adjacent to the existing LFG to energy (LFGTE) facility. A second potential site is the area called North Addition / West Addition within the ARL, located at 15500 E. Eagle River Loop Rd. The report also included an organics collection service area at the SWS MRF as described in more detail in Section 8.1.1.3.

Additionally, based on a key recommended organics diversion initiative in accordance with the existing ISWMP, one of the key recommended organics diversion initiatives was the development of a Food Waste Reduction and Prevention Plan (August 2022) was developed that focused on food waste prevention, food rescue, and food recovery. This plan was an extension of the Organics Management Feasibility Report, which primarily evaluated organics collection and processing options.

Together, these efforts were developed to enable SWS to assess the most effective organics management strategies for managing existing organics feedstock while accounting for future scalability and enhanced organics diversion. The key takeaways from these plans remain relevant and important and are summarized below.

- Food system capacity building is a cross-cutting effort that requires engagement from stakeholders across multiple sectors. Collaboration between government agencies, businesses, nonprofit organizations, and community partners is essential, as no single entity can independently build the capacity of the local food system.
- Integrated organics management for inedible food scraps and wasted food offers significant benefits. An integrated approach includes strategies to increase the organics collection and expand composting and processing infrastructure, supporting higher diversion rates and more resilient long-term organics management.

8.1.1. Current Organics Collection

SWS previously implemented a curbside organics collection pilot program to evaluate the feasibility and performance of residential organics diversion. Following the completion of the pilot located at the SWS MRF, SWS transitioned to an ongoing seasonal curbside collection program in 2018 that operates from May through September (with the SWS MRF continuing to accept drop-offs of food scraps and lawn waste until the end of October), supporting program continuity and institutional commitment to organics diversion.

Since the conclusion of the pilot program, MOA has reported a 30% increase in overall organics collection, indicating sustained participation and growing public acceptance of curbside organics service. This increase reflects improved capture of organic materials and suggests positive behavioral shifts among participating households.

Program performance was further enhanced through operational improvements by opening Materials Recovery Facility (MRF) adjacent to the CTS. The organics transfer location was relocated from the ARL to the CTS. This relocation improved operational efficiency and offered a more favorable experience for organic collection haulers, thus expanding diversion.

Collectively, these early performance indicators demonstrate that the curbside organics program has achieved measurable gains in material diversion, providing a good foundation for future program expansion and scalability.

8.1.1.1. Food Scrap Collection

The Anchorage Community Compost (ANC) program, operated by SWS, offers residents a convenient opportunity to divert household food scraps from the landfill during the summer composting season. The primary community drop-off site is located at the SWS CTS and MRF, where up to two 5-gallon buckets of approved food scraps per visit are accepted for no charge. Community compost drop-off is available May through October, Monday–Saturday, 8:00 a.m.–4:30 p.m.

Community organics disposal is supported at both the CTS and the MRF, offering convenient options for residents to divert food scraps, yard waste, fish and other organics from the landfill during the composting season.

Beyond drop-off services, MOA SWS also operates a curbside organics collection program, in which residential food scraps and yard waste is collected and transported to a farm located in the Matanuska Valley as a soil amendment. This combined approach of community drop-off, curbside collection, and commercial organics diversion supports Anchorage’s broader diversion goals and contributes to reduced greenhouse gas emissions and improved local soil health.

Two additional pilot programs—the Food to Farm (F2F) initiative and the Dehydrator Project—are being launched in 2026. In alignment with SWS’s goals to divert organic materials from the landfill, these programs prioritize food waste diversion following EPA’s hierarchy: feed people, feed animals, compost, create soil amendment, and landfill as a last resort. SWS will collaborate with large food-scrap generators, including breweries, big-box grocery stores, and restaurant or institutional kitchens, to collect clean, high-quality food scraps. These materials will be provided to farmers in the Matanuska Valley who are establishing livestock operations specifically designed to utilize the food waste stream and help close the local food system loop. SWS has also received a grant to research year-round food-scrap collection using dehydration as a method to produce material suitable for animal feed or soil amendment. As part of this effort, SWS is partnering with two local restaurants to evaluate ease of use inside the kitchen and transport to the MRF for dehydration. The project will track pounds of processed material, volume diverted from the landfill, energy consumption, and beneficial end uses. A key advantage of the dehydrator system is that the final product is shelf-stable, providing operational flexibility during winter months when road conditions can limit transportation.

8.1.1.2. Residential Organics Ordinances

The MOA has adopted several regulations pertaining to its organics recycling programs. Applicable regulations pursuant to MOA Chapter 26.70.070 Residential Recycling[2] are as follows:

1. Organic material collection services are charged monthly with a subscription rate of $5.50 for a 32-gallon organics cart and $11.00 for a 96-gallon organics cart.
2. This rate covers a once-weekly collection of organic materials on collection routes designated by the general manager.
    a. SWS shall provide each customer requesting organics service on a designated automated collection route with roll cart organics container(s) of volume equal to the subscription volume elected by the customer. Organics roll carts shall be unique in color or labeling such that they are readily distinguishable from refuse collection and recyclable collection. The customer is responsible for cleaning roll carts.
    b. Each container will be designated by a unique serial number which shall be assigned to the customer's account.
    c. The customer shall place roll carts for organics collection at the curbside or alley within three feet of the drivable roadway or alley with a minimum of three feet of clearance from any pole, mailbox, vehicle, roll cart, snow berm, or other obstruction on any side. Customers shall be responsible for clearing snow or other obstructions, limiting access to the collection containers.
    d. Roll cart containers are SWS property.
    e. Customers vacating premises or otherwise terminating service shall be responsible for arranging return of all roll carts to SWS. Upon request, SWS will pick up carts. A charge of $158.80 per roll cart shall be assessed to the final bill for any non-returned/damaged carts.
    f. SWS shall replace lost, stolen, or damaged roll carts where damage is considered in excess of normal wear and tear. The customer shall be billed $158.80 for each replacement cart.
    g. SWS staff may not enter any building to collect a container.

8.1.1.3. Organics Collection Service Area and Schedule

SWS operates a curbside organics collection program within the MOA service area during the summer season and provides community organics disposal service at the CTS and SWS MRF. SWS collects both yard waste and food scrap materials weekly through its curbside collection program, which operates May 1 through September 30 each year. SWS found that compost carts and the organic materials inside the carts freeze during the winter. This makes it extremely difficult to remove the carts, which creates operational challenges for both residents and the collection crews. Therefore, SWS runs the organics collection service only during the warmer months.

SWS offers a weekly service schedule and service area map to help residents understand how the curbside collection program works and determine whether they are within the service collection area (see Figure 2).

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[2] Chapter 21.07 - DEVELOPMENT AND DESIGN STANDARDS (NEW CODE - Effective January 1, 2014) | Code of Ordinances | Anchorage, AK | Municode Library

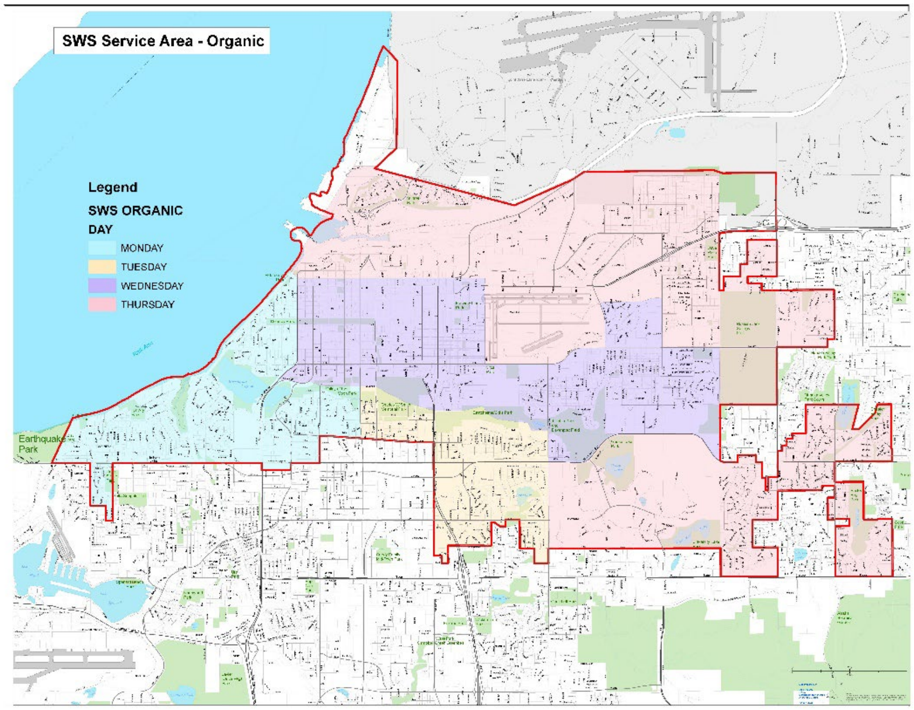

Figure 2: SWS Organics Curbside Collection Service Area and Schedule

8.1.2. Organics Processing

Figure 3: A Farm located in Palmer, Alaska

Hauling food waste to a farm as a soil amendment is approximately 90-miles roundtrip for SWS staff. This long-haul distance introduces additional transportation costs, GHG emissions, and operational vulnerability.

As a result, the processed material is classified as a soil amendment rather than finished compost, as the organic material does not undergo full compost maturation. The material is subsequently land applied to agricultural fields.

8.1.2.1. SP Composting Pilot Program

Since the summer of 2025, SWS has initiated a pilot composting project that utilizes an ASP composting system located within one of the designated bays at the SWS MRF. SWS constructed an O2Compost 4-cubic yard ASP micro-bin (see Figure 4: ASP Composting Pilot) to test feedstock mixes (recipes) using the organics collected through SWS' curbside organics collection program as well as materials collected through the drop-off program at the SWS MRF.

Collections ran from May through October of 2025, with operations expected to resume in spring 2026. Of the approximately 1,000 tons of material received at the SWS MRF and hauled to a farm as the end market for the composted material, the pilot program processed 8 cubic yards. Tetra Tech conducted outreach to volunteer compost staff, who provided a summary of the pilot program's processes and findings via email on February 2, 2026 as outlined below:

Figure 4: ASP Composting Pilot

- Approximately 95% of the material collected during the pilot program consisted of yard waste, primarily grass in the summer and leaves in the fall, with decreasing amounts of grass in the fall; the remaining 5% consisted of food waste, which was collected only during the summer months.
- Organic material used in the pilot project originated from drop-off locations.
- The ASP system adequately composted leaf and yard debris; however, these materials may be more effectively processed in an outdoor turned-windrow system rather than an indoor ASP system.
- The pilot project experienced issues with the pile drying out, which caused the composting process to stall after 1−2 weeks, whereas a 2−3-week hot composting phase was originally targeted.
- Achieving adequate moisture content in the leaf and yard debris recipe proved challenging, particularly when adding dry wood chips to improve porosity and permeability, which is required for ASP performance.
- The compost reached maturity in approximately 3 months, with an observed 40% reduction in volume within the first 3 weeks.
- The ASP pilot program used a pipe on-grade aeration system flooring, commonly referred to as a plenum.
- Plastic contamination was present in very low amounts (<1%) and was removed manually.
- SWS (or a hired subcontractor) could compost leaf and yard debris, food waste, and shredded or chipped material from the wood lot.
- The SWS MRF spans 6 acres and consists primarily of flat outdoor space. Leaf and yard debris could be shredded and composted in outdoor turned windrows at the SWS MRF, while food waste could be mixed with wood chips and composted indoors at the SWS MRF garage using an ASP method.

