Attachment 1 - Design and Construction

SECTION 3 – ENGINEERING REPORT

3.1 LOCATION STANDARDS

Prior to preparation of this permit application, a Preliminary Location Screening Analysis (Screening Analysis) was performed to assess the suitability of the PCSMF site for use as a soil repository. The Screening Analysis was used to determine if the PCSMF site met the criteria for Class I Landfills under the State of Utah regulations R315-302-1. Appendix J presents the updated Screening Analysis detailing how the PCSMF meets the location standards.

3.2 ESTIMATED FACILITY LIFE

Based on the known soil disposal needs, the projected life of the facility is scheduled to be approximately 10 years. Currently, approximately 35,000 cubic yards of potentially contaminated soils are stored on the PCSMF site and approximately 60,000 cubic yards of potentially contaminated soil will be generated by the development of the Arts & Culture project. Additional projects that are scheduled by PCMC include Highway 248 , Homestake, Boothill, Spiro and the QWTP projects. These additional projects are anticipated to generate an additional 22,814 cubic yards of soil. The remaining capacity of 24,086 cubic yards will be used for unidentified projects within the Park City Soil Ordinance Boundary.

The facility capacity is based on minimal excavation in the Cell 2 footprint. The airspace for Cell 2 is largely based on the capacity developed by moving the existing 35,000 cubic yards of soil stockpiled on site into Cell 1. Additional capacity can be generated by dropping the elevation of the bottom of Cell 2. Clean soils generated from additional Cell 2 excavation can be utilized for landscaping on site or removed from the PCSMF project property.

The facility life is presented in the following table:

			Soil Disposed (Cubic Yards)	Remaining Capacity (Cubic Yards)
				141,900 *
Cell 1	2021	Relocate Existing Soils	35,000	106,900
		1/2 of Arts and Culture	30,000	76,900
Cell 2	2022	1/2 of Arts and Culture	30,000	46,900
	2023	TBD	5,000	41,900
	2024	TBD	5,000	36,900
	2025	TBD	5,000	31,900
	2026	TBD	5,000	26,900
	2027	TBD	5,000	21,900
	2028	TBD	5,000	16,900
	2029	TBD	5,000	11,900
	2030	TBD	5,000	6,900
	2031	TBD	5,000	1,900

* Initial Capacity Site Capacity

3.3 FACILITY DEVELOPMENT AND OPERATION

The current plans call for development of the facility in two cells; these are shown on Drawing 3, Appendix B. The development of Cell 1 will include construction of site access roads and storm water control structures. Presently, with the exception of some dirt roadways there is not vehicle access around the site. Fill needed for the initial berm construction (32,000 cyd) will be generated from the Cell 1 cut (34,000 cyd). The floor of the landfill cells is designed with a slope of 4.9% to generate the required soil storage capacity and to avoid large bedrock excavations. All storm water will be diverted in an eastern direction away from active working areas and toward natural drainages on the property. Based on the soil disposal need projections we anticipate that Cell 1 will accommodate the projected waste stream for approximately 1 year depending on the development of the Arts & Culture project. During this time , the development of Cell 2 will be designed, permitted, and constructed.

3.3.1 Liner

Liner installation for Cell 1 is anticipated for early summer of 2021 in preparation for soil acceptance in late summer. The landfill floor and side slope will be lined using a primary HDPE liner and secondary GCL liner. Preparation for liner placement will include removal of oversize cobbles in order to protect liner materials, a geocomposite material will be placed over HDPE liner to protect the during soil placement. The geocomposite (drain net) will also be utilized for the collection and management of potential leachate. Cell 2 will utilize the same liner components and will tie into the Cell 1 liner materials to maintain a continuous lined facility.

