Prepared for

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COLSTRIP WASTEWATER FACILITY CLOSURE PLAN UNITS 1&2 STAGE I&II EVAPORATION POND SITE

Per Requirements of AOC Article IX

Colstrip Steam Electric Station
Colstrip, Montana

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ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order on Consent
CCR	Coal Combustion Residuals
COI	Constituent of Interest
CSES	Colstrip Steam Electric Station
EHP	Effluent Holding Pond
GCL	Geosynthetic Clay Liner
HDPE	High Density Polyethylene
LCRS	Liquid Collection and Removal System
MDEQ	Montana Department of Environmental Quality
RPP	Reinforced Polypropylene
SOEP	Stage I Evaporation Pond
STEP	Stage II Evaporation Pond
USEPA	U.S. Environmental Protection Agency
USGS	United States Geologic Survey

1. INTRODUCTION

1.1 Purpose

This Facility Closure Plan (Plan) has been prepared by Geosyntec Consultants, Inc. (Geosyntec) on behalf of Talen Montana, LLC (Talen) pursuant to Article IX of the "Administrative Order on Consent Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at Colstrip Steam Electric Station, Colstrip Montana" (AOC) [MDEQ 2012]. The AOC was entered between Talen, the successor of PPL Montana, LLC, and the Montana Department of Environmental Quality (MDEQ or the Department) in August 2012.

The AOC for Colstrip Steam Electric Station (CSES or the Station) applies to three areas:

i. Areas at and downgradient of Units 1&2 Stage I and Stage II evaporation ponds northwest of the main plant site (SOEP/STEP Site);
ii. Areas at and downgradient of the main plant site (Plant Site); and
iii. Areas at and downgradient of Units 3&4 effluent holding ponds southeast of the main plant site (EHP Site).

Article IX of the AOC requires a Facility Closure Plan be developed for each of the three areas (or sites). Figure 1 depicts the locations of the three sites. All wastewater facilities identified in Attachment A of the AOC will be addressed in one of the three plans. Table 1 replicates the facilities listed in Attachment A of the AOC and notes which plan addresses each facility. This Facility Closure Plan is for the SOEP/STEP Site. The Plant Site and the EHP Site will be addressed in separate facility closure plans.

1.2 Scope

This Plan specifically addresses the AOC Article IX requirements for the SOEP/STEP Site including: (1) provisions for control, minimization, or elimination, to the extent necessary to protect human health and the environment, of post-closure escape of Constituents of Interest (COIs) to the environment; (2) proposed actions to inform and obtain input from the community consistent with AOC Article V – Public Participation; and (3) cost estimates for closure and post-closure care. Closure of all CCR units will occur in compliance with the criteria for closure set forth in 40 CFR 257.102.

The current version of the coal combustion residual (CCR) Master Plan Summary Report for the CSES (Master Plan Summary) prepared by Geosyntec [2016a], and the written closure plan and post-closure plan for existing impoundments prepared by Geosyntec [2016b, 2016c], serve as the baseline for this Plan for the SOEP/STEP Site.

1.3 Plan Updates

This Plan will be updated either every five years or when a major change or modification is made to the facility, per the requirement of AOC Article IX.E.

2. BACKGROUND

2.1 Facility Location

The CSES is a coal-fired steam electric generating facility partially owned and operated by Talen. The Station is located near the City of Colstrip, which lies within Rosebud County in south central Montana, approximately 90 miles east of Billings, Montana. An aerial location map of the CSES is shown in Figure 1. Figure 2 presents the location of the SOEP/STEP Site on United States Geologic Survey (USGS) 7 ½ minute topographic quadrangle maps [USGS 2014].

2.2 SOEP/STEP Site Description

The SOEP/STEP Site contains several impoundments (or ponds) used for disposal of flyash scrubber slurry from Units 1 and 2. The SOEP/STEP impoundments are also used to store captured groundwater and stormwater runoff for reuse. The SOEP/STEP Site is located approximately 2 miles northwest of the Plant Site. The impoundments within the SOEP/STEP Site are identified in Figure 3. Table 2 summarizes the historic and current process wastewater impoundments at the SOEP/STEP Site. Details of the construction history of the individual impoundments can be found in the "Colstrip Steam Electric Station History of Construction" prepared by Geosyntec [Geosyntec 2016d].

When CSES Units 1 and 2 were constructed in 1975, the SOEP was constructed to manage CCR wastes and wastewater associated with plant processes. The STEP was constructed later in 1992 directly down drainage from the SOEP and started receiving slurry in 1994. Through the 3-mile scrubber pipeline, scrubber slurry generated from Units 1 and 2 is transported hydraulically to the STEP, and decant water is either evaporated or pumped back to the plant for reuse. The scrubber slurry is currently received at the paste plant building at the STEP Site, where approximately 90 percent of the available free water in the flyash scrubber slurry is removed prior to disposal in ponds [Geosyntec 2016a]. Decant water is routed to the STEP New Clearwell (B Cell) and then returned to the scrubbers for reuse [Hydrometrics 2016]. Bottom ash was disposed at the Plant Site and stored in the Units 1&2 Bottom Ash Pond until 1983. After 1983, bottom ash was dewatered and transported via truck to the EHP Site for final disposal [Geosyntec 2016a]. Clear water from the bottom ash is reused at the plant [Hydrometrics 2016].