The pilot project experienced issues with pile drying. Because wood chips absorb moisture, ongoing monitoring of pile moisture content and the addition of water, as needed, will be required. However, wood chips also provide structural integrity to the compost pile, improving aeration. Since wood chips decompose more slowly than food waste, larger wood pieces are likely to remain intact throughout the composting cycle and will need to be screened from the finished compost.

Tetra Tech confirms that wood chips, yard waste, and food waste can be composted. Achieving a mix with the desired overall characteristics typically requires blending multiple feedstocks. Food waste recipes are generally dominated by yard waste and/or wood chips. Moisture content and the carbon-to-nitrogen (C:N) ratio are the primary feedstock characteristics that determine the appropriate blend. Particle size, bulk density, and pH are parameters that also influence the composting process.

8.1.3. Operational Constraints

In 2024, SWS diverted over 654 tons of organics from the ARL. By diverting organics through the various curbside and drop off food scrap collection programs, the MOA has reduced greenhouse gas (GHG) emissions and leachate production at the landfill and returned food scraps to the soil or as animal feed.

Given that the MOA has less than 70 years of remaining landfill capacity, it is important to continue to improve upon and expand the City's organics collection and diversion programs.[3]

Staffing limitations continue to be a primary operational challenge for SWS. Limited personnel resources, constrained service coverage, and reduced collection frequency may hinder the program's ability to capture additional organic material.

Collectively, constraints of staffing limitations, restricted operating days, long-haul transportation of organics, and the absence of a local, fully permitted composting facility producing mature compost present significant barriers to program scalability, increased diversion, and long-term financial sustainability. Addressing these challenges will be critical to expanding organics diversion, improving operational efficiency, and establishing resilient end-markets for compost.

8.1.4. Organics Program Summary Tables

Tables 8-1 and 8-2 below summarize existing curbside organics program operated by SWS and the drop-off organics collection program that services MOA customers.

Table 8-1: MOA Organics Curbside Collection Program Summary

Curbside Organics Collection	
Service Provider & Eligibility	SWS/Municipal SWS only operates in designated service areas. Any SWS customer with roll cart trash and recycling service may participate in curbside organics collection. A private hauler services about 300 curbside customers in designated neighborhoods.
Collection Frequency	Weekly during Spring and Summer (May to September).
Container Types & Rates	32-gal pink cart @ $6.27/month. 64-gal pink cart @$12.56/month.

[3] Solid Waste Services Composting

Curbside Organics Collection	
Collection & Transfer Site	Delivery: ANC Community Compost located at the CTS and SWS MRF, 1208 E. 56th Ave. Processing: A farm located in Palmer 90 miles outside of Anchorage. Note: Material is not composted but instead classified as soil amendment.
Materials Accepted	Kitchen scraps: Fruits, vegetables, coffee grounds, tea bags, and paper filters. Yard waste: Grass, leaves, and garden debris.
Materials Not Accepted	Fish, meat, dairy, poultry, cooked food or bones, animal wastes / manure, compostable containers, dirt, rocks, plastics, or glass, plastic or compostable bags.

Table 8-2: Drop-Off Organics Program at the MRF

Drop-Off Organics	
Service Provider & Eligibility	Residential & workplace self-haul, and commercial haulers at the MRF. Community Compost drop-off at the CTS during the summer months. Additional Composting through Yarducopia, community and Anchor Gardens throughout the MOA.
Collection Frequency	Spring & Summer (May – September); Monday-Saturday from 8:00 AM-4:30 PM.
Container Types & Rates	Drop-off up to two 5-gallon buckets of food scraps for free at ANC Community compost, $20 flat rate for residential drop off and ½ price tipping fee for commercial haulers.
Collection & Transfer Site	ANC Community Compost located at CTS & SWS MRF at 1208 E. 56th Ave. Processing at A farm in Palmer, 90 miles outside of Anchorage. Note: Material is not composted but instead classified as soil amendment.
Materials Accepted	Kitchen scraps: Fruits, fish carcasses, vegetables, coffee grounds, tea bags, and paper filters.

8.2. RECYCLING PROGRAMS

8.2.1. Summary of Existing Recycling Programs

According to SWS, Anchorage disposes of approximately 1,200 tons of waste daily, equating to about 8 pounds[4] per person per day, and of this, less than 20% is recycled. Increasing recycling outreach and education efforts should improve proper recycling and allow for more targeted public service messaging. Outside of education, other options to increase recycling diversion and keep materials out of the ARL include:

- Considering surcharges or other restrictions at the point of disposal.
- Increasing opportunities for multifamily units such as by improving accessibility to containers by placing bins alongside trash in common areas, and using clear, visual and multi-family signage to help reduce contamination.
- Incentivizing recycling for businesses.

Recycling in Anchorage is managed through a combination of municipal programs (SWS serviced), private drop-off centers, and specialized recyclers. For those with SWS collection, curbside recycling is provided bi-weekly to over 9,500 customers, and mixed paper and cardboard are collected from more than 50 municipal offices. All recyclables are transported to the Smurfit WestRock Recycling Center.[5] As of 2025, residential curbside recycling provided by SWS is free for those with trash service but is limited to specific materials. The MOA's current recycling programs aimed at diverting materials from the waste stream are further described in this section.

Current recycling programs within the MOA include both curbside and drop-off collection of common recyclable materials, such as paper, cardboard, plastics, metals, and glass. In addition to residential collection services, commercial and institutional recycling efforts are supported by local ordinances and outreach initiatives, which are identified and discussed in this section. A high-level overview of key program components presented include:

- Curbside Collection Services: Tetra Tech has evaluated the current coverage and method of existing recyclables collection from residential single and multi-family households and commercial establishments within the MOA, with a detailed focus on areas serviced by SWS crews. This includes material types, collection logistics, and end-market destinations. Currently, some recyclables are shipped to West Coast processing facilities with logistical support from Alaskans for Litter Prevention and Recycling (ALPAR), who coordinates the use of donated shipping containers from Alaskan carriers. As noted in the 2019 ISWMP, and still relevant in 2026, the existing system lacks capacity to accommodate growth from expanded recycling programs. Key recommendations include, but are not limited to:
    - SWS may consider increasing residential drop-off capacity and convenience by extending hours to reduce pressure on the curbside collection service.
    - Expand public education on acceptable versus unacceptable materials to reduce levels of contamination.
    - Seek grants from both state, federal sources, and from large industry nonprofit organizations for upgrading material recovery equipment and expanding sorting lines.

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[4] Municipality of Anchorage Solid Waste Services

[5] SWS

  - The Alaska Department of Environmental Conservation (DEC) provides a comprehensive list of solid waste and recycling funding resources.6
  - U.S. EPA Solid Waste Infrastructure for Recycling (SWIFR) Grants were available through January 2026 and should be monitored for the next potential round of funding.7
  - The Recycling Partnership (TRP) offers funding for infrastructure and processing upgrades at MRFs.8 This is one of the most practical grant sources for local governments like Anchorage.
  - The Closed Loop Partners provides recycling-related funding.9 This organization offers below-market loans and funding to municipalities to improve recycling infrastructure, including MRF upgrades. These grants are typically one year in length and are generally smaller for first time grant recipients.
  - 11th Hour Racing also provides funding for projects to improve recycling, reduce waste and plastic pollution.10
- Drop-off Centers: Residents and commercial establishments within the MOA can self-haul recyclable materials to one of the following three major recycling drop-off locations throughout Anchorage:
  - Smurfit WestRock Anchorage Recycling Center.
  - Anchorage Regional Landfill Recycling Center.
  - Central Transfer Station (CTS).
  - Girdwood Transfer Station (GTS).

A summary of the four (4) facilities is described with additional detail provided in Section 8.2.3 as it relates to their recycling operations. In addition, Tetra Tech evaluated the MOA's current drop-off collection and processing infrastructure with a focus on material components and end markets in subsequent sections. Tetra Tech has also provided recommendations on designated locations for residents to deposit recyclables not accepted at curbside—whether from existing infrastructure or new infrastructure capabilities, as noted in Section 8.2.3.

8.2.2. Curbside Collection Program

8.2.2.1. System Overview

Within the MOA, SWS and private waste haulers Alaska Waste and Northern Waste collect commingled recyclables from roll carts or commerical dumpsters. These materials are utlimately brought to the Smurfit WestRock Anchorage Recycling Center or to the MRF adjacent to the CTS for processing and shipping to end markets. Figure 5, below, shows the geographic areas within the MOA serviced by both SWS crews and Alaska Waste.

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[6] Funding Resource Guide | AK Dept. of Environmental Conservation

[7] Solid Waste Infrastructure for Recycling Grant Program | US EPA

[8] Recycling Grants | Available Grants for Recycling Programs + Processors

[9] Apply for Funding - Closed Loop Fund - Closed Loop Partners

[10] Grant Giving - 11th Hour Racing

8.2.2.2. Recycling Ordinances

Figure 5: Recycling Service Area Map

The MOA has several regulations that apply to both residential and commercial recycling programs. These requirements are outlined in MOA Chapters 26.70[11] and 26.90[12] under *Solid Waste Collection* and are described below.

26.70.070 – Residential Recycling.

A. Terms of Service:

1. SWS shall provide one roll cart container for the collection of recyclable materials free of charge when used in combination with residential refuse service. The roll carts shall be unique in color or labeling such that refuse collection and recyclable collection are readily distinguishable. The customer is responsible for cleaning roll carts.

