Wetland Mitigation Plan

Blue Creek, Coeur d'Alene, Idaho

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TABLE OF CONTENTS

List of Figures

List of Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
BLM	U.S. Department of the Interior Bureau of Land Management
BMP	Best Management Practice
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWA	Clean Water Act
ICP	Institutional Controls Program
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
M&E	Monitoring and Evaluation
O&M	Operations and Maintenance
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
se	standard error
SHPO	State Historic Preservation Office
SWPPP	Stormwater Pollution Prevention Plan
TES	Threatened and Endangered Species
THPO	Tribe Historic Preservation Office
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WENI	West End Natural Infiltration

Section 1.0 Introduction

Page Repository is located west of Smelterville, in Idaho's Silver Valley. Alternatives for future repository sites and waste stream management are being evaluated for a final selection. However several alternatives propose expansion of Page Repository to the west into the area known as West Page Swamp. Wetlands in West Page Swamp cover 42.8 acres and include four distinct wetland classes. The alternatives involving expansion into the West Page Swamp may require mitigation for 25 – 40 acres of lost wetlands values. A potential wetland mitigation site was identified at the mouth of Blue Creek, adjacent to Blue Creek Bay on Coeur d'Alene Lake. The site is owned by the federal Bureau of Land Management (BLM) and shows considerable potential as a mitigation site for the West Page Swamp.

This Draft Wetland Mitigation Plan sets the practical and regulatory framework for completion of the mitigation. The U.S. Environmental Protection Agency (USEPA) Region X and Idaho Department of Environmental Quality (IDEQ) share the lead for this project.

Lead Agencies and Contacts:

IDEQ, Bruce Schuld – Lead for Implementation

USEPA, John Olson – Lead for Regulatory Compliance; Clean Water Act (CWA) and Resource Conservation and Recovery Act (RCRA)

USEPA, Anne McCauley – Lead for Funding

Section 2.0 Purpose and Objectives of the Mitigation Plan

The purpose of this plan is to present a framework for comprehensive wetland mitigation as compensation for some of the wetlands lost during expansion of the Page Repository into portions of the West Page Swamp. Additional wetland mitigation and sites may be needed to fully mitigate for wetlands values lost by future repository developments or remedial projects in the Bunker Hill Box. Expansion justification and alternative analysis is presented in IDEQ's application for permitting under the CWA, Section 404 (IDEQ 2008).

This proposed plan will summarize past research that has characterized the biologic, geomorphic, and hydrologic conditions in both West Page Swamp and the proposed mitigation site. Practical goals will be set for mitigation, the legal framework will be outlined, and engineering and construction requirements for meeting the mitigation goals will be introduced.

2.1 Mitigation Goals and Objectives

Mitigation goals are driven, in part, by Compensatory Mitigation Legislation (33 CFR Parts 325 and 332), which encourages a "watershed approach" to siting compensatory mitigation. The legislation reads, in part:

"Such an approach considers how the types and locations of compensatory mitigation projects will provide the desired aquatic resource functions, and will continue to function over time in a changing landscape. It also considers the habitat requirements of important species, habitat loss or conversion trends, sources of watershed impairment, and current development trends, as well as the requirements of other regulatory and non-regulatory programs that affect the watershed, such as storm water management or habitat conservation programs. [The] approach should not focus exclusively on specific functions (e.g., water quality or habitat for certain species), but should provide, where practicable, the suite of functions typically provided by the affected aquatic resource."

At Page, the impacts to aquatic and terrestrial wildlife and habitat have been significant due to the history of mining, milling, and smelting in the immediate vicinity. In addition, the risks associated with flooding are extreme due to the proximity of the Page Repository to a major river, several tributary streams, and the town of Smelterville, which contributes stormwater to the wetlands surrounding the repository. A goal of this mitigation project is to do no further harm to these resources, and to improve habitat where possible.

Implementation of mitigation at Page is expected to take place over a number of years as the repository expansion is constructed in phases. This plan focuses on one of two alternative mitigation sites that have been identified and advanced for investigation.

Specific goals for this mitigation plan are as follows:

1. Improve the quality of approximately 15 acres of low-medium quality wetlands currently found in the Blue Creek Area.
2. Create 4 acres of new wetlands in the Blue Creek Area in the Palustrine – Emergent class and 8 acres of new wetlands in the Palustrine – Scrub-shrub class.

2.2 Siting Requirements

The choice of sites for wetland mitigation is driven primarily by the potential for meeting mitigation goals and requirements while improving overall water quality. Regulatory guidance is provided, and permitting is required.

2.2.1 Watershed Approach

A watershed approach is used in siting wetland mitigation projects whenever possible. The critical features of this approach are that the mitigation wetland is in the same watershed as the project site and it replaces as many of the functions and values as possible. Blue Creek is located within the Coeur d'Alene River basin. However, West Page Swamp is located about 40 river miles upstream from the mouth of the river where it flows into Coeur d'Alene Lake, and the Blue Creek site is at the northeast end of the lake, an additional 20 miles from this confluence. In addition, mitigation at Blue Creek would potentially preclude construction of wetlands in the immediate vicinity of West Page Swamp, thereby decreasing the total wetland area at the Page site. As a result, the watershed approach would not be well implemented with mitigation at Blue Creek.

