ENVIRONMENTAL INFORMATION DOCUMENT

FOR

HAYDEN AREA REGIONAL SEWER BOARD WASTEWATER TREATMENT SYSTEM

SUBMITTED TO THE HAYDEN AREA REGIONAL SEWER BOARD

DECEMBER 2012

REVISED APRIL 2013

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ENVIRONMENTAL INFORMATION DOCUMENT

HAYDEN AREA REGIONAL SEWER BOARD WASTEWATER TREATMENT SYSTEM

PROJECT NO. 41104

SUBMITTED TO THE:

HAYDEN AREA REGIONAL SEWER BOARD

PLANNING GRANT FUNDING PROVIDED BY
IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY
PROJECT NO. WWG-353-2012-9

PROFESSIONAL ENGINEER
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4/5/13
STATE OF IDAHO
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DECEMBER 2012
REVISED APRIL 2013

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Table of Contents

Appendix

A. Wastewater Treatment Facility Plan for the Hayden Area Regional Sewer Board
B. Joint Powers Agreement
C. Maps of the System
   - Existing System Overview
   - Selected Improvements Overview
   - APE/PPPA Map
D. Cost Information and Alternative Comparison Tables
   - Unit Process Cost Information
   - Alternative Cost Information
   - Financial Analysis (by FCS Group)
   - Alternative Comparison Tables
E. Physical Information
   - Topography Map
   - Geologic Information
   - Soils Information
F. Land Use Information
G. Floodplains and Wetlands Maps
H. Wild and Scenic River Information
I. Historic Locations Information
J. Endangered Species, Critical Habitat Information, and Essential Fish Habitat Information
K. Recreation and Open Spaces Map
L. Farmland Classification Information
M. Air Quality Map
N. Water Quality Information
O. Public Participation Information
   - October Legal Notice, Advertisement, and Article
   - Public Comment Form
   - November 1st Agenda, Presentation, Meeting Minutes, and Sign-In
   - November 1st Meeting Attendee Summary
P. Agency Consultation Correspondence
   - Example Agency Consultation Letter and Attachments
   - Agency Responses

COVER SHEET

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Project Cost and Funding

Estimated Construction Costs:

Secondary/Advanced Treatment	$ 30,867,800
Reuse Site	$ 4,480,000
Pipeline/Transmissions	$ 8,032,900
Total Estimated Construction Cost[1]	**$ 43,380,700**

1. Costs exclude Engineering, Administration, and Legal-Bond; refer to the Facility Plan in Appendix A for more information.

Proposed Project Costs/Funding[1]:

Proportionate Bonding by Each Entity[2]	$ 27,300,000
City of Hayden Portion	$ 16,808,610
Hayden Lake Recreational Water and Sewer District Portion	$ 7,177,170
Kootenai County Portion	$ 319,410
HARSB (pooled capacity) Portion	$ 2,994,810
Expansion Funded by New Users through Capitalization Fees	$ 26,050,000
Total Project Funding	**$ 53,350,000**

1. Funding shall include Engineering, Administration, and Legal-Bond; refer to the Facility Plan in Appendix A for more information.
2. Proportions based on 2012 purchased ER capacity

Current Funding[1]:

Proportionate Bonding by Each Entity	$ 16,564,220
City of Hayden Portion (IDEQ Loan)	$ 7,050,000
Hayden Lake Recreational Water and Sewer District Portion (IDEQ Loan[2])	$ 6,200,000
Kootenai County Portion	$ 319,410
HARSB (pooled capacity) Portion (using Existing Funds)	$ 2,994,810
Expansion Funded by New Users through Capitalization Fees (future funding)	N/A
Total Current Project Funding	**$ 16,564,220**

1. Funding shall include Engineering, Administration, and Legal-Bond; refer to the Facility Plan in Appendix A for more information.
2. Hayden Lake Recreational Water and Sewer District is also funding collection system improvements through the same IDEQ loan. The cost represented here is the amount appropriated to fund their share of the HARSB upgrades.

User Costs

Each HARSB member entity (City of Hayden, Hayden Lake Recreational Water and Sewer District, and Kootenai County) will fund their proportionate share of the needed regulatory and replacement/depreciation projects differently. Although, there will be a common funding approach through proportionate bonding based on equivalent residential flow increments (ERs). HARSB is a full financial partner in that its proportionate share funds any ERs that have not yet been purchased by the three entities. Each of the three entities (City of Hayden, Hayden Lake Recreational Water and Sewer District, and Kootenai County) may have vacant lots within their purchased capacity. The dormant connections (vacant lots not yet hooked up) may be assessed fees (debt service) for this upgrade (depending on the method of finance), but will not be charged with operation and maintenance charges (or the current monthly user charge) until which point they receive service (hook-up). The financial analysis (Appendix D) projects an annual average rate increase of 5.4 percent for the average HARSB customer to fully fund the improvements, including construction, operations, maintenance, and fully-funded depreciation reserves. Therefore, the following fees will be assessed (for this project):

Average User Costs

Current Average Monthly User Charge per ER[2,3]	$ 21.14
Average Change in Operation and Maintenance Monthly Charge per ER *per year*[4]	$ 1.00
Average Change in Debt Service Monthly Charge per ER *per year*[1,5]	$ 2.08
Future Average Monthly User Charge per ER	**$ 60.81**

1. Financing is separate for each of the three (technically four) entities
2. This is generally not the only cost borne by the ratepayers; fees for the individual collection systems are also charged to the ratepayer (but are not discussed here).
3. Cost per user assumes 10,061 ERs with purchased capacity (7,962 connected/active ERs) for 2012, projecting growth to 12,000 ERs with purchased capacity (11,384 connected/active ERs) for 2032. Costs each year are calculated based on that year's projected growth in capacity for each entity.
4. Increase applies to the first 19 years (refer to page 6 of Financial Analysis in Appendix D)
5. Increase applies to the first 10 years (refer to page 9 of Financial Analysis in Appendix D)

City of Hayden User Costs

Current Average Monthly User Charge per ER[2,3]	$ 26.00
Average Change in Operation and Maintenance Monthly Charge per ER *per year*[4,6]	$ 1.00
Average Change in Debt Service Monthly Charge per ER[1,5,7]	$ 15.80
Future Average Monthly User Charge per ER (2032)	**$ 60.80**

1. Financing will be accomplished through a revenue bond, with funding through an IDEQ loan.
2. The HARSB operation and maintenance fee is generally not the only cost borne by the ratepayers; fees for the individual collection systems are also charged to the ratepayer. The current user charge shown here is the ***total*** fee assessed to each connected ER.
3. Cost per user is based on current connected ERs with purchased capacity (refer to Note 4)
4. Cost per user assumes 5,943 ERs with purchased capacity and connected to the system (6,195 ERs with purchased capacity – connected and not connected) for 2012, projecting growth to 8,946 purchased/connected ERs (9,197 ERs with purchased capacity – connected and not connected) for 2032. Costs each year are calculated based on that year's projected growth in capacity for the City of Hayden.
5. Cost per user is based on current connected ERs with purchased capacity (refer to Note 4)
6. Increase applies to the first 19 years (refer to page 6 of Financial Analysis in Appendix D)
7. Assumes a financing scenario of 3% over 20 years to fund the entire project share.

Hayden Lake Recreational Water and Sewer District User Costs

Current Average Monthly User Charge per ER[2,3]	$ 44.00
Average Change in Operation and Maintenance Monthly Charge per ER *per year*[4,6]	$ 1.00
Average Change in Debt Service Monthly Charge per ER[1,5,7]	$ 15.20
Average Change in Debt Service Monthly Charge per ER[1,5,8] for Collection System	$ 9.00
Future Average Monthly User Charge per ER (2032)	**$ 87.20**

1. Financing will be accomplished through a Local Improvement District (LID), with funding through an IDEQ loan. The LID will be assessed annually, but it is shown here as a monthly equivalent for comparison purposes.
2. The HARSB operation and maintenance fee is generally not the only cost borne by the ratepayers; fees for the individual collection systems are also charged to the ratepayer. The current user charge shown here is the ***total*** fee assessed to each connected ER.
3. Cost per user is based on current connected ERs with purchased capacity (refer to Note 4)
4. Cost per user assumes 1,939 ERs with purchased capacity and connected to the system (2,645 ERs with purchased capacity – connected and not connected) for 2012, projecting growth to 2,339 purchased/connected ERs (2,645 ERs with purchased capacity – connected and not connected) for 2032. Costs each year are calculated based on that year's projected growth in capacity for the HLRWSD.
5. Cost per user is based on current ERs with purchased capacity (connected and not connected) (refer to Note 4)
6. Increase applies to the first 19 years (refer to page 6 of Financial Analysis in Appendix D)
7. Assumes a financing scenario of 3% over 20 years to fund the entire project share.
8. The District is planning to fund improvements to their collection system with a portion of their IDEQ loan. Currently, their loan application reflects approximately $700,000 for collection system improvements. However the District is requesting a potential increase to this amount ($4,200,000) to fund additional collection system improvements. The debt service amount for the $4,200,000 amount is reflected.

Kootenai County User Costs

Current Average Monthly User Charge per ER[1,2]	$ 25.00
Average Change in Operation and Maintenance Monthly Charge per ER *per year*[3,5]	$ 1.00
Average Change in Debt Service Monthly Charge per ER[4,6]	$ 22.40
Future Average Monthly User Charge per ER (2032)	**$ 66.40**

1. The HARSB operation and maintenance fee is generally not the only cost borne by the ratepayers; fees for the individual collection systems are also charged to the ratepayer. The current user charge shown here is the *total* fee assessed to each connected ER.
2. Cost per user is based on current connected ERs with purchased capacity (refer to Note 4)
3. Cost per user assumes 80 ERs with purchased capacity and connected to the system (118 ERs with purchased capacity – connected and not connected) for 2012, projecting growth to 100 purchased/connected ERs (138 ERs with purchased capacity – connected and not connected) for 2032. Costs each year are calculated based on that year's projected growth in capacity for Kootenai County.
4. Cost per user is based on current connected ERs with purchased capacity (refer to Note 4)
5. Increase applies to the first 19 years (refer to page 6 of Financial Analysis in Appendix D)
6. Assumes a financing scenario of 3% over 20 years to fund the entire project share.

Abstract

The November 2012 Wastewater Treatment Facility Plan for the Hayden Area Regional Sewer Board recommends several improvements to the existing wastewater treatment facility system to meet the pending National Pollutant Discharge Elimination System (NPDES) discharge limits for the Spokane River and Idaho Department of Environmental Quality (IDEQ) rules. The improvements are aimed at implementing treatment components and processes that will produce wastewater effluent to meet the pending discharge limits for the Spokane River. Additionally, the improvements will address replacement/depreciation needs for the existing facilities. This Environmental Information Document briefly addresses the expected environmental impacts of the proposed alternatives for the improvements. After receiving public input, the Board selected the improvement alternatives to be included in the proposed project. The environmental impacts associated with the proposed project are assessed in this document. After consultation with environmental agencies, mitigation measures were identified to address items of concern. Mitigation measures include the following:

- Best Management Practices (BMPs) shall be developed as part of the project design and implemented during construction. If portions of the project draining to a water of the United States total greater than 1 acre, those portions will fall under the Construction General Permit and a Stormwater Pollution Prevention Plan will need to be developed.
- A floodplain development permit will be required for construction activities in the mapped flood hazard area.
- If artifacts (cultural and historic remains) are discovered during the course of construction, all work will stop and the Coeur d'Alene Indian Tribe and SHPO will be contacted. Mitigation may be further evaluated.
- The Contractor must mitigate fugitive dust. No burning of construction debris or vegetation will be allowed. Additional requirements will be necessary for the standby power (generator) to minimize air quality impacts. Odor control for some individual treatment processes at the WWTP may also be required to contain, collect and transmit, and treat odors generated by the treatment processes.

1. BACKGROUND

1.1. SYSTEM BACKGROUND

The Hayden Area Regional Sewer Board (HARSB) is a regional facility that provides wastewater treatment service in Northern Idaho. It was formed through a 1986 Joint Powers Agreement (JPA) between the City of Hayden, the Hayden Lake Recreational Water and Sewer District (District), and Kootenai County. Each JPA member entity provides a designated elected representative to serve on the HARSB governing board.

HARSB individual entity sewer service areas include the Coeur d'Alene Airport, the City of Hayden, the City of Hayden Lake, and the western portions of the District near Hayden Lake. The HARSB Wastewater Treatment Plant (WWTP) is located in the City of Hayden on the west side of Atlas Road immediately south of the Coeur d'Alene Airport. HARSB currently pumps approximately 1.2 million gallons per day of recycled water from the treatment plant to the HARSB reuse site to irrigate fodder crops and hybrid poplar trees from June through September when Spokane River flows fall below 2,000 cubic feet per second (cfs). It pumps to the Spokane River at all other times. Current reuse and discharge permits are issued by the Idaho Department of Environmental Quality (IDEQ) and the U.S. Environmental Protection Agency (EPA), respectively. An overview of the existing system can be found in Appendix C.

The existing HARSB WWTP is an extended aeration activated sludge process that provides secondary treatment. The major components of the treatment facility are listed below:

- Preliminary Treatment
- Aeration Basins
- Secondary Clarifiers
- Effluent Flow Measurement
- Effluent Disinfection
- Sludge Handling
- Liquid Sludge Holding
- Sludge Dewatering

Wastewater lift stations and sanitary sewer collection systems are owned and maintained by individual HARSB members. HARSB owns and maintains the common force mains that bring influent flow to the WWTP. The cost of maintaining and upgrading the common force mains, treatment and reuse system is shared proportionally by HARSB members based on Equivalent Residences (ER[1]s) served within each entity's boundaries. Staff employed by HARSB also assist in maintaining the individual entities' sewer lines and pumping stations (when requested), and charge those entities for the time and materials required. Raw wastewater collection and pumping systems are not owned or operated by HARSB and, therefore, are not covered under this document.

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[1] The term "equivalent residence" or ER will be used throughout this document as the common denominator for projecting future sewer flows or comparing flows on an equal basis. An ER is 200 gallons per day, or approximately equivalent to the amount of wastewater produced by the average single-family detached housing unit within a sewer system.

1.2. Facility Plan Information

HARSB authorized J-U-B Engineers, Inc. to prepare a WWTP Facility Plan for the HARSB wastewater treatment facility located in Kootenai County, Idaho. The purpose of the report was to update the master planning efforts and financial analysis to align with pending discharge permits (see Section 1.2.1 below). This Facility Plan provides HARSB with the guidance necessary for making improvements to its WWTP over the next 20 years. It also provides preliminary planning for expansion beyond the 20-year evaluation period. The plan identifies immediate needs as well as long-term upgrades required for the facility. The plan presents development of costs, implementation strategies, and financial planning to budget and pay for necessary upgrades.

The primary reasoning for the facility planning effort is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (see Section 1.2.1 below). These permit limitations are driven by a concern for diminished dissolved oxygen and fish tissue concentrations of toxic compounds. Thus, the facility plan evaluates current and future compliance with the discharge requirements and with Idaho Department of Environmental Quality (IDEQ) rules (which have been developed to protect public health and safety and water quality). The system currently meets the NPDES permit requirements for the existing permit.

Since the primary reason for the facility planning effort is to meet new requirements for discharge into the Spokane River (see Section 1.2.1 below), identifying existing deficiencies with respect to IDEQ requirements identified in the IDAPA (Idaho Administrative Procedures Act) rules[2] within the existing system was not a high priority but was still completed. Each treatment process was discussed along with “operational issues” identified. Operational issues were identified for:

- Preliminary Treatment
- Aeration Basin Division Box
- Secondary Clarifier Division Box
- Effluent Flow Measurement
- Disinfection Process
- Utility Water Supply
- Reclaimed Water Recycle and Reuse

Refer to the Facility Plan (Appendix A) for further information regarding the operational issues identified for the system.

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[2] IDAPA 58.01.02 Water Quality Standards, IDAPA 58.01.16 Wastewater Rules, IDAPA 58.01.08 Idaho Rules for Public Drinking Water Systems, IDAPA 58.01.11 Groundwater Quality Rules, and IDAPA 58.01.17 Rules for Recycling and Reuse of Municipal and Industrial Wastewater

1.2.1. *Water Quality Discussion*

1.2.1.1. *Surface Waters*

The Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) was prepared by the Washington Department of Ecology (WDOE) and approved by the EPA in July 2010. The TMDL was developed to address water quality concerns in Lake Spokane (Long Lake), the upstream impoundment above the Long Lake Dam. The TMDL restricts discharge of oxygen-demanding substances, including ammonia-nitrogen, total phosphorus, and five-day carbonaceous biochemical oxygen demand ($CBOD_5$) to among the lowest levels in the United States. Since Idaho permits issued by EPA cannot cause the violation of a downstream water quality standard, EPA plans to issue revised NPDES Permits in 2012 consistent with those issued by WDOE in 2010 and 2011. The anticipated permit for HARSB will equate to concentration limits of 3.8 mg/L (parts per million) for ammonia, 0.05 mg/L phosphorus (50 parts per billion), and 3.8 mg/L $CBOD_5$ at 3.2 million gallons per day (mgd) of flow. It will also likely include a Compliance Schedule of up to 10 years to fully meet the new requirements. No Compliance Schedule will be allowed for June through September, when discharge was not allowed under the existing permit or for conditions that HARSB's existing treatment plant can comply immediately (ammonia).

In addition to the DO TMDL, WDOE is also requiring Washington dischargers to participate in a Regional Toxics Task Force (RTTF) with the express purpose of reducing polychlorinated biphenyl's (PCBs) in the Spokane River. Fish tissue concentrations in the Spokane River and Lake Spokane led to action on toxics, including a proposed PCB TMDL in Washington in 2006, a TMDL for cadmium, lead and zinc in 1998, as well as concerns over dioxin and a "PCB-like" flame retardant molecule called polybrominated diphenylether (PBDE). Under the proposed draft NPDES Permit for HARSB, EPA does not require participation in the RTTF. However, the Idaho Water Quality Standard for PCB was more stringent than the Washington standard until May 2012 when EPA rejected Idaho's daily fish consumption[3] value. EPA stated that Idaho's recommended national standard of 17.5 g/day of fish consumption may be inadequate based on fish consumption studies completed in Oregon (175 g/day), by the Spokane Tribe of Indians, and underway in Washington. Idaho has responded to EPA by currently pursuing rulemaking that may include Idaho-specific fish consumption rates. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent for PCB and dioxin plus sample river water for PCBs to determine "if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians."

Heavy metals also tend to accumulate in fish tissues and create concern for human health. Idaho's "TMDL for Dissolved Cadmium, Lead, and Zinc in the Surface Waters of the Lake Coeur d'Alene Basin" was ruled void on procedural grounds by the Idaho Supreme Court in 2003 and has not been revisited. Since Idaho has the Spokane

[3] Fish consumption essentially sets limits for 187 Water Quality Standards and 88 toxic compounds in Idaho, including PCBs, dioxins, and metals.

River listed as a high priority water body, IDEQ contends that existing permit holders are limited to the mass loadings currently allowed in approved permits until a TMDL is approved. Therefore, river discharge limitations for metals will be influenced by both the proposed TMDL and the fish consumption standards being considered in 2012 and beyond.

1.2.1.2. GROUND WATERS

The reuse site used by the HARSB WWTP for several months of the year overlies the Spokane Valley-Rathdrum Prairie Aquifer (SVRPA), which has been designated as a “Sensitive Resource Aquifer” in Idaho. It is also classified as a “Sole Source Aquifer” by the EPA. As such, there are several special provisions that impact reuse practices over this resource. Reuse activities over the SVRPA are likely to increase over time due to population growth and tightened restrictions on discharge to the Spokane River. Stringent regulations designed to protect the high quality of the SVRPA also mean that reuse water quality, monitoring, and management practices will be held to a higher standard than in other areas of the State. Since HARSB currently operates the largest reuse facility over the SVRPA, proposed improvements should also protect or enhance the aquifer.

1.3. PURPOSE AND NEED

The purpose of the proposed project is to meet the increasingly stringent NPDES discharge limits in the Spokane River while also replacing depreciated components of the WWTP (which have been identified as deficiencies with respect to Idaho Rules[4]). The discharge limits and Idaho Rules are in place to protect public health and safety and water quality. Several upgrades and repairs for the WWTP, with respect to NPDES discharge limits and Idaho Rules, were identified for the system components, such as preliminary treatment and equalization, secondary treatment, tertiary treatment, disinfection, outfall/pipelines, biosolids, reclaimed water recycle and reuse, and administration and ancillary support systems (refer to Section 1.2 above). Thus the project addresses the public health and safety and water quality issues identified with respect to NPDES discharge limits and Idaho Rules (which protect water quality in surface and ground water in the surrounding area and describe parameters for providing proper wastewater treatment to users). Specifically, the projects will address treatment requirements, reuse site needs, and outfall/pipeline capacity/condition to meet pending permit requirements and Idaho Rules. The improvements (described further in Section 2) include a variety of options that include modification to the existing treatment and reuse facilities and outfall/pipeline construction/replacement.

[4] IDAPA 58.01.02 Water Quality Standards, IDAPA 58.01.16 Wastewater Rules, IDAPA 58.01.08 Idaho Rules for Public Drinking Water Systems, IDAPA 58.01.11 Groundwater Quality Rules, and IDAPA 58.01.17 Rules for Recycling and Reuse of Municipal and Industrial Wastewater

2. PROPOSED ALTERNATIVES

Each "unit process" within the WWTP was analyzed and improvements were identified to meet the Spokane River discharge requirements as well as replace depreciated components. Thus, each unit process has several alternatives to address the requirements and replacement needs. These unit process alternatives were then compiled into larger alternatives that were presented to HARSB. Detailed descriptions of the proposed alternatives and the unit processes can be found in the Facility Plan (Appendix A) and have been summarized here. Detailed cost estimates for these alternatives can be found in Appendix D.

2.1. UNIT PROCESS IMPROVEMENTS

2.1.1. PRELIMINARY TREATMENT AND EQUALIZATION IMPROVEMENTS

2.1.1.1. HEADWORKS IMPROVEMENTS

The headworks improvements consist, primarily, of improvements to the influent screening, grit removal, and flow measurement. The headworks will need to be relocated due to the fact that expansion or upgrading the existing headworks in its current location is not practical. The equipment on the headworks should be sized for the proposed 2.4 mgd average daily flow (ADF)[5], but the structure, piping, channels, etc. should be designed for the expanded future flow of 4.8 mgd ADF.

Influent Screening: Two mechanical screens with screenings washer compactors[6] are recommended for the new influent screening. One of the existing screens is reaching the end of its useful life and should be replaced. Thus, one new screen and washer compactor should be installed (and designed for 2.4 mgd ADF). It may be possible to recondition and reuse the other current screen in the new headworks.

Bypass Capability: The new headworks should also have the capability to bypass the screening and grit removal. This could be achieved through a parallel channel.

Grit Removal: There are several grit removal facilities that are commonly used. Due to the downstream biological phosphorus removal processes proposed to occur at the treatment facility, a vortex grit chamber[7] would be applicable to this system.

Flow Measurement: Influent flow measurement will be required to operate flow equalization (see Section 2.1.1.2 below). A Parshall flume is the preferred method of flow measurement because it is self-cleaning and provides a visual backup and check of the flow rate; however, it can (if designed with a free-flowing tail water) significantly aerate the water, release odors, and potentially have a negative impact on the

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[5] 2.4 mgd is the average daily flow projected for 2031 (20 year projection), refer to TM No. 3 in the Facility Plan (Appendix A) for more information and Section 4.4 of this document.

[6] Washer compactors can be used in conjunction with the screen to better remove organics from the screenings and to reduce vector attraction and odors.

[7] This type of grit removal has been successful at the Post Falls Water Reclamation Facility (WRF) with their biological phosphorus removal process

downstream biological phosphorus removal process. A magnetic flow meter in the influent pipeline is an alternative to the Parshall flume.

Other Recommendations: Odor control (combination of biofilter and Vapex[8]), corrosion resistance (coating and appropriate construction materials to prevent severe damage from corrosion), and a vactor truck dump station (to isolate inert solids and potentially remove grease prior to entering headworks) are also recommended improvements for the headworks system.

The anticipated cost of new headworks is approximately $2,770,000 with no additional O&M (operation and maintenance) costs[9].

The anticipated long-term environmental impacts associated with the new headworks consist primarily of air quality (odor generation); the new facilities will require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating them on-site. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet preliminary treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.1.2. FLOW EQUALIZATION IMPROVEMENTS

The primary objective of flow equalization for municipal wastewater plants is simply to dampen the diurnal flow variation, which then achieves a constant or nearly constant flow rate through the downstream treatment processes and subsequently lower peak hydraulic design flow rates. Additionally, this also dampens the mass flow of wastewater constituents (i.e. BOD, TSS, etc.) by blending the wastewater in the equalization basin. This then results in a more uniform loading of the treatment processes (which is needed in a biological removal process).

Flow equalization can be operated as an in-line or an off-line process. An in-line process is recommended for HARSB because it provides a better equalization of wastewater constituents despite requiring more pumping. Equalization should also occur after screening and grit removal to minimize maintenance of the basin. The basin should be covered to reduce odors, but internal components should be corrosion resistant due to the highly corrosive conditions that will exist within the covered basin. The basin should contain more than one cell for redundancy; a pump station will also be needed to pump flow out of the basin, which should also include two pumps for

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[8] Vapex generates a water mist with a hydroxyl radical to chemically destroy the odorous compounds at the headworks.

[9] New facilities are not expected to have higher proportional O&M costs. Costs are expected to escalate in proportion to plant flow.

redundancy. Other design constraints can be found in Section 5.2 and 5.3 of the Facility Plan.

The anticipated cost of a new flow equalization basin is approximately $3,640,000 with an additional O&M cost of $586,000 (20-year present worth).

The anticipated long-term environmental impacts associated with the new headworks consist primarily of air quality (odor generation) and energy. The new facilities will require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating them on-site. Additionally, the equalization basin will require additional energy (power) to maintain mixing in the basin. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet primary treatment needs, reduced sizing for downstream components, and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.1.3. No Action

As stated previously, the WWTP will need to be improved to meet the requirements of the Spokane River discharge requirements. In order to meet these discharge requirements, upgrades to the preliminary treatment processes are needed. Without these improvements, the facility will not be able to meet the discharge requirements. Additionally, there are components of the existing facility that have depreciated and need to be replaced. Thus, this is not a viable option for HARSB.

Environmentally, this option would lead to impacts to water quality and public health as it would not allow the WWTP to meet the discharge requirements of the Spokane River. If these requirements are not met, HARSB could face significant fines, which would in turn impact the socioeconomic profile by imposing fines on the HARSB constituents.

2.1.1.4. Recommendation

Based on the review of the proposed improvements, comparison to other plant improvements and the overall costs, it is recommended that the new headworks, and equalization basin be constructed to meet the anticipated needs of the 20-year flow and loading projections.

2.1.2. Secondary Treatment Improvements

2.1.2.1. Aeration Basin Improvements

There are three existing aeration basins which are currently configured as oxidation ditches. The process can nitrify an estimated 2.4 mgd ADF, but the aerators for the three ditches only provide for 2.0 mgd ADF. The aerators in Ditch 1 and 2 must be upgraded in order to meet this capacity requirement. The aeration capacity can be upgraded in several ways:

Option 1: A total of four new aerators would be purchased. The existing aerators at Ditch 1 and 2 would be upgraded to match the capacity of Ditch 3. Additionally, one aerator would be added to each ditch. This would result in three identical ditches (they are not currently identical in aeration capacity). Installation of this configuration would result in a minimum downtime for the ditches.

Option 2: Another approach is to add aeration capacity to the existing Ditch 1 and 2 by constructing a concrete deck at the third return point of the ditches. The ditches would be down for approximately 4 to 6 weeks for the construction of the concrete decks (which is a longer downtime than in Option 1).

The anticipated cost of Option 1 for the Aeration Basin improvements is approximately $1,160,000 with no additional O&M costs[10]. The anticipated cost of Option 2 for the Aeration Basin improvements is approximately $1,280,000 with no additional O&M costs.

Generally, there are no anticipated long-term environmental impacts associated with these improvements. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise, depending on alternative selected), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities for secondary treatment and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.2.2. Biological Phosphorus and Nitrogen Removal Improvements

Biological phosphorus reduction (BPR) is one of the most economical methods of phosphorus reduction. It will be employed to remove the first 80 to 95 percent of the phosphorus. BPR is achieved by growing microorganisms that are capable of accumulating and storing excess amounts of phosphorus. The growth of phosphorus-accumulating organisms (PAOs) is stimulated by subjecting the activated sludge to a cycle of anaerobic and aerobic conditions. Phosphorus is then removed by wasting excess activated sludge.