2.3 Master Plan Summary

The Master Plan Summary [Geosyntec 2016a] for the CSES was prepared to describe the means and methods for managing water and waste at CSES in a manner that complies with the United States Environmental Protection Agency's (USEPA's) Final Rule for regulation of CCR under Subtitle D of the Resource Conservation and Recovery Act (RCRA), hereafter referred to as the CCR Rule or the Rule [USEPA 2015]. The current version of the Master Plan Summary was prepared by Geosyntec for Talen and updated on 23 September 2016 to reflect the shutdown of Units 1 and 2 by 1 July 2022 and non-liquid disposal of CCRs at the EHP by 1 July 2022.

A key consideration of the Master Plan Summary is to identify and coordinate the actions that will be implemented to comply with the CCR Rule and the requirements of the AOC. The actions recommended in this Plan are consistent with both the Master Plan Summary and the AOC, at this time. However, as the site investigation and remediation requirements of the CCR Rule are addressed, it will be necessary to verify that the SOEP/STEP Site development and closure activities described in the Master Plan Summary are consistent with the AOC implementation plans and potential regulatory changes.

3. HEALTH AND ENVIRONMENTAL PROTECTION

3.1 SOEP/STEP Site Closure Plan

To provide for control, minimization, or elimination, to the extent necessary to protect human health and the environment, of post-closure impact of COIs to the environment, a closure plan and post-closure plan for each impoundment regulated by the CCR Rule has been prepared [2016b, 2016c]. Impoundments not regulated by the CCR Rule (STEP A and B Cells) will be similarly closed by removal of water prior to use as stormwater containment structures (STEP B Cell). Additionally, pipelines will be drained and closed in place, and their associated drain pits will be decommissioned, removed, and the disturbed area will be reclaimed with vegetation.

3.1.1 SOEP/STEP Wastewater Facility Closure

Closure plans for the individual impoundments within the SOEP/STEP Site, the pipelines and the drain pit along the pipeline are described below. Table 2 summarizes these plans.

SOEP

The impoundment system at the SOEP/STEP Site has been operating since 1975 [Hydrometrics 2016]. The SOEP, also referred to as SOEP Evaporation Pond in the AOC Attachment A, received scrubber slurry from the Plant Site Units 1&2 A/B Ponds between 1975 and 1997. The SOEP was constructed with the approximately 70-foot high Stage I Main Dam and a partial liner consisting of natural clay. The Stage I Main Dam was constructed with chimney drains, a blanket

drain, and a toe drain. Water from those drains was routed to a sump that returned seepage water to the SOEP [Hydrometrics 2016]. Being full in 1997, the SOEP was closed with an MDEQ approved soil cap. The reclamation program for this impoundment was completed in 2002 with an engineered evapotranspiration cover to reduce infiltration.

STEP

The STEP was constructed in 1992 directly down drainage (east) from the SOEP (Figure 3) and started receiving slurry in 1994. The STEP was constructed via the Stage II Main Dam that is approximately 88 feet high. The Stage II Main Dam was constructed with a central core grout curtain that extends horizontally along the entire length of the dam, and vertically through the alluvium where it is keyed into the underlying siltstone. The Stage II Main Dam was constructed with chimney drains and toe drains that are routed to a sump that conveys water to E Cell [Hydrometrics, 2016]. The STEP currently consists of five impoundments, including A Cell, B Cell (New Clearwell), D Cell, E Cell, and Old Clearwell. STEP C Cell was designed to be north of E Cell, but will not be constructed.

STEP A Cell

STEP A Cell is full and no longer receives scrubber slurry, captured groundwater or process water. A Cell was constructed in 1992 and was lined with 60-100 -mil HDPE geomembrane over the compacted liner subgrade. The footprint of A Cell is 42.1 acres. Per the Master Plan Summary, A Cell will be closed in accordance with the requirements of the CCR Rule (not regulated by the Rule). In 2020, A Cell is planned to be closed by leaving CCR in place. A final alternative cover system will be constructed over the entire area of the unit.

STEP B Cell

To provide additional volume to store process water, STEP B Cell (16.8 acres) was constructed using a double-liner system with a liquid collection system placed in between and under the liners in 2006. In 2011, after the paste plant was in operation, B Cell was converted to the STEP New Clearwell where the decant water was returned to the scrubbers for re-use. When there is no longer the need for decant water reuse, B Cell will be dewatered through the treatment system identified in the Master Plan Summary, and will be used for stormwater management at the SOEP/STEP Site.

STEP D Cell

In 2011, STEP D Cell (25.7 acres) was constructed to provide additional volume to store clear water and paste as needed. D Cell was constructed using a double-liner system with a liquid collection system placed in between and under the liners. D Cell will be closed in accordance with the requirements of the CCR Rule. D Cell is planned to be closed by leaving CCR in place in 2023. A final alternative cover system will be constructed over the entire area of the unit.

STEP E Cell

STEP E Cell (46.8 acres) was constructed in 1992 and was lined with 100-mil HDPE geomembrane over the compacted liner subgrade. E Cell is currently the only STEP cell receiving paste from the paste plant. E Cell also receives water from the STEP Main Dam Sump. In 2022, E Cell is planned to be closed in accordance with the requirements of the CCR Rule by leaving CCRs in place. A final alternative cover system will be constructed over the entire area of the unit.

STEP Old Clearwell

STEP Old Clearwell (10.9 acres), commissioned in 1992, was lined with 100-mil HDPE geomembrane over the compacted liner subgrade. The unit stores water and scrubber slurry. The Old Clearwell is planned to be filled with paste before its closure in 2022. Old Clearwell will be closed in accordance with the requirements of the CCR Rule by leaving CCR in place. A final alternative cover system will be constructed over the entire area of the unit.

