

Attachment #4 – Closure and Post-Closure

2.0 – CLOSURE PLAN

2.1 CLOSURE SCHEDULE

The Landfill will be closed in two operations; the first closure will occur as the west half of Phase B is to final grade; and the last closure will take place once the entire Landfill is to final grade. As indicated in Part II – General Report, the Phases have been designated to facilitate access, development and design. Based on facility life calculations using a zero percent growth rate, closure is expected around the year 2035.

2.2 DESIGN OF FINAL COVER

As discussed previously, the final cover will consist of a minimum of two feet of soil six inches of which will consist of a topsoil material. The slopes of the side slopes of the final cover will be no steeper than a 4:1 (horizontal to vertical) with no portion of the final cover less than a 5% slope. The cover soil will be seeded with indigenous grasses.

2.3 CAPACITY OF SITE IN VOLUME AND TONNAGE

The Landfill capacity and projected life by Cell are presented in the following summary table:

ACTIVE CELL	YEAR	ESTIMATED DAILY C&D WASTE (Tons)*	DAYS OF OPERATION	ESTIMATED YEARLY C&D WASTE (Tons)	ESTIMATED YEARLY C&D WASTE (Cu. Yds.)	CUMULATIVE WASTE (Cubic Yards)	REMAINING LANDFILL CAPACITY (Cu. Yds.)
	2019	11	260	2,874	5,748	104,384	110,316
4	2020	13	260	3,380	6,760	111,144	103,835
4	2021	13	260	3,380	6,760	117,904	97,075
4	2022	13	260	3,380	6,760	124,664	90,315
4	2023	13	260	3,380	6,760	131,424	83,555
4	2024	13	260	3,380	6,760	138,184	76,795
5	2025	13	260	3,380	6,760	144,944	70,035
5	2026	13	260	3,380	6,760	151,704	63,275
5	2027	13	260	3,380	6,760	158,464	56,515
5	2028	13	260	3,380	6,760	165,224	49,755
6	2029	13	260	3,380	6,760	171,984	42,995
6	2030	13	260	3,380	6,760	178,744	36,235
6	2031	13	260	3,380	6,760	185,504	29,475
6	2032	13	260	3,380	6,760	192,264	22,715
6	2033	13	260	3,380	6,760	199,024	15,955
6	2034	13	260	3,380	6,760	205,784	9,195
6	2035	13	260	3,380	6,760	212,544	2,435
<p>(Cells 1, 2, and 3 have been filled by the end of 2019)</p> <p>Approximate Initial Waste Disposal Capacity (Cubic Yards) = 214,700</p> <p>Gross Air Space is approximately 226,000 Cubic Yards</p> <p>Net Air Space is approximately 214,700 Cubic Yards based upon a 5% reduction to allow for cover soils</p> <p>Conversion of tons of waste to Cubic Yards of waste is based upon an estimated conversion rate of 1,000 pounds per one Cubic Yard</p>							

2.4 FINAL INSPECTION

A final inspection will be performed at the Landfill site at the termination of landfilling activities. The final inspection will determine if the Landfill meets all the closure requirements as outlined in the permit and closure plans. The final inspection will be performed by both ICSW and State of Utah DWMRC personnel.

3.0 – POST-CLOSURE CARE PLAN

3.1 SITE MONITORING

There are no post-closure monitoring requirements for groundwater or gas at the Landfill since it is a Class IVb facility. However, other physical aspects of the Landfill will be monitored on a quarterly basis.

Landfill topography shall be visually checked for depressions that could result in ponding or rapid erosion. Irregularities in the surface of the final cover will be regraded and revegetated as needed to protect the surface from erosion and to eliminate ponding.

Side slopes will be maintained or reestablished with a maximum gradient of 4:1 and the top slopes will be maintained at no less than 5% to prevent ponding. The frequency of monitoring may be reduced only after a successful demonstration to the Executive Secretary that the closed Landfill has stabilized.

During the post-closure care period, run-off from the covered Landfill will be directed toward ditches constructed to collect and transport runoff to natural drainages west and northwest of the site. The ditches will be inspected quarterly through the post-closure period. Repairs to the ditches will be completed as part of the maintenance activities.

3.2 CHANGES TO RECORD OF TITLE, LAND USE AND ZONING

The Iron County Recorder will be provided plats and a statement of fact concerning the location of any disposal site no later than 60-days after certification of closure. If necessary, the closed Landfill will be rezoned to conform to the existing Iron County zoning regulations after final closure. A description of the Landfill history and filled areas will be permanently appended to the record of title. Land use restrictions will be assigned to the site in compliance with existing regulations for closed landfills at the time of closure.