[11] Chapter 26.70 - SOLID WASTE COLLECTION | Code of Ordinances | Anchorage, AK | Municode Library

[12] 26.70.090 - Commercial recycling. | Code of Ordinances | Anchorage, AK | Municode Library

2. Each container will be designated by a unique serial number which shall be assigned to the customer's account. Upon initiation of service, one set of containers shall be delivered at no charge to the customer.
3. Customers will be provided with a list of accepted recyclables. SWS may inspect the contents of any recycling collection container. Containers found to contain contaminants shall be tagged, notifying the customer that unacceptable materials were found. Contents of the container shall be collected as refuse, and the customer shall be billed $30.00 each time a container is found to contain contaminants.
4. Recyclables will only be collected from roll carts provided by SWS. Any waste material not contained within the designated roll cart with the lid tightly closed shall be considered excess refuse and subject to excess charges.
5. The customer shall place roll carts for recyclables collection at the curbside or alley within three feet of the drivable roadway or alley with a minimum of three feet of clearance from any pole, mailbox, vehicle, roll cart, snow berm, or other obstruction on any side. Customers shall be responsible for clearing snow or other obstructions limiting access to the collection containers.
6. Roll cart containers shall remain SWS property.
7. Customers vacating premises or otherwise terminating service shall be responsible to arrange for the return of all roll carts to SWS. Upon request, SWS will pick up carts.
8. SWS shall replace lost, stolen, or damaged roll carts where damage is considered in excess of normal wear and tear. The customer shall be billed $158.80 for each replacement cart.

26.70.90 - Commercial Recycling

A. The following rates apply to the collection of commercial recyclables from containers having a capacity of 96 gallons that can be emptied mechanically from a refuse collection vehicle.
    1. Ninety-six-gallon roll cart service refers to automated curbside collection of recyclables.

B. Terms of service:
    1. 96-Gal roll carts billed at $17.00 every other week; $33.90 once per week, and $67.70 twice per week

C. Additional service and rules pertaining to commercial recycling.
    2. A fee of $30.00 may be applied to a customer whose commercial recycling containers contain more than 10% of contaminants. The fee will be applied at the discretion of the collection driver.
    3. A customer may schedule a recycle pick up at times other than the scheduled collection times at a rate pursuant to subsection C.3. below.
    4. The charge for special pickup service with a one-person crew shall be $121.61 straight time and $135.46 overtime for each one-half hour of vehicle time required for the pickup, plus recycling charges based on the estimated volume of refuse picked up. The charge for special pickup service with a two-person crew shall be $137.59 straight time and $160.69 overtime for each one-half hour required for the pickup, plus recycling charges based on the estimated volume of refuse picked up.

5. Commercial recycling materials left outside of a roll cart will be treated as refuse material and charged at refuse rates.

8.2.3. Drop-off Recyclables Program

8.2.3.1. Overview

Residents and commerical establishments within the MOA can self-haul recyclable materials to one of three major recycling drop-off locations throughout Anchorage. A brief summary of the three facilites are described below with additional detail provided in Section 3.4 as it relates to the MRF component.

8.2.3.2. Smurfit WestRock Anchorage Recycling Center

The Smurfit WestRock Anchorage Recycling Center, owned by Smurfit WestRock following the merger of WestRock and Smurfit Kapa in July 2024, is located at 6161 Rosewood Street. The facility is open 24 hours a day, 7 days per week for material drop-off. Items accepted at the Smurfit WestRock drop-off facility include:

- Aluminum cans
- Aluminum foil (clean)
- Cardboard
- Glass bottles and jars
- Mixed paper
- Newspaper
- Plastic bottles and jugs (#1 and #2)
- Steel/tins cans
- Christmas lights

Collected recyclables get sorted and baled and shipped to the lower 48 states (like Tacoma, WA) for final processing. Other recovered resources, such as glass, cardboard, mixed paper, and plastic, are utilized locally as further detailed below.

8.2.3.3. Anchorage Regional Landfill Recycling Center

The ARL Recycling Center (operated by SWS), located at 15500 Eagle River Loop Road, also accepts recyclable materials and is open Monday through Saturday from 8:00am to 5:00pm. Items accepted at the ARL Recycling Center include:

- Aluminum cans
- Cardboard
- Glass bottles and jars
- Mixed paper
- Newspaper
- Plastic bottles and jugs (#1 and #2)
- Steel/tins cans

In addition to the common drop-off recyclables noted above, the ARL Recycling Center accepts special items. These include:

- Appliances/white goods (fees apply)
- Auto batteries (1st free with fees for 2 or more)
- Recyclables, such as cardboard, aluminum cans, plastic bottles and jugs, are exported to the lower 48 states.

8.2.3.4. Central Transfer Station

The CTS located at 1310 E. 56th Avenue (residential entrance) also provides dedicated self-haul drop-off carts for recyclables. Items accepted at the CTS include:

- Aluminum cans
- Cardboard
- Mixed paper
- Newspaper
- Plastic bottles and jugs (#1 and #2)

In addition to the common drop-off recyclables noted above, the CTS accepts special items. These include:

- Appliances/white goods, and other metals (fees apply)
- Auto batteries (1st free with fees for 2 or more)
- Used motor oil
- Food scraps (May through October only)

Recyclables, such as cardboard, aluminum cans, plastic bottles and jugs, are exported to the lower 48 states.

8.2.3.5. Girdwood Transfer Station

The Girdwood Transfer Station as of April 2026 now accepts clean aluminum cans for free as a drop off service to residents only. Commercial customers can contact a private hauler for servicing.

7.2.3.6 Materials Recovery Facility

The Materials Recovery Facility accepts:

- Organics for use to feed animals (F2F) program, as a soil amendment in farms located in the Mat- Su valley
- Plastics such as all #1 and #2 as well as #5 plastics for use in manufacturing a plastic wood or other beneficial materials
- Wildfire mitigation wood, residents are encouraged to create a defensible space for wildfire mitigation efforts. In 2024 there was a flat $20 fee for residents, in 2025 it was free for residents due to the increased concern for wildfire within the MOA resulting in about $65,000 community investment by SWS, and in 2026 the charge for disposal is now back in place.

8.2.4. Recycling Program Summary Tables

Tables 8-3 and 8-4 below summarize characteristics of the existing curbside recycling program operated by SWS and the drop-off recycling program that services MOA customers.

Table 8-3: MOA Curbside Collection Program Summary

Curbside Recycling Collection	
Service Provider & Eligibility	SWS and Commercial Haulers SWS only operates in designated service areas. Any SWS customer with roll cart trash may participate in free curbside recycling collection. Commercial haulers service customers outside the SWS-designated service areas.
Collection Frequency	Residential: Every other week (EOW) for single-family. Commercial: EOW, 1 x week, or 2 x week for businesses and multi-family.
Container Types & Rates	Residential: 64 or 96-gal carts. Price included in trash collection. Commercial: 96-gal cart. $19.35 EOW; $38.59 1 x week; $77.07 2 x week.[13]
Collection & Transfer Site	Delivery: Smurfit WestRock Anchorage Recycling Center located at 6161 Rosewood St. SWS pays a market rate tipping fee to Smurfit WestRock
Materials Accepted	Aluminum cans and steel cans Cardboard Magazines and catalogs, mixed paper, and newspaper Office paper, plastics #1 and #2 (bottles and jugs only) Telephone directories
Materials Not Accepted	Aluminum foil E-Waste Glass bottles and jars, juice, or milk cartons Plastic bags Plastic #3-7 such as film, clamshell or take out containers, yogurt cups, pill bottles, etc. Waxed cardboard such as fish boxes or milk cartons

[13] As of 2025. 2025 Collection, Disposal, HHW RATES1

Table 8-4: MOA Drop-Off Collection Program Summary

Drop-Off Recycling Collection	
Service Provider & Eligibility	Self-Haul for all Anchorage residents and businesses.
Facility Locations	Delivery: Smurfit WestRock Anchorage Recycling Center located at 6161 Rosewood St. Delivery: ARL located at 15500 Eagle River Loop Rd. Delivery: CTS located at 1208 E. 56th Ave. Processing: Materials are baled and brought to Port of Anchorage for delivery to Washington and other states.
Hours of Operation	Smurfit WestRock Anchorage Recycling Center: 24 hours/7 days. ARL: Mon – Sat 8:00 am – 5:00 pm. CTS: Mon – Sat 8:00 am – 4:30 pm.
Materials Accepted (Varies by Location)	Aluminum and tin/steel cans Aluminum foil Auto batteries (fee charged) Cardboard Glass bottles and jars Mixed paper and newspaper Plastic #1 and #2 (bottles and jugs) White Goods (fee charged)

8.3. MATERIAL RECOVERY FACILITIES

There are two MRFs located in Anchorage: (1) the Smurfit WestRock Anchorage Recycling Center and (2) the SWS MRF overseen by SWS.

The Smurfit WestRock MRF is located at 6161 Rosewood Street. Higher-value recyclables, such as metals and plastics, delivered are baled and transported to the Port of Anchorage for shipment to the west coast. Glass bottles and jars collected at the Smurfit WestRock Anchorage Recycling Center are hauled to Central Recycling Services, where the glass is crushed into a recycled glass aggregate for use in local construction projects.

The SWS MRF is located off of East 56th Avenue, across from the CTS (See Figure 6). The SWS MRF accepts organics, both landscaping materials and pilot food scraps for the Food to Farm (F2F) and food dehydration pilot projects, and plastics for making recycled plastic lumber or other beneficial plastic projects and the wood lot for wildfire mitigation.

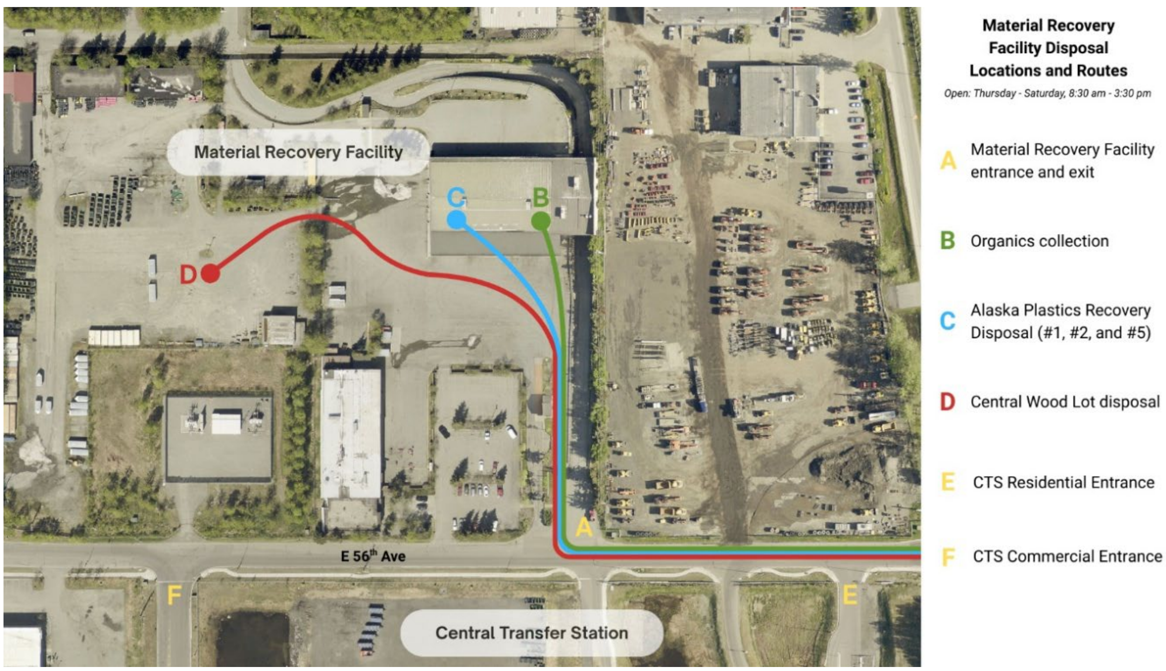

Figure 6: SWS Facilities Location

8.3.1. Current Market Conditions

Tetra Tech conducted a high-level review of current market conditions and regulatory considerations affecting recyclable materials, as described in the subsections that follow.

