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CENTRAL PENINSULA LANDFILL SOLID WASTE MASTER PLAN

PRESENTED TO THE KENAI PENINSULA BOROUGH ADMINISTRATION

19 MARCH 2024

AGENDA

- Site Operations Review
- Transfer Facility Analysis
- New Technologies Review
- Waste-To-Energy Review
- CPL Development Plan
- Cost Review

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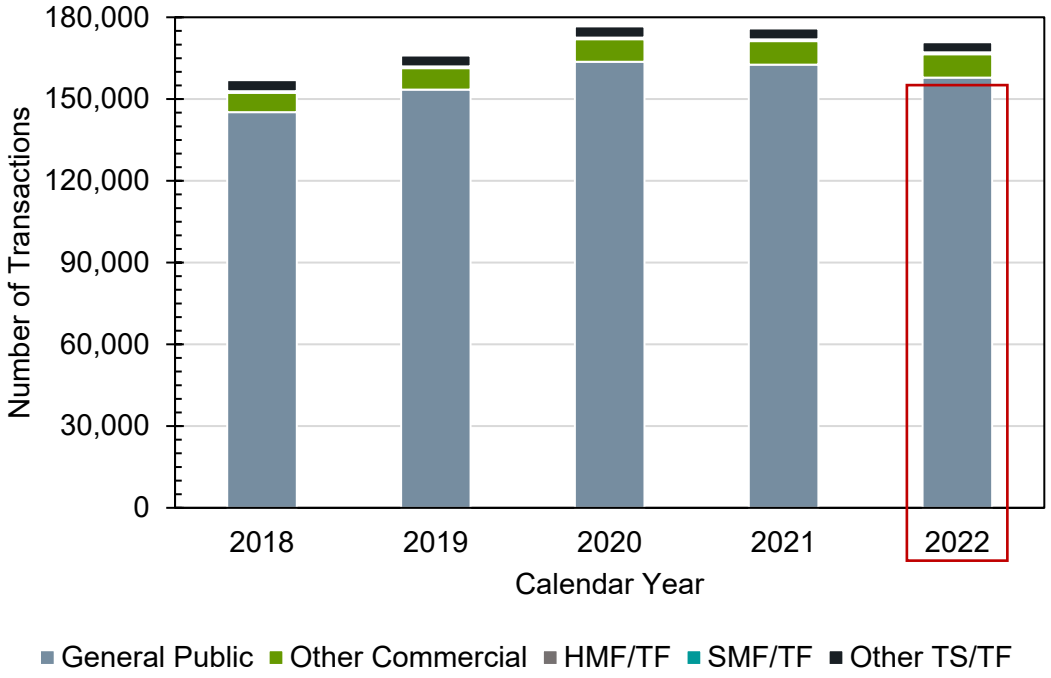
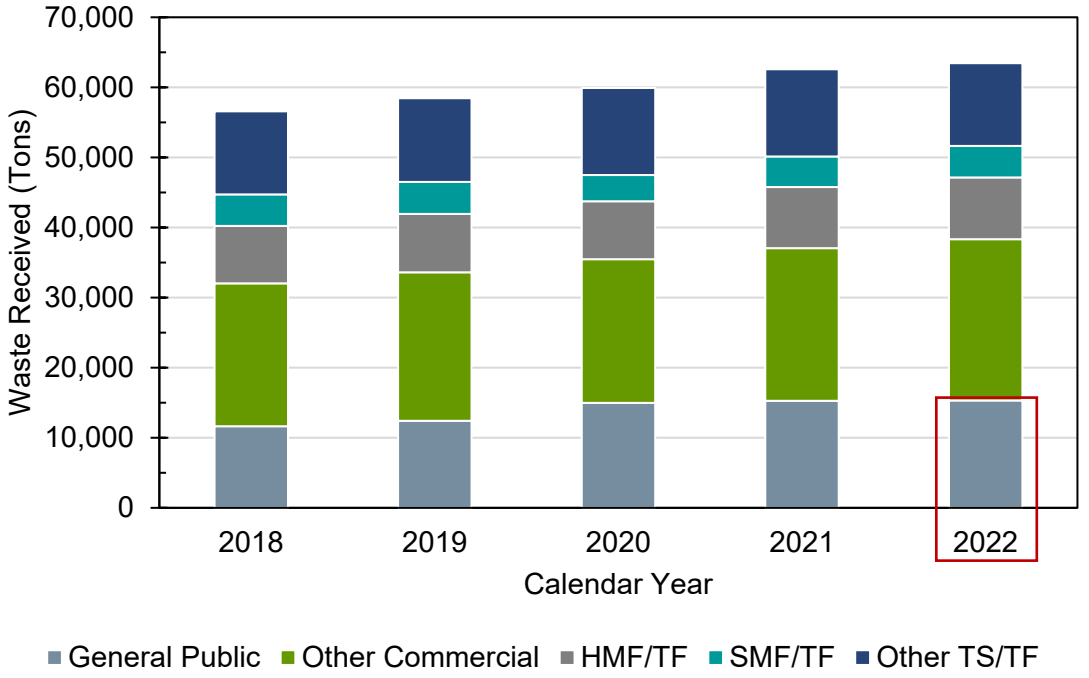
SITE OPERATIONS REVIEW

Traffic by Customer Type

Transactions



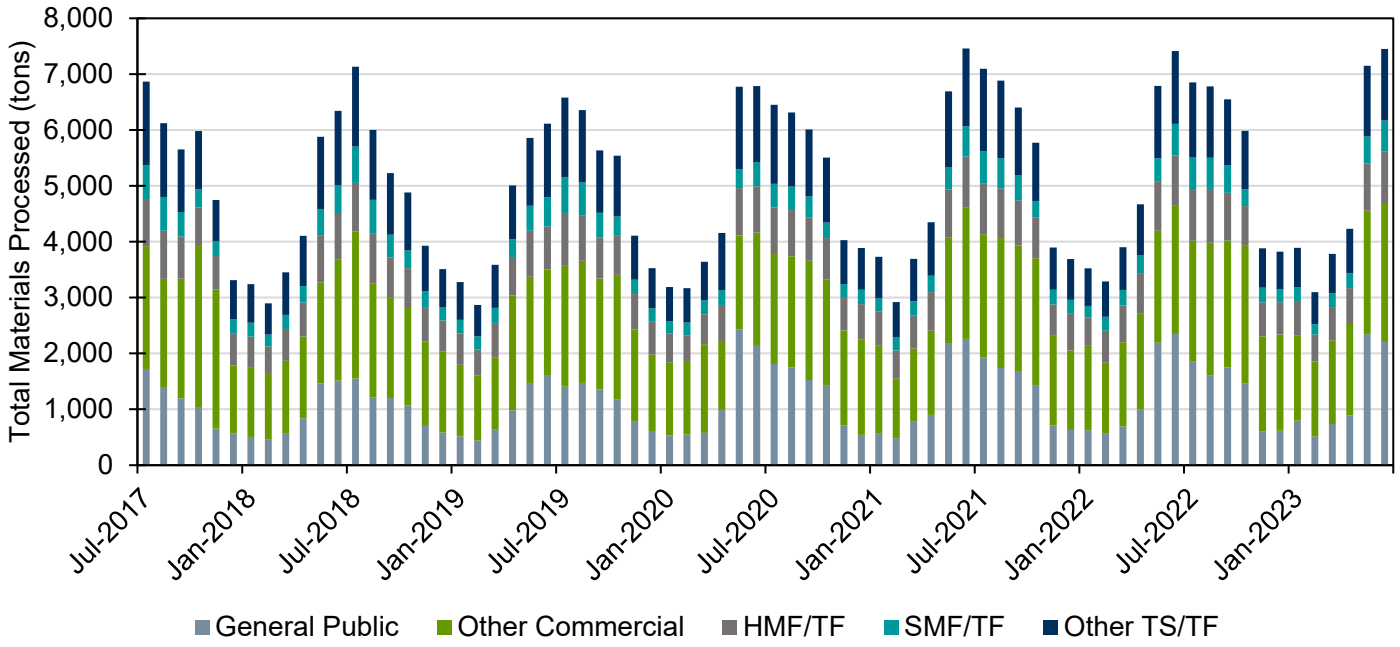
Waste



KEY TAKEAWAY

General public customers account for 93% of transactions, but only 23% of waste managed at CPL

Seasonality of Traffic



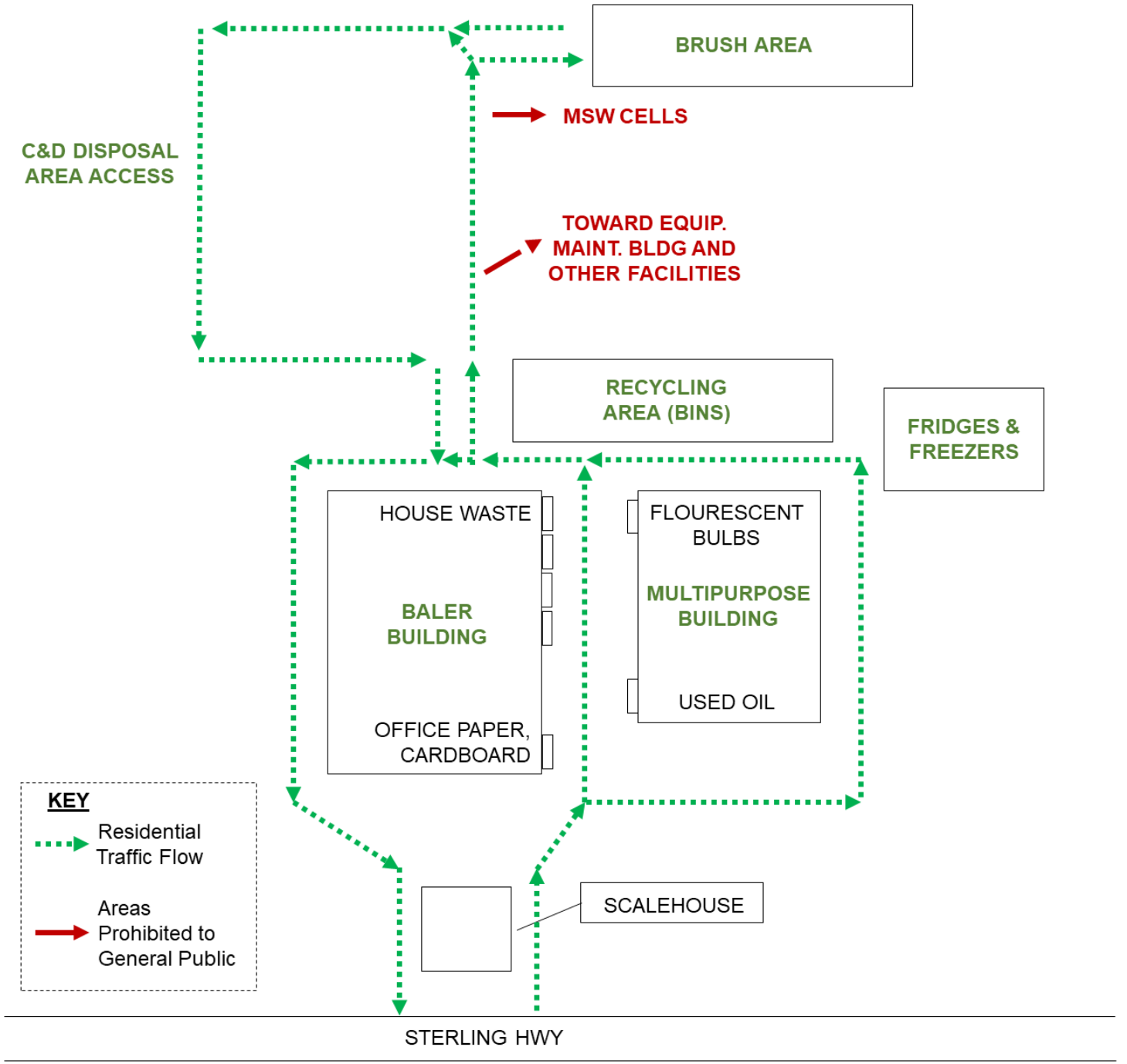
Holiday	Date	Number of transactions
New Years Day	1/1/2022	Closed
Martin Luther King Jr. Day	1/17/2022	446
Presidents Day	2/21/2022	322
Independence Day	7/4/2022	236
Memorial Day	5/30/2022	373
Labor Day	9/5/2022	421
Veterans Day	11/11/2022	389
Thanksgiving	11/24/2022	Closed
Friday after Thanksgiving	11/25/2022	448
Christmas Eve	12/24/2022	297
Christmas Eve	12/25/2022	Closed
New Years Eve	12/31/2022	545
Summer Average		590
Winter Average		444