The efficiency of BPR is highly dependent on the characteristics of the wastewater and maintaining true anaerobic conditions in the anaerobic zone[11]. Flow equalization will help stabilize the process by minimizing fluctuations in flow and

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[10] Included with escalated costs for existing facility

[11] Anaerobic conditions are maintained by keeping all dissolved oxygen and nitrate out of the anaerobic zone. Dissolved oxygen can be controlled by design and operations. Nitrate must be removed by adding a denitrification step in the treatment process. Denitrification is stimulated by subjecting the activated sludge to anoxic conditions (i.e. nitrate present but no dissolved oxygen). If there is no dissolved oxygen present, the activated sludge will utilize the nitrate as a substitute and thereby remove it from the wastewater.

loadings. The BPR process also requires good sludge management[12] to prevent the phosphorus retained by the sludge from being released. A treatment system that contains the biological phosphorus removal, nitrification, and denitrification is referred to as biological nutrient removal or reduction process (BNR), meaning the process is designed to remove or reduce phosphorus and nitrogen.

Both anaerobic and anoxic tanks are proposed to achieve the BNR process at the WWTP. The tanks will be appropriately sized to achieve optimum treatment (and meet 2.4 mgd ADF) and will meet the required mixing without entraining air. Variable speed drives are recommended for optimization of the tanks and energy usage. Chemical co-precipitation[13] is also recommended, to act as a backup if the BPR process was upset or if it were to drop in efficiency, or as a replacement alternative to the BNR process.

The anticipated cost of the BNR improvements are approximately $3,770,000 with an additional O&M cost of $623,000 (20-year present worth).

The anticipated long-term environmental impacts associated with the new BNR treatment process consists primarily of air quality (odor generation) and energy. The influent anaerobic basins will potentially require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating them on-site[14]. Additionally, the BNR process will require additional energy (power) to maintain mixing in the basin. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet tertiary treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.2.3. Secondary Clarifiers and Sludge Pumping Improvements

The WWTP currently has four secondary clarifiers with a total capacity of 1.9 mgd ADF with the largest unit out of service. One additional 60-foot-diameter clarifier is required to provide the design capacity of 2.4 mgd ADF. Additional design criteria are provided in Section 6.3 of the Facility Plan (Appendix A).

The anticipated cost of the additional secondary clarifier is approximately $1,320,000 with no additional O&M costs[15].

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[12] The sludge should be kept aerobic at all times and should be dewatered as soon as possible.

[13] Chemical co-precipitation is the addition of a coagulant (alum or ferric chloride) to the oxidation ditch effluent and the co-precipitation of insoluble phosphate and biological sludge in the secondary clarifiers.

[14] Site plan alternatives will be discussed in later sections, but it is possible that odor control systems for headworks and equalization improvements may be able to be combined to help reduce costs.

[15] Included with escalated costs for existing facility

Generally, there are no anticipated long-term environmental impacts associated with these improvements. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet tertiary treatment needs), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.2.4. NO ACTION

As stated previously, the WWTP will need to be improved to meet the requirements of the Spokane River discharge requirements. In order to meet these discharge requirements, upgrades to provide a BNR process will need to be constructed. Without these improvements, the facility will not be able to meet the discharge requirements. Additionally, upgrades to the oxidation ditches and secondary clarifiers are required to meet the design flow of 2.4 mgd ADF. Thus, this is not a viable option for HARSB.

Environmentally, this option would lead to impacts to water quality and public health as it would not allow the WWTP to meet the discharge requirements of the Spokane River. If these requirements are not met, HARSB could face significant fines, which would in turn impact the socioeconomic profile by imposing fines on the HARSB constituents.

2.1.2.5. RECOMMENDATION

Based on the review of the proposed improvements, comparison to other plant improvements, and the overall costs, it is recommended that prior to the addition of tertiary treatment facilities, new BNR facilities should be added, including anaerobic and anoxic tanks. This recommendation is supported by the analysis that the alternative option of using increased chemicals for precipitation of phosphorus will require additional solids handling and pH/alkalinity adjustment. A more undefined concern for this alternate option is the potential for micro constituents being present in the chemical coagulants. Lastly, reliance on chemicals (a commodity item) is a less predictable cost due to price volatility. As capacity is required due to growth, aeration improvements and an additional clarifier should be constructed to meet the anticipated needs of the 20-year flow and loading projections.

2.1.3. TERTIARY TREATMENT IMPROVEMENTS

These improvements are the options considered to meet the waste load allocations (WLAs) of the NPDES permit. The primary objective of the tertiary treatment is to remove phosphorus to the concentrations necessary to meet the WLA of the pending permit. In order to develop alternatives that can feasibly meet the discharge limits, the Facility Plan reviewed data available from current operating facilities and recent pilot work (refer to Section 7.3 in the Facility Plan, Appendix A). The targeted treatment process will likely include a chemical coagulation and settling step followed by filtration to remove remaining precipitated solids.

2.1.3.1. Chemical Coagulation and Settling for Enhanced Phosphorus Removal

Pilot tests from other facilities[16] indicate that two chemical precipitation steps in series are required to achieve optimum phosphorus reduction and reduce chemical use and sludge production as much as feasible. Coagulation and sedimentation will be the first step. Membrane filtration systems are capable of meeting the requirements in a single-step configuration and will not require the sedimentation step. Filtration will occur after secondary treatment with BNR. All of the following technologies will require a chemical feed and storage facility for the coagulant and/or polymer.

Coagulation and Tertiary Clarification: A tertiary clarifier is similar to a conventional secondary clarifier, but conventional secondary clarifiers do not have provisions for injecting and mixing coagulants or polymers; therefore a separate injection and mixing box must be provided, and a tank or zone to allow the chemical floc to form is also required. This option would cost approximately $4,470,000 with an additional O&M cost of $868,000 (20-year present worth).

Coagulation-Sedimentation Package Plant (Corix Coagulation and Sedimentation Package Plant: The Corix Water Systems is one of the many manufacturers that make prepackaged coagulation-sedimentation plants. This type of technology is well proven in drinking water treatment for treating surface waters with high and variable contaminant loadings, turbidity, iron, and manganese. A coagulant is added to the raw water to precipitate dissolved contaminants and encourage suspended particles to group together in the form of “floccs”. Gentle agitation encourages the floccs to grow and then they are removed by settling. Accumulated solids are periodically removed by automatically-controlled water or air/water backwashing. This option would cost approximately $6,390,000 with an additional O&M cost of $1,152,000 (20-year present worth).

Ballasted Sedimentation Package Plant (Kruger Ballasted Sedimentation Package Plant: Ballasted sedimentation uses a foreign particle such as sand or magnetite as a seed for floc formation and to promote rapid sedimentation. The process uses microsand ballast as the seed for floc formation. The treated water and ballasted floc are separated with the aid of a lamella settler. The floc sludge is pumped out and the sludge and microsand are separated. The microsand returns to the process while the sludge is discharged. This option would cost approximately $5,210,000 with an additional O&M cost of $1,314,000 (20-year present worth).

The anticipated long-term environmental impacts associated with the new tertiary chemical coagulation and settling process consists primarily of energy impacts.

[16] It should be noted that ongoing information related to ultra-low phosphorus removal is continuing at many of the Spokane River dischargers. Thus, the presented technologies are not the only available technologies, but rather these technologies were evaluated to determine probable range of costs for coagulation-sedimentation/filtration treatment. Final selection of the technology to be used should be based on onsite pilot and more refined information developed during preliminary design. More information on the existing pilot test information on these technologies can be found in Section 7.3.2.1 in the Facility Plan (Appendix A).

The tertiary process will require significant additional energy (power) as well as imported chemicals for coagulations and pH/alkalinity adjustment to be added. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (minor excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and minor excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet discharge requirements), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.3.2. TERTIARY-FILTRATION FOR ENHANCED PHOSPHORUS REMOVAL

Filtration is the final process needed to achieve ultralow effluent phosphorus concentrations. Pilot tests from other facilities[17] have shown that the following technologies may be appropriate for HARSB.

Membrane Filtration (GE Tertiary Ultrafiltration Membrane System): This type of system consists of hollow plastic fiber strands with microscopic pores. Clean water is pulled into the membrane fibers. Alum or ferric chloride is used to precipitate phosphorus. This option would cost approximately $11,080,000 with an additional O&M cost of $2,924,000 (20-year present worth).

Continuous Backwash Upflow Filter (CBUF) (BluePRO Reactive Filtration Series System: This type of system utilizes continuous backwash up-flow filters operated in series operation. The wastewater is distributed to the bottom of the filter and flows upward through the sand bed. The sand bed moves downward as trapped sediments and sand are pulled from the bottom of an air lift pump and scoured clean. The clean sand is deposited on top of the sand bed. The residuals are carried away in a reject flow stream. The BluePRO system uses ferric chloride to coat the media granules, and a precipitation/adsorption process removes the phosphorus from the liquid. This option would cost approximately $13,300,000 with an additional O&M cost of $1,747,000 (20-year present worth).

Dual Media Conventional Downflow Filtration: These units come as a pre-packaged system that includes an influent flocculation bay, skid-mounted pumping systems, and dual media filtration filter tanks. Filtered product water storage will be required such that it can be used for backwashing the filters. This option would cost approximately $9,060,000 with an additional O&M cost of $1,533,000 (20-year present worth).

The anticipated long-term environmental impacts associated with the new tertiary filtration process consist primarily of energy impacts. The tertiary process will

[17] It should be noted that ongoing information related to ultra-low phosphorus removal is continuing at many of the Spokane River dischargers. Thus, the presented technologies are not the only available technologies, but rather these technologies were evaluated to determine probable range of costs for coagulation-sedimentation treatment. Final selection of the technology to be used should be based on onsite pilot and more refined information developed during preliminary design. More information on the existing pilot test information on these technologies can be found in Section 7.3.2.2 in the Facility Plan (Appendix A).

require significant additional energy (power) as well as imported chemicals for coagulations and pH/alkalinity adjustment to be added. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (minor excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and minor excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet discharge requirements), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.3.3. *CONFIGURATIONS*

Several configurations for the tertiary treatment process were developed and are shown in Table 2-1.

Table 2-1: Tertiary Treatment Configurations

	Configuration 1	Configuration 2	Configuration 3
Coagulation/Settling Alternatives			
Coagulation and Tertiary Clarification	$4.5 M to $6.4 M	-	-
Corix Water Systems, Coagulation-Sedimentation Package Plant			
Kruger, Actiflo Coagulation and Ballasted Sedimentation Package Plant			
Filtration Alternatives			
Membrane Filtration	-	-	$11.1 M
Dual Pass CBUF	-	$13.3 M	-
Dual Media Downflow	$9.0 M	-	-
Range of Capital Costs	$13.5 M to 15.45 M	$13.3 M	$11.1 M
Range of Annual O&M Costs	$318,000 to $374,000	$285,000	$305,000

2.1.3.4. *ADDITIONAL CONTAMINANTS*

Two additional contaminants have been identified that may become an effluent limit requirement in the future: “emerging contaminants of concern” and metals and toxics. These have been discussed in detail in Section 7.4 and Section 7.5 of the Facility Plan but have been briefly summarized here.

Emerging contaminates of concern is a general term used for chemicals and microorganisms that have only recently been identified or come under consideration for regulation. Subgroups such as endocrine disrupting compounds (EDCs) and pharmaceutically active compounds (PhACs) are often aggregated with human commercial products in a grouping called pharmaceuticals and personal care products (PPCPs). Polychlorinated Byphenyls (PCBs) are a carcinogen that is of concern as well. The already proposed treatment process to meet the NPDES permit requirements will potentially reduce the concentrations of some emerging contaminants. To reduce *all* contaminants may require additional advanced oxidation processes or granular activated carbon adsorption. All of the treatment processes required to completely oxidize or remove the contaminants are energy intensive.

Metals and toxics are already of concern specifically in the Spokane River, as it is listed as impaired for cadmium, lead, and zinc under Subsection 303(d) of the Clean Water Act, with a high priority for improvement activities. Current draft NPDES permit discussions with IDEQ and EPA indicate they will likely require an effluent wasteload concentration and mass limit for cadmium, lead, and zinc. If a water-quality-based concentration standard is not developed through a TMDL (see Section 7.5 of the Facility Plan in Appendix A for more information), an additional "quaternary" treatment process may be required. Additionally, the ability to remove metals in conjunction with simultaneous removal of phosphorus will compete[18] and will require significant pilot testing to achieve. Continued negotiation and cooperation with IDEQ to address these issues may not result in the expensive quaternary process (which appears to provide no demonstrable benefit to water quality or the environment).

2.1.3.5. No Action

As stated previously, the WWTP will need to be improved to meet the requirements of the Spokane River discharge requirements. If these improvements are not made, oxygen-demanding pollutants will continue to degrade the downstream portions of the Spokane River and will not meet the requirements for the NPDES permit. Thus, this is not a viable option for HARSB.

Environmentally, this option would lead to impacts to water quality and public health as it would not allow the WWTP to meet the discharge requirements of the Spokane River. If these requirements are not met, HARSB could face significant fines, which would in turn impact the socioeconomic profile by imposing fines on the HARSB constituents.

2.1.3.6. Recommendation

The Facility Plan recommends the following Phosphorus Management Plan:

1. Include budgeting for tertiary phosphorus removal.
2. Include piloting of tertiary membrane coagulation/settling filtration in the HARSB Phosphorus Management Plan. Budgeting should be based on soliciting proposals from suitable manufacturers for piloting and, ideally, conducted in conjunction with the City of Post Falls (as they are currently operating a similar process at their WRF). HARSB should budget approximately $750,000 to $1,250,000 for piloting two to three treatment technologies.

[18] Phosphorus removal requires a much lower optimal pH for coagulation and settling or filtration as compared to that required for removal of metals.

2.1.4. *Disinfection Improvements*

The existing chlorination/dechlorination system[19] is approaching the limits set by the International Fire Code for chlorine gas systems. With changing treatment processes, the disinfection system must also meet Class A Reuse[20] disinfection (if Class A is to be pursued). There are several alternatives that are available to meet these requirements, which are discussed below.

Chlorine Gas: The existing building does not have the space or the unloading and handling facilities that are needed for the recommended one-ton containers. It could be expanded easily, but a new building would be required. When discharging to the river, the existing chlorine contact tank can provide the minimum recommended contact time, but there is no ability for it to be taken off line. Thus, redundancy has been budgeted in the cost for this option. This option would cost approximately $1,730,000 with an additional O&M cost of $786,000 (20-year present worth).

Sodium Hypochlorite – Bulk Storage: Sodium hypochlorite is a liquid form of chlorine. It can be purchased in bulk quantities, stored on site, and metered into the effluent for disinfection. Chlorine contact time and dechlorination are required just the same as for chlorine gas. Similar to the gaseous form of chlorine, redundancy has been budgeted into the cost for this option. The main elements of a bulk chemical storage and feed system are the storage tanks, metering pumps, chlorine residual monitoring instruments, and controls. This option would cost approximately $1,850,000 with an additional O&M cost of $3,748,000 (20-year present worth).

Sodium Hypochlorite – Onsite Generation: The sodium hypochlorite can be generated onsite from a brine solution. An onsite generation facility will require all of the equipment needed by the bulk storage facility in addition to the hypochlorite generators. The benefit of onsite generation is independence from vendor deliveries. This option would cost approximately $2,730,000 with an additional O&M cost of $1,503,000 (20-year present worth).

Dechlorination: Dechlorination is required when discharging to the Spokane River whether using gas or liquid forms of chlorine. Like chlorine, de-chlorinating chemicals can be obtained in gaseous or liquid forms. The gas used for dechlorination is sulfur dioxide. Sulfur dioxide feed systems are similar to chlorine feed systems. Sulfur dioxide is intensely irritating to the respiratory tract, eyes, and mucous membranes and thus has special containment requirements. The liquid used for dechlorination, commonly, is sodium bisulfite. It can be fed in a similar fashion to sodium hypochlorite or other liquid chemical solutions. Gas dechlorination would cost approximately $340,000 with an additional O&M cost of $479,000 (20-year present

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[19] Historically, chlorine gas has been the dominant disinfectant used by the wastewater treatment industry. Recently, the trend has been away from the use of chlorine gas to liquid hypochlorite orphan and other disinfection technologies due to several reasons such as moving away from hazardous chemicals for safety concerns, storage and containment requirements, and others (refer to Section 8.1 of the Facility Plan, Appendix A).

[20] Class A Reuse is the highest quality of treated effluent to be used for land application, followed by Class B, C, and D. The facility currently produces Class C effluent.

worth). Liquid dechlorination would cost approximately $370,000 with an additional O&M cost of $339,000 (20-year present worth).

Ultraviolet Light: There are many advantages and disadvantages to utilizing UV systems, such as that it does not involve transport, storage, handling or use of dangerous chemicals but does require increased standby power (refer to Section 8.1.5 in the Facility Plan, Appendix A, for more information). UV disinfection systems are typically installed in open channels in wastewater treatment applications, but if the UV system is following filtration, pressurized enclosed vessels are also being used. In this case, the pressurized enclosed vessel with a low-pressure-high output system is used for estimating purposes. UV Light disinfection would cost approximately $2,510,000 with an additional O&M cost of $847,000 (20-year present worth).

Ozonation: Ozone (O_3) is a powerful disinfecting agent and chemical oxidant in both inorganic and organic reactions. Due to the instability of ozone, it must be generated onsite from air or oxygen carrier gas. The components of an ozone disinfection system include feed-gas preparation, ozone generation, ozone contacting, and ozone destruction. There are many advantages and disadvantages of ozonation such as that it is more effective than chlorine in destroying viruses and bacteria, but it is very reactive and corrosive, thus requiring corrosion-resistant material such as stainless steel (refer to Section 8.1.6 in the Facility Plan, Appendix A, for more information). Ozonation would cost approximately $4,660,000 with an additional O&M cost of $1,226,400 (20-year present worth).

The anticipated long-term environmental impacts associated with the new disinfection process consist primarily of energy impacts, water quality, and public health. The disinfection process (if a non-chemical option is selected) will require significant additional energy (power). If a chemical option is selected, the chemical feeds produce byproduct materials that, although currently unregulated, are becoming an increased concern in receiving water quality. Lastly, chemical options pose an increased risk to operators and adjacent properties in the event of a chemical leak (public health). The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet discharge requirements), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.4.1. Configurations

Several configurations for the disinfection process were developed and are shown in Table 2-2. Ozone was ruled out due to its high cost.

Table 2-2: Disinfection Configurations

	Configuration 1 (Chlorination with SO_2 Gas Dechlor)	Configuration 2 (Chlorination with Liquid Sodium Bisulfite Dechlor)	Configuration 3 (UV Light)
Chlorine Disinfection Alternatives			
Chlorine Gas	$3,225,000	$3,335,000	-
Bulk Sodium Hypochlorite	$6,307,000	$6,417,000	-
On-Site Sodium Hypochlorite	$4,942,000	$5,052,000	-
UV Light	-	-	$3,357,000

1. Configuration costs shown are Capital plus O&M for 20-year net present worth.

2.1.4.2. *No Action*

As stated previously, the WWTP will need to be improved to meet the requirements of the Spokane River discharge requirements. In order to meet these discharge requirements, upgrades to the disinfection system will need to be constructed. Without these improvements, the facility will not be able to meet the discharge requirements. Thus, this is not a viable option for HARSB.

Environmentally, this option would lead to impacts to water quality and public health as it would not allow the WWTP to meet the discharge requirements of the Spokane River. If these requirements are not met, HARSB could face significant fines, which would in turn impact the socioeconomic profile by imposing fines on the HARSB constituents.

2.1.4.3. *Recommendation*

The costs for gas chlorination and UV light are similar. At the time the new facility is to be constructed and based on review of the systems, HARSB should pursue the UV Light option for several reasons including less reliance on chemicals that have price volatility, decreased site footprint, and others (refer to Section 8.3 of the Facility Plan, Appendix A).

2.1.5. *Outfall Improvements*

The existing outfall force main (14-inch C-905 PVC) is routed along Atlas Road from the WWTP to the existing river diffuser located in the Spokane River (near the City of Huetter). During the non-river discharge season, the valves are reconfigured to direct the flow through a force main (14-inch) to the land application site storage lagoon. Portions of this land application line are older, smaller diameter pipe (10-inch) and should be replaced to match the existing larger diameter (14-inch).

2.1.5.1. *River Outfall*

The river diffuser was recently upgraded to a capacity of 5.3 mgd. The river outfall force main has been targeted for improvements by constructing a parallel 24-

inch-diameter line along Huetter Road, and re-connecting to the existing diffuser assembly on the south end. There are two alternatives for this southern portion of the outfall (shown in the proposed alternative map in Appendix C)[21]. The line will connect to the land-application (14-inch) line on the north end, ¼ mile south of Wyoming Road in Huetter. The 14-inch Atlas Road line should be used in combination with the new proposed 24-inch Huetter Road line. The anticipated cost of the river outfall improvements is approximately $3,688,400.

Generally, there are no anticipated long-term environmental impacts associated with these improvements. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), agricultural lands (minor ground disturbance in agricultural areas, but no irreversible conversion), and air quality (construction emissions). Positive impacts consist of improvement to socioeconomic profile (allowing for growth within the system).

2.1.5.2. Land Application Force Main

The existing 14-inch line from the plant west to Huetter Road then north to the land application site contains a portion of 10-inch pipe that is restricting capacity of the pipeline. This section should be replaced with a 14-inch pipe to match the capacity of the rest of the pipeline. The portion of this force main from the WWTP to Huetter Road will be used for both the land application discharge configuration and the river discharge configuration (when connected to the new 24-inch line that will run south along Huetter Road). This section (WWTP to Huetter Road intersection) should be improved in phases to increase capacity incrementally. These phases include: upgrading the section from the WWTP to the Huetter Road intersection (to match the size of the river outfall line), and installing a parallel (minimum) 18-inch line to the land application site to achieve a capacity of 5.5 mgd (for budgeting purposes, a 24-inch line has been assumed). The anticipated cost of the land application force main improvements is approximately $2,400,000 (both phases).

Generally, no long-term environmental impacts are anticipated in association with these improvements. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), agricultural lands (minor ground disturbance in agricultural areas, but no irreversible conversion), and air quality (construction emissions). Positive impacts consist of improvement to socioeconomic profile (allowing for growth within the system).

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[21] One option consists of constructing the outfall in an abandoned railway alignment (which will eventually be utilized as a pedestrian/bike path) along the Spokane River. If, however, an agreement cannot be reached to use this area, the line will need to be placed in the roadway prism for Seltice Way (north). This second option is not ideal since there are numerous other utilities in this area and coordination may be difficult. Thus, the first option is preferred, but the second option may be necessary.

2.1.5.3. H-3 Effluent Lift Station

Improvements to increase the capacity of the H-3 Lift Station[22] to a capacity of 5.0 mgd (with one pump remaining in standby) will be critical to meet the 20-year anticipated peak flows assuming no equalization[23]. Following, or during the construction of tertiary improvements and disinfection upgrades, the H3 Effluent Lift Station should be relocated to the WWTP site downstream of the tertiary treatment improvements. The anticipated cost of the H-3 lift station pump capacity improvements is approximately $400,000.

Generally, no significant long-term environmental impacts are anticipated in association with these improvements. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), agricultural lands (minor ground disturbance in agricultural areas, but no irreversible conversion), and air quality (construction emissions). Positive impacts consist of improvement to socioeconomic profile (allowing for growth within the system).

2.1.5.4. No Action

The outfall improvements are not necessary to meet the discharge requirements for the Spokane River. However, these improvements do provide redundancy and provisions for future growth. Thus, HARSB could consider this option at this time.

Environmentally, this option would only lead to restricted growth capabilities due to undersized mains.

2.1.5.5. Recommendation

The outfall improvements are recommended in several phases:

- Phase 1 River Discharge Piping and Removal of 10-inch Pipe Bottleneck: 24-inch line Huetter Road Outfall Piping. These improvements should be constructed as soon as possible to allow for continued flow increases.
- Phase 2 Land Application Site Piping: Parallel 24-inch Line WWTP to Huetter Road. These improvements should be constructed following Phase 1 and construction of plant flow equalization to allow for review of flow conditions with the new pipeline and peak flow attenuation.
- Phase 3 Land Application Site Piping: Parallel 24-inch Line Huetter Road/Wyoming Intersection to Land Application Site. These improvements should be targeted following construction of plant flow equalization. This will allow for field verification of actual available

[22] This lift station is located at the WWTP's effluent and pumps the flow to either the river or the land application site.

[23] Implementation of plant flow equalization may help alleviate the timing of when this improvement is required by reducing peak flows into and out of the WWTP.

capacity of the H-3 pump station with the installed improvements from Phases 1 and 2.

- Phase 4 Pumping: H-3 Lift Station Pump Capacity Improvements to 5.0 mgd or higher. These improvements should be started following construction of plant flow equalization and the implementation of Phases 1 through 3. The H-3 improvements should be coupled with revisions to the disinfection system and tertiary treatment improvements.

2.1.6. Biosolids Improvements

Currently, the WWTP's excess sludge is wasted from the secondary clarifiers and pumped into an aerated sludge holding tank where it is held until it is dewatered. The sludge is dewatered by a belt filter press that produces a 14 percent solids cake. Dewatered sludge is collected, transported, and land applied by a Contractor. The use or disposal of sewage sludge biosolids is regulated by Title 40, Part 503 of the Code of Federal Regulations. The Part 503 Rule establishes requirements for the final use or disposal of sewage sludge biosolids. The biosolids rule requires that sewage sludge meet requirements before it can be land applied:

1. Pollutant Limits – all biosolids applied to the land must meet ceiling concentration limits for heavy metals and also either pollutant concentration limits or cumulative pollutant loading rate limits plus annual pollutant loading rates.
2. Pathogen Reduction – the Part 503 Rule designates two levels of pathogen reduction, Class A and B. Class B biosolids are treated to a lesser degree than Class A. Class B biosolids are restricted in how they can be land applied. Refer to Section 10.1.3 in the Facility Plan, Appendix A, for more information on the Class A/B requirements.
3. Vector Attraction Reduction – Vectors (flies, mosquitos, fleas, and birds) can transmit pathogens physically to humans and other hosts through contact or other means. Reducing the attractiveness of biosolids to vectors reduces the potential for transmitting diseases from pathogens in biosolids. The Rule presents several options for reducing vector attraction; refer to Section 10.1.3 in the Facility Plan, Appendix A, for more information.

Biosolids management is a broad term that covers all aspects of handling, treatment, and disposal. Options for implementing each component (waste sludge storage, sludge thickening, processes to reduce pathogens and vector attraction, sludge dewatering, disposal) were chosen and analyzed. The options were then combined to create complete Biosolids Management Plan options.

2.1.6.1. Waste Sludge Storage

Currently, the waste sludge is pumped to an aerated tank where the sludge is aerobically digested. The waste sludge is not thickened and the tank does not have equipment to decant. As an aerobic digester, the process is very near capacity and will not be adequate at the design load. It is recommended that the tank be used as an aerated holding tank for waste activated sludge prior to sludge thickening or sludge dewatering. This option would cost approximately $309,000 with an additional O&M cost of $242,000 (20-year present worth).

Generally, there are no anticipated long-term environmental impacts associated with this option. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: wildlife (noise) and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet discharge requirements and future wastewater loading), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment), and socioeconomic profile (allowing for growth within the system).

2.1.6.2. SLUDGE THICKENING

Thickening is a procedure to increase the solids content of the sludge by removing some of the water fraction. The thickened sludge requires less tank volume and is generally easier to further process and dewater. Common methods of sludge thickening are gravity settling, floatation thickening, a rotary drum thickener, a centrifuge, and a gravity belt thickener. Gravity settling was not evaluated further because it is not compatible with the biological phosphorus removal.

Flotation thickening adds dissolved air to the sludge under pressure. When the solution is depressurized, the dissolved air is released as very fine bubbles that float the sludge solids to the top where they are skimmed off. Since this process is aerobic, it is not compatible with the biological phosphorus reduction. Rotary drums, centrifuges, and gravity belts are also aerobic and would be compatible with the BPR process. This option[24] would cost approximately $1,548,600 with no additional O&M costs.

Generally, there are no anticipated long-term environmental impacts associated with this option. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.6.3. PROCESSES TO REDUCE PATHOGENS AND VECTOR ATTRACTION

There were several options considered for this component of the biosolids management plan. Refer to Section 10.1.4.3 in the Facility Plan (Appendix A) for more information on these options.