8.3.2. Overview of Current Recycling Markets, Gaps and Barriers

The MOA, and the state of Alaska in general, face major recycling hurdles due to its geographic remoteness. This remoteness increases transportation costs both within the state itself (due to its small population density and lack of road infrastructure) as well as to the sale of recyclables to markets outside of Alaska (mainly the lower 48 states).

The small population density, relative to the size of the state, creates insufficient material volumes. This coupled with harsh weather conditions, challenges with both municipal and state funding sources, an aging infrastructure, and contamination of the recyclable stream, results in economic inefficiencies when implementing and operating traditional recycling models. However, with these challenges come the opportunity for innovative solutions. Some of the key market challenges and solutions are identified below.

8.3.2.1. Key Challenges

- Lack of Scale: Small populations and waste volumes in Anchorage and other areas across the state may not meet the critical mass needed for efficient, large-scale processing facilities, making local processing uneconomical for municipalities.
- Volatile Global Markets: The value of recyclables has decreased in recent years due to changes in international policies, such as China's "National Sword" policy. This has caused declines in the market value of certain materials (like some plastics and mixed paper), sometimes forcing them to be disposed of in landfills.
- Lack of Local End Markets: The absence of local manufacturing means there is little demand for recycled products within Alaska itself. The economic viability, therefore, relies on external market prices, which can be volatile.
- Contamination: Food residue, plastic bags, and other non-recyclables can have a detrimental impact if they enter the clean recycling stream as the loads may be rejected by MRFs. Plastic bags especially can get tangled in the gears, belts, and discs, causing jams, equipment shutdowns, costly damage, and dangerous working conditions for employees who must manually cut them out. Contamination also reduces material quality and increases costs, a common problem across Anchorage and the entire state.
- Island Effect: Alaska’s geographic isolation from the contiguous United States creates significant challenges for recycling and material recovery. Unlike states in the Lower 48, which can move recyclables efficiently across state lines by road or rail, Alaska has no such overland transportation options. Barge transport is the most cost-effective method for exporting recyclable materials, while air transport is technically feasible but prohibitively expensive. As a result, the logistics of recycling in Alaska are uniquely complex and costly compared to other states.
- Market Volatility and High Costs: Unstable resale values for commodities like cardboard and plastics make programs financially perilous. This coupled with expensive collection, processing (due to small scale), and transportation costs can create significant economic barriers, therefore, making it more difficult to compete with cheaper landfill disposal options.

8.3.2.2. Opportunities

- Education: Improving resident knowledge to reduce contamination (e.g., rinse and clean recyclables, no plastic bags in the recycling carts, no glass in the curbside collection program, etc.) is crucial to promote and market higher-quality materials.
- Developing Local Solutions: A significant gap exists in local processing. Recent improvements to processing involve Alaska Plastic Recovery, who use collected plastics to create durable products like plastic lumber for local use (decks, picnic benches). In addition, glass bottles and jars are hauled from the Smurfit WestRock Anchorage Recycling Center to Central Recycling Services, where the glass is crushed into a recycled glass aggregate used in local construction projects.
- Providing Economic Incentives: There are tremendous recycling opportunities in the Railbelt due to ALPAR’s shipping and railroad partners. Their contributions help deliver recyclable materials to outside

markets, which improves the economic feasibility of recycling for communities, residents, and businesses.[14] However, the reliance on volunteer shipping services highlights a gap where stable, market-driven economic incentives could provide a resilient and economically viable system.

8.3.2.3. Recycling Rates and Pricing Trends for Commodities

The Recycling Partnership's (TRP) 2024 State of Recycling report provides statewide residential recycling rates by commodity for common recyclable materials, such as cardboard, mixed paper, glass containers, aluminum cans, and plastic containers made of polyethylene terephthalate (PET) and high-density polyethylene (HDPE) (#1 and #2 plastics).[15] The TRP report focuses on packaging materials in the residential waste and recycling stream as most packaging materials are found in the home, and the residential sector of the waste stream is severely under-resourced. The exception to this statement is cardboard, as the majority of cardboard is currently found in the commercial sector rather than the residential sector. However, cardboard packaging continues to grow in the residential waste stream due to e-commerce. According to TRP, statewide recycling rates for recyclable packaging materials commonly found in Alaskan households are as follows:

- Cardboard: 29%
- HDPE Natural Bottles: 23%
- Mixed Paper: 21%
- Aluminum Cans: 20%
- HDPE Colored Bottles: 20%
- PET Bottles: 18%
- Glass Containers: 2%

Although these are statewide rates, they are assumed similar to be to the recycling rates within the MOA as Anchorage is the largest generator of recyclables in Alaska. The pricing for recycling commodities is constantly changing based on fluctuating market conditions for each material type. Listed below is approximate pricing data (in order of value) for the Pacific Northwest from the first half of 2025 that provides insight into recent market conditions for the same packaging materials commonly found in households that are listed above.[16]

- Aluminum Cans: $1,600 / ton
- HDPE Natural Bottles: $1,300 / ton
- PET Bottles: $200 / ton
- HDPE Colored Bottles: $150 / ton
- Cardboard: $55 / ton
- Mixed Paper: $30 / ton
- Glass Containers: negative $35 / ton

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[14] Tips for Being a Better Recycler | ALPAR

[15] The Recycling Partnership's State of Recycling: Present and Future of Residential Recycling in the U.S (2024).

[16] The Kitsap County Solid Waste Advisory Committee Meeting conducted on October 1, 2025 included a final review of the Appendix Chapter of the Solid Waste and Hazardouw Waste Plan. This draft document is no longer available on the Kitsap County website; however, Tetra Tech has a PDF copy available upon request.

In the Pacific Northwest, aluminum cans have consistently had high market value, and the commodity pricing has remained over $1,000 per ton since early 2021. Over the last five (5) years the market prices for PET and HDPE have fluctuated over time, with the pricing for PET remaining between $100 and $475 per ton, natural HDPE ranging from $400 to $1,900 per ton and colored HDPE ranging from $150 to $900 per ton. Corrugated cardboard and mixed paper have also shown comparable pricing fluctuation patterns over the last five (5) years, with corrugated cardboard pricing ranging from a low of approximately $10 per ton to a high of approximately $140 per ton and mixed paper ranging from a low of negative $5 per ton to a high of approximately $90 per ton.[17]

Since at least 2016, pricing for most recyclables has had a negative market value with supply exceeding demand, meaning it costs SWS money. SWS applies a $2 surcharge on residential loads, which subsidizes the recycling program. The MOA prioritizes recycling as the best option for preserving the life of the landfill and maximizing the best use of a resource.

8.3.2.4. Transportation Logistics and End-Market Destinations

Anchorage's transport system depends on using empty barges (returning from delivering goods to Alaska) to haul recyclables to the lower 48 states, a system that is efficient but still costly. As noted previously, Anchorage has strong recycling opportunities in the Railbelt due to ALPAR's donors, which include Matson, TOTE Maritime, AML/Lynden, and the Alaska Railroad. Their contributions to Anchorage's recycling program help move commodities to markets outside the state. The key challenges and potential solutions facing the MOA as it relates to transportation and end market destinations are shown below:

Key Challenges

- Logistical and Geographic Isolation: Even with ALPAR's donors, Alaska's vast geographic area requires most recyclables of value (paper, plastic, metal) to be shipped by expensive barge or other means of transportation to markets in Washington or Oregon, often costing more than the materials are worth, even with agreements in place.
- Infrastructure and Funding: Limited local budgets, aging facilities, and a lack of investment in modern recycling infrastructures can hinder effective recycling collection and processing programs.
- High Costs: Expensive collection, processing (due to small scale), and transportation create significant economic barriers, making it hard to compete with cheaper landfill disposal.

Opportunities

- Backhauling: Continue to promote and utilize existing barge routes (like river systems) and other transportation partnerships with ALPAR's donors to bring recyclables out during regular supply runs, which can significantly cut costs.
- EPA SWIFR Grants: Consider applying for funding opportunities from the United States Environmental Protection Agency (EPA) Solid Waste Infrastructure for Recycling (SWIFR) grant program. The EPA SWIFR grants are designed to help state, tribal, and local governments improve their waste management and recycling systems by building infrastructure, reducing contamination, and advancing a circular economy for materials. These grants support activities like upgrading recycling facilities, developing organics collection, improving material management, and creating end markets for recycled goods.

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[17] IBID

8.3.2.5. State and Regional Policies Affecting Recyclable Material Handling and Sales

According to TRP, approximately 51%[18] of Alaska residents participate in a recycling collection program statewide. TRP defines participation as a household placing a recycling container out at the curb, delivering recyclables to a drop-off site, or using an on-property recycling container at least once per month. Alaska's participation rate is lower than the national average of 59%.[19] Current recycling policies across the state emphasize improved data collection and reporting, investment in recycling and diversion infrastructure through grant programs (including EPA funding sources such as SWIFR) and expanded residential and commercial education initiatives.

There are currently no local ordinances or state laws in Alaska that mandate recycling, which contributes to an ongoing need for improved public education on what materials are recyclable and how to recycle correctly. In absence of a state-wide recycling mandate, municipalities and state agencies, such as the ADEC[20], collaborate to implement a range of regional and voluntary recycling policies.

These collaborative efforts focus on enhancing data collection and reporting, expanding public education and outreach programs for both residential and commercial sectors, and strengthening partnerships with non-profit organizations such as ALPAR. Such partnerships help to address Alaska's unique logistical and geographic challenges, including the state's vast size, long distances to recycling and processing facilities, and reliance on barge transportation to move recycling commodities to processing markets in the lower 48 states.

8.3.3. Old Central Transfer Station (CTS) Evaluation

Following the recent relocation of solid waste transfer, HHW management, fleet maintenance, and administrative functions to the new CTS on the south side of East 56th Street, SWS seeks to further improve service quality by consolidating residential and commercial recycling operations at the old CTS property at 1111 East 56th Street.