KEY TAKEAWAY

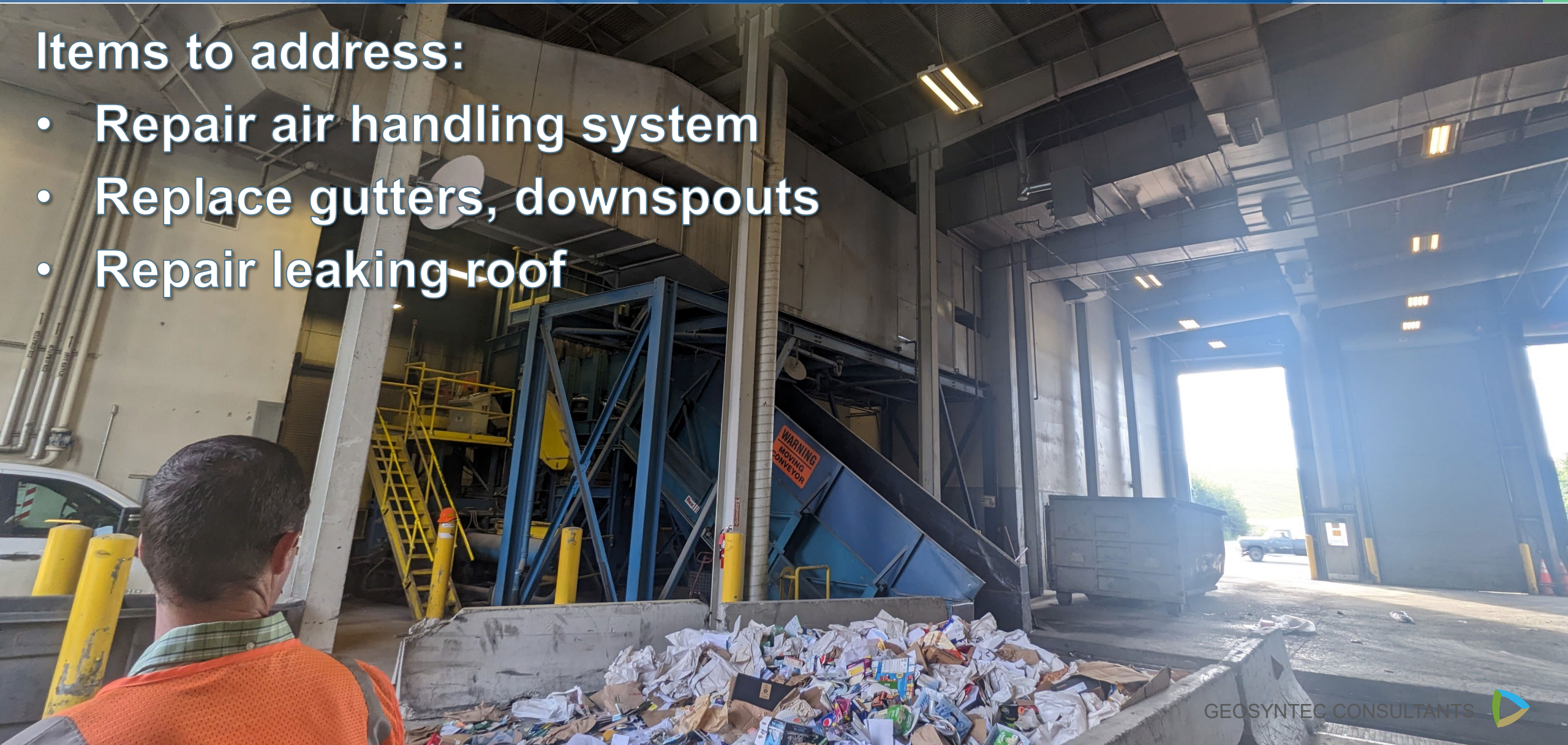
The amount of waste managed at CPL is much lower in winter and on holidays

Traffic Study

- 64% of customers used the Baler Building
- 22% of customers make multiple stops
- Average time on site = 6 minutes



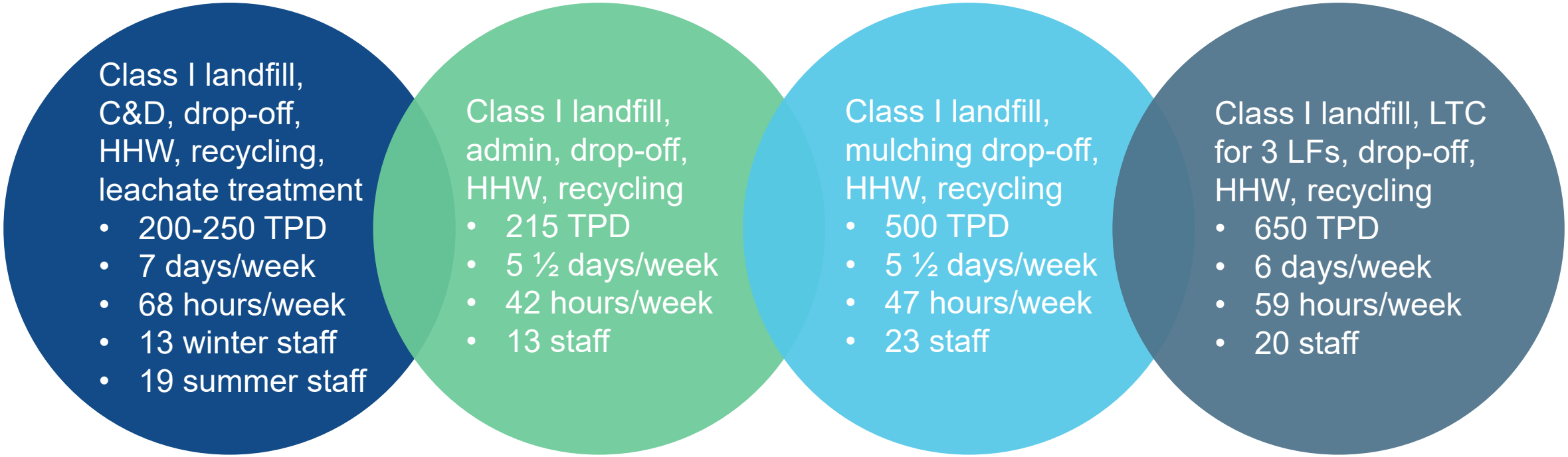
Baler Building



Items to address:

- Repair air handling system
- Replace gutters, downspouts
- Repair leaking roof

Benchmarked Landfills – Operations and Equipment



CPL

Beulah Facility, MD

Midshore II Facility, MD

Putnam County, FL

CPL's staffing is in-line with benchmarked peers

Leachate Treatment

On-site leachate treatment requires at least 1 dedicated FTE, with support from another employee. CPL does not currently have a dedicated role for leachate treatment.

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Recommendations for Leachate Management

Address Seeps

- Remediation by excavation

Alternative Daily Cover

- Consider using tarps as ADC

Leachate Storage and Evaporation

- Continue planned improvements

Grading

- Grade Cell 3 at 4% slope to encourage runoff

Rain Tarps

- Keep rain tarps over Cells 1 and 2

Equipment

CPL Equipment

Item	Model	Qty
C&D Dozer	Cat D8T	1
Compactor	Bomag 772RB4, Cat 826H	2
Grading Dozer	Cat D3	1
Roll-Off	International HV607, Peterbilt 365	2
Excavator	Komatsu PC 210LC-11	1
Scraper	Cat 623K Elevating Scraper	1
Wheel Loader	Cat 966M, Cat 914K, Volvo L150G	3
Misc. Small	-	Mult.

Recommended Equipment

Item	Size	Qty
Trash Dozer	85,000 lbs	1
Compactor	80,000 lbs	1 + spare
Grading Dozer	20-40,000 lbs	1
Excavator	50-60,000 lbs	1
Articulated Dump Truck	50-60,000 lbs	1
Grader	35-40,000 lbs	1
Track/Wheel Loader	2-3 CY bucket	2
Water Truck	2-3,000 gallon capacity	1

Compaction

- MSW AUF
  - CPL = 0.57 tons/CY
  - Peers = 0.61 – 0.72 tons/CY
- C&D AUF
  - CPL = 0.20 tons/CY
  - Target = 0.40 tons/CY
- Ways to improve:
  - Compact in 1-2 ft lifts
  - Use compactor (not dozer) for C&D
  - Compact C&D daily
  - Use tarps as ADC

