# HIGHLAND FLATS TREE FARM

# WETLAND AND RIPARIAN MITIGATION

# -2016 ANNUAL REPORT-

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## 1.0 INTRODUCTION

A Detailed Wetland and Riparian Mitigation Plan (Detailed Plan) was developed for the Highland Flats Tree Farm in Naples, Idaho. The Detailed Plan described the activities to occur within three separate mitigation areas: the Headwater (HW) Restoration area, the Culvert Enhancement area and the Reservoir Mitigation Area (see Figure 1 for mitigation area location). The primary mitigation area is the HW Restoration area, which is dominated by the non-native invasive species reed canary grass and common tansy. As a result, mitigation implementation was scheduled to occur over a two-year period to allow time for weed control to occur in the most heavily infested areas. This report provides a summary of all mitigation tasks implemented in 2016. A second construction implementation report will be prepared in 2017 when all tasks have been completed.

Mitigation implementation began in June 2016 with bare root plant, sod, erosion control and weed solarization material ordering. Weed control was initiated in July, and continued throughout 2016. The 2016 activities ended November 21, with completion of seeding.

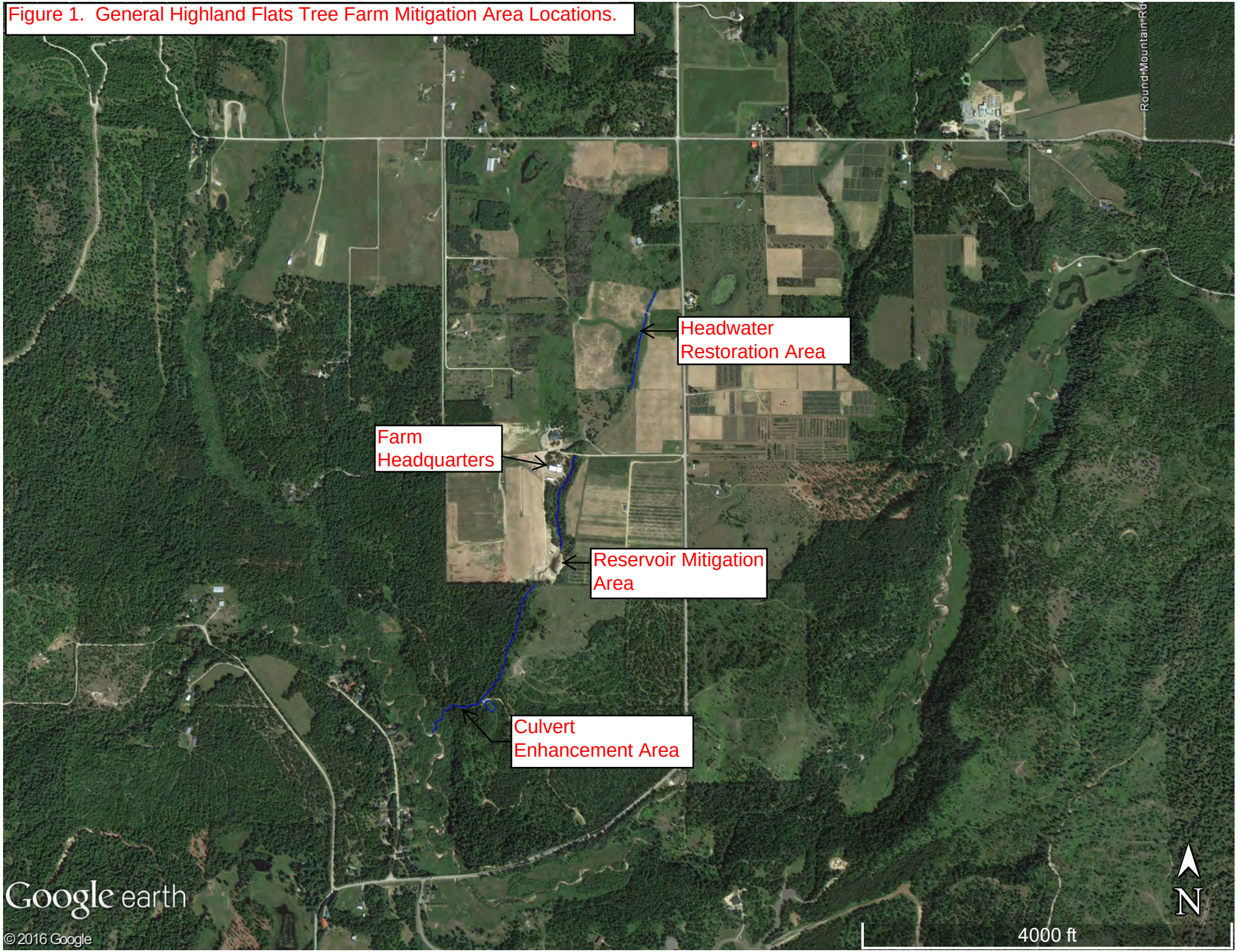
Within each mitigation site, implementation activities were similar and can generally be grouped into the following three categories:

- Weed Control
- Site Preparation, and
- Planting and Seeding.

This report describes the activities completed within each mitigation area, provides specific implementation dates and documentation of activities, and identifies any deviations from the Detailed Plan. Since similar activities proceeded concurrently on all sites, the implementation details are described below by activity. Section 2.0 describes the weed control activities and Section 3.0 site preparation. Planting and seeding details are provided in Section 4.0.

Some schedule deviations were required as a result of a late September permit issuance followed by unseasonably wet and warm Fall conditions. Section 5.0 provides an implementation summary and a revised implementation schedule for those activities not able to be completed in 2016 as a result of the unusual Fall weather conditions. Appendix A provides a comparison of the 2016 weather conditions to the 30-year average for Bonner's Ferry, the nearest weather station. Photo-documentation of construction activities is in Appendix B, with plant order documentation in Appendix C.

Figure 1. General Highland Flats Tree Farm Mitigation Area Locations.



## 2.0 WEED CONTROL

Weed control is a major mitigation plan component and was conducted throughout most of the 2016 growing season, with manual removal in the Reservoir and Culvert areas, and a combination of solarization and topsoil replacement in the HW Restoration area.

### 2.1 HW Restoration Area

In spite of a hot, dry spring, early summer conditions were particularly favorable for reed canary grass (*Phalaris arundinacea*, hereafter referred to as RCG) and common tansy (*Tanacetum vulgare*) growth, with plants achieving heights greater than 4 feet by the time of the initial Detailed Plan approval (Figure B-1). As a result, mowing and use of a hand held, gas powered weed trimmer was necessary prior to black plastic installation in the HW Restoration area, along with removal of previous burn or wood chip piles (in upland areas). Mowing, pile removal and black plastic installation occurred in all of the upland and mesic riparian communities in which these activities could be accomplished without a wetland permit or other approval in July. Mowing and solarization material placement in wetlands occurred in August (Figure B-2).

The initial upland mowing and solarization were conducted by Highland Flats Farm (HF) staff in early July and inspected and completed in areas of concern in late July with a Wetland Scientist present (July 25-29). Key areas of concern included (1) how to address solarization around the existing shrubs in portions of HW-1 and HW-2 (west side) to ensure that the native woody species were retained and not affected by the mowing or overheating, and (2) clearer identification of the wetland/upland boundaries in which different types of work could occur. At that time, the plastic was cut and placed around the scattered existing shrubs, small shrub patches, and small trees and four to six inches of wood chips/shreds placed within the openings to prevent weed emergence. The wood chips were effective around single woody plant stems in HW-2, but were much less effective around the shrub clumps in HW-1. In lieu of removing the shrub clumps, additional manual control was used around them in HW-1 with a combination of manual removal and clipping. This level of control will likely also be necessary in 2017.