Units 1&2 Scrubber Pipeline and North 1AD Drain Pond

A three-mile pipeline was constructed to transport scrubber slurry from the scrubbers to the SOEP/STEP Site and return decant water to the scrubbers in 1975. The pipeline was originally lined-steel, and was changed out to two HDPE pipelines in 2001, one for scrubber slurry and one for return decant water. Along the pipelines, North 1AD Drain Pond is geosynthetic lined and periodically used to facilitate draining the pipelines during maintenance. The pipelines and the drain pit will be decommissioned once the SOEP/STEP Site is no longer in service. CCR material and water in the pipelines and the drain pit will be drained and transported to the final disposal ponds at the STEP Site. The pipelines will be closed in place. The geosynthetic liner in the drain pit will be removed and disposed in the disposal ponds at the STEP Site after dewatering. The drain pit will then be pushed in with soils to achieve the natural-appearing grade that blends the area into the surrounding landscape. The disturbed area will be reclaimed with vegetation.

3.1.2 Final Cover System

As discussed above, STEP A Cell, D Cell, E Cell and Old Clearwell closures will be designed in accordance with the requirements of the CCR Rule §257.102(d)(3)(ii) for an alternative final cover system. A low-permeability final cover will be used to close all CCR Rule-regulated impoundments to control and reduce, to the extent feasible, post-closure infiltration of stormwater into the waste. The infiltration layer of the alternative final cover system will achieve an equivalent reduction in infiltration as the prescriptive final cover system such that the permeability of the final cover system is less than or equal to the permeability of the bottom liner or natural subsoils present (or 1×10^{-5} cm/sec, whichever is less). The design of the final cover system will include an erosion layer that provides equivalent protection from wind or water

erosion as an erosion layer that contains a minimum of six inches of earthen material capable of sustaining native plant growth.

The final cover will be constructed of earthen and geosynthetic components that are sufficiently flexible to accommodate expected local differential settlements and subsidence. The design of the final cover system, lateral drainage layer, and dewatering system are such that there will be no further impounding of water, sediment, or slurry in the closed impoundment.

Quality control and quality assurance measures will be implemented at the time of final cover system construction to document that the final cover was constructed as designed to achieve and maintain slope stability and integrity throughout the closure and post-closure periods. The specific closure design varies depending on the future use of the unit. For more details of the final cover system design for each pond, please see the written closure plan for existing impoundments [Geosyntec 2016b].

The specific design for each cell varies depending on the future use of the cell as follows. The general cross section for final alternative cover system is provided in Figure 4 and described below.

Final Alternative Cover Design

STEP A, D and E Cells, as well as Old Clearwell, will be closed with a cover design that includes (from top to bottom):

- 6-inch thick erosion layer capable of sustaining native plant growth;
- 12-inch thick layer of earthen material serving as an infiltration layer;
- geocomposite drainage layer (where needed);
- 40-mil textured HDPE geomembrane; and
- 8-oz non-woven geotextile cushion (where needed).

The geomembrane will be installed above a prepared subgrade of CCR material.

As designed, the final alternative cover system will provide sufficient lateral drainage of liquids off the cap, which will reduce the head on the geomembrane and thus, the infiltration through the final cover. The geomembrane infiltration layer will be overlain by an 18-inch protective cover soil layer, which will protect the geomembrane infiltration layer and provide vegetative support to limit erosion of the final cover. The drainage layer will be graded at a sufficient slope to allow free flow of liquid through the geocomposite. Liquids collected within the drainage layer will be conveyed off the cover and collected in stormwater management features such as channels, culverts, and storage ponds.

As discussed in Section 3.1.1, STEP B Cell was double-RPP lined and a liquid collection system was installed between and under the liners in 2008. Therefore, STEP B Cell was constructed in a manner that satisfies the closure requirements of the CCR Rule. Moreover, after the cells are no longer in service, STEP B Cell will be left empty and used for stormwater storage. Attachment 1 considers the infiltration through the aforementioned double-liner system after the cell closure used for stormwater storage. As can be seen, the stormwater stored in the pond will be evaporated quickly under the site conditions and little water will remain in the ponds. The pond is assumed to be dewatered and left dry when closed. The city of Billings, Montana was selected for weather data inputs, including evapotranspiration, precipitation, temperature and solar radiation data. Using these data inputs, the 30-year average annual percolation through the double-liner cell was determined to be negligible, 1.9×10^{-5} gallons per minute per acre.

3.2 Post-Closure Care

Post-closure care activities considered in this Plan include maintenance of final covers as needed to maintain integrity and effectiveness and to addresses settlement and erosion, and operation and management of liquid collection and removal system. Groundwater activities, such as operation and maintenance of groundwater monitoring and groundwater capture systems, will be addressed by the groundwater remediation reports under the AOC.

3.2.1 Property Uses During Post-Closure Period

Currently cattle graze on the SOEP site at the recommendation of a reclamation consultant, to facilitate good vegetative cover. This practice may continue after facility closure in addition to stormwater or captured groundwater storage at the SOEP/STEP Site. Disturbance to the integrity of the closure/containment system is not anticipated. To provide for control, minimization, or elimination, to the extent necessary to protect human health and the environment, of post-closure escape of COIs, an appropriate institutional control may be imposed on the real property, without conveying the property or creating a dominant and servient estate.

3.2.2 Final Cover System Maintenance

Construction of the final cover as described above uses passive management systems to the extent possible to reduce the need for long-term maintenance of cells after closure. If the closed unit is not used for storage of stormwater or captured groundwater, the final cover will be vegetated with native, non-woody vegetation requiring little maintenance such as mowing. Following decommissioning, the Units 1&2 Scrubber Pipeline route will be reclaimed with vegetation and require no post-closure care.