Mitigate Traffic

- Divert general public customers

Reduce Hours

- 5 ½ days/week
- Close extra holidays

Baler Building

- Make repairs
- Get safety audit

Staffing

- Add dedicated leachate treatment FTE

Compaction

- Compact in small lifts
- Compact C&D

Equipment

- Add ADT and grader to rolling stock
- Update GPS

Recommendations for Operations

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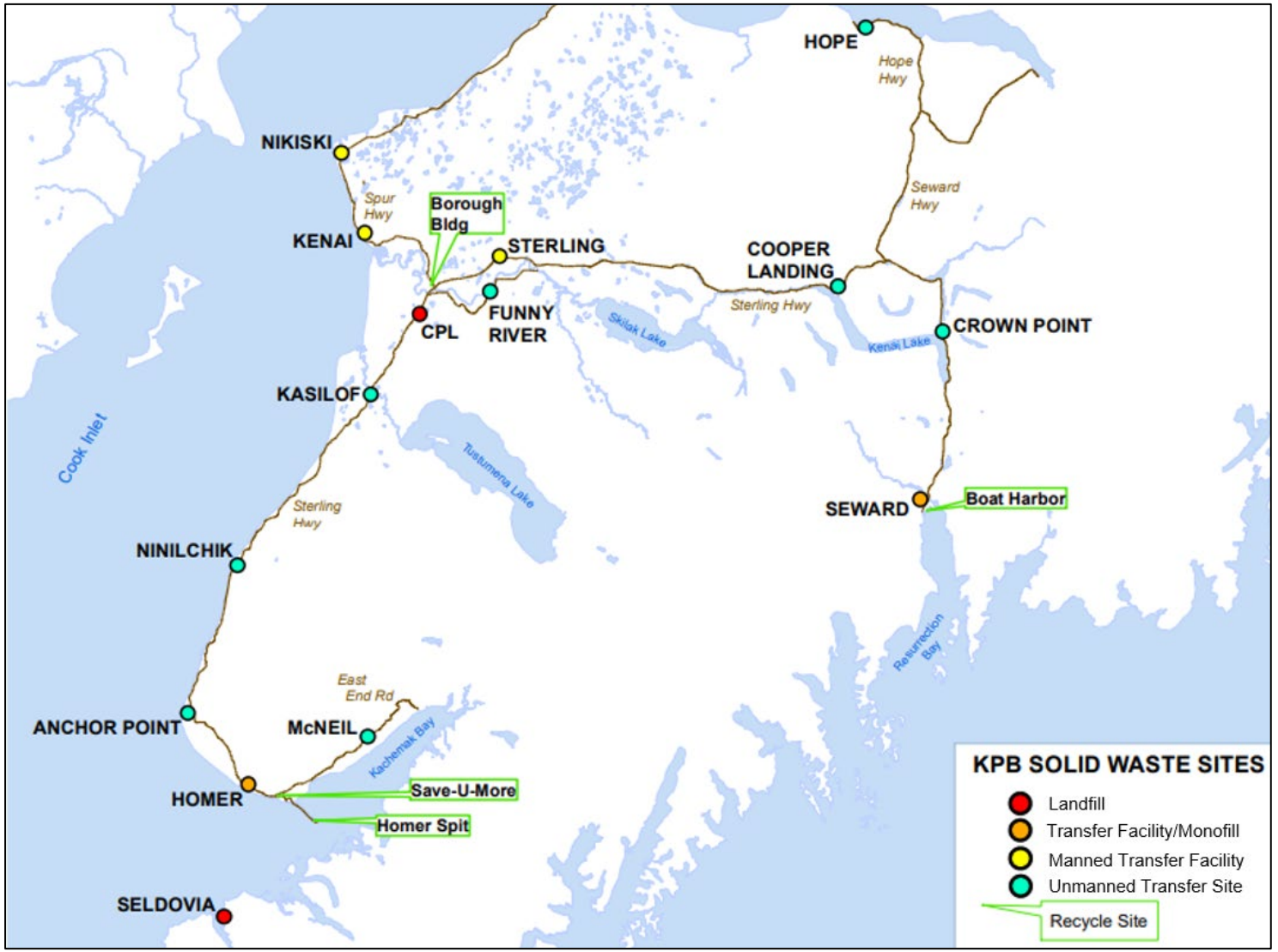
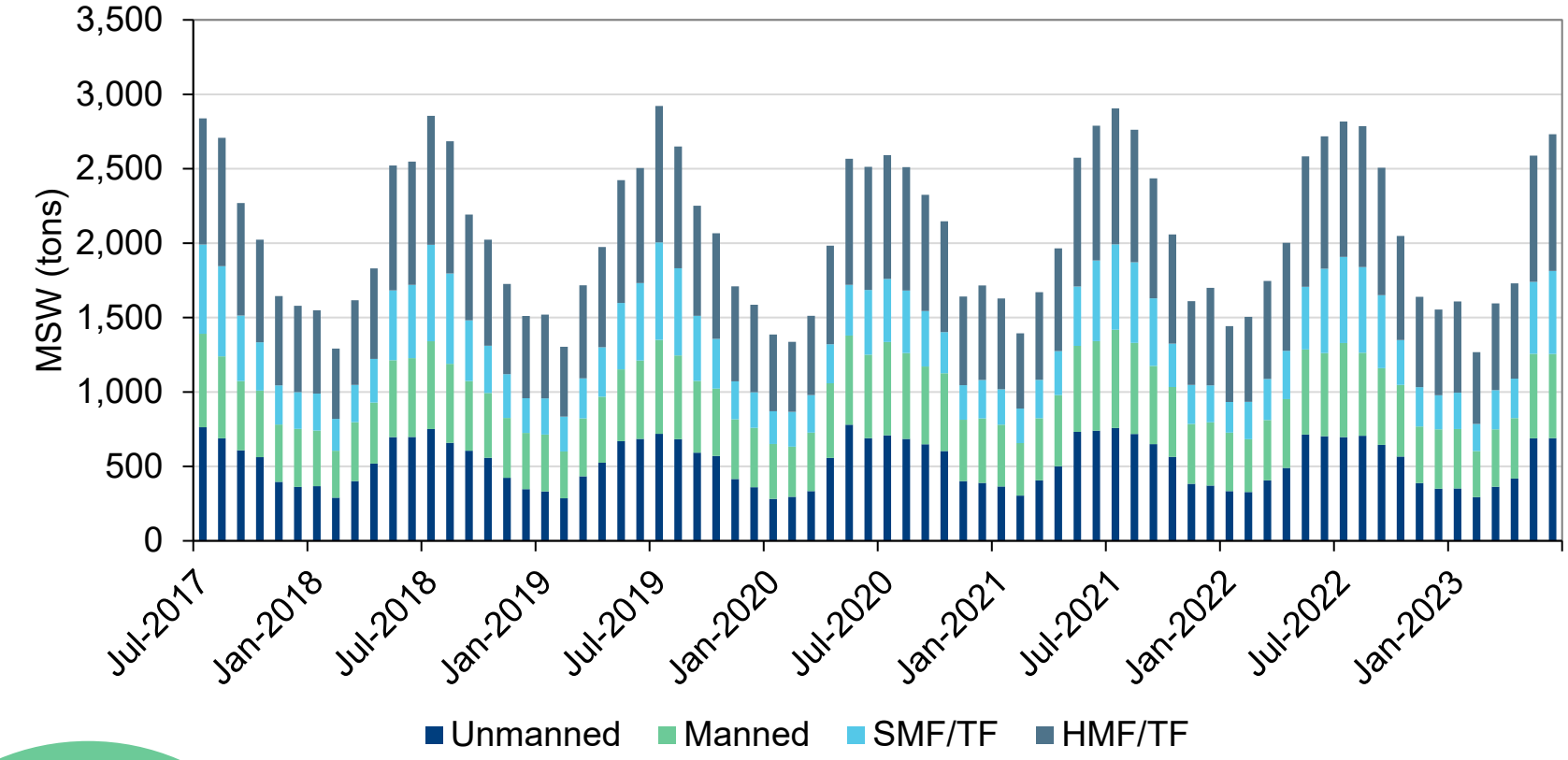
TRANSFER SITE ANALYSIS

Transfer Sites and Facilities



Seasonality of Usage



KEY TAKEAWAY

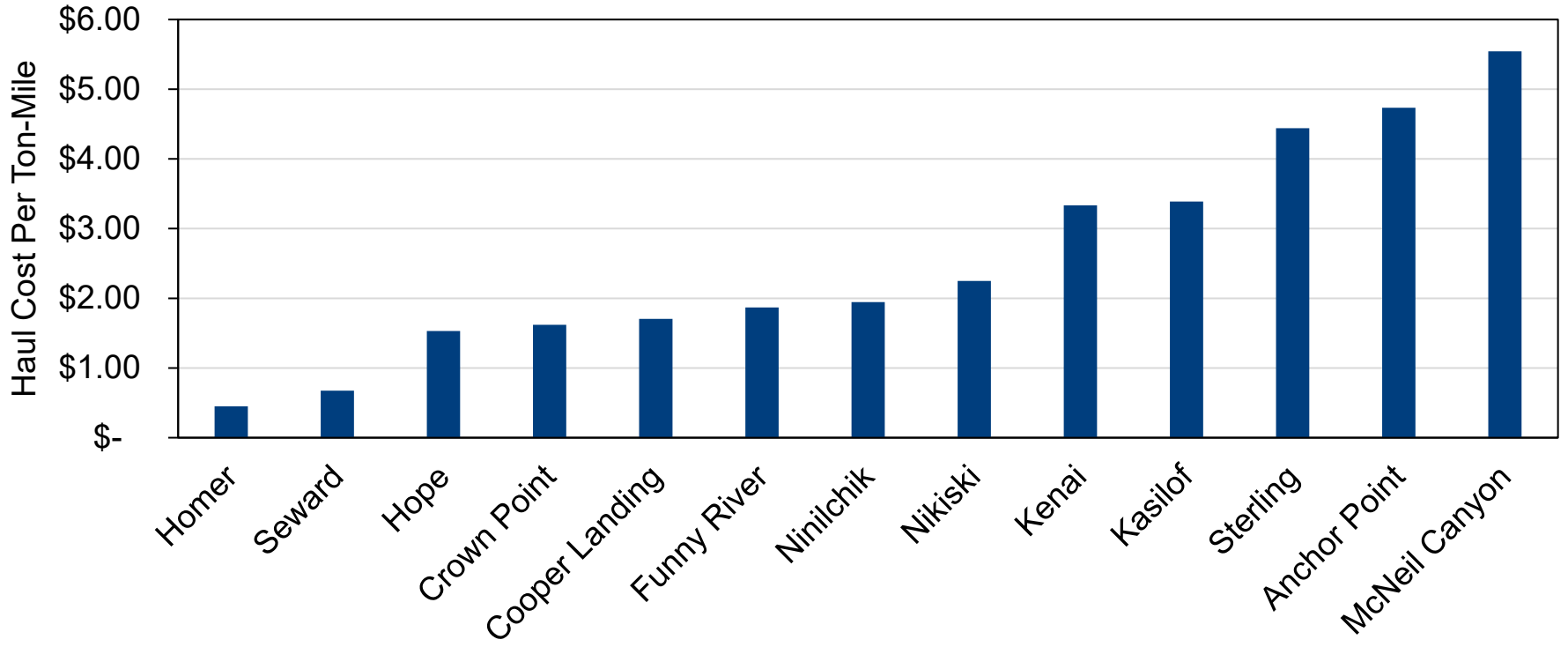
Transfer site utilization is highly seasonal, with more waste accepted in summer compared to winter

Challenges

- Illegal dumping, scavenging and vandalism
- Full recycling containers
- Recycling contamination
- High operational costs at Seward and Homer compared to Lower 48

Challenges – Dumping and Vandalism

An illegally dumped mattress and graffiti at Ninilchik transfer site (unmanned).



HAUL COSTS

Sites with longer haul distances have greatest overall costs but lowest normalized costs.

Haul costs normalized to distance are significantly higher for Anchor Point and McNeil Canyon.