3.3 MAINTENANCE

Post-closure maintenance activities will be designed and implemented under the direction of a licensed professional engineer in response to results of inspections. Design decisions will be made after the first post-closure quarterly inspection and implemented within 30-days

after identification of maintenance issues. Results of post-closure maintenance shall be reported to the Executive Secretary by a professional engineer licensed in the state of Utah.

Because of the arid climate in Iron County, maintenance of final covers and run-on/run-off systems should be minimal. Final cover and control structures will be inspected quarterly as indicated previously.

Run-on/run-off control structures and final covers could be damaged by an unusually intense storm. Consequently, an unscheduled inspection will be required after any occurrence of a 25-year storm event within a five-mile radius of the site. If the post-storm inspection discloses damage, it will be appraised by a licensed engineer. Iron County staff will solicit bids if necessary and supervise repair construction as necessary. Funds for payment for the repair work will be disbursed from the Financial Assurance Plan after approval by the Executive Secretary.

3.4 POST-CLOSURE CONTACTS

Iron County Courthouse.....(435) 477-8300

4.0 – FINANCIAL ASSURANCE

4.1 CLOSURE COSTS

The Parowan Landfill is planned to be closed in two separate events. After the western half of Phase B is to final grade; the first of the closure events will take place. The second closure event will be concurrent with the filling of the eastern half of Phase B to final grade. Due to the operational nature of the landfill; the largest area of the Landfill to be open will be the entire footprint of Phase B. The closure cost estimates are based on the cost to close the largest area, including the cost of obtaining, moving and placing the cover material, final grading, placing topsoil, fertilizing and seeding.

4.2 POST CLOSURE CARE COSTS

The post-closure estimate must be the cost for completing care reasonably expected during the 30-year post-closure period. These tasks include site inspections, maintenance, and record keeping.

4.3 FINANCIAL ASSURANCE MECHANISM

Iron County intends to comply with the financial assurance requirements by demonstrating financial ability based on the local government financial test. Detailed financial assurance costs are presented in Appendix E.

IRON COUNTY CLASS IVb LANDFILL CLOSURE PROCESS

1. Engineer final cover closure package
2. Place waste to final cover contours
3. Place additional fill soil to cover all waste and provide stable surface for final cover soil placement
4. Place final cover grade stakes
5. Place final cover soils
6. Revegetate
7. File final report with DEQ

CLOSURE COST ESTIMATE (West 1/2 Phase B) acrea 3.0

Item #1 - Engineering Package (Initial)	LS	\$	7,500
Provide engineering plans, specifications, QA/QC plan and provide coordination with DEQ staff and final engineering report. Subsequent engineering packages will utilize initial engineering package as template.			
Item #2 - Place additional soil (1' in depth) to cover waste and provide base for final cover.*			
Haul soil	4,840	\$ 2.21	10,688
Place soil	4,840	\$ 2.93	14,197
Item #3 - Place final cover soils (2' in depth)			
Haul soil	9,680	\$ 2.21	21,377
Place soil	9,680	\$ 2.93	28,395
Item #4 - Revegetate			
Seed, tackifier, mulch	3.0	\$ 2,000	\$ 6,000
Wattles	3.0	\$ 200	\$ 600
Subtotal			\$ 88,757
10% contingency			\$ 8,876
Final Closure Cost			<u>\$ 97,633</u>

ASSUMPTIONS:

1 - One loader to load dump truck	Hourly Rate	\$ 140
2 - One 10-wheel dump truck to haul soil	Hourly Rate	\$ 125
3 - One loader to move soil from top of slope	Hourly Rate	\$ 140
4 - One dozer to grade slope	Hourly Rate	\$ 180
5 - One water truck	Hourly Rate	\$ 120
6 - Hauling production is 120 yd ³ /hour		\$ 2.21 per cubic yard to haul soil
7 - Soil placement on slope is 150 yd ³ /hour		\$ 2.93 per cubic yard to place soil
8 - Final cover grading 2 hours for each 100'x90' area		\$ 1,355 per acre for final grading
9 - Revegetation and erosion control (each cell (100'x90') and takes 200' of wattles)	wattles are \$1/ft	\$ 2,000 per acre per acre

APPROXIMATE COST PER ACRE \$ 32,544

IRON COUNTY CLASS IVb LANDFILL CLOSURE PROCESS

1. Engineer final cover closure package
2. Place waste to final cover contours
3. Place additional fill soil to cover all waste and provide stable surface for final cover soil placement
4. Place final cover grade stakes
5. Place final cover soils
6. Revegetate
7. File final report with DEQ