[24] The basis of the cost estimate for this component was a gravity belt thickener. The other methods previously mentioned are suitable. The final decision is better left until pre-design of the facility.

Aerobic Digestion: Advantages to this option include that it is relatively simple to operate compared to anaerobic systems, reduces the amount of grease in the sludge, and reduces the number of pathogens at a low level. Disadvantages include that it has a higher power cost for supplying the oxygen and that it is significantly influenced by temperature. This option would cost approximately $3,020,000 with an additional O&M cost of $560,000 (20-year present worth).

Anaerobic Digestion: This process is performed in the absence of oxygen. Anaerobic digestion will release phosphorus that had been removed by the biological phosphorus removal process. The two common process configurations are low-rate and high-rate processes; the high-rate process[25] is assumed for this analysis. Thickening of the sludge feed is needed so that the design detention time can be maintained with smaller tanks. The major equipment components are the tanks, cover, the sludge heating system, sludge mixing system, and gas storage system. This option would cost approximately $6,591,000 with an additional O&M cost of $282,000[26] (20-year present worth).

Alkaline Stabilization: Alkaline stabilization is the process of mixing alkaline material, usually lime, with the sewage sludge to raise the pH to a point that is unfavorable for the growth of pathogens. The method is listed in the Part 503 Rule as an approved alternative for meeting Class B and Class A Pathogen requirements. Advantages to this option include that it is consistent with EPA's national beneficial reuse policy, has a long-established history, and small land area is required. Disadvantages include that the process does not reduce organic matter, there is potential for odor generation both at the processing and end use site, and there is potential for dust production. The major equipment components are a wastewater solids feed/conveyance mechanism, lime storage, a lime transfer conveyor, a mixer, and air emission control equipment to minimize odors and dust. This option would cost approximately $3,028,000 with an additional O&M cost of $2,348,000 (20-year present worth).

Heat Drying: Heat drying is simply the evaporation of water from sewage sludge. It must be preceded by a dewatering process, and in the end the final product must be disposed. It requires material handling and storage equipment, heat generation and transfer equipment, air handling and air pollution control equipment. Heat drying is listed in the Part 503 Rule as an approved process to meet Class A pathogen reduction. Advantages of this option include that it may have commercial value as fertilizer, fertilizer supplement, or soil conditioner, it requires a relatively small footprint, and it greatly reduces the volume of material that needs to be transported. Disadvantages include that it is a significant capital investment, it has complex equipment, and there are safety concerns that include explosive potential of the dust and potential for fires. This option would cost approximately $7,659,000 with an additional O&M cost of $1,211,000 (20-year present worth).

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[25] In the high-rate process, the solids loading rate is much greater (up to four times), the retention period is lower (one-half), mixing capacity is greater and improved, and the sludge is heated to a typical operating temperature of 95°F.

[26] Heating costs were assumed to be offset by the use of digester gas.

Composting: In this option, HARSB would own and operate a compost facility[27]. The composting process uses biological activity to aerobically stabilize sludge. The Class A pathogen requirements and vector attraction reduction requirements are both met if specified time and temperature requirements are met. Composting can be done in large containers, in aerated static piles, or in windrows. Some challenges are odor, dust, truck traffic, and a sufficient supply of affordable bulking agent. From an operational standpoint, it is desirable to have the compost facility at the treatment plant, which may require additional land area (a 20-acre site adjacent to the existing plant site is recommended). This option would cost approximately $5,814,000 with an additional O&M cost of $11,376,000 (20-year present worth).

The anticipated long-term environmental impacts associated with the new processes to reduce pathogens and vector attraction consist primarily of air quality (odor generation) and increased energy consumption. The new facilities may require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating on-site. The new facilities will also most likely increase the power necessary to run the plant by adding new processes to the treatment. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.6.4. SLUDGE DEWATERING

Sludge dewatering is a physical operation used to reduce the moisture content of the sludge in order to reduce the cost of trucking sludge to the ultimate disposal site and dewatering is required if further treatment processes such as composting, alkaline stabilization, or heat drying are to be used. The following are methods that can be used for sludge dewatering.

Belt Filter Press: A belt filter press (BFP) is a continuously fed device that presses sludge between two porous belts, allowing the water to be removed. It is a predominantly used method in the United States and is currently used at HARSB. Aerobically digested sludge does not dewater easily; anaerobically digested sludge dewaters slightly better than aerobically digested sludge. The components of this option consist of belt filter press, a polymer system, feed pumps, a dewatered sludge conveyor, and appurtenances. This option would cost approximately $1,134,000 with no additional O&M costs.

[27] In this regional area, compost facilities are being operated by the City of Coeur d'Alene, the City of Cheney, EKO Compost, and Barr-Tech.

Centrifuge: A centrifuge can be used to both thicken and dewater sludge by centrifugal force. A solid bowl scroll centrifuge[28] is the most widely used type. Centrifuges general perform very well on anaerobically digested sludge. The components of this option consist of centrifuge, a polymer system, feed pumps, dewatered sludge conveyor, and appurtenances. This option would cost approximately $2,195,000 with no additional O&M costs.

Screw Press: A screw press uses a slowly rotating screw auger to compress the sludge in a conical wedge wire screen basket. The sludge is driven through the center of the screen basket into a pressure cone before being discharged. Water drains by gravity through the screen basket. This type of dewatering option was piloted at HARSB in 2011, with success. The existing belt filter press (17 years old, with an expected 20-year life cycle) can be used as a backup service to increase system redundancy and provide a new active dewatering device. Two screw presses will be necessary to meet the design loading. The components of this option consist of screw presses, a polymer system, feed pumps, dewatered sludge conveyors, and appurtenances. This option would cost approximately $1,699,000 with no additional O&M costs. Alternatively, one screw press[29] could be installed parallel to the existing belt filter press at a cost of $889,500. Longer term dewatering would relocate the screw press to a new sludge dewatering and loading facility. The cost of this facility is $3,864,500.

The anticipated long-term environmental impacts associated with the new sludge dewatering methods consist primarily of air quality (odor generation) and increased energy consumption. The new facilities may require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating on-site. The new facilities will also most likely increase the power necessary to run the plant by adding new processes to the treatment. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.6.5. DISPOSAL

There are two options for disposal of the biosolids: contracted land application or contracted composting. HARSB currently pays a Contractor to pick up, haul, and

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[28] The bowl rotates along a horizontal axis and operates in a continuous feed mode. It consists of a rotating bowl having a cylindrical, conical shape and an internal screw conveyor. Sludge is introduced into the rotating bowl and the solids concentrate on the periphery. The screw conveyor spinning at a slightly difference speed moves the solids to the discharge end.

[29] This screw press could then later be relocated to a new facility and a second parallel screw press installed.

dispose of the sludge for $45 per wet ton (contracted land application). The sludge must meet Class B requirements. Contracted composting is a method of disposal, but there are no pre-qualifications for the sludge to meet Class B requirements. The City of Post Falls contracts for composting and disposal for $65/wet ton. The options for disposal have been calculated for each option and are discussed further in the next section (2.1.6.6).

The anticipated long-term environmental impacts associated with the disposal methods consist primarily of air quality (emissions) and increased energy consumption (fuel for solids trucking). Generally, there are no anticipated short-term environmental impacts associated with this option. Positive impacts consist of improvement to public health (appropriately disposing of biosolids) and socioeconomic profile (allowing for growth within the system).

2.1.6.6. Configurations

Biosolids management plan alternatives were developed for further evaluation. The components and cost of each alternative are shown below.

Table 2-3: Biosolids Management Plan Options

	Waste Sludge Holding Tank	Sludge Thickening	Processes to Reduce Pathogens and Vector Attraction					Sludge Dewatering	Sludge Disposal	
			Aerobic Digestion	Anaerobic Digestion	Alkali Stabilization	Heat Drying	Composting		Contracted Land Application	Contracted Composting
Alternative 0 (Do Nothing)										
Alternative 1	$0.551M						$2.225M	$1.779M		$4.59M
Alternative 2	$0.551M	$1.549M	$3.58M					$1.779M	$2.56M	
Alternative 3	$0.551M	$1.549M		$6.87M				$1.779M	$1.95M	
Alternative 4	$0.551M	$1.549M	$3.58M		$5.376M			$1.779M	$4.26M	
Alternative 5	$0.551M	$1.549M	$3.58M			$8.87 M		$1.779M	$0.711M	
Alternative 6	$0.551M	$1.549M	$3.58M				$17.191M	$1.779M	$5.973M	

1. Costs in this table include capital and O&M costs (present worth).

Alternative 0 (Do Nothing): HARSB aerobically digests the sludge to Class B quality and pays a Contractor to haul and land apply the biosolids. Unless the flow and loads to the treatment plant remain at the current level, this is not a viable alternative. The aerobic digester is near capacity. The facility will not be able to produce Class B sludge at the design conditions.

Alternative 1: This option would include: (1) upgrade the aeration system in the existing aerobic digester, it will become an aerobic holding tank prior to dewatering, (2) screw presses will replace the existing belt filter press which is nearing the end of its design life, (3) instead of constructing a process to treat the waste sludge, HARSB will hire a Contractor to compost the sludge (such as Barr-Tech). A significant disadvantage of this plan is the lack of control from the standpoint of HARSB. If the compost contractor suddenly fails or cannot operate it will be very difficult to quickly develop an alternate action. Alternative 1 would cost approximately $9,145,000 (including present worth of O&M costs).

Alternative 2: This option would include: (1) upgrade holding tank and aeration, (2) sludge thickening, (3) aerobic digestion, (4) dewatering improvements, (5) and contracted land application. Alternative 2 would cost approximately $10,018,600 (including present worth of O&M costs).

Alternative 3: This option would include: (1) upgrade holding tank and aeration, (2) sludge thickening, (3) anaerobic digestion, (4) dewatering improvements, (5) and contracted land application. Alternative 3 would cost approximately $12,698,600 (including present worth of O&M costs).

Alternative 4: The aerobic digestion component of this alternative is not required. The alkali process can still produce Class A or Class B biosolids. It is included in the alternative because it reduces odor potential and results in Class B biosolids[30]. Alternative 4 would cost approximately $17,094,600 (including present worth of O&M costs).

Alternative 5: The aerobic digestion component of this alternative is not required. The heat drying process can still produce Class A biosolids. It is included in the alternative because it reduces odor potential and results in Class B biosolids[31]. Alternative 5 would cost approximately $17,039,600 (including present worth of O&M costs).

Alternative 6: This alternative differs from Alternative 1 in the HARSB would own and operate the compost facility. The aerobic digestion is included as part of this alternative, but it is not required. Composting can still produce Class A biosolids, but the aerobic digestion reduces the odor potential and results in Class B biosolids[32]. Alternative 6 would cost approximately $30,622,600 (including present worth of O&M costs).

The alternatives were compared and evaluated based on several criteria such as lifecycle cost, odors and impact to surrounding neighbors, and ability to provide a long-term solution. Refer to Section 10.1.5.1 in the Facility Plan (Appendix A) for the complete analysis. The resulting ranking[33] is as follows:

[30] Meeting Class B biosolids requirements at the treatment plant leaves other disposal options than if it is does not.

[31] Meeting Class B biosolids requirements at the treatment plant leaves other disposal options than if it is does not.

[32] Meeting Class B biosolids requirements at the treatment plant leaves other disposal options than if it is does not.

[33] Each of the evaluation criteria was given a weighting from 1 to 5 so that criteria that were deemed to be more important could be emphasized. Except for costs, the alternatives were ranked for each criteria on a scale of 1 to 10, 10 being the highest. Ranking of cost was made by dividing the cost of the minimum alternative by the cost of the alternative and multiplying by 5 (this was to normalize and to account for the relative difference between costs).

Table 2-4: Biosolids Management Plan – Cost Ranking

	Normalized Cost Rank
Alternative 1	6.0
Alternative 2	5.5
Alternative 3	4.3
Alternative 4	3.2
Alternative 5	3.2
Alternative 6	1.8

2.1.6.7. Other Options

The Facility Plan also discusses two other options for biosolids management that were later removed from the alternatives but are included in this discussion.

Solar Drying to Further Reduce Water Content: Solar drying has been utilized for sludge drying from the inception of wastewater treatment. Open drying beds are used at small treatment plants and were used by the City of Coeur d'Alene until approximately 1985. Drawbacks to open drying beds are the odor potential, rewetting the solids from precipitation, and cold temperature in the winter. From the regulation discussion, for Class B biosolids to meet vector attraction requirements, the end moisture contact must be less than 25 percent water (75 percent solids). To meet pathogen reduction for air drying the sludge must be dried in open beds for at least three months, of which two months the temperature must be above 32°F. A lifecycle cost of solar drying versus contracted disposal was evaluated with the following results: (1) initial capital investment for solar drying is $2.4 million, (2) the ongoing O&M is much less than the contracted disposal, and (3) it would take nearly 18 years to recover the capital cost invested for a solar dryer. As this capital investment is significant, and the potential uncertainty of being able to successfully operate the system in the winters is low, it is not recommended to pursue solar drying at this time as the return on capital investment could easily be shifted well beyond 20-years if the system is incapable of operating in the winter. As more information becomes available for solar drying systems in climates similar to HARSB, the option may want to be further evaluated to refine the capital and O&M costs evaluation.

Regional Joint Digestion Evaluation: In the spring of 2012 during development of this plan the City of Post Falls and HARSB representatives began discussion of the potential option of developing a regional anaerobic treatment and biosolids handling facility. The initial discuss was based on the realization that the capital cost for either facility may potentially be reduced if they were to combine the biosolids treatment to one location. Costs were evaluated and determined that depending on where the facility were to be located, the lifecycle costs would be $27.8 to $33.9 million. Based on the evaluation and as each entity continues to update and modify their biosolids management strategies, the Joint Digestion alternative (at the Post Falls facility, which is the low cost option) should be considered a viable option with potential capital and lifecycle cost savings.

The anticipated long-term environmental impacts associated with the alternative options consist primarily of air quality (odor generation) and increased energy consumption. The facilities may require odor control measures and systems to be incorporated into the design to mitigate nuisance odors by containing and treating on-site. The facilities will also most likely increase the power necessary to run the plant by adding new processes to the treatment. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet treatment needs and managing vector attraction and odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system). Additionally, the regional option may decrease overall impacts by combining two facilities.

2.1.6.8. No Action

As stated previously, HARSB aerobically digests the sludge to Class B quality and pays a Contractor to haul and land apply the biosolids. Unless the flow and loads to the treatment plant remain at the current level, this is not a viable alternative. The aerobic digester is near capacity). The facility will not be able to produce Class B sludge at the design conditions.

Thus, the anticipated environmental impacts would be long-term and would impact public health (inability to appropriately meet treatment needs for biosolids and thus impact the surrounding community), water quality (inability to appropriately treat biosolids, which may eventually impact surrounding water bodies), and the socioeconomic profile (not allowing for growth in the system).

2.1.6.9. Recommendation

Based on the ranking of alternatives and the criteria utilized it is recommend that HARSB continue with their current activities utilizing Tenelco for biosolids disposal (No Action). As HARSB continues to grow, this option will potentially become unavailable due to sludge quality, as the City of Post Falls recently had similar issues with lightly digested solids and odor complaints at the land application site. At that point Contracted Composting (BarrTech Inc.) or similar facilities will likely be the most cost-effective. As the facility continues to grow and as HARSB moves toward becoming increasing less dependent on contracted biosolids disposal, they should make improvements targeting aerobic or anaerobic digestion. All of the options will require biosolids dewatering improvements as discuss previously. Phasing of these improvements with other plant processes, including biological nutrient reduction, and tertiary treatment addition will be critical to properly sizing biosolids handling facilities.

Dewatering improvements are expected to occur in phases as follows:

- Phase 1: Addition of screw press in existing building ($889,500)
- Phase 2: Dewatering improvement in new building (new and relocated screw press) with enclosed truck loading ($3,864,500)

- Phase 3: Treatment of biosolids to Class B ($4,568,600)

2.1.7. Reclaimed Water Recycle and Reuse Improvements

HARSB currently irrigates approximately 300 acres, which include timothy hay, orchard grass, alfalfa hay, and hybrid poplar trees on the 476-acre reuse site. The effluent is first stored in a 10.8 MG (9.5 MG of working capacity) storage lagoon prior to being irrigated. The estimated, conservative capacity of the reuse facility is 1.65 mgd, or 290 acres per mgd. It is recommended that this should continue as the reuse limitation until further data supports a higher irrigation rate.

2.1.7.1. Anticipated Wastewater Reclamation and Reuse Standards over the SVRPA and New Reuse Permit Conditions

Reuse activities over the SVRPA are likely to increase over time due to population growth and tightening restrictions on discharge to the Spokane River. Stringent regulations designed to protect the high quality of the SVRPA also mean that reuse water quality, monitoring, and management practices will be held to a higher standard than in other areas of the State. In reviewing current HARSB reuse practices, these standards can be met but will require significant initial background work to characterize the soil and groundwater as well as propose a suitable cropping and monitoring plan. Class A reuse water[34] with nutrient removal may alleviate a number of groundwater protection concerns.

2.1.7.2. Water and Nutrient Loading

Water and nutrient application rates at the HARSB land application site will be less (smaller quantity) than similar land application systems that are not over the SVRPA. Even with the most stringent oversight by IDEQ, the HARSB reuse system is a viable method of effluent disposal. In order to grow the crop (after BNR and phosphorus reduction), most of the nitrogen must be derived from commercial inorganic sources. The site will resemble typical agricultural operation over the aquifer but will be managed at lower nutrient loadings and loss to the aquifer.

2.1.7.3. Capacity Discussion

As wastewater flows increase, the current non-irrigated areas will be planted and drip irrigation systems extended. Further, within the 20-year period, the current storage lagoon will likely require maintenance to the liner system. Costs for both expansion of the irrigation system and maintenance of the lagoon have been developed. With better control and data availability[35], the capacity of the site may be expanded beyond the 1.65 mgd capacity. It is also possible that the site could be used to reduce chemical use and accept considerable biosolids produced at the treatment plant. Refer to Section 11.6 in the Facility Plan (Appendix A) for more information.

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[34] The system currently treats to Class C reuse requirements

[35] In 2008, and Agri Met Weather Station was installed at the land application site, which provides several parameters that allow for HARSB to calculate daily crop water use. Refer to Section 11.3 in the Facility Plan (Appendix A) for more information.

2.1.7.4. *CONFIGURATIONS*

Based on sizing criteria, configurations for various options were evaluated. The system could be (1) expanded to full capacity at the current site, (2) expanded to 2.4 mgd, (3) converted to a complete full reuse system, and (4) abandoned with the expectation of the ability to go to full year round river discharge. The following costs were estimated for these options:

Table 2-5: Land Application System Alternatives

	Capital Cost (Present Worth)	O&M Cost (20-year Present Worth)
Expansion of Irrigation (current site)[d]	$5,600,000	[a]
Expanded Land Application System to 2.4 mgd total capacity (based on 290 ac/mgd)	$16,010,000	[a]
Abandon Current Reuse Activity (sell 472.4 ac)[b]	($9,450,000)	-
Full Reuse (Woodland Waters[36])[c]	$44,400,000	[a]

a. O&M costs are expected to be similar to current reuse operation. Costs are expected to escalate over time proportional to flow.
b. Assumes land application and reuse are abandoned and property is sold after 10 years.
c. Based on Prairie Option costs from Welch-Comer Engineers “Woodland Waters Evaluation.” For comparison, land cost added for additional reuse land expansion at a rate of $20,000 per acre.
d. Assumes cost to expand drip irrigation system with plantings on current site and liner repair on existing lagoons.

The anticipated long-term environmental impacts associated with these improvements relate potentially to land use and agricultural lands. If the current reuse land is abandoned and sold, the land could be re-purposed for a non-agricultural purpose which may permanently change the use of the land area. Conversely, if new land is obtained for reuse purposes, that area may be re-purposed from its existing use. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), agricultural lands (excavation in agricultural areas), and air quality (construction emissions). Positive impacts consist of improvement to sole source aquifer (continued protection of aquifer through maintenance and monitoring of reuse system), public health (continued protection of community through maintenance and monitoring of reuse system), and socioeconomic profile (allowing for growth within the system).

[36] Woodland Waters is an analysis performed by Welch-Comer Engineers to evaluate the option of a regional land use facility between the City of Post Falls WRF (which currently treats the City of Rathdrum’s wastewater) and HARSB. This facility would store and land apply all the effluent from the three areas on Rathdrum Mountain (timber crop).

2.1.7.5. NO ACTION

The current HARSB reuse facility has sufficient capacity to meet current and future 20-year demands. However, the current storage lagoon will likely require maintenance, planting will need to be expanded, and the irrigation system will need to be expanded to meet the future demands. Without these repairs, the system will likely not meet the future demand.

Thus, the anticipated environmental impacts would be long-term and would impact public health (neglected maintenance and expansion of the system could lead to un-monitored discharges and inability to meet future demand), water quality (neglected maintenance and expansion of the system could lead to un-monitored discharges to surrounding water bodies), and the socioeconomic profile (not allowing for growth in the system).

2.1.7.6. RECOMMENDATION

The following recommendations have been made in regards to the reuse options:

1. With additional instrumentation such as flow meters, soil moisture probes with remote readout, higher application rates may potentially be practiced.
2. HARSB should retain the current land application system for combined nutrient reduction and biosolids disposal even after the discharge to the Spokane River is secured.
3. HARSB should continue to expand their land holdings as available for land application. At a minimum, the land areas should be increased such that a capacity of land application area for 2.4 mgd[37].
4. HARSB should not pursue full-year round reuse at this time due to anticipated land costs.
5. As part of the evaluation of overall treatment and disposal alternatives, the alternative of abandoning current land application system with associated risks, costs, and implications should be considered.
6. NOTE: It should be noted that there is a considerable risk and unpredictability of land availability and cost of land for these alternatives. Further, land is expected to vary from -50 to +50 percent from budgeted pricing. This has considerable impact to overall alternatives being considered.

2.1.8. ADMINISTRATION AND ANCILLARY SUPPORT SYSTEMS IMPROVEMENTS

HARSB currently has several major administrative and support systems at the treatment facility which include: odor control, utility water pump station, maintenance shop spaces, operations and control buildings, and electrical and SCADA (supervisory

[37] This would include an additional 223 acres based on the current rating of 290 acres/mgd, for seasonal reuse coupled with river discharge when not irrigating, which includes buffer distances and space for storage lagoons, access, etc.

control and data acquisition). The necessary improvements to these systems are described below.

Odor Control[38]*:* The IDEQ has established rules regarding odor control[39] at wastewater treatment plants; they are not numeric limits but rather subjective criteria for perception of odor-containing air pollutants[40]. Generally, odor control consists of containment, collection and transmission, and treatment. Several options exist for odor control treatment at individual unit processes, specifically, compost biofilters, carbon absorption, chemical scrubbers, and bioscrubbers. Refer to Section 12.2 in the Facility Plan (Appendix A) for more information on these specific odor control treatments. Because of the varying conditions and odor-generating compounds present at individual unit processes, the odor control treatment systems specific to each process area should be developed during design. Odor control treatment design should allow for proper identification of the odorous compounds that will be generated, selection of the treatment process with the highest likelihood of success, balanced with the cost of construction, operation and maintenance of the odor control system. Future plant-wide odor control has not been addressed specifically in this plan. Rather, potential future unit processes requiring odor control (headworks, influent flow equalization, and any biosolids handling processes) have been addressed individually.

Utility Water Pump Station: The current utility water pump station provides capacity required to operate the new belt filter press wash water system and plant utility water for other processes (headworks, biological basin spray bars, and irrigation). As the plant grows and expands beyond the current configuration, additional reuse water will be required in excess of the current capacity. Coarse screening should also be provided, but it is anticipated that screening would be required only to remove large particulates[41]. It has been assumed that a new pumping facility will be constructed as part of the H-3 improvements to provide utility water to the WWTP. It may be possible to eliminate or combine the Utility Water Pump Station with future H-3 improvements, and utilizing a common pump station may allow for capital cost savings. The estimated cost of this improvement is approximately $244,300, for a pump station with 300 gpm capacity and as required for selected dewatering equipment.

15-Inch Influent Force Main Replacement and Upgrade: The current 15-inch H1 lift station discharge force main has been identified for upgrade and/or replacement due to capacity limitations during the 20-year planning period in a separate planning

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[38] Odor control requires the collection and treatment of process odors to minimize complaints from the public. Containment requires covering process basins, equipment, and channels that emit odors. Collection is performed by ventilating the contained spaces and routing the foul (odorous) air to a treatment system. Treatment can be performed by a variety of commonly used methods from carbon adsorption, compost biofilters to chemical scrubbing.

[39] IDAPA 58.01.01.776.01

[40] The plants have and should continue to take a pro-active approach to monitor, log, and record complaints that are received, which will help to identify specific processes and activities that generate odor complaints.

[41] The space for the current system cannot easily be expanded and thus the utility water pumps are proposed to be constructed downstream of any tertiary filtration facilities. Thus, only a coarse screen is required.

document (Refer to Appendix 12-B in the Facility Plan, located in Appendix A). The replacement is necessary due to capacity limitations over that time span as well as the historical leaks and breaks associated with the thin-walled irrigation class pipeline. The estimated cost of this improvement is approximately $5,336,000.

Maintenance Shop/Storage Spaces: The WWTP currently has several areas where maintenance on plant equipment occurs; currently, this work occurs in the shop area on the west side of the dewatering building. The east half of this building houses the dewatering equipment. As the plant expands and dewatering is relocated in the future, the east half of this facility should be converted (re-purposed) as a maintenance area[42]. The current covered parking area/sludge storage pole building is approaching 20-years old and will need to be re-located or replaced to make the area available when influent plant flow equalization is added in order to avoid construction activities for storage activities. The estimated cost of this improvement is approximately $40,000.

Operations and Control Building (SCADA, Laboratory, and Offices): The current operations and control building is likely adequately sized for projected growth; however, additional laboratory space will probably be needed. The current building is not large enough to house all of the necessary facilities. Further, the additional tertiary processes will increase laboratory and maintenance staff requirements. The location for this building will need to be determined in conjunction with the expansion and addition of other plant processes. The layout and phasing could consist of: (1) relocated current administration building (1998 manufactured home) to allow construction of new anoxic BNR basins, (2) construct a new administration/control building in the location of the current "covered parking/sludge storage building" area (current staff personnel desks, locker rooms, and lunchroom facilities could be relocated to this facility, allowing for expansion of the current laboratory space within the current control building). The estimated cost of this improvement is approximately $639,900.

Electrical and Emergency Power: Expansion of the backup emergency power system will be necessary for the expanded plant facilities. Plant electrical system should be modified to include: (1) modifying power feeders for a single point power metering to the WWTP, (2) expand emergency power for expanded plant processes and improvements through the addition of multiple backup generators (instead of modifying the existing larger generator). The estimated cost of this improvement is approximately $500,000.

Staffing: The current facility is very complex, and operations and maintenance staff training levels are constantly being elevated. As new, more stringent treatment requirements and process improvements are implemented, it will become even more important that additional training and personnel be implemented.

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[42] It has been assumed that a new building will be constructed as part of the dewatering improvements. However, final selection of the location of maintenance facilities should be made and reviewed in conjunction with the dewatering expansion and addition of other plant processes.

The anticipated long-term environmental impacts associated with the new administration and ancillary support systems consist primarily of increased energy consumption and air quality. The new facilities will also most likely increase the power necessary to run the plant by adding new buildings and emergency backup power. The emergency backup power sources will intermittently impact air quality, but not beyond the state or federal limits. The anticipated short-term environmental impacts consist primarily of those associated with construction such as: topography (excavation and site restoration), surface and ground water (protected by stormwater controls to prevent pollution of surface and ground water), wildlife (noise and excavation), and air quality (construction emissions). Positive impacts consist of improvement to public health (providing facilities to meet treatment needs and managing odors), sole source aquifer (reducing the likelihood of failures and impacts by improved treatment support and replacement of depreciated facilities), and socioeconomic profile (allowing for growth within the system).

2.1.8.1. No Action

The improvements identified for the administration and ancillary support systems will be required as the WWTP expands and increases in complexity. Without these facilities, the WWTP does not have the ability to be appropriately managed and supported (emergency power and odor control treatment).

Thus, the anticipated environmental impacts would be long-term and would impact public health (neglected expansion of the system could lead to inability to meet discharge requirements and inability to meet future demand), water quality (neglected expansion of the system could lead to inability to meet discharge requirements), and the socioeconomic profile (not allowing for growth in the system).

2.1.8.2. Recommendation

The projects identified are recommended to maintain proper long-term operation of the WWTP and provide support services to the facility as identified.