Larger Containers

- Increase size at unmanned sites to reduce no. of hauls

Install Signage, Reduce Hours

- Mitigation for dumping and vandalism

Crown Point → STF

- Consolidate CP loads at STF to reduce haul costs

Upgrade to Manned

- Upgrade Anchor Point, Kasilof and McNeil Canyon

Recycling at Unmanned Sites

- Remove or replace containers

STF and HTF Upgrades

- Improve compaction
- Add skirting
- Improve traffic flow
- Analyze ops costs

Recommendations for Transfer Sites

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NEW TECHNOLOGIES AND METHODOLOGIES

Size Reduction (Grinding/Shredding)

Facility Information			Size Reduction	
Borough	**Location**	**Landfill Name**	**Land Clearing/ Yard Waste[1]**	**Tires**
Kenai Peninsula	Soldotna	Central Peninsula Landfill	✓	✗
Anchorage	Anchorage	Anchorage Regional Landfill	✓	✓
Matanuska-Susitna	Palmer	Palmer Central Landfill	✓	✓
Fairbanks North Star	Fairbanks	South Cushman Landfill	✗	✗
Juneau	Juneau	Capitol Disposal Landfill	✗	✗

Alternative Daily Cover (ADC)

Facility Information			Alternative Daily Cover
Borough	Location	Landfill Name	
Kenai Peninsula	Soldotna	Central Peninsula Landfill	None
Anchorage	Anchorage	Anchorage Regional Landfill	Tarp machine year-round (if the below are unavailable); Shredded wood waste, ground C&D debris and auto-shredder fluff seasonally, as available
Matanuska-Susitna	Palmer	Palmer Central Landfill	Tarp (when wind <20mph)
Fairbanks North Star	Fairbanks	South Cushman Landfill	EnviroCover® (April 30 to October 1)
Juneau	Juneau	Capitol Disposal Landfill	Petroleum contaminated soils and incinerator ash, as available

TARPS AS ADC

Using tarps as alternative daily cover can help reduce leachate production and improve airspace utilization factor.

https://tarpomatic.com.au/

Other Processes Considered

Recyclables

- Similar materials collected across AK

Composting

- Prevalent in other AK boroughs, but not at LF
- Mat-Su and Juneau received federal funding

Scalehouse Technology

- WasteWorks is industry preferred
- RFID lanes not recommended

Recommendations for New Technologies and Methodologies

Size Reduction

- Get mulching/grinding quotes
- Repair air curtain

Alternative Daily Cover

- Consider using tarps as ADC
- Get quotes for other ADC's

Recycling

- No changes recommended

Composting

- Support backyard initiatives
- Gauge public interest

Scalehouse Tech

- No changes recommended

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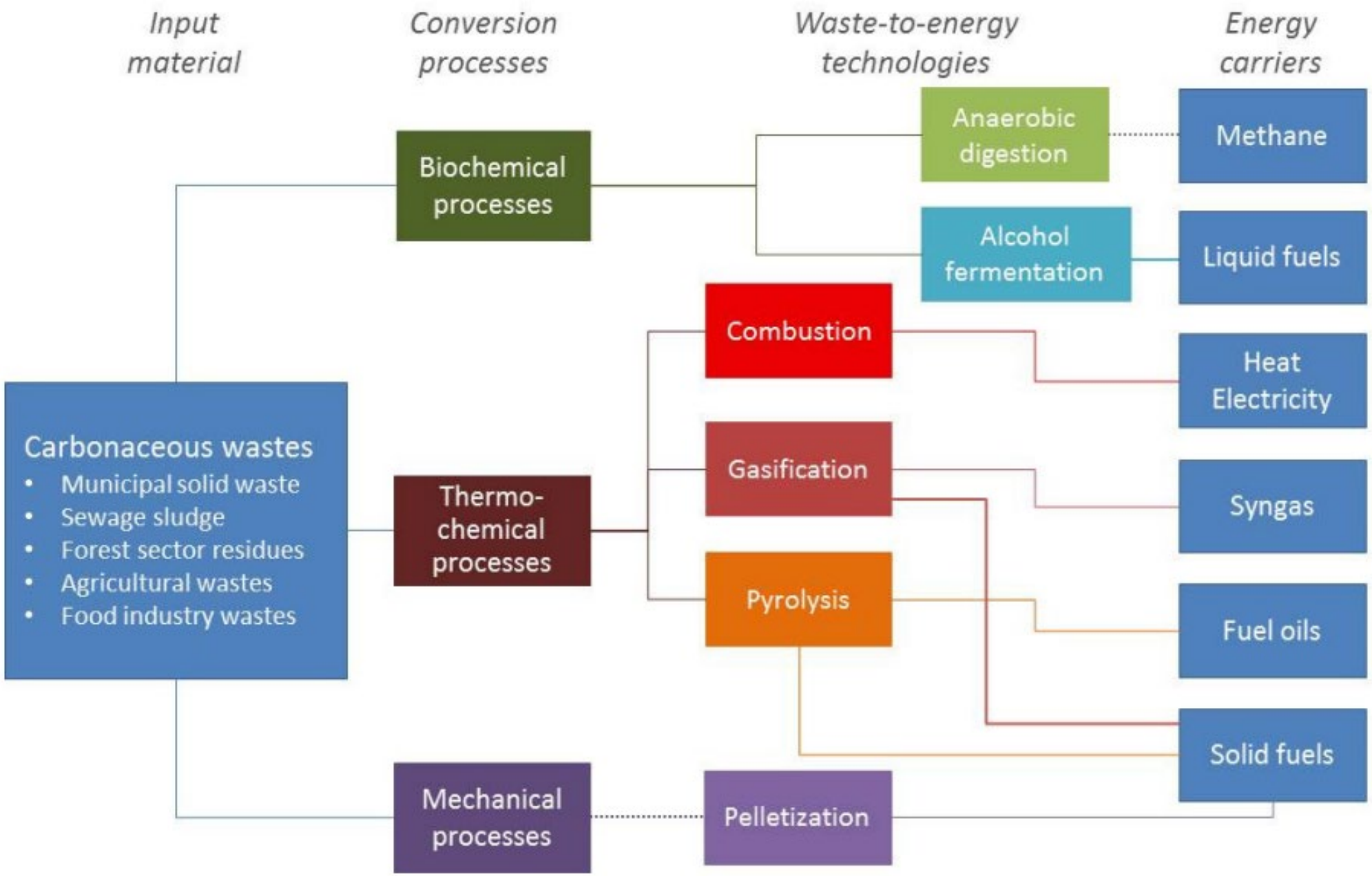
WASTE-TO-ENERGY REVIEW

WTE



Waste-to-energy technologies (from Caló and Pongrácz, 2014)

Caló, A. and Pongrácz, E. (2014). “The Role of Smart Energy Networks to Support the Application of Waste-to-Energy Technologies.” Pollack Periodica 9.

WTE FOR KPB

Geosyntec does not recommend that KPB independently pursue WTE, but should consider contributing waste by rail if a regional facility is constructed.

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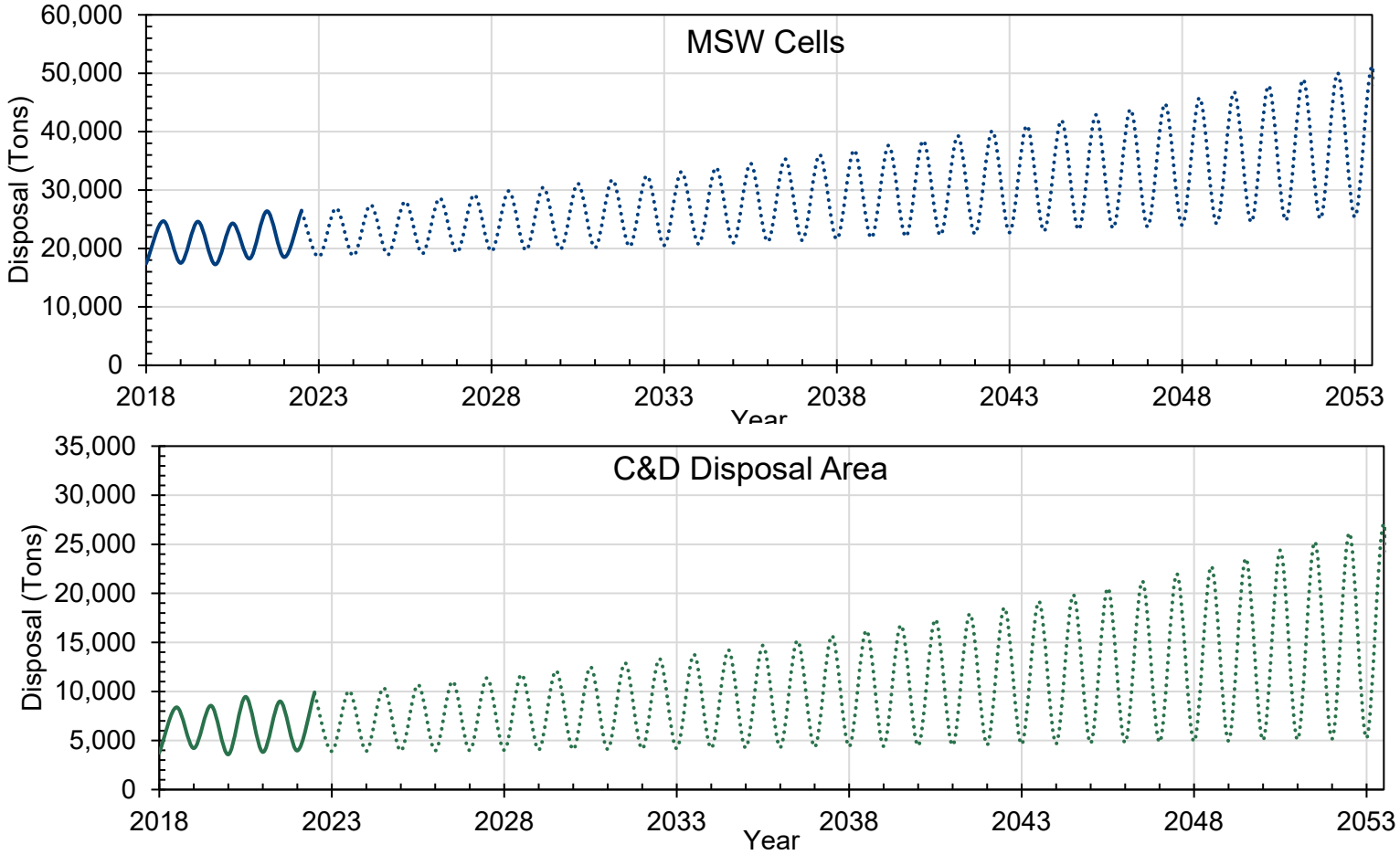
CPL DEVELOPMENT PLAN