2.2.2 Wetland Characteristics

Wetlands and potential wetlands at Blue Creek are very similar in wetland classification to those found at West Page Swamp. However, they are not identical and exact replacement of wetland classes, functions, and values will not be possible at Blue Creek. Because Blue Creek is situated on a lake shore, the existing wetlands are more lacustrine than palustrine. However, excellent potential exists for creation of palustrine wetlands at the site. This potential is discussed further in Section 4.0 Target Conditions.

2.2.3 Permitting, Hydraulic Analysis, No-rise Certification

A number of permitting requirements must be met to site this mitigation project, the most significant of which is under the jurisdiction of the Clean Water Act (CWA), Section 404, which requires justification for the filling of wetlands that leads to the need for this mitigation project. In addition, hydraulic analysis will be required to assess any impacts that the project will have on the 100-year floodplain, allowing for certification of any potential rise in water surface as a result of this project. These and other permitting requirements are discussed further in Section 5.0 Regulatory Compliance.

2.3 Potential Mitigation Credits

Mitigation credits are computed based on a site's potential for replacing lost wetlands. This potential is determined using a number of criteria including potential to create, restore, enhance, or preserve lost wetland classes and values; potential for experimentation and application of adaptive management at the site; need for long term maintenance; natural plant recruitment potential; watershed proximity; and several others. Based on an informal assessment of these criteria at Blue Creek, it is estimated that this site will provide about 7 acres of wetland mitigation credit. The timeframe for establishing these credits is likely to be 5 to 10 years after construction is complete.

Section 3.0 Proposed Mitigation Site Conditions

Two potential mitigation sites were investigated by IDEQ in 2008: West Smelterville Flats and the West End Natural Infiltration (WENI) Area. In 2009, Inland Northwest Resources reviewed three additional sites for Upstream Mining Group: 3 acres at Pinehurst Rodeo Grounds; 13 acres at the confluence of the North and South Forks of the Coeur d'Alene River; and up to 160 acres at Shadowy St. Joe on the St. Joe River in Benewah County. Collaboration with Idaho Department of Fish and Game (IDFG) has been proposed on the Lower St. Joe Habitat Segment of the Coeur d'Alene Wildlife Management Area at the Shadowy St. Joe site. In addition, collaboration with BLM on Blue Creek Bay near Coeur d'Alene Lake has been proposed. A Wetland Mitigation Plan has been submitted for the WENI Area. This report focuses on the Blue Creek Bay site. The West Smelterville Flats area is no longer being considered due to the relatively high quality of the existing wetlands there and its proximity to Smelterville Airport. Pinehurst Rodeo Grounds and the Confluence sites are not currently under consideration due to their small size and ownership issues. The Shadowy St. Joe site poses many challenges and is not currently being considered but may become a viable mitigation site in the future.

3.1 Existing Conditions of the Blue Creek Area

The proposed Blue Creek mitigation site is located immediately adjacent to Blue Creek Bay on Coeur d'Alene Lake. The site is approximately 27 acres with an estimated 15 acres of existing Lacustrine – Emergent , Palustrine – Emergent, and Palustrine – Scrub-shrub wetland. Blue Creek is somewhat incised due to prior straightening and construction of a berm through the site. As a result, the water table has dropped as much as 1-2 feet below historical levels. The area was previously used for haying, but is now a meadow managed for habitat and recreation. The stream is partially shaded with riparian vegetation dominated by dogwood (*Cornus stolonifera*), black hawthorn *(Crataegus douglasii)*, black cottonwood (*Populus balsamifera*) and thinleaf alder (*Alnus incana*). Other dominant plants at the site include bulrush (*Scirpus spp.*), reed canarygrass (*Phalaris arundinacea*), cattail (*Typa latifolia*), sedges (Carex spp.), and pasture grasses. On the east side of Blue Creek there are several non-native weed species, including two on the Idaho Noxious Weed List: orange hawkweed (*Hieracium aurantiacum*) and oxeye daisy (*Leucanthemum* vulgare). In the northern part of the site there is a plantation approximately 1 acre in size that BLM planted with native tree species, including Quaking aspen (*Populus tremuloides),* willow, alder, dogwood, and cottonwood. Planted trees are 1-2 meters tall. The plantation area is bounded by higher elevation, dry ground on the north-west side and a wetter potential wetland area on the south and east.

Although Blue Creek is in a watershed affected by high concentrations of cadmium, lead, and zinc, the levels are greatest further upstream in the upper basin. Heavy metal concentrations have not been detected in the Blue Creek drainage. Soils found at the Blue Creek site are on the hydric soil list for Idaho. Fine sediments in the stream are primarily due to runoff from adjacent roads.