2.2. Improvement Alternatives

2.2.1. Alternative 1: No Action Alternative

For this alternative, HARSB would not implement any improvements to the wastewater treatment facilities. This option is not recommended due to the following:

- HARSB will likely be unable to meet upcoming effluent discharge standards. The non-compliance situation will likely continue in the future unless improvements are implemented. This will likely result in fines and/or other penalties imposed by regulatory agencies.
- Effluent quality from the facility will most likely continue to worsen in the future as the treatment facilities become overloaded.
- Future residential and commercial growth may be restricted through a building moratorium unless the improvements are implemented. This may result in a loss of business and reduced property values and revenues.

2.2.1.1. *Environmental Review*

For this alternative, the primary environmental impacts are associated with the inability to treat wastewater and meet effluent requirements for discharge to the river. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Population, Economic, and Social Profile: no ability to expand the system or allow growth within the system (long-term impact)
- Impacts to Wetlands and Water Quality: significant water quality issues associated with the inability to treat wastewater due to overload of existing treatment facilities (short- and long-term impact)
- Impacts to Public Health: water quality concerns with respect to inability to meet upcoming discharge requirements to river (short- and long-term impact)

2.2.2. *Alternative 2: Additional Treatment with Year Round River Discharge (Current Reuse Land to 1.65 MGD)*

Under this option, HARSB would upgrade the existing WWTP maintain their current reuse activities and capacity (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. For this alternative, the existing treatment system would be expanded to biological nutrient reduction, combined with some form of tertiary treatment including effluent filtration. The following are recommended improvements under this alternative:

- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier No. 5, Convert the secondary treatment system to full biological nutrient reduction system including anaerobic and anoxic tanks.
- Effluent Filtration: Provide coagulation/settling and filtration to meet increased river discharge effluent requirements.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system.
- Effluent Pump Station and Outfall/Land App Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall minor modifications to existing land application reclaimed water pipeline (no expansion).
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.

- Reuse: Repair and maintain existing system on existing site (no site expansion).

The advantages of Alternative 2 are as follows:

- Reduced cost (no capital or O&M) for expansion of land application system.
- Land application reduces the total phosphorus load being sent to the river. Reducing the total phosphorus (TP) load allows for higher concentration TP effluent to be sent the river while meeting the waste load allocation. This allows for reduced chemical treatment costs for removing TP. This will occur until the Land Application system reaches capacity.

The disadvantages of Alternative 2 are as follows:

- Risk of inability to meet expected and future river discharge effluent requirements (reduced buffer on meeting waste load allocation).
- As HARSB grows, the current land application site will reach capacity, and the system's ability to off-set the TP waste load allocation will continue to decrease.

The estimated cost for Alternative 2 is approximately $53.35 million with a projected $10.70 million in O&M costs (present worth). This was the recommended option.

2.2.2.1. Environmental Review

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades and pipeline improvements and ability to meet effluent requirements for discharge to the river. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): excavation for treatment facilities and pipeline (short-term and minor long-term impact)
- Impacts to Population, Economic, and Social Profile: potential risk as the system grows and thus could be unable to meet river discharge requirements year-round (potential long-term impact)
- Impacts to Wetlands and Water Quality: potential risk as the system grows and thus could be unable to consistently treat wastewater to meet water quality requirements and standards (potential long-term impact)
- Impacts to Cultural Resources: potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)

- Impacts to Flora and Fauna: temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: increased energy consumption with the upgrade of treatment facilities (long-term impact)
- Impacts to Public Health: *positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

2.2.3. ALTERNATIVE 3: ADDITIONAL TREATMENT COMBINED WITH EXPANDED SEASONAL REUSE (EXPANSION OF REUSE LAND TO 2.4 MGD)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the reuse activities would be expanded to match the average daily flow conditions for the 20-year period.

During the non-growing season, treated effluent will continue to be discharged to the Spokane River. During the growing season, treated effluent would then be pumped to the existing and new storage lagoons where it would be held until it could be applied through the slow-rate land application site for irrigation of a crop. The following are recommended improvements under this alternative:

- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional Secondary Clarifier No. 5, Convert the secondary treatment system to full biological nutrient reduction system including anaerobic and anoxic tanks.
- Effluent Filtration: Provide coagulation/settling and filtration to meet increased river discharge effluent requirements.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system.
- Effluent Pump Station and Outfall/Land App Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall and land application reclaimed water pipeline.
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Storage Lagoon: 7-day storage (in addition to existing storage) would be added as a buffer to process upset, and for equalization of flows for

irrigation. The Spokane River would be retained for non-growing season or non-compliance reuse disposal of reclaimed water.

- Expanded Land Application Site: The HARSB current slow-rate land application system does not have adequate capacity for the projected 20-year flow projections. The system will need expanded to continue current practices. Additional land will be required to procure additional land to provide the necessary irrigated acreage and expanded storage lagoon. An additional 223 acres will be required for 2.4 mgd ADF.
- Irrigation Pump Station: A new irrigation pump station would be required to irrigate the expanded reuse site. The pump station would likely consist a new building, with multiple irrigation pumps with a combined capacity of 3000 gpm (peak day equalized flow of 4.0 mgd); piping, fittings, controls, and flow meters for distribution to the expanded reuse site irrigation system.
- Miscellaneous Improvements: Additional improvements required for this alternative include:
  - Site fencing around the storage lagoon and land application site to keep wildlife, debris and unauthorized personnel from entering the site.
  - Extension of power to the new storage lagoon site from the irrigation pump station.
  - Site piping for the transmission lines to the lagoon, irrigation pump station, and land application site.
  - Groundwater monitoring wells around the land application site to monitor potential impacts on the surrounding aquifer.
  - Wheel line, drip or center pivot irrigation system for the new land application site.
  - A gravel access road to the new storage lagoon and/or land application site.

The advantages of Alternative 3 are as follows:

- Expansion of land application system reduces risk and provides flexibility to meet expected and future river discharge effluent requirements.
- Beneficial reuse of reclaimed effluent.
- Alternative disposal point.
- Land application reduces the total phosphorus load being sent to the river. Reducing the total phosphorus (TP) load allows for higher concentration TP effluent to be sent the river while meeting the waste load allocation. This allows for reduced chemical treatment costs for removing TP.
- Allows for offset to the TP waste load allocation beyond the current permitting planning at 3.2 mgd and 50 ppb TP.

The disadvantages of Alternative 3 are as follows:

- Capital cost of expanded land application system
- Additional O&M and regulatory compliance issues
- Increased concern (public perception) of expanding reuse activities over the Rathdrum Prairie Aquifer

The estimated cost for Alternative 3 is approximately $67.0 million with a projected $8.70 million in O&M costs (present worth).

2.2.3.1. Environmental Review

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades, expanded reuse and pipeline improvements and potential land re-purposing for expanded reuse. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): excavation for treatment facilities, expanded reuse and pipeline (short-term and minor long-term impact)
- Impacts to Land Use: expansion of reuse will potentially re-purpose the existing land identified for reuse expansion (potential long-term impact)
- Impacts to Cultural Resources: potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)
- Impacts to Flora and Fauna: temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Air Quality: temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: increased energy consumption with the upgrade of treatment and reuse facilities (long-term impact)
- Impacts to Public Health: *positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

2.2.4. Alternative 4: Additional Treatment combined with Abandoning Reuse (sell existing reuse land in 10 years)

For this alternative, the existing treatment system would be utilized for treatment of the wastewater combined with the same in-plant improvements identified for Alternative 2. In addition to these improvements, the reuse activities would be abandoned and revenue from the sale of the land would be utilized to fund necessary WWTP capital improvements and O&M. The following are recommended improvements under this alternative:

- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional Secondary Clarifier No. 5, Convert the secondary treatment system to full biological nutrient reduction system including anaerobic and anoxic tanks.
- Effluent Filtration: Provide coagulation/settling and filtration to meet increased river discharge effluent requirements.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system.
- Effluent Pump Station and Outfall Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall pipeline.
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Sell Current Land Application Site.

The advantages of Alternative 4 are as follows:

- Utilize sale value of Reuse site to offset capital improvements at WWTP.
- Reduced Land Application O&M costs and regulatory reporting.
- Decreased concern (public perception) of expanding reuse activities over the Rathdrum Prairie Aquifer.

The disadvantages of Alternative 4 are as follows:

- Abandonment of land application system increases risk and reduces flexibility to meet expected and future river discharge effluent requirements, including potential PCBs, dioxins and metals limitations.
- No beneficial reuse of reclaimed effluent.
- No alternative disposal point.
- Requires more consistent treatment to low level TP and increased O&M costs due to increased chemical usage.
- No offset to the TP waste load allocation beyond the current permitting planning at 3.2 mgd and 50 ppb TP.
- Land cannot be sold until the end of the compliance period while maintaining current practices (approximately 10 years).

The estimated cost for Alternative 4 is approximately $39.6 million with a projected $13.80 million in O&M costs (present worth). This is the least cost alternative, but since it has considerable disadvantages, this is not the recommended option.

2.2.4.1. *Environmental Review*

For this alternative, the primary environmental impacts are associated with the excavation and site disturbance for treatment facility upgrades and pipeline improvements and ability to meet effluent requirements for discharge to the river. Thus, the anticipated potential environmental impacts associated with this alternative consist of the following:

- Impacts to Climate and Physical Aspects (Topography, Geology, and Soils): excavation for treatment facilities and pipeline (short-term and minor long-term impact)
- Impacts to Population, Economic, and Social Profile: potential risk as the system grows and thus could be unable to meet river discharge requirements year-round (potential long-term impact)
- Impacts to Land Use: abandoned reuse will potentially re-purpose the existing land currently used for reuse (potential long-term impact)
- Impacts to Wetlands and Water Quality: potential risk as the system grows and thus could be unable to consistently treat wastewater to meet water quality requirements and standards (potential long-term impact)
- Impacts to Cultural Resources: potential impact if cultural resources are discovered or identified in pipeline corridors (potential short- and long-term impact)
- Impacts to Flora and Fauna: temporary impacts associated with site disturbance which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Agricultural Lands: existing land used for reuse could be sold and re-purposed, thus potentially irreversibly changing the land classification and use for agricultural purposes (potential long-term impact)
- Impacts to Air Quality: temporary impacts associated with construction emissions which can be mitigated through the use of BMPs (short-term impact)
- Impacts to Energy: increased energy consumption with the upgrade of treatment facilities (long-term impact)
- Impacts to Public Health: *positive*, improved ability to meet effluent requirements for discharge to the river (long-term impact)

2.3. Alternative Comparison

An additional comparison of the alternatives has been included in Appendix D. This comparison highlights the major impacts anticipated for each alternative discussed above.

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3. PROPOSED ACTION/SELECTED ALTERNATIVES

3.1. SELECTED ALTERNATIVE

Based on J-U-B and HARSB staff recommendation, and consideration and review of public input, the recommended plan, Alternative No. 2, was adopted by the HARSB Board. This alternative meets the long-term treatment needs and provides planning for potential future regulatory changes.

Alternative No. 2 includes several phases of improvements necessary to meet compliance schedule milestone dates dictated by the NPDES Permit[43]. These improvements have been organized by proposed date of implementation such that projects are scheduled, constructed, and commissioned in advance of compliance schedule milestones. Further, the financial plan (included in Appendix D) utilizes this schedule to identify necessary changes to user rates and fees necessary to fund and implement the proposed improvements.

Phasing (year of implementation) for the selected alternative projects is shown in the financial plan (Appendix D). The timeline for these projects should be reviewed and updated based on final NPDES Permit and 401 Water Quality Certification compliance schedule conditions that have yet to be finalized. Additionally, some of the proposed phasing is not based on the compliance schedule but are based on anticipated system growth rates developed and adopted in the Facility Plan (Appendix A). These growth rates should also be reviewed annually to determine if improvement projects should be advanced in the phasing plan (need to happen quicker) or if they should be delayed.

Last, the project costs are shown in 2012 dollars. The financial plan (included in Appendix D) updates project budgets to current (year of construction) dollars based on historic and projected cost escalation factors, including the Engineering News Record Construction Cost Index (CCI). Those adjusted project budgets should be used at the time of construction for setting project budgeting.

3.2. COST ESTIMATES FOR THE SELECTED PLAN

Cost estimates for the selected improvements were updated to reflect changes selected phasing and necessary improvements. The expected construction costs for the WWTP project are summarized in the following table. A detailed opinion of costs for the project is presented in Appendix D.

Table 3-1: Estimated Construction Costs

Secondary/Advanced Treatment	$30,867,800
Reuse Site Improvements	$4,480,000
Pipeline/Transmission Improvements	$8,032,900
Total Project Construction Cost	$43,380,700

Table 3-2: Estimated Project Costs

Construction	$43,380,700
Engineering and Administration	$8,969,200
Pilot Study	$1,000,000
Project Sub Total	$53,349,900

[43] The NPDES Permit is also accompanied by a 401 Water Quality Certification issued by IDEQ.

4. AFFECTED ENVIRONMENT AND ANTICIPATED IMPACTS

4.1. SERVICE AREA / AREA OF POTENTIAL EFFECT / PROPOSED PROJECT PLANNING AREA

The HARSB service area includes the entirety of the HLRWSD, City of Hayden, and the Kootenai County/Coeur d'Alene airport. These areas encompass the all of Hayden and Avondale Lakes. The WWTP is located in the City of Hayden on the west side of Atlas Road immediately south of the Coeur d'Alene Airport. The HARSB service area is bordered to the east by Kootenai County lands (Idaho Panhandle National Forest) and to the south by the City of Dalton Gardens and the City of Coeur d'Alene. HARSB provides wastewater treatment services to the residents within the service areas for the three entities. The service area boundaries for HARSB consist of the boundaries for each entity (HLRWSD boundary, City of Hayden City Limits and Area of City Impact, Kootenai County/Coeur d'Alene Airport properties). Thus, for this project, the Proposed Project Planning Area (PPPA) consists of all three entities' boundaries and the area necessary for the proposed project improvements (which also includes the outfall corridor on Huetter Road and in the Huetter area). For this project, the Area of Potential Effect (APE) is the same as the PPPA boundary; maps reference the APE/PPPA boundary. Refer to Appendix C for an overview of the APE and PPPA for the system. The connections within the HARSB area consist of a mix of residential, commercial, and industrial. The residential connections are both year-round and seasonal. The APE/PPPA is located in portions of Sections 3-4, 6-11, 13-17, 19-23, 34 Range 3 West, Section 1-26, 28-29, 32-33 Range 4 West, Township 51 North, and Section 4-5, 8-9 Range 4 West, Township 50 North, Boise Meridian.

The project area is located throughout the Hayden/Hayden Lake area and is variable in topography. The terrain is generally very steep and hilly in the eastern portions of the project area while the western and southern portions are generally flatter. The elevation of the HARSB area varies from 3,000 feet in the southeast to 2,130 near the Spokane River shore. The area is flat and somewhat treed in the more densely populated areas and forested in the Hayden Lake area; the western portions are generally prairie areas without many trees. The service area consists of varying lot sizes. The major river in the area is the Spokane River, just south of the APE/PPPA; there are several major creeks (Hayden Creek, Mokins Creek, Jim Creek, and Yellowbanks Creek) in addition to several smaller tributaries.

4.2. PHYSICAL ASPECTS

4.2.1. AFFECTED ENVIRONMENT

The HARSB service areas are located throughout the Hayden and Hayden Lake, Idaho; the project area also includes the proposed outfall along Huetter Road and in the Huetter area. The boundary of the APE is shown in a map in Appendix C.

4.2.1.1. TOPOGRAPHY

The terrain is generally very steep and hilly in the eastern portions of the project area while the western and southern portions are generally flatter, prairie land.

Elevation typically decreases from east to west and north to south. A topographical map of the area is included in Appendix E.

4.2.1.2. *GEOLOGY*

The Geologic Map of Coeur d'Alene, Idaho Quadrangle (Lewis et. al, 2002) was consulted to determine the geologic information for the project area. This map can be found in Appendix E. In addition, Appendix E provides an enlarged version of the above map for the area within the APE/PPPA. The types of rock present are:

- Holocene Deposits – Alluvial Deposits (Holocene), Lacustrine Sediments and Alluvium (Holocene), Fluvial Gravel (Pleistocene and Holocene)
- Catastrophic Flood Deposits and Reworked Outwash – Gravel of Dalton Gardens fan (Pleistocene), Gravel of Green Ferry (Pleistocene), Gravel of Green Ferry, Fan Facies (Pleistocene), Gravel of Green Ferry, Bar Facies (Pleistocene), Gravel of Hayden Lake (Pleistocene)
- Older Sediments – Sediment (Miocene)
- Columbia River Basalt Group – Wanapum Formation, Priest Rapids Member (Miocene), Grande Ronde, N_2 Magnetostratigraphic Unit (Miocene)
- Intrusive Rocks – Biotite Granodiorite (Cretaceous)
- Belt Supergroup – Revett Formation (Middle Proterozoic), Burke Formation (Middle Proterozoic)

Detailed descriptions of these deposits, sediments, basalt and bedrock can be found in Appendix E on the geological map. There are two high-angle faults and one normal fault in the southeastern portion of the HARSB area; there is also a normal fault which is located in the western half of the APE/PPPA. However, the associated description of the map does not identify major, active faults in this area (the normal fault in the western half of the APE/PPPA is shown as a major fault). The Miocene and Younger Faults in Idaho Map (included in Appendix E), was also consulted and found that the faults do not appear to be active. The Fault map also indicates that the project area is within the Lewis and Clark Fault Zone (a pre-Miocene fault zones with possible Miocene and younger strike-slip motion). Additionally, there are a few instances of "strike and dip of compositional layering interpreted as bedding" in the southeastern portion of the APE/PPPA (as indicated on the geologic map).

4.2.1.3. *SOILS*

The soils in the area are mapped primarily as loams (silt, stony, gravelly, and cobbly) by the USDA Soil Survey (although large portions of the Hayden Lake area have not been mapped in the Idaho Panhandle National Forest). The mapped soils are generally well drained with other soils ranging from poorly drained to excessively drained. These soils also have higher shrink-swell potential, but appropriate precautions during construction will be implemented to reduce the impact of this condition. The majority (56 percent) of the soils have a low to moderate possibility of erosion due to the moderate grain size. The soils that have a higher possibility of erosion are loams with low portions of larger grain sizes; these soils are located near the creek areas near Hayden Lake as well as in the flatter portions of the project area. A Natural Resources Conservation Service, Web Soil Survey map and soil descriptions is provided in Appendix E. In addition, the erosion potential survey and shallow excavation suitability is included in Appendix E.

4.2.2. *Environmental Impacts*

4.2.2.1. *Topography*

The proposed project will primarily consist of improvements within the previously disturbed areas. The pipeline replacements and new pipeline will be constructed within the roadway prism or in rights-of-way and thus are anticipated to be placed in previously disturbed areas. The reuse site improvements will occur on previously disturbed areas. The treatment plant improvements will extend into the adjacent parcels, which have been farmed but have not been significantly disturbed. Thus, there may be some new disturbance associated with the treatment site improvements; however, these improvements are not anticipated to negatively impact the existing topography. The existing topography will be restored to its existing condition upon completion of the project (for all improvements).

The Natural Resources Conservation Service was consulted regarding this project. They did not have any concerns other than ensuring that the disturbed areas would be reseeded after the mainline (pipelines) is replaced. The areas to be disturbed due to the pipelines will be restored to their pre-construction condition (as mentioned above).

Therefore, short-term direct impacts due to ground disturbance (pipelines and site improvements) are anticipated, but no long-term, indirect, or cumulative impacts are anticipated.

4.2.2.2. *Geology*

No active fault lines or unusual geological features that may impact the proposed project were identified within the project planning area. Therefore, no impacts (short-term, long-term, direct, indirect, or cumulative) to geology are anticipated.

4.2.2.3. *Soils*

The soils in the area are mapped primarily as loams (silt, stony, gravelly, and cobbly) by the USDA Soil Survey. The soils have some possibility of erosion due to the fine grained particle size. Best Management Practices (BMPs) will be implemented during construction to minimize the potential for the soils to erode and leave the construction site.

Therefore, there will be short-term direct impacts due to ground disturbance (pipelines and site improvements) are anticipated, but long-term, indirect, or cumulative impacts are not anticipated.

4.3. CLIMATE

4.3.1. AFFECTED ENVIRONMENT

The following climate information for the HARSB area was obtained from the Western Regional Climate Center, based on monthly averages:

- Average Annual Temperature High – 59° F
- Average Annual Temperature Low – 37° F
- Average Annual Precipitation – 25.2 inches
- Average Annual Snow Fall – 45.8 inches

The prevailing wind in the area is North, Northeast (November through February) and South (March through October), according to the Western Regional Climate Center at an average of 7.4 mph. There are no known special or unusual meteorological constraints in the area.

4.3.2. ENVIRONMENTAL IMPACTS

There are no known special or unusual meteorological constraints that would affect the feasibility of the proposed project. Therefore, no impacts (short-term, long-term, direct, indirect, or cumulative) are anticipated.

4.4. POPULATION AND FLOW PROJECTIONS

4.4.1. AFFECTED ENVIRONMENT

The system currently serves 7,962 equivalent residences (ERs). A total of 10,061[44] ERs have purchased capacity through the HARSB facility. Thus, 2,099 ERs are currently vacant or are yet to be purchased within the HARSB service areas. Multiple flow meters have been used historically (influent, effluent, partial effluent) to determine WWTP flows and wasteloads.

The number of current ERs served by the system (2012) is based on information in the financial plan (see Appendix D) and provided by the three entities. The following table provides the current number of ERs within the system.

Table 4-1: 2012 ER Summary

	Residential	Commercial/ Industrial	Dormant Connections	Total Active	Total
City of Hayden ERs	4,872	1,071	252	5,943	6,195
HLRWSD ERs	1,896	43	706	1,939	2,645
Kootenai County Airport ERs	-	80	38	80	118

1. Residential includes all units that are billed as one ER.
2. Dormant Connections refer to vacant lots which are not yet hooked up for service.

[44] Out of these, 1,104 ERs are owned by HARSB, available to be purchased by the three entities.

The current population in the HARSB service area can be estimated using the U.S. Census Bureau's estimate for average person per household in Kootenai County (2.24 for 2010) multiplied by the residential ERs served by HARSB. Thus, the population served by the HARSB WWTP is approximately 15,161 people.

The U.S. Census Bureau estimates the population growth rate for Kootenai County from 2000 to 2010 to be 27.4% or 2.74% annually. Population growth can be based on historical population data (WWTP flow from 2007 through 2011) or on documented population growth estimates (Kootenai Metropolitan Planning Organization 2009 and 2011 projections, Rathdrum Prairie Wastewater Master Plan 2010 projections). The Facility Plan (Appendix A) discusses both sources of information in greater detail in Section 3.2.1-3.2.5. Growth rates for the HARSB area have been projected in the range of -1.05 to 5.5 percent, with high variability. Therefore, a growth rate of 3.5% will be utilized in the growth projections, as a conservative annual growth rate. HARSB will monitor and revise these growth projections periodically to ensure an appropriate level of capital improvement to meet the needs of the community. It is anticipated that growth will occur within City limits, ACI limits, or District boundary limits. Table 4-2 and Table 4-3 below present the estimated growth projection, based on the 20-year growth rate (3.5%), the current number of sold connections, and the anticipated number of connections contributing flow to the system at the end of the 20-year planning period. This projection was adopted for the financial analysis, and included in the financial plan (see Appendix D).

Table 4-2: Purchased ER[1]

Purchased ER Forecast	2013	2014	2017	2018	2023	2028	2032
City of Hayden	6,239	6,288	6,472	6,548	7,083	8,003	9,197
HLRWSD	2,645	2,645	2,645	2,645	2,645	2,645	2,645
Kootenai County	119	120	123	124	129	134	138
HARSB	1,059	1,008	821	744	204	1,218	20
Total	10,061	10,061	10,061	10,061	10,061	12,000	12,000

[1]Data contained in this table is referenced from Table 1, of the Financial Plan (Appendix D)

Table 4-3: Connected ER/Population Forecast[1]

Connected ER Forecast	2013	2014	2017	2018	2023	2028	2032
City of Hayden	5,987	6,036	6,221	6,297	6,831	7,752	8,946
HLRWSD	1,959	1,979	2,039	2,059	2,159	2,259	2,339
Kootenai County	81	82	85	86	91	96	100
HARSB							
Total	8,027	8,097	8,344	8,442	9,081	10,106	11,384
Residential Total	6,824	6,884	7,096	7,178	7,716	8,571	9,630
Estimated Population Forecast[2]	15,286	15,420	15,895	16,0789	17,284	19,199	21,571

[1]Data contained in this table is referenced from Table 2, of the Financial Plan (Appendix D)

[2]Estiamted population forecast is based on the assumption that all of the Kootenai County ERs will be industrial/commercial, the percentage of industrial/commercial ERs for the City of Hayden will remain unchanged, and no additional industrial/commercial connections will be added to HLRWSD.

The calculated flow estimates for the HARSB WWTP are shown in Table 4-4; this utilizes the 3.5 percent annual growth rate. Average daily flow was projected through the 20-year planning period. To provide a conservative estimate, peaking factors relative to average daily flows were assumed to remain consistent and re-applied to the 20-year average daily flow projection.

Table 4-4: Projected Influent Flows for WWTP

	"2007-2011" Historical Flow (mgd)	2011 Peaking Factor [a]	2031 Projected Flows (mgd)
Peak Hour Flow (Max Instantaneous)	2.48	2.05	4.92
Observed Maximum Day	1.94	1.68	4.03
Statistical Maximum Day	1.75	1.51	3.62
Statistical Maximum Week	1.48	1.28	3.07
Observed Maximum Month (2011) [c]	1.49	1.29	3.09
Statistical Maximum Month	1.35	1.16	2.78
Average Daily Flow	1.16 (1.21) [b]	---	2.40
Statistical Minimum Month	0.98	0.88	2.12
Actual Minimum Day	0.87	0.38	2.09

a. Relative to Average Daily Flow 2011.
b. Current 2011 average to be used as baseline for projections.
c. Observed maximum month in 2011 was higher than statistical trend due to extreme I/I event.

The 20 year population estimation (utilizing the residential 9,630 ERs estimation) is approximately 21,571 people (9,630 ERs x 2.24 people per household). The 20 year flow projection is 2.40 mgd, average daily flow. Wasteload projections can be found in Section 3.3 of the Facility Plan (Appendix A).

4.4.2. *ENVIRONMENTAL IMPACTS*

The proposed improvements will support the anticipated growth for HARSB, and the growth is not anticipated to be excessive. The Idaho Division of Financial Management's statewide projected 2010-2030 growth rate is 1.57 percent compounded annually (36.5 percent, cumulative, for 20 years). The projected HARSB estimated growth over that time period is 1,939 ERs (purchased). When compared to the statewide projections for that time period, the estimated growth does *not* exceed the statewide projection by 25 percent[45]. However, the estimated growth for HARSB is more than 500 ERs over the life of the project. Therefore, the direct and indirect impacts to the population should be positive in the long-term since the improvements will support the anticipated growth for HARSB. Short-term and cumulative impacts are not anticipated.

4.5. ECONOMIC AND SOCIAL PROFILE

4.5.1. *AFFECTED ENVIRONMENT*

The majority of the homes served by HARSB are primary, year-round and seasonal single family dwelling units. The collection systems also serve several commercial and industrial connections, primarily in the Kootenai County airport area. Although no social-economic data is available specifically for this area, data exists for the City of Hayden, City of Hayden Lake, and Kootenai County broader areas. The U.S. Census Bureau reports the following:

Table 4-5: Economic Information[46]

	Percent of Population Below Poverty Level	Median Household Income
City of Hayden	7.9	$44,946
City of Hayden Lake	4.2	$59,934
Kootenai County	13.6	$46,423

Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and polices. The HARSB will seek the input of all persons within the APE/PPPA through public meetings. All members of the community will be treated the same and have equal access to the Board's public services and decision-making process.

The residents within HARSB will benefit from the proposed project by receiving service from a reliable wastewater treatment system. The project is anticipated to improve the existing system by installing upgrades required to meet the more stringent

[45] In order to exceed the statewide projection by 25 percent, HARSB's growth would have to increase by 7,106 ERs (1.25 x (1.365) x 10,061 purchased ERs)

[46] U.S. Census Bureau, 2010 *State and County QuickFacts* and *American Fact Finder*

NPDES permit limits (enforced due to diminished dissolved oxygen and fish tissue concentrations of toxic compounds). By meeting these new limits (and replacing depreciated components), HARSB constituents will not be subject to significant fines due to non-compliance with their permit and will increase the longevity of the system. In addition, the project will allow for future growth and economic expansion within this area.