When STEP B Cell is converted for stormwater management, the cover system for the underlying impoundment will be protected from erosion damage by the placement of stormwater in the lined impoundment. This negates the need for the installation of an erosion layer as part of

the cover system, and eliminates the need for future maintenance and repair of erosion layer soils and vegetation.

Following the closure of the CCR surface impoundments where no stormwater storage is planned (i.e., A, D, E Cells, and Old Clearwell), erosion and sediment control measures will be maintained until vegetated surfaces of the final cover system are fully stabilized. After vegetation is fully established, routine site inspections will be performed as part of post-closure care to monitor the condition of the access roads, stormwater channels, and final cover, and evaluate if repair maintenance is needed.

When identified during routine site inspections, eroded, non-vegetated, or otherwise damaged areas of the final cover will be repaired by the addition of soil, regrading, and revegetation, as necessary.

During detailed design of impoundment closure, a run-on and run-off control and stormwater management system will be developed. The run-on and run-off control system will be designed and constructed to limit erosion and other damage to the final cover. The run-on and run-off control system will also be designed and constructed to maintain its effectiveness following closure of the surface impoundment.

The drainage systems will be operated and monitored as needed to remove liquids from above the cover system. If routine inspections and/or monitoring, or performance of the drainage system, indicate that the drainage system is not operating as designed, maintenance will be performed to correct the deficiency.

3.2.3 Liquid Collection and Removal System Maintenance

As discussed above, STEP B and D Cells were constructed with a liquid collection and removal system (LCRS) placed between the double-liner system. The underdrain collections systems for the B and D Cells consist of: (i) one underdrain collection system situated between the primary and secondary liners (between liner collection), and (ii) a second underdrain collection system situated beneath the secondary liner (under liner). The double liner and underdrain collection systems generally consist of the following components (from top to bottom):

- 45-mil RPP primary geomembrane liner;
- 350-mil geocomposite drainage layer consisting of a geonet between two geosynthetic cushions (between liner or primary collection system);
- 36-mil RPP secondary geomembrane liner;
- geosynthetic cushion layer; and
- compacted native clay soil (under liner or secondary collection system).

Liquids collected in the drainage system will be conveyed to a sump fitted with riser pipes in which a pump will be operated to remove liquids to the decant water pond for use by the plant and after plant shutdown to the treatment system identified in the Master Plan Summary. The LCRS installed above the geosynthetic liner will reduce the liquid head on the liner and limit infiltration from the overlying cells. The LCRS installed below the geosynthetic liner will be operated to remove any liquid seeping through the liner.

The LCRS will be operated and maintained throughout the post-closure period managing liquid produced by the waste placed in the impoundments if necessary. If monitoring or performance of the LCRS indicates that the system is not operating as designed, maintenance will be performed to correct the deficiency.

4. PROPOSED ACTIONS FOR PUBLIC PARTICIPATION

Per Article IX.C of the AOC, this Plan "shall include proposed actions to inform and obtain input from the community consistent with Article V." The proposed actions that Talen will conduct for public participations and that the Department shall perform as part of its action on this submission are in accordance with Article V.F of the AOC (Amendment entered effective 1 March 2017). The following bullet points are a summary of those requirements:

- Talen will submit this Plan to the Department per the requirements of the AOC;
- The Department shall post this Plan on its website upon receipt of this report. If the Department disapproves the plan, it shall also post its written disapproval;
- The Department shall post any revised plans submitted by Talen addressing concerns identified by the Department in its disapproval;
- The Department shall post a preliminary approval or preliminary conditional approval of the plan or revised plan on its website and a notice to the public of a 30-day period within which to comment on the report;
- Upon receipt of a written request within 10 days of posting by 10 or more persons or by a group having 10 or more members, the Department will conduct a public meeting on the plan;
- If a request for a public meeting has been received, the Department will set a public meeting and publish a public notice of the meeting on its website and in the local newspaper and the Billings Gazette;
- The public meeting must be held at least 10 days prior to the close of the public comment period. The Department shall conduct the public meeting;
- The Department will respond to substantive public comment as part of its final action on the submission; and

- The Department shall conduct a public meeting annually to inform the public of progress made by the Department and Talen under the AOC and to accept any input the public may have on implementation of the AOC.

5. COST ESTIMATE FOR CLOSURE AND POST-CLOSURE CARE

Cost estimates are based on recent cost experience at CSES for similar construction work and Geosyntec's experience with similar projects. To estimate costs for future development activities, costs for typical construction activities anticipated to be performed at the Station were developed (e.g., capping, liner system) and these costs were then normalized on a per unit basis (e.g., acre, foot, square foot). This per unit cost was then used to estimate construction costs for each of the anticipated impoundment construction activities based on the size of the existing or proposed impoundment and the type of construction activity being performed. Costs for closure and post-closure care activities are presented in 2017 dollars.

Table 3 presents the cost estimate for closure and post-closure care of wastewater facilities at the SOEP/STEP Site. It is notable that the future construction costs are heavily dependent on a few construction components (primarily geosynthetics but also, for some units, excavation), for which the costs are reasonably well known, and on several ancillary construction items (e.g., liquid or cover drainage systems), which are affected by specific design details and, therefore, are less certain. More detailed cost estimates will be developed during the design phase for each construction activity. In addition, the costs are dependent on the assumptions discussed throughout this Plan.