8.3.3.1. MRF Feasibility Study

In November 2019, Tetra Tech conducted a MRF Feasibility Study to assess the practicality of establishing a MRF using the old CTS property (now referred to as the SWS MRF) located across the street from the new CTS. The purpose of this document was to:

- Characterize the current recycling situation in the MOA and develop future recycling collection and processing scenarios
- Provide context to outline the trade-offs of potential collection program changes, including source separated glass collection and curbside collection expansion
- Determine prospective site footprint for the MRF, facility layout, equipment requirements, estimated capital and operating costs, and operational flexibility for future recycling scenarios and community growth
- Assess potential revenues from sale of commodities and other socio-environmental benefits
- Develop a framework for evaluating the feasibility of constructing and operating an enhanced MRF in the MOA

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[18] The Recycling Partnership's State of Recycling: Present and Future of Residential Recycling in the U.S (2024).

[19] IBID

[20] DEC Home | AK Dept. of Environmental Conservation

8.3.3.2. Resource Recovery Center

In 2021, SWS shifted priorities and Tetra Tech conducted an evaluation of the old CTS and developed a technical memorandum (2021) for a proposed Resource Recovery Center (RRC). As noted in the memorandum, SWS reserved capital funding to complete site improvements in advance of converting the old CTS property to a RRC. These improvements included removing outdated or unused structures, refurbishing or modifying aging infrastructure, and developing a source-separated organics receiving and transfer facility. Figure 7 shows the proposed RRC.

The proposed RRC, located across the street from the new CTS, would add significant convenience for MOA residents and commercial establishments. It would enhance the functionality of organics and recycling drop-off programs and create additional opportunities for increased recycling and landfill diversion. The plan also includes refurbishment of the existing administration building to allow for separate occupancy. Figure 7 shows the conceptual site plan for the Anchorage RRC. The plan designates areas for residential recycling drop-off; residential organics drop-off and transfer at the old CTS; a dedicated building for commercial drop-off, warehousing, and baling of single stream “resmix” and fiber; and a separate approximate 12,400 square foot building for metals and source-separated plastics warehousing and baling. The site plan also shows traffic flow for the overall site. The proposed RRC was envisioned to improve and complement—or replace—the Smurfit Westrock operations and was developed independently from the design concepts evaluated in the MRF Feasibility Study.

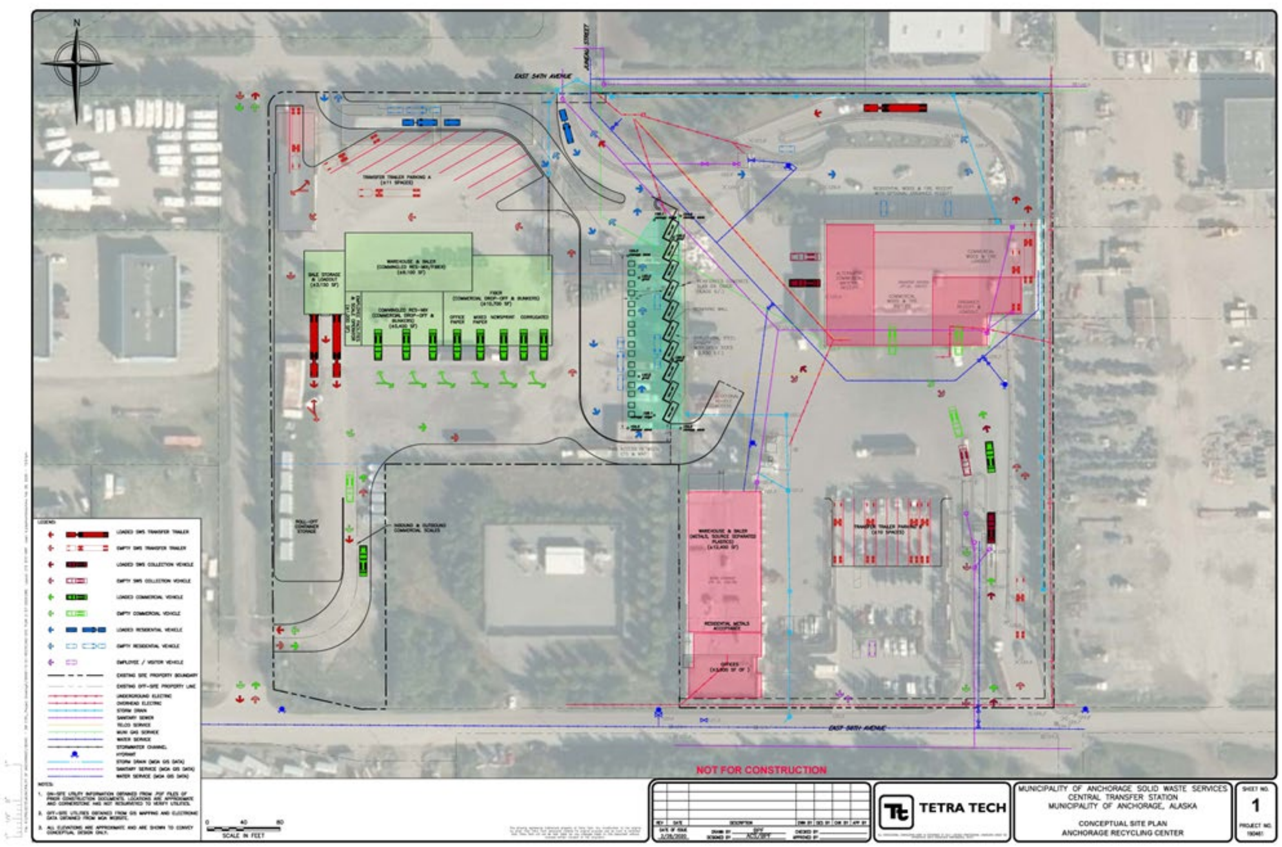

Figure 7: Proposed Anchorage Resource Recovery Center Conceptual Site Plan

8.3.3.3. Organics Receiving at the Proposed Resource Recycling Center

Tetra Tech conducted an initial review to incorporate receipt and management of residential and potentially commercial organics at the old CTS (as indicated now referred to as the SWS MRF). Figure 8 shows the initial draft site layout for recycling and organics collection. The areas outlined in red are designated for SWS organics receiving and collection activities.

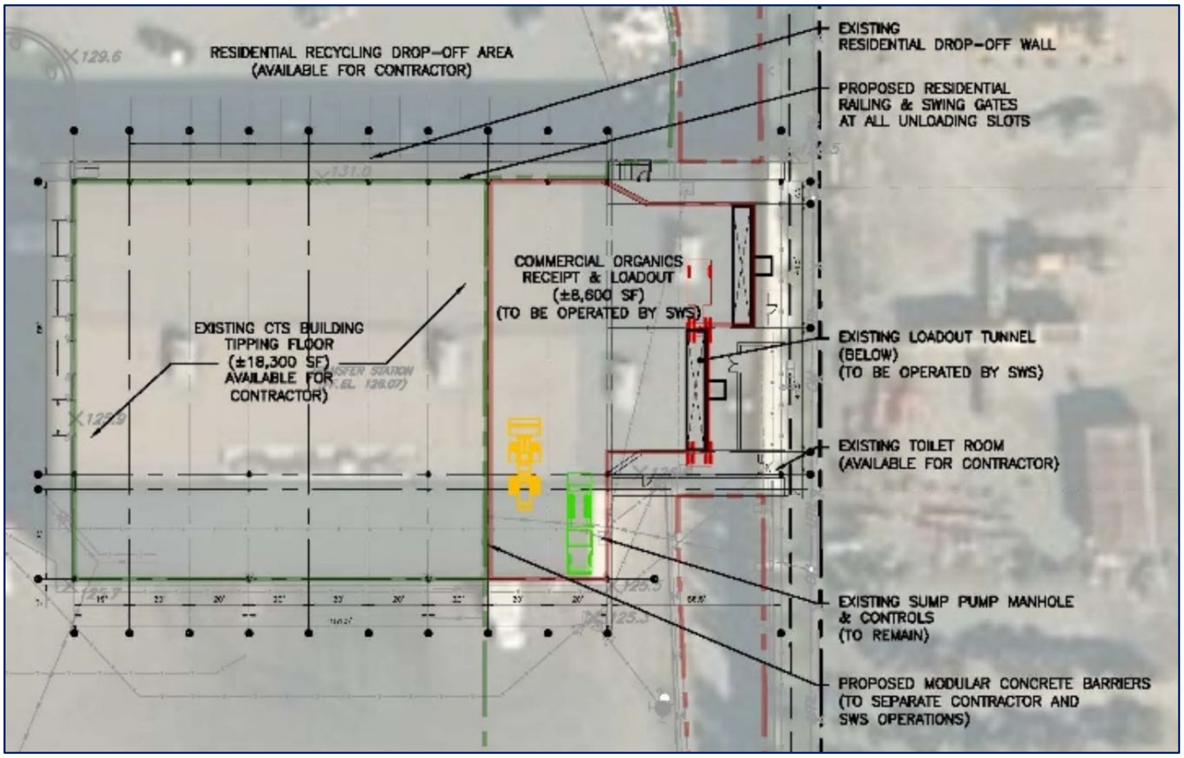

Figure 7: Organics Collection at the Resource Recycling Center (old CTS)

8.3.3.4. Current Property Utilization

The existing administrative building, originally conceptually modeled for residential metals and plastics management, is currently being used as a shelter for individuals experiencing homelessness in Anchorage. This function may transition ownership of the building from SWS.

The old CTS, now referred to as the SWS MRF, also contains three (3) existing bays used by SWS for organics collection and transfers, a pilot-scale ASP composting operation, the dehydrator pilot and collection of plastics. Section 8.1.2.1 provides additional information on the ASP composting operation.

8.3.3.5. Feasibility Analysis for New Baler

As outlined in the November 2019 MRF Feasibility Study, MRF design capacities for the facility were estimated using feedstock projections across three (3) scenarios:

- Scenario 1 was based on status-quo collection levels, with increased recapture from City Municipal (75%), City Private (50%), and Drop-Off (20%) sectors and no improvement in commercial recycling recapture.
- Scenario 2 assumed moderate improvements in recycling, with the commercial sector achieving a 40% recapture rate in addition to the participation increases described in Scenario 1.

- Scenario 3 assumed optimistic recycling participation, with 75% recapture for City Municipal, City Private, and Drop-Off sectors, and 50% recapture for the Commercial sector.
- Source-separated materials from commercial sources would require limited processing (i.e., sorting) but would need to be baled for shipping.
- Commingled recyclables from both residential and commercial sources requiring sorting and baling

The required number of balers would depend on the operational layout of the MRF (e.g., whether separate materials are staged in separate buildings) and the types of materials processed (e.g., use of specialized balers for specific material types).

8.3.3.6. New Baler Specifications and Estimated Cost

Based on the assumptions presented in the MRF study, a new baler should be sized to process the two identified recycling streams at a capacity of approximately 24 tons per hour (TPH). To support this, Tetra Tech conducted a high-level cost and specification review to identify balers capable of meeting current and future MRF operational needs.