CLOSURE COST ESTIMATE (East 1/2 Phase B) acrea 3.0

Item #1 - Engineering Package (Initial)	LS		\$ 7,500
Provide engineering plans, specifications, QA/QC plan and provide coordination with DEQ staff and final engineering report. Subsequent engineering packages will utilize initial engineering package as template.			
Item #2 - Place additional soil (1' in depth) to cover waste and provide base for final cover.*			
Haul soil	4,840	\$ 2.21	10,688
Place soil	4,840	\$ 2.93	14,197
Item #3 - Place final cover soils (2' in depth)			
Haul soil	9,680	\$ 2.21	21,377
Place soil	9,680	\$ 2.93	28,395
Item #4 - Revegetate			
Seed, tackifier, mulch	3.0	\$ 2,000	\$ 6,000
Wattles	3.0	\$ 200	\$ 600
Subtotal			\$ 88,757
10% contingency			\$ 8,876
Final Closure Cost			<u>\$ 97,633</u>

ASSUMPTIONS:

1 - One loader to load dump truck	Hourly Rate	\$	140
2 - One 10-wheel dump truck to haul soil	Hourly Rate	\$	125
3 - One loader to move soil from top of slope	Hourly Rate	\$	140
4 - One dozer to grade slope	Hourly Rate	\$	180
5 - One water truck	Hourly Rate	\$	120
6 - Hauling production is 120 yd ³ /hour		\$	2.21 per cubic yard to haul soil
7 - Soil placement on slope is 150 yd ³ /hour		\$	2.93 per cubic yard to place soil
8 - Final cover grading 2 hours for each 100'x90' area		\$	1,355 per acre for final grading
9 - Revegetation and erosion control (each cell (100'x90') and takes 200' of wattles)	wattles are \$1/ft	\$	2,000 per acre per acre

APPROXIMATE COST PER ACRE \$ 32,544

LANDFILL POST-CLOSURE COSTS (30 YEARS)

Section 1.0 - Engineering

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
1.1	Post-Closure Plan	NA			\$0
1.2	Annual Report (including results from gas, leachate, and ground water sampling - details of maintenance performed)	LS	\$300	30	\$9,000
a	Semiannual Site Inspections	LS	\$200	60	\$12,000
b	Plan Update	LS	\$0	0	\$0
Engineering Subtotal					\$21,000

Section 2.0 - Gas Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Sample Collection	LS	\$0	0	\$0
2.2	Sample Analysis	NA	\$0	0	\$0
2.3	Report (Part of Annual Report)				
Gas Collection System - Sampling Subtotal					\$0

Section 3.0 - Leachate Collection System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
2.1	Sample Collection	LS	\$0	0	\$0
2.2	Sample Analysis	NA	\$0	0	\$0
2.3	Report (Part of Annual Report)				
Leachate Collection System - Sampling Subtotal					\$0

Section 4.0 - Ground Water Monitoring System - Sampling

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
3.1	Sample Collection	LS	\$0	0	\$0
3.2	Sample Analysis	LS	\$0	0	\$0
3.3	Report (Part of Annual Report)				
Ground Water Collection System - Sampling Subtotal					\$0

Section 5.0 - Facility Operations and Maintenance

Item	Description	Unit Measure	Cost/Unit	No. Units	Total Cost
4.1	Cover				
a	Soil Replacement	LS	\$1,000	6	\$6,000
b	Vegetation/Reseeding	LS	\$500	6	\$3,000
4.2	Storm Water Protection Structures				
a	Ditch and Culvert Maintenance	LS	\$0	0	\$0
b	Berm and Basin Maintenance	LS	\$0	0	\$0
4.3	Gas Collection System				
a	System Operation	NA	\$0	0	\$0
b	System Repair	LS	\$0	0	\$0
4.4	Leachate Collection System				
a	System Operation	NA	\$0	0	\$0
b	System Repair	NA	\$0	0	\$0
4.5	Ground Water Monitoring System				
a	System Operation	NA	\$0	0	\$0
b	System Repair	LS	\$0	0	\$0
4.6	Site Security				
a	Lighting, signs, etc...	LS	\$0	0	\$0
b	Fencing and Gates	LS	\$1,000	6	\$6,000
4.7	Miscellaneous				
a					
b					
Facility Operations and Maintenance Subtotal					\$15,000

Total	\$36,000
10% Contingency	\$3,600
Total Post-Closure Cost	\$39,600