6. REFERENCES

MDEQ (2012). Administrative Order on Consent Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at Colstrip Steam Electric Station, Colstrip Montana. Montana Department of Environmental Quality, July 2012.

Geosyntec Consultants (2016a). "Master Plan Summary Report Update - Colstrip Steam Electric Station." Revision 3, prepared for Talen Montana, LLC, Project Number ME1199. Columbia Maryland. 23 September 2016.

Geosyntec (2016b). "Written Closure Plan Per Requirements of 40 CFR §257.102 for Existing Impoundments at Colstrip Steam Electric Station Colstrip, Montana." prepared for Talen Montana, LLC, Project Number ME1272. Columbia Maryland. October 2016.

Geosyntec (2016c). "Post-Closure Plan Per Requirements of 40 CFR §257.104 for Existing Impoundments at Colstrip Steam Electric Station Colstrip, Montana" prepared for Talen Montana, LLC, Project Number ME1272. Columbia Maryland. October 2016.

Geosyntec (2016d). "History of Construction Per Requirements of 40 CFR §257.73 Colstrip Steam Electric Station Colstrip, Montana" Geosyntec Consultants. September 2016.

Hydrometrics (2016). "Units 1 & 2 Stage I and II Evaporation Ponds Site Report." Prepared for PPL Montana, LLC. Hydrometrics Inc., Billings, Montana. March 2016.

USEPA (2015). "Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule." Title 40 Code of Federal Regulations, Parts 257 and 261. United States Environmental Protection Agency.

USGS (2014). "Colstrip SE Quadrangle Montana-Rosebud Co. 7.5-Minute Series." United States Geological Survey. Accessed 17 March 2016. http://store.usgs.gov/b2c_usgs/usgs/maplocator/(ctype=areadetails&xcm=r3standardpitrex_prd&carea=%24root&layout=6_1_61_48&uiarea=2)/.do

TABLES

Table 1 AOC Attachment A Facilities with Plan Reference

Wastewater Facility [1]	Facility Closure Plan
Units 1&2 A/B Flyash Pond	Plant Site
Clearwell	
A Pond	
B Pond	
1&2 Scrubber Pipeline [2]	SOEP/STEP Site
Units 1&2 Wash Tray Pond	Plant Site (currently Units 1&2 Bottom Ash Clearwell)
Units 1&2 Bottom Ash Pond w/ Clearwell	Plant Site
Units 1&2 Brine Waste Disposal Ponds	Not Applicable (previously closed per MDEQ approval)
D1-D3 ponds	
D4 pond	
Units 1&2 Cooling Tower Blowdown (Pond C)	Plant Site
Pond C North	
Pond C South	
Units 1&2 Stage I Evaporation Pond (E Pond)	Not Applicable (previously closed per MDEQ approval)
Units 1&2 Stage II Evaporation Pond	SOEP/STEP Site
Cells A-E	
Cell B	
Old Clearwell	
Cell D	
Units 3&4 Auxiliary Scrubber Drain Pond	Not Applicable (concrete structure being addressed as part of plant demolition work)
Units 3&4 North Plant Area Drain	Plant Site
Units 3&4 Wash Tray Pond	Plant Site
Units 3&4 Scrubber Drain Collection (DC Pond)	Plant Site
Units 3&4 Bottom Ash Pond w/ Clearwell	Plant Site
Units 3&4 Effluent Holding Pond w/ Clearwell (EHP)	EHP Site
Effluent Holding Pond (EHP)	
Units 3&4 Scrubber-EHP Pipeline [2]	EHP Site
Units 1-4 Sediment Retention Pond	Plant Site

Table 1 AOC Attachment A Facilities with Plan Reference (cont.)

Wastewater Facility (1)	Facility Closure Plan
Units 1-4 North Plant Sediment Retention Pond	Plant Site
Units 1-4 Surge Pond (Castle Rock Lake)	Not Applicable (Fresh water supply pond, not a wastewater facility)
Unit 4 Cooling Tower Canal	Not Applicable (concrete structure being addressed as part of plant demolition work)
Drain Pit #3 (2)	EHP Site
Drain Pit #5 (2)	EHP Site
Drain 1AD Drain Pond (2)	SOEP/STEP Site

Notes: (1) Wastewater facilities from AOC Attachment A unless otherwise specified.

(2) Drain pits along the pipelines were not listed in AOC Attachment A.

Table 2 Description of Wastewater Facility Construction and Service History at the SOEP/STEP Site

Wastewater Facility	Surface Area (acre) [(1)]	Years in Service	Contents Stored	Construction Upgrades/Operational Changes
STEP A Cell	42.1	1992-2015	CCR water and solids, currently just contains CCR solids only	HDPE-Lined, close by capping the unit in 2020
STEP B Cell (New Clearwell)	16.8	2006-2011	Decant water	Lined in 2008 using double-liners with 45-mil RPP and liquid collection systems installed in between and under the liners.
		2011-2022	Decant water	Changed to the New Clearwell receiving decant water from the paste plant
		After 2022	Stormwater	To store stormwater as post-closure stormwater management pond
STEP C Cell	17.0	Not Applicable	Not Applicable	Permitted, but will not be constructed
STEP D Cell	25.7	2011-2022	CCR water and solids	Double-lined RPP with liquid collection systems installed in between and under the liners. Close by capping the unit in 2023
STEP E Cell	46.8	1992-2022	CCR water and solids	HDPE-Lined, close by capping the unit in 2022
STEP Old Clearwell	10.9	1992-2022	CCR water and solids	HDPE Lined; close by capping the unit in 2022
SOEP Evaporation Pond	114	1975-1997	CCR water and solids	Closed per MDEQ approved evapotranspiration soil cap with reclamation program completed in 2002

Table 2 Description of Wastewater Facility Construction and Service History at the SOEP/STEP Site (cont.)