4.5.2. *Environmental Impacts*

The residents within HARSB will benefit from the proposed project by receiving service from a reliable wastewater treatment system. By meeting the new NPDES limits (and replacing depreciated components), HARSB constituents will not be subject to significant fines due to non-compliance with their permit and will increase the longevity of the system. The budgeted project will increase user rates, as shown in Table 4-6.

Table 4-6: User Rate Increase Information

	Median Household Income	Current User Rate (% of Income)	Projected User Rate in 2032 (% of Income)
City of Hayden	$44,946	0.57%	1.62%
City of Hayden Lake	$59,934	0.42%	1.22%
Kootenai County	$46,423	0.55%	1.57%

It is important to note that the project cost for the WWTP upgrade is not the only cost borne by the HARSB service area. The constituents also pay for O&M and capital projects for their respective collection systems. The project will allow for future growth and economic expansion within this area, which is a positive long-term impact associated with the project.

Therefore, the direct and indirect impacts to economic and social profile (allowing for future growth and economic expansion) should be positive in the long-term. However, negative direct, indirect and cumulative impacts to economic and social profile (due to rate increases for both the WWTP upgrade and any additional collection system improvements for each entity) are anticipated in the long-term as well. Short-term impacts are not anticipated.

4.6. Land Use

4.6.1. *Affected Environment*

Lumber and agriculture were mainstays of the economy for most of the 20th century, and a number of the residents commuted to the thriving mining district in Idaho's Silver Valley to the east. The last 20 years of the century saw a decline of the lumber industry, the decline of mining, and major changes to agricultural production. During this time, tourism grew into a major force and the area attracted new industries and commercial development. Rapid residential development also occurred.

The HARSB encompasses land use classifications from several entities. The City of Hayden Lake, City of Hayden, and Kootenai County together comprise the land use classifications for the HARSB area. The land area within the project area is mainly comprised of urban/residential, rural residential, commercial, and industrial. See Appendix F for land use maps from the three entities. The project improvements on the WWTP site will occur within light industrial areas. The improvements to the outfall will occur in commercial and urban residential areas. The reuse site improvements will occur in timber and rural residential areas. The improvements are not anticipated to impact the existing land uses for the area.

4.6.2. *Environmental Impacts*

The completion of the improvements is not anticipated to negatively impact the current land use. Therefore, no impacts (short-term, long-term, direct, indirect, or cumulative) are anticipated.

4.7. Floodplains and Wetlands

4.7.1. *Affected Environment*

Based on the Kootenai County, Idaho and Incorporated Areas Flood Insurance Rate map, dated May 3, 2010, there are some proposed improvements located within the 100 year special flood hazard area; although no base flood elevations have been identified. Portions of the floodplain map are provided in Appendix G. The proposed (and alternate) alignment for the Huetter Pipeline appears to travel through the flood hazard area, near the Spokane River. For the majority of the alignment in this area, the pipeline will be located in the existing railroad right-of-way before it heads south and connects with the existing river diffuser. The other improvements are not within the 100 year flood hazard area.

United States Fish and Wildlife Service provided a National Wetlands Inventory database[47]. A map of wetlands (also showing the improvements) within the project area was prepared using the database and is included in Appendix G. It does not appear that the improvements are located in wetland areas. The Huetter Pipeline is located *adjacent* to designated wetlands, but no work will be occurring below the ordinary high water mark (OHWM).

4.7.2. *Environmental Impacts*

Best management practices (BMPs) will be utilized to protect the water quality of the wetlands and floodplains and to prevent sediment from leaving the construction site.

The Idaho Department of Water Resources was consulted regarding the impact of the improvements on floodplains in the project area. According to them, the only project component located within the flood hazard area (for the Spokane River) is the new outfall pipeline. Since Kootenai County is the jurisdiction in this area, they recommended contacting the floodplain administrator for Kootenai County to determine whether a floodplain development permit will be required. The Kootenai

[47] The geodatabase is only effective as of the date of extraction (2009). Also the dataset represents the extent, approximate location and type of wetlands and deepwater habitats in the US. Refer to http://www.fws.gov/wetlands/Data/Wetlands-Geodatabase-User-Caution.html for more information on the geodatabase.

County floodplain administrator concurred that a floodplain development permit would be required for the outfall work near the Spokane River. Thus, a floodplain development permit will be required for construction activities in the mapped flood hazard area.

The Army Corps of Engineers also provided consultation regarding the wetland locations for this project. The Corps determined that there were no waters of the United States, including wetlands, within the Corps' regulatory jurisdiction. Therefore, both the Idaho Department of Water Resources (IDWR) and the Idaho Department of Lands (IDL)[48] were contacted to conduct follow-up consultation regarding the wetlands. The IDWR indicated that they do not have jurisdiction over the project area since the work will not be occurring below the OHWM. The IDL also indicated that they would only have jurisdiction if the project areas were below the elevation 2,128 feet on the Spokane River. Since none of the project areas fall within this requirement, none of these agencies have jurisdiction over the areas. HARSB will need to employ the use of BMPs to ensure that sediment from the construction sites does not leave and enter wetlands (non-jurisdictional or otherwise).

Therefore, short-term direct impacts are anticipated for floodplains or wetlands due to potential for sediment to leave the construction site and enter wetlands and floodplains near to the proposed project sites (which will be mitigated through best management practices (BMPs). In addition, submittal of and compliance with a floodplain development permit from Kootenai County will be required for the construction activities. Indirect, long-term positive impacts are expected since existing water sources will be protected by improving the overall system reliability. Cumulative impacts are not anticipated.

4.8. Wild and Scenic Rivers

4.8.1. *Affected Environment*

The nearest designated Wild and Scenic River to the project area is a portion of the St. Joe River. This is approximately 50 miles from the project area. See Appendix H for a map of the Wild and Scenic Rivers in the area.

4.8.2. *Environmental Impacts*

Since there are no designated wild and scenic rivers in the project area, no impacts (short-term, long-term, direct, indirect, or cumulative) are anticipated.

4.9. Cultural Resources

4.9.1. *Affected Environment*

The area west of Hayden Lake was originally settled by homesteaders in the late 1800s. By the early 1900s, the area grew into a thriving community based on local agriculture and logging-related activities around Hayden Lake. In the late 1920s, many people moved to the area from the Midwest and other areas, developing more

[48] Generally, the IDWR has jurisdiction when the water body or wetland is "flowing" and the IDL has jurisdiction when the water body or wetland is "isolated".

agricultural land under the Homestead Act, while working in the logging, lumber, and recreational industries centered on the lake. The City of Hayden Lake was incorporated in 1955. Residential and commercial development has continued to grow in the area since the 1950s.

A search of the Idaho sites listed on National Register of Historic Places, provided in Appendix C, shows the historic sites located in the project area. There are a total of four historic properties within the APE/PPPA, all of them near Hayden Lake. John A. Finch Caretaker's House is located near the Hayden Lake Country Club and the Clark House is located on Hayden Lake Road. The Jacob and Cristina Thunborg House and the East Hayden Lake School II are on the other side of Hayden Lake near Chicken Point. Appendix I also contains a map with the location of these four properties. The closest Tribal Land is the Coeur d'Alene Indian Reservation (Coeur d'Alene Tribe), which is approximately 10 miles south of the project area. The Kalispell and Bitterroot Salish Tribes also have historic ties to the HARSB area.

4.9.2. Environmental Impacts

Since the majority improvements will be occurring within previously disturbed areas, impacts to cultural resources are not anticipated.

The State Historic Preservation Office was consulted regarding the impact to cultural resources from this project. They indicated that the river outfall, treatment plan expansion, and any other areas that would disturb previously undisturbed ground would require an archeological survey. They also indicated that the project area is within an area where archeological sites may exist.

Therefore, Eastern Washington University Archeological and Historical Services conducted an archeological survey for the project. The survey involved both a field survey and a records search in addition to correspondence with the affected Tribes. Records search revealed that cultural resource studies have been completed in the area, but no NRHP (National Register of Historic Places) eligible cultural resources were identified. The prairie areas of the project were judged to have a low potential for historical resources due to the area's history of sparse population and broad agricultural fields. The area near the Spokane River was judged to have a higher potential for historical resources due to the extent of activity that has taken place on the north bank of the river. The field survey revealed no artifacts. Therefore, the project is not expected to impact cultural resources. If artifacts are discovered during the course of construction, all work will stop, the Coeur d'Alene Indian Tribe and SHPO will be contacted, and mitigation may be further evaluated.

The cultural resource assessment was completed and submitted to the Idaho Department of Environmental Quality, but is not included for confidentiality reasons. The SHPO reviewed the cultural resource assessment and documented that it meets the Secretary of the Interior's Standards. No additional investigations were recommended. The Coeur d'Alene Tribe did not provide any comments on the assessment. Refer to Appendix P for correspondence with the SHPO and the Coeur d'Alene Tribe.

Therefore no impacts (short-term, long-term, direct, indirect, and cumulative) to cultural resources are anticipated.

4.10. PLANTS AND WILDLIFE

4.10.1. *AFFECTED ENVIRONMENT*

The U.S. Fish and Wildlife Office was consulted to determine threatened and endangered plant and animal species in Kootenai County. A list from the Office can be found in Appendix J. According to this agency's database, there are no endangered species within the county. Threatened species include the following: Canada Lynx, Bull Trout, Spalding's Catchfly, and Water Howellia. Candidate species include the following: Yellow-billed Cuckoo and North American Wolverine. Critical habitat has been identified in the Columbia River Basin for the protection of Bull Trout, but there are no designated critical habitat areas in the HARSB area, as shown in Appendix J.

Essential fish habitat (EFH) for ocean going fish was also examined for the HARSB area. Chinook Salmon are identified as an ocean going fish in the state of Idaho (primarily in central Idaho). After reviewing a map of EFH in Idaho, provided by IDEQ, HARSB is outside of this habitat area. Refer to Appendix J for the map of EFH in Idaho.

Upon further review, the Spalding's catchfly has been known to exist within Kootenai County. This species can typically be found in moist grasslands, sagebrush-steppe habitats, or pine forests. After contacting a local wetland scientist (refer to Appendix P for correspondence and maps), it was discovered that this species can be found in dry Palouse grasslands, which are dominate in the southwestern area of Kootenai County. Additionally, based on the level of disturbance that has occurred on the land application (currently and in the past farming activities), it is doubtful that this species would be found on the project site. Thus, this species is not anticipated to occur in the project location.

4.10.2. *ENVIRONMENTAL IMPACTS*

As mentioned above, the project area is not located in a critical habitat area and it is not anticipated that the species or habitat areas will be affected by the project.

The U.S. Fish and Wildlife Office provided consultation for this project. They provided a link to the updated countywide species and habitat listing. The consultation also discussed a Section 7 consultation, which is required if there is a federal nexus[49] (such as federal funding or federal permitting). It is not anticipated that there will be a "take" of any listed species or their habitat. In addition, the Idaho Department of Fish and Game does not anticipate that the proposed project will have a significant impact on the fish and wildlife in the project area, since the improvements will fall within existing rights-of-way.

Therefore, no impacts to plants and wildlife (short-term, long-term, direct, indirect, or cumulative) are anticipated.

[49] If a federal agency is involved in the project in some way, then it is the responsibility of the federal agency to assess whether or not implementation of the project may affect listed species or their habitat. If there is no federal involvement, the only coordination with the U.S. Fish and Wildlife is if there is an anticipated "take" of a listed species.

4.11. Recreation and Open Space

4.11.1. *Affected Environment*

The project area has been recognized by many sources for its beautiful scenery and recreational uses. There are city parks throughout the more densely populated areas (Croffoot Park and Sports Complex, Broadmore Park, City of Hayden City Park, Finucane Park), one public beach (Honeysuckle Beach), a national recreational trail (English Point), and two campgrounds/boat launches (Sportsman Park and Mokins Bay). The only improvement located within these areas is the H1 force main replacement. This improvement will occur within the pre-existing roadway and pipeline alignment and thus is not anticipated to impact the park. The other improvements are not located within recreational areas. Refer to Appendix K for a map showing these locations.

4.11.2. *Environmental Impacts*

The H1 force main replacement is not anticipated to disturb areas beyond its original disturbance or beyond the roadway prism and thus is not anticipated to negatively impact recreational areas. Therefore, short-term, direct impacts are anticipated in association with disturbance for the H1 force main replacement. No long-term, indirect, or cumulative impacts are anticipated.

4.12. Agricultural Lands

4.12.1. *Affected Environment*

Prime agricultural classification is provided as part of the USDA Soil Survey conducted for the soil information in Section 4.1. According to the Soil Survey, “farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops.” There are several areas that are listed as areas of prime farmland (with varying classifications) and are summarized in Table 4-7.

Table 4-7: Prime Farmland Classifications

Classification	Percent (by acreage) of APE/PPPA
Prime farmland if irrigated	50.6
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	0.2
Farmland of statewide importance	0.9
Farmland of statewide importance, if drained	2.5
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season	0.7
All areas are prime farmland	0.9

The areas listed as “prime farmland if irrigated” are primarily located the prairie areas and in golf course areas, both of which are irrigated. The majority of improvements are located within previously-disturbed areas which are not utilized for agricultural purposes. These include line replacements/installations within roadway prisms and modifications to the treatment facility. The treatment facility and reuse area are both located in prime farmland areas. The treatment facility area is not currently being utilized for agricultural purposes, and the reuse site will continue to be utilized for reuse farming purposes. The improvements are not anticipated to irreversible convert agricultural lands (even though they are located in these classified farmland areas).

4.12.2. Environmental Impacts

The planning area includes several areas of prime farmland (with varying classifications). The areas listed as "prime farmland if irrigated" are primarily located in the prairie areas and in golf course areas, both of which are irrigated. The improvements are located in classified agricultural areas, but the improvements are not anticipated to irreversible convert agricultural lands (since they are not currently used for agricultural purposes or will continue in agricultural use). Therefore short-term, direct impacts are anticipated due to ground disturbance for the improvements (line replacements/installations and treatment facility/reuse area improvements). Long-term, indirect, or cumulative impacts are not anticipated.

4.13. Air Quality

4.13.1. Affected Environment

The State of Idaho has been delegated authority to regulate air quality through the Environmental Protection Agency (EPA) and the Clean Air Act. The State Implementation Plan provides the rules and regulation to maintain acceptable air quality standards within the state and site specific plans delineating areas that do not meet air quality standards. Areas that do not meet specific air quality standards are known as Nonattainment Areas. A map showing Nonattainment Areas and Areas of Concern for the State of Idaho is provided in Appendix M. The proposed project planning area is not located in a Nonattainment area or an area of concern. Additionally, Kootenai County is classified as "attainment" or "unclassified" for all Criteria Pollutants; but it is in an area of concern for particulate matter and is currently included in an "Interim Air Quality Plan" for managing particulate matter emissions in the county. Potential air quality impacts may arise from land clearing, demolition, construction and subsequent operational phases of the project[50].

The IDEQ has established rules regarding odor control[51] at wastewater treatment plants; they are not numeric limits but rather subjective criteria for perception of odor-containing air pollutants[52]. Generally, odor control consists of containment,

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[50] Information on Kootenai County classification for Criteria Pollutants and the Interim Air Quality Plan was provided by IDEQ's agency consultation.

[51] IDAPA 58.01.01.776.01

[52] The plants have and should continue to take a pro-active approach to monitor, log, and record complaints that are received, which will help to identify specific processes and activities that generate odor complaints.

collection and transmission, and treatment. Because of the varying conditions and odor-generating compounds present at individual unit processes within the WWTP, the odor control treatment systems specific to each process area will be addressed during the design phase. Future plant-wide odor control has not been addressed specifically in the Facility Plan (Appendix A). Rather, potential future unit processes requiring odor control (headworks, influent flow equalization, and any biosolids handling processes) will be addressed individually.

Noise from the existing facility occurs due to the treatment processes in placed (pumps, motors, etc.). However, the WWTP is located in a light industrial area and there have not been any complaints from surrounding properties.

4.13.2. Environmental Impacts

The IDEQ was consulted, and they require that reasonable controls be implemented during construction and maintenance to prevent fugitive dust during all phases of the project. The project plans should also describe the proper disposal of any demolition and construction debris in accordance with solid waste regulations. Open burning of demolition or construction debris is not allowed. Vegetation/land clearing should be accomplished using mechanical methods to avoid generation of smoke. Demolition and construction debris must be treated in accordance with solid waste regulations.

Additionally, the facility's standby power (generator) is exempted from permitting requirements (limited by IDAPA 58.01.01.222.02.d, shown below) if the generator meets these requirements.

> "Stationary internal combustion engines used exclusively for emergency purposes which are operated less than five hundred (500) hours per year and are fueled by natural gas, propane gas, liquefied petroleum gas, distillate fuel oils, residual fuel oils, and diesel fuel; waste oil, gasoline, or refined gasoline shall not be used".

This is a Category II exemption (according to the IDAPA referenced above). Documentation of total hours of operation per year, available to IDEQ at any time, is required for compliance.

The standby power must also meet National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE rule). After completing the web-based tool[53], the applicable federal standards are 40 CFR part 60, subpart IIII (for compression ignition) or 40 CFR part 60, subpart JJJJ (for spark ignition).

Lastly, odor control for individual unit processes within the WWTP will be addressed for each unit process during design. Odor control will meet all applicable standards and will consist of containment, collection and transmission, and treatment. Odor control is anticipated to be required at the headworks, influent flow equalization, and any biosolids handling processes.

[53] http://www.epa.gov/ttn/atw/rice/output/quiz.html

Short-term impacts are anticipated in association with construction emissions; however, the impact to air quality is not anticipated to exceed state or federal limits. Long-term impacts are anticipated due to odors from individual processes within the WWTP, but odor control will be addressed for each unit process and will not impact air quality beyond state or federal limits. Indirect or cumulative impacts are not anticipated. Documentation of exemption compliance for the emergency power generators (total hours of operation per year) must be available for IDEQ at any time.

4.14. Water Quality

4.14.1. Affected Environment

4.14.1.1. Surface Water

The primary surface water bodies within the HARSB area are Avondale Lake and Hayden Lake as can be seen in the topographical map in Appendix E. Both of the lakes are fed by small tributaries (Hayden Creek, Yellowbanks Creek, Mcleans Creek, Windy Creek, Harrison Creek, Colburn Creek, Mokins Creek, Nilsen Creek, Jim Creek) and discharge to the SVRPA. Avondale Lake is of good quality. Hayden Lake currently has a TMDL (Total Maximum Daily Load, established by the EPA) for total phosphorus. The phosphorus originates from Hayden Creek, Mokins Creek, and other tributaries, atmospheric fallout, residential storm water, and shoreline septic systems (not within the HLRWSD service area). The phosphorus entering the lake does not discharge to another surface water body; rather it stays either in the lake or the lake bottom sediments and then eventually travels to the SVRPA. Since portions of the project are adjacent to Hayden Lake, excess nutrients cannot be input into the Lake from the project (due to the limitations expressed in the TMDL). For more information on the Hayden Lake TMDL[54], see Appendix N.

During construction, BMPs will be developed and implemented to protect the quality of the nearby surface water bodies from further degradation.

4.14.1.2. Adjacent Surface Water

The treatment facility discharges to the Spokane River during a portion of the year. This discharge is regulated by the National Pollutant Discharge Elimination System (NPDES) limits. The current permits for the Spokane River dischargers are driven by a concern for diminished dissolved oxygen and fish tissue concentrations of toxic compounds.

The Spokane River and Lake Spokane Dissolved Oxygen Total Maximum Daily Load (DO TMDL) was prepared by the Washington Department of Ecology (WDOE) and approved by the EPA in July 2010. The TMDL was developed to address water quality concerns in Lake Spokane (Long Lake), the upstream impoundment above the Long Lake Dam. The TMDL restricts discharge of oxygen-demanding substances, including ammonia-nitrogen, total phosphorus, and five-day carbonaceous biochemical oxygen demand ($CBOD_5$) to among the lowest levels in the United States. Since Idaho permits issued by EPA cannot cause the violation of a downstream water quality standard, EPA

[54] Sub-Basin Assessment of Total Maximum Daily Loads of Lakes and Streams Located on or Draining to the Rathdrum Prairie (17010305)

plans to issue revised NPDES Permits in 2012 consistent with those issued by WDOE in 2010 and 2011. The anticipated permit for HARSB will equate to concentration limits of 3.8 mg/L (parts per million) for ammonia, 0.05 mg/L phosphorus (50 parts per billion), and 3.8 mg/L $CBOD_5$ at 3.2 million gallons per day (mgd) of flow.

In addition to the DO TMDL, WDOE is also requiring Washington dischargers to participate in a Regional Toxics Task Force (RTTF) with the express purpose of reducing polychlorinated biphenyl's (PCBs) in the Spokane River. Fish tissue concentrations in the Spokane River and Lake Spokane led to action on toxics, including a proposed PCB TMDL in Washington in 2006, a TMDL for cadmium, lead and zinc in 1998, as well as concerns over dioxin and a "PCB-like" flame retardant molecule called polybrominated diphenylether (PBDE). Under the proposed draft NPDES Permit for HARSB, EPA does not require participation in the RTTF. However, the Idaho Water Quality Standard for PCB was more stringent than the Washington standard until May 2012 when EPA rejected Idaho's daily fish consumption[55] value. EPA stated that Idaho's recommended national standard of 17.5 g/day of fish consumption may be inadequate based on fish consumption studies completed in Oregon (175 g/day), by the Spokane Tribe of Indians, and underway in Washington. Idaho has responded to EPA by currently pursuing rulemaking that may include Idaho-specific fish consumption rates. Because of these issues, EPA intends to require Idaho dischargers to regularly sample influent and effluent for PCB and dioxin plus sample river water for PCBs to determine "if the discharges have the reasonable potential to cause or contribute to excursions above water quality standards for PCBs in waters in the State of Idaho, State of Washington, or the Spokane Tribe of Indians."

Heavy metals also tend to accumulate in fish tissues and create concern for human health. Idaho's "TMDL for Dissolved Cadmium, Lead, and Zinc in the Surface Waters of the Lake Coeur d'Alene Basin" was ruled void on procedural grounds by the Idaho Supreme Court in 2003 and has not been revisited. Since Idaho has the Spokane River listed as a high priority water body, IDEQ contends that existing permit holders are limited to the mass loadings currently allowed in approved permits until a TMDL is approved. Therefore, river discharge limitations for metals will be influenced by both the proposed TMDL and the fish consumption standards being considered in 2012 and beyond.

Due to the aforementioned concerns and requirements, the treatment facility will need to meet the discharge requirements for the new permit. Additionally, excess nutrients cannot be input into the Spokane River (which is adjacent to portions of the project) by the project (due to limitations in the TMDL's and NPDES permit). During construction, BMPs will be developed and implemented to protect the quality of the nearby surface water bodies from further degradation.

4.14.1.3. GROUND WATER

The Spokane Valley-Rathdrum Prairie Aquifer underlies the western portion of the HARSB area, and the eastern portion is within the source area for the Aquifer, as

[55] Fish consumption essentially sets limits for 187 Water Quality Standards and 88 toxic compounds in Idaho, including PCBs, dioxins, and metals.

can be seen in the map of the Aquifer in Appendix C. The Aquifer is classified as a "Sole Source Aquifer" by the EPA. A sole source aquifer classification indicates that the aquifer supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer. This aquifer is the sole source of drinking water for the majority of residents within HARSB and makes the protection of the source very important. Even though the aquifer lies 150 to 400 feet below the surface in Idaho, it is susceptible to contamination as the coarse sand and gravel offer limited protection from surface activities. In addition, all aquifer flow that is not pumped for use by the region's population recharges the Spokane River in Washington beginning approximately seven miles west of the Idaho border. Therefore, this aquifer is categorized as a Sensitive Resource Aquifer[56] by the IDEQ and requires the highest level of protection.

Both Hayden Lake and Avondale Lake recharge the SVRPA. Hayden Lake's discharge is the major contributor to the recharge flows in the aquifer. Area lakes contribute about 20 percent of the inflow into the Aquifer. Hayden Lake's inflow into the Aquifer constitutes the largest inflow from area lakes (62 cubic feet per second), contributing approximately 22 percent of the overall inflow from area lakes, which is considerable relative to Hayden Lake's size.

As previously mentioned, HARSB also pumps its recycled water to fodder crops and hybrid poplars from June through September when river flows fall below 2,000 cfs. Irrigation must be conducted at agronomic rates – rates that meet the crop needs without percolating reuse water and dissolved constituents into the underlying groundwater (which in this case is the SVRPA).

The project is not anticipated to affect water rights or the quantity of ground water available for private drinking water wells. Since the project will improve the existing system (replacing depreciated elements) and improve the quality of the wastewater effluent, the ground water quality will be further protected from future pollution of uncontrolled, untreated discharges and enhanced through higher quality effluent.

During construction, BMPs will be developed and implemented to protect the quality of the ground water from further degradation from uncontrolled untreated discharges.

4.14.2. ENVIRONMENTAL IMPACTS

4.14.2.1. SURFACE WATER

The primary surface water bodies within the District are Avondale Lake and Hayden Lake, as can be seen in the topographical map in Appendix E. Hayden Lake currently has a TMDL for total phosphorus. The Spokane River is adjacent to portions of the project area and also has a TMDL and several nutrient input requirements for dischargers. Since portions of the project are adjacent to Hayden Lake and Spokane River, excess nutrients cannot be input into the Lake or River from the project (due to the limitations expressed in the TMDLs and other requirements).

The IDEQ was consulted, and they require the protection of surface water and

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[56] The SVRPA is the only Sensitive Resource Aquifer in Idaho.

control of erosion and sedimentation by the use of acceptable best management practices (BMPs). If the project disturbs an area greater than 1 acre and drains to a water of the United States, the project will need to comply with the most recent edition of the Construction General Permit, a permit administered by the EPA. The project will need to have a Stormwater Pollution Prevention Plan, which complies with the Construction General Permit; if it is determined that compliance is necessary.

The IDL was also consulted regarding this project. They indicated concern and need for permitting/easements if there would be work occurring in the Spokane River. The River diffuser will not be moved or changed and the outfall line will be reconnected prior to the diffuser. Thus, no work in the River will occur and should not require permitting or easements from the IDL.

Therefore, short-term impacts to water quality (surface water) are anticipated due to ground disturbance near surface water bodies, but the surface water bodies will be protected utilizing BMPs during construction, as required by IDEQ. Indirect, long-term positive impacts are expected since existing water sources will be protected by improving the overall system's ability to meet the discharge requirements of the Spokane River. However, there could be indirect, long-term negative impacts as the system grows (it may not be able to meet water quality requirements in the future). Cumulative impacts are not anticipated.

4.14.2.2. Ground Water

The SVRPA underlies the western portion of the HARSB area, and the eastern portion of HARSB is within the source area for the Aquifer, as can be seen in the map of the Aquifer in Appendix N. The Aquifer is classified as a "Sole Source Aquifer" by the EPA. This aquifer is the sole source of drinking water for the majority of residents within the HARSB area and makes the protection of the source very important.

The project is not anticipated to affect water rights or the quantity of ground water available for private drinking water wells. Since the project will improve the existing system (replacing depreciated elements) and improve the quality of the wastewater effluent, the ground water quality will be further protected from future pollution of uncontrolled, untreated discharges and enhanced through higher quality effluent.

The EPA Sole Source Aquifer Program provided consultation for this project. They reviewed the information provided and found that the project would not have a significant adverse impact on the Spokane Valley-Rathdrum Prairie Aquifer. Thus, short-term, long-term, direct and indirect positive impacts to water quality and sole source aquifer (ground water) are anticipated due to improvement of existing system to decrease likelihood of unmonitored, untreated discharges from entering the ground water system and from enhanced quality effluent. Short-term impacts are anticipated due to ground disturbance but will be mitigated through the use of BMPs. Cumulative adverse impacts are not anticipated.

4.15. PUBLIC HEALTH

4.15.1. AFFECTED ENVIRONMENT

The existing WWTP is maintained and operates well. The recommended improvements to the HARSB WWTP will improve the facility's ability to meet Spokane River discharge requirements, which are in place to address diminished dissolved oxygen and fish tissue concentrations of toxic compounds. If HARSB continues utilizing their current system, un-improved, they could be posing a potential future risk to public health and water quality if they were unable to meet the discharge requirements for the Spokane River. This would potentially subject HARSB to future fines for unpermitted discharges and non-compliance.

4.15.2. ENVIRONMENTAL IMPACTS

Currently, the treatment facility operates well and is maintained. Improving the system with this project will extend the life of the system and reduce the treatment's impact to public health and water quality of the Spokane River and other adjacent water bodies.