The Blue Creek Area contains numerous sensitive species. The site is within proposed critical habitat for bull trout but is currently not designated critical habitat (BLM 2008). Westslope cutthroat trout, a BLM sensitive species, is likely to inhabit Blue Creek. One BLM sensitive

plant species, Henderson's sedge (*Carex hendersonii*), exists at the site (BLM 2008). Sensitive birds observed at or near the site include the common loon, Calliope hummingbird, Willow flycatcher, Red-naped sapsucker, and the Cordilleran flycatcher. Between 2003 and 2007, an average of 45 different migratory bird species were observed over open water at Blue Creek Bay and 35 species were observed in the riparian area (BLM 2008). There is also some evidence of beaver activity in the wetland.

3.1.1 Historical and Existing Site Conditions

The Blue Creek wetland is currently owned by BLM. The proposed mitigation site is within a 736-acre area acquired from private ownership between 1991 and 2003 for conservation, recreation, and historical values (BLM 2008). Blue Creek drains approximately 8 square miles into Coeur d'Alene Lake and is surrounded by private land. The upstream boundary of the proposed site is E. Yellowstone Trail, a paved road in poor condition. The proposed site was previously used for growing hay. Currently, the channel is confined by a berm, causing moderate incision and lowering of the water table.

3.1.1.1 Previous Construction in Blue Creek Area

Two construction events have occurred at the proposed site. The most pertinent is the construction of the berm, which was historically built to drain the wetland. The other construction project was a log landing on the east side of the bay that was historically used as a logging transfer station but is now primarily used as a parking area.

3.1.1.2 Surrounding Land Uses

Properties surrounding the Blue Creek site are rural residential with the exception of the BLM-owned land just upstream from the road crossing. E. Yellowstone Trail borders the site on the north and west sides, and S. Landing Road runs along the east side of the site.

3.1.2 Hydrology

The proposed mitigation site is in the delta where Blue Creek enters Coeur d'Alene Lake and is subjected to approximately 7 feet of lake level fluctuations, annually. Blue is the primary stream in its drainage.

3.1.1.1 Flow Rates in Blue Creek

Flow rate for streams without gauging stations can be estimated using region-specific regression equations as described in Berenbrock (2002). For Blue Creek, the regression equations and their associated standard errors are:

Regression Equation	Standard Error (se) of Prediction (percent)	Predicted Flow (cfs)	Range of Predicted flow (cfs) using se
$Q_2=0.742\ DA^{0.897}P^{0.935}$	+64.2 to -39.1	125.3±	76 to 205
$Q_{10}=2.17\ DA^{0.884}(E/1000)^{-0.538}P^{1.04}$	+65.8 to -39.7	289.4±	174 to 480
$Q_{50}=4.22\ DA^{0.876}(E/1000)^{-0.962}P^{1.14}$	+71.4 to -41.6	497.1±	290 to 852
$Q_{100}=5.39\ DA^{0.874}(E/1000)^{-1.13}P^{1.18}$	+74.1 to -42.6	606.8±	348 to 1056
Qx = flow rate in cubic feet per second (cfs) for a recurrence interval, x, in years DA = drainage area in square miles P = mean annual precipitation in inches E = mean elevation of the drainage in feet For Blue Creek, DA= 9.84 square miles, P= 26.9 inches, and E= 2790 feet.			

3.1.3 Soil type and sources

The Blue Creek site consists of two main soil types, Cald silt loam and Kruse silt loam. The majority of the area is Cald silt loam, described as very deep, somewhat poorly drained, and neutral to slightly acidic. Organic matter content is high and the available water capacity is high with slow runoff. It is on the hydric soil list for Idaho. A smaller portion of the area (<20% of total area) is Kruse silt loam, characterized as being a very deep, well-drained soil with medium acidity. This soil type is typical in the higher elevations of the site, which are not likely to be utilized during this mitigation.

3.2 Targets for Future Site Conditions

The primary goals for the future of the Blue Creek Area are to improve current wetland conditions and restore areas that were historically wetland. The recovery of this area will be gradual, with desired conditions being met after a minimum of 10 years. Overall, the goal is to reconnect the creek to its floodplain, thereby raising the water table, re-hydrating the adjacent meadows, and encouraging native riparian vegetation growth. To accomplish these goals sections of the berm will be removed, grade control structures will be constructed using natural materials, and the riparian and wetland areas will be planted with appropriate native species.

Homeowners in the area are also vested in the wetland. Their desired uses include a natural, multi-use recreation area (BLM 2008). However, recreational use by motorized vehicles within the mitigation site will be prohibited, and potential access points for motorized vehicles will be obliterated to protect mitigation work and development of wetland values.