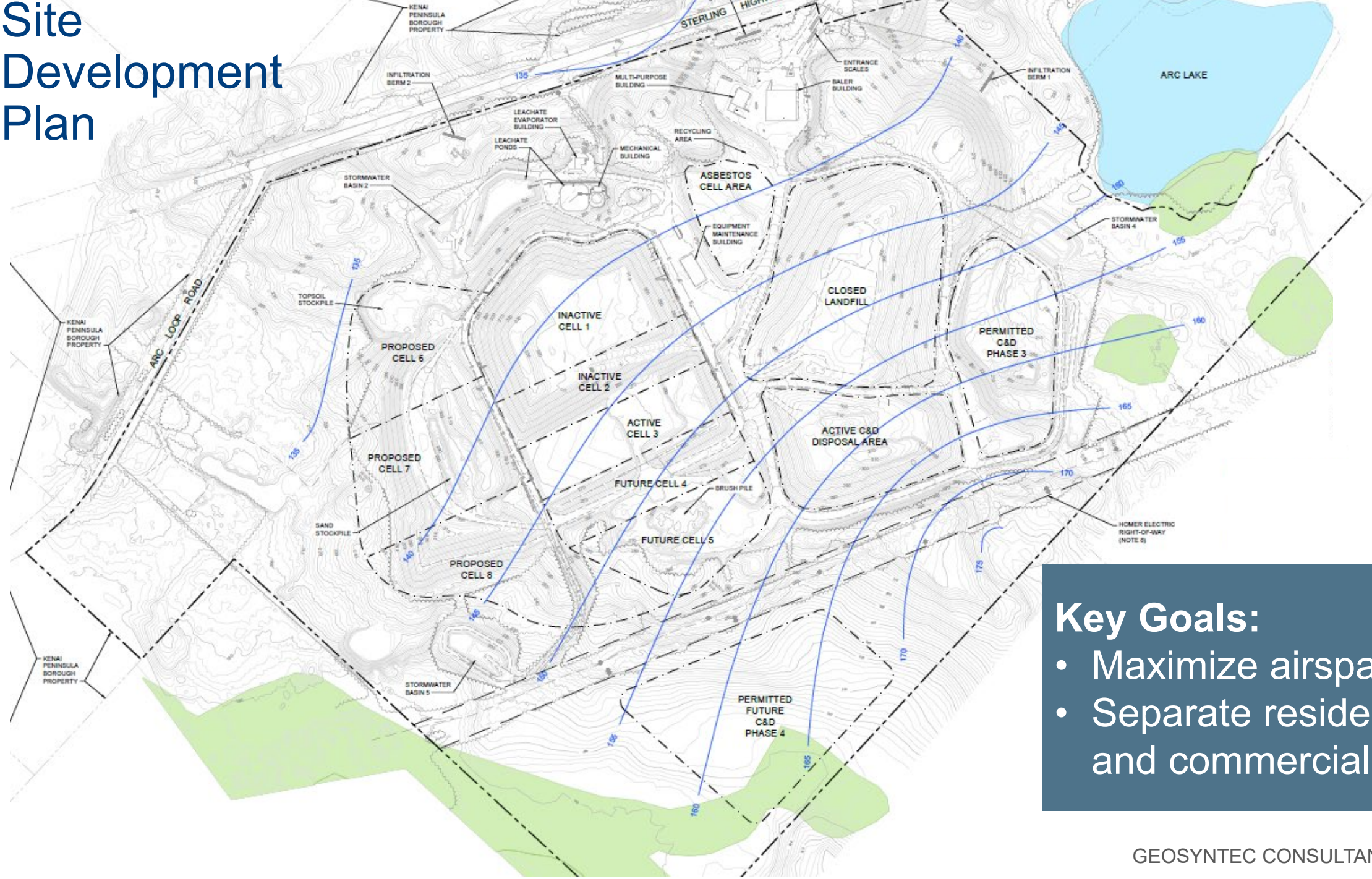
Disposal Capacity Projections



KEY TAKEAWAY

Anticipate increasing disposal and increasing seasonality over the next 30 years

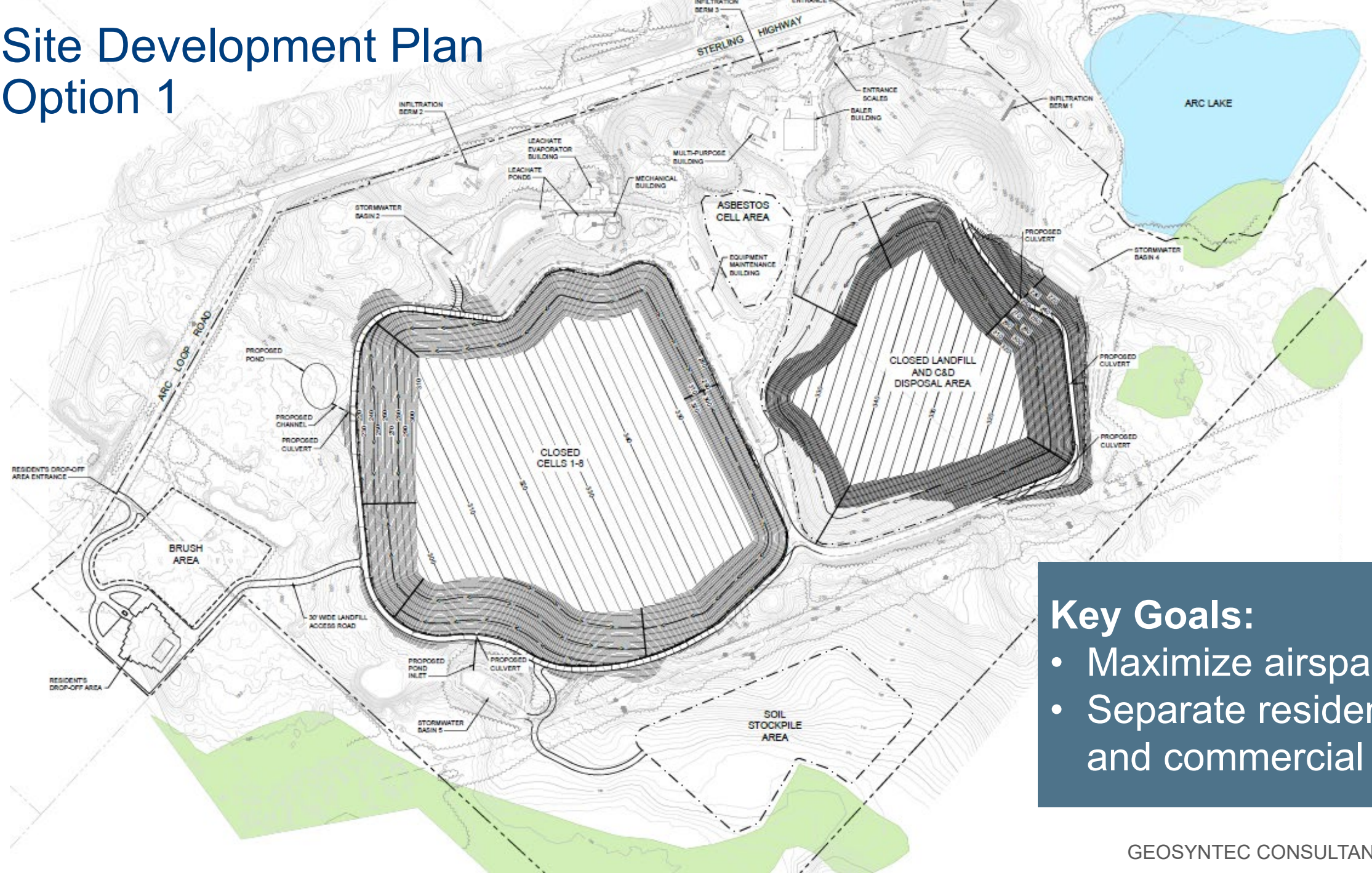
Site Development Plan



Key Goals:

- Maximize airspace
- Separate residential and commercial traffic

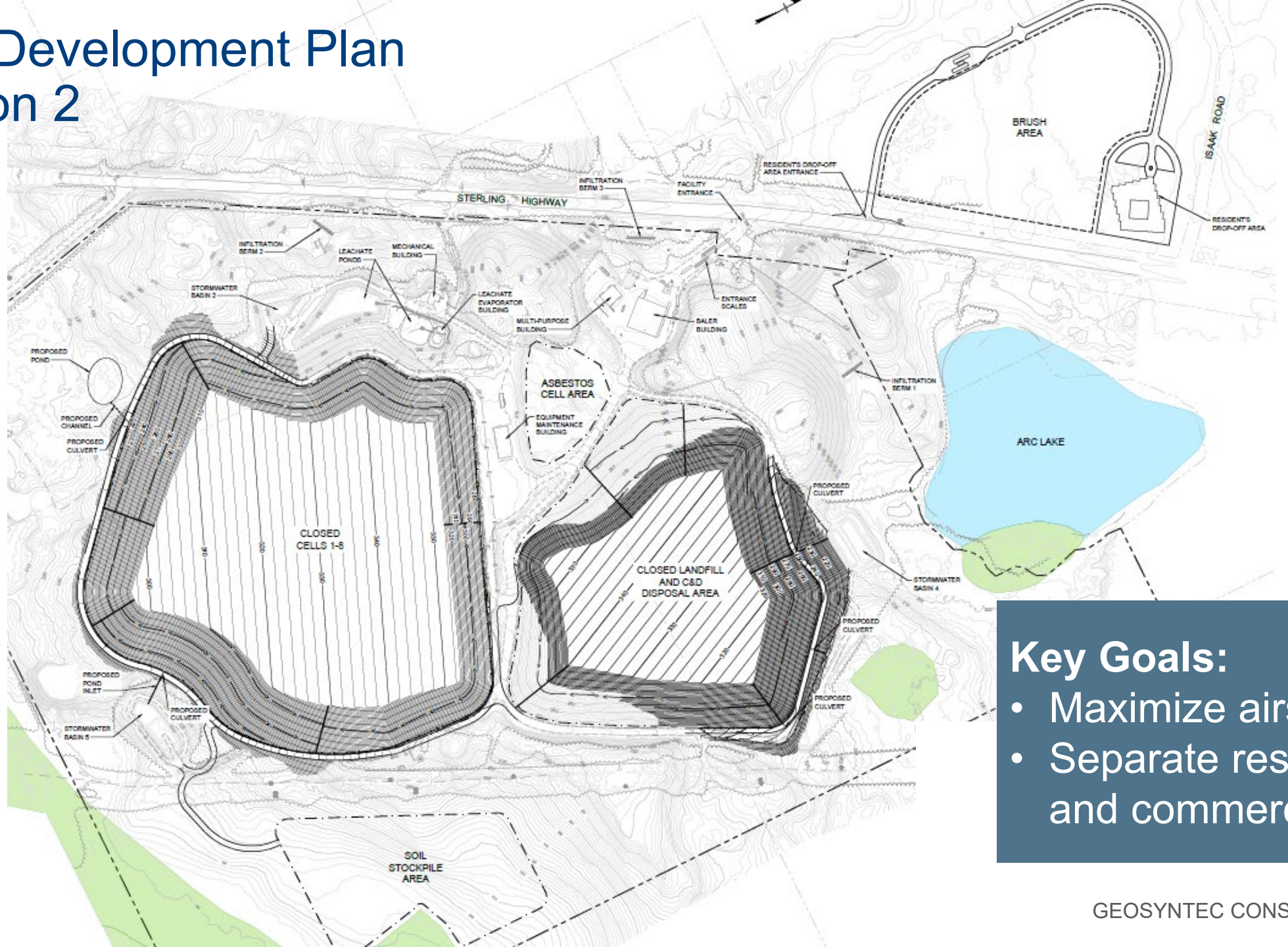
Site Development Plan
Option 1



Key Goals:

- Maximize airspace
- Separate residential and commercial traffic

Site Development Plan
Option 2

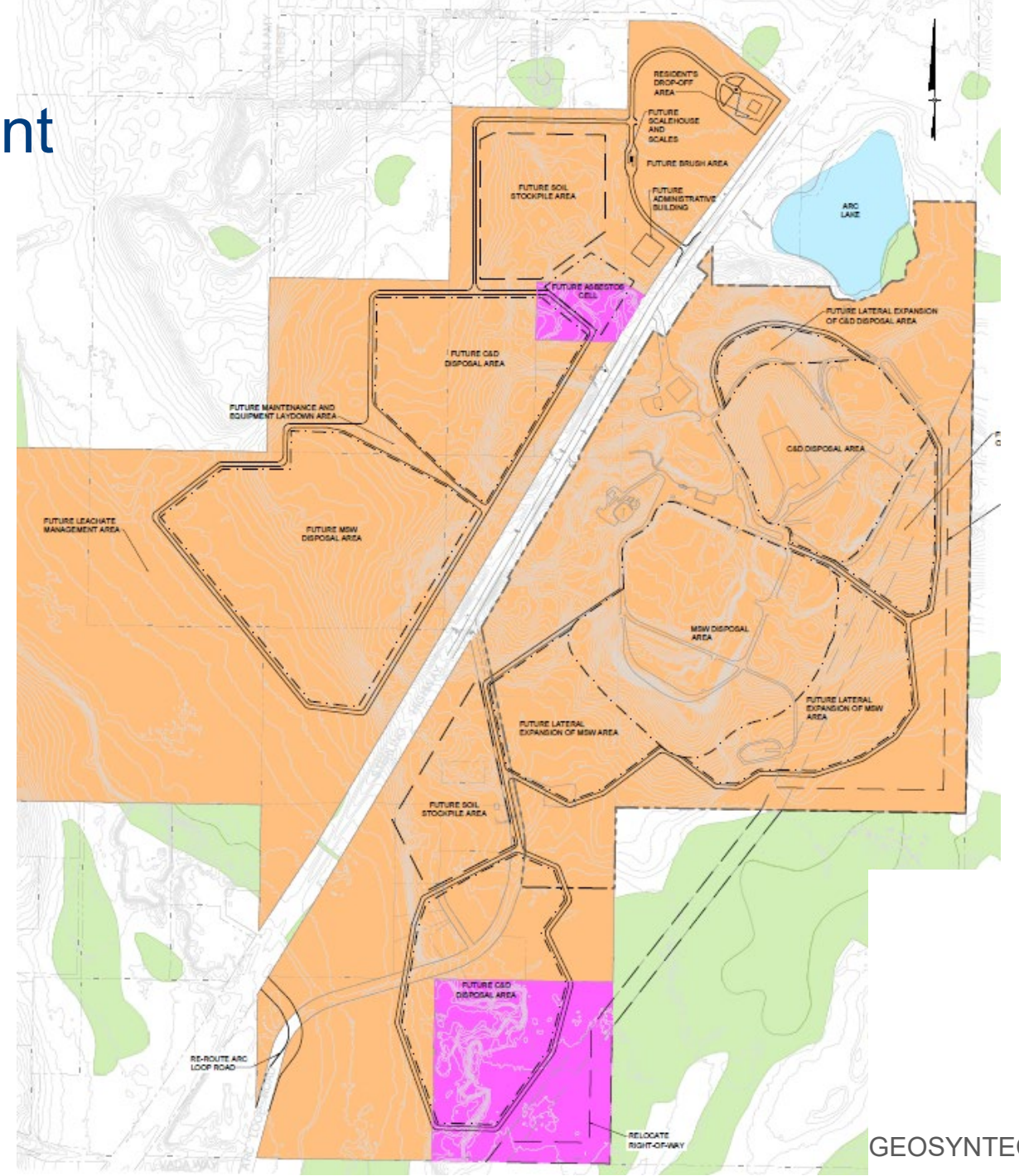


Key Goals:

