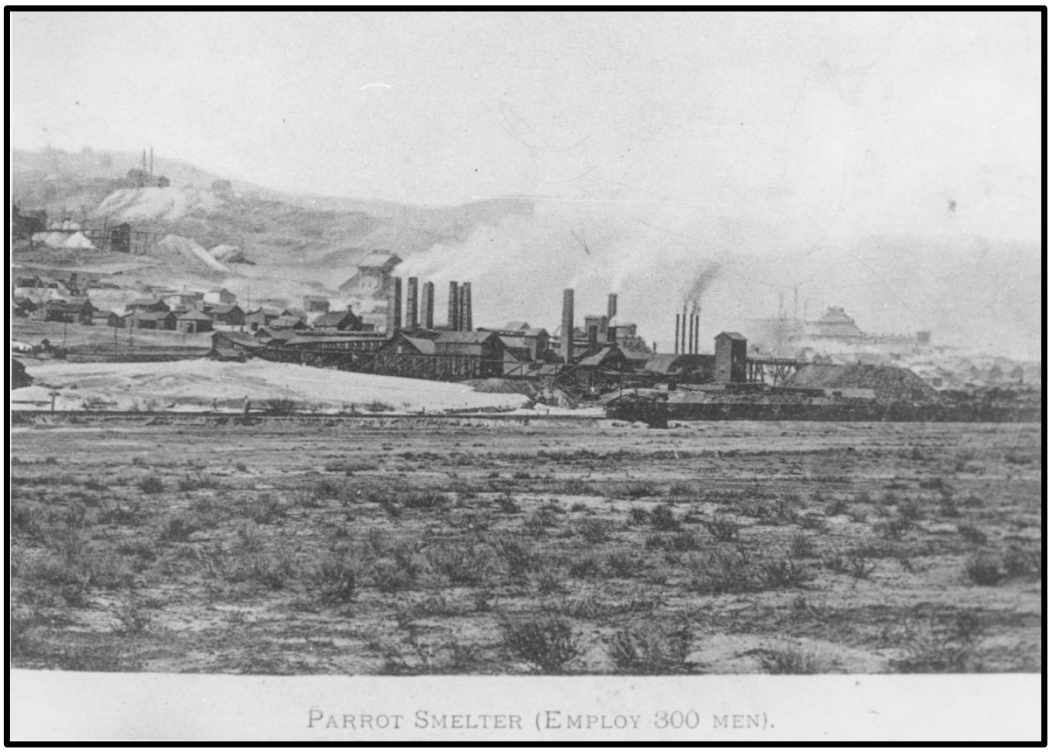
Butte Area One
Draft Restoration Plan Amendment



Parrot Tailings Waste Removal

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1.0 INTRODUCTION

This draft Butte Area One (BAO) Restoration Plan Amendment (Amendment) describes the primary work necessary to address contamination associated with the Parrot Tailings, including: waste removal design (waste volumes, removal and disposal, overburden removal and placement, transport, and disposal location.); construction dewatering; facility salvage/demolition; utility abandonment; transportation planning; worker and public safety, monitoring well protection/abandonment/replacement; bidding and construction; project phasing/sequencing; and post-removal surface grading for end land use. The draft Amendment would be the second amendment to the 2012 Butte Area One Final Restoration Plan (BAO Plan), and a further development of the 2015 Preliminary Conceptual Restoration Plan (PCRP) for the Parrot Tailings waste.

The draft Amendment is subject to a 32-day public comment period, ending Monday, February 1, 2016 at 5:00 p.m. A public meeting will be held on Thursday, January 14, 2016 beginning at 6 p.m. at the Butte-Silver Bow Public Archives, 17 West Quartz Street, Butte, Montana.

Future BAO Plan amendment(s) would address BAO Plan actions for Diggings East, Northside Tailings, and other areas of mine wastes in and around Blacktail and Silver Bow Creek and their adjacent floodplains.

2.0 BUTTE AREA ONE RESTORATION PLAN BACKGROUND

2.1 Background and Purpose

In 1983, the State of Montana filed a lawsuit in federal District Court against the Atlantic Richfield Co. (ARCO) for injuries to the natural resources in the Upper Clark Fork River Basin (UCFRB), which extends from Butte to Milltown. The *Montana v. ARCO* lawsuit, brought under federal and state Superfund laws, sought damages from ARCO, contending that decades of mining and smelting in the Butte and Anaconda areas had injured natural resources in the basin and deprived Montanans of their use.

The State settled *Montana v. ARCO* through a series of settlement agreements, or consent decrees, completed and approved by the Court in 1999, 2005 and 2008. The 1999 settlement provided approximately $130 million in natural resource damages, which was placed into the UCFRB Restoration Fund. The 1999 settlement also included a provision for the future transfer of additional funds into the UCFRB Restoration Fund if later determined not to be required for the Streamside Tailings Operable Unit remedy.

The 2008 settlement focused on three injured areas in the UCFRB covered under the settlement agreement. One was the Butte Area One injured groundwater and surface water site. The 2008 *Montana v. ARCO* Consent Decree allocated $28.1 million, plus interest, to restore, replace or acquire the equivalent of the injured groundwater and surface water of Butte Area One (BAO). The Butte Natural Resource Damage Restoration Council (BNRC), a nine member volunteer council, with assistance from the Montana Natural Resource Damage Program (NRDP), developed the BAO Plan to guide the expenditure of these funds. The BAO Plan built on the 2007 Butte Area One Draft Conceptual Restoration Plan, attached to the 2008 *Montana v. ARCO* Consent Decree. This draft Amendment has been preceded by the PCRP, issued by NRDP for public input in February 2015, which focused on the Parrot Tailings, Diggings East and Northside Tailings, and the Blacktail Berm.

2.2 BAO Plan Implementation during Consent Decree Negotiations – Parrot Tailings Wastes

The BAO Plan states:

> At this time a Consent Decree finalizing the remedial actions for Butte Priority Soils Operable Unit has not been reached, however, in keeping with their goal, the BNRC has produced this restoration plan in time for the Governor's consideration. Since the final Butte Priority Soils Operable Unit remedy plan is unknown, this restoration plan is not as specific as the council had desired. Instead, it offers enough flexibility that it should complement the future remedy and not take its place.

A major component of the BAO Plan is restoration of the Upper Silver Bow Creek corridor, which is above the confluence with Blacktail Creek. The BAO Plan calls for removal of mine wastes left

in place along the floodplain of Upper Silver Bow Creek through BAO, with an allocation of $10 million towards that removal. The BAO Plan identifies these wastes, which include the Parrot Tailings, Diggings East, Northside Tailings, and other isolated areas of mine wastes in the Blacktail and Upper Silver Bow Creek floodplains, as the primary sources supplying inorganic contaminants to the alluvial groundwater, surface water, and in-stream sediment resources within the Upper Silver Bow Creek corridor. The BAO Plan noted that leaving these wastes in place was by far the greatest concern expressed by the majority of the citizens that responded during the public solicitation process.

The BAO Plan also states:

> The restoration of the Upper Silver Bow Creek corridor, as provided above, will become part of a more definitive restoration plan that will be developed by the NRDP before the ongoing BPSOU Consent Decree negotiations are concluded. That plan will be funded with up to a $10 million allocation provided for in this section and, it is envisioned, from other funding sources.

It was the State's intention, consistent with the BAO Plan, to implement Upper Silver Bow Creek corridor restoration in coordination with cleanup actions under the Butte Priority Soils Operable Unit (BPSOU) remedy and future consent decree. However, State discussions related to remedy / restoration coordination, as well as State discussions of remedy funding contribution have not sufficiently developed for submittal to the public for comment and further input.

This draft Amendment therefore seeks to implement a portion of the Upper Silver Bow Creek corridor actions ahead of the future consent decree, while still reserving and maintaining the State's positions regarding groundwater and surface water resources.[1] This draft Amendment addresses removal of the Parrot Tailings waste, and defers discussion regarding the Diggings East, Northside Tailings, and other areas of mine wastes in the Blacktail and Upper Silver Bow Creek floodplains.

A Butte Priority Soils Operable Unit consent decree remains the State's goal. The consent decree must be fair, reasonable, in the public interest, and consistent with the goals of CERCLA. This requires acceptable remedy/restoration coordination and an acceptable remedy funding contribution, as well as implementation of a protective and compliant remedy.[2]

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[1] See for example the September 22, 2006 Partial Concurrence letter from Richard Opper, Montana Department of Environmental Quality Director, to Max H. Dodson, EPA Assistant Regional Administrator, regarding the BPSOU Record of Decision: "DEQ does not concur with the overarching decision to leave accessible, major sources of groundwater contamination in place. We refer specifically to the Parrot Tailings, Diggings East Tailings and the North Side Tailings. Our concern is that leaving these wastes in place poses a significant and permanent threat to groundwater and to the long-term water quality in Silver Bow Creek."

[2] The State retains and reserves all rights and authorities, including, but not limited to, those related to the BPSOU Record of Decision and BPSOU potentially responsible parties. This includes, but is not limited to, the groundwater and surface water components of the BPSOU Record of Decision remedy.

2.3 Parrot Tailings Wastes Removal Funding

The BAO Plan states:

> Because this [Upper Silver Bow Creek] restoration could cost as much as $30 million and because of the large number of other important projects to be accomplished using Butte Area One funds, the BNRC Restoration Recommendation would allocate $10 million for restoration activities in the Upper Silver Bow Creek corridor and requests a match from other sources to complete the project.
>
> Restoration activities could include land shaping and contouring; constructing sediment controls; waste removals, importing clean soils and soil amendments; revegetating disturbed areas; and replacing recreational or public facilities that would be eliminated incidental to waste removal activities. The BNRC prefers that the cost of waste removal be funded by other sources and not with Butte Area One restoration settlement monies.

Given that the BAO Plan allocates $10 million towards the $30 million Upper Silver Bow Creek project, and also includes a preference towards waste removal being funded from other sources, the State proposes to fund a portion of the Parrot project with an advance from unexpended money in the SSTOU/SBC Remediation Fund that is to be transferred to the UCFRB Restoration Fund and allocated to a reserve fund for specific projects in 2016.[3]

The State's determination of what amount can be transferred out of the SSTOU/SBC Remediation Fund is subject to approval by the U.S. Environmental Protection Agency. Utilization of the UCFRB Restoration Fund for the Parrot project requires a modification to the UCFRB Aquatic and Terrestrial Resources Restoration Plans, and will be subject to public comment, and input from the UCFRB Advisory Council and Trustee Restoration Council, prior to submittal to the Governor for approval. The draft modification to the UCFRB Aquatic and Terrestrial Resources Restoration Plans will shortly be issued for public comment.

The State believes that a significant portion of the Upper Silver Bow Creek corridor work is a responsibility of remedy. The State expects a remedy funding contribution to be received as part of the BPSOU consent decree.

[3] Streamside Tailings Operable Unit (SST OU) Consent Decree paragraph 15.e states, "Any funds, including Earnings, in the SST OU Account which the United States and the State determine, pursuant to the [Site Specific Memorandum of Agreement], are not required for Future Response Costs and implementation of any modification of the ROD incurred by EPA or the State (including reasonable estimates for O&M) for the SST OU shall be transferred to the State's Upper Clark Fork River Basin Restoration Fund, established pursuant to paragraph 16 of the State CD."

2.4 Role of the BNRC and Public

The BAO Plan states:

> The restoration of the Upper Silver Bow Creek corridor, as provided above, will become part of a more definitive restoration plan that will be developed by the NRDP before the ongoing BPSOU Consent Decree negotiations are concluded. That plan will be funded with up to a $10 million allocation provided for in this section and, it is envisioned, from other funding sources. The more definitive plan, whether or not other sources are found to contribute to its funding, shall be treated as a "significant, substantial change" in this BAO Restoration Plan for the purposes of Section 6 [Restoration Plan Implementation], below, and will be subject to the same review and public comment steps before its final approval by the Governor as provided for in Section 6.