A baler with a processing capacity of approximately 24 TPH aligns with the large horizontal auto-tie or two-ram category, commonly used in MRFs handling high volumes of old corrugated cardboard (OCC), mixed paper, plastics, and multi-stream recyclables. Industry data indicate that balers in this class have machine footprints of approximately 30 feet by 15 feet and bale chambers sized to handle high-volume OCC and mixed recyclables.

Based on market pricing for balers in the 20-24 TPH throughput range, estimated capital costs range from $150,000 to $300,000 for lower capacity and from $450,000 to $750,000 for larger capacity throughput. These figures represent the capital cost of the baler itself and do not include additional expenses such as installation, building modifications, electrical work, conveyors, maintenance equipment or operational integration. Final costs will vary depending on manufacturer specifications, level of automation, and installation and shipping requirements.

8.3.3.7. MRF Operational Features

The baler functions as a critical component within the overall MRF operation. Upstream of the baling system, sorted materials are delivered via a horizontal pit conveyor feeding an incline conveyor equipped with a photocell to regulate material flow. A skilled loader operator must keep the pit conveyor adequately supplied. Materials then move to a pre-sort line, where film, bulky rigids, and other unacceptable items are removed. Next, cardboard screens separate large OCC and paperboard (e.g., cereal boxes and other single-layer paperboard packaging). The remaining material passes through ballistic separators to divide two-dimensional (2D, flexible) and three-dimensional (3D, rigid) items.

On the fiber line, contaminants are removed to improve material value, and the remaining lower-grade fiber is baled for shipment. The container line uses a ferrous magnet for tin cans, an eddy current for aluminum, and manual sorting to remove contaminants. Remaining plastics are discharged as mixed plastics for baling. Optical sorters can further separate plastics into higher value grades. Source separated commercial materials bypass the system and are loaded directly onto the baler conveyor for baling.

As outlined in the 2019 MRF Feasibility Study, the estimated capital costs of a potential MRF in the MOA were based on vendor information and Tetra Tech calculations. Two MRF equipment vendors were contacted to provide quotes and equipment information that would suit the MOA's needs. The processing capacity was based on the noted capture rates and operation of the facility based on one shift per day, and five days per week. Important space considerations for the MRF (including the processing equipment, feedstock receiving and storage area, and recyclable commodities storage) and operating requirements were discussed and provided.

Capital cost was estimated based on the processing equipment and the building to house that equipment. Processing equipment was quoted to cost between $6M and $8M for a turnkey system which includes delivery and commissioning. Building costs were based on a new pre-engineered metal building that was estimated to be 63,000 square feet. Building costs according to the 2019 MRF Feasibility study were expected to range between $240 to $250 per square foot. Table 8-5 presents the summary of capital costs of a potential MRF. These costs do not include estimated operating costs. The cost estimates are preliminary, as the 2019 conceptual site plan will need to be revisited and refined in collaboration with SWS. However, based on current market conditions, material costs and engineering design are anticipated to be higher due to inflation, using a multiplier of 1x as the baseline for adjustment.

Table 8-5: Summary of Capital Costs of a Potential MRF

Item	Scenarios 1 - 3	
	Vendor 1	Vendor 2
Building Size (sq. ft.)	63,600	
Site Development Costs	$800,000	
Building Cost	$15.9M	
Stationary & Mobile Equipment	$8M	$6M
Engineering Design (10%)	$1.6M	
Administration & Contingency (20%)	$3.2M	
Total Capital Cost	$29.5M	$27.5M
Annual Amortized Capital Cost (20 years at 5% interest)	$2.33M	$2.19M

8.3.3.8. Labor

The MRF requires staff labor and utilities to receive, sort, and bale incoming commodities. The configuration outlined in the MRF study estimated daily inbound throughput ranging from 15 TPH, approximately 32,000 tons per year assuming a single eight-hour shift, to 25 TPH, or approximately 62,400 tons per year under the same operating assumptions. The study also noted that higher annual processing capacity could be achieved by adding a second shift. The types of personnel required to operate the proposed MRF, based on Scenario 1, are shown below in Table 8-6.

Table 8-6: Estimated Staffing Summary Needs Based on Scenario 1

Personnel	Quantity
Plant Manager	1
Plant Administration	1
Operations Supervisors	1 or 2
Equipment Maintenance Personnel	1
Equipment Operators	2
Sort Staff	18

8.3.3.9. Recycling Drop-off Depot

A typical recycling drop-off depot consists of a designated area with several bins for collecting recyclable materials, including paper, cardboard, plastics, glass, and metals. Each bin is dedicated to a specific material stream, thereby reducing processing requirements at the MRF. The recycling depot may also accept HHW, with specific containment measures for paint, used oil, electronics, and tires. If desired, MOA can have a warehouse-sized facility to house a baler, allowing collected recyclable material to be compacted for efficient storage and transportation. The warehouse may also serve as storage for bales and provide a designated customer interface area for material drop-off. Alternatively, bales may be stored outdoors in a shipping container to protect materials, such as cardboard, from getting wet and losing value.

As identified in the evaluation of the old CTS and in the May 2021 technical memorandum for the proposed RRC, the installation of a new baler would require a dedicated heated storage area to support consistent and reliable operational performance.

8.4. RECOMMENDATIONS

To expand organics diversion, address existing operational constraints, and build a more resilient and scalable organics management system, the following recommendations are provided for SWS consideration:

- Explore a Public-Private Partnership (P3) for Composting Capacity: Evaluate the feasibility of a P3 to expand local composting capacity, with a focus on implementing an ASP composting system. ASP technology provides a scalable, efficient option for midscale operations, helping to streamline processes and reduce staffing demands.
- As mentioned in the 2021 Organics Feasibility Study, a full-scale composting facility could be developed as a membrane-covered ASP composting operation, building on the demonstrated pilot-scale operation and incorporating staff training.
- Improve Access to Organics Collection: Enhance residential and commercial access to organics programs by expanding collection programs drop-off locations, and service options to increase participation.
- Improve Recycling Access: Expand and streamline access to recycling services to increase diversion, reduce contamination, and improve recovery of valuable recyclable materials.

- Implement Public Space Recycling: Install clearly marked recycling and waste bins in high-traffic, public areas, such as downtown, parks, trails, and transit stops to make recycling more convenient. Need to consider collection service to support public space recycling.
- Launch Targeted Education and Outreach Campaigns: Use social media, community newsletters, and local media (print and radio) to clearly communicate accepted and prohibited materials and reduce contamination rates.
- On an annual basis, update content within the MOA SWS webpage[21] to provide current information. This is crucial for maintaining public involvement, environmental compliance, and providing clear, real-time information to residents and the commercial sector. An updated website can serve as a key communication tool to help the MOA customers reduce contamination in recycling streams, lower call volumes for customer service, and support sustainability goals.
- Conduct Waste Audits: Perform regular audits of residential and commercial waste streams to identify contamination hotspots and adjust program strategies.
- Consider New MRF Requirements: As part of future MRF planning, consider incorporating the following improvements:
    - Heated, utilities-supported indoor space to support material handling, staff comfort, and year-round operations.
    - Improved material quality controls for baling, including measures to reduce contamination and increase the value of cardboard and plastics #1 and #2.
    - Purchase new baler as described in Section 8.3.3.6.
- Designate and Enhance Drop-Off Infrastructure: Identify and recommend designated locations for residents to drop off recyclable materials which may not be accepted curbside, whether through upgrades to existing infrastructure or development of new facilities. According to the TRP, effective recycling streams typically demonstrate the following performance characteristics:
    - At least 90% of households participate in either curbside or drop-off recycling programs. In Alaska, participation is currently only 51%[22], highlighting the need for greater investment in communication, outreach, and community support.
    - Recycling facilities should convert at least 95%[23] of incoming recyclable materials into saleable commodities. Currently, an estimated 87%[24] of materials are successfully sorted and sent to market.
    - End markets for recyclable materials must be strong enough for facilities to reliably sell their processed commodities. At present, limited market demand, and recycling program structure, means local governments must absorb the cost of processing recyclables.

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[21] Solid Waste Services Solid Waste Services

[22] IBID

[23] IBID

[24] IBID

9.0 ARL LANDFILL GAS MANAGEMENT

9.1. EXISTING GAS COLLECTION SYSTEMS

The ARL began operations in 1986 and currently contains approximately 11.9 million tons of waste in place of the 27.1 million tons total permitted capacity. At current disposal rates, ARL is projected to reach capacity around 2135. The waste footprint encompasses approximately 165 acres across Cells 1 through 12. Of this area, approximately 127 acres have intermediate cover and active GCCS wells installed, while the remaining 28 acres are under daily cover with no permanent GCCS infrastructure and are generally associated with active disposal areas.

Annual waste disposal at ARL peaked at approximately 370,000 tons in 2002 and has generally declined since that time based on population fluctuation. Future disposal rates are assumed to remain at approximately 300,000 tons per year, consistent with recent trends. Historical waste composition data indicates that MSW accounts for an average of approximately 78 percent of total waste disposed at ARL through 2024, with C&D waste representing approximately 17 percent, land clearing waste approximately 2 to 3 percent, and inert materials comprising the remainder.

Compliance and migration monitoring are conducted routinely at ARL. The ARL has three perimeter LFG migration probes located outside the waste mass including one single-completion probe (GP-1), one double completion probe (GP-2), and one triple-completion probe (GP-3). During the most recent monitoring event conducted on September 8, 2025, methane concentrations at all probe depths were 0.0 percent by volume, with carbon dioxide concentrations ranging from approximately 0.6 to 6.7 percent. Structure monitoring was also conducted at eight on-site buildings, and no methane concentrations exceeded 25 percent of the LEL (SCS, 2025).

Surface emissions monitoring (SEM) is conducted quarterly in accordance with federal requirements. During the latest SEM event conducted on September 11, 2025, there were no locations which exceeded 500 parts per million by volume (ppmv) total organic carbons (TOC's). In August 2025, SWS conducted an Enhanced SEM Event and subsequently implemented significant remediation efforts that led to the low methane concentrations (SCS, 2025).

The ARL has an active GCCS in operation, with an average LFG flow rate of approximately 2,835 scfm at a normalized methane concentration of 50 percent by volume (SCS, 2025). The GCCS controls LFG generated by waste disposed of at the ARL for environmental protection and supplies LFG to a third-party electrical generation facility operated by Doyon Utilities, LLC (Doyon).

As of 2025, the GCCS includes approximately 81 vertical extraction wells, 20 horizontal collectors, eight (8) slope collectors, five (5) lateral wells, six (6) perimeter wells, and one leachate riser. Vertical wells are installed primarily in Cells 1 through 7 and Cell 10, with spacing ranging from less than 100 feet to approximately 300 feet in some areas. Horizontal collectors are installed in Cells 2 through 7, Cell 10, and Cells 11/12, with the greatest concentration of collectors in Cells 7 and 11/12.