- Maximize airspace
- Separate residential and commercial traffic

Recommended Long-Term Development

- If additional land is designated for solid waste use, CPL has >90 years of capacity remaining
- Long-term plan is to move entire operation across Sterling Highway when current areas are depleted (estimated 2090)



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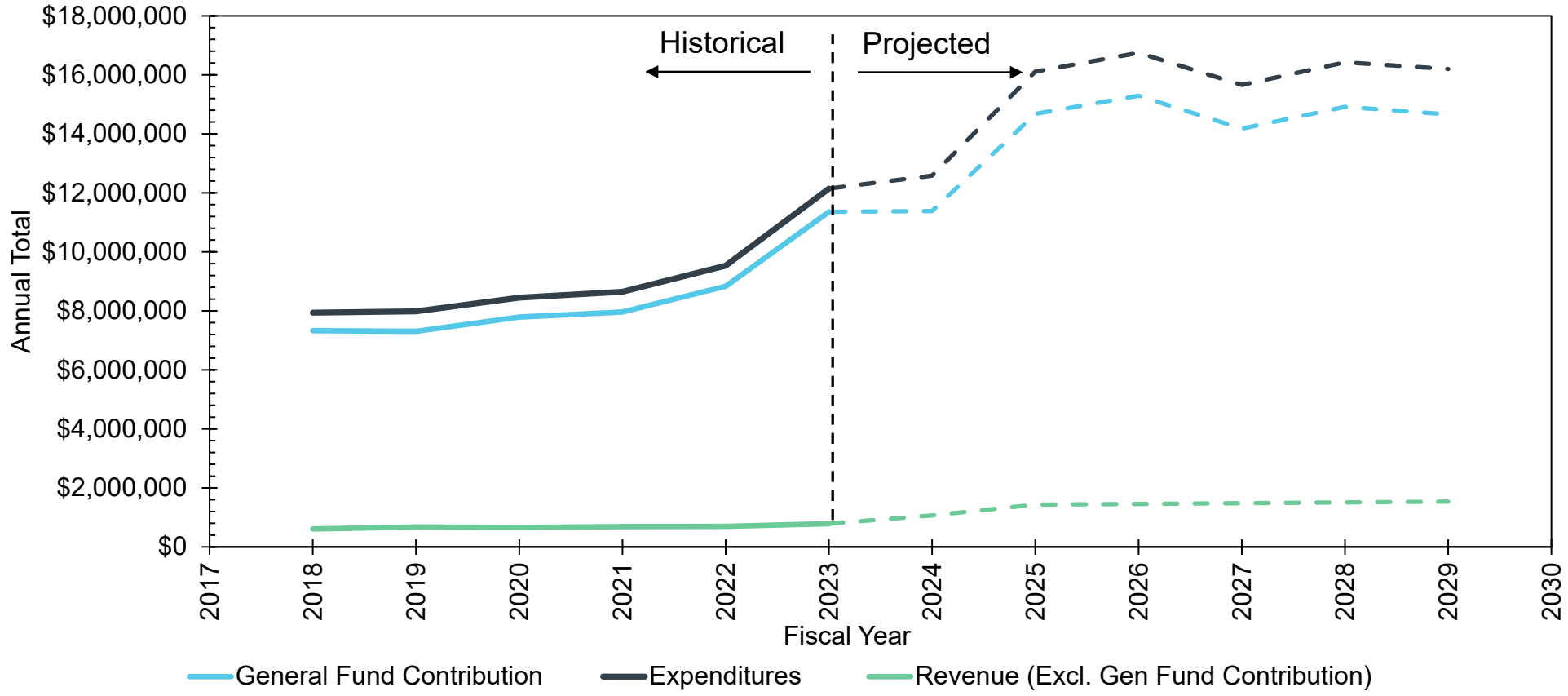
COST REVIEW

Financial Projections



KEY TAKEAWAY

Revenues are expected to increase as a result of recent tipping fees changes, but will still be outpaced by expenditure increases.

Cost of Services to Residents

Metrics	Historical						Projected					
	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
CPL Approx. Cost/Ton of Waste	$65	$69	$72	$72	$73	$84	$93	$113	$116	$123	$137	$146
CPL Revenue/Ton of Waste	$7	$8	$7	$7	$7	$7	$11	$15	$15	$16	$16	$16
Avg. General Fund Contribution/Resident/ Year	$126	$125	$132	$136	$149	$191	$192	$247	$257	$238	$250	$245
Avg. General Fund Contribution/Household/ Year	$310	$308	$326	$334	$367	$471	$472	$608	$632	$585	$615	$603

Alternative Rate Scenarios

- **Scenario A (Low Impact) –** Increase fees for C&D debris, wood/land clearing debris, and tires by 50% (i.e., the same total increase that fees were most recently increased by) and continue to only charge commercial customers;
- **Scenario B (Medium Impact) –** Charge all customers for MSW disposal and begin charging residents for C&D disposal at CPL, HMF/TF and SMF/TF; and
- **Scenario C (High Impact) –** Have residents purchase a sticker that allows them access to dump waste at KPB facilities, and have commercial customers pay tipping fees for MSW.

Scen.	Waste Stream	Unit	Current Rate	Proposed Rate
A	C&D	per ton	$90.00	$135.00
	C&D	per CY	$18.00	$27.00
	Land Clearing	per ton	$90.00	$135.00
	Land Clearing	per CY	$18.00	$27.00
	Tires	per ton	$90.00	$135.00
	Tires	per CY	$18.00	$27.00
B	MSW	per ton	$0	$80.00
		per compacted CY	$0	$20.00
		per non-compacted CY	$0	$10.00
	Residential C&D	per ton	$0	$90.00
		per CY	$0	$18.00
C	Commercial MSW	per ton	$0	$100.00
	Commercial MSW	per compacted CY	$0	$20.00
	Assessment	per household	$0	$200.00

Recommended Rate Increases

- Conversion to Enterprise Fund is not recommended
- Increasing direct charges spreads cost more equitably

Scen.	Waste Stream	Unit	Current Rate	Proposed Rate	Impact
A	C&D	per ton	$90.00	$135.00	Revenue increase = $656,000/yr GF decrease = 4%
	C&D	per CY	$18.00	$27.00	
	Land Clearing	per ton	$90.00	$135.00	
	Land Clearing	per CY	$18.00	$27.00	
	Tires	per ton	$90.00	$135.00	
	Tires	per CY	$18.00	$27.00	
B	MSW	per ton	$0	$80.00	Revenue increase = $3.27M/yr GF decrease = 22%
		per compacted CY	$0	$20.00	
		per non-compacted CY	$0	$10.00	
	Residential C&D	per ton	$0	$90.00	
		per CY	$0	$18.00	
C	Commercial MSW	per ton	$0	$100.00	Revenue increase = $4.4M/yr GF decrease = 30%
	Commercial MSW	per compacted CY	$0	$20.00	
	Assessment	per household	$0	$200.00	

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SUMMARY AND CONCLUSIONS

Increase Tipping Fees

- Increase direct contributions to system finances

Separate General Public Traffic

- Increases safety, efficiency of operation

Permit Cells 4-8 and C&D Expansion

- Provides disposal capacity through 2053

Use Tarps as ADC

- Mitigates leachate challenges and increases AUF

Upgrade Unmanned Sites

- Staff sites at Anchor Point, Kasilof and McNeil Canyon
- Upgrade recycling containers

Add Staff and Reduce Hours

- Reduce operations to 5 ½ days/week
- Add a leachate treatment FTE

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THANK YOU

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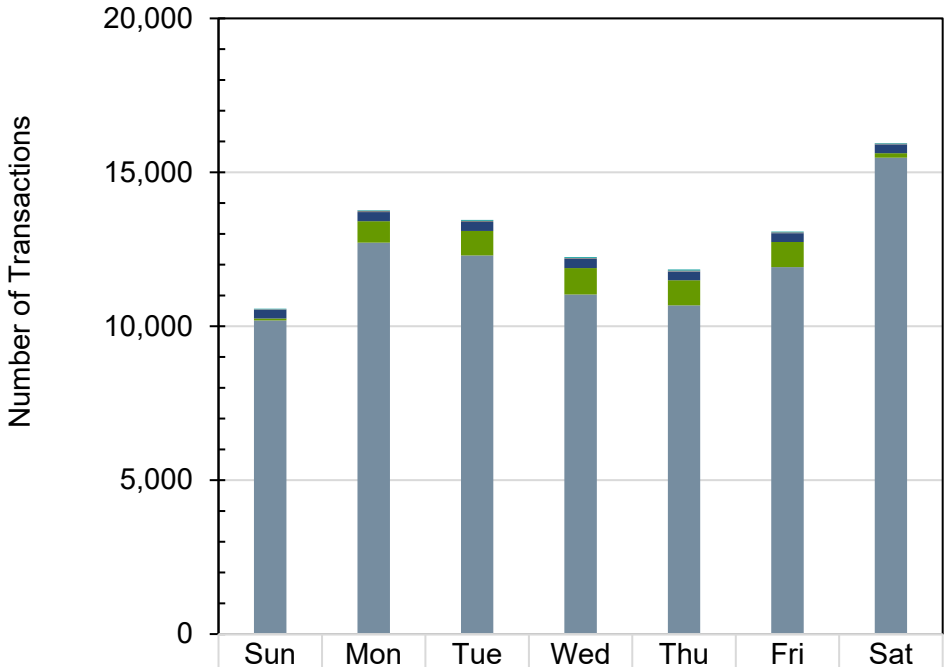
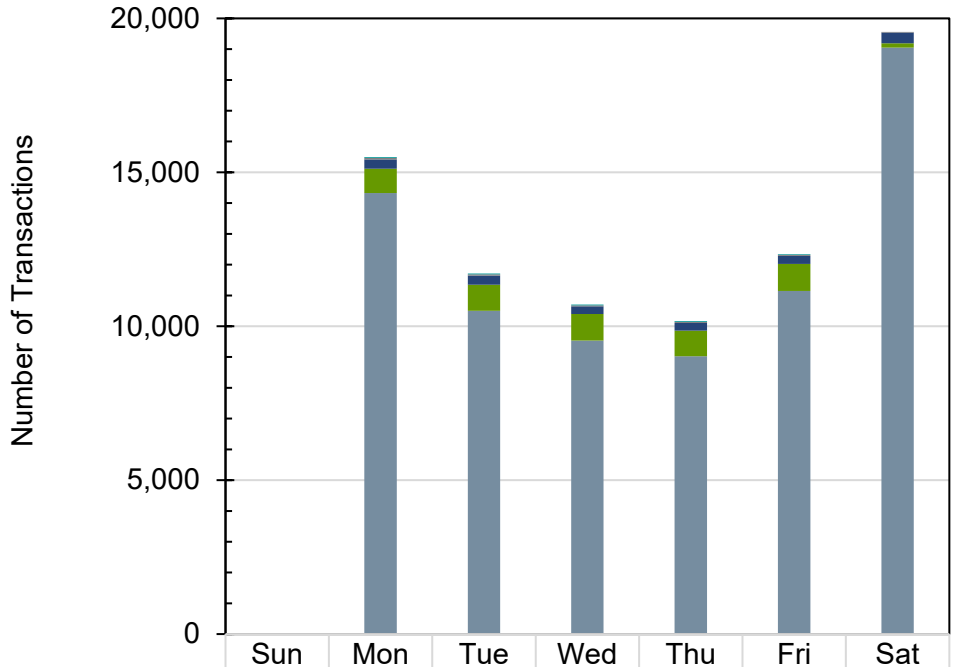
Transactions per Day of the Week