Although most of the solarization material was installed by the HF staff, all solarization installation was inspected by a Wetland Scientist on July 25 and September 18 to ensure installation as per the specifications (i.e., HDPE sheets used, appropriate sheet overlap and anchoring, necessary area covered, continued protection throughout the growing season). The edges of the plastic near the dirt road were covered by up to 6 inches of wood chips and the plastic additionally anchored by medium-sized rock (6-8 inches) to prevent movement in the wind (see Figure B-2).

The sheets were examined and repaired several times following high winds. It was also noted by the HF staff that deer were damaging the plastic as they traversed across it to the unnamed stream. These areas were repaired by either adding wood chips to cover the holes or additional plastic sheeting added. Because of the potential to tear the weed control material, the ground water levels were not examined following solarization installation.

## 2.2 Culvert Enhancement Area

The RCG within the Culvert Enhancement area established on a small sediment deposit (25 feet long by 2 to 7 feet wide) immediately upstream of the culvert. The RCG and associated sod was manually removed on September 20 under the supervision of a Wetland Scientist and by a crew that had previously been trained in RCG removal (see Section 2.3 below and Figure B-3). The RCG and sod was placed directly into a series of covered 30 to 50 gallon bins, and transported to the designated upland disposal area. Once the sod was removed, the natural bed elevation was attained and no further sediment removal was necessary. All removal was conducted manually, without trackhoe or other mechanized equipment use. There was no damage to any of the existing riparian shrubs during removal.

## 2.3 Reservoir Mitigation Area

As observed on April 25 and the end of May, the RCG was restricted to scattered stems at the upstream end of the reservoir (Figure B-3). However, additional RCG emerged and expanded during the 2016 growing season. By July, the RCG was observed throughout the Upper Reservoir Mitigation area, with occasional RCG stems along much of the remaining shoreline by July.

The initial RCG removal was conducted under the supervision of a Wetland Scientist between July 27 to 29. Prior to weed removal, 425 feet of fiber rolls were placed at the lower edge of the main RCG population and staked at 5 to 7 foot intervals to prevent sediment, RCG vegetative parts, and RCG seedheads from entering the reservoir. Fiber rolls were doubled where necessary to achieve an adequate sediment barrier. At the start of the removal, HF staff were trained in the distinction between RCG and other similar looking species, as well as the below-ground plant structure to ensure that full root and rhizome systems were extracted and not simply cut, which would allow resprouting. Removal was done manually removed using tile spades, shovels or trowels. Once dug, all RCG roots, rhizomes, stems and seedheads were placed within covered 30 to 50 gallon plastic bins. The bins were transported to the designated upland disposal site noted on Figure A-4 of the Detailed Plan (Figure B-4). Approximately 25 bins of RCG plants and associated sod were disposed of. The day after the removal was completed, the fiber rolls were visually inspected and any seedheads, seeds, roots, and/or rhizome pieces that had initially been missed were manually removed and disposed of.

All visible RCG was removed from the two Reservoir mitigation areas as well as the adjacent reservoir shoreline during July. Follow-up inspections for newly emerging stems occurred weekly throughout the rest of the growing season by designated HF Staff who exhibited both (1) a clear understanding of the plant characteristics, and (2) skill in complete rhizome and root extraction (see Figure B-3). Wetland Scientist inspections on September 19 and October 26 confirmed that the follow-up work had been successful.

In addition to the manual removal, solarization material was placed over RCG within the immediately adjacent upstream wetland to help reduce RCG seed input and vegetative growth into the mitigation area. The material was placed over a 10 by 25 foot area, taking care to avoid the

native cattails.

In spite of the initial RCG control success, there is abundant RCG growth upstream of the mitigation area and additional manual removal will likely be necessary in 2017. As a result, the fiber rolls placed around the reservoir were retained in place to trap both any sediment disturbed and any inadvertently dropped RCG parts during 2017 manual weed control.

Three aquatic plants within the reservoir (for which flowering parts were necessary for positive identification) were collected and identified in July 2016. These species included two natives: northern water plantain (*Alisma triviale*, OBL) and leafy pondweed (*Potamogeton foliosus*, OBL), and one non-native invasive species, Eurasian milfoil (*Myriophyllum spicatum*, OBL). Cover of the two native species far exceeded that of the invasive milfoil, but the milfoil still required control. The water plantain occurred in a zone extending from approximately one foot above OHW to one to two feet below OHW, depending on the slope and bottom topography. The other two species primarily occurred at estimated elevations of 2,260 feet or below.

Some manual removal of the milfoil was conducted between July 27 to 29 at the same time as the RCG removal, but the majority of the removal occurred between September 19 through 21. At this time, the reservoir level was lower and all of the mitigation areas and much of the remaining reservoir could be accessed. All removal was conducted by a Wetland Scientist to ensure accurate distinction between the two deepwater aquatic species and to ensure full plant collection without fragmentation, a key concern in harvesting late season (post-flowering) milfoil. Five 30-gallon containers of milfoil were removed and disposed of in the upland disposal area. At the end of the deepwater aquatic weed removal, the native leafy pondweed provided more than 90% of the deepwater plant community cover. As for the RCG, the milfoil is locally abundant in the nearby McArthur Lake Wildlife Management Area and may re-colonize with migratory waterfowl use of the reservoir. The milfoil will likely require additional control in 2017 and subsequent years.

## 3.0 SITE PREPARATION

### 3.1 HW Restoration Area

#### 3.1.1 Topsoil Harvest

The new topsoil was obtained from a recently logged parcel west of the Culvert Enhancement area (Figure 2) and harvested between October 6 and 13. It was harvested using a trackhoe, with the soil placed in an approximately 10 cubic yard capacity dump truck. The soil was then transported to the HW Restoration area, stored in a weed-free, upland location and covered with black plastic for protection from wind and rain erosion.

Although the topsoil harvest was accomplished quickly, road damage caused by unexpected, heavy October precipitation affected the soil transport. More rain occurred during the short topsoil harvest period (2.32") than typically occurs during the entire month of October (1.61" [range of 0.79 to 1.97"]) and the main access road failed, requiring the road to be re-built for topsoil harvest. Approximately 100 cubic yards of soil was able to transported before the re-built road became completely impassable for the equipment needed to harvest and transport the soil.[1] As a result, not all harvested topsoil was able to be transported to the HW Restoration area.

As grading proceeded, it was clear that additional topsoil was needed and three truckloads of soil were obtained from a local nursery. The soil was identified as being from a weed-free source, but was not certified weed-free. It was examined by a Wetland Scientist as it was unloaded for any visible signs of weed infestation, such as remnant weed plants, or roots/rhizomes of RCG or tansy (which are fairly distinct). None were noted.

#### 3.1.2 Grading and Topsoil Replacement

The grading was delayed twice during October due to the heavy precipitation and concerns about road access, the ability to adequately decompact the clay subsoil and the ability to prepare a loose, friable bed for the new plants (see Appendix A for additional details). The grading was initiated on October 21 and was conducted between October 21 and 25, a period in which little new precipitation was received but in which the soil was already wet (Figure B-5). The black plastic had been removed in September, with grade staking completing at that time, allowing rapid mobilization during the most likely favorable grading period. Immediately prior to grading, fiber rolls were installed along the stream channel and the upper end of HW-3a, as specified.