3.3.2 Fill Method

Waste soil will be placed at the toe of work face and spread horizontally in six-inch to twelve-inch layers and compacted with site equipment. The placement of soil will begin at the bottom of Cell 1 and will not be pushed down the side slopes. Soils will not be placed at the top of the side slopes and pushed down into the cell to minimize stress on the liner system components. The eastern portion of Cell 1 will be left unfilled to provide liquid storage associated with the leachate collection system. Drawing 3, Appendix B presents the location of the Leachate Pond within Cell 1 boundaries.

3.3.3 Daily, Intermediate and Final Cover

3.3.3.1 Daily and Intermediate Soil Cover

Since all of the waste delivered to the PCSMF will be soils, there will be no need for daily or intermediate cover soils.

3.3.3.2 Final Cover

The PCSMF staff will initiate final cover system installation within 30 days after soil disposal reaches the final elevation in any particular landfill closure phase with installation of the final cover being complete within 180 days after initiation.

It is anticipated that final cover will be placed over the landfill areas in three separate events (phases) as sufficient area is brought to final elevation. The minimum area planned for placement of final cover will be approximately two acres. Closure phases may be adjusted to better accommodate landfill operation and waste placement.

The engineered final cover system will prevent surface water infiltration (thereby minimizing leachate generation), maintain slope stability, control surface water and erosion, and be capable of supporting vegetative cover. The vegetative cover will be selected with shallow root systems to reduce cover soil penetration. The cover will be constructed as indicated on the permit drawings in Appendix B. Beginning at the surface, the planned cover consists of a minimum of 6-inches of topsoil, 18-inches site soils, geofabric, HDPE and GCL over the managed soils. Prior to construction of the final cover in each of the stages, an engineering design package consisting of Drawings, Specifications and a QA/QC plan will be submitted to the DWMRC for approval.

Final cover side slopes will be constructed and maintained at a maximum of 3H:1V. The final cover surface will also contain access roads with shallow ditches to provide access for final cover maintenance and break up long drainage paths to minimize erosion.

3.3.4 Elevation of Final Cover

As illustrated on drawings in Appendix B, the natural ground surface at the site of the landfill slopes generally downward from west to east. Within the proposed landfill footprint, the natural elevation of the surface drops from approximately 6,710 to 6,650 feet with the final cover having a maximum elevation of 6,720 and a minimum elevation of approximately 6,670 feet above mean sea level (msl).

3.3.5 Equipment Requirements and Availability

Section 1.5 and 1.6 of Part II – General Report, contains a listing of equipment and personnel to be utilized at the facility.

3.4 MONITORING SYSTEM DESIGN

3.4.1 Ground Water Monitoring System

The installation of the ground water monitoring system is scheduled to be concurrent with the general development of Cell 1. The locations of the proposed wells are shown in Appendix B and discussed in the Ground Water Monitoring Plan (Appendix E).

3.4.2 Surface Water

In general, surface water will be prevented from running into the active landfill area by ditches and berms created during perimeter road construction. Run-off from the final cover will also be managed by using access roads equipped with berms and ditches. The perimeter road will divert surface flows initiated off-site around active areas of the landfill to existing nearby drainages. PCSMF personnel will inspect the constructed drainage system quarterly. Temporary repairs will be made to any observed deficiencies until permanent repairs can be scheduled. PCSMF personnel or a licensed contractor will repair drainage facilities as required.

3.4.3 Leachate Management

Among the possible problems created by waste storage in the landfill is the possible contamination of soil, surface water, or ground water from storm water contacting or passing through the potentially contaminated soils. Due to the relatively low precipitation, the nature of the waste, and high evapotranspiration rates associated with the semi-arid climate at the site, the quantity of water infiltrating the landfill is predicted to be very small and subsequent leachate generation low. The landfill cover is designed to minimize infiltration and promote runoff. Furthermore, liquid waste will not be allowed in the landfill.

What leachate is generated will be collected by the leachate management system. The leachate management system will consist of a geocomposite drainage material to provide lateral drainage of leachate directly above the liner system.

Cell 1 bottom liner slope will be constructed with a minimum slope of approximately 4.9% (west to east) in order to direct leachate flows to the Cell 1 leachate pond.

