

BUTTE HILL REVEGETATION EVALUATION

BUTTE-SILVER BOW CITY-COUNTY, MONTANA

Prepared for
Department of Justice
Natural Resource Damage Program

Prepared by
Herrera Environmental Consultants, Inc.



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November 21, 2016

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Introduction

The purpose of this report is to review the 2016 plans, evaluate the project implementation, and develop recommendations for revegetation projects on the Butte Hill that were funded with monies from the Butte Area One Restoration Fund to determine if those projects are proving to be successful, feasible and cost effective and to make recommendations on how those revegetation efforts might be improved. During the summer/fall of 2015 Herrera Environmental successfully completed an evaluation of revegetation projects being implemented by Butte-Silver Bow (BSB) and Montana Tech (MT Tech). As a result of this evaluation, Herrera made several recommendations for how to improve their projects to more closely match standard and successful methods employed by the reclamation/restoration industry.

This report has three goals. The first is to review the 2016 plans and determine if 2015 recommendations were addressed in those plans. The second goal is to evaluate the progress that the project sponsors have made to follow the goals set forth in their 2016 plans and to utilize the 2015 recommendations in the implementation of their projects. The final goal is to provide additional suggestions to reduce costs and increase the effectiveness and amount of revegetation that can be conducted with available funds.

Montana Tech Native Plant Restoration Project 2016 Annual Plan Evaluation and Adherence to the Plan

General Comments

This plan included steps that had already been taken to improve collaboration with the proposed Butte-Silver Bow Tree Planting Projects. Improved collaboration will definitely result in a more focused effort of the projects on the Butte Hill. It will also allow project planners to schedule future native plant needs, resulting in a more effective use of the Montana Tech greenhouse facilities. *Collaboration between MT Tech and BSB was demonstrated in the joint presentation of the individual project plans with well-defined roles for each of the projects. In addition, BSB has requested an inventory of MT Tech plants for future projects.*

The development of a GIS based reference site tool will provide the information for focusing future planting projects species mixes to ensure optimal survival and establishment. When used in coordination with Butte- **Silver Bow's GIS program, the GIS tool will also be able to focus projects on areas most critical for erosion control and sediment reduction.** It will be very important that project managers of all planting projects on the Butte Hill be well trained in the use of these tools. *The GIS tool has been developed, species mixes for each typical site have been determined and the information is being used in plant species selection for projects on the Butte Hill.*

The monitoring efforts of Montana Tech as described in the plan would involve visiting past sites and recording survival and other observations. This information should be compiled into

a short report that summarizes the findings and adaptive management recommendations for future projects. *MT Tech has data for survival of past sites and has collected data for the 2015 plantings. They will be providing a report on their findings in the near future.*

Nursery Operations

The 2016 Work Plan describes the maintenance of the plant holding area, the seed orchard and the operation of the greenhouse. The holding area plans are well thought out. The commitment to removing old inventory with questionable value will eliminate some wasted maintenance time. The species in the seed orchard should be reviewed to decide which species are really important for future projects and which species actually need to be cultivated to provide adequate seed supplies. Species not valuable for future projects and species that can be easily collected from the wild should be removed from the orchard. This would reduce maintenance costs. *In spring 2016, Herrera staff met with MT Tech and toured the seed orchard and discussed the appropriate species that MT Tech should continue to maintain for seed production and those species not listed were removed from the orchard thus reducing maintenance costs.*

The operation of the greenhouse should be determined by the plant needs for 2016 and future needs for projects in 2017 and beyond. Collaboration between BSB and Montana Tech can facilitate planning for plant needs. Plans for future years need only provide a preliminary list of potential species needed. This will allow enough time for seed collection, seed treatment and production and for growing plants into larger container sizes. **The plan's commitment to reducing the number of species and focusing on the most valuable and effective species is a good step forward.** The production of more woody species will provide plant material that will be able to survive well on the site and provide more effective erosion control than forbs or grasses. *The inventory of plants available for planting in spring 2017 is 40% woody plants and the plan is to increase that percentage in 2017 nursery production.*