3.2.1 Invasive Plant Control

Invasive plant species were introduced in the meadow through haying and road use. However, the area has been monitored and treated consistently for approximately 10 years, significantly reducing invasive plants (BLM 2008). Invasive species previously found in the area include: Spotted knapweed (*Centaurea maculosa*), common tansy (*Tanacetum vulgare*), Dalmation

toadflax (*Linaria dalmatica ssp. Dalmatica*), meadow hawkweed (*Hieracium caespitosum*), common mullein (*Verbascum thapsus*), Canada thistle (*Cirsium arvense*), sulfur cinquefoil *(Potentilla recta*), oxeye daisy (*Chrysanthemum leucanthemum*), St. Johnswort (*Hypericum perforatum*), rush skeletonweed (*Chondrilla juncea*), yellow toadflax (*Linaria vulgaris*), bull thistle (*Cirsium vulgare*), orange hawkweed (*Hieracium aurantiacum*), field bindweed (*Convolvulus arvensis*), and reed canarygrass *(Phalaris arundinacea).*

Reed canarygrass, orange hawkweed, oxeye daisy, St. Johnswort, and bull thistle are still found at the site. A final Operating and Maintenance plan will include invasive species controls.

3.2.2 Public Enjoyment

The proposed mitigation site is adjacent to Coeur d'Alene Lake and is surrounded by private homes. Improvements and additions to the existing wetland will adhere to requirements put forth by concerned citizens in the planning of a natural, multi-use recreation site. The improved wetland will enlarge the area available to wetland and riparian plant species, thus attracting more wildlife species and improving fish habitat.

Section 4.0 Target Conditions

4.1 Reference Sites and Indicator Species

Reference sites are used to aid the design process when a similar area is available for emulation. Criteria used to select the reference site for Blue Creek can be divided into two subcategories: 1) criteria designed to closely match the natural physical features of the Blue Creek site (slope, proximity to Blue Creek, proximity to a fresh water inlet bay, hydrologic characteristics, and soil characteristics), and 2) criteria designed to emulate conditions that are currently found at West Page Swamp, making them desirable future conditions for the Blue Creek site (type and quality of wetland classes and subclasses found at Page and overall site condition). Based on these criteria, Fernan Creek, immediately adjacent to Fernan Lake and approximately 3 miles northwest of Blue Creek Bay, has been chosen as the reference site for this mitigation project. The following functions, values, and benefits are to be emulated at the mitigation site.

4.2 Functions, Values, and Benefits of the Fernan Creek Wetland

The wetland at the Fernan Creek inlet to Fernan Lake was assessed by IDFG in 1999 for its Conservation Strategy (IDFG 1999). In the IDFG assessment, the site is classified as a 'Reference Site', identifying it as having 'high quality assemblages of common community types' (IDFG 1999). The wetland area at Fernan Creek is classified as Palustrine, subclasses Scrub-shrub and Emergent.

4.2.1 Native Plant Habitat

Native plants found at the Fernan Creek wetland vary by the wetland subclasses described here.

4.2.1.1 Palustrine – Scrub-shrub

The shrub layer is dominated by thinleaf alder, black hawthorn, and Geyer/Silver Willow (*Salix geyeriana)*. Spirea (*Spirea douglasii*) is dominant at the wetland margins, and woods rose (rosa woodsii) is also common. A non-native rose is widespread at the site. The herbaceous stratum is dominated by *Carex spp.* and Tufted Hairgrass (*Deschampsia cespitosa*). Also common are buttercup (*Ranunculus spp.*), bigleaf lupine (*Lupinus polyphyllus*), and camas (*Camassia quamash*).

4.2.1.2 Palustrine – Emergent

The emergent subclass is comprised of rooted, herbaceous hydrophytes and is usually dominated by perennial plants. The dominant persistent herbaceous species at this site are reed canarygrass, Northwest Territory sedge (*Carex utriculata),* blister sedge (*Carex vesicaria),* and Cusick's sedge (*Carex cusickii*).

4.2.2 Soils

Soil survey data for Fernan Creek list the soil type as Ramsdell silt loam and Pywell Muck, both of which are on the list of hydric soils for Idaho.

4.2.3 Wildlife Habitat

About 140 bird species in North America are dependant on wetlands for survival (Stewart 2007). Many other birds use wetlands during some portion of their life cycle for breeding, nesting, feeding, or cover. Many species use both wetland and upland forested areas for feeding because of the abundance of insects associated with trees. Just a few of the common wetland-dependant bird species that have been found near Fernan Creek during breeding season are the tree swallow, northern rough-winged swallow, marsh wren, red-winged blackbird, American coot, osprey, and great blue heron (Sturts 2003). The previous IDFG assessment of the wetland noted it has high waterfowl values and neotropical migrants were observed during that survey (IDFG 1999).

4.2.4 Other Wetland Functions and Values at Fernan Creek

The wetland is known for its high quality assemblages despite past grazing. Much of the site is a temporarily flooded wetland with largely native vegetation, a trait that is rare given the varied land use in the region. The site also serves as a sediment trap from the uplands before reaching Fernan Lake (IDFG 1999).

4.3.5 Needs of Selected Vegetation

The following sub-sections describe site conditions required for successful growth of some of the plant species that will be appropriate for reintroduction at the Blue Creek wetland site.