In 2025, approximately 62 percent of vertical wells and 70 percent of horizontal collectors exhibited consistently high methane concentrations (greater than 55 percent by volume). However, a subset of these wells also exhibited low applied vacuum or flow rates, suggesting that some LFG generated within portions of the waste mass is not fully captured due to system vacuum limitations, condensate management constraints, or localized well performance issues. Waste moisture and climatic conditions also influence LFG generation and recovery at the ARL. Higher-than-average precipitation in recent years, and seasonal freezing of newly placed waste, affects the timing and rate of waste decomposition and LFG generation.

As part of the ongoing Leachate Management and Flare Project, SWS is advancing upgrades at the ARL to improve LFG handling and quality, flare capacity, and on-site leachate management. The project includes a 5,000-scfm blower skid, a 3,000-scfm enclosed flare, a 1,000-scfm enclosed flare dedicated to the leachate evaporation system, two 1,000-scfm compressors, and a 50,000-gpd leachate evaporation concentration unit. This also includes upgraded 3,000 scfm biogas equipment and controls sized to support delivery to Doyon and a potential CNG fueling station along with wellfield upgrades or future Compressed Natural Gas (CNG) filling station. The upgraded system is designed to prioritize delivery of up to 2,500 scfm of conditioned LFG to Doyon. Remaining LFG will be directed as needed to support leachate evaporation and to maintain full control capacity through the existing 2,000-scfm flare and the new 3,000-scfm and 1,000-scfm flares, providing operational redundancy and flexibility as site flows increase over time. SWS prioritizes beneficial use for the LFG rather than flaring. The wellfield upgrades include a consolidated header and upgraded piping so that the new blower skid becomes the sole source of vacuum and pressure control, eliminating competing pull from the existing blower and the Doyon facility and enabling full pull-push control of LFG flow through the proposed system.

The project is planned to be completed in two design packages to achieve project schedule objectives. Package 1 provides interim LFG control capacity through installation of a new 3,000-scfm enclosed flare temporarily connected to the existing blower system, for regulatory compliance. Package 2 includes construction of the permanent blower and leachate evaporation building, wellfield upgrades, biogas equipment such as scrubbers, leachate evaporation system, and the additional flare, establishing an integrated system capable of managing up to 5,000 scfm of LFG over the long term.

The project is in the conceptual phase of the design and is to be installed no later than August 2028. These improvements are intended to support existing commitments to Doyon while accommodating future increases in LFG recovery and additional beneficial use options. The future LFG recovery potential at the ARL will exceed the full processing capacity of the existing Doyon facility (2,500 scfm). A number of options outside the scope of the current Doyon contract have been reviewed to determine the potential viability and relative level of benefit to SWS as part of this ISWMP.

Four (4) utilization options for SWS beneficial use of LFG were considered, as noted below.

- Direct Thermal Use (Medium BTU);
- Electrical Generation - Export;
- Electrical Generation - Local
- CNG Local or RNG Injection to Pipeline.

These options are discussed further in the following sections, with updates reflecting current LFG flows, contractual commitments, and the proposed integrated flare and leachate evaporation system.

9.2. SUPPORTING THE DOYON PROGRAM

The existing GCCS at ARL currently supplies sufficient LFG to meet Doyon’s operational demand. In 2025, the average LFG flow delivered to Doyon was approximately 1,300 scfm, while the total collected LFG flow averaged approximately 2,835 scfm at 50 percent methane. The proposed system supports Doyon’s capacity delivery rate of approximately 2,500 scfm, and continued delivery to Doyon remains a primary operational objective. Doyon’s current capacity is 1,800 scfm and may be expanded to 2,500 scfm, therefore the design is based on the potential future 2,500 scfm capacity. The Leachate Management and Flare Project is designed to strengthen long-term support of the Doyon Program by improving gas quality, operational reliability, and system control. The proposed system includes a new 5,000-scfm blower skid, expanded flare capacity with one new 3,000-scfm flare and one 1,000-scfm flare, and biogas upgrading equipment sized to handle up to 3,000 scfm, to support the Doyon facility and potential future CNG vehicle fueling or RNG pipeline injection. Under the proposed configuration, the new blower skid will serve as the sole source of vacuum on the wellfield, eliminating competing vacuum influences between the existing flare station and Doyon.

The biogas upgrading system will be installed upstream of the Doyon interconnection to condition LFG in accordance with the Master Implementation Agreement between the MOA and Doyon. The biogas system will include hydrogen sulfide reduction, chilling and dehydration, regenerative siloxane and VOC removal, and final carbon polishing, with a dedicated thermal oxidizer to safely destroy regeneration exhaust gases. Redundant treatment equipment will allow continuous operation during maintenance and delivery of a clean, dry, and consistent LFG stream to Doyon. The biogas upgrading system will be sized for 3,000 scfm to prioritize delivery of up to 2,500 scfm to Doyon, with remaining capacity available for potential future CNG vehicle fueling or RNG pipeline injection. Space will be reserved within the blower building for equipment needed to further treat the LFG for CNG vehicle fueling or RNG pipeline injection if this option is pursued. Any LFG not utilized by the biogas upgrading system will be directed to a flare or leachate evaporation.

Overall, this improves long-term support of the Doyon Program by maintaining sufficient LFG supply, enhancing gas quality, minimizing maintenance and operational downtime, increasing electrical output, and increasing operational redundancy. The upgraded system provides Doyon with a more reliable and better-conditioned LFG stream while supporting broader LFG and leachate management objectives at the ARL.

9.3. ENERGY RECOVERY AND BENEFICIAL USE OPTIONS

In addition to the existing Doyon facility and the proposed leachate evaporation system included in the current project scope, several additional energy recovery and beneficial use options have been evaluated at a planning level as part of the ISWMP update. These options are discussed below to inform a long-term strategy.

9.3.1. Electrical Generation - Export

As part of discussions with SWS, it was mentioned that Doyon had expressed an interest in expanding their existing facility to include additional generators. It is understood that the current customer for generated electricity (JBER) has the capacity to take all existing and proposed generated power from the Doyon facility, and that Doyon is currently working towards the development of a long-term agreement with JBER.

9.3.2. Electrical Generation - Local

If surplus generated power is available for use by SWS, there are a number of applications that would potentially benefit from a source of on-site electrical power. Primary among these is the provision of electric power to an on-site leachate lift station or leachate treatment facility as an alternative to continued off-site trucking of leachate for disposal. Excess electricity production could also be utilized to re-charge electrical vehicles for SWS via an on-site charging station. These options presume the availability of excess electrical power at some future date, as well as the development of additional leachate management infrastructure.

9.3.3. CNG Local or RNG Injection to Pipeline

If an expansion of the Doyon facility is not realized, the utilization of excess LFG for the production of renewable CNG vehicle fuel or for RNG injection into the pipeline is also a viable option. An excess LFG rate of 400 scfm could yield approximately 1,700 diesel gallon equivalents per day. The production of alternative fuel on-site would offset, in part, the diesel fuel currently utilized in tanker trucks hauling leachate to the off-site disposal facility or could be used to power transfer trucks between the CTS and ARL. As part of the 3,000 scfm biogas upgrade project currently underway at ARL, space will be reserved within the proposed blower skid building for future equipment needed to further treat LFG and prepare CNG for vehicle fueling or RNG for pipeline injection. Space will be allocated for a nitrogen rejection unit, CO_2 removal membranes, and a deoxygenation unit within the blower building. This equipment is not included in the current scope, but the layout accommodates it should SWS choose to pursue this option in the future.

9.3.4. Leachate Evaporation

As part of prior planning efforts for the ARL, leachate evaporation systems fired by medium-BTU LFG were evaluated as a potential option for long-term leachate management. The upper limit of projected peak generation in 2062 is 4,680 scfm and the lower limit is 3,615 scfm. Therefore, use of LFG to power a leachate treatment facility is only feasible if the Doyon facility is not expanded. Assuming the Doyon facility remains at its existing capacity, ARL could install one of these units, and operate it at full capacity, in approximately 2028, with the second unit installed in approximately 2049.

Under the current project approach, the equipment was adjusted to a 50,000-gpd leachate evaporation system with an estimated LFG demand of approximately 1,000 scfm at 50 percent methane. The 50,000-gpd leachate evaporation system is consistent with recovery projections, current contractual commitments to Doyon, and a phased implementation strategy.

Under the currently planned project improvements, leachate evaporation is considered as an integrated use of LFG that operates on gas available after existing contractual commitments to Doyon are satisfied. Delivery of LFG to the Doyon energy generation facility remains the highest priority beneficial use. The proposed blower, flares, and biogas upgrading system is intended to prioritize delivery to Doyon, with remaining LFG available for leachate evaporation or flaring. Rather than targeting a fixed leachate treatment capacity based on long-term peak LFG generation projections, leachate evaporation capacity would be expected to scale over time based on surplus LFG availability and operational needs. This approach maintains support for existing energy recovery commitments while allowing flexibility to expand leachate evaporation as LFG generation and site conditions evolve.

9.3.5. Biogas Upgrades

As part of the Leachate Management and Flare Project, biogas upgrading has been identified as a necessary component to support continued beneficial use of LFG at the ARL. The primary function of the biogas upgrading system is to condition LFG prior to delivery to the Doyon energy generation facility by removing constituents that may adversely affect engine performance, maintenance requirements, and long-term reliability.

The biogas upgrading system is anticipated to utilize a regenerative treatment approach and will include equipment for hydrogen sulfide reduction, chilling and dehydration, regenerative siloxane and VOC removal, and final carbon polishing. The system will be sized for up to 3,000 scfm to prioritize delivery of up to 2,500 scfm to Doyon, consistent with Doyon's planned expansion capacity. The remaining capacity may support potential future CNG vehicle fueling or RNG pipeline injection, and space will be reserved within the blower building for additional CNG or RNG conditioning equipment if that option is pursued. Final sizing of the biogas upgrading and scrubbing system has not yet been established and will be based on available LFG flows, existing commitments for LFG delivery, and overall system operating priorities. Conditioned LFG would be directed to Doyon as the primary beneficial use, while surplus gas could be managed through flaring or leachate evaporation, consistent with other energy recovery and beneficial use options evaluated in this ISWMP update.

10.0 ARL LEACHATE MANAGEMENT

10.1. CURRENT COLLECTION AND TREATMENT SYSTEMS

Since the ARL began accepting waste, the generation and management of leachate—the liquid byproduct of precipitation percolating through waste—has been an ongoing operational and environmental challenge. As with any landfill, leachate generation at ARL is influenced by precipitation volumes, waste characteristics, and the area of active or open landfill.

Leachate generated at the ARL is conveyed by gravity through the landfill drainage layer and leachate collection piping, then routed from low points in Cells 4/5, 6, and 7 to two lined storage lagoons west of the landfill. The lagoons are equipped with jet aeration mixers that provide oxygen-based pretreatment. The mixers were intended to reduce biochemical oxygen demand (BOD), ammonia-Nitrogen, and zinc. Monitoring data since installation and startup indicate reductions in BOD and zinc.