In accordance with the BAO Plan, this draft Amendment is the more definitive plan to describe the removal of the Parrot Tailings wastes portion of the Upper Silver Bow Creek mine waste removal. This draft Amendment was preceded by the 2015 Preliminary Conceptual Restoration Plan which described preliminary conceptual approaches for restoration of the Upper Silver Bow Creek corridor.

This draft Amendment would be the second amendment to the BAO Plan. The first, signed by Governor Bullock in July 2014, involved the small projects category of the BAO Plan.

Both the BNRC and the public have played a large role in the development of restoration actions and expenditures. This draft Amendment is subject to a 32-day public comment period, ending Monday, February 1, 2016 at 5:00 p.m. A public meeting will be held on Thursday, January 14, 2016 beginning at 6 pm at the Butte-Silver Bow Public Archives, 17 West Quartz Street.

In addition, the BNRC and NRDP will continue to hold meetings to provide a status of any ongoing developments, as well as provide a forum for restoration plan discussions.

The Governor as Trustee will make the final decision on the draft Amendment following consideration of the input of the Trustee Restoration Council, the BNRC, NRDP, and the public, consistent with Section 6 of the BAO Plan.

Should the Governor approve the Amendment, the public will also be informed about the development of the Parrot Design. An informational public meeting on a 30% Parrot Design would be held following Amendment approval, followed by a 2nd informational public meeting of the final Design prior to construction.

There will also be public comment related to the draft modification of the UCFRB Aquatic and Terrestrial Resources Restoration Plans discussed in Section 2.3, above.

3.0 PARROT TAILINGS BACKGROUND

3.1 Butte Area One Overview

The deposition of wastes within the City of Butte from mining and mineral-processing operations has resulted in injury to groundwater and surface water resources of the Upper Silver Bow Creek watershed.

The identified injured alluvial groundwater and surface water within Butte is located in the south central portion of the Butte Priority Soils Operable Unit, referred to as Butte Area One (BAO). The BAO is depicted in the red-outlined area on Figure T1.

Injury to groundwater in BAO has been demonstrated by the occurrence of concentrations of inorganic contaminants (including cadmium, zinc, iron, lead, copper, arsenic, and sulfate) that exceed State water quality standards in the alluvial aquifer. The areal extent of the known contamination above these standards in the alluvial aquifer is approximately one square mile.

The concentration of copper in Parrot Tailings area groundwater can exceed 1,000,000 parts per billion (ppb or ug/L). Similarly, the concentration of zinc and cadmium can exceed 500,000 ppb and 2,000 ppb respectively. In the Diggings East and Northside Tailings areas, some samples from the original soil horizon (black clay/silt) on which these wastes were deposited contain in excess of 2% copper and 2% zinc. A total mass of over 3,000,000 pounds of copper and 7,000,000 pounds of zinc are estimated to be contained in the unsaturated zone in these areas. Visual wastes are located all along the floodplains, stream banks and in-stream of Blacktail Creek and Silver Bow Creek within the BPSOU boundaries. These media have shown existing elevated contaminant concentrations of copper and zinc typically ranging from 2,000,000 to 5,000,000 ppb. A 10-inch slotted PVC sub-drain and associated gravel pack was installed below Upper Silver Bow Creek. This sub-drain was constructed to collect highly contaminated shallow near drain groundwater and keep it from discharging directly to Upper Silver Bow Creek.

These tailings and wastes will continue to release hazardous substances to the groundwater and surface water of Blacktail Creek and Silver Bow Creek for many centuries, if not thousands of years unless addressed.

3.2 History of Parrot Tailings

The history of the Parrot Tailings site was well-described in the following excerpt from the Montana Bureau of Mines and Geology (MBMG) Open File Report No. 590 (MBMG, 2010):

> The mine waste (tailings and slag) concentrated in this study area are mostly the result of mineral processing and refining operations of the Parrot Smelter. Construction of the Parrot began in August of 1880. The smelter was completed in July 1881 and consisted of open stalls for roasting lump ore, reverberatory roasters, and matting reverberatory furnaces. In 1884, with the installation of six converters, the Parrot was the first smelter in the United States to successfully produce blister copper from copper matte using the Bessemer process (Southwick,

> 2008). With the installation of the converters, the Parrot was processing about 350 tons/day ore and producing about 25,000 pounds of copper per day, and discharging roughly 110 tons/day of tailings (Quivik, 1998). In 1886, the Parrot had increased its facilities, and was the second largest copper producer in the district. Besides smelting, the Parrot also had a concentrating plant used to treat the second-class ore prior to smelting, which produced a significant amount of tailings. The concentrating plant consisted of crushing equipment, jigs, and vanning tables, and was capable of processing 250 tons of ore per day. The Anaconda Copper Mining Company (ACM) purchased the Parrot Smelter and closed the facility in 1899.

During the mid-1950s, the Anaconda Mining Company placed large volumes of Berkeley Pit overburden (Butte quartz monzonite) on top of the Parrot Tailings. Previous investigations have documented fill material thicknesses from 1-foot to more than 22-feet in several locations overlying the Parrot Tailings, and slag thicknesses range from 0 to 21.5-feet. Waste material is present in the form of a yellow to grey tailings layer that has a documented thicknesses from 0 to 14 feet, and a black organic rich clay and silt layer with documented thicknesses ranging from 0 to 4 feet. The black clay layer has been interpreted in these previous studies as being the pre-mining native soil surface of the Silver Bow Creek floodplain. This black clay layer underlies a majority of the mine waste materials. Leachate from the tailings layer has permeated the black clay and contaminated these fine-grained soils with contaminant levels that are now typically higher than the overlying tailings and mining wastes.

3.3 Goals and Objectives for Parrot Tailings Waste Removal

Previous investigations have documented high contaminant soil concentrations of arsenic, copper, cadmium, lead, and zinc in tailings and other waste materials in and around the Parrot Tailings Waste Removal Area (WRA) as shown in Figure T-1. These contaminants are associated with the source area wastes, as well as leaching impacts to underlying soils and groundwater. Groundwater underlying the site is severely contaminated with these same contaminants, as well as contamination of cadmium, iron, and manganese. The ultimate discharge point for all alluvial groundwater in the Butte areas is Blacktail Creek and Silver Bow Creek.

The BAO Plan objectives of removing mine wastes left in place in Butte Area One are to eliminate known sources of heavy metal contamination to alluvial groundwater and surface water; to restore the area to a beneficial end use; to enhance the area riparian corridors; and to improve the quality of the fishery in Blacktail Creek and Upper Silver Bow Creek.

A project-specific refinement of the BAO Plan objectives for the Parrot project are to protect Blacktail Creek and Silver Bow Creek aquatic resources (surface water and in-stream sediment) from contaminated groundwater discharge and improve the quality of the creeks' fishery and aquatic macro-invertebrate communities.

In preparation for the Parrot project and in order to better define geological and environmental conditions, in late summer of 2015, NRDP conducted a design data gap investigation of the Parrot

Tailings and surrounding areas. NRDP then hired the team of Water & Environmental Technologies, Inc. (WET) and Morrison-Maierle, Inc. (MMI) in October 2015 to prepare a waste removal design. This Amendment provides additional details on the proposed Parrot Tailings waste removal activities, which will inform the Parrot Design.

3.4 Waste Removal Activities

3.4.1 Waste Removal Lithology and Removal Extent

Lithology

The WRA is located near the Butte Civic Center as shown in Figure T-2. The typical lithological profile of the WRA consists of a varying thickness of native and imported fill material placed on top of intermittent smelter slag and/or tailing piles. The slag or tailings lay on top of an organic clay/silt layer, which has been interpreted as the original Upper Silver Bow Creek floodplain soil horizon. For the purposes of this draft Amendment, the Butte quartz monzonite and slag will be included in the “overburden” category, and the tailings, waste rock and organic clay/silt will be combined and classified as “waste.” Material underlying the organic clay/silt layer is part of the alluvial aquifer and will be classified as “alluvium.”

Figures T-3 and XS-1 through XS-3 show lithologic cross sections of the WRA. These soil and waste lithologies were developed using all available soil boring and monitoring well completion logs from previous studies of the Parrot Tailings, as well as the recent data gap investigation information. Boring log information is being used to create a 3-dimensional model to extrapolate the various lithologic surfaces. The site model is being updated with new data; as a result, soil cross-sections and volumes in this document are approximate and will be further refined during the design process.

Waste Removal Extent

A proposed WRA is illustrated in Figure T-3. This removal area was delineated using investigation activities (noted above) that identify waste location and extent based on soil lithology, contaminant concentration and leaching potential, and limitations presented by surrounding infrastructure. The proposed removal activities will excavate as much of the waste material as practicable, including the groundwater saturated wastes and wastes with high leaching potential. The tailings and organic clay/silt layers were identified by MBMG (2010) and the PCRP as contaminated layers that are saturated and leach contaminants into the groundwater. Most of the tailings, organic clay/silt layer, and any intermixed alluvium encountered within the proposed waste removal area will be considered waste and will be removed. To support waste removal decisions via soil lithology, site specific soil screening levels are being developed as a secondary means of defining waste material. Field-screening during construction using a portable XRF analyzer will guide waste removal activities and document soil concentrations at removal limits.

Excavation Limitations

Previous studies have identified areas of overburden and waste material that exist outside the proposed WRA boundary. Significant infrastructure constraints exist making complete waste removal cost prohibitive and impracticable. In addition, potential remedy constraints exist that the

design will seek to address. Also, environmental considerations such as the groundwater divide, north of which the groundwater flows toward the Berkeley Pit, negate the need for removal in areas with significant infrastructure constraints if infiltration of precipitation is minimized by installing an evapotranspiration cover system to protect these unsaturated wastes (see section below).

Significant utility infrastructure exists along the north boundary of the WRA that are cost prohibitive and logistically impracticable to reroute and replace. These utilities include the Silver Lake Water Line, the Horseshoe Bend Effluent Line, and a Butte-Silver Bow (BSB) sanitary sewer main. Removing waste under the existing BNSF/Patriot Rail line and Shields Avenue are also cost prohibitive and logistically impracticable, as these are active lines that serve Montana Resources and other railroad customers.

Identified overburden and waste areas that cannot be feasibly removed will be left in place. These areas will be protected with an evapotranspiration (ET) cover system to minimize infiltration through these wastes and eliminate continued contamination of groundwater. The thin layer of tailings under the Butte Civic Center parking lot is limited and will not be removed due to these factors as well as the existing pavement which inhibits infiltration.

This Amendment will help inform the WRA design efforts that will need to account for multiple logistical and infrastructure needs associated with the project, including but not limited to:

- Refinement of overburden and waste volumes;
- Development of removal criteria;
- Determination of excavation methods and equipment;
- Protection of adjacent BNSF/Patriot Rail lines;
- Acceptance of landowners and other necessary parties;
- Removal/replacement of utilities located within and adjacent to the removal area;
- Design of a waste transport corridor that minimizes disruption to public safety and active mine operations;
- Refinement of disposal location;
- Determination of method to place waste;
- Compliance with all applicable laws and regulations;
- Minimization of impacts to surrounding properties and residents; and
- Implementation of storm water and dust control efforts during construction.