The Panhandle Health District was consulted regarding this project. They expressed concern that the reuse farm would be eliminated from the system. The reuse farm will not be substantially expanded as part of this project but will not be eliminated. The proposed improvements anticipate year-round discharge to the River with supplemental use of the reuse farm. Based upon this, the Panhandle Health District supports the project and did not have any further concern (assuming the reuse farm continues to be utilized).

Thus, the impacts to public health are anticipated to be positive in the long-term, short-term, directly, indirectly, and cumulatively since the project will improve the HARSB treatment facility's ability to meet discharge requirements for the Spokane River and will continue use of the reuse farm.

4.16. SOLID WASTE/SLUDGE MANAGEMENT

4.16.1. AFFECTED ENVIRONMENT

The current sludge management includes biosolids stabilization and dewatering system (aerated sludge holding tank, sludge dewatering, and disposal). HARSB aerobically digests the sludge to Class B quality and pays a Contractor to haul and land apply the biosolids. The proposed improvements will upgrade the aeration system, add screw presses for dewatering, and contracted composting as a disposal method[57]. At a later time, HARSB plans to upgrade to either aerobic or anaerobic digestion with sludge thickening and contracted land application for disposal. These plans conform to the Part 503 Rule (refer to Section 2.1.6 for more information on the biosolids improvements).

[57] Since the sludge will not meet Class B quality (under the new treatment process), it is necessary that the contract for the disposal Contractor provide a treatment process such as composting.

4.16.2. *ENVIRONMENTAL IMPACTS*

The near-term improvements to the biosolids handling will not significantly change the sludge management process. The individual components will be upgraded and contracted composting for disposal. The long-term improvements will upgrade the biosolids management plan to an aerobic or anaerobic digestion and contracted land application system. Since the improvements will meet the Part 503 Rule, no impacts (short-term, long-term, direct, indirect, or cumulative) are anticipated.

4.17. ENERGY PRODUCTION/CONSUMPTION

4.17.1. *AFFECTED ENVIRONMENT*

The existing facility utilizes energy (fuel, power, etc.) to operate the WWTP and all related facilities (reuse site and outfall). The proposed project will be adding several new treatment processes as well as pumping and ancillary facilities. These will require an increased energy consumption to appropriately operate the facility. When selecting new treatment components and pumping facilities, energy efficient components will be examined so as to improve efficiency and reduce the impact to energy consumption.

4.17.2. *ENVIRONMENTAL IMPACTS*

The proposed facility upgrades are anticipated to increase overall energy consumption due to new treatment processes as well as pumping and ancillary facilities. Energy efficient components will be examined so as to improve efficiency and reduce the impact to energy consumption. Therefore, long-term, direct impacts to energy consumption are anticipated due to increased energy consumption for the WWTP. Short-term, indirect, and cumulative impacts are not anticipated.

4.18. REUSE/LAND APPLICATION

4.18.1. *AFFECTED ENVIRONMENT*

The treatment facility currently discharges to either the Spokane River or to a reuse farm that grows timothy hay, orchard grass, alfalfa hay, and hybrid poplar trees on a 476-acre site. The facility currently utilizes approximately 300 acres of the reuse site for irrigation and approximately 4.0 acres for a storage lagoon.

The proposed project will maintain the existing irrigation system and expand the system (as needed) on the existing site[58] (the project will not expand the reuse facilities beyond the existing site boundaries). In order to grow the crops (after BNR and phosphorus reduction), most of the nitrogen will need to be derived from commercial inorganic sources. The site will resemble typical agricultural operation over the aquifer but will be managed at lower nutrient loadings and loss to the aquifer. It is possible that the site could be used to reduce chemical use and accept considerable biosolids produced at the treatment plant in the future. Refer to Section 11.6 in the Facility Plan (Appendix A) for more information on these alternate uses of the reuse site.

[58] As wastewater flows increase, the current non-irrigated areas will be planted and drip irrigation systems extended. Further, within the 20-year period, the current storage lagoon will likely require maintenance to the liner system.

4.18.2. *<u>Environmental Impacts</u>*

The improvements will not significantly impact the reuse or land application of wastewater but are intended to maintain the existing system and expand as needed. Therefore, impacts to reuse/land application (short-term, long-term, direct, indirect, or cumulative) are not anticipated.

4.19. Regionalization

4.19.1. *<u>Affected Environment</u>*

HARSB was formed through a 1986 Joint Powers Agreement (JPA) between the City of Hayden, the HLRWSD, and the Kootenai County. All three entities pump wastewater to the regional HARSB Facility. Thus, the HARSB facility is already a regional facility, accepting wastewater from three entity service areas.

4.19.2. *<u>Environmental Impacts</u>*

The improvements to the treatment facility will not affect the agreement between HLRWSD, City of Hayden, or Kootenai County for the treatment of wastewater. Thus, impacts (short-term, long-term, direct, indirect, and cumulative) to regionalization are not anticipated.

5. ENVIRONMENTAL IMPACT MITIGATION

Section	Regulatory Agency	Mitigation
4.2 Physical Aspects AND 4.14 Water Quality	Idaho Department of Environmental Quality	Stormwater controls (BMPs) will need to be developed that adequately protect surface waters and ground water from being impacted during and after construction. If the area of disturbance is larger than 1 acre, a Stormwater Pollution Prevention Plan (complying with General Construction Permit) will be required through EPA.
4.7 Floodplains and Wetlands	Kootenai County	A floodplain development permit will be required for construction activities in the mapped flood hazard area.
4.9 Cultural Resources	Idaho SHPO and Coeur d'Alene THPO	If artifacts are discovered during the course of construction, the Coeur d'Alene Indian Tribe and SHPO will be contacted and all work will stop. Mitigation may be further evaluated.
4.13 Air Quality	Idaho Department of Environmental Quality	The contractor must mitigate fugitive dust as a result of construction of this project using reasonable controls in accordance with IDEQ regulations and should be advised during the preconstruction conference of the requirements to keep dust to a minimum. The project plans should also describe the proper disposal of any demolition, construction, or cleared vegetation debris. Open burning of debris is not allowed. Demolition and construction debris must be treated in accordance with solid waste regulations. The District's standby power is exempted from permitting requirements per IDAPA 58.01.01.222.02.d. Documentation of hours of operation per year must be kept and made available to Idaho IDEQ at any time for determination of continued compliance. The standby power must also meet the applicable federal requirements: 40 CFR part 60, subpart IIII (for compression ignition) or 40 CFR part 60, subpart JJJJ (for spark ignition). Odor control at individual unit processes throughout the WWTP may be required to contain, collect and transmit, and treat odors. Design of these odor control facilities will meet state and federal standards.

6. PUBLIC PARTICIPATION

As part of the improvement alternative selection process, public input was sought and received from the community. This section identifies the steps taken to solicit public input.

The Public Review Draft Facility Plan for the Wastewater Treatment Facility was presented to the HARSB area at a public meeting held on November 1, 2012 at the City of Hayden City Hall. During this meeting a presentation was given identifying and discussing the recommended improvement alternatives. Cost information for the improvements (presented in Section 3 of this document) was also summarized in the presentation. The meeting was announced through a legal notice in the local paper (on October 17, 2012) as well as one advertisement and one article. The public's questions during the public meeting mainly consisted of the reasoning for the project and costs. These questions were addressed by the Board, the Engineer, or the HARSB manager. Copies of the local paper notices (legal notice, advertisement, and article), presentation, meeting minutes, and meeting sign-in sheets are included in Appendix O.

The public was provided a 15-day comment period (October 17th through November 1st) to review the Public Review Draft document and submit written comments to the Board regarding the improvement alternatives *prior to and at* the November 1st meeting. Notice of this comment period was provided in the legal notice (published on October 17th). No written comments were received. Time was given during the November 1st meeting for verbal comments; the public comment period was officially closed prior to the Board's decision (see below). A copy of the comment form (which accompanied the Public Review Drafts at the viewing locations and at the November 1st meeting) is included in Appendix O.

After reviewing and hearing the public comments received during the meeting (no written comments were received during the 15-day comment period, but time was given at the meeting for verbal comments), the Board selected the recommended improvement option (Alternative 2) for the WWTP upgrade (discussed in further detail in Section 2 and 3). The recommended improvement option consists of specific improvements to the WWTP, the reuse site, and pipelines and outfalls.

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8. AGENCY CONSULTATION

The following table provides a list of agencies that were contacted November 5, 2012 via mail to request their comments, concerns, or any potential impacts of the proposed project. The request letters and their response are located in Appendix P.

Agency	Contact	Address
US Army Corps of Engineers, Coeur d'Alene Regulatory Office	Beth Reinhart/ Shane Slate	2065 W. Riverstone Drive, Ste. 201 Coeur d'Alene, ID 83814
US Fish and Wildlife Service	State Supervisor/ Ben Conard	11103 East Montgomery Drive Spokane, WA 99206
Idaho Department of Environmental Quality, Coeur d'Alene Regional Office	Katy Baker-Casile/ John Tindall	2110 Ironwood Parkway Coeur d'Alene, ID 83814
US EPA, Idaho Operations Office	James Werntz/ Maria Lopez	1435 North Orchard Boise, ID 83706
EPA Region 10	Mike Lidgard, Manager	1200 6th Avenue, OWW 130 Seattle, WA 98101
EPA Region 10, Office of Environmental Assessment	Sue Eastman, Hydrogeologist	1200 6th Avenue, OWW 136 Seattle, WA 98101
USDA-NRCS	Aubrey Woodcock, District Conservationist	7830 Meadowlark Way, Suite C1 Coeur d'Alene, ID 83815
Idaho Department of Water Resources	Mary McGown, State NFIP Coordinator/Greg Taylor (CDA office, wetlands issue)	322 East Front Street Boise, ID 83720
Idaho Department of Fish and Game, SE Region	Regional Supervisor/ Charles Cosi	2885 Kathleen Avenue Coeur d'Alene, ID 83815
Idaho Department of Agriculture	Gary Bahr	PO Box 790 Boise, ID 83701
Panhandle District Health Department	Dale Peck, Environmental Health Director/ Dick Martindale	2195 Ironwood Court Coeur d'Alene, ID 83814
Department of Lands, Northern Operations	Roger Jansson, Operations Chief – North / Jim Brady	3780 Industrial Avenue South Coeur d'Alene, ID 83815
USDA-RD	Howard Lunderstadt, Rural Development Specialist	7830 Meadowlark Way, Suite C3 Coeur d'Alene, ID 83815
Idaho Department of Commerce	Dennis Porter, State Program Manager	700 West State Street Boise, ID 83720
Idaho State Historical Society	Suzi Pengilly, Deputy SHPO	210 Main Street Boise, ID 83702
Coeur d'Alene Tribe of Idaho	Jill Wagner, PhD, THPO, Cultural Resource Program	PO Box 408 Plummer, ID 83851

9. MAILING LIST

The mailing list for this project includes both the agencies consulted and the meeting attendees. Meeting attendees have been summarized and listed in Appendix O. The affected residents can be reached, most efficiently, through the local newspaper.

APPENDIX A

Wastewater Treatment Facility Plan for the Hayden Area Regional Sewer Board

Submitted Separately

APPENDIX B

Joint Powers Agreement

ORIGINAL COPY

JOINT POWERS AGREEMENT

OF THE

HAYDEN AREA REGIONAL SEWER BOARD

FOR THE

HAYDEN AREA REGIONAL SEWER FACILITIES

THIS AGREEMENT is entered into this 9th day of October, 1986, between THE CITY OF HAYDEN (the "City") and THE HAYDEN LAKE RECREATIONAL WATER AND SEWER DISTRICT (the "Sewer District"), being governmental Entities in Kootenai County, Idaho, who are referred to herein individually as "Entity" and collectively as "Entities." The Entities desire to join together, under the authority of Idaho Code § 67-2328, to provide for the acquisition, ownership, development, operation, and maintenance of the proposed Hayden Area Regional Sewer Facility (the "Facility"), which Facility shall consist of the following:

A. Phase I: Interim Drain Field and Regional Collector;

B. Phase II: Mechanical Treatment Plant;

C. Phase IIIA: Spokane River Outfall; and

D. Phase IIIB: Mechanical Treatment Plant Expansion.

As used in this Agreement, the term "Facility" shall refer to and include all real and personal property and equipment and related rights necessary to the collection and treatment of sewage from areas within the jurisdiction of each Entity, as more fully described herein.

The parties contemplate: (i) the construction and operation, as part of the Facility, of an Interim Drainfield on land owned by Kootenai County, pursuant to the terms of an existing agreement with Kootenai County; (ii) the construction and operation of a Mechanical Treatment Plant on land to be owned by the Board; (iii) the providing of sewer service to specific Entity Service Areas within the jurisdiction of each Entity as defined herein (and the possible expansion of the Entity Service Areas); and (iv) the providing of sewer service to individuals or entities occupying land outside the Entity Service Areas but within the Kootenai County Airport Service Area as defined herein.

Attached hereto and incorporated herein as Exhibits are the following descriptions which pertain to the Facility and the operations of the Board:

Exhibit	Description
"A-1"	Schematic Map showing the Hayden Area Regional Sewer System, including the Regional Collector, the Interim Drainfield and the Treatment Plant Site (the "Facility") as presently contemplated
"A-2"	Map showing the Airport Service Area
"B"	Description of Facility Components
"C"	Legal Description of Interim Drainfield and Treatment Plant Site

Immediately following execution of this Agreement, each Entity shall execute such documents as may be necessary to convey all right, title, and interest in the Facility components to the Board.

NOW, THEREFORE, the Entities agree as follows:

1. NAME AND COMPOSITION. The entity created by this Joint Powers Agreement shall be known as the "Hayden Area Regional Sewer Board," to be referred to herein as "the Board". The members of the Board shall be the two (2) Entities described above, each of which shall appoint two (2) individual representatives, each of whom shall be fully authorized and empowered to attend all meetings and vote on all Board matters on behalf of the respective Entities. Each Entity shall designate one representative as "primary" and the other as "secondary," with the function of the secondary representative being only to act in the absence or unavailability of the primary representatives. Each Entity shall provide and maintain at the office of the Board, a duly authorized resolution of that Entity setting forth the authority of the individual representatives to bind such Entity with respect to all decisions required of or deemed appropriate by the Board. Except for the Major Decisions described in Paragraph 5 below, which must be approved by direct action of both Entities, the representatives shall have full authority to vote on behalf of the Entities with respect to Board business, and it shall be the responsibility of each Entity to provide guidelines to its representatives as to how that Entity's interests should be voted.

2. OFFICE. The principal office of the Board shall be at the Hayden City Hall, or at such other place as may be designated by the Entities. This Agreement and all records of the Board shall be maintained at the office and shall be available to all Entities and all members of the general public for inspection and/or copying (at the requesting party's expense) at reasonable business hours and on reasonable notice.

3. TERM. The term of this Agreement and of the Board shall be for so long as the Facility, or any part thereof, is required to provide sewer collection and treatment service for Users in the area to be served by the Facility.

4. PURPOSE AND POWERS.

4.1 Purpose. The purpose of the Board shall be as follows:

(a) To acquire, own, develop, operate, and maintain the Facility so as to provide the most cost-effective sewer service possible to the Users of the Facility. Users are classified as follows:

(1) Entity Users are those Users entitled to sewer service by virtue of their location within the Entity Service Areas. The Entity Service Areas are currently coextensive with the jurisdictional boundaries of the City and the Sewer District, and may be expanded in the discretion of either Entity, subject only to the provisions of Paragraph 9.2 below.

(2) Airport Users are third parties located outside the Entity Service Areas, but within the Airport Service Area, who are entitled to sewer service by virtue of a written contractual arrangement between Kootenai County and the Board, to be executed concurrently with this Agreement.

(b) To coordinate the performance of the Entities' responsibilities toward their respective constituents with respect to the provision of sewer services.

4.2 Powers. Subject to the provisions of this Agreement, and such limitations as may be imposed by law, the Board shall have the following powers:

(a) To acquire, own, develop, operate, and maintain the Facility, and to conduct and operate the business of the Board, and to execute documents and instruments relating to such business;

(b) To negotiate agreements with the Panhandle Health District, Division of Environment, and other local, state, or federal agencies, for funding, design, etc., of the initial and subsequent Phases of the Facility;

(c) To negotiate agreements for the acquisition of land, improvements, equipment, easements, permits, or other interests in real or personal property which may become components of or otherwise be needed for the construction, operation, and/or maintenance of the Facility (including the Treatment Plant Site);

(d) To negotiate arrangements with Kootenai County for the providing of sewer service to the Airport Service Area and for the use of the Interim Drainfield;

(e) To establish and collect appropriate assessments, fees, and service charges to be levied against Users of the Facility in order to cover any necessary capital improvements and any repair, operation, and maintenance costs, including reserves therefore;

(f) To procure and maintain insurance covering the various risks to which the Board (including the Entities and the individual representatives) or its operations may be subjected;

(g) To open bank accounts in the name of the Board, designate the authorized signatures therefor, and make deposits and withdrawals from Board accounts on the signatures of one or more designated individuals;

(h) To pay expenses incurred in performing the business and purposes of the Board;

(i) To employ, discharge, and pay the compensation of the Managing Agent, accountants, contractors, engineers, laborers, Facility operators, consultants, lawyers, and others whose services are required or necessary;

(j) To perform rate analysis and establish User fees, and to provide minimum standards for sewer use, spill control, and industrial pretreatment;

(k) To monitor actual flows to the Facility and actual numbers of Equivalent Residences (ERs) connected to the Facility from all Users, and to require control of significant commercial and industrial discharges;

(l) To provide secretarial and administrative services for Board meetings, including, but not limited to, agendas, secretarial services for the meetings, and minutes;

(m) To establish billing procedures and provide for the collection of funds from all Users for repair, maintenance, and operation of the Facility, including such sinking fund reserves as may be considered necessary;

(n) To establish bookkeeping and auditing procedures for the receipt and expenditures of all funds collected by the Board;

(o) To furnish an annual status report to each Entity on the Facility, including an audit of all financial aspects and the status of actual flows and hookups from each Entity;

(p) To prosecute or defend, as the case may be, any suit, arbitration, or administrative proceedings asserted against or brought on behalf of the Board;

(q) To review and approve contracts for acquisition, design, construction management, and construction of Facility components, even though only one (1) Entity may be providing the funding or acting as the "lead" Entity with respect to the construction of any such component;

(r) To apply for and cause compliance with the requirements of any grant or loan which would be utilized to establish or increase capacity for the Facility or reduce expenses of operation of the Facility;

(s) To do all other things allowed or required by law and necessary, incidental, or convenient to the exercise of the foregoing powers and to the accomplishment of the foregoing purposes.

5. MANAGEMENT AND ACCOUNTING. The affairs of the Board shall be managed by both Entities, through their respective representatives, with all decisions to be made by a unanimous vote of the Entities at a regular or special meeting; provided, however, that the Entities may unanimously appoint a Managing Agent, who may or may not be a representative of an Entity, to manage the day to day administrative affairs of the Board, subject to such scope and limitation as may be unanimously agreed upon by the Entities.

Regardless of the appointment of a Managing Agent, or of the general authority of the Entity representatives as set forth herein, the following major decisions ("Major Decisions") shall require the written approval of both Entities (acting directly and not through their representatives):

5.1 Sale, transfer, or encumbrance of all or any part of the Facility;

5.2 Adoption or revision of an operational budget for the Board, or the incursion or payment of any obligation or contract, except as specifically contemplated in a unanimously approved budget;

5.3 Expansion or reduction of the capacity of the Facility except as specifically contemplated in Paragraph 9 below;

5.4 Modification or amendment of this Agreement;

5.5 Negotiation, amendment, or modification of agreements for the acquisition or disposition of rights in land and/or improvements, including, without limitation, the agreements for use of the Interim Drainfield and for acquisition of the Treatment Plant Site;

5.6 Negotiation, amendment, or modification of agreements with Kootenai County pertaining to the Airport Service Area;

5.7 Establishment, modification, or revision of rates to be charged Users in the Service Areas for sewer hookups, collection, or treatment services;

5.8 Appointment, dismissal, establishment, or verification of the authority of Managing Agent;

5.9 The resolution of a voting deadlock between representatives; and

5.10 The doing or causing to be done of any act which would have a material adverse effect on the Board of the Facility or which would impose a financial obligation on the Board or either Entity over and above those imposed under a duly approved budget of the Board.

The books and records of the Board shall be kept on a cash basis in accordance with generally accepted accounting principles applied on a consistent basis from year to year. The fiscal year of the Board shall be from December 1 until November 30 of the following year.

operate on calendar year - accrual
year
r/s

6. <u>MEETINGS</u>.

6.1 <u>Regular Meetings</u>. Regular meetings of the Board shall be conducted at least monthly at such time and place as may be fixed by the Board. Notice of the time and place of each regular meeting shall be given to each primary representative, personally, or by mail or telephone, at least three (3) days prior to the day of the meeting, and shall be posted on the door of the Board office.

6.2 Special Meetings. A special meeting of the Board may be called by either Entity. Except in the case of an emergency, notice shall be provided and posted in the manner prescribed for notice of regular meetings, and shall include a description of the nature of any special business to be conducted by the Board.

6.3 Waiver of Notice. Before or at any meeting of the Board, either Entity may waive notice of such meeting, and such waiver shall be deemed equivalent to the giving of such notice of to that Entity.

6.4 Quorum. The presence in person of a representative of all Entities shall be required at all meetings. However, in the absence of one Entity at a duly noticed meeting, the attending Entity present may adjourn the meeting to another time, but may not transact any other business. Any such adjournment for lack of attendance shall be to a date not less than five (5) days, nor more than twenty (20) days from the original meeting date. Notice for this reconvened meeting shall be provided by the Entity in attendance, in the same manner as for regular meetings. At any such reconvened meeting, which is not attended by both Entities, the attending Entity shall be empowered to take any action on behalf of the Board which would be authorized by this Agreement, except for the Major Decisions described in Paragraph 5 above, which shall require unanimous consent in all cases.

6.5 Chairman. The Chairman of the Board will be alternated annually between the representatives of the two Entities of the Board at the first regular meeting in January. The first Chairman will be selected by the flip of a coin at the first regular meeting after the effective date of this Agreement, and shall serve until the next January meeting.

6.6 Open Meetings. Regular and special meetings of the Board shall be open to all members of the public; provided, however, that only the representatives of the Entities (or the Entities themselves) may participate in the actual decision-making.

7. SEWER SERVICE CHARGES. With respect to each ER, the Board shall be responsible for assessing and collecting from each Entity (or directly from the Entity Users, as determined by the Board) and from the Airport Users:

7.1 A discharge/hookup fee or its equivalent (sometimes referred to as a "capitalization fee") in a minimum amount as established by the Board (which shall be uniform for all Entity Users, and which shall be subject to a mandatory annual adjustment at the beginning of each fiscal year according to the Engineering News Record Index increase over the most recent year for which the Index is published). Even though the capital expense of constructing the Facility shall be paid by the initial Users, the purpose of the charge described in this subparagraph is to create a reserve fund for the construction of further improvements to expand capacity and to spread the burden of capital expenses over new Users as well as the original Users;

7.2 Periodic assessments, as established by the Board, in amounts sufficient to provide for repair, maintenance, and operation of the Facility and reserves therefor ("O&M fees") with each Entity's and User's share of costs to be computed in accordance with the general policy guidance of Article 8 below. The intent of the parties is to have O&M fees be uniform for all Entity Users, to the extent that the fees pertain to operation and management of the Facility as defined herein; however, the Board may, in its discretion, adjust fees to individual Entity Users if the Board undertakes management and operation of collection systems owned by the Entities but which are not part of the Facility;

While each Entity must collect, as a minimum, O&M fees and discharge/hookup fees established by the Board, this section in no way precludes each Entity from establishing its own O&M fees and discharge/hookup fees for the area within its jurisdiction. Minimum O&M fees and discharge/-hookup fees must be collected by each Entity and deposited in a dedicated fund maintained by the Board on a monthly or quarterly basis.

Each Entity agrees to provide, by Ordinance, that discharge/hookup fees or their equivalent will be collected for each building or structure requiring new or additional sewer service within its Service Area boundaries and to standardize its definition of an ER and the allocation of ERs to a particular property. Each Entity agrees to provide periodic reports as required by the Board giving the numbers of structures, ERs assigned, the amount of fees collected, and other relevant information requested by the Board.

8. <u>PRORATION; INDEMNIFICATION</u>. It is the intent of this Agreement to allocate costs equitably between the Entities on an approximate percentage of use basis. Each Entity will pay a percentage of the repair, operation, and maintenance of the Facility (including Sewer Collector Lines, Lift

Stations, and all other Facility components, as well as the Treatment Plant) based upon its number of ERs on line compared to the total of all ERs on line for the Entity Users. Arrangements with Airport Users shall similarly be made on an approximate percentage of use basis; provided, however, that the Board may, in its discretion, exclude certain components of the Facility from consideration in establishing fees to be paid by Airport Users.

Further, in the event of a federal, state or local court action, concerning the Facility, the two Entities will assume responsibility for such litigation in a direct proportion to the percentage of use of the system. This formula shall be based upon the total ERs on line and in use by that Entity to the total number of ERs on line and in use by both Entities at the time of the event on which the court action is based. Each Entity shall agree to indemnify the other Entity in the same percentage for any damages or costs suffered by the other Entity due to such court action. Any unanticipated cost of such a court action may then be charged to the Entity Users and Airport Users as a cost of operation of the Facility, to be incorporated into and amortized on a reasonable schedule, payable along with the periodic O&M charges.

9. EXPANSION OF SERVICE AND/OR CAPACITY. The parties agree that service provided by the Facility may be expanded in one or more of the following manners, and subject to the following terms and conditions:

9.1 Addition of Users Within A Service Area. The Entity Service Areas and the Airport Service Area, as defined herein, are recognized under Sewage Management Plan Agreements with the Panhandle Health District, where required. Either Entity shall have the right to expand its number of Users within its Service Area without the consent of the Board; provided, however, that any such expansion shall be subject to availability of capacity of the Facility of a "first come, first served" basis. However, the additional capacity may only be reserved by payment of the appropriate capitalization (discharge/hookup) fee set by the Board as provided herein.

9.2 Expansion of Service Areas. Either of the Entity Service Areas may be expanded, in the sole discretion of the appropriate Entity, by the lawful expansion of the City or the Sewer District, and pursuant to modification of the applicable Sewage Management Plan Agreement, where required.

9.3 Expansion of Treatment Plant Capacity. The parties acknowledge that the Facility is presently designed to accommodate more Users than will require sewer service on completion of the Regional Treatment Plant. By collecting discharge/hookup fees as Users are added to the system, the Board will accumulate a reserve fund which can later be used to finance construction of the Spokane River Outfall, and then for additional capacity at the Treatment Plant. After construction of the Spokane River Outfall, either Entity which desires to add Users to the system, which would require expansion of the Facility for additional capacity, shall have the right to utilize any existing reserve fund for that purpose; provided that the expanding Entity shall pay any additional funds necessary to construct the complete next phase of the development of the Facility (including lift stations as well as Treatment Plant expansion and with the size and scope of the "complete next phase" being determined by the Board). The amount advanced by the expanding Entity shall then be divided by the then current ER capital assessment fee to determine the portion of the excess capacity which then belongs exclusively to the expanding Entity. All remaining capacity shall then be considered available at par to either Entity and to the Airport Users as provided herein or in the User Agreement with Kootenai County. Notwithstanding the right of either Entity to require unilaterally the expansion of the capacity, the Board shall unanimously approve and supervise the design and construction of the expansion.

10. TRANSFERS. No Entity may directly or indirectly sell, transfer, assign, pledge, or encumber all or any part of its rights or obligations in the Board or in the Facility.

11. TERMINATION AND DEFAULT. This agreement will terminate only upon agreement of both Entities or upon the entering of a court order requiring termination of the Board.