The potential for the weather to halt the grading and topsoil replacement was fairly high. Therefore, the grading was done in sections to ensure that all work areas could be completed to a stable

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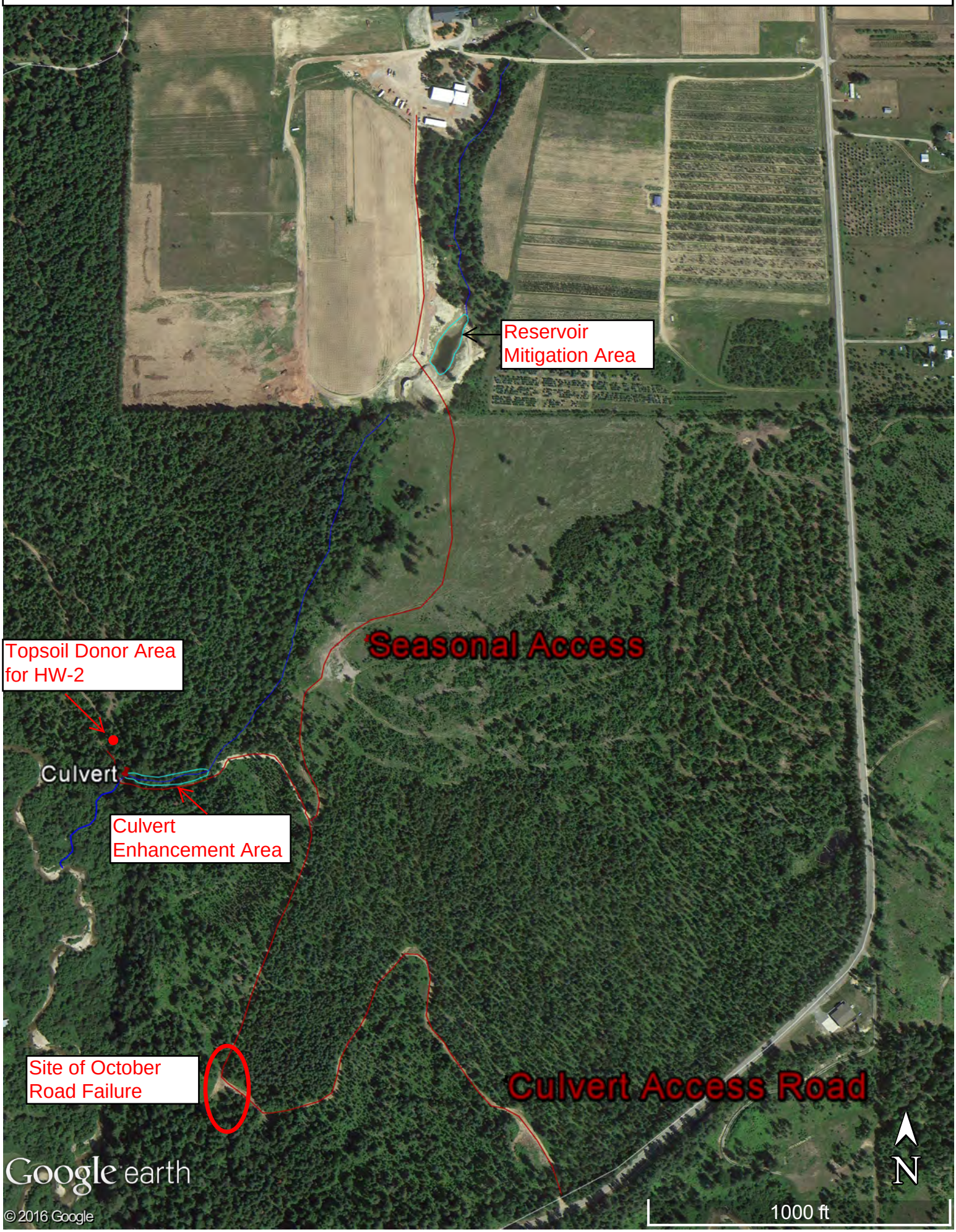
[1] It was known that the seasonal access road use to the topsoil and Culvert Enhancement area would be limited and would not be suitable for heavy equipment under any conditions. No main access road problems were identified in the Detailed Plan as all work requiring heavy equipment was scheduled to occur under dry conditions.

Figure 2. Access Roads for the Culvert Enhancement Area.



overwinter condition. The grading was started with soil excavation and removal along the surveyed Transect 2 to specified elevations. Excavation occurred next within the topsoil replacement area of upper HW-3a to establish the upper and lower grades to meet. Because of the heavy weed cover, as well as the presence of a large amount of upland mounds preventing a tight solarization seal, the topsoil replacement area extended further south than the original grade tie-in point (Figure 3). Soil excavation then proceeded between those points, with just mound removal and topsoil replacement at the southern end (elevations 2,277 or lower) and with soil elevation periodically checked along the grading stakes within this area (Figure B-6).

As soon as a large enough area was excavated, subsoil decompaction began, allowing decompaction to occur concurrently with excavation. The new topsoil was placed beginning on October 24 and was completed on October 25 (Figure B-7). New topsoil depths were a minimum of six inches, with some scattered pockets of up to 12 inches. Where these pockets of deeper soil occurred near the road, they were retained and marked as cottonwood planting locations. Overall the soil was left slightly uneven and roughened, as desired, for good soil-seed contact.

The Detailed Plan required some fit-in-the-field modifications for two items:

- Even under the lower October 21-25 precipitation conditions, the soil was wet enough so that decompaction was difficult. To obtain the desired decompaction level, some of the grades needed to be modified slightly to allow the equipment adequate space to work. In particular, in lieu of making a small sharp bench adjacent to the stream channel, a more gradual slope needed to be created, similar to the slopes within the adjacent upper HW-3a. The channel tie-in point remained the same (see Figure 4). A more defined slope break will be possible with the remaining grading to be done upstream of Transect 2.

- A rubber-tired loader was specified for use in the topsoil replacement. However, the multiple passes required by the loader to spread the topsoil tended to re-compact the subsoil. Instead, the loader was used to place the topsoil at the edges of the graded area. The trackhoe was then stationed in a set central location where it could place soil throughout the entire width of the graded area. Once topsoil depths were examined and approved, the trackhoe was able to rip the area where it had been stationed and move to another location.

The grading work was halted at the end of the day October 25, following discussion with EPA. Key concerns at that point were (1) the inability to adequately decompact the wet subsoil, (2) the potential to cause greater erosion within the HW-2 area with a new storm arriving, (3) the degradation of the HW access road with its potential to further affect all of the adjacent HW mitigation sections, and (4) the inability to dispose of excavated soil associated with the access road condition. As early as October 23, dump trucks either bringing in or removing topsoil had to be assisted in site access using the rubber-tired loader and/or the trackhoe to pull the truck through an approximately 200- foot road section adjacent to HW-3b.