A Quality Assurance Project Plan (QAPP) will be developed to ensure that appropriate Quality Assurance / Quality Control (QA/QC) measures are implemented and monitored during the waste removal activities. The QAPP will be consistent with established EPA QA/QC programs to the extent applicable, and will clearly define construction protocols, data collection methods, and quality control procedures. A site-specific Health and Safety Plan (HASP) will be developed to establish safety protocols that will be employed throughout the project. The HASP will ensure that all oversight activities and construction contractor-developed procedures meet the appropriate Occupational Safety and Health Administration (OSHA) or Mine Safety Health Administration (MSHA) regulations.

3.4.2 Overburden and Waste Removal Volumes

Overburden and waste volume estimates have been provided in previous studies of the WRA. Table 1 includes the waste volumes provided in the 2010 MBMG report and the PCRP.

Table 1. Removal Area Estimated Overburden and Waste Volumes (cubic yards)

Source	Overburden (cy)	Waste (cy)	Total Volume (cy)
MBMG Open File Report No. 590 (MBMG, 2010)	749,939	320,972	1,070,911
Preliminary Conceptual Restoration Plan (Confluence, 2015)	675,000	270,000	945,000

Differences in the volume estimates are due to the use of different removal boundaries in the two studies, as well as potential over-estimation of overburden volumes due to variable and intermittent lithologic layers.

The WRA design will use the 2015 data gap investigation data to refine the overburden and waste volumes prior to construction. It is important to recognize sloping along the perimeter of the removal area to protect existing utilities and infrastructure and to meet safety requirements will be necessary and will effectively reduce the volume of overburden and waste removed.

3.4.3 Waste Disposal Location

The BAO Plan requires that the wastes be disposed in an environmentally protective manner. The BAO Plan noted three potential waste disposal locations for the Parrot Tailings waste:

(1) Butte Mine Waste Repository,
(2) Berkeley Pit, and
(3) Yankee Doodle Tailings Ponds.

Table 2 presents a comparative analysis of the Butte Mine Waste Repository and Berkeley Pit waste disposal locations using the BAO Plan legal criteria. The Yankee Doodle Tailings Ponds disposal location alternative was not included in the comparative analysis as the State is not including a disposal location alternative that would hamper the uninterrupted operation of Montana Resources activities.

Table 2. Comparative Analysis of Waste Disposal Locations

#	*Assessment Criteria*	Berkeley Pit	Mine Waste Repository
1	*Technical Feasibility*	Aspects of alternative are technically feasible	Aspects of alternative are technically feasible
2	*Relationship of Expected Costs to Expected Benefits*	Costs are commensurate with benefits	Costs are commensurate with benefits
3	*Cost-Effectiveness*	Aspects of alternative are more cost-effective	Aspects of alternative are less cost-effective
4	*Results of Response Actions*	Does not interfere with response actions	Does not interfere with response actions
5	*Adverse Environmental Impacts*	Temporary impacts associated with construction activity	Temporary impacts associated with construction activity
6	*Recovery Period and Potential for Natural Recovery*	Alternative would not affect recovery period	Alternative would not affect recovery period
7	*Human Health and Safety*	Alternative would be more protective of human health and safety	Alternative would be less protective of human health and safety
8	*Federal, State, and Tribal Policies, Rules, and Laws*	Alternative is consistent with Policies, Rules, and Laws	Alternative is consistent with Policies, Rules, and Laws
9	*Resources of Special Interest to the Tribes and DOI*	Alternative is consistent with MOA	Alternative is consistent with MOA

Based on the comparative analysis, placement of the Parrot wastes and any incidental overburden onto the south ramp of the Berkeley Pit is the preferred waste disposal location. The criteria that were most influential in this analysis were technical feasibility, cost-effectiveness, and human health and safety.

Technical feasibility: Both disposal options are technically feasible. Each alternative is based on proven technologies, construction methods, and scientific principles. The likelihood that either of the alternatives would achieve the objectives is relatively high. Disposal of wastes into the Butte Mine Waste Repository has been ongoing for numerous years demonstrating the technical feasibility of disposal. Similarly, placement of wastes into the Berkeley Pit has also been ongoing. The technical feasibility of transportation from the WRA to a waste disposal, clearly favors Berkeley Pit disposal due to the short distance between the WRA and disposal area, the minimum construction improvements needed for transportation, and the similar elevation between the WRA and disposal area.

Transport of wastes to the Berkeley Pit from the WRA would proceed on a dedicated road established on the railroad right of way and Montana Resources property. Use of the dedicated road would result in a short route (<2 miles round trip) without conflict with public street traffic, and would permit the use of large capacity (35-40 ton) off-road trucks versus the trucks allowed on

public streets (14 ton). Access would need to be granted by Montana Resources, and for the railroad right of way and crossing, Burlington Northern Santa Fe Railway (BNSF). Disposal would occur on a bedrock area along the southwest rim of the Berkeley Pit (Figure C-2).

Transport to the Butte Mine Waste Repository from the WRA would proceed either on public streets or on a dedicated road established on the railroad right of way and Montana Resources property, Atlantic Richfield and various other property owners, which might also partly include a former haul road that runs along the west side of the Berkeley Pit if practicable. Use of the dedicated road would result in a longer haul path (~6 miles round trip), and use of smaller off-road trucks. In addition to Montana Resources and BNSF access, access would also need to be granted by Atlantic Richfield, Butte-Silver Bow County, and potentially other land owners.

Transportation to the Butte Mine Waste Repository by dedicated road would involve switch backs to help lessen the effect of the approximate 600 foot vertical rise, and would lower the centerline grade of the roadway due to the steep terrain. Construction of the road would need grades to be held below 15% for off-road haul trucks, which due to the terrain, would need to be smaller than the large capacity (35-40 ton) off-road trucks which could be used to the Berkeley Pit. Transport to the Butte Mine Waste Repository on either the dedicated road or public streets would result in human health and safety impacts, as discussed below.

Cost-Effectiveness: Costs from the Montana Tech 2011 *Cost Estimate for the Removal of the Parrot Tailings*, referenced in the BAO Plan, were used for cost comparisons. The disposal options proposed in each alternative are cost effective since they can be accomplished with standard engineering practices, traditional construction methods, and readily available equipment and materials. However, the cost-effectiveness criteria favors disposal into the Berkeley Pit since cost for transportation and disposal into the Berkeley Pit is approximately $2 million less than transportation and disposal at the Butte Mine Waste Repository by dedicated road or city streets ($13.3 million compared to $15.2 million / $14.8 million), due primarily to costs of an approximate 2.7-mile road with a 600-foot vertical rise, and large cut and fill requirements for switchbacks. Transportation and disposal at the Butte Mine Waste Repository via public streets may be more cost-effective than a Butte Mine Waste Repository dedicated road; however, it significantly increases risk to public safety without commensurate benefit.

Human Health and Safety: Transportation to the Butte Mine Waste Repository on public streets would provide the least amount of public safety, by placing a significant number of truckloads on steep city streets. Transportation to the Butte Mine Waste Repository on a dedicated road would also include safety concerns due to the 600-foot vertical rise and significant switchbacks. No heightened safety concerns are associated with transportation to the Berkeley Pit. Safety concerns associated with placement of waste is comparable between the Butte Mine Waste Repository and Berkeley Pit location options. Analysis by the State design team shows that placement on the Berkeley Pit south ramp will lead to added safety within Berkeley Pit since it requires the least amount of worker and equipment access below Montana Resource's 100-foot buffer.

Results of Response Actions and Adverse Environmental Impacts: Both disposal options involve CERCLA remedies. The Butte Mine Waste Repository is part of the Butte Priority Soils Operable Unit and remedy, and the Berkeley Pit is part of the Butte Mine Flooding Operable Unit. For the Butte Mine Waste Repository disposal option, expansion of the repository would be necessary to accommodate the wastes. The wastes would be covered similarly to the other wastes within the Butte Mine Waste Repository. For the Berkeley Pit disposal option, disposal would need to take into account the Butte Mine Flooding remedy and consent decree requirements. The Consent Decree prohibits using the Mine Flooding Operable Unit in any manner that would interfere with or adversely affect the implementation, integrity, or protectiveness of the remedial measures to be performed pursuant to the Consent Decree. Disposal of wastes into the Berkeley Pit is subject to approval by EPA and the involvement of Montana Resources and Atlantic Richfield. The Parrot wastes are of similar nature to existing wastes on the Berkeley Pit south ramp area, and no media would be affected by the placement of the wastes. The design team performed a stability analysis which determined placement of wastes on the Berkeley Pit south ramp area would be stable and safe. The State design team also performed both a geochemical and volumetric analysis to quantify any potential geochemical effects and to quantify the volumetric displacement of pit water if the waste was placed into the pit waters. It supported NRDP's expectation that the volumetric change and change to chemistry would be negligible. However, placement on the south ramp would lead to added safety in implementation of the Parrot Project.

3.5 Waste Dewatering

3.5.1 Groundwater Depth and Saturated Waste Extent

Groundwater elevations within the WRA are somewhat uncertain and will require additional evaluation during design. The PCRP indicated that shallow groundwater exists under the BSB Shop Complex, which partially saturates the waste materials. As estimated in the PCRP, approximately 9 acres of the WRA may be groundwater saturated with thicknesses ranging from 0 to 6.5-ft, depending on seasonal groundwater fluctuations. The PCRP also indicated that boreholes used to estimate the groundwater elevations in this area were completed prior to remediation activities within Upper Silver Bow Creek; as a result, the groundwater flow regime may not be the same. The 2015 Parrot design data gap investigation has collected groundwater elevation data indicating that groundwater elevations may be lower than reported in the PCRP.

It is anticipated that groundwater will be encountered in the wastes, as well as in the alluvium underlying the organic clay/silt layer waste. Greater groundwater volumes will most likely be encountered in the alluvium than in the waste due to the higher hydraulic conductivity of the alluvium.

3.5.2 Waste Removal Dewatering Design

Due the anticipated presence of groundwater during waste removal activities, a construction dewatering plan will be developed to lower water elevations below the proposed excavation depth.

The dewatering plan design will use historic and current data to define anticipated groundwater conditions during construction. Also to better understand the groundwater flow regime groundwater

dewatering tests will be conducted within the identified area of saturated waste. The dewatering tests will define aquifer characteristics such as horizontal and vertical gradients, hydraulic conductivities, transmissivities, and saturated thicknesses, and the effect of dewatering activities on the groundwater divide.

These aquifer characteristics will be used to model and design a site dewatering plan for the waste removal activities. The dewatering plan design will most likely consist of a series of dewatering wells, well points, infiltration galleries, trenches or some combination thereof to control groundwater elevations and make excavation within the saturated zone more efficient. A phased dewatering approach may be used as large-scale dewatering of the saturated waste may not be feasible.

3.5.3 Groundwater Disposal Plan

Based on groundwater quality data from previous investigations and ongoing monitoring activities, groundwater from dewatering operations is expected to be limited if properly sequenced. Potential disposal options for groundwater will be determined during design, and could potentially involve disposal for use in ongoing Montana Resources operations, Berkeley Pit, or the sub-drain.

3.5.4 Evapotranspiration Cover System

An objective of the Parrot Tailings waste removal activities is to eliminate known sources of inorganic contamination to alluvial groundwater and surface water. Parrot Tailings wastes which cannot be reasonably accessed and removed because of infrastructure or because of potential remedy constraints will be protected in-place with an Evapotranspiration (ET) Cover System. The purpose of ET cover systems is to protect groundwater resources by limiting infiltration of precipitation through wastes.

Unlike conventional engineered cover systems which use materials with low hydraulic permeability to minimize downward migration of precipitation (infiltration), ET cover systems use natural water balance components to minimize infiltration. ET cover systems rely on soil properties to store water until it is used by plants (transpired) or evaporated from the soil surface. Infiltration of precipitation through the Parrot Tailings wastes is a primary route of contaminants moving from the wastes to groundwater.