4.3.5.1 Palustrine – Scrub-shrub

Thinleaf alder (*Alnus incana*) prefers moist sites along margins of ponds and creeks. This tree is not drought tolerant but will tolerate brief inundation. It grows best in well drained, moderately fertile soils.

Spirea (*Spirea douglasii*) grows in moist areas, swamps, lake margins, and damp meadows. It tolerates inundation well and prefers organic soil.

Coyote Willow (*Salix exigua*) needs a sunny and permanently moist site.

Peachleaf Willow (*Salix amygdaloides*) needs a sunny and permanently moist site. It will tolerate flooding, but should be planted in a site where the water table varies and is, at least for part of the season, below ground surface. This is a good shade tree, so it should be used heavily in areas where reed canarygrass threatens to recolonize.

Geyer Willow (*Salix geyeriana*) can grow in wet and dry sites, but needs a water table within approximately 3 feet of the surface. It is commonly found in wet meadows and marshes and along low-gradient streams.

Redosier dogwood (*Cornus sericia*) prefers rich, moist soils with a pH range of 5.5 to 7.0 and high levels of mineral nutrients. It will tolerate flooding and is often one of the first shrubs to invade wet meadows. It can live with the roots submerged in water for most of the growing season. It is an early to mid successional species that is suppressed in shade and is not normally found in the understory of closed canopy forests. It is found in the understory of mixed open forests.

4.3.5.2 Palustrine – Emergent

Small-fruited bulrush (*Scirpus microcarpus*) will grow in shallow water. It transplants well and prefers sunny exposure, but will grow in partial shade. It will grow in most soil types and pH ranges.

Common cattail (*Typha latifolia*) is an early successional species in wetlands. It will quickly colonize, especially on exposed, permanently saturated, mineral soils of moderate fertility. As water levels fluctuate, cattail may give way to sedge and bulrush species. Cattail should not be planted extensively, but allowed to colonize in the mitigation wetlands. It can be an aggressive plant, so careful monitoring of competition by neighboring species will be important. Cattail is beneficial in the removal of excessive nutrients in a wetland.

Creeping spikerush (*Eleocharis palustris*) will grow in permanent water up to 3 feet deep and will survive after the water table drops below ground surface in the late season. It transplants well, and plants should be spaced 1-2 ft apart. It is tolerant of a range of soil types and pH.

Common rush (*Juncus effusus*) grows in full sun to partial shade in wet, slightly acidic soils. It grows best in areas that are periodically flooded, but can withstand some drying and inundation up to about 3 inches.

Beaked sedge (*Carex rostrata*) grows in shallow water and transplants well. It is adapted to most soil types. It should be planted in independent clumps, as it will dominate within a small area.

Tufted hairgrass (*Deschampsia cespitosa*) grows best in very moist habitats and is common in disturbed sites. Soil pH can range from 3.3 to 8.4.

4.3.6 Plant Quantities

The planting requirements for successful mitigation are, in part, dependant on the planned timing for proof of efficacy. In short, the more seedlings planted, and the bigger the seedlings planted in the first two years after construction, the shorter the time to successful wetland function. Plant establishment and hydrology are the two most important factors in successful wetland mitigation. It is estimated that a minimum of 60,000 to 70,000 seedlings at an approximate cost of $150,000 will be required during the first two years after construction.

Section 5.0 Regulatory Compliance

This section describes how various features of this mitigation plan comply with the Applicable or Relevant and Appropriate Requirements (ARARs) identified for this pilot project.

5.1 Compliance with ARARs

The Coeur d'Alene Basin Record of Decision (ROD) (USEPA 2002) contains ARARs that are pertinent to the Page wetland mitigation project. The following presents the substantive compliance of this project with these ARARs. Appendix A lists the pertinent ARARs and corresponding: 1) citations, 2) brief descriptions, and 3) comments about where each ARAR will be addressed in mitigation documentation. In addition, the discussion below provides information about the general ARAR categories addressed.

5.1.1 Water Quality

To ensure that there are no adverse effects on Coeur d'Alene Lake, a Stormwater Pollution Prevention Plan (SWPPP) will be developed based upon sediment and erosion Best Management Practices (BMPs). Stormwater discharges into the lake will be minimal because the final mitigation design will include sediment and erosion controls to prevent discharges during and after construction. Stormwater during construction will be managed on-site using temporary stormwater collection systems within the construction zone. The SWPPP will provide compliance with the Idaho Non-Point Source Management Plan as well as USEPA-administered water quality permit programs.

5.1.2 Wetlands and Floodplains

Wetland areas were mapped within the mitigation project boundary (Figure 1). Incorporation of existing wetlands into the final mitigation design will require the implementation of stormwater BMPs during construction to minimize the potential for sediment runoff to the existing regulated wetland areas. Some existing wetlands at the site may be altered for optimal design. These alterations will be addressed in the Stream Channel Alteration permit.