# Figure 3. 2016 Graded and Topsoil Replacement Area.

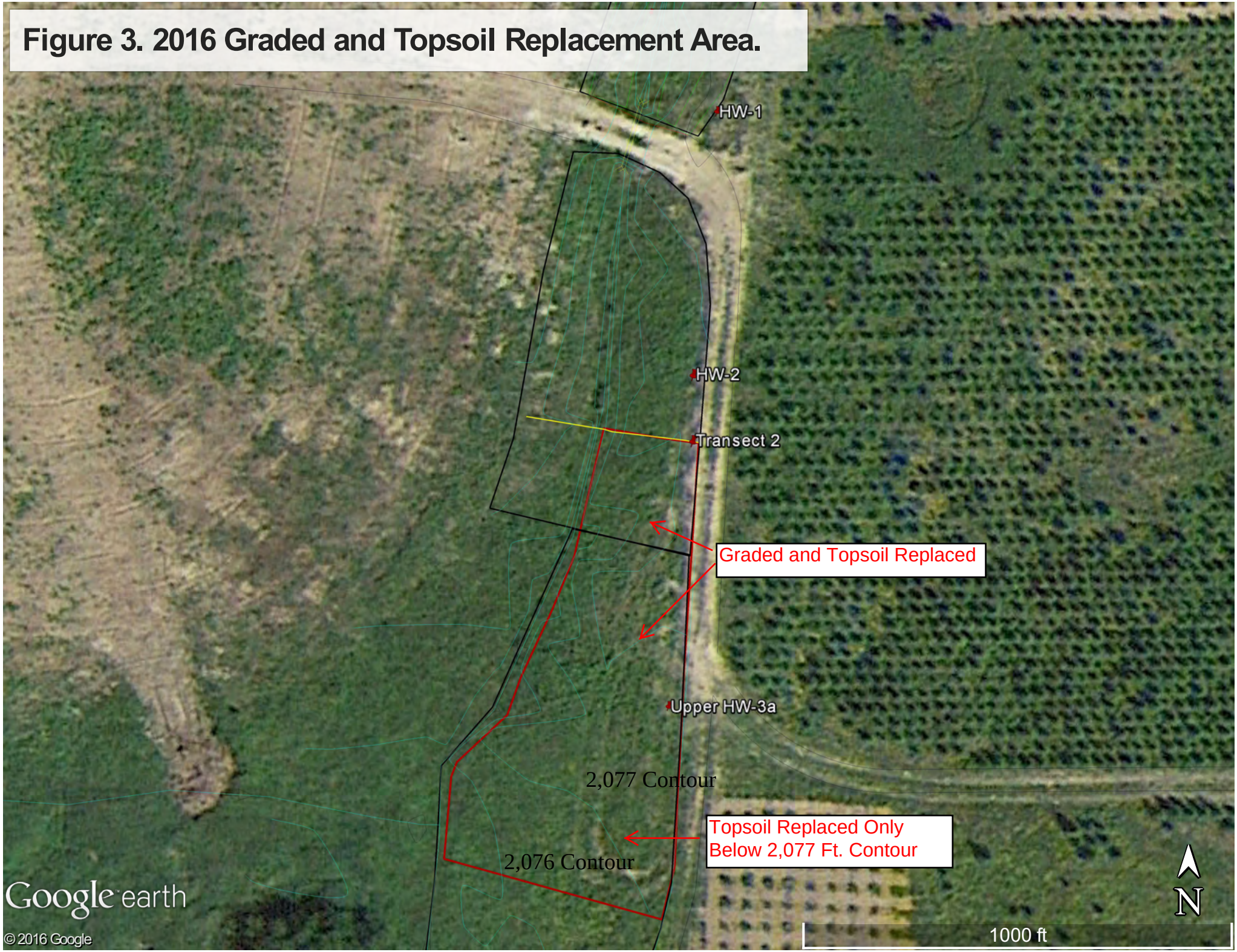
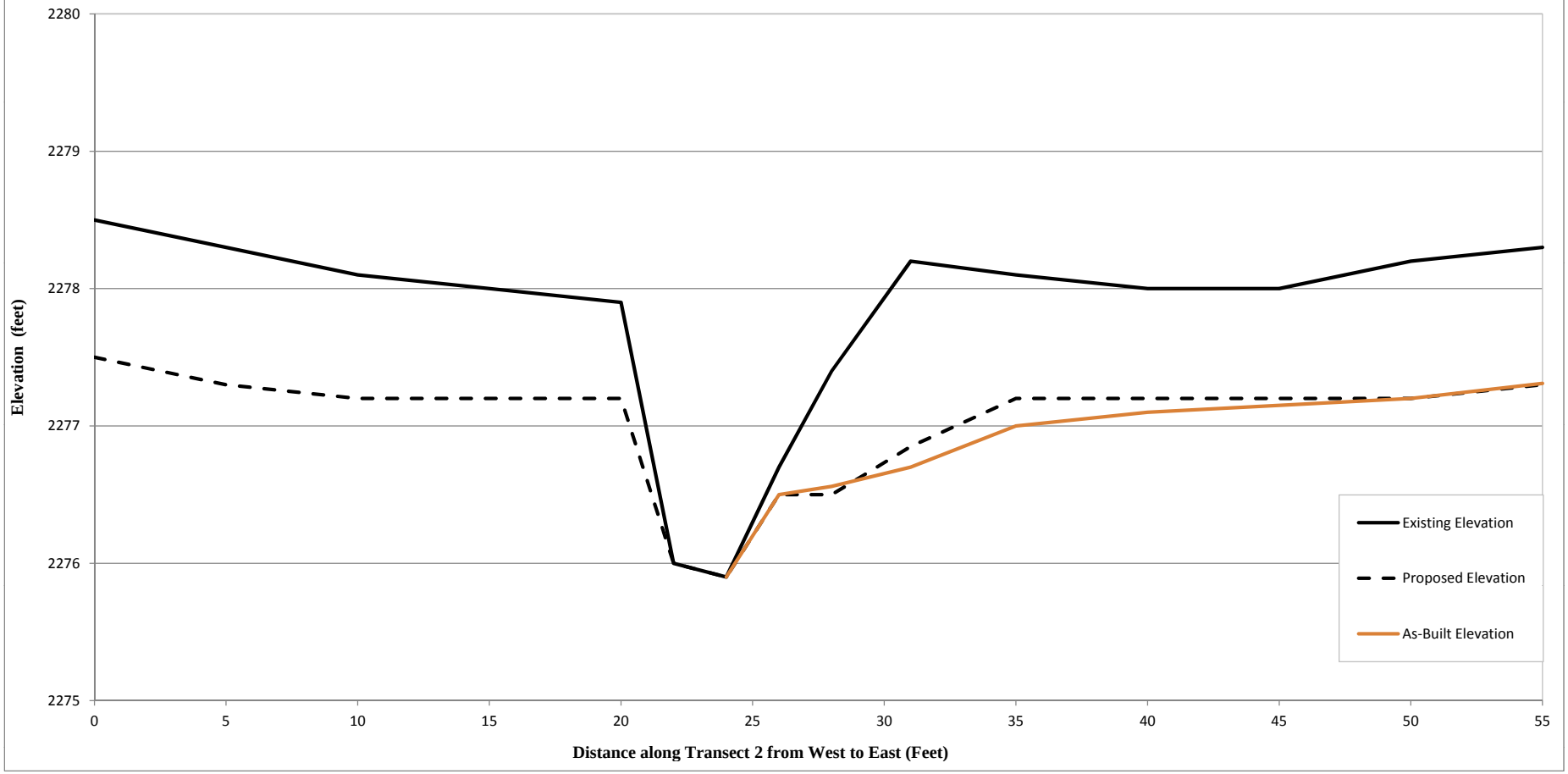


**Figure 4. Current, Proposed and As-Built Elevations Along Transect 2 in HW-2 . Only the east side of the stream was graded in 2016.**



As of October 25, approximately 0.12 acres of HW-2 and upper HW-3a had been either graded with topsoil replacement or had the topsoil replaced, with an additional 0.03 acres of topsoil replacement adjacent to the road to provide a weed buffer. This acreage was roughly half of the area in which grading and/or topsoil replacement was to occur, and generally equal to the original amount of graded area prior to the decision to replace the topsoil. All aspects of erosion control installation, grading, and topsoil replacement were supervised by a Wetland Scientist.

Following grading, plant locations were flagged in preparation for planting, Transect 2 was re-surveyed, and staking placed to prevent any accidental off-road travel in the mitigation area. All travel into the area was halted on October 26, until the road could be repaired and off-road erosion prevented. After that, the only access was for planting and other minimal field work using light vehicles.