Currently, the collected leachate is hauled off-site via tanker truck to the Turpin Street Septage Receiving Station, where it enters the municipal wastewater system and is treated at the Asplund Wastewater Treatment Facility (WWTF), owned and operated by the Anchorage Water and Wastewater Utility (AWWU). SWS maintains Industrial Wastewater Discharge Permit #9 with AWWU to authorize this practice. In 2024, approximately 118,000 gallons per day of leachate were hauled on average, and a maximum of 197,000 gallons per day were hauled, with operations often occurring 24 hours per day, seven days per week.

10.2. RECENT DEVELOPMENTS IN LEACHATE MANAGEMENT

In May 2022, the MOA issued a Compliance Order by Consent (COBC) with the State of Alaska, requiring SWS to implement improved leachate management as part of a Supplemental Environmental Project (SEP). The SEP's objectives include enhancing leachate collection, minimizing the risk of environmental exposure associated with off-site transport, and reducing air emissions from hauling activities. The COBC defines two potential approaches for achieving compliance: (1) implementation of a deep injection well or (2) development of a leachate evaporation system.

Construction of a stratigraphic test well, to evaluate the feasibility of a deep injection well, confirmed that local geological conditions were unsuitable for this option. As a result, SWS is now implementing a comprehensive Leachate Management Program (LMP) to fulfill COBC obligations and ensure long-term sustainability. This LMP includes the following key actions:

- Interim Landfill Capping – Implementing a capping plan to reduce water infiltration and decrease leachate generation at the source.
- Mechanical Evaporation – Installing mechanical leachate evaporation to reduce hauling volumes and associated emissions. Sizing of mechanical evaporation is dependent on the available LFG, used to heat and evaporate the leachate as part of this process. Evaporation alone cannot manage the leachate produced at the ARL.
- Advanced Leachate Treatment – Evaluating advanced treatment processes and regulatory acceptance for treatment of the remaining generated leachate.

The LMP objective is to support SWS in developing a technically and financially feasible, resilient, and sustainable long-term leachate management strategy that minimizes reliance on trucking, mitigates environmental risks, and strengthens the operational resilience of the ARL. It is anticipated that the LMP will be largely implemented by the required COBC date of September 2028.

SWS considered various options for leachate management, which included:

- Connecting to the JBER sanitary sewer system to deliver leachate directly to the municipal sanitary system for disposal through AWWU Asplund WWTP at Point Woronzof
- Constructing a separate pipeline along the Glenn Highway to deliver leachate directly to the municipal sanitary system for disposal through AWWU Asplund WWTP at Point Woronzof
- Constructing a conveyance to deliver leachate to AWWU's Eagle River wastewater treatment plant (ERWWTP)
- Deep well injection of leachate
- Leachate evaporation

Deep well injection was eliminated because of uncertainties associated with seismicity and geology, in the area and high cost. Disposal through the ERWWTP was eliminated as the facility is a tertiary biological treatment system with a relatively low throughput and stringent effluent standards. Concerns were raised that introduction of leachate could upset the biological treatment process and/or result in exceedance to effluent discharge standards. While the two alternatives to pipe the leachate for treatment at the Asplund WWTP would eliminate the practice of hauling by truck, anticipated changing discharge standards to the POTW will require significant improvements to the leachate treatment system prior to disposal.

In the most recent Industrial Discharge Permit for disposal to the AWWU system, effluent standards for zinc were reduced from 12 mg/L to 5.62 mg/L. Historically, SWS was able to consistently meet the older standard for zinc, however the discharge would only meet the more stringent standard about 80 percent of the time. The Asplund WWTP operates under a 301(h) waiver from the U.S. EPA which allows the plant to discharge after primary treatment and disinfection. AWWU has indicated that to maintain their 301(h) waiver they must control total discharges of BOD and total suspended solids (TSS) from their WWTP. BOD and TSS concentrations common to ARL leachate are relatively high (in excess of 2,000 mg/l and 5,000 mg/l, respectively) it is likely that additional, much more stringent discharge limits may be imposed on leachate discharge in the near future for these parameters. Continued discharge of leachate to the AWWU system will likely require significant upgrade to the leachate treatment system.

SWS conducted a Treatability Study to determine what process changes would be needed to meet current and potential new discharge standards. The study determined that adding a step to allow settlement of suspended solids in a quiescent pond prior to loading was sufficient to consistently meet the new, more stringent zinc standard. This could be accomplished using the existing ponds; providing aeration in the primary pond and allowing effluent to overflow into the secondary still pond for settling prior to loading in the trucks. Because of the age of the existing blowers and liner systems, and the need for more efficient solids removal it is estimated that upgrades to the existing pond system will cost $4,225,000. The Treatability Study also considered alternatives to significantly reduce BOD and TSS concentrations in the discharge. The study considered various enhanced aeration schemes, as well as submerged fixed film and moving bed bioreactors. These alternatives were found to cost between $12.2 and $15.2 million for the treatment upgrades only without consideration of hauling or volume reduction efforts. The leachate evaporation alternative that was considered for this study included an installed capacity to evaporate up to 100,000 gallons of leachate per day. The study recognized that during peak leachate generation periods this capacity is not adequate to process all leachate produced and would need to be augmented with continued hauling and discharge to the AWWU system. The proposed scheme would have the advantages that:

- While not eliminating truck hauling, the number of trips hauled would be significantly reduced
- The significant reduction in volume discharged to the AWWU system would eliminate the need for significant pretreatment of the leachate. AWWU indicated that potential BOD and TSS limitation would likely be imposed on a total loading basis, thus by reducing the total volume of discharge the total loading would be proportionately reduced. Because the enhanced zinc standard is a numeric limit, treatment to meet this standard would still be required.
- The evaporation system would utilize any LFG not sold to Doyon Utilities. The constructed system would include additional blower capacity to the GCCS for collection and control of LFG at the site.

10.3. INTERIM LANDFILL CAPPING

Temporary landfill cover, through interim landfill capping, is proposed to reduce leachate generation by strategically and temporarily covering one or more active landfill areas. Interim capping will limit stormwater infiltration into the waste mass, decreasing leachate production and reducing associated management requirements. Related to interim capping is providing temporary cover for portions of the developed landfill cells that have not yet received waste to limit stormwater and snowmelt from short-circuiting through the landfill drainage layer that is not covered with waste, intermingling with the landfill leachate, and increasing the volume of leachate to be managed.

Previous temporary cover efforts at the ARL were conducted in 2021 when approximately 150,000 sf of reinforced geomembrane cover was placed over the exposed drainage layer on the southeast side slope of cell 9A, and 64,750 sf of reinforced geomembrane cover was placed over the exposed drainage layer on the southwest side slope of cell 8B. However, weather reduced the life of these covers. Several options for this existing temporary cover will be evaluated, including:

- Continue to keep the existing covers in place with reduced effectiveness.
- Replace the covers in kind.
- Replace the temporary cover with different, weather-resistant material.

Initial plans for interim landfill capping will be developed on areas of the landfill that will not be used for waste placement in the near term. Types of interim cover will also be evaluated and recommended. Following plan development, SWS will design and implement interim landfill covers. Monitoring of leachate generation will continue to monitor the effects of covering portions of the landfill.

10.4. INFRASTRUCTURE FOR LEACHATE MANAGEMENT: EVAPORATION

Permanent infrastructure and equipment will be necessary to successfully reduce truck hauling, manage leachate through evaporation, and meet the requirements set by the COBC SEP. Under the LMP approach, the leachate evaporation capacity is intentionally sized based on the available LFG after meeting ARL's contractual obligation to supply LFG to Doyon. Any LFG not delivered to Doyon is currently managed through flaring. The leachate evaporation would utilize remaining LFG to heat and evaporate leachate generated at the ARL.

The LMP includes installation of a leachate evaporation concentration system designed for an initial treatment capacity of approximately 50,000 gpd. The system utilizes flue gas from a dedicated enclosed flare to provide the thermal energy required for evaporation. The leachate concentrator evaporation process is as follows:

- A single external induced draft fan will draw hot flue gas from the flare and ambient air into the tempering system to mix.
- Leachate feed and recycle streams will be added to the tempered (600 to 1,000 °F) hot gas at entry to the evaporation zone.
- Induced turbulence in the evaporation zone will shear leachate into tiny droplets. The expanded surface area of droplets will drive very rapid heat transfer by direct contact.
- The flue gas will now be oversaturated with suspended liquid droplets when exiting the evaporation zone at 140 – 180 °F.
- Oversaturated flue gas will continue through the entrainment separator. Entrained droplets will coalesce and flow down into a sump while demisted gas continues through exhaust stack.

Combusted LFG from the proposed new flare(s) will be the primary source of thermal energy and would be routed to the evaporator. The leachate evaporator exhaust will be vented to the atmosphere. The residual leachate will be recirculated from the leachate evaporators to a holding/settling tank. Residual leachate will be removed from the bottom of the holding/settling tank for disposal.

For the initial phase of evaporation (estimated at 50,000 gpd), approximately 5,000 gpd of residual leachate at approximately 25 percent solids will need to be disposed of via recirculation into the active face of the landfill or offsite.

Infrastructure necessary for operation of a mechanical evaporator is planned to include the following:

- Upgrades and modifications to the LFG wellfield and piping connections from the waste mass.
- Installation of a blower skid (5,000 scfm), compressors, chillers, and associated electrical equipment.
- Installation of a flare stack – capable of 3,000 scfm – and piping and connections between the blower skid and flare stack.
- Initial installation of one (1) 50,000 gpd leachate evaporation concentration unit, with future evaporator units installed if LFG becomes available.
- Pumping, piping, connections, and infrastructure necessary to convey leachate to the evaporation unit.

10.5. RESEARCH AND PILOT PROJECTS

Advanced treatment of the remaining leachate following implementation of mechanical evaporation continues to be evaluated. Alaska’s extreme climate and undefined regulatory standards for discharge of treated leachate make it necessary to validate the ARL leachate treatment process prior to full-scale implementation. A pilot test incorporating recommended processes will quantify expected effluent quality and site specific operational and maintenance expectations. By running a pilot test under true cold-region conditions and over several months, design parameters can be refined. Robust standard operating procedures that minimize surprises once the treatment process is fully implemented will be developed during this test. In a setting where mobilization windows are narrow and on-site modifications can be prohibitively expensive; this front-end risk reduction pays dividends in performance certainty and cost control.

Advanced treatment processes have been preliminarily evaluated and the recommended process includes heat exchange, membrane bioreactor (MBR), followed by reverse osmosis (RO). To further evaluate the efficacy of this process, and ancillary treatment support processes, for leachate quality specific to ARL, a desktop evaluation via modeling is ongoing. Results of this modeling effort will assist in conversations with regulators prior to piloting, defining unknowns as much as possible before pilot design, and aid in scheduling of next steps.

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