ET cover systems have been widely tested and monitored in the inter-mountain west and are the preferred method for safely protecting mine waste impacts to groundwater from infiltration of precipitation. The total thickness of ET cover systems will be determined in design, but is typically 42– 48 inches in precipitation zones such as Butte. Potential ET Cover System areas are shown in Figure C-1, with the exception that an ET cover system would not be placed in the park between Texas Avenue and the BSB county shops. In addition to the area identified in C-1, additional ET cover systems or other engineering controls to prevent infiltration will be implemented for areas within or adjacent to the WRA where waste cannot be feasibly removed. These areas include boundary areas where sloping requirements may prevent removal, and areas along existing railroad grades.

ET cover systems offer certain advantages over other more engineered infiltration barriers, such as superior long-term performance at limiting infiltration through wastes in semi-arid regions such as Butte, the establishment of robust and diverse native vegetation, the ability for passive recreational use of the cover area, and minimal long-term operation and maintenance.

The Parrot ET Cover System design will incorporate key design parameters such as climate, soil type, soil thickness, vegetation type, soil fertility, and vertical/horizontal infiltration. An operations and maintenance plan for the ET Cover System will be developed prior to construction.

3.5.5 Overburden

Overburden will consist of fill and slag excavated from the WRA. Selected rock and fill that is free of contamination will be returned to the WRA in order to establish grades necessary for post removal land uses.

Excess overburden, which will include slag, will also be placed beneath the ET Cover System in areas with an ET Cover System in order to minimize the potential for groundwater contamination from overburden. Potential overburden placement and ET Cover System areas are shown in Figure C-1, with the exception that potential overburden placement and ET Cover System would not occur in the park between Texas Avenue and the BSB county shops.

Final ET Cover System specifications, grades, and topography, will be determined once overburden volumes have been evaluated and finalized. Overburden placement may be limited in some areas by existing utilities and infrastructure.

3.6 Butte-Silver Bow Shop Complex Demolition

Removal of waste within the WRA will require demolition of the BSB Shop Complex (Figure C-3). Each of the existing buildings will be evaluated individually to develop either a cost-effective removal plan, or a potential salvage plan, if salvage is deemed feasible. The NRDP will coordinate with BSB to obtain available design and construction drawings for each of the existing buildings, utilities, and associated infrastructure. These drawings will be utilized to determine each building's construction type, the ability to be salvaged, or the best method of demolition.

During the BSB Shop Complex demolition design process, an environmental conditions assessment will be conducted to identify any evidence of hazardous wastes spills or leaks, lead paint or asbestos that will require an additional handling and disposal plan.

3.6.1 Demolition Plan

Once all building structure information and data are gathered, a demolition plan will be developed for the shop structures and associated area landscaping. If structures are deemed to have salvage value, a plan will be developed to recover these costs. Each structure will be evaluated to make this determination. A general contractor may be solicited to assist with determining a structure's salvage value. Structures/materials that cannot be salvaged will scrapped and recycled. Unrecyclable materials will be hauled to the BSB landfill.

3.6.2 BSB Transition Coordination

Work on the portion of the WRA occupied by the BSB Shop Complex will be phased to assure that these Public Works Department operations will operate through 2016 and into portions of 2017 until relocated shops are constructed and ready for occupancy. Scheduling and coordination with BSB will occur during the transition to a new location, in order to minimize disruption to BSB Public Works operations. BSB Public Works operations will be established at their new location prior to demolishing the existing old complex.

3.7 Utilities and Transportation

3.7.1 Identify and Abandon Utilities

Multiple public and private utilities exist within the WRA and transportation corridor. A preliminary utilities plan, with proposed actions, is included in Figure C-4. This general plan will be used in discussion with individual utility owners to coordinate protection measures, removals, abandonments, and relocations to minimize any disruption in service.

Within the WRA, one impacted natural gas distribution line is primarily for service to the BSB Shop Complex. As a service line, it is expected that this will be cut and capped at the western project boundary and the line itself removed immediately before demolition of the buildings being serviced.

A second buried natural gas transmission line is located in the area of the transportation corridor along the northern boundaries of the WRA. Re-routing or protection measures for this line will be discussed with the utility owner and implemented as necessary.

Electrical service lines to the BSB Shop Complex will be removed in concert with the building demolition work. This work would not affect customers in the adjacent area. Larger transmission lines also are located along the northern boundaries of the WRA. At this time, it is anticipated that these lines will be protected and left in place. Prior to construction, coordination with the utility owner will take place to plan the most efficient strategy of maintaining these lines. If it is determined the lines need to be relocated, this work would occur on a schedule that would minimize disturbance to the surrounding community.

Water services to the BSB Shop Complex will be capped and removed from the project site. The WRA will be at or near a shut off valve to allow reconnection for needed services based on end land use demands. All water mains appear to be outside of the WRA, which will be confirmed to construction. The fire hydrant near the northeast corner of the Civic Center facility may require a temporary connection to maintain fire protection during the project.

The main sanitary sewer service from the BSB Shop Complex appears to be located along the southern boundary of the WRA. This service will be disconnected and capped as a stub for future use. The sewer main is near, but outside, the disturbance limits and will be protected in place with no disruption to service.

There are three main storm sewer facilities within the WRA and proposed ET Cover System areas. The first is the internal collection and conveyance piping network at the BSB Shop Complex. This series of manholes and pipes will be removed and the manholes salvaged to the extent feasible. The outfall from this collection system is south of the WRA and will be protected in place and maintained for use in future development. A second storm sewer main line, the Warren Avenue Main, passes through the northern and western boundary of the WRA. The outfall for the Warren Avenue Main is at the southwestern corner of the WRA. This line serves the Second Street neighborhood to the north and the Warren Avenue Hydrodynamic Device (HDD) near the western boundary of the WRA. The Warren Avenue storm main will be temporarily rerouted during construction and replaced upon completion. The HDD will be protected in place and will not be disturbed. A third storm sewer main, the Texas Avenue Main, passes through the proposed ET Cover System area on the east side of Silver Bow Creek. This line serves the Greeley Neighborhood to the east and the Texas Avenue HDD. This main and the HDD will be protected in place and will not be disturbed.

Communications lines within the WRA appear to be service lines. These will be removed with little to no disruption of service to the surrounding area.

3.7.2 Utilities Replacement

Once waste removal activities are complete, the area will be regraded with overburden material and brought to finish grade so that public and private utilities (power, gas, communication, fiber, water, sewer, stormwater) can be replaced. The design and construction of these utilities will be completed in accordance with the individual utility owner's requirements, standards, and specifications, and coordinated to serve the end land uses.

3.7.3 Civic Center Road Replacement

This project will require removal and reconstruction of approximately 1,800 feet of Civic Center Road. The limits of reconstruction are anticipated to extend from the east side of the Civic Center parking lots to the intersection with Texas Avenue. The 700 foot section adjacent to the Civic Center and the Butte-Silver Bow Transit Center, immediately east of Harrison Avenue will not be impacted.

Civic Center Road provides a connection between Harrison Avenue and Continental Drive via Texas Avenue. The route is a designated truck route, as outlined in the *2005 Butte-Silver Bow Transportation Plan Update*. This designation stems primarily from the traffic generated by the Butte Shop Complex located just east of the Civic Center. Existing horizontal and vertical alignments for the corridor are summarized as:

- From Harrison Avenue to the western boundary of the WRA, the road has a curb to curb width of approximately 48-ft with two 13-ft travel lanes and 11-ft shoulders. Sidewalks are provided along the north side of Civic Center Road. On the south side, sidewalks are provided from the intersection to the end of the Civic Center Building. This segment has an approximate slope of 1-percent and storm drain facilities.

- From the western boundary of the WRA to Texas Avenue, the roadway narrows to approximately 40-ft in width with two 12-ft travel lanes and 8-ft shoulders. Curb and gutter is provided along the majority of the Butte Shop Complex property on the south side. Near the culvert crossing at the east end, the shoulders narrow to 4-ft. Slopes along this segment vary from 1-percent to 0.5-percent. A steeper transition exists from the east boundary of the Civic Center parking as the road climbs the slope of the WRA. The slope along this segment is approximately 4 percent.

Final grade and road elevations will be determined during design; however, it is anticipated that the alignment of Civic Center Road will be generally consistent with the current road location. As part of the design process NRDP will coordinate with BSB so the needs of the intended future uses are considered. Issues to be considered:

- Need for additional turn lanes or other traffic control measures.
- Pedestrian access, with an evaluation to determine best routes, safety concerns, and future remedies.
- A storm drainage analysis to identify areas of concern. Findings will be incorporated into the design to alleviate issues.
- Proximity to rail embankment will be evaluated to determine if there are safety or operational issues.

Access along the northern side of Civic Center Road is currently unrestricted. As end land uses are finalized by BSB, the design will incorporate more defined access points. These maybe similar to the access locations for the existing Civic Center parking area. For this analysis the following tasks will be completed in coordination with BSB:

- Future traffic generation will be calculated. This information will be used as part of the development criteria for the road reconstruction.
- The roadway design vehicle will be selected after the future use evaluation.
- Plan and profile drawings will be developed based on the selected alignment, geometric changes, and identified drainage needs.
- Utility coordination will be completed to maximize compatibility with future end land uses.

3.7.4 Traffic Control

Beginning with Phase I, Civic Center Road will be closed to through traffic. The closed section will extend from the western project boundary to the intersection with Texas Avenue. The major features of the closure include:

- Access to the Butte-Silver Bow Transit Center and Civic Center / Civic Center parking areas from Harrison Avenue will not be restricted.
- Access for vehicles traveling to and from the Butte Shop Complex will be maintained until the Center is relocated.
- Butte-Silver Bow Transit buses will be rerouted, but no bus stops will be changed.
- The Alley Rally Site will be closed or relocated until the project is completed.

An overall project area traffic control map is shown in Figure C-10.

Through traffic will be rerouted on a signed detour until Civic Center Road reconstruction is completed. Traffic will be diverted off of Harrison Avenue to Grand Avenue as the alternate west-east route. Access to Shields Avenue / Farrel Street will continue uninterrupted from Texas Avenue. Similar to Civic Center Road, Grand Avenue is also a designated truck route and is expected to adequately handle additional traffic.

Grand Avenue is signalized at Harrison Avenue with a dedicated left turn lane for the southbound to eastbound movement. This existing traffic control is expected to handle the additional loading on Grand Avenue. There are also dedicated turn lanes for the westbound to northbound / southbound movements at the intersection. This intersection/route was selected due to its existing designation as a major collector, and because of its traffic safety controls.

It is expected that the detour will affect traffic levels on other local, minor streets to some extent. The area of streets which are expected to experience temporary additional traffic is generally described within boundaries as follows:

- Farrel Street and Second Street to the North;
- Atlantic Street to the West;
- George Street to the South; and
- Howard Avenue to the East.

Public notifications of closures or traffic control alterations will be provided in advance to residents. This will include any special accommodations for pedestrian or bicycle routes. Access to individual residences is not expected to be affected.

Prior to construction, the contractor will finalize the work zone safety plan and coordinate with this overall traffic control plan. Additional routes, safety control measures, signage, etc., may be employed to minimize interaction between the public and construction vehicle traffic. These are anticipated to be temporary measures and advance notification will be provided to residents.

3.8 Monitoring Well Protection, Abandonment, and/or Replacement Plan

The WRA has an existing monitoring well network that will be impacted by waste removal activities. As a result, a monitoring well protection/abandonment/replacement plan will be prepared to properly identify impacted wells and mitigation actions. Specifically, the plan will include the following information:

- Locations of all monitoring wells within the project area, including the WRA, overburden placement areas, transportation corridor, and disposal site.
- Identification of wells to be abandoned, wells to be replaced, and wells to be protected.
- Technical procedures for well abandonments and replacements, will be conducted in accordance with State of Montana DNRC requirements.