### 3.2 Culvert Enhancement Area

Logging by the previous owner resulted in some piling of small branches within the riparian terrace to the northwest of the culvert. The branches were not suitable for providing stream structure either now or in the future, but had the potential to enter the stream and clog the culvert. These branches were removed by the Wetland Scientist on September 20.

### 3.3 Reservoir Mitigation Area

As per the Detailed Plan, no other site preparation outside of the manual weed control and fiber roll installation was conducted.

## 4.0 PLANTING AND SEEDING

### 4.1 Bare Root Planting-All Mitigation Areas

Dormant bare root plants were placed in all three mitigation areas in 2016. Dormancy was originally anticipated to occur during the first week of November. However, November was unseasonably warm and the specified plants did not enter dormancy until mid-November. There was daily contact during November between the nursery and either the Wetland Scientist or HF staff to ensure that plants could be obtained as soon as dormancy was achieved. Five of the six species to be planted Fall 2016 were lifted on November 16 and 17 and immediately planted. The nursery provided notification on November 17 that the meadowsweet had not yet entered dormancy and might not enter dormancy in time for Fall planting. Five other nurseries were immediately contacted to identify dormant meadowsweet availability. The WACD Plant Materials Center represented the only nursery in which there was meadowsweet stock at that time. However, the material source was not locally adapted (low elevation, western Washington) and their stock likewise had not achieved dormancy and would not in time for Fall planting at the higher elevation of the Highland Flats site. As of December 2, the meadowsweet still had not gone dormant at the local Bonner's Ferry nursery and the manager stated that the species would not be lifted in 2016, but would be available for dormant spring planting in 2017.

All of the specified plants were placed in the Reservoir Mitigation area and all but 10 meadowsweet in the Culvert Enhancement area.

As a result of a combination of factors (late COE permit, early and heavy October precipitation and late plant dormancy), the 2016 HW Restoration area planting plan was changed from the Detailed Plan twice. The first was on October 28 to reflect the reduced grading area, which is reflected in the revised numbers in Table 1. This table shows that to account for the reduction in the graded area but the increase in the area of topsoil replacement, the number of cottonwoods were increased, some coyote willows were added for soil stabilization, and the number of snowberry were decreased. The second change was on December 2 when the final notice regarding the Fall 2016 meadowsweet unavailability was received.

Appendix B, Figures B-8 and B-9 depict the mitigation areas after planting was completed. Appendix C, Table C-1 provides an updated table of the plants placed in 2016, and the number of plants to be placed in both Spring and Fall 2017. Overall, 304 of the revised 454 individuals were planted, including some additional experimental willows in the Reservoir Mitigation area. In order to meet minimum bundle sizes, which were generally in increments of 50, there were some extra plants remaining: 18 alder, 2 cottonwood, 18 willow and 8 dogwood. These plants were placed in a small area around the reservoir from which they could be transplanted in the spring, if necessary to replace any non-surviving individuals, or to supplement the reservoir planting as the spring water levels recede.

| **Table 1. Numbers of Woody Plants to be Placed in Fall 2016 by Species and Area, as Revised October 28, 2016.** | | | | |
|---|---|---|---|---|
| **Species** | **Area** | | | |
| | **Culvert** | **Reservoir** | **Headwater** | **Total** |
| Speckled Alder | 32 | | | 32 |
| Black Cottonwood | 30 | | 18 | 48 |
| Coyote Willow | | 100* | 32 | 132 |
| Douglas' Meadowsweet | 10 | | 140 | 150 |
| Red-osier Dogwood | 42 | | | 42 |
| Snowberry | | | 50 | 50 |
| **Total** | 114 | 100 | 240 | 454 |
| * 50 mitigation willows and 50 experimental willows. | | | | |

### 4.2 Seeding-HW Restoration Area

The topsoil replacement portion of Upper HW-3a and the graded portion of HW-2 were seeded on November 21. Seed was broadcast and lightly raked in. Most of the area was seeded with the Wetland-Riparian seed mix. The Upland Riparian seed mix was applied within a 2 to 10 foot buffer strip along the road. Care was taken to not place the seed within 1 foot of the planted tree/shrub stems, to prevent competition between the generally faster growing grasses and the woody plants. The soil was friable enough and the seed able to be placed at the desired depth. Therefore, no additional mulch was applied. Appendix C contains a copy of the seed tags. Because the seed was ordered before the weather prevented full grading, not all of the ordered seed was put out. Approximately 70% of the Wetland-Riparian seed mix and 10% of the Upland seed mix was sown.

### 4.3 Sod Planting-Reservoir Mitigation Area

Two staff gages were installed in the reservoir on July 28. One staff gage was placed in the Lower Reservoir planting area near the reservoir outlet, where only shrubs are scheduled to be planted. This gage (Gage 1, Figure B- 10) was placed at the lower end of the proposed shrub planting area at an estimated elevation of 2,259.5 feet. The other gage (Gage 2) was placed in the Upper Reservoir planting area in a location where the bulrush sod was to be placed. At the time of the gage placement, reservoir water levels were estimated as 2,260 to 2,260.5 feet above MSL, or approximately 1.5 to 2.0 feet below OHW. The July 28 reservoir water levels were 0.9 feet at Gage 1 and 1.4 feet at Gage 2. For the planting to be successful for both species, reservoir water levels were identified as needing to drop to a level of 0.5 to 0.7 feet at Gage 2. At this level, there would be adequate soil moisture for the sedge mats, yet the water levels would not be too deep for the

bulrush mats. The reservoir water level stayed relatively high throughout June and July, but fell rapidly during August and early September, reaching 0 at both gages by early September. At the time the sod was ready for harvest in September, water levels were too low for the sedge mats, but adequate for the bulrush. As per the Detailed Plan Section 4.3.4 regarding sedge mat installation under certain Fall conditions, the sedge mat installation was deferred until Spring 2017.

On September 19, prior to sod installation, the exact locations for the 10 approximately 1 by 5 meter (3.25 by 16.2 feet) bulrush sod mats were staked in the field and any minor surface irregularities that could prevent sod installation identified. The bulrush sod mats were harvested and picked up at the grower's facility in Rexburg, Idaho by HF staff on Tuesday, September 20 and delivered to the Highland Flats site late that evening. They were fully installed the next day by 3:00 pm, for a total time from harvest to installation of 29 hours.

The mats were delivered wet and were kept wet during the installation period. All of the mats were installed on moist to saturated soil. They were carefully placed to ensure full soil-root/rhizome contact and were well anchored with wooden stakes. Mats were cut as necessary to fit the appropriate level surfaces and to avoid any existing patches of native plants, with a sharp cutting tool and as per the grower's directions (Kathleen Scott, North Fork Native Plants, pers. comm.).

Some of the mats were placed above the water level at the time of planting and some were planted within 3 to 6 inches of water (Figures B-11 and B-12). The mats placed above the September reservoir water level were watered following installation and watered daily or every other day until October 7 when the October rainy period began. New sod root growth into the underlying soil was observed by the HF staff in September and the plants were beginning to enter dormancy in good condition at the time the reservoir water level began to rise. All mats were fully submerged by mid-October.

The bulrush sod was inspected on October 26, and all mats were found to be fully dormant, well anchored and not dislodged with the rapid reservoir rise. Because the bulrush were mostly dormant prior to being submerged by more than a foot of water, they are expected to suffer no adverse effects from the early and rapid change in water level.