As currently planned the largest area to be lined/open at one time will be Cell 1, approximately 115,000 ft2 (2.6 acres). The leachate pond has been sized to completely capture all run-off from the design storm falling on this area. The minimum required pond capacity in this scenario is 0.71 acre-ft. The area set aside for the leachate collection/evaporation pond is approximately 1/2 acre in size. This requires an average pond depth of 1.4 feet. Cell 1 is 12 in height at the eastern side where the leachate pond will be located. The geometry of Cell 1 results in a minimum of 10 feet of available freeboard and provides adequate capacity in the event the design storm occurs when the pond is not completely empty. The 100-yr 24-hour storm event is utilized for the sizing of the leachate pond. The 100-yr design storm is a conservative

parameter since only the 24-hour, 25-yr storm is required by regulation. Leachate ponds will be established in each of the cells.

3.4.4 Landfill Gas

Due to the nature of the waste (soils) to be managed at the PCSMF, no landfill gas will be generated and no landfill gas system will be installed.

3.5 DESIGN AND LOCATION OF RUN-ON/RUN-OFF CONTROL SYSTEM(S)

The two nearest weather stations to the site are in the Park City Fire Station 31 and the Park City Radio stations. The Park City Fire Station 31 and at the Park City Radio weather stations show the average annual rainfall to be 20.62 and 21.17 inches, respectively. Both these stations are located at similar elevation and several miles west of the site. Appendix K – Hydrologic Assessment presents the precipitation data for the Park City area.

3.5.1 Run-On from a 25-Year, 24-Hour Storm

The site is located on the east facing slope of the Park City Hill with potential for surface flows to run toward the site from the eastern slopes of the Park City Hill. The land immediately uphill from the site is currently used to grow alfalfa or other crops. There is a shallow drainage that transports surface waters from the west and north of the site towards Highway 248. Surface flows from west and north of the facility will be diverted around the facility until they can be reintroduced to the natural drainage along Highway 248.

A perimeter road consisting of ditches and berms will be constructed around the landfill to create a barrier to surface water flows that is capable of transmitting flows from a 25-year, 24-hour storm (2.61 inches - NOAA Atlas 14) around the site. The high point of the perimeter road will be located at the western boundary of the site and divert any potential run-on north and south of the facility. Preliminary calculations of the peak flow rates from the predicted run-on areas used for initial design of the storm water collection ditches are provided in Appendix K – Hydrologic Assessment.

3.5.2 Run-Off from a 25-Year, 24-Hour Storm

The design for the landfill will incorporate a run-off control system that will divert the surface flows resulting from a 25-year, 24-hour storm (2.61 inches – NOAA Atlas 14) that falls on the landfill cover. The proposed final cover surface will direct flows to perimeter berms and ditches that will convey all storm water to the storm water pond located north of Cell 1 as indicated in Appendix B.

Preliminary calculations of the flow rates from the predicted runoff to be used for design of the storm water collection ditches are provided in Appendix K - Hydrologic Assessment. All ditches will be constructed with 2H:1V side slopes, maximum depth of flow was calculated to be 1.39 feet in the run-off channels.

Berms and ditches will be incorporated into the active landfill areas to direct the precipitation away from the working faces.

PCSMF personnel will be responsible for the maintenance of the slopes and drainage systems to ensure the efficient operation of the run-off system.

As shown on several of the permit drawings (Appendix B) one storm water pond will be constructed at the site for detention and control of storm water run-off. In order to account for the potential presence of some water in the pond due to antecedent moisture, the design storm event the pond will be sized for will be the 100-year 24 hour storm (3.22-inches - NOAA Atlas 14).

The PCSMF is designed and will be constructed so as not to cause point or non-point source discharges to surface waters in violation of the CWA or in violation of State of Utah water quality management plans approved under Section 208 or 319 of the CWA. Prior to initiation of work at the site a Utah Pollutant Discharge Elimination System (UPDES) permit will be obtained by PCMC.