Wastewater Facility	Surface Area (acre) (1)	Years in Service	Contents Stored	Construction Upgrades/Operational Changes
Units 1&2 Scrubber Pipeline and North 1AD Drain Pond (2)	Not Applicable	1975-2022	Scrubber slurry transported from the scrubbers to the SOEP/STEP Site and decant water returned to the scrubbers	The 3-mile pipeline was originally lined-steel, changed out to HDPE in 2001. North 1AD Drain Pond along the pipeline supports maintenance of the pipeline as needed. To be decommissioned and removed in 2023.

Notes: (1) This is the footprint of the cell.

(2) The Units 1&2 scrubber pipeline and North 1AD Drain Pond along the pipeline are an accessory to the SOEP/STEP Site and are considered in the Report.

Table 3 Cost Estimates for Wastewater Facility Closure and Post-Closure Care at the SOEP/STEP Site

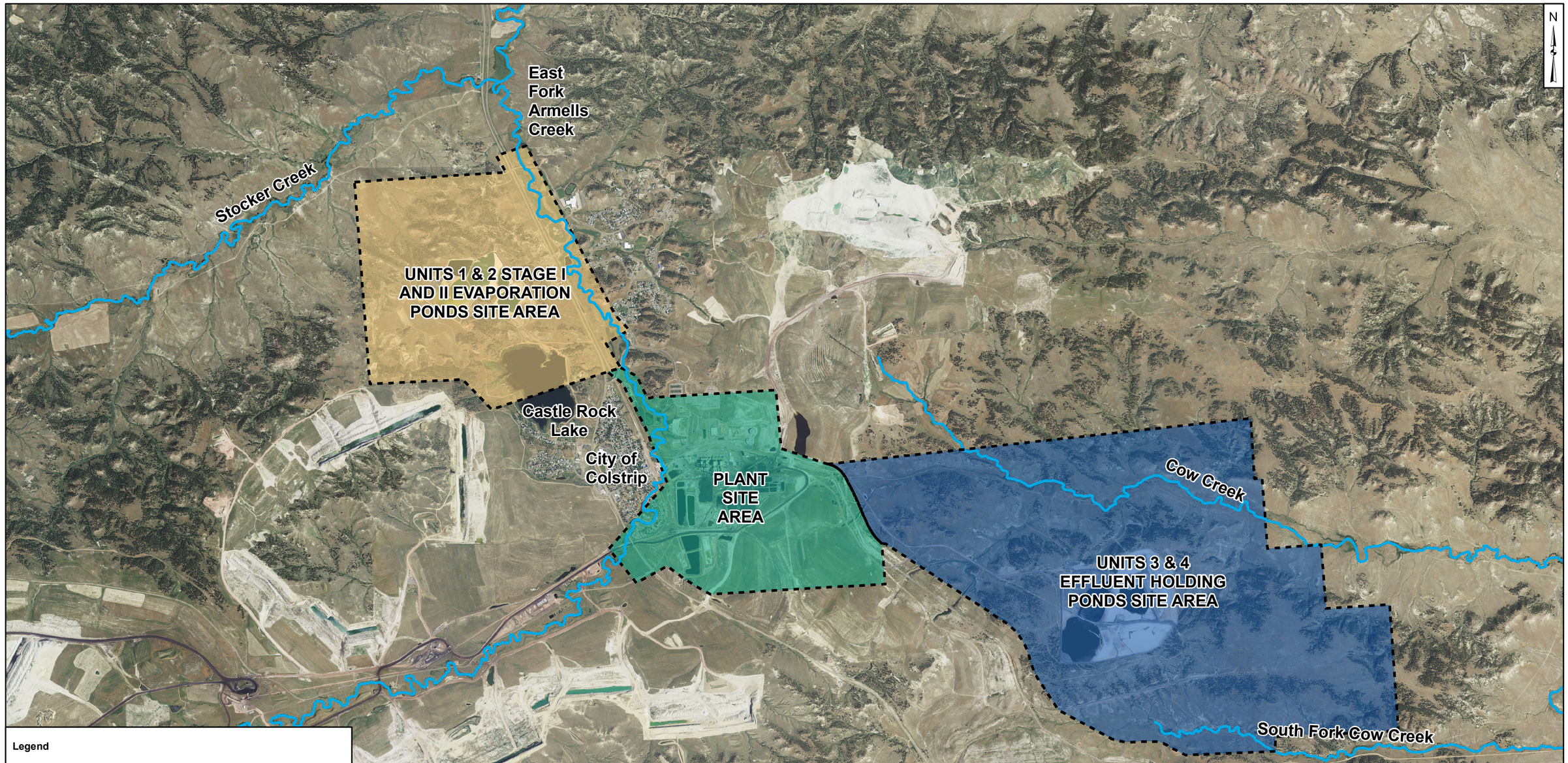
Wastewater Facility	Closure (1)	Post-Closure Care (1)(2)(3)	Subtotal (1)
STEP A Cell	$ 8.90 M	$ 2.54 M	$ 11.44 M
STEP B Cell	$ 0.50 M	$ 0.00	$ 0.50 M
STEP D Cell	$ 5.60 M	$ 1.56 M	$ 7.16 M
STEP E Cell	$9.80 M	$ 2.81 M	$ 12.61 M
STEP Old Clearwell	$2.60 M	$ 0.66 M	$ 3.26 M
Units 1&2 Scrubber Pipeline and North 1AD Drain Pond	$ 0.10 M	$ 0.00	$ 0.10 M
SOEP/STEP SITE TOTAL			**$ 35.07 M**

Notes: (1) Costs for closure and post-closure care activities are presented in 2017 dollars.