Table 3. Proposed Monitoring Well Protection/Abandonment/Replacement

Proposed Restoration Plan Action	Monitoring Well ID
Remove/Abandon and Replace During Construction	GS-09-01, GS-09-02, GS-09-03, GS-10A and B, GS-41S and D, GS-42S and D, GS-45, PT 14-1, PW-01
Abandon – Do Not Replace	AMC-11, PC-Test Well-MP, GS-7(already abandoned)
Protected	AMW-08, AMC-12, GS-50 (AI-SD-614), AMC-11-20

Other stakeholders and agencies will be consulted in this effort, and NRDP staff will approve the final network. The current monitoring well network with proposed action is shown in Figure C-6.

3.9 Bidding and Construction

3.9.1 Development of Bid Documents

A consistent and recognizable bid document format will be utilized for this project. The documents will follow current NRDP bid document format, utilizing applicable documents and sections that the stakeholders, agencies, and potential bidders will recognize. The various sections will include:

- Standard terms and conditions;
- Information for bidders;
- Bid and contract documents;
- Special provisions;
- Appendices;
- Standard specifications; and
- Construction drawings.

The bid document will include the project design details presented in this Amendment and those developed during the design phase.

A draft final bid document will be prepared for review by NRDP, and once approved the final bid documents will be provided to BSB, stakeholders, applicable agencies, and the public. An engineer's cost estimate for the waste removal will be generated to insure that the scope and budget for the work is within the overall project scope.

3.9.2 Bidding

The project will be advertised following State of Montana procurement and bidding requirements. At this time it is anticipated that the work will be performed under one general contract for a prime contractor.

The bid opening will be conducted by NRDP, a bid tabulation will be prepared, and after evaluating all bids a recommendation for award will be made. Once an award is approved, the award and contract documents will be prepared and executed by the successful contractor and NRDP.

3.9.3 Construction

With the execution of the contract documents, the successful contractor will be issued a notice to proceed to begin the removal activities as outlined in the bid documents. NRDP will further develop a construction management team to provide general administration of the construction contract and oversight of the work by the contractor, insuring compliance with the bid documents and all regulatory requirements. Throughout the project NRDP's construction management team will also be available to update stakeholders, other agencies, and the public on project status.

3.10 Construction Phasing and Schedule

As shown on Figure C-7 it is anticipated that construction for this project will occur over a currently anticipated two to three-year period and will be broken into various phases as necessary to complete the project. The Phase I activities will occur in 2016 consisting of transportation corridor development, site control and security, implementation of the closure of Civic Center Road to through traffic and an associated traffic control plan, and removal of overburden and waste materials north of Civic Center Road. In 2017 and or 2018, the BSB Shop Complex will be removed once the new facility is constructed and operational. After removal of the BSB Shop Complex buildings, Civic Center Road adjacent to the BSB Shop Complex will be removed to Texas Avenue and overburden and waste will be excavated on the south side of Civic Center Road.

During removal, demolition and site regrading activities, storm water handling and erosion control measures will be established, maintained and updated until final grading and utility reconstruction is completed. The current schedule is anticipating project completion in 2018.

3.11 Post-Removal Surface Grading Design

A post-removal surface grading plan will be prepared that will protect the removal area and surrounding capped overburden and adjacent remedy components on Upper Silver Bow Creek. The WRA will be regraded with overburden material and brought to finish grade so that wet and dry utilities (power, gas, communication, fiber, water, sewer, storm) can be installed and Civic Center Road reconstructed.

The final grading plan will be based on three primary factors:

1.) Ability to reuse overburden at the WRA or potentially place on other properties;
2.) Protection of capped overburden/waste and Upper Silver Bow Creek remedy components; and
3.) End land use plans desired by BSB.

Potential overburden reuse locations are shown in Figure C-1. It is expected that some overburden material will need to be replaced on the WRA to meet grades acceptable to BSB and NRDP. A cut-fill analysis will be conducted to determine the most appropriate final site grades that will protect remedy components, minimize material handling, and meet BSB end land use plans. Depending on final volume of overburden removed and the WRA post removal surface, other locations to place overburden have been identified as shown in Figure C-1.

3.11.1 Grading Plan Options for End Land Use

After waste removal, the final surface for the WRA will be below the existing grade of surrounding properties. Overburden/fill material will be required to construct a surface that will be acceptable to BSB and NRDP. As an example, a consistent and relatively flat grade could be constructed using the Butte Civic Center parking lot as the controlling site elevation, sloping gently toward Silver Bow Creek. Grades around the perimeter of the removal area could be designed to match/complement other surrounding properties to the extent possible. Depending on overburden volumes and placement options, the site elevation may need to be raised in a tiered fashion, as suggested in the PCRP. The post-removal surface grading plan is not anticipated to impact the existing Civic Center parking lot or other infrastructure.

3.11.2 Interim/Final Surfaces

Interim and final surfaces will be designed for the WRA to accommodate surface changes during and at the end of construction, including anticipated post-removal development. The interim WRA surface will ensure proper storm water drainage across the site, and will include a vegetated cover or other features to limit erosion until the final surface. Design and construction of final surface features within the WRA will be completed by the property owner following construction. The final WRA surface is subject to further development, and is anticipated to consist of a combination of asphalt parking lots, commercial buildings, and green space. Both the interim and final surface designs will limit infiltration at the site. Design requirements will be outlined for further development to ensure that the project is protected.

Figure T-3 shows potential overburden placement locations which are located north of the WRA and contain wastes to be protected in place by an ET cover system. These ET Cover Systems will in effect eliminate water infiltration through these in-place wastes, eliminating impacts to groundwater and ultimately surface water resources of Blacktail Creek and Silver Bow Creek.

4.0 REFERENCES

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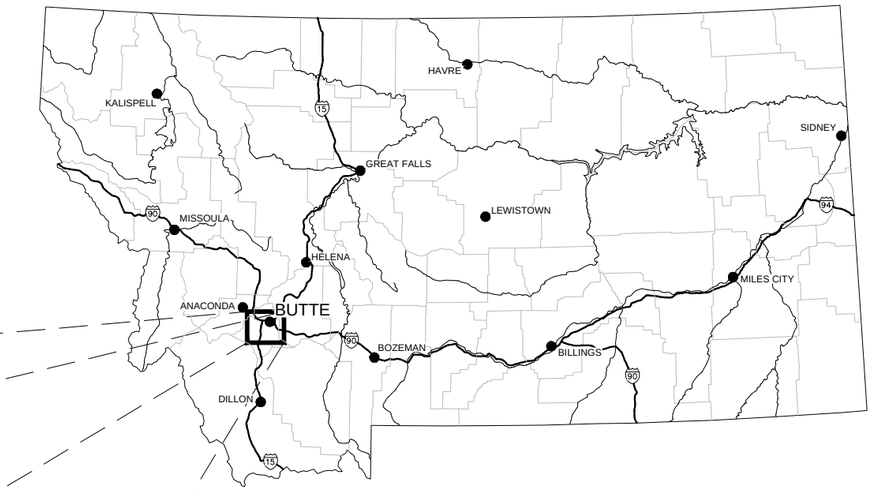
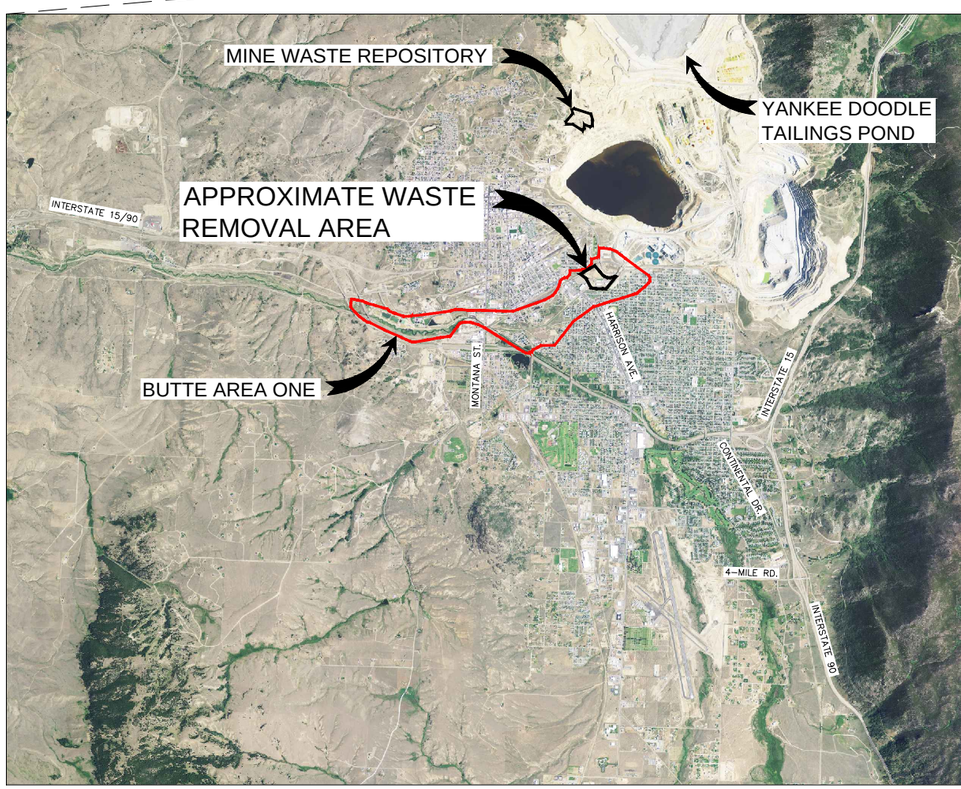
DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT

LOCATED IN SILVER BOW COUNTY, MONTANA





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XS2	LITHOLOGY OF WASTE REMOVAL AREA: SECTION B-B' EAST - WEST
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PRELIMINARY
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No.	Description	Date	Drawn By

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TITLE SHEET
SITE LOCATION MAP

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-T101-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/30/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
T1

M:\NRDPM02\CAD\CIVIL\SC-T101-NRDPM02.dwg PLOT DATE 2015-12-30 12:29 USER: dstratton

PRELIMINARY
NOT FOR CONSTRUCTION

No.	Description	Date	Drawn By

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PARROT TAILINGS REMOVAL PROJECT SITE MAP

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-TI01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/30/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
T2