Summer 2022 (May - Sept)



	Sun	Mon	Tue	Wed	Thu	Fri	Sat
SMF/TF	17	19	24	24	31	22	15
HMF/TF	16	38	43	29	33	33	28
Other TF/TS	285	297	291	299	283	283	285
Other Commercial	60	697	796	856	816	816	143
General Public	10,192	12,716	12,298	11,034	10,678	11,922	15,476

Winter 2022 (Jan-April, Oct-Dec)



	Sun	Mon	Tue	Wed	Thu	Fri	Sat
SMF/TF	0	24	26	25	26	21	0
HMF/TF	0	54	43	33	36	35	21
Other TF/TS	0	299	293	249	249	258	347
Other Commercial	0	792	848	863	833	879	141
General Public	0	14,326	10,502	9,535	9,026	11,146	19,048

Scenario A

Adjusted Rate Structure Projections *Impact of tipping fee changes on revenue*	Proposed Rate	Projected Revenue[3]					
		FY24	FY25	FY26	FY27	FY28	FY29
C&D (per ton)	$135	$525,440	$1,076,112	$1,102,400	$1,129,746	$1,158,152	$1,187,690
Land Clearing (per ton)	$135	$13,346	$281,506	$281,914	$282,321	$282,729	$283,136
Tires (per ton)	$135	$18,507	$3,663	$3,826	$3,994	$4,176	$4,364
C&D (per CY[1])	$27	$77,510	$155,936	$158,600	$161,310	$164,066	$166,869
Land Clearing (per CY[1])	$27	$2,622	$7,682	$7,693	$7,704	$7,715	$7,726
Tires (per CY[1])	$27	$0	$0	$0	$0	$0	$0
Change in Revenue[2]		**$0**	**$656,210**	**$665,250**	**$674,625**	**$684,286**	**$694,301**
General Fund Contribution Required		***$11,384,528***	***$14,019,103***	***$14,623,779***	***$13,499,891***	***$14,230,711***	***$13,965,207***
Avg. General Fund Contribution/Household/Year		*$472*	*$580*	*$605*	*$557*	*$587*	*$575*

KEY TAKEAWAY

4% reduction in General Fund Contribution

Scenario B

Adjusted Rate Structure Projections *Impact of tipping fee changes on revenue*	Proposed Rate	Projected Revenue[3]					
		FY24	FY25	FY26	FY27	FY28	FY29
MSW (per ton, CPL and Homer)	$80	$0	$2,426,716	$2,467,343	$2,508,909	$2,551,413	$2,594,911
MSW (per compacted CY, Seward)	$20	$0	$146,825	$149,283	$151,798	$154,369	$157,001
MSW (per non-compacted CY, Seward)	$10	$0	$18,353	$18,660	$18,975	$19,296	$19,625
Res. C&D (per ton, CPL and Homer)	$90	$0	$672,020	$688,437	$705,514	$723,253	$741,700
Res. C&D (per CY, all sites w/o scales)[1]	$18	$0	$10,396	$10,573	$10,754	$10,938	$11,125
Change in Revenue[2]		**$0**	**$3,274,309**	**$3,334,296**	**$3,395,949**	**$3,459,270**	**$3,524,361**
General Fund Contribution Required		***$11,384,528***	***$11,401,003***	***$11,954,733***	***$10,778,567***	***$11,455,727***	***$11,135,146***
Avg. General Fund Contribution/Household/Year		*$472*	*$472*	*$494*	*$445*	*$472*	*$458*

KEY TAKEAWAY

22% reduction in General Fund Contribution

Scenario C

Adjusted Rate Structure Projections *Impact of tipping fee changes on revenue*	Proposed Rate[4]	Projected Revenue[3]					
		FY24	FY25	FY26	FY27	FY28	FY29
Comm. MSW (per ton, CPL and Homer)	$100		$1,932,957	$1,965,318	$1,998,427	$2,032,283	$2,066,930
Comm. MSW (per compacted CY, Seward)	$20		$146,825	$149,283	$151,798	$154,369	$157,001
Assessment (per household)[1]	$200		$2,324,201	$2,327,443	$2,330,684	$2,333,965	$2,337,246
Change in Revenue[2]			**$4,403,983**	**$4,442,044**	**$4,480,909**	**$4,520,617**	**$4,561,177**
General Fund Contribution Required		***$11,384,528***	***$10,271,330***	***$10,846,986***	***$9,693,607***	***$10,394,380***	***$10,098,330***
Avg. General Fund Contribution/Household/Year		*$472*	*$425*	*$448*	*$400*	*$428*	*$416*

KEY TAKEAWAY

30% reduction in General Fund Contribution

Peer Tipping Fees

Facility	Limitations	Municipal Solid Waste	C&D	Wood/Land Clearing Debris
Kenai Peninsula Borough	N/A	No charge	Free for Residential; $90.00 per ton 1 CY ($20 minumum charge): $20.00 2-5 CY $90.00/load 6-10 CY: $180.00/load 11-20 CY: $360.00/load 21-30 CY: $540.00/load 31-40 CY: $720.00/load	
Anchorage Regional Landfill	<1 CY	$8 (or $3 for <4 garbage bags)	$110/ton	Fee = 1/2 of per ton rate (wood is free)
	>1 CY < 5 CY (and <1,000lbs)	$18/load		
	>5 CY or >1,000lbs	$18/load or $76.47/ton (whichever is greater)		
	If no scales: <5CY	$11.25/CY if non-compacted or $22.5/CY if compacted		
Anchorage Transfer Station	>5 CY or >1,000lbs	$22/load or $89.21/ton	Not accepted	Not accepted
Palmer Central Landfill	<=33-gallons, bagged or canned	$2/bag (limit of 5 bags)	N/A	N/A
	Per ton basis	In Borough $142/ton; Outside Borough $248/ton	In Borough $135/ton; Out of Borough $270/ton	Free for Residential; Commercial $128/ton

Peer Tipping Fees

Facility	Limitations	Municipal Solid Waste	C&D	Wood/Land Clearing Debris
Palmer Transfer Station	<=33-gal bas	$2/bag	Same as MSW	Free for Residential; Commercial N/A
	Loads cannot exceed 5CY or 8ft in length	$17/CY	Same as MSW	
South Cushman Landfill	N/A	Free for residential; In Borough Commercial $137/ton; Out of Borough Commercial $270/ton	Same as MSW	Same as MSW
Fairbanks North Star Borough Transfer Facilities	Only for residents	Free for residents; no commercial allowed	Not accepted	Free for residents; no commercial allowed
FCSWDD Landfills and Bale Stations	Loads of up to two bags are charged at minimum fee.	$80/ton minimum of $5.00 for up to 200 lbs	$80/ton minimum of $5.00 for up to 200 lbs	No charge
FCSWDD Volunteer Operated Transfer Sites	N/A	$10/CY $10 minimum	$10/CY $10 minimum	No charge
FCSWDD District Operated Transfer Sites	N/A	$5/CY $5 minimum	$5/CY $5 minimum	No charge

Cost of Recycling per Ton

	1	2	3	4	(3+4)-(1+2)
List of Commodities	**Sort /Process /Bale Cost per year**	**Annual Shipping Cost**	**Value of Airspace per year**	**Value of Recycled material per year**	**Net Value (cost) of Recycling[1]**
Plastics #1	$3,753	$65	$121	$0	($3,697)
Plastics #2	$3,784	$65	$122	$0	($3,727)
Cardboard	$253	$65	$121	$10	($187)
Mixed Paper	$273	$70	$131	$0	($212)
Office Pack (shredded Paper)	$262	$67	$126	$15	($189)
Aluminum	$727	$76	$143	$540	($121)
Tin	$410	$0	$125	$0	($285)
Total	**$400**	**$66**	**$124**	**$24**	**($318)**

Construction Schedule and Cost

Construction Event	Design	Construction	Operation	Total Cost[1]
MSW Cell 4	2025	2027	2029	$4,628,440
MSW Cell 5	2031	2033	2035	$5,210,450
Residents' Drop-off Area	2031	2033	2035	$8,302,734
C&D Vertical Expansion	2032	2034	2036	$300,000
MSW Cell 6	2038	2040	2042	$8,759,150
MSW Cell 7	2041	2043	2045	$11,058,700
MSW Cell 8	2050	2052	2054	$10,048,910