(2) A post-closure care period of 30 years is considered after the SOEP/SETP Site is closed after plant shutdown. Under the CCR Rule, the owner or operator of a CCR unit should conduct post-closure care for 30 years.

(3) Post-Closure Care includes maintenance of final cover as needed to maintain integrity and effectiveness and addresses settlement and erosion, operation and management of liquid collection and removal system. Operation and maintenance of groundwater monitoring system and groundwater capture system will be addressed by the remediation report under the AOC.

FIGURES



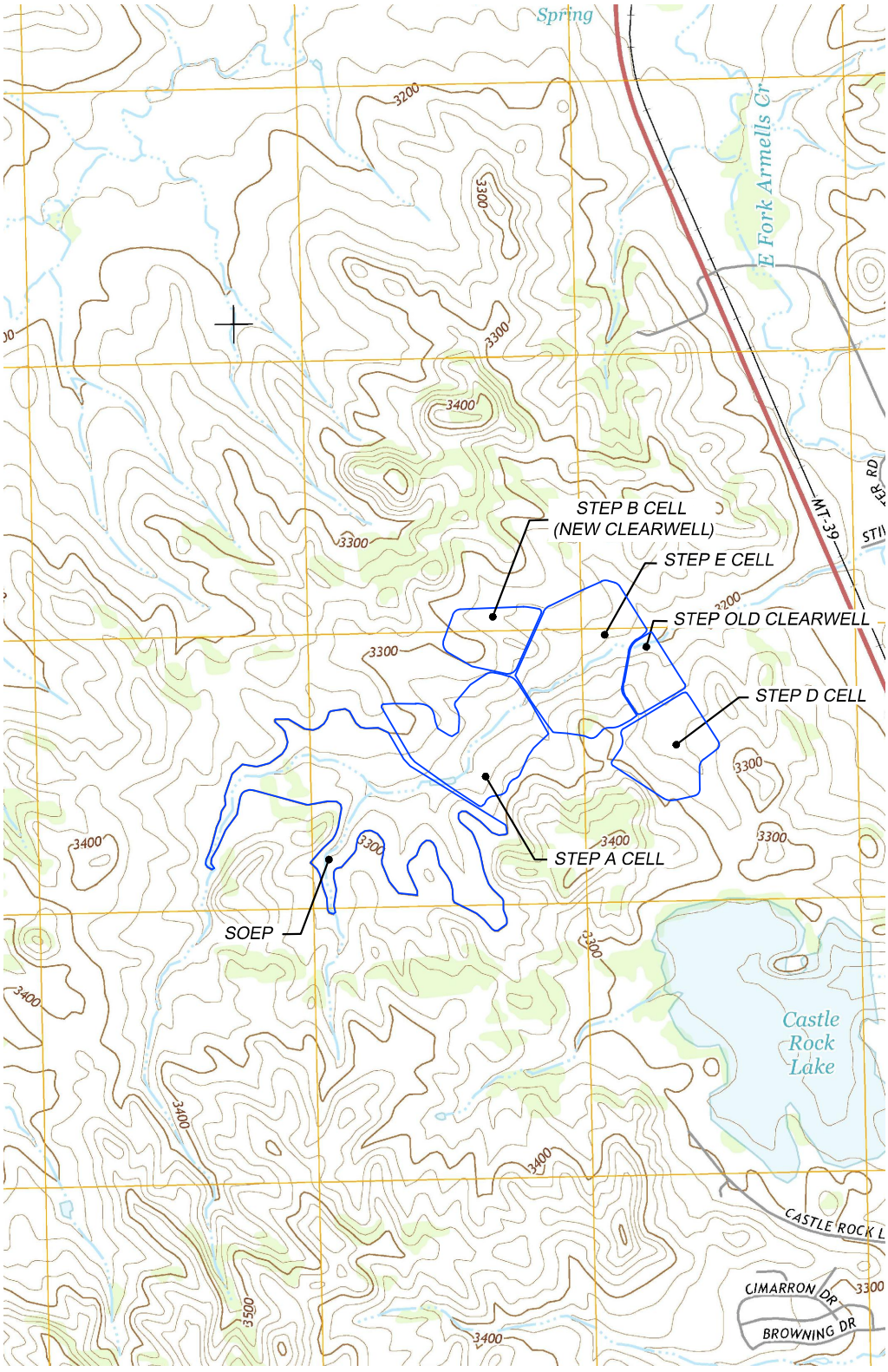
Administrative Order on Consent Site Areas