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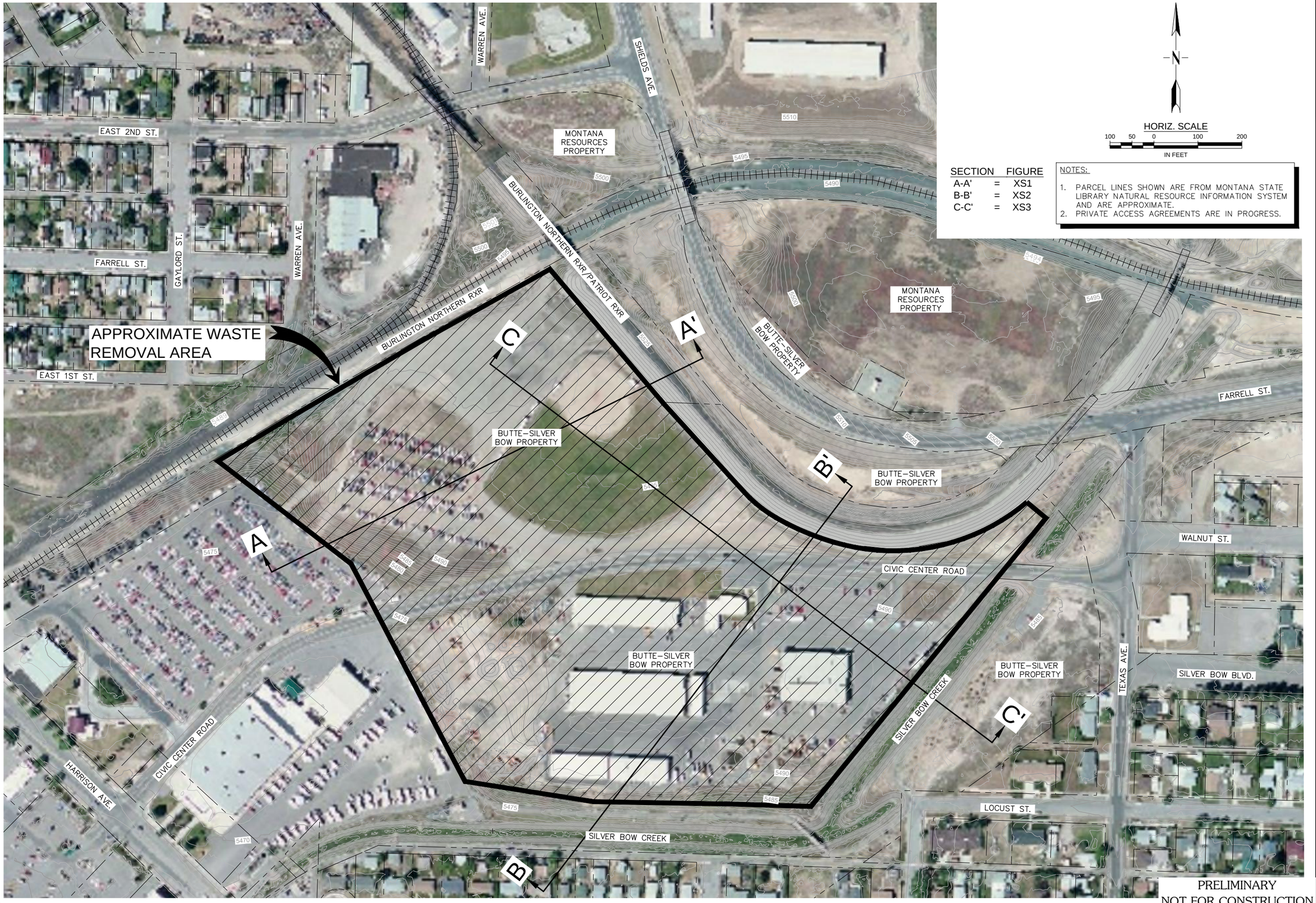

HORIZ. SCALE

100 50 0 100 200

IN FEET

SECTION		FIGURE
A-A'	=	XS1
B-B'	=	XS2
C-C'	=	XS3

NOTES:

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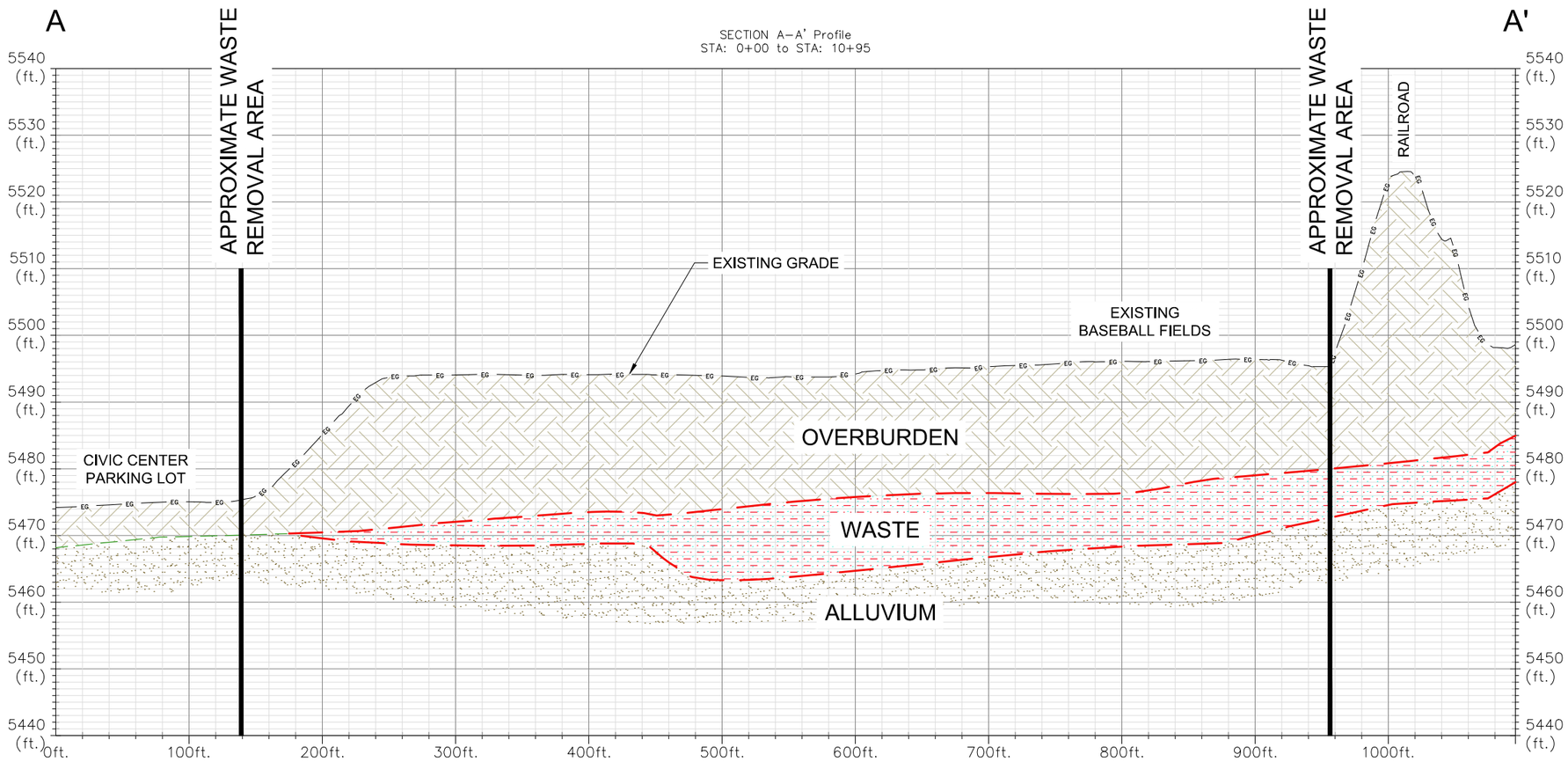
APPROXIMATE WASTE REMOVAL AREA

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-TI101-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
T3

M:\NRDPM02\CAD\CIVIL\SC-TI01-NRDPM02.dwg PLOT DATE 2015-12-22 14:48 USER: dstratton



NOTE:

LITHOLOGY DATA WAS EXTRAPOLATED BASED UPON HISTORICAL SOIL BORING AND MONITORING WELL LOGS FROM MULTIPLE STUDIES AND SHOULD BE CONSIDERED APPROXIMATE. LITHOLOGY EXTENT AND VOLUMES WILL BE FURTHER DEVELOPED IN THE DESIGN PROCESS.

5X VERTICAL EXAGGERATION

HORIZ. SCALE

50 25 0 50 100

IN FEET

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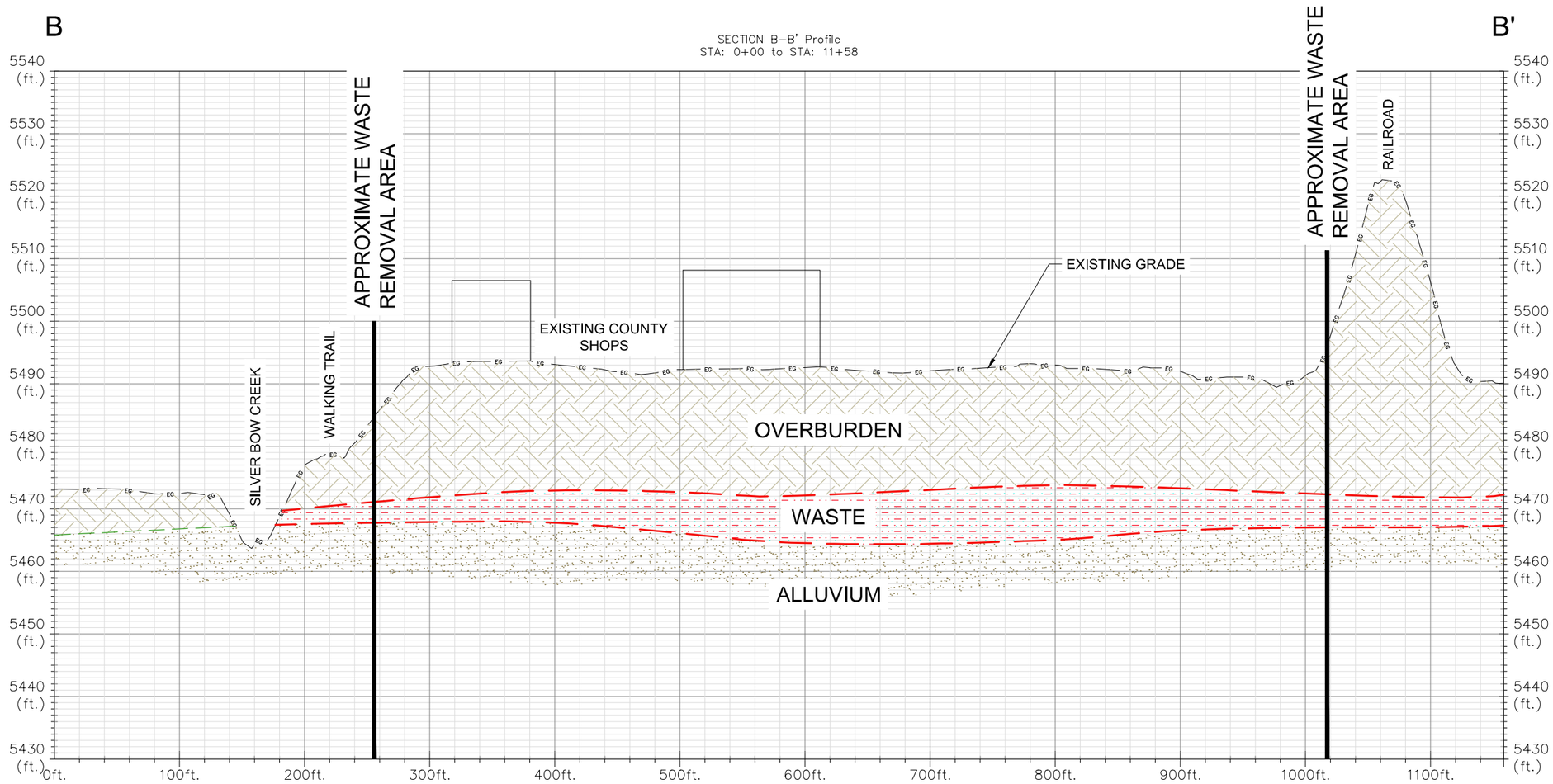
LITHOLOGY OF WASTE REMOVAL AREA SECTION A-A' EAST-WEST

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-XS01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
XS1

M:\NRDPM02\CAD\CIVIL\SC-XS01-NRDPM02.dwg PLOT DATE 2015-12-22 14:56 USER: dstratton



5X VERTICAL EXAGGERATION

HORIZ. SCALE

50 25 0 50 100

IN FEET

NOTE:

LITHOLOGY DATA WAS EXTRAPOLATED BASED UPON HISTORICAL SOIL BORING AND MONITORING WELL LOGS FROM MULTIPLE STUDIES AND SHOULD BE CONSIDERED APPROXIMATE. LITHOLOGY EXTENT AND VOLUMES WILL BE FURTHER DEVELOPED IN THE DESIGN PROCESS.