Maintenance of Earlier Planting Sites

Weeding and irrigation (using the irrigation plans that will be developed) should continue on dispersal islands that were planted in the past. However, if those plantings are not thriving, or if there is no evidence that they are actually dispersing into the surrounding area, perhaps maintenance of the sites should be discontinued. The cost of maintaining sites that clearly have no potential for future success would be a waste of valuable funds that could be applied toward more effective methods of revegetation. *MT Tech staff conducted hand weed removal on a number of the projects in 2016 but have reduced the irrigation to emergency applications only. The survival monitoring that was completed this summer will provide the information to decide which past sites should continue to be maintained and which should have the maintenance eliminated.*

Propagation of Plants for BSB 2016 plantings

The plan for propagating and/or utilizing plants already in inventory at the MT Nursery will provide site adapted stock. With more of the plant material that is planted on the hill grown

from local seed sources will come better survival and establishment. With continued collaboration there is also the potential for significant cost savings by using plants from the MT growing facilities instead of purchasing expensive plant material from commercial nurseries. *2016 MT Tech nursery production was ramped up to grow a large number of plants. There will be 10,000 plants that will be ready for 2017 spring or fall planting.*

Promoting Stewardship and Community Outreach

The West Gagnon Dump Planting is an excellent outreach and educational effort. Involvement with a variety of participants will be an opportunity to introduce a restoration focused approach to planting. It is suggested that local media be invited to this planting to educate the public about this approach. This project will require some very effective training of participants and careful oversight of the actual planting to ensure the success of the project. A project with this kind of public involvement can be valuable only if it succeeds. *The plants used on this project were purchased from the state nursery and some of the species were not appropriate for the site but others seem to be doing well.*

Native Plant Training

The MT Tech 2016 Annual Plan included sending staff to the June 2016 American Society for Mining Reclamation Conference in Spokane Washington. This meeting had many sessions relating to the issues on the Butte Hill and provided MT Tech staff with some valuable information and resources for conducting successful revegetation and producing high quality native plant material. The USFS training mentioned in the plan has not yet been scheduled. *Robert Pal and Mark Mariano of MT Tech both attended and presented papers at the ASMR Conference where they were able to network with restoration professionals from around the world.*

Plant inventory

The MT Tech 2016 Annual Plan provides a good inventory of existing plant material at the MT nursery. Most of the shrubs will be valuable for planting on the 2016 project sites. However, **the “Non-Native” species of Salix and Malus should be removed from the inventory by giving them away or destroying them.** The inventory lists 5 species of grasses that have not been identified. These species should not be used until they can be successfully identified. This would require that they be held until they produce flowers. The list of forb plants includes 40 species. These plants should be used on projects as possible to reduce the inventory. This inventory includes 3 unknown forb species that should be identified or destroyed. Future forb growing should include about half as many species. *The inventory of plants on hand has been reduced by removing all species with unknown or inappropriate seed sources and those not appropriate for planting on the Butte Hill.*

Seed Collection 2016 Species List

There are 71 species of forbs on this list. The cost of storage, germination testing and inventory control of this many species is an unnecessary expense. This list should be reviewed to select the best 20 species for establishing and providing erosion control on the Butte Hill. If

the eliminated species are in fact native to the Butte Hill, they could be disposed of by broadcasting on un-vegetated sites with the hope that some seed would germinate and grow.

The shrub/tree seed inventory looks good but the addition of lodge pole pine should be conducted as soon as possible. *An extensive collection of lodge pole pine and Douglas fir was performed this fall and that seed is now in storage.*

Any seed lot that is not identified should be discarded to eliminate the cost of maintenance. In August, Herrera and MT Tech staff had a conference call and decided upon a revised list of seed to be collected and maintained. This list is greatly reduced in number of species and focuses directly on species best adapted to the Butte Hill and best for reducing erosion and sediment flow. In addition, big sagebrush and rubber rabbit brush were added to the production list. These plants are well adapted to the site conditions and will survive well on shallow soils that overlay waste materials. This will allow for establishment of effective erosion control without costly waste removal and soil replacement.