The remaining four sedge mats will be installed in late spring 2017. The reservoir will be carefully monitored to ensure that they can be planted when the desired water level is reached. For the sedge mats only, this will be when a water level of six inches over the planting surfaces is reached, which if weather conditions are similar to 2016, would be reached in June.

Although there was no seeding in the Reservoir Mitigation area, at the time of sod installation, the native water plantain was observed dropping its seed. Where the seed was being dropped on sod, some of the seed heads were harvested and spread instead on adjacent surfaces to enhance potential germination there.

## 5.0 SUMMARY AND 2017 SCHEDULE

Table 2 provides a comparison of the anticipated 2016 work schedule to the actual completed work. All of the tasks specified for the Reservoir and Culvert Mitigation areas were completed, with the exception of (1) planting 10 meadowsweet at the Culvert Mitigation area because they were not available due to weather conditions, and (2) delaying planting of four sedge mats until the spring as a result of insufficient Reservoir Mitigation area water levels.

Most of the HW Restoration area activities were scheduled for 2017 to allow the solarization time to work in controlling the RCG and tansy. A portion of HW-2 and upper HW-3a were scheduled to be graded and/or have topsoil replaced along with seeding and bareroot planting in 2016. The area of topsoil replacement was increased in upper HW-3a to ensure a smooth grade between graded and ungraded portions of the HW area, as well as address issues with a large number of small upland mounds affecting the solarization success. Approximately 0.12 acres of HW-2 and upper HW-3a were either graded or had the weedy topsoil replaced, along with 0.03 acres of adjacent roadside buffer. These areas were planted and seeded. The rest of HW-2 remained ungraded as a result of unseasonably wet conditions.

Scheduled activities that were not completed in 2017 as a result of adverse weather or hydrologic conditions will be completed as soon as conditions are favorable in Late Winter/Spring 2017. These activities include:

- Dormant stock meadowsweet planting at the Culvert Enhancement area and the graded portion of HW-2/HW-3a, anticipated in late March or early April.

- Sedge sod mat installation to be installed as the reservoir water levels decline, anticipated in late May or early June, depending on spring weather conditions.

- HW-2 grading completion, to be scheduled as soil and access road conditions are sufficiently dry enough to complete the work in an efficient manner. Based on the 2016 ground and unnamed stream water levels, these conditions would occur between July and early September. Because the Section 404 permit specified grading to be completed or substantially completed by March, the permit will need to be extended to cover the 2017 grading.

Weed control within all areas will be a huge priority in 2017, along with the completion of the HW Restoration area grading, topsoil replacement, subsoil decompaction, and planting. Weed control activities will need to include the following:

- Repair of the black plastic in the ungraded HW areas to fix any overwinter damage that resulted in tears, holes or other breaks in the material.

- Re-application of black plastic in the HW-2 area if grading is not to be conducted early in the growing season. Alternatively, keeping the plants mowed or cut down with a weedeater

to prevent weed seed or vegetative spread could be used until grading and topsoil replacement occurs.

- Manual removal of persistent RCG along the stream channel and around scattered shrubs and shrub clumps in HW-1. This must occur during the spring when the soil is moist and manual full plant removal is possible.

- Continued examination and manual removal of RCG around the reservoir. Repair of the buffer black plastic as necessary. Removal of milfoil will also likely be necessary, once the reservoir drops to a level below 2,260 feet above MSL, and the deepwater plants can be safely accessed.

Although it is not anticipated, any new RCG that establishes within the Culvert Enhancement area will need to be identified during each monitoring visit and either removed or marked for HF staff removal.

The originally-scheduled 2017 construction activities, such as drip irrigation installation and operation, decompaction of HW-3b and parts of HW-1, and removal of solarization material and planting within the rest of the HW Restoration area will still occur. Table 3 provides a summary of all 2017 construction activities including both originally-scheduled items and those that were delayed by the weather. Monitoring of the 2016 construction will also be initiated in 2017.

| Table 2. Anticipated Schedule as Compared to Actual 2016 Mitigation Implementation. | | |
|---|---|---|
| **Task** | **Anticipated Dates [1]** | **Completed as Scheduled** |
| **1. Order Materials/Initial Mobilize** | Begin June 15 | Yes |
| **2a. Weed Control-HW Restoration Area** | | |
| Remove upland rocks, chips, tansy etc. | Early to Mid-July | Yes |
| Mow or weed trim in upland areas | Early to Mid-July | Yes |
| Mow or weed trim in wetland areas | Early-August | Yes |
| Install black plastic | Early to Mid-July and August | Yes |
| **2b. Weed Control Culvert Enhancement** | | |
| Manually remove RCG | Mid-Sept | Yes |
| **2c. Weed Control-Reservoir Mitigation Area** | | |
| Install erosion control and manually dig and remove RCG | Early to Mid-July | Yes, completed July 29 |
| **3. Site Preparation-Grading and Decompaction-HW Restoration Area** | | |
| Remove black plastic, select areas | Mid-Sept | Yes |
| Install erosion control | Mid-Oct | Yes |
| Strip topsoil HW-2 and upper HW-3a | Mid-Oct | Yes, upper HW-3a, Partial HW-2 |
| Grade HW-2 and upper HW-3a and decompact subsoil | Mid-Oct | |
| Apply clean topsoil HW-2 and upper HW-3a | Mid-Oct | |
| Remove fiber rolls HW-3a | Mid-Oct | Yes |
| Seed graded area | Mid-Oct to Mid-Nov | Yes |
| **4. Planting** | | |
| Install sod-Reservoir | Mid-Sept | Partial, 10 of 14 mats installed |

| **Table 2. (continued)** | | |
|---|---|---|
| Install bare root woody plants-Culvert, Reservoir | Mid-Oct to Mid-Nov | Yes |
| Install bare root woody plants- HW-2, upper HW-3a | Mid-Oct to Mid-Nov | All available plants installed |
| **5. Monitoring** | | |
| Install staff gage, if necessary | Mid-July | Yes |
| Monitor implementation #1 | Mid-July | Yes |
| Monitor implementation #2 | Mid-Sept | Yes |
| Monitor implementation #3 | Mid-Oct to Mid-Nov | Yes |
| Construction Implementation Report | Mid-Nov to Mid-Dec | Yes |
| [1] All dates were estimated and dependent on weather conditions and agency approval. | | |

**Table 3. Revised 2017 Mitigation Implementation and Monitoring Schedule. Except for deliverable dates, all dates are approximate and weather or site condition-dependent.**

| **Task** | **Month** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |
| **Maintenance** | | | | | | | | | | | | |
| Install irrigation-Culvert and HW | | | X | | | | | | | | | |
| Run Irrigation | | | | X | X | X | X | X | X | | | |
| Weed Control | | | | X | X | X | X | X | X | X | | |
| Implement Contingency | | | | As, or if, necessary | | | | | | | | |
| **Monitoring** | | | | | | | | | | | | |
| Spring | | | | | X | | | | | | | |
| Mid-Summer | | | | | | if nec. | | | | | | |
| Late Summer | | | | | | | | X | X | | | |
| Final Planting and Seeding | | | | | | | | | | X | X | |
| Memo submission | | | | | X | | | | X | | | |
| Annual Report | | | | | | | | | | | | X |
| **2017 Construction** | | | | | | | | | | | | |
| Extend 404 Permit | X | | | | | | | | | | | |
| Plant meadowsweet | | | X | X | | | | | | | | |
| Install sedge sod | | | | | X | X | | | | | | |
| Verify Fall 2017 plant materials | | | | | X | | | | | | | |
| Order any new replacement plants | | | | | X | | | | | | | |

| **Table 3. 2017 Construction** (continued). | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task** | **Month** | | | | | | | | | | | |
| | **J** | **F** | **M** | **A** | **M** | **J** | **J** | **A** | **S** | **O** | **N** | **D** |
| Finish Grade HW-2 | | | | | | | X | X | X | | | |
| Remove black plastic, rest HW | | | | | | | | | | X | | |
| Decompact HW-1, HW-3b | | | | | | | | | | X | | |
| Plant HW-1, rest HW-2, Lower HW-3a, HW-3b, full channel | | | | | | | | | | | X | |
| Seed all HW areas | | | | | | | | | | | X | |
| Remove HW fiber rolls where plants have stabilized graded areas | | | | | | | | | | | X | |
| Replace plants as necessary-all areas | | | | | | | | | | | X | |
| Remove reservoir fiber rolls, if not needed for future weed control | | | | | | | | | X | | | |

## 6.0 REFERENCES

EcoWest Consulting, Inc. 2016. Highland Flats Tree Farm Wetland and Riparian Restoration Plan-Final Detailed Plan . Unpublished report prepared for Essential Oil Research Farm, LLC, Naples, Idaho.