12. CONTEMPLATION OF PARTIES. Certain basic facts and/or assumptions have been contemplated by the Entities in connection with the negotiation and execution of this Agreement, and are set forth as follows to assist in the interpretation of intent, should questions later arise:

12.1 The design capacity of the Phase I Regional Pump Stations is 4,000 ERs.

12.2 The design capacity of the Phase II Treatment Plant is to be 0.75 mgd or 3333 ERs, with completion estimated in October 1987;

12.3 The design capacity of the Phase IIIB Treatment Plant is to be based on growth requirements and demand by the participating Entities. Projected total Facility capacity following construction of Phase III is 5200 ERs, or 1.2 mgd;

12.4 Treatment in Phase I will consist of septic tank effluent applied under pressure to Drainfield Module No. 1. Each User under Phase I must utilize an approved septic tank;

12.5 Treatment anticipated under Phase II will be treatment of raw sewage in a mechanical oxidation ditch treatment plant with discharge of effluent to the Interim Drainfield, Modules 1 and 2;

12.6 Subsurface land application of treated effluent may be incorporated into the Phase I and II treatment processes to provide more drainfield capacity on a temporary basis, and/or reduce nutrient loading to the Spokane River;

12.7 Each Entity has purchased through cash contribution to Phase I, the following numbers of paid-up hookups in the Phase II Treatment Plant:

Entity	ERs Paid
City	183
Sewer District	116

12.8 The Sewer District may issue a credit to LID property owners who have already paid discharge/hookup fees, since no further discharge/hookup fees will be charged until after the LID process is completed;

12.9 The Sewer District, under its LIDs 2 and 3, will design and construct the Phase II Treatment Plant as the "Lead Entity." It is estimated that the two thousand one hundred forty-one (2,141) parcels of land within LIDs 2 and 3 will be entitled to Facility capacity (including Treatment Plant and Regional Collector) as a result of the LID process, although the exact number will not be known until the LID process is complete;

12.10 In addition to the cash already contributed, as reflected in the credits allocated in Paragraph 12.7 above, the City agrees to contribute at least eight percent (8%) toward construction of Phase II Treatment Plant and/or Phase IIIB Spokane River Outfall for which it will receive credit for ERs in ratio to the discharge/-hookup fee in effect at the time of construction. These total amounts due will be turned over to the Sewer District in monthly progress payments based upon approved Pay Estimates;

12.11 Capacity in the Phase I Interim Drainfield will be allocated on a first come, first served basis, with a Three Hundred Dollar ($300.00) per ER charge, in addition to LID or discharge/hookup fees, assessed for new subdivision lots or buildings which will contribute sewage directly to the Phase I Interim Drainfield. Money assessed under this provision will be placed in a separate account and will be used for construction of Drainfield Module No. 2 or for the Spokane River Outfall. The Interim Drainfield fee may, however, be waived in specific cases on an equitable basis, such as for existing tenants within the Airport Service Area who have already paid discharge/hookup fees to Kootenai County.

12.12 At no time will an Entity be entitled to more connections to Regional Facilities than the total number of paid-up discharge/hookup fees in terms of ERs. Additional reserve capacity will be available to either Entity on a first come, first served basis. Capacity may not be allocated or purchased above and beyond the approved design capacity of the Facility, except by Major Decision, and only if the required additional capacity is under design.

12.13 The Entities shall acquire the Treatment Plant Site, by each advancing fifty percent (50%) of the costs of acquisition, following which the Treatment Plant Site shall be purchased by the Board as an expense of the Facility.

13. MISCELLANEOUS AND PROCEDURAL.

13.1 Attorney's Fees. If legal action is required or deemed necessary to enforce or interpret any provisions of this Agreement, the prevailing party shall be entitled to recover its costs of suit, including a reasonable attorney's fee incurred in connection therewith.

13.2 Municipal Authority. Each Entity, and each individual signing on behalf of an Entity, hereby agrees that the execution of this Agreement is fully authorized by appropriate municipal action of the Entity and will be supported by an appropriate resolution to be filed at the office of the Board.

13.3 Integrated Agreement; Modification. This Agreement contains all agreements of the parties and may not be amended or modified except in writing, signed by all parties.

13.4 Termination of Interest of Kootenai County. The Entities acknowledge that this Agreement is a substantial revision of a prior Joint Powers Agreement among the Entities described herein and Kootenai County, and that Kootenai County has elected not to be represented on the Board under this Agreement, but to obtain sewer service for Airport Users within the Airport Service Area pursuant to a separate agreement between the Board and Kootenai County. Accordingly, the effectiveness of this Agreement is hereby made contingent upon the consent of Kootenai County as set forth below. By execution of the attached Consent, the County shall agree that it is no longer a party to the Board and that further modifications of this Agreement may be adopted by the City and the Sewer District without any consent of the County.

13.5 Arbitration. Any controversy arising from this Agreement or its breach, with respect to interpretation of the provisions hereof or the intent of the parties, shall be resolved by three (3) arbitrators appointed as follows:

(a) Within ten (10) days after notice by either party to the other requesting arbitration and stating the basis of the party's claim, one (1) arbitrator shall be appointed by each party. Notice of the appointment shall be given by each party to the other when made;

(b) Two (2) arbitrators shall immediately choose a third arbitrator to act with them. If they fail to select a third arbitrator within ten (10) days of their appointment, on application by either party, the third arbitrator shall be promptly appointed by the then presiding judge of the District Court for Kootenai County, Idaho, acting as an individual.

The arbitration shall be conducted according to the then prevailing Rules of the American Arbitration Association, and any judgment upon the award rendered in the arbitration may be entered in any court having jurisdiction.

IN WITNESS WHEREOF, the parties to the Agreement have executed the same by reason of the authorization separately obtained by both parties as required by the laws governing their powers.

CITY OF HAYDEN

By Chester R. Davis

CHESTER R. DAVIS, Mayor Pro-tem

HAYDEN LAKE RECREATIONAL WATER
AND SEWER DISTRICT

By Henry Hinck
HENRY HINCK, Chairman

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CONSENT OF KOOTENAI COUNTY

Kootenai County hereby consents to the execution of the above Agreement, and to the immediate termination of the prior Joint Powers Agreement among the Entities described herein and Kootenai County. The rights and obligations of Kootenai County with respect to the Facility shall be as described by separate agreements between the Board and Kootenai County, executed simultaneously with this Agreement, and the effectiveness of this Consent is specifically made contingent upon the execution of the Contract User Sewer Agreement between Kootenai County and the Board. Immediately upon execution of this Agreement and such separate agreements, Kootenai County shall execute such documents as may be necessary to convey all of its right, title and interest in all Facility components as described herein, to the Board.

Further, by execution of this Consent, the County hereby agrees that it is no longer a party to the Board and that further modifications of this Agreement may be adopted by the City and the Sewer District without any consent of the County.

BOARD OF COMMISSIONERS OF
KOOTENAI COUNTY

By________________________
GLENN R. JACKSON,
Chairman

By Frank N. Henderson
FRANK N. HENDERSON
Commissioner

By Evalyn R. Adams
EVALYN R. ADAMS,
Commissioner

ATTEST:

Leah Phelps
LEAH PHELPS
Clerk
By: Jennifer Lee
Deputy Clerk

STATE OF IDAHO)
:ss.
County of Kootenai)

On this 10th day of October , 1986, before me, Marian L. Jobes , a Notary Public in and for the State of Idaho, duly commissioned and sworn, personally appeared CHESTER R. DAVIS , to me known to be the Mayor Pro-tem of THE CITY OF HAYDEN, the Entity that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said Entity, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument on behalf of said Entity.

WITNESS my hand and official seal hereto affixed the day and year first above written.

Marian L. Jobes
Notary Public for Idaho
Residing at Hayden Idaho
Commission Exp. 12/30/86

STATE OF IDAHO)
:ss.
County of Kootenai)

On this 2d day of October, 1986, before me, Edward F. Wroe , a Notary Public in and for the State of Idaho, duly commissioned and sworn, personally appeared HENRY HINCK, to me known to be the Chairman of the HAYDEN LAKE RECREATIONAL WATER AND SEWER DISTRICT, the Entity that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said Entity, for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute the said instrument on behalf of said Entity.

WITNESS my hand and official seal hereto affixed the day and year first above written.

Edward F. Wroe
Notary Public for Idaho
Residing at Hayden Lake
Commission Exp. 12/26/88

STATE OF IDAHO)
:ss.
County of Kootenai)

On this 9th day of October, 1986, before me, Terri R. Anderson, a Notary Public in and for the State of Idaho, duly commissioned and sworn, personally appeared ~~GLENN R. JACKSON~~, FRANK N. HENDERSON, and EVALYN R. ADAMS, to me known to be ~~the Chairman and~~ Commissioners, of the BOARD OF COMMISSIONERS OF KOOTENAI COUNTY, ~~respectively~~, the Entity that executed the foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said Entity, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute the said instrument.

WITNESS my hand and official seal hereto affixed the day and year first above written.

Terri R. Anderson
Notary Public for Idaho
Residing at Coeur d'Alene
Commission Exp. 9-9-91

EFW12A/D,1 - D9/25/86

HAYDEN AREA REGIONAL FACILITIES SCHEMATIC MAP

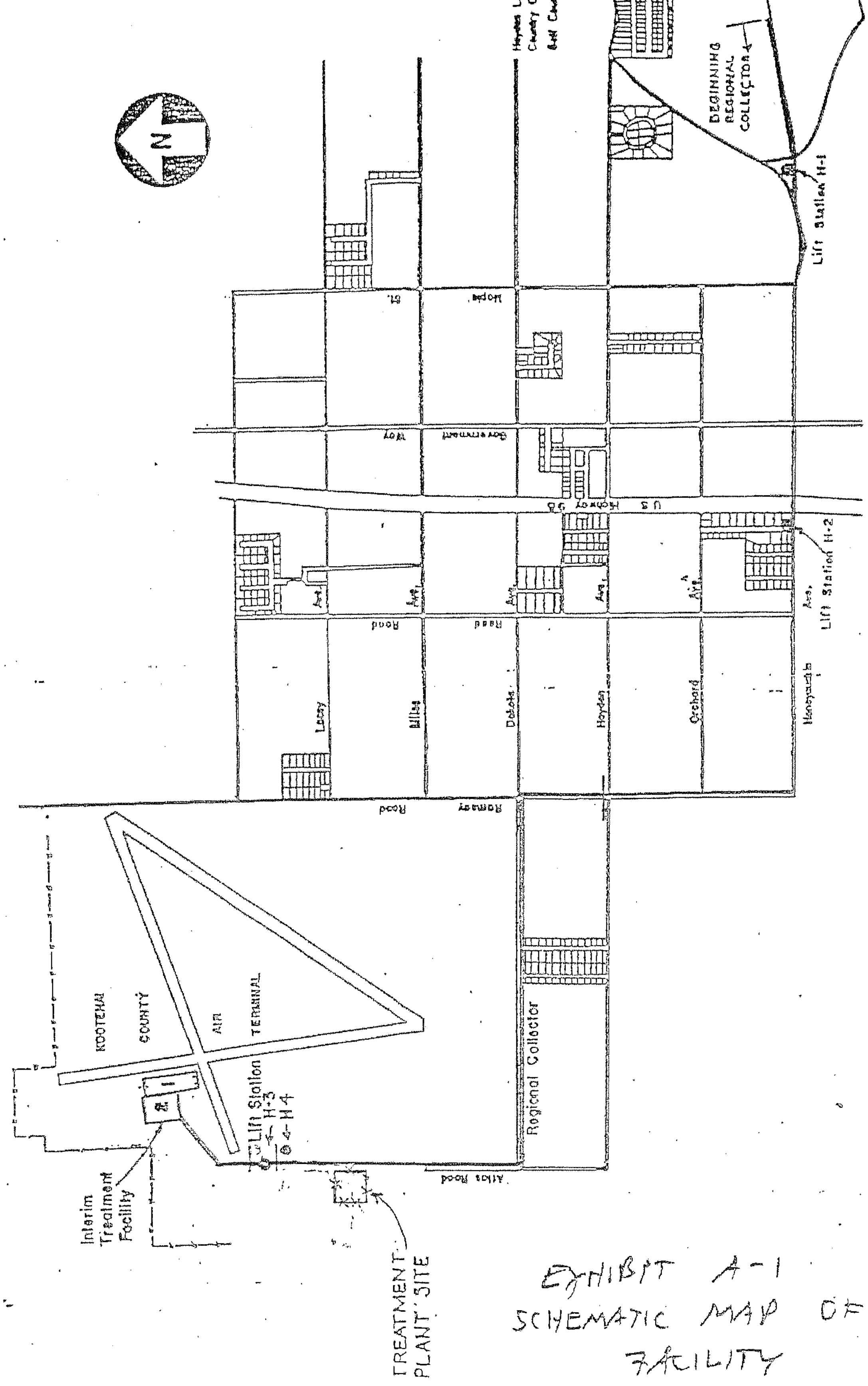


EXHIBIT A-1
SCHEMATIC MAP OF
FACILITY

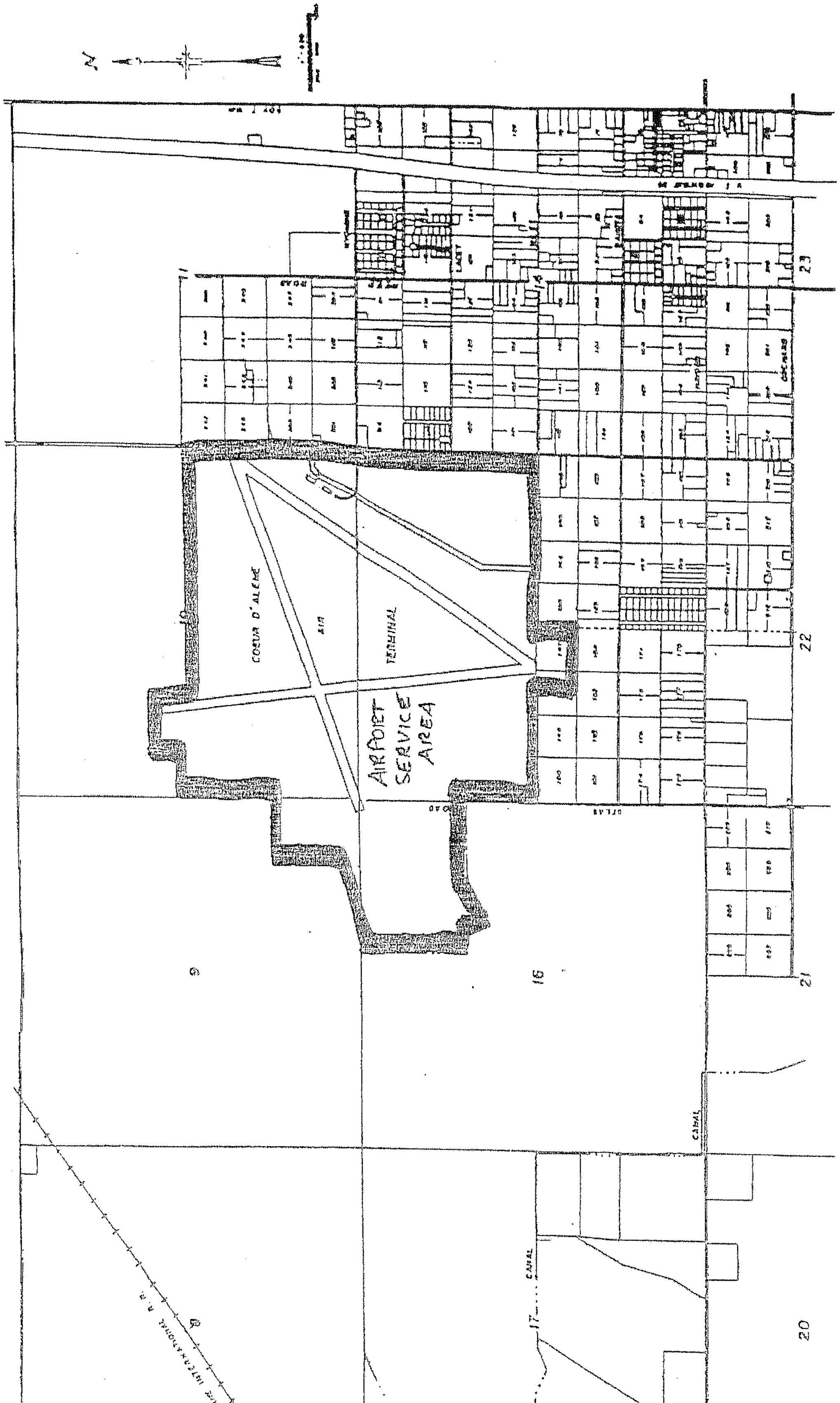


EXHIBIT A-2
AIRPORT SERVICE AREA

EXHIBIT "B" TO
JOINT POWERS AGREEMENT

[DESCRIPTION OF FACILITY COMPONENTS]

PHASE I:

The Hayden Area Regional Sewer Collector Facilities, as shown on engineering construction drawings entitled "Construction Plan, Hayden Area Regional Sewer Collector and Interim Treatment Facility", prepared by LePard & Frame, Inc., and V. David Welch Associates, Inc., dated August 29, 1985, exclusive of Schedule "I-B" and Schedule "I-BB" of those plans, all of which plans are on file at the office of the Kootenai County Commissioner. Phase I Facilities consist of thee major pumping stations and controls, pipeline, valves, one subsurface drainfield module, and related appurtenances (subject, however, to the rights of Kootenai County as fee owner of the Interim Drainfield property).

PHASE II:

Mechanical Treatment Plant, initially sized to provide sewage treatment service for 3,333 Equivalent Residences including, without limitation, screening and grit removal, oxidation ditch, clarification, disinfection, sludge handling facilities, buildings, land disposal facilities, and other related appurtenances.

PHASE III:

A. Spokane River Outfall, including, without limitation, lift stations, force mains, diffuser, and related appurtenances to convey and discharge the Treatment Plant effluent to the Spokane River;

B. Mechanical Treatment Plant Expansion, including without limitation, addition of various treatment and sludge handling components to increase capacity of Treatment Plant. Expansion is not limited to one increment or project and will be accomplished by the addition of various components over an extended time frame.

ANCILLARY RIGHTS:

Included within the description of the Facility components shall be all easements, rights of way, permits, grant applications, and other rights appurtenant to and/or necessary for the construction and operation of the Facility for its intended purpose, for which specific assignments or conveyances shall be prepared and delivered upon request.

EFW12A/D,18 - D9/25/86

EXHIBIT "C" TO
JOINT POWERS AGREEMENT

LEGAL DESCRIPTIONS OF INTERIM DRAINFIELD
AND TREATMENT PLANT SITE

INTERIM DRAINFIELD

A portion of the Southwest Quarter of Section 10, Township 51 North, Range 41 West, B.M., Kootenai County, Idaho, more particularly described as follows:

Commencing at the Southwest corner of said Section 10; thence North 0°43'15" West, 74.57 feet along the West boundary of said Southwest Quarter to a point on the extension of the Northerly boundary of Runway 23, the POINT OF BEGINNING; thence continuing North 0°43'15" West, 2587.96 feet along the West boundary of said Southwest Quarter to the Northwest corner of said Southwest Quarter (West Quarter Corner of said Section 10); thence South 89°52'29" East, 878.01 feet along the North boundary of said Southwest Quarter to a point on an extension of the Westerly boundary of airport Runway 14; thence South 15°07'00" East, 2036.28 feet along the Westerly boundary of Runway 14 extended and the Westerly boundary of Runway 14; thence 147.11 feet along the arc of a 100.00 foot radius curve right, said curve having a chord bearing South 27°01'38" West, 134.20 feet; thence South 69°10'16" West, 1407.48 feet along the northerly boundary of Runway 23 and the Northerly boundary of Runway 23 extended to the POINT OF BEGINNING.

Containing approximately 62.4 acres

TREATMENT PLANT SITE

The East 500 feet of the North 435 feet of the Northeast Quarter of the Southeast Quarter of the Northeast Quarter of Section 16, Township 51 North, Range 4 West, B.M., Kootenai County, Idaho;

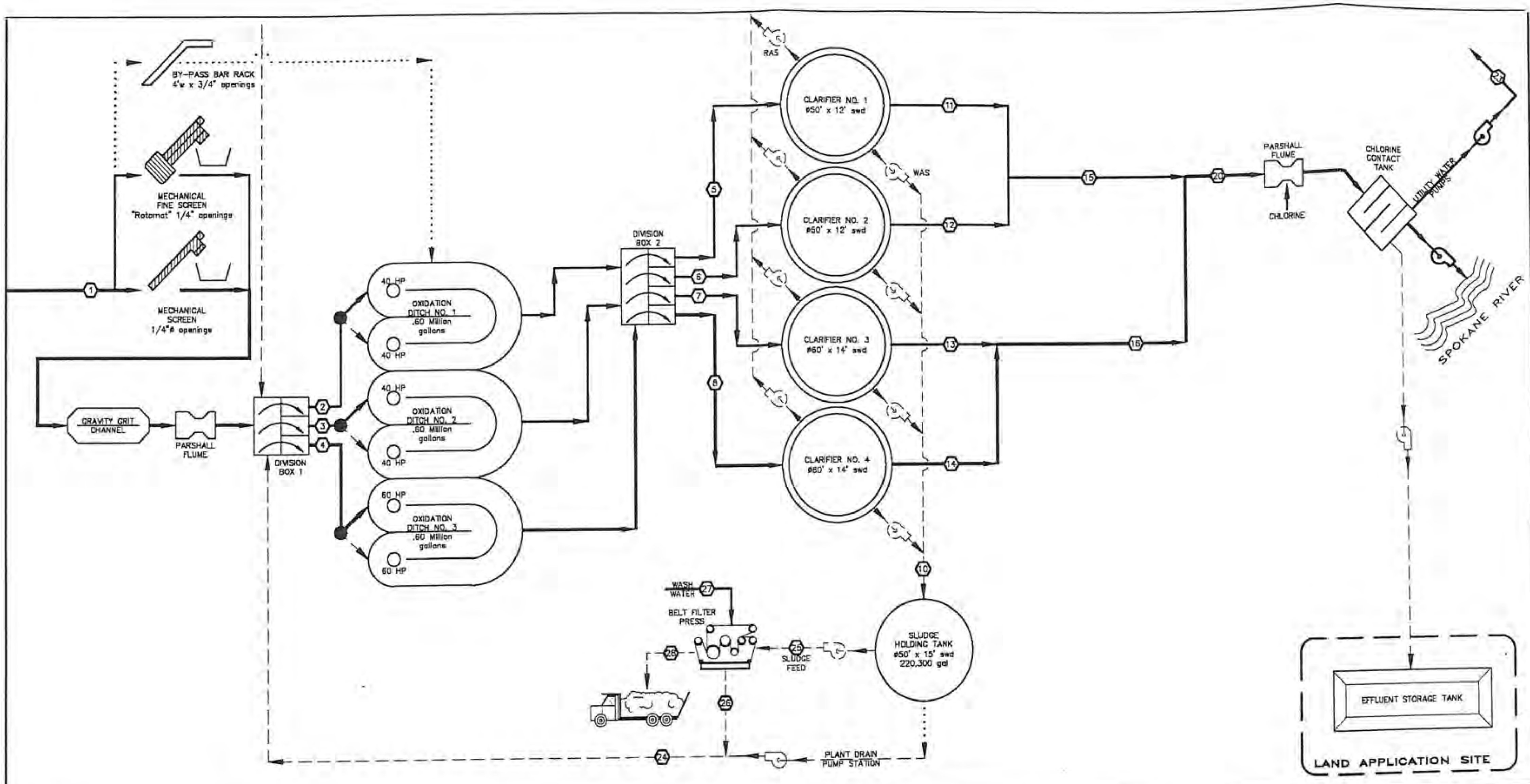
Less any recorded right-of-way.

APPENDIX C

Maps of the System

- Existing System Overview
- Selected Improvements Overview
- APE/PPPA Map

Figure 2-1 – Process Flow Schematic



NUMBER	FLOW STREAM IDENTIFICATION	FLOW, mgd	
		AVERAGE	PEAK
1	INFLUENT	2.400	5.520
2	OXIDATION DITCH NO. 1 INFLUENT	1.919	2.795
3	OXIDATION DITCH NO. 2 INFLUENT	1.919	2.795
4	OXIDATION DITCH NO. 3 INFLUENT	1.919	2.795
5	CLARIFIER NO. 1 INFLUENT	1.674	2.438
6	CLARIFIER NO. 2 INFLUENT	1.674	2.438
7	CLARIFIER NO. 3 INFLUENT	0	0
8	CLARIFIER NO. 4 INFLUENT	2.410	3.511
9	RETURN ACTIVATED SLUDGE	1.440	2.400
10	WASTE ACTIVATED SLUDGE	0.036	0.036
11	CLARIFIER NO. 1 EFFLUENT	0.966	2.009

NUMBER	FLOW STREAM IDENTIFICATION	FLOW, mgd	
		AVERAGE	PEAK
12	CLARIFIER NO. 2 EFFLUENT	0.966	2.009
13	CLARIFIER NO. 3 EFFLUENT	0	0
14	CLARIFIER NO. 4 EFFLUENT	1.391	2.893
15	CLARIFIERS NO. 1 & 2 COMBINED FLOW	1.931	4.017
16	CLARIFIERS 3 & 4 COMBINED FLOW	1.391	2.893
17	EFFLUENT FILTER FEED	---	---
18	SAND FILTER FILTRATE	---	---
19	SAND FILTER REGECT (FUTURE)	0.360	0.828
20	CLARIFIER EFFLUENT	---	---
21	NOT USED	---	---
22	NOT USED	---	---
23	UTILITY WATER	---	---
24	PLANT DRAIN (FUTURE FLOW RATE)	0.958	1.426

NUMBER	FLOW STREAM IDENTIFICATION	FLOW, mgd	
		AVERAGE	PEAK
25	BELT FILTER PRESS SLUDGE FEED (150 gpm)	---	---
26	BELT FILTER PRESS FILTRATE (1+1 FUTURE)	0.299	0.299
27	BELT FILTER PRESS WASH WATER (73 + 73 gpm)	0.210	---
28	BELT FILTER PRESS DEWATERED SLUDGE	0.022	---
29	NOT USED	---	---
30	NOT USED	---	---
31	NOT USED	---	---

LEGEND

- MAIN PLANT FLOW
- SIDE STREAM
- BY-PASS
- 12 FLOW STREAM IDENTIFICATION

NOTE:

1. THE HYDRAULIC PROFILE IS MADE ON THE FLOW PATH IDENTIFIED BY THE HEAVY CONTINUOUS LINE.
2. CLARIFIER NO. 3 IS ASSUMED TO BE OUT OF SERVICE.