Colstrip Steam Electric Station
Colstrip, Montana

Geosyntec consultants

Columbia, MD | July 2017

Figure 1



N

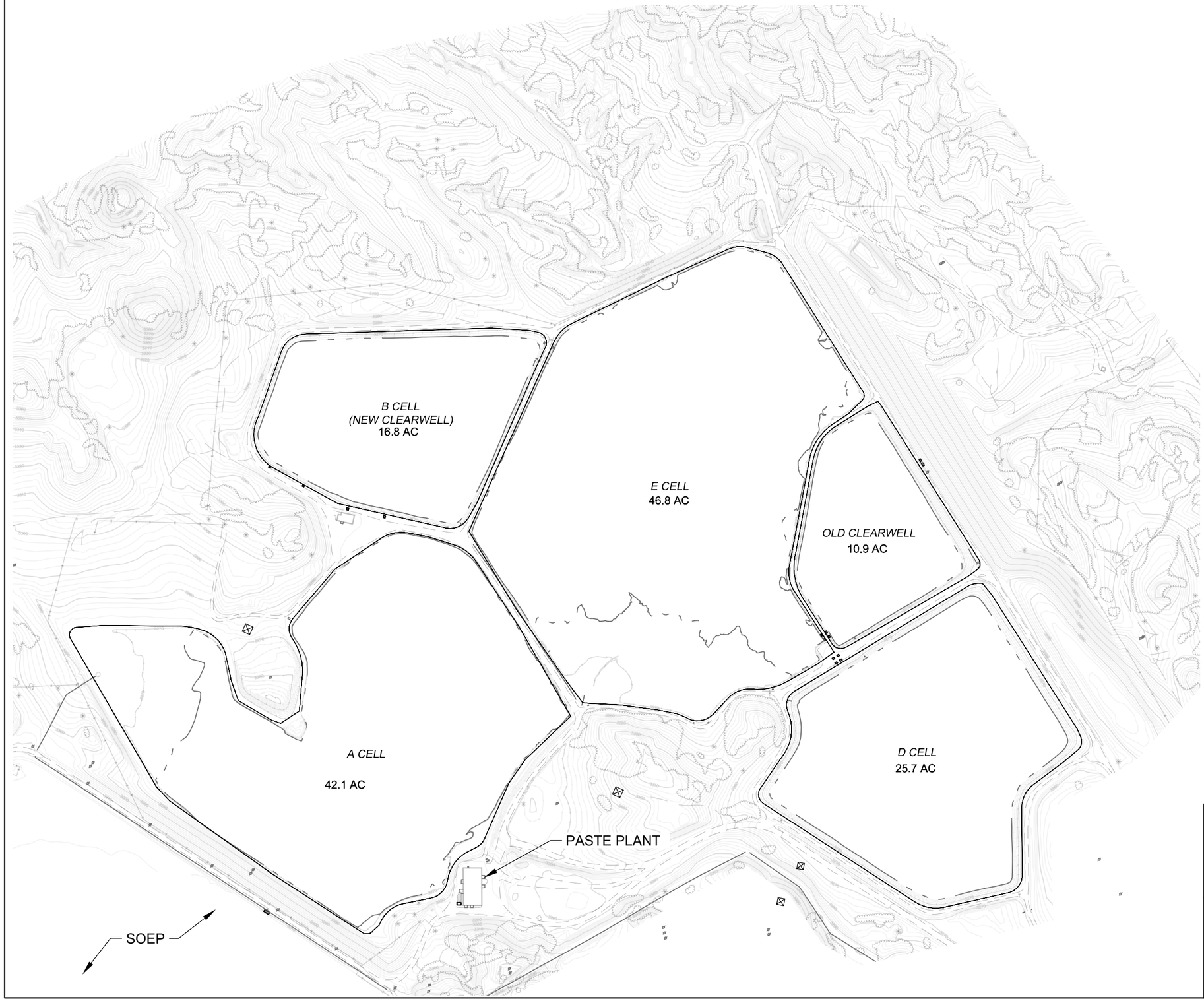
SOURCE: USGS MAP (7.5, MINUTE SERIES, ROSEBUD COUNTY, 2014)

0 1,000'
SCALE IN FEET

CELL LOCATIONS
UNITS 1&2 STEP AREA

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	JULY 2017
PROJECT NO.	ME1431
DOCUMENT NO.	MD17151
FILE NO.	F001–003
FIGURE NO.	2



LEGEND

- EXISTING GRADE CONTOUR (FEET-MSL)
- EXISTING ROAD / DRIVE
- EXISTING STRUCTURE
- EXISTING TREELINE
- EXISTING WATERLINE

NOTE:
EXISTING CONDITIONS FROM AN AERIAL SURVEY BY
AERIAL DESIGN DATA OF NORTH HUNTINGTON, PENNSYLVANIA
FROM FLYOVER CONDUCTED ON 8 DECEMBER 2014.

0 400'
SCALE IN FEET

SITE LAYOUT
STEP POND AREA
COLSTRIP STEAM ELECTRIC STATION
COLSTRIP, MONTANA

Geosyntec consultants
COLUMBIA, MARYLAND

DATE:	JULY 2017
PROJECT NO.	ME1431
DOCUMENT NO.	MD17152
FILE NO.	1199f152
FIGURE NO.	3

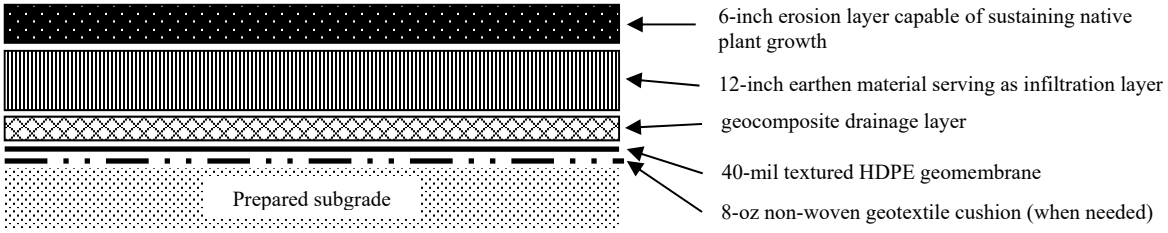


Figure 4 Final Alternative Cover System