NOAA. 2016. Bonner's Ferry Climatic Data, WETS Tables. Available at http://agacis.rcc-acis.org/16021/wets/results

## APPENDIX A. BONNER'S FERRY, IDAHO WETS STATION WEATHER DATA

In contrast to 2015, in which temperatures were much hotter than usual in almost all months in Bonner's Ferry, the 2016 growing season temperatures were more similar to those of the long term average (NOAA 2016). The exceptions were in the early spring and August (3 to 5 degrees Fahrenheit [˚ F] warmer than average) and October and November. The mean October and November temperatures displayed in Table A-1 represent temperatures during the time plants seasonally enter dormancy. The higher than normal Fall temperatures also reflected the general lack of killing frost temperatures. On average, the minimum temperature reaches 28 ˚ F between September 22 to October 5, and 24 ˚ F or lower between October 3 to 18. In 2016, a minimum temperature of 27 ˚ F was reached on October 12 and 13, but rapidly increased to the high 30s and 40s throughout the rest of October and November. As of December 2, 2016, the minimum temperature had still not reached a level at which all plants would enter dormancy.

Although there were several months in which precipitation levels varied from long term averages, the overriding precipitation event was the historically wet October 2016. In this month, the precipitation total of 7.99 inches dramatically exceeded the long term monthly average of 1.61 inches. On average, there are five days in October on which precipitation of at least 0.10 inches is recorded. In 2016, there were 18 such days, with one day totals exceeding 1.50 inches. The bulk of the October precipitation came during three separate storms (October 7-11, October 14-21, and October 26-31). The grading was conducted in between the second and third storms. At the time the grading was initiated, 5.96 inches of precipitation had been received for the month.

The specific weather values that affected mitigation implementation are highlighted in the table below. These are:

- The warmer than usual fall temperatures which affected the date at which plants entered dormancy, and even delayed dormancy in some plants until late December.

- The extremely wet October which affected the ability to grade the soil without causing damage to it.

**Table A-1. Comparison of Long Term Monthly and Annual Precipitation and Temperature from the Bonner's Ferry, Idaho WETS Station to the Actual Monthly Total Values for 2015 and 2016. The shaded cells represent values substantially different from long term averages and which affected mitigation implementation. Missing values represent data that have not yet been collected.**

| Month | Temperature ˚ Fahrenheit | | | WET-Bonner's Ferry | | | | |
|---|---|---|---|---|---|---|---|---|
| | 30-Year Average | 2015 | 2016 | 30-Year Average (inches) | | | Individual Year Monthly Totals (inches) | |
| | | | | Average | 30-70% Range | | 2015 | 2016 |
| **January** | 28.1 | 29.0 | 30.1 | 2.70 | 1.62 | 3.28 | 2.34 | 2.64 |
| **Feb** | 31.4 | 37.7 | 36.9 | 1.77 | 1.12 | 2.14 | 2.90 | 1.56 |
| **March** | 39.4 | 42.7 | 41.2 | 1.49 | 0.93 | 1.80 | 3.89 | 3.48 |
| **April** | 47.2 | 47.1 | 53.8 | 1.42 | 0.86 | 1.73 | 1.06 | 0.38 |
| **May** | 54.3 | 59.9 | 58.3 | 1.76 | 1.07 | 2.12 | 1.21 | 2.08 |
| **June** | 61.6 | 69.0 | 62.7 | 1.62 | 1.07 | 1.95 | 0.81 | 1.04 |
| **July** | 67.5 | 71.4 | 67.7 | 1.02 | 0.53 | 1.27 | 0.43 | 0.70 |
| **August** | 66.9 | 70.5 | 69.2 | 1.07 | 0.48 | 1.31 | 0.99 | 0.23 |
| **September** | 57.4 | 57.6 | 57.8 | 1.16 | 0.58 | 1.42 | 0.51 | 1.19 |
| **October** | 45.4 | 51.4 | 46.5 | 1.61 | 0.79 | 1.97 | 0.73 | 7.99 |
| **November** | 35.0 | 34.9 | 41.0 | 3.03 | 1.82 | 3.68 | 3.60 | 1.81 |
| **December** | 26.8 | 30.8 | -- | 2.91 | 1.89 | 3.50 | 5.90 | -- |
| **Total** | 47.0 | 50.2 | -- | 21.56 | 18.76 | 23.84 | 24.37 | -- |

# APPENDIX B

# MITIGATION IMPLEMENTATION PHOTO-DOCUMENTATION

**Figure B-1. HW Restoration area vegetation immediately prior to cutting (top) and with partial mowing in upland areas (bottom).**

**Figure B-2. HW Restoration area with all solarization installed.**

**Figure B-3. End of May RCG growth in the Upper Reservoir planting area (top). HF Staff member demonstrating extraction of both RCG roots and rhizomes including all active growing points, as well as the large amount of RCG in the Upper Reservoir planting area and adjacent upstream wetland in July (bottom).**

**Figure B-4. RCG as disposed off on the ground in the upland disposal area.**

**Figure B-5. HW Restoration area on October 21 prior to grading.**

**Figure B-6. HW-2 Grading and soil removal adjacent to Transect 2 looking slightly southeast (yellow flags, top) and graded area looking north at Transect 2 (yellow flags, bottom).**

**Figure B-7. HW-2 topsoil replacement looking south from Transect 2 (yellow flags, top) and Graded HW-2/Upper HW-3a (bottom) following topsoil replacement and bare root plant location staking.**

**Figure B-8. HW Restoration area (top) and Reservoir Mitigation area including both the mitigation and experimental willows (bottom), post-planting. The pink flags in the top photo represent locations in which the meadowsweet will be planted in the late winter/early spring.**

**Figure B-9. Culvert Enhancement area post-planting. The pink flags represent locations in which the meadowsweet will be planted in the late winter/early spring. The yellow flags on the higher surfaces represent planted cottonwoods, with dogwood and speckled alder planted immediately adjacent to the channel.**

**Figure B-10. Gage 1 shortly after installation in July (top) and Gage 2 on September 8 , following RCG manual removal and water level decrease (bottom). The fiber rolls were placed around the outside edge of the majority of the RCG in July.**