Figure 11-1 – Site Map

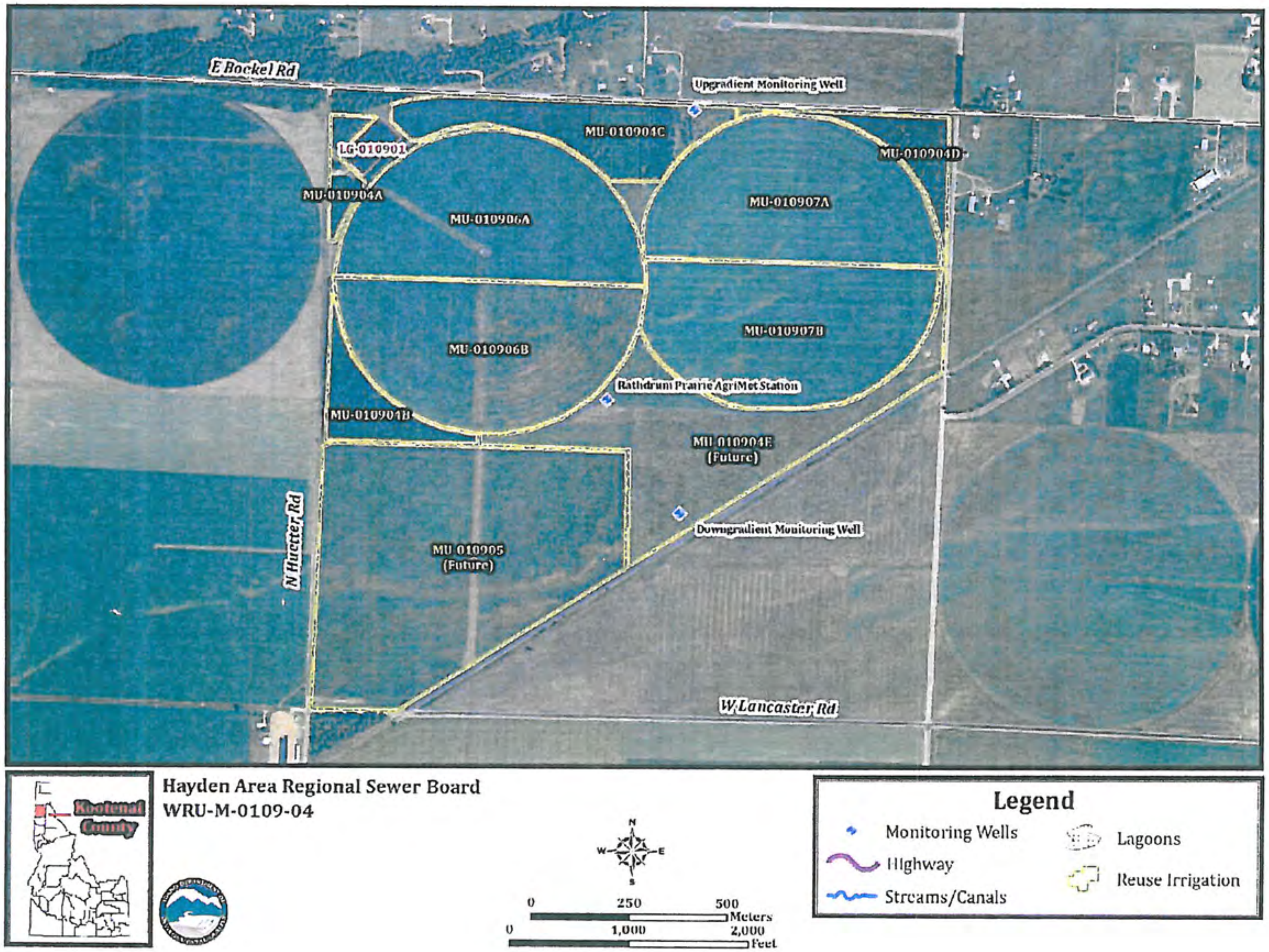
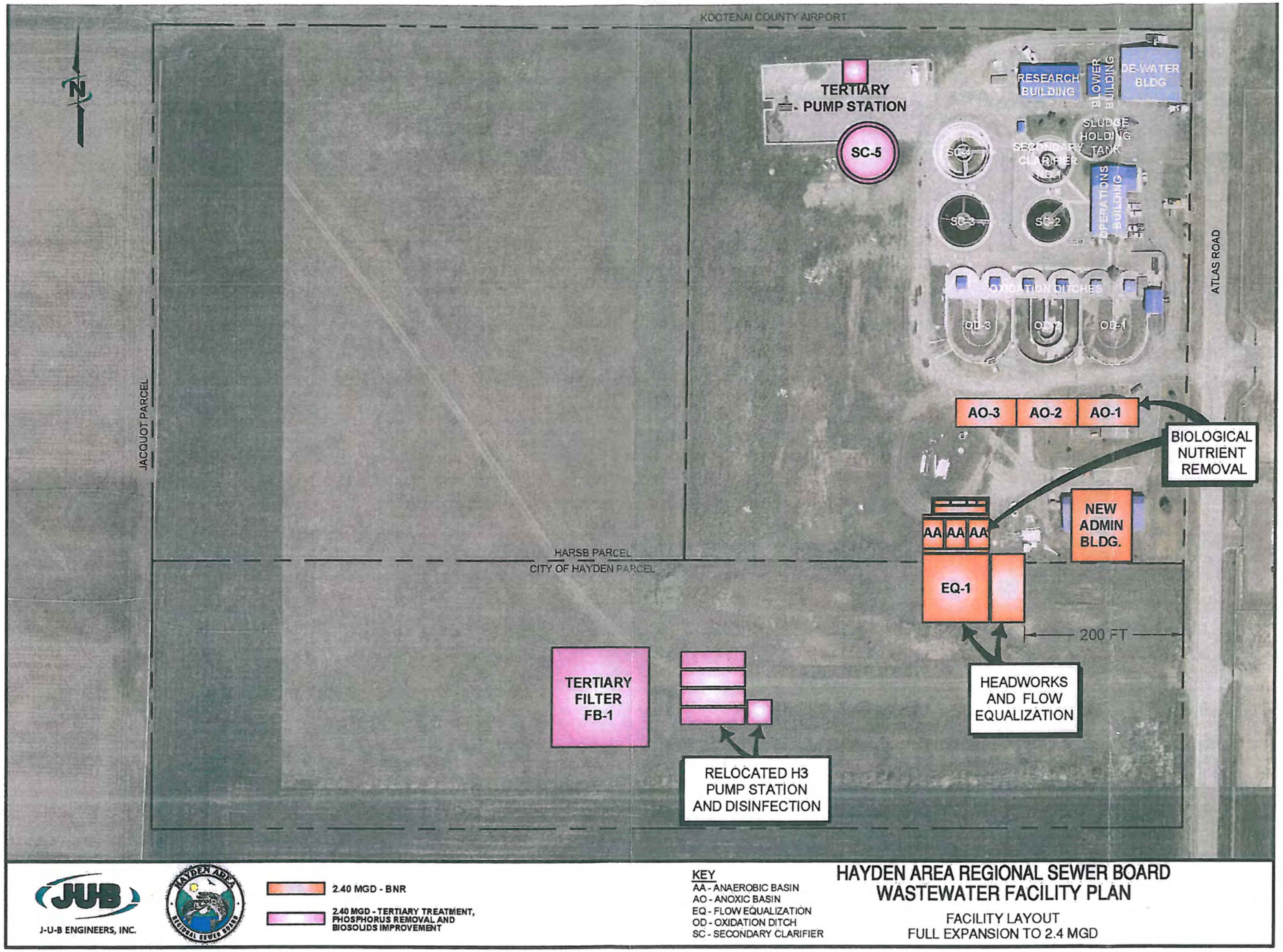
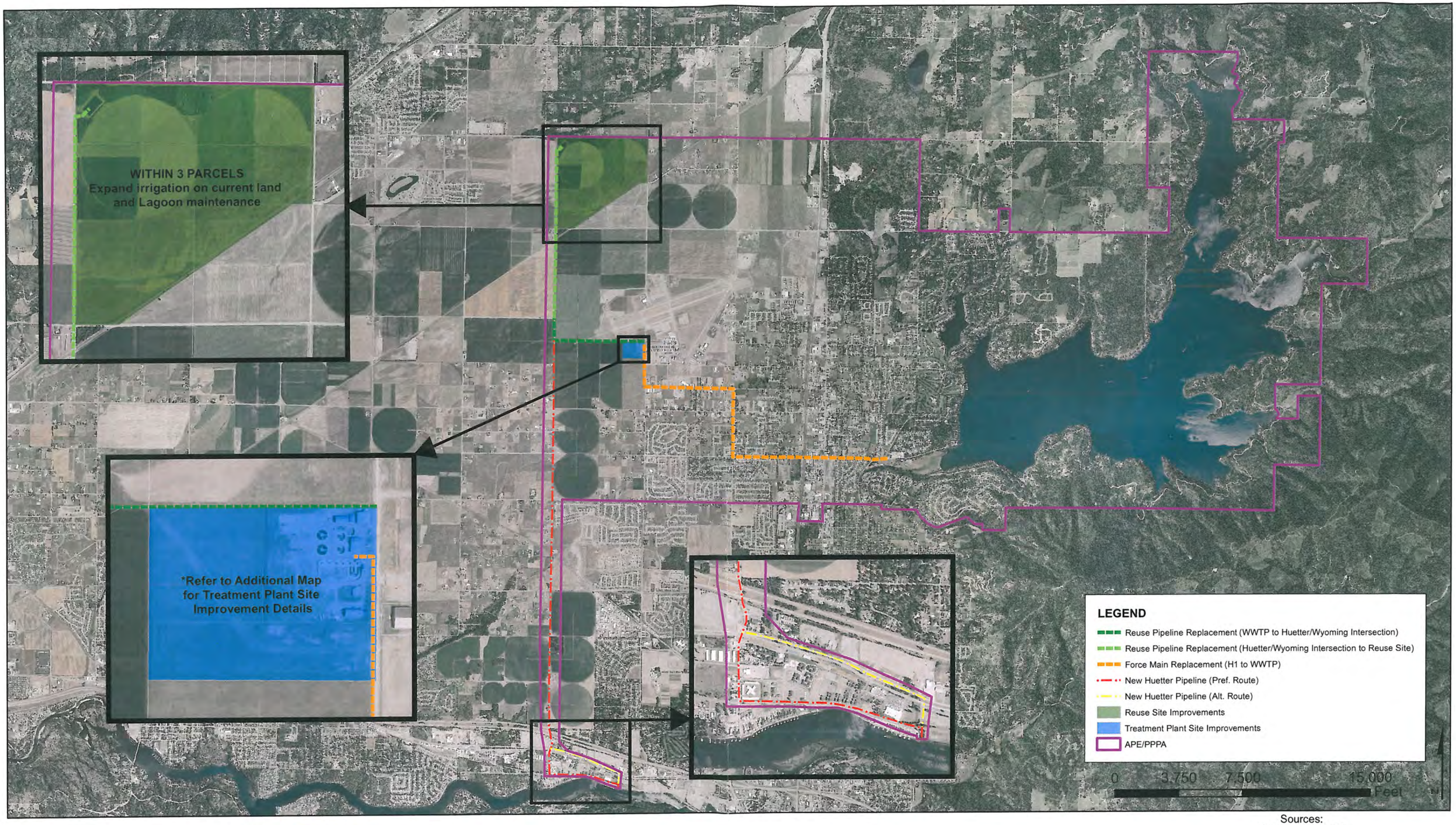


Figure 13-1 – 20-Year Potential Improvements Site Plan (2.4 MGD ADF Capacity)





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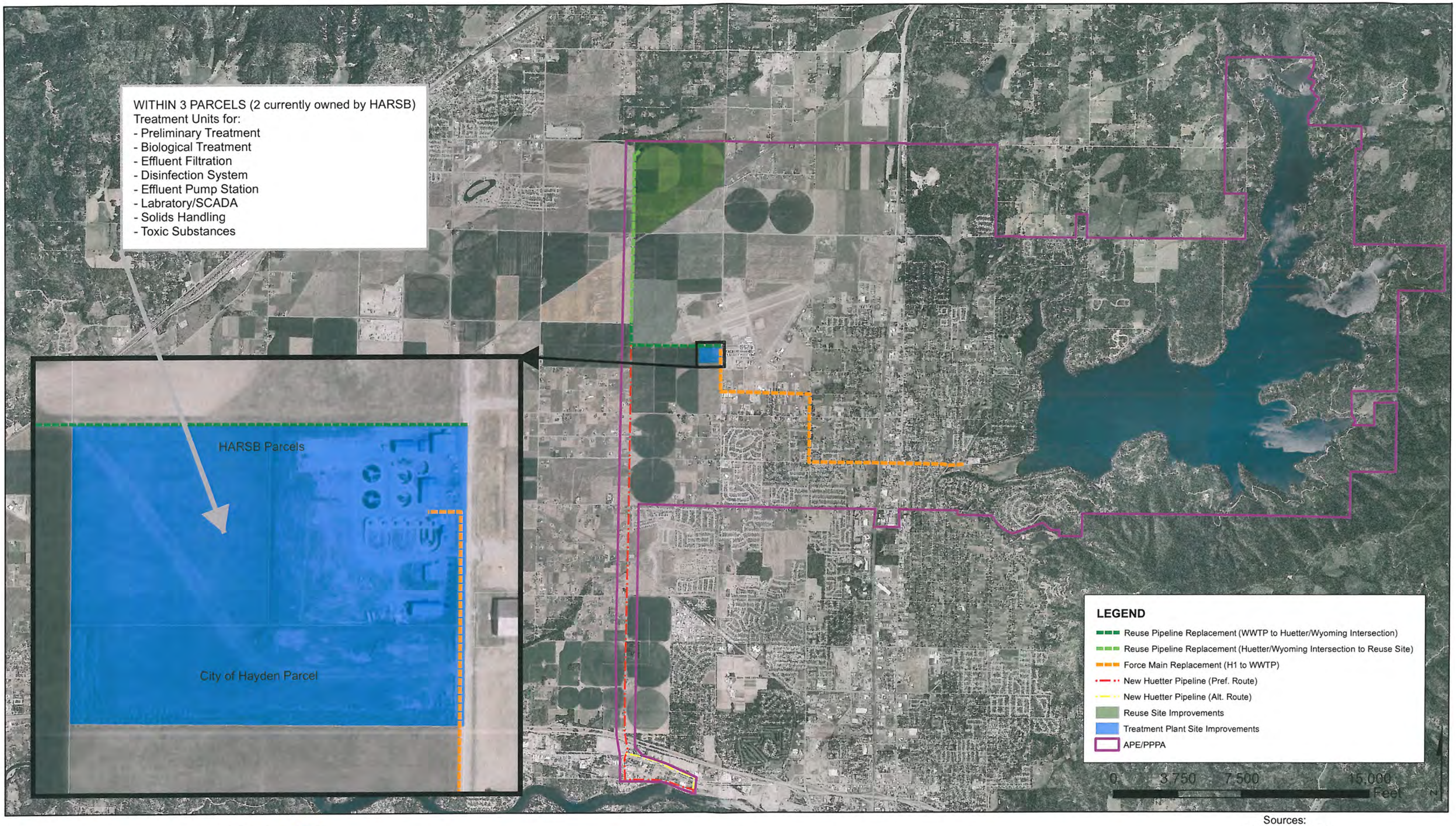
(fax) 208-664-5946

HARSB

Proposed Wastewater Improvements

Sources:
USDA, NAIP 2009
Idaho State Tax Commission
HLRWSD
Kootenai County GIS Department

PROJECT NO. 41104
DRAWN BY .... AW
FILENAME .... ProjectOverview_11x17L
DATE 10/10/12



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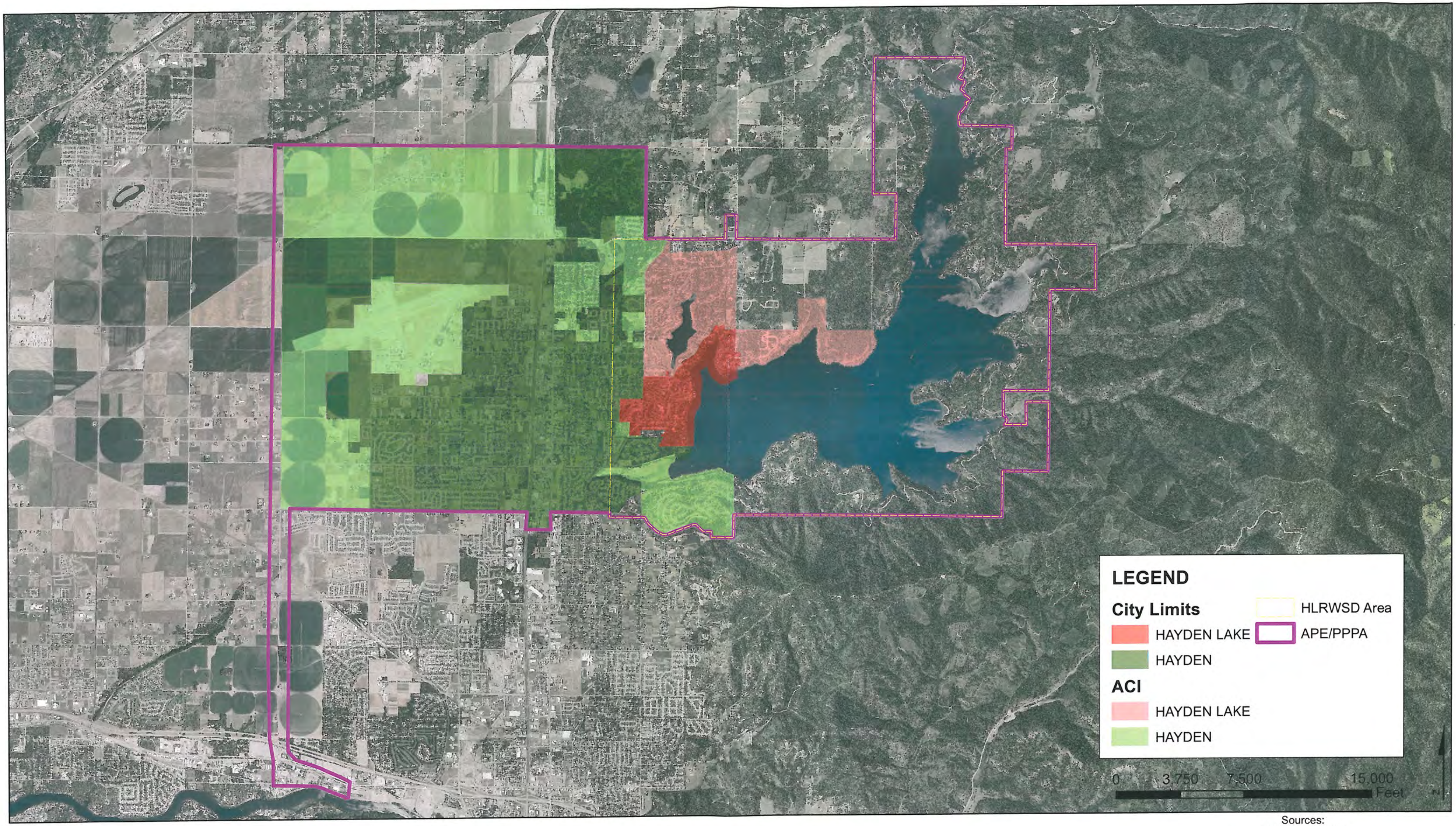
HARSB

Proposed Wastewater Treatment Plant Site Improvements

Sources:
USDA, NAIP 2009
Idaho State Tax Commission
HLRWSD
Kootenai County GIS Department

PROJECT NO.................................41104
DRAWN BY......................................AW
FILENAME.......................................ProjectOverviewWWTP_11x17L
DATE..10/30/12



Sources:
USDA, NAIP 2009
Idaho State Tax Commission
Kootenai County GIS Department

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HARSB

APE/PPPA Overview (with City Boundaries)

PROJECT NO. 41104
DRAWN BY. .... AW
FILENAME. .... APE_PPPA_11x17L
DATE. 12/19/12

Sources:
USDA, NAIP 2009
Idaho State Tax Commission
Kootenai County GIS Department

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HARSB

APE/PPPA Overview

PROJECT NO.................................41104
DRAWN BY.......................................AW
FILENAME.......................................APE_PPPA_11x17L
DATE...11/14/12

APPENDIX D

Cost Information and Alternative Comparison Tables

- Unit Process Cost Information
- Alternative Cost Information
- Financial Analysis (by FCS Group)
- Alternative Comparison Tables

Appendix 5-A

Engineer's Opinion of Probable Cost

Preliminary Treatment
and Equalization

HARSB WWTP
Item: Equalization Storage
Engineer: RMC
Date: June 2012

Peak Daily Flow	4.03E+06 gal/day	
Equalization %	20%	
Required Total Equalization Working Volume:	806,000 gal	
Assume Rectungular Basin:		
Bottom Slab	2 ft	
Working Depth	16 ft	
Dead Depth (at bottom, when emptying)	2 ft	
Free Board (headspace for air flow)	1 ft	
Top Slab	1 ft	
Total Overall Tank (height)	22	
Interior Dimensions:		
Length	85 ft	
Width	80 ft	
Calculated Volume (working)	108800 ft^3	
Calculated Volume (working)	813,824 gal	
Calculated Volume (working)	3080.659 cubic Meters	
Mixing Energy Requirements		
From M&E pg 344	0.004 to 0.008 kW/M3	for med. Strength wastewater
Assume 0.006 kW/m3	0.006 kw/m3	
	18.483954 kW	
	24 hr/day	
	443.61489 kW-Hr/day	
	161919.43 kw-hr/yr	
Pumping Power Calculations:		
Assume 15ft static and 15 ft friction head	30 ft	
Assume 65% efficiency	0.65	
Flow (average daily flow -midpoint of lifecycle)	2.4 mgd	
Flow (average daily flow -midpoint of lifecycle)	1665.6 gal/min	
	3.7112299 cfs	
HP Required	10688.342 ft-lb/hr	
	19.43335 HP	
	14.491449 kW	
	24 hr/day	
	347.79477 kW-Hr/day	
	126945.09 kw-hr/yr	
	288864.53 TOTAL KW-HR /YR	

from [illegible]
[illegible]

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Headworks and Influent EQ Tank (2.4 mgd firm capacity)**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	**New Headworks**				
2	Building 40 x 50 (near EQ Tank)	2,000	SF	$ 200	$ 400,000
3	Screening and Solids Washing/Compacting Equipment	2	EA	$ 175,000	$ 350,000
4	Grit Chambers and Classification Eqpt	2	EA	$ 175,000	$ 350,000
5	Flow Measurement	1	LS	$ 10,000	$ 10,000
6	Odor Control (Foul Air Scrubbing)	1	LS	$ 60,000	$ 60,000
7	Vactor Dump Station	1	LS	$ 100,000	$ 100,000

Construction Subtotal	**$1,270,000**
Mobilization, Bonding, Administration (12%)	$ 152,400
Site Electrical, Controls and Testing (30%)	$ 426,700
Construction Total	**$ 1,849,100**
Engineering and Administration (30%)	$ 554,700
Construction Reserve Contingency (20%)	$ 369,800
Total Capital	**$ 2,770,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Headworks				
	No difference escalated in current O&M costs				
	Power over 20 years				-
	Operator Time (over 20 years)				-
		O&M Costs (20 Year Lifecycle) Subtotal			$ -
		TOTAL Present Worth (O&M and Capital)			$ 2,770,000

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Headworks and Influent EQ Tank (2.4 mgd firm capacity)**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
1	Excavation and Site Work	3500	CY	$ 3	$ 10,500
2	Concrete Tank	806,000	GAL	$ 1.50	$ 1,209,000
3	Coatings	25000	SF	$ 8	$ 200,000
4	Interior Mechanical Piping/Gates	1	LS	$ 35,000	$ 35,000
5	Submerged Mixers	4	EA	$ 20,000	$ 80,000
6	Odor Control (Foul Air Scrubbing)	1	LS	$ 80,000	$ 80,000
7	**Pumping**				
8	Concrete - Common Wall Construction with EQ Tank	1	LS	$ 25,000	$ 25,000
9	Pumps	3	EA	$ 35,000	$ 105,000
10	Mechanical Piping	1	LS	$ 50,000	$ 50,000
				Construction Subtotal	**$1,794,500**
				Mobilization, Bonding, Administration (12%)	$ 215,300
				Site Electrical, Controls and Testing (25%)	$ 502,500
				Construction Total	**$ 2,512,300**
				Engineering and Administration (25%)	$ 628,100
				Construction Reserve Contingency (20%)	$ 502,500
				Total Capital	**$ 3,640,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Equalization				
	Power Costs (mixing)	161919	kW-Hr	**$0.07**	**$ 11,334**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
	Pumping				
	Power Costs (mixing)	126945	kW-Hr	**$0.07**	**$ 8,886**
	Operator Time (Annual Man-Hours) (2.5 hrs/week)	130	HR	**$35.00**	**$ 4,550**
				Total Annual O&M Costs	***$ 29,321***
	Power over 20 years				**$ 404,410**
	Operator Time (over 20 years)				**$ 182,000**
				O&M Costs (20 Year Lifecycle) Subtotal	**$ 586,000**
				TOTAL Present Worth (O&M and Capital)	**$ 4,226,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Appendix 6-A

Engineer's Opinion of Probable Cost

Secondary Treatment

Determine the Design SRT for Nitrification

Assumptions			
Avg Q	2.4	mgd	
Avg BOD	4800	lbs/d	240 mg/l
Avg NH3	960	lbs/d	
Min water temp	10	C	
Min DO =	2.0	mg/l	minimum DO in the aeration basin
K_{DO} =	0.3		half saturation coeff
Effluent NH3	1.0	mg/l	
K_N =	0.5		half saturation coeff
$\mu_{N,\,max\,(T)}$ =	0.288	d^{-1}	maximum the design nitrifier growth rate
μ_N =	0.167	d^{-1}	nitrifier specific growth rate at the specified conditions
k_{Nd} =	0.050	g NVSS/g NVSS-days	nitrifier decay rate
$SRT_{theoretical}$ =	8.6	days	
Safety Factor =	2		nitrification safety factor = ratio of max NH3 to avg NH3
SRT_{design} =	17.1	days	
$k_{b\,(20C)}$ =	0.1		
$k_{b\,(T)}$ =	0.068		
a =	0.7	g VSS/g BOD	heterotrph yield coeff
X_d =	0.06		
S_r =	240	mg/l	
Aerobic Volume	1.8	mGal	
t =	0.8	days	aerobic HRT
X_v t =	2685		
X_v =	3,580	mg/l	
VSS Percentage	75%		
X	4,774	mg/l	

Secondary Clarifier sizing Calculation				
Design Flows				
Avg Day Flow	2.40	mgd		
Max Day Peaking Factor	1.51			
Max Day flow	3.62	mgd		
Peak hour Factor	2.05			
Design Peak hourly flow	4.92			
Design Max recycle ratio	1.5		ratio to the average day flow	
Design MLSS	4,774	mg/l		
Design Criteria from 10-States Standards				
SLR	35	lbs/day/sf	peak solids loading rate at design peak hourly flow plus the design max sludge return rate and design MLSS	
SOR	1000	gpd/sf	surface overflow rate at design peak hourly flow	
Existing Clarifier Info				
SC1	50	ft dia	1,963	sf
SC2	50	ft dia	1,963	sf
SC3	60	ft dia	2,827	sf
SC4	60	ft dia	2,827	sf
total				
clarifier surface are with largest unit out of serivce				
SA =			6,754	sf
$SLR = \frac{8.34 * MLSS(P_{PHF} * Q_{ADF} + R * Q_{ADF})}{A}$				
Existing Firm Capacity based on SLR =	1.67	mgd		
Existing Firm Capacity based on SOR =	4.47	mgd		
If a equalization is added and the peak hour flow is reduced to the max day flow				
			6,754	sf
then;				
Firm Capacity based on SLR =	1.97	mgd		
Firm Capacity based on SOR =	3.29	mgd		
If a 5th 60' dia clarifier is added the surface are with the largest out of service will be				
			9,582	sf
then;				
Firm Capacity based on SLR =	2.37	mgd		
Firm Capacity based on SOR =	4.67	mgd		

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Secondary Treatment
Aeration Improvements - Option 1

CLIENT: **HARSB**

CLIENT PROJ. NO. | J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Demo 4 existing aerators	1	LS	$7,000	$ 7,000
2	Relocate one Aerator from OD3 to OD2	1	LS	$5,000	$ 5,000
3	New 60 HP Aerator	1	EA	$70,000	$ 70,000
4	New 75 HP Aerator	3	EA	$80,000	$ 240,000
5	Mechanical and Installation	1	LS	25%	$ 78,000
6	Rebuild Aerator Frames in OD1 and OD2	4	LS	$35,000	$ 140,000
7	Polymer System	1	LS	$30,000	$ 30,000

Construction Subtotal	**$ 570,000**
Mobilization, Bonding, Administration (12%)	$ 68,400
Site Electrical, Controls and Testing (25%)	$ 159,600
Construction Total	**$ 798,000**
Engineering and Administration (25%)	$ 199,500
Construction Reserve Contingency (20%)	$ 159,600
Total Capital	**$ 1,160,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	O&M costs included in escalated costs of existing facility				
		O&M Costs (20 Year Lifecycle) Subtotal			
		PRESENT WORTH CAPTITAL AND O&M			**$ 1,160,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Secondary Treatment
Aeration Improvements - Option 2

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Demo Radius Walls	75	CY	$150	$ 11,250
2	FRP Radius Wall on OD1	90	CY	$800	$ 72,000
3	FRP Center Wall on OD1	12	CY	$800	$ 9,600
4	FRP Elevated Slab on OD1	90	CY	$1,000	$ 90,000
5	FRP Elevated Beams on OD1	17	CY	$1,000	$ 17,000
6	Aerator Frame	1	LS	$35,000	$ 35,000
7	50 hp Aerator	1	EA	$65,000	$ 65,000
8	Mechanical and Installation	1	LS	25%	$ 16,000
9	Demo Radius Walls	75	CY	$150	$ 11,250
10	FRP Radius Wall on OD2	90	CY	$800	$ 72,000
11	FRP Center Wall on OD2	12	CY	$800	$ 9,600
12	FRP Elevated Slab on OD2	90	CY	$1,000	$ 90,000
13	FRP Elevated Beams on OD2	17	CY	$1,000	$ 17,000
14	Aerator Frame	1	LS	$35,000	$ 35,000
15	50 hp Aerator	1	EA	$65,000	$ 65,000
16	Mechanical and Installation	1	LS	25%	$ 16,000

Construction Subtotal	**$ 631,700**
Mobilization, Bonding, Administration (12%)	$ 75,800
Site Electrical, Controls and Testing (25%)	$ 176,900
Construction Total	**$ 884,400**
Engineering and Administration (25%)	$ 221,100
Construction Reserve Contingency (20%)	$ 176,900
Total Capital	**$ 1,280,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	O&M costs included in escalated costs of existing facility				
		O&M Costs (20 Year Lifecycle) Subtotal			
		PRESENT WORTH CAPTITAL AND O&M			**$ 1,280,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Secondary Treatment
BNR Improvements

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Anaerobic