5.1.3 Stream Channel Alteration

If the site is advanced for further consideration, all wetlands, channels, and floodplains associated with existing and design conditions at the Blue Creek Area will be modeled and finalized in a Surface Water Management Report. The report will include potential impacts during flooding events and in response to any anticipated rise in base flow and water table as a result of the proposed mitigation action.

5.1.4 Native American and Cultural Resource Protection

Cultural Resources protection will be addressed as part of the Public Outreach Plan. BLM will provide cultural resources survey and concurrence from Idaho State Historic Preservation Office (SHPO) and the Coeur d'Alene Tribe Historic Preservation Office (THPO). These offices will be included as interested entities in the Public Outreach Plan.

5.1.5 Encroachment Permits and Access Agreements

The road providing access to the Blue Creek site is E. Yellowstone Trail. The Eastside Highway District and Idaho Transportation Department have established encroachment permitting processes for approaches or other proposed encroachments that may be required for any work adjacent to E. Yellowstone Trail.

5.1.6 Threatened and Endangered Species

No impacts to Threatened and Endangered Species (TES) are anticipated due to this mitigation action. However, Lake Coeur d'Alene is designated critical bull trout habitat so it will be necessary to consult with the U.S. Fish and Wildlife Service (USFWS) for concurrence under the Endangered Species Act. This process will also serve to comply with Idaho Administrative Procedures Act (IDAPA) Rules Governing Classification and Protection of Wildlife.

5.1.7 Migratory Bird Treaty

USFWS will be notified when migratory bird nest(s) are identified in areas that are planned to be cleared. If a nest is observed, the site will be flagged and USFWS will be notified. Reasonable efforts will be made to schedule construction with minimal impacts to nests during the nesting period by scheduling clearing activities in consultation with USFWS. The mitigation will be implemented in a manner that avoids the taking or killing of protected migratory bird species, whether individual birds or their nests or eggs, including Tundra Swans.

5.1.8 Control of Air Pollution in Idaho

Dust control measures during construction will be included in construction BMPs. No air pollution impacts are anticipated as a result of the completed project.

Section 6.0 Components of the Comprehensive Mitigation Plan

A comprehensive mitigation plan will be developed for the preferred mitigation site and will include wetland system design, monitoring and evaluation (M&E) planning, operations and maintenance (O&M) planning, a project timeline, and task-specific cost estimates. Following is a list of steps required to complete the comprehensive mitigation plan.

6.1 Design

If this site is chosen for mitigation, a conceptual plan for this mitigation project will be developed, followed with detailed design drawings and specifications. The plan will address concepts for hydrologic conditions and controls, grading and dike construction, bridges, soils, planting, control of invasive plant species, public access and restriction, construction BMPs, and construction scheduling and oversight.

6.1.1 Hydrologic Modifications

The preliminary design footprint for mitigation wetlands at the Blue Creek Area is shown in Figure 2. The plan consists of establishing breaks in the berm that currently constrains the channel, and adding woody debris to the channel for habitat and grade control.

6.1.2 Preliminary Wetland Configuration

Overland flow entering the site will cross S. Landing Road via multiple culverts designed to distribute flow more evenly across the meadow. Flow in Blue Creek will primarily remain in the existing channel but will have access to the floodplain at multiple places along its route to the bay. The berm extends along the west side of Blue Creek for about 1100 ft. Approximately 300 ft of this berm will be removed in short increments throughout its length (Figure 2). The channel dimensions will be constructed so that Blue Creek will extend over its banks during the high flow event of a typical year. The created wetland will support native vegetation throughout the meadow as a result of this floodplain connectivity and an increase in water surface elevation in the channel. Alder, dogwood, willow, sedges, rushes and other native plants will be used to revegetate the areas where the berm was removed. Woody debris placed in the channel will provide additional fish habitat, increase water retention time in the meadow, and raise the water table.

6.1.3 Grading

Grading will be associated with breaching the berm along the channel and will match natural topographical variation with the meadow.

6.1.4 Inlet and Outlet Control Structures

Additional culverts may be placed under S. Landing Road, which borders the east side of the site, to improve meadow hydration from hill slope runoff.

6.1.5 Bridges

There are no bridges associated with the Blue Creek mitigation project.

6.1.6 Soils

The capacity of the soil substrate to remove and retain nitrogen and phosphorus is a function of both the oxidation-reduction potential of the soil and the extent of soil-water contact in the wetland. Silt or loam soils have finer textures and lower porosities than soils high in sand or gravel, promoting longer contact times. A silty loam soil high in well decomposed organic matter is essential for plant growth, microbial activity, and pollutant removals. If only low-fertility topsoil is available for construction, it should be amended with compost during construction. Currently, soils at the Blue Creek site are silty loam, which is adequate to support the proposed vegetative plans, and it is anticipated that little or no additional soil will be imported to the site.