Butte Tree Planting Project 2016 Work Plan Evaluation and Adherence to the Plan

General Comments

The 2016 work plan incorporated a majority of the recommendations in the 2015 evaluation of the past Butte Tree Planting Projects. This will definitely result in some significant cost savings and successful progress toward meeting the goal of minimizing erosion and sediment loading to Silver Bow Creek. Collaboration with Montana Tech in the development of this plan is a very good step toward improving the overall effort of native plant revegetation on the Butte Hill.

Site improvement and Program Plan Budgets

The budgets proposed seemed **very reasonable**. However, it seems that 5% of one person's time for planning and oversight of these projects may not be enough to ensure that projects are completed as planned. It is critical that site preparation and planting are kept on schedule (Site preparation in the 2016 plan was to occur prior to the end of April and was finally completed the second week in June). *This resulted in poor grass and container plant survival.*

Careful oversight during the planting process is key to ensure high survival and establishment of plants. This requires that staff availability must be committed to the planned planting and site preparation schedules. *It was very difficult to schedule a BSB staff person to meet with during the 2016 planting season. It seems that the BSB staff is very busy and the revegetation planting projects are not a high priority and there is some confusion about who is responsible for managing the revegetation program.*

It is suggested that a person with a clear understanding of the goals and methods of the plans be present for at least the start-up of any project to ensure that the project is implemented

as planned and quality is maintained. *Several projects were conducted by a private landscaper. The quality of the workmanship was very poor and the oversight not effective. BSB staff had the contractor replace inappropriate plant material and replant poorly installed plants but the quality of those plantings is inferior. Increased oversight of contractors or use of trained restoration planters would reduce the need for such intensive oversight.*

Watering Plan

The commitment to developing a watering plan will result in long term benefits for the plantings. It is critical to complete this plan prior to the 2016 irrigation season. This plan should be applied not only to 2016 plantings but all past plantings. An important part of this effort must include training of all staff who conduct the irrigation applications. Staff should keep careful and complete records of irrigation amounts and schedules to provide information needed to modify the plan with the goal of maintaining the vegetation while gradually reducing irrigation until plants can survive on natural precipitation. It will be critical that BSB staff clearly understand the specific watering plans and closely monitor irrigation to assure that the plans are being followed. *BSB developed a very well thought out irrigation plan but during a summer inspection of BSB planting sites, Herrera staff talked with the maintenance person doing the irrigation and he had not heard of the plan. This plan would be very effective if it was will implemented.*

Native Plant Training

This plan commits to sending Butte-Silver Bow staff to revegetation training in 2016. This would be very valuable and will result in immediate and future improvements to the projects. The USFS training mentioned in the plan has not yet been scheduled. Herrera staff will investigate alternative training sessions in 2016. *The USFS Training did not occur this year so BSB staff were unable to get the training committed to in their plan. There is an on line set of training modules. **The basis of the training is the “Roadside Revegetation Manual”** which is an excellent native plant restoration resource. This could be an alternative to the USFS Training session for BSB staff.*

<http://nativerevegetation.org/train/>

2016 Butte Hill Tree Planting and Native Plant Restoration Project Review

General Comments

It is critical that all plants installed on the projects be from the most appropriate seed sources available. It was suggested that the seed source for all purchased plants be obtained from the suppliers to determine if they are from Western Montana. These seed sources should be recorded on the planting records for each site. *None of the plants installed on the BSB planted projects were from Western Montana Seed Sources. This is critical for long term survival and reproduction of a sustainable native plant community.*

Minor changes in seed mixes and eliminating the use of 5 gallon container plants and use of less expensive one gallon plants instead. *Some 5 gallon juniper plants were installed but were not the native creeping juniper that occurs on site. MT Tech now has several thousand native junipers available for future planting at one tenth of the cost of the plants installed this year.*