**Figure B-11. Sod shortly after delivery to site (top) and sod in the process of being installed (bottom).**

**Figure B-12. Bulrush sod shortly after installation completed.**

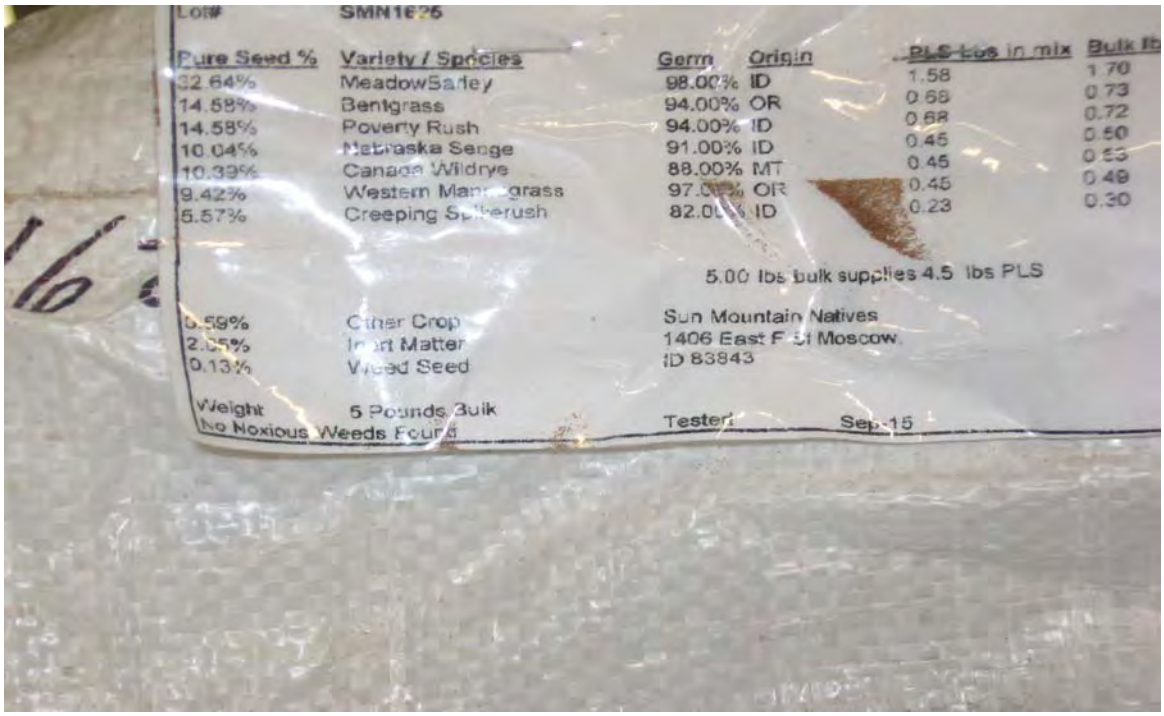
# APPENDIX C

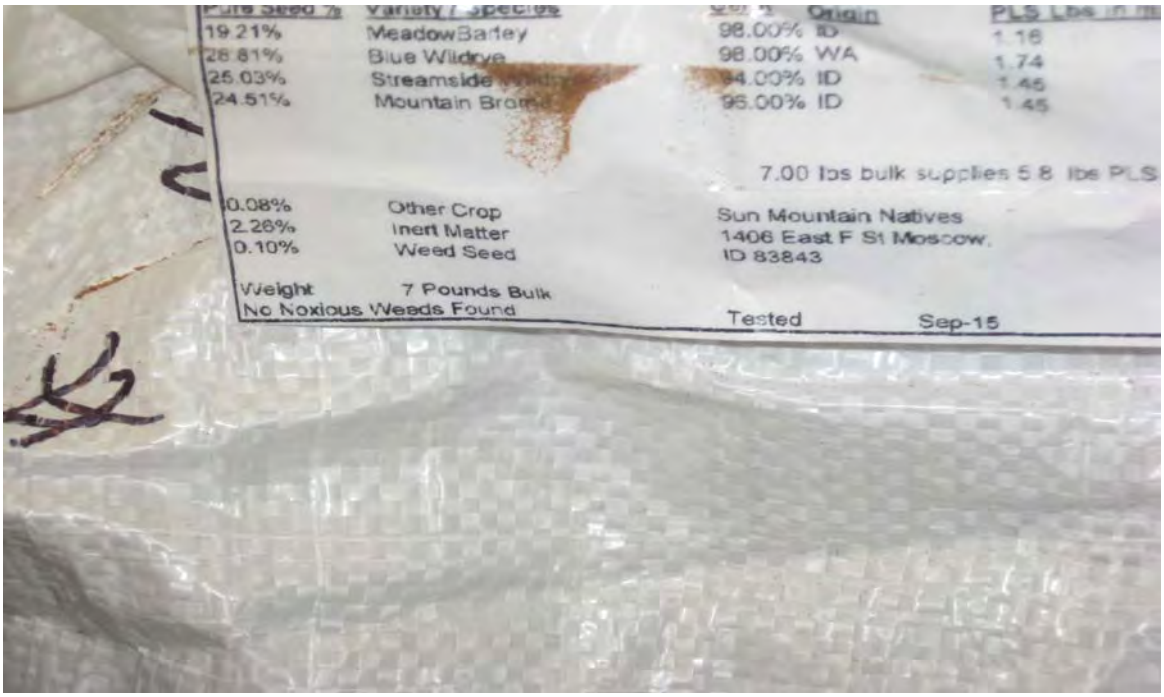
## PLANTING TABLES, SEED TAGS ,
## AND PLANT ORDER DOCUMENTATION

**Table C-1. Summary of Woody Plant Material to Be Placed in the Highland Flat Farm Mitigation by Year and Overall, as Revised 12/2/2016*.**

| Mitig Area | Habitat | Bare Root Shrubs and Trees | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alin | Cose | Crdo | Pico | Poba | Potr | Saex | Sabe | Spdo | Syal | Total |
| **Fall 2016** | | | | | | | | | | | | |
| Culvert | PFO | | | | | 30 | | | | | | 30 |
| Culvert | PSS | 32 | 42 | | | | | | | | | 74 |
| Reservoir | PSS | | | | | | | 50 | | | | 50 |
| Reservoir | PSS-Exper | | | | | | | 50 | | | | 50 |
| HW-2 | Mesic Rip | | | | | | | | | | 50 | 50 |
| HW-2 | PSS-partial | | | | | | | 32 | | | | 32 |
| HW 3a-upper | PFO/SS | | | | | 18 | | | | | | 18 |
| **Total Fall 2016** | | **32** | **42** | | | **48** | | **132** | | | **50** | **304** |
| **Spring 2017** | | | | | | | | | | | | |
| Culvert | PFO | | | | | | | | | 10 | | |
| HW-2 | Mesic Rip | | | | | | | | | 72 | | |
| HW 3a-upper | PFO/PSS | | | | | | | | | 68 | | |
| **Total Spring 2017** | | | | | | | | | | **150** | | **150** |
| **Fall 2017** | | | | | | | | | | | | |
| HW-3a | PFO/SS | | | 39 | | 77 | | | 77 | 351 | | 544 |
| HW-all | PSS | | 27 | | | | | 8 | | 11 | | 46 |
| HW-1,2, 3a | Mesic Rip | | | | | | | | | 155 | 259 | 414 |
| HW-1 | Upl Rip | | | | 13 | | 13 | | | | | 26 |
| HW-3a/b | Upl Rip | | | 21 | 12 | | 12 | | | | | 45 |
| **Total Fall 2017** | | **0** | **27** | **60** | **25** | **77** | **25** | **8** | **77** | **517** | **259** | **1075** |
| **Total-Both Yrs** | | **32** | **69** | **60** | **25** | **125** | **25** | **140** | **77** | **667** | **309** | **1529** |

* Total without experimental willows=1479




**Wetland-Riparian Seed Mix (top) and Upland Seed Mix (bottom) as photographed at the Highland Flats Tree Farm prior to seeding**.

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