6.1.7 Planting Plan

Planting is a critical element for successful wetland establishment. Generally, the more plants introduced initially, the better opportunity the wetland will have for rapid success. Ideally, planting should be conducted in the spring to early summer, with water levels appropriate for early development introduced as soon as possible. However, construction schedules rarely allow for this luxury, and planting is often completed in the fall. In this case, it will be necessary to use erosion control fabric on all planted slopes and high-quality mulch on flat planted surfaces. Irrigation may be recommended during the first season after plantings. Reintroduction of water should be controlled and closely monitored to avoid adverse impacts to plants and water quality.

A final planting plan will be included in construction plans and specifications. It will likely include planting of nursery stock sized from 20 cubic inches to 2 gallons as well as clump planting of existing woody vegetation that may be disturbed or relocated during construction. A second year of planting is recommended to account for mortality during the first year after construction.

6.1.8 Control of Invasive and Noxious Species

The final design must include the elements necessary to discourage re-establishment of noxious species. Methods may include mowing, scalping, cultivation, hydration and flooding, and shade from over-story vegetation.

6.1.9 Public Access/Restriction Plan

Public enjoyment is an important value of this site as it will provide improved scenery and wildlife viewing. Once vegetation is well established, public access will be allowed but will be limited to day use for hiking, horseback riding, and access to the lake.

6.2 Construction Plan

6.2.1 Construction BMPs

All earth work should be done during the driest part of the year. Standing water should be avoided in areas where high-quality wetlands are already established, but should be drained or pumped from ditches and low-quality areas before earthwork commences. Areas subject to stormwater runoff must be protected appropriately as outlined in the SWPPP.

6.2.2 Construction Schedule

A construction window may be established by permitting agencies. The best conditions for minimal disturbance of existing wetlands will occur during the late summer months. Alternatively, the early spring offers a potential construction season that provides the best opportunity for establishing new vegetation during the first year. There are advantages and disadvantages to performing earthwork during these two timeframes, and risks are always present for this type of construction. The choices should be weighed carefully before a decision is made regarding construction timing. In any case, planting should be completed as early in the summer as possible, and hydration provided during the dry months in order to allow plants maximum establishment opportunity before senescence.

6.2.3 Construction Oversight

Many contractors do not have experience building wetlands. The earthwork requires considerations that are not typical in the construction industry. For this reason, it is critical that a wetlands expert with experience in construction oversight and a clear understanding of the project goals and objectives be on-site during construction activities. Construction plans, specifications, and field layout must clearly portray the desired work. However, if appropriate oversight is available for the extent of the construction, plans and specifications can be less detailed, allowing for modifications as conditions dictate. This situation lends itself well to a time and materials contract, avoiding costly and time-consuming change orders.

6.3 Monitoring and Evaluation

The goal of monitoring should be to review efficacy of the desired systems, functions, and values of the mitigation site, and to provide guidance for Operations and Maintenance (O&M) to apply adaptive management techniques for adjustment and fine tuning of the system to achieve maximum performance. Impacts on surrounding surface and groundwater bodies must be evaluated for quality and quantity changes. Finally, monitoring of the hydrologic and hydraulic functions of the mitigation site is required to make any adjustments necessary for improving wetland performance. Goals for monitoring are to:

- provide data for improved operations,
- identify problems, and
- determine compliance with regulatory requirements.

6.3.1 Monitoring and Evaluation Plan

A Monitoring and Evaluation (M&E) Plan will be developed during the design phase and will designate each of the program features outlined above. In addition, the plan will outline required analysis and reporting of the results from these events. To evaluate the performance of the system, the following metrics for optimal wetland performance will be determined:

- vegetation characteristics,
- hydraulic loading rates,
- inflow and outflow volumes,
- water quality changes between inflow and outflow, and
- excursions from normal operating conditions.

In addition, the monitoring plan will delineate criteria for success and efficacy of the project, measureable performance standards, and schedules and durations for M&E events.

6.3.1.1 Monitoring of Wetland Mitigation

The primary performance standard for mitigation will be how well the functions and values of wetlands in West Page Swamp are emulated in the Blue Creek Area. Three monitoring activities are proposed for this standard:

- Photo points established before construction and monitored periodically at the same location, angle, and resolution,
- Qualitative periodic survey for weed infestation, sparsely vegetated areas, and vegetation health and diversity, and
- Wetland delineation and classification mapping, which should be done periodically, but less often than the other two activities, to determine whether the target wetland species and hydrologic regimes are dominating for designed wetland classes.

6.3.1.2 Hydrology

Inflows will be comprised primarily of the stream channel flowing in from the watershed and secondarily of surface flow from the adjacent slopes. Hydrologic monitoring will be limited to surface water depths and depth to groundwater associated with wetland delineation activities.

6.3.1.4 Regulatory Compliance

Any additional monitoring required by permits will be outlined in the M&E Plan. A Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) must be written and followed for any sampling that is undertaken as part of the monitoring program.