The use of “time of planting” slow release fertilizer packets and mycorrhizal inoculum was recommended. This would increase survival and establishment. *Mycorrhizal inoculums were applied on 2016 plantings*

Anchoring of 5 gallon and smaller trees is not needed and if used can result in slower growth of strong woody trunks. *No anchoring of trees occurred on the 2016 planting.*

Recommendations for Improving the Butte Hill Revegetation Program

Site Selection

BSB is the partner in this program with control of and/or access to potential restoration sites. Because of this, BSB staff should work closely with MT Tech to select project sites with high potential for reducing erosion and sediment production. A BSB staff member with good knowledge of the Butte Hill sites and related storm-water and sediment issues should be designated as the lead person in selecting appropriate planting sites. A BSB staff person who is familiar with the BSB GIS program should be the lead in developing maps and obtaining all required access agreements and other permits.

Planting Plan Development

MT Tech has developed the GIS Reference Site tool for selecting species and Robert Pal has the native plant restoration skills and experienced staff needed to put together planting plans for the sites that will result in the highest potential for meeting the goals of the program.

Site Preparation

BSB has been conducting all of the major site preparation such as removing waste and placing clean fill for planting pods, disking site, preparing seed beds, seeding, and placing of top soil and compost. In spring of 2016 there were some problems in seed availability and as a result site preparation was delayed by more than a month from the optimum time. In addition, some equipment problems resulted in some sites on which the disking was inadequate. This resulted in difficulty in planting and excess competition from the vegetation that was not effectively removed. In order to address problems with seed availability in the future, it is strongly recommended that seed be ordered as soon as the 2017 work plans are approved. In addition, site preparation should be scheduled well in advance of planting. If soil conditions allow, disking could be conducted at any time prior to the planting date. If equipment and maintenance staff are not available, a possible alternative would be for MT Tech staff to rent the proper equipment to get the site preparation completed as needed. The MT Tech staff includes a qualified equipment operator who could be utilized to keep the projects on schedule.

Plant Material Acquisition

Montana Tech has a large inventory of seedling plants that are adapted to conditions on the Butte Hill and very appropriate for planting on sites with minimal site preparation. In addition, this type of plant material has been extensively used for the past 20 years for successfully restoring native plants on harsh sites. If planted early in spring when they are still dormant they require no supplemental irrigation. Because of their small size, the planting cost of a seedling is about \$1.50 compared to \$50 for planting a five gallon plant. It is recommended that all plant material be supplied by the MT Tech Nursery. If larger material is desired for future planting, the MT Tech nursery could pot up existing seedlings to larger container sizes that would be available in a year or two. This would provide in-expensive site adapted plant material in sizes more visible and impressive for planting sites where the public desires an immediate visual effect.

Irrigation Plan

The excellent Irrigation Plan that was developed by BSB this year should be utilized to modify **the watering of “Tree Pods” and other past revegetation efforts.** A specific BSB staff member should be designated to ensure that all irrigation be based upon this plan. This will result in the past plantings getting weaned off of excessive watering and becoming adapted to survival on natural precipitation.

Planting Maintenance

The monitoring reports based upon the work done in 2016 by Montana Tech should be utilized to determine which past plantings are viable enough to continue to maintain by periodic weeding and supplemental watering. **The “Tree Pods” and other large plantings installed by BSB** should be kept weeded and pruned if needed to maintain the appearance and health of the plantings. The smaller plantings installed by MT Tech crews should continue to be maintained by MT Tech. All seedling plantings installed in 2017 should also be maintained by MT Tech staff.

Collaboration between BSB and MT Tech

The collaboration that has begun between the two organizations should be further improved. It is critical that clear lines of responsibility be drawn and communication be reliable and frequent. It is suggested that a set meeting in person between the designated managers of the BSB and MT Tech program be scheduled on a monthly basis. This communication is critical to keep the planned revegetation activities on schedule and occurring at the optimum time for success.