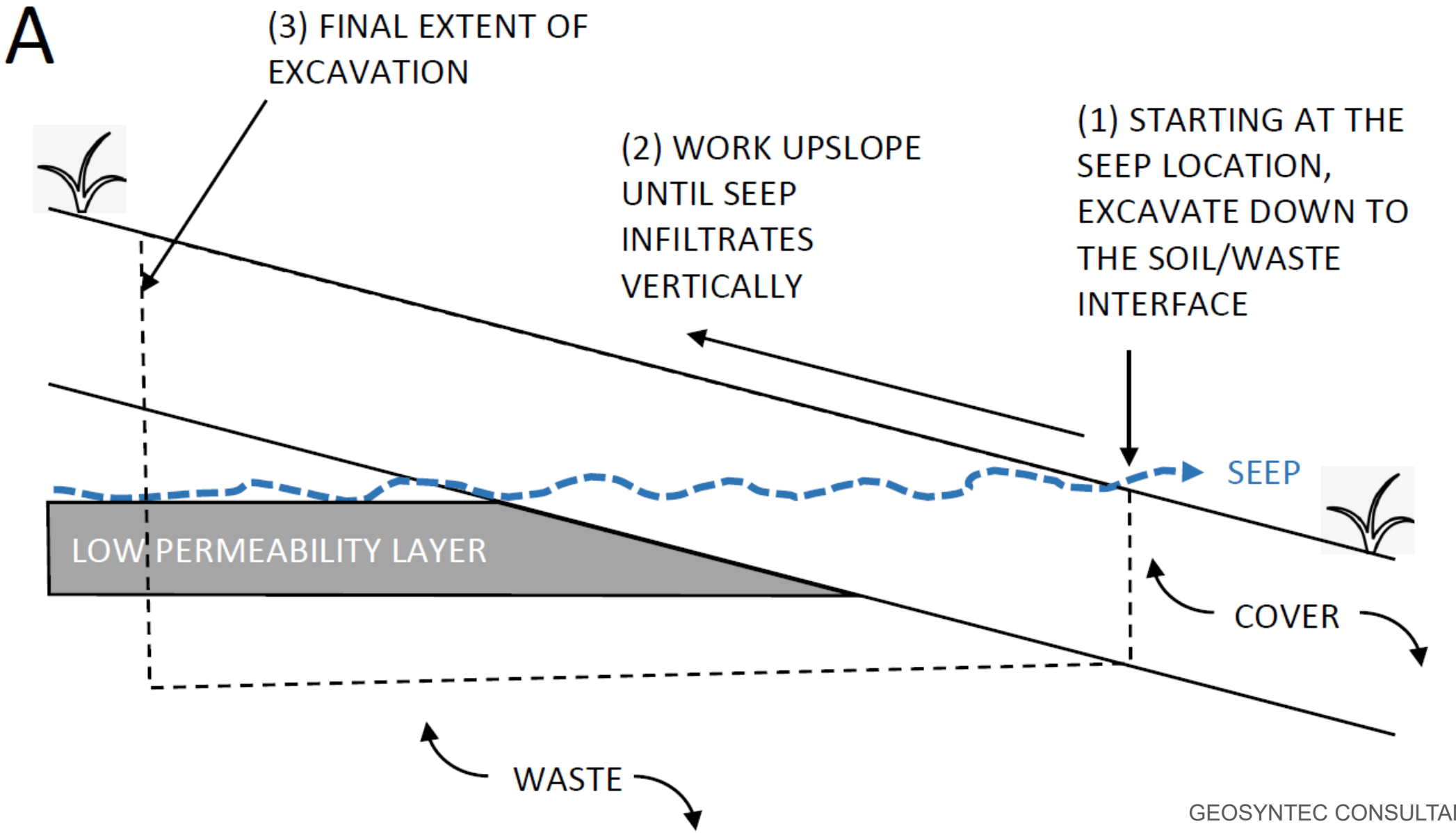
1. In 2024 dollars.

Closure and Post-Closure Cost Estimates

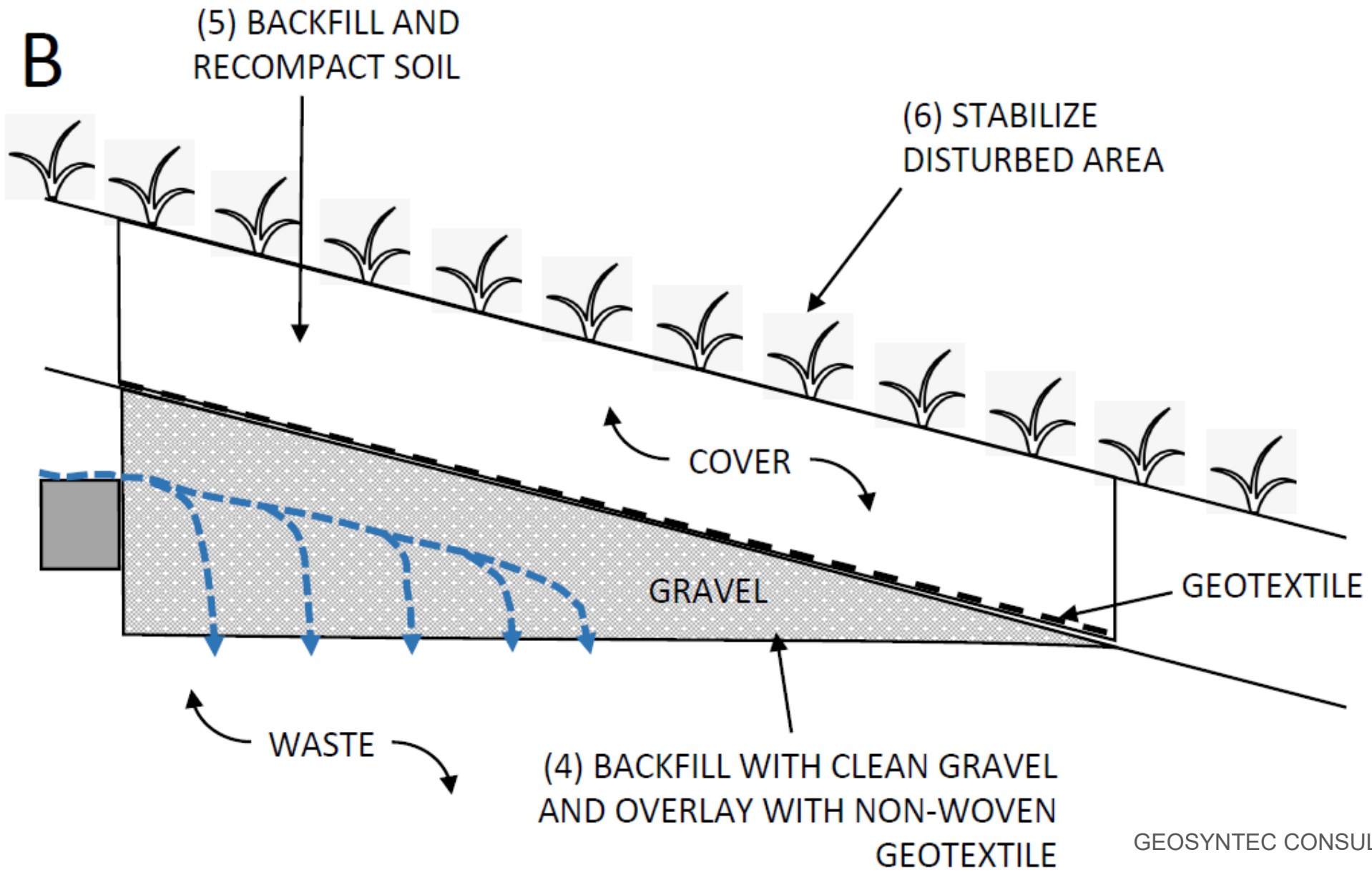
Disposal Area	Inflated 2023 Estimate[1]		Recalculated 2023 Estimate[2]	
	Closure Cost	Total Post-Closure Care Cost	Closure Cost	Total Post-Closure Care Cost
Lined MSW Cells	$8,797,078	$1,716,533	$14,781,008	$10,724,088
C&D Disposal Area	$1,716,533		$8,685,446	
Asbestos Disposal Area	$783,775		$954,911	

- High inflation from 2021 through 2023 (average of 6.2% annually);
- Soil and gravel unit costs are two to three times higher than budgeted in the 2021 estimate based on local estimates;
- The geotextile layer was not budgeted for in the 2021 estimate;
- Installation of an active gas collection system was not budgeted for in the 2021 estimate;
- Based on site records, annual leachate management costs are 29 times higher than budgeted in the 2021; and
- Based on CPL's current service contract, water monitoring costs are eight times higher than budgeted in 2021.

Remediating Leachate Seeps



Remediating Leachate Seeps



Remediating Leachate Seeps

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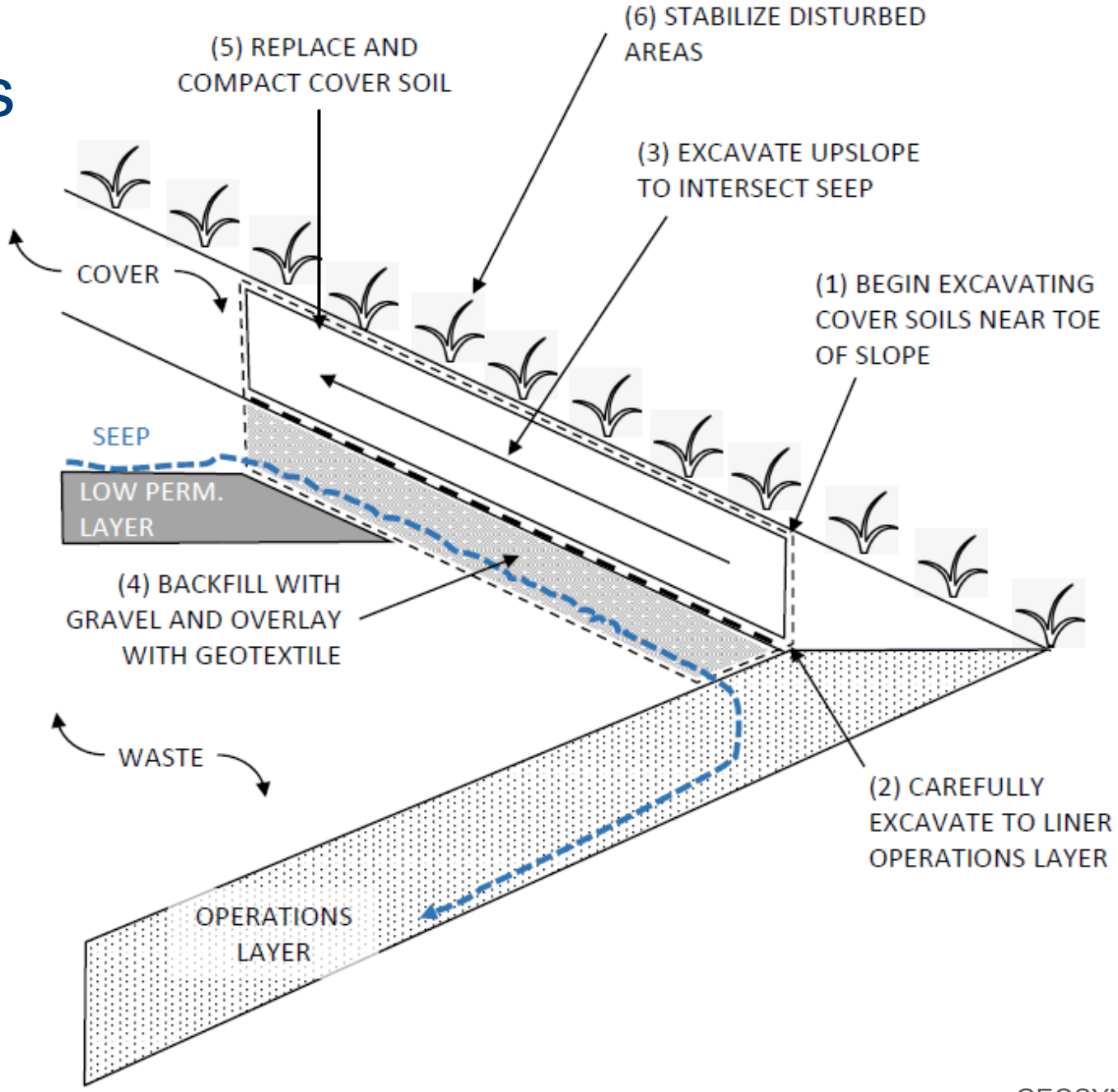

Technology Comparison

WTE Process	CAPEX	OPEX	Benefits	Challenges
Combustion Based	$78M	$1.7M/year	• Revenue • Airspace	• High capital cost • Small capacity • Permitting timeline • Public opposition
Waste-by-Rail to Regional WTE	$7M	$5-8M/year	• Airspace	• No regional WTE • OPEX similar to CPL • Space restrictions
Anaerobic Digestion	$3.4M	$170k/year	• Revenue • Airspace • GHG reduction	• Limited waste streams • Markets for end products • PFAS
Solid Recovered Fuels	$21M	$3M/year	• Revenue • Airspace	• Unproven technology • Markets for end products
Gasification	$74M	$4M/year	• Revenue	• High capital cost • Unproven technology