6.4 Operations and Maintenance

Management of the constructed wetlands is essential for good performance and accomplishment of long-term mitigation goals. The overall focus of management should be on:

- providing necessary contact between water and the microbial community, litter, and sediment substrate,
- assuring that flows reach all parts of the wetland and detention times are adequate, and
- maintaining a healthy environment for vigorous growth of vegetation.

6.4.1 Operations and Maintenance Plan

O&M activities will be fully described in an O&M Plan written during the design phase of the wetland mitigation project. The plan will include a provision for periodic updates to reflect specific system characteristics learned and altered during operation and monitoring. The plan will provide a schedule for system inspection and monitoring and mitigation steps for any deficiencies encountered. The plan will specify those individuals responsible for performing and paying for maintenance. The plan will also address:

- a schedule for inspection, cleaning, and maintaining of inlet culverts and monitoring devices, if needed,
- a schedule for inspecting any embankments and structures for damage,
- criteria for revegetation during establishment and after unusual events,
- maintenance methods,
- provisions for erosion, drought, and flooding, and
- processes for adaptive management; considerations ,and responses to undesirable impacts of implementation.

6.4.1.1 Hydrology

Flows and water levels in the mitigation wetlands should be checked periodically to ensure that water is moving through all parts of the wetland, that buildup of debris has not blocked flow paths, and that stagnant areas have not developed. The importance of assuring adequate water depth and movement cannot be over-emphasized. Stagnant water increases the likelihood of mosquitoes and unsightly conditions. Any deviations from optimal performance noted during monitoring events should be corrected.

6.4.1.2 Vegetation

Vegetation should be inspected regularly and invasive species should be removed. Herbicides should not be used except in extreme circumstances, and then only with extreme care, since they can severely damage emergent vegetation and aquatic species health.

6.4.1.3 Structures

Water control structures should be inspected on a regular basis and immediately after any unusual flow event or after rapid ice break-up. These events can scour substrates and cause other damage to structures. Any damage, erosion, or blockage should be corrected as soon as possible to prevent catastrophic failure and expensive repairs.

6.4.1.4 Mosquitoes

Mosquitoes are common in natural wetlands and can be expected in constructed wetlands. The best approach to avoiding mosquito problems in constructed wetlands is to create conditions in the wetland that are not attractive to mosquitoes or are not conducive to larval development. Open, stagnant water creates excellent mosquito breeding habitat, and stagnant, high-nutrient water is ideal for larval development. Flowing water and a covered water surface minimize mosquito development. Control methods include unblocking flows to eliminate stagnant backwaters, shading the water surface (females avoid shaded water for egglaying), and dispersing floating mats of duckweed or other floating plants. Swallows and bats can eat thousands of adult mosquitoes every day, so providing swallow perches and bat boxes will reduce the number of mosquitoes. It may be possible to introduce mosquito-eating fish species to the aquatic bed wetlands. However, more research will be required to ensure that the chosen species are suited to this environment and are not likely to cause undesired impacts. Some control is provided by insects such as dragonflies, which prey on mosquito larvae.

The control of mosquitoes with insecticides, oils, and bacterial agents such as BTI (*Bacillus thuringiensis isroelensis*) is often difficult in constructed wetlands. The use of insecticides in constructed wetlands, which have large amounts of organic matter present, is ineffective because the insecticides adsorb onto the organic matter and are rapidly diluted or degraded by the water traveling through the wetland. Chemical treatment is poorly understood and runs the risk of contaminating both the wetland and the receiving waters. Before beginning any involved control procedures, every aspect of the wetland system and the surrounding area should be carefully inspected, perhaps with the aid of a good vector-control specialist. The inspection should include such minor components as old cans, discarded tires, un-drained depressions, hollow stumps, water control structures, open piping, and any other location where standing water can accumulate. Mosquito problems often originate from some small pocket of standing water rather than from the wetland as a whole.

6.5 Mitigation Timeline

A timeline must be included in the comprehensive mitigation plan showing the steps required to permit, design, and construct the mitigation wetlands. The timeline should also include monitoring through demonstration of efficacy of the project.

6.6 Cost Projections

Detailed task-specific cost projections must be developed for the life of the project and included in the comprehensive mitigation plan.

Section 7.0 Next Steps

This document represents an outline for the comprehensive mitigation plan required to initiate wetland mitigation at Page. Included here is a list of steps required to complete this process.

- Choose one or more mitigation locations and an overall mitigation strategy;
- Contact and establish relationships with all appropriate permitting agencies;
- Prepare final design drawings and specification of wetland site, grading, planting, and flow path to Coeur d'Alene Lake;
- Prepare M&E Plan and SAP/QAPP;
- Prepare O&M Plan;
- Complete cost projections;
- Prepare Public Outreach Plan;
- Collect baseline monitoring data for water quality, flow rates, and soil fertility and contamination;
- Research local soil sources;
- Prepare project timeline;
- Compile all steps into a Comprehensive Mitigation Plan.

Section 8.0 References

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Figure 1. Existing Site Conditions Map.

Figure 2. Wetland Mitigation Conceptual Design.