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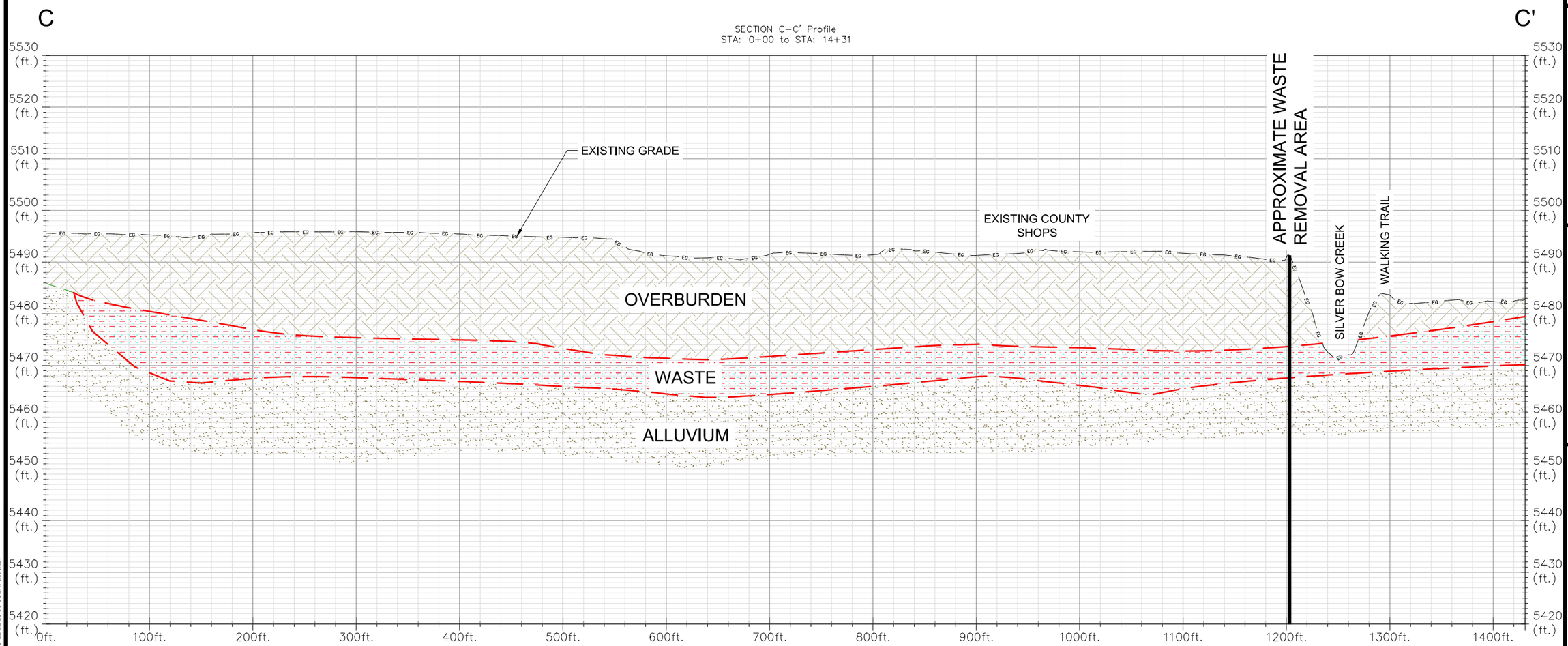
LITHOLOGY OF WASTE REMOVAL AREA SECTION B-B' EAST-WEST

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-XS01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
XS2

M:\NRDPM02\CAD\CIVIL\SC-XS01-NRDPM02.dwg PLOT DATE 2015-12-22 14:57 USER: dstratton



5X VERTICAL EXAGGERATION

HORIZ. SCALE

50 25 0 50 100

IN FEET

NOTE:

LITHOLOGY DATA WAS EXTRAPOLATED BASED UPON HISTORICAL SOIL BORING AND MONITORING WELL LOGS FROM MULTIPLE STUDIES AND SHOULD BE CONSIDERED APPROXIMATE. LITHOLOGY EXTENT AND VOLUMES WILL BE FURTHER DEVELOPED IN THE DESIGN PROCESS.

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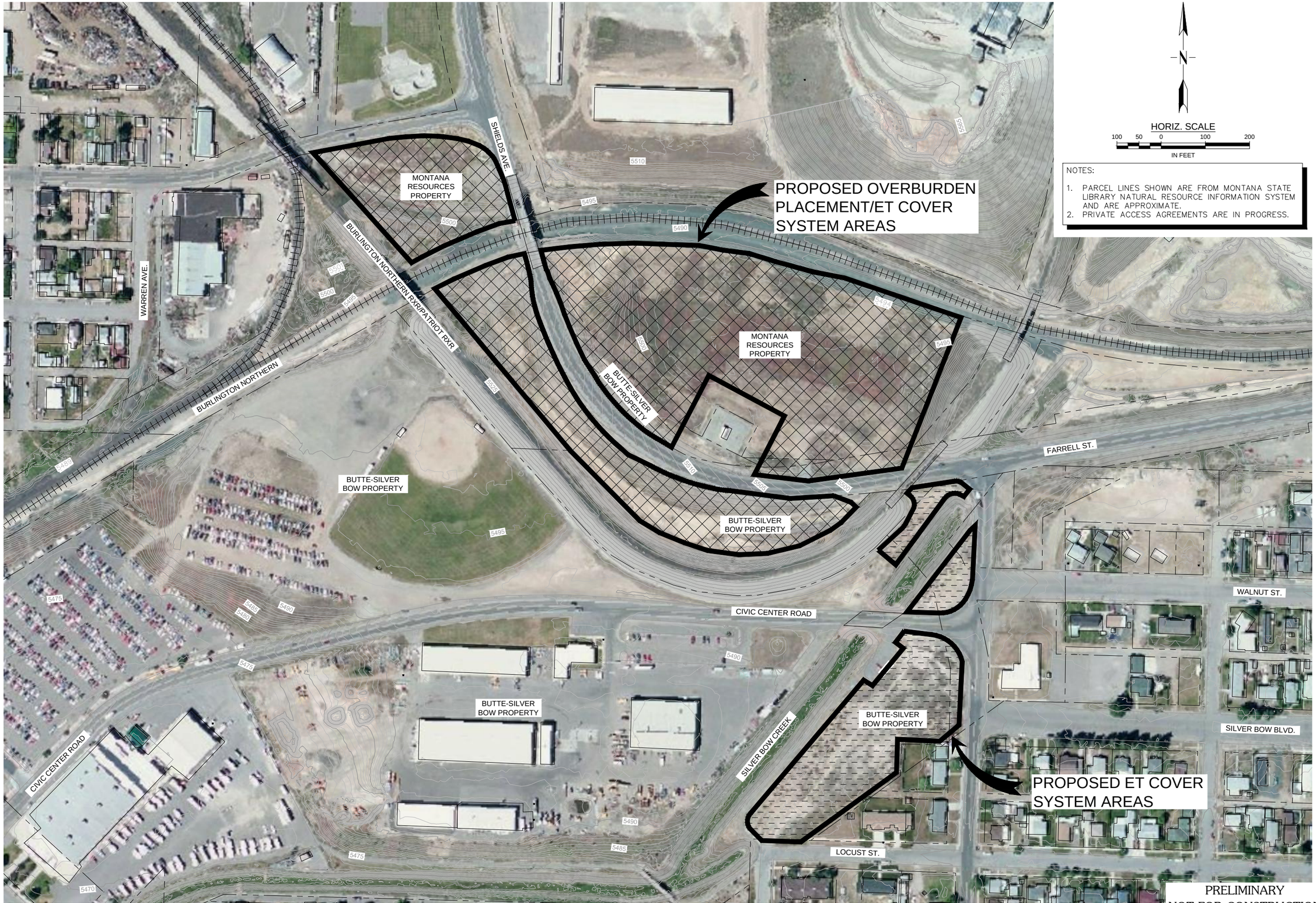
LITHOLOGY OF WASTE REMOVAL AREA SECTION C-C' NORTH - SOUTH

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-XS01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
XS3

M:\NRDPM02\CAD\CIVIL\SC-XS01-NRDPM02.dwg PLOT DATE 2015-12-22 15:06 USER: dstratton



HORIZ. SCALE

100 50 0 100 200

IN FEET

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POTENTIAL OVERBURDEN PLACEMENT/ET COVER SYSTEM AREAS

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-BW01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
C1

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M:\NRDPM02\CAD\CIVIL\SC-BM01-NRDPM02.dwg PLOT DATE 2015-12-22 15:13 USER: dstratton

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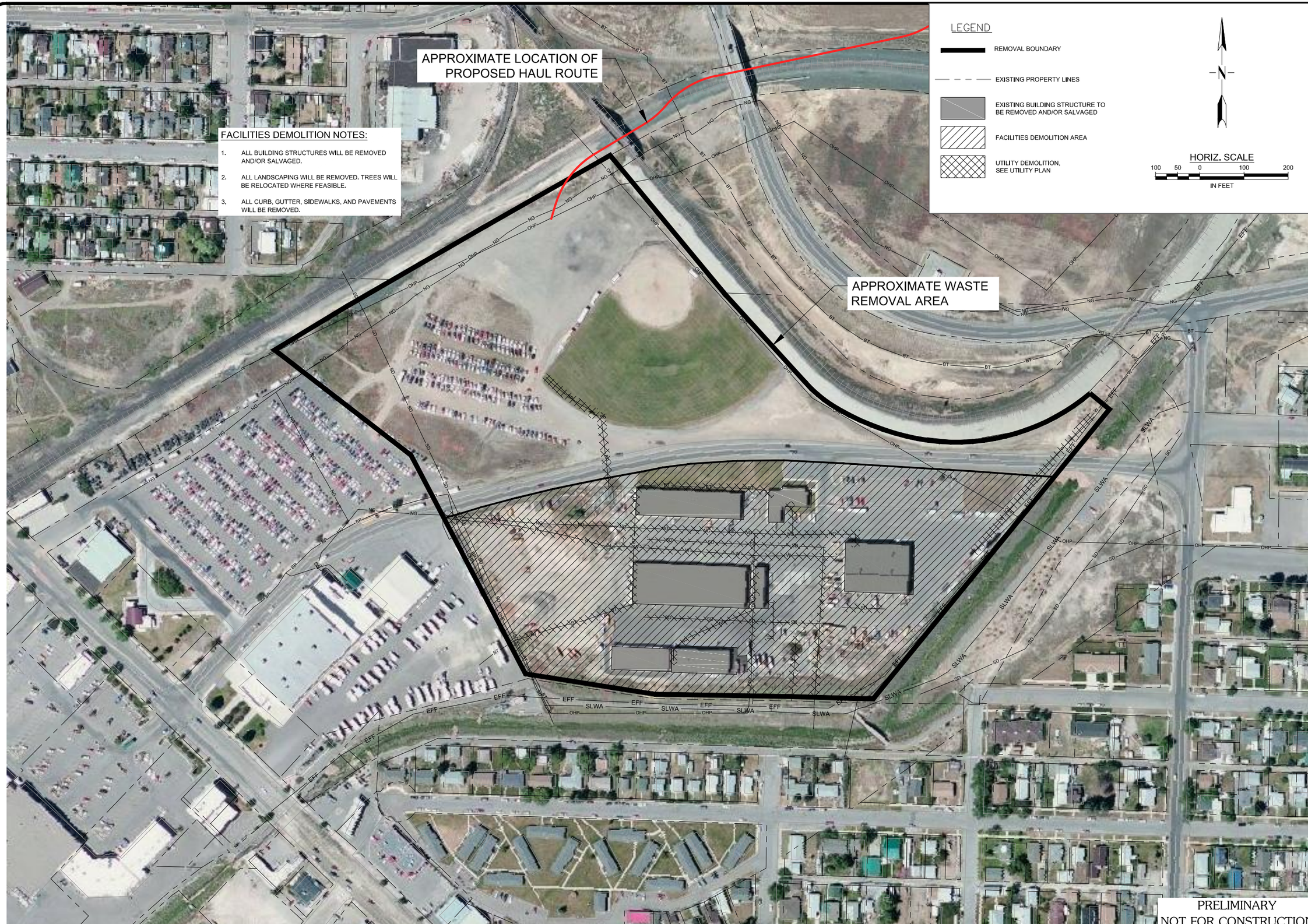
PROPOSED HAUL ROUTE AND WASTE DISPOSAL AREA OPTIONS

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. C2-HAUL ROUTE AND DISPOSAL AREA.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAH
CHECKED BY:	MB

FIGURE
C2

R:\4558\006\ACAD\Sheets\C2-HAUL ROUTE AND DISPOSAL AREA.dwg PLOT DATE 2015-12-22 16:51 USER: dhalton



FACILITIES DEMOLITION NOTES:

1. ALL BUILDING STRUCTURES WILL BE REMOVED AND/OR SALVAGED.
2. ALL LANDSCAPING WILL BE REMOVED. TREES WILL BE RELOCATED WHERE FEASIBLE.
3. ALL CURB, GUTTER, SIDEWALKS, AND PAVEMENTS WILL BE REMOVED.

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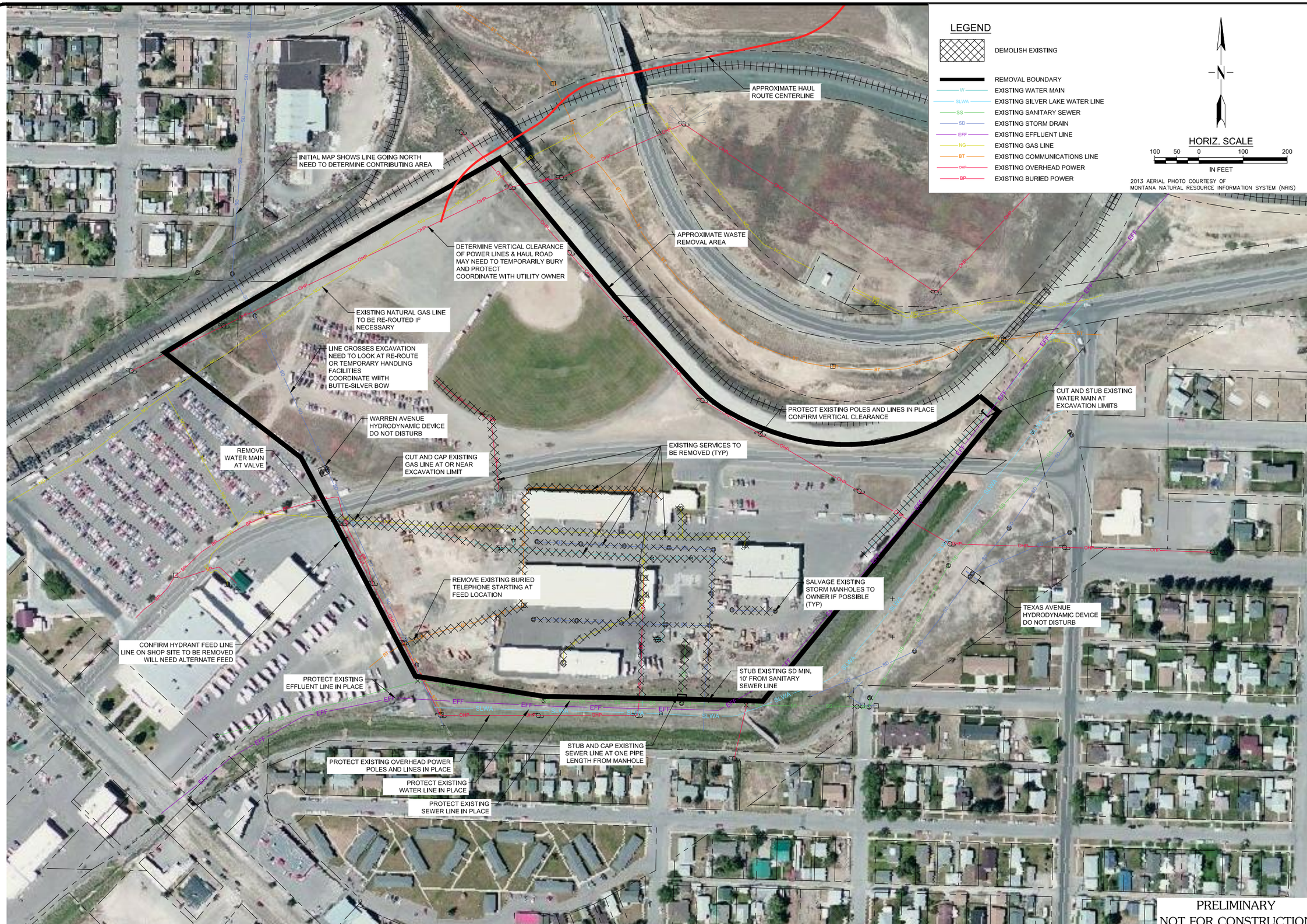
DEMOLITION PLAN

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. C3-DEMOLITION PLAN.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAH
CHECKED BY:	MB

FIGURE
C3

R:\4558\006\ACAD\Sheets\C3-DEMOLITION PLAN.dwg PLOT DATE 2015-12-22 16:51 USER: dhallsten



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UTILITY PLAN

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. C4-UTILITY PLAN.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAH
CHECKED BY:	MB

FIGURE
C4

R:\4558\005\ACAD\Sheets\C4-UTILITY PLAN.dwg PLOT DATE 2015-12-22 16:55 USER: dhallsten

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TRAFFIC CONTROL PLAN FOR PHASE 1 & 2

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. C5-TRAFFIC CONTROL PLAN_CLIENT.dwg

JOB NO:	NRDPM02
DATE:	12/29/15
DRAFTER:	DAH
CHECKED BY:	MB

FIGURE
C5

R:\4558\006\ACAD\Sheets\DRAFT AMENDMENT DRAWINGS\C5-TRAFFIC CONTROL PLAN_CLIENT.dwg PLOT DATE 2015-12-29 10:01 USER: dhallston

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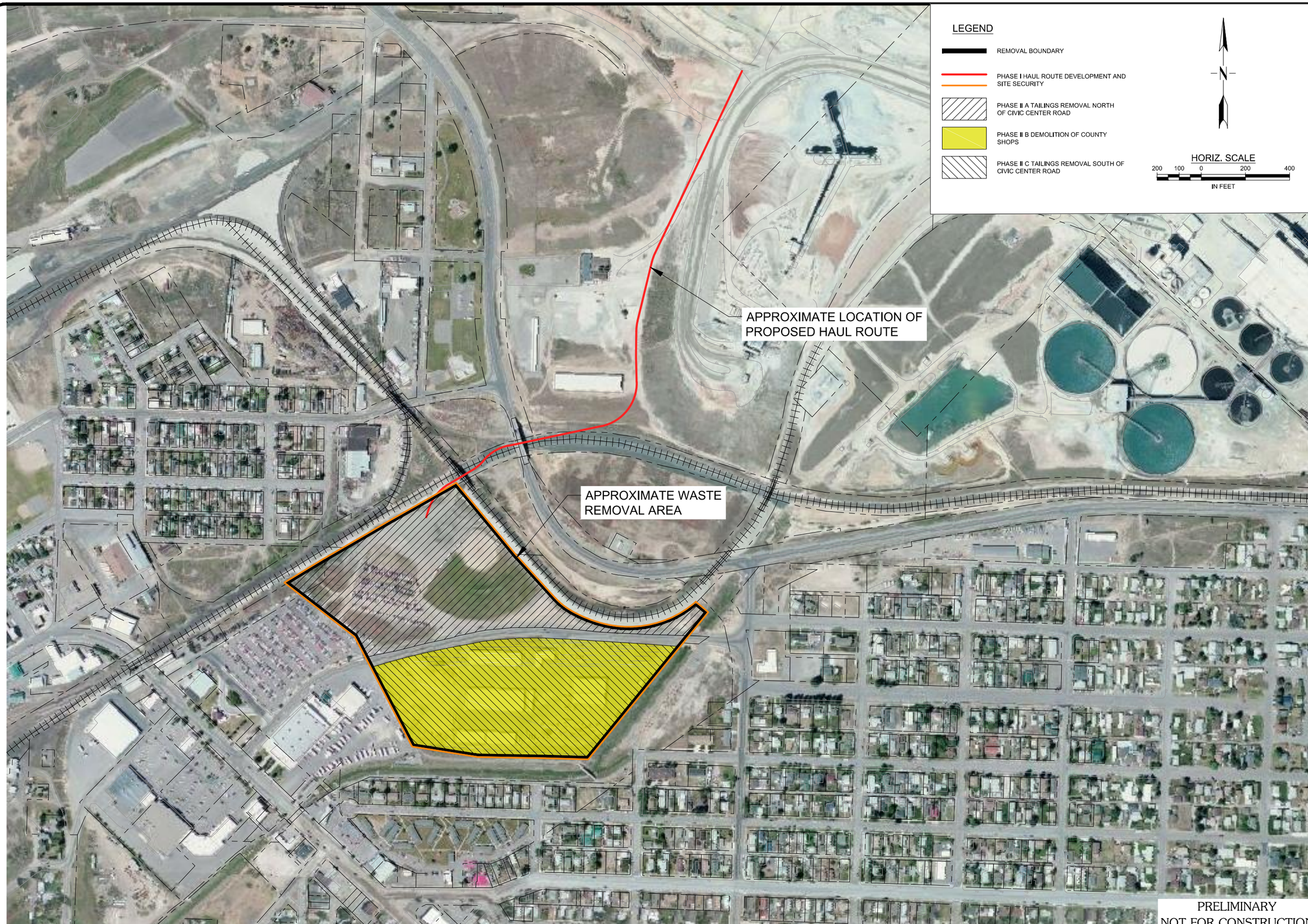
PROPOSED MONITORING WELL ABANDONMENT/REPLACEMENT PLAN

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. SC-BM01-NRDPM02.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAS
CHECKED BY:	JV/JT

FIGURE
C6

M:\NRDPM02\CAD\CIVIL\SC-BM01-NRDPM02.dwg PLOT DATE 2015-12-22 15:16 USER: dstratton



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CONSTRUCTION PHASING PLAN

PROJECT NAME: DRAFT BUTTE AREA ONE RESTORATION PLAN AMENDMENT
LOCATION: BUTTE, MONTANA
FILE NO. C7-CONSTRUCTION PHASING PLAN.dwg

JOB NO:	NRDPM02
DATE:	12/22/15
DRAFTER:	DAH
CHECKED BY:	MB

FIGURE
C7

R:\4558\006\ACAD\Sheets\C7-CONSTRUCTION PHASING PLAN.dwg PLOT DATE 2015-12-22 16:58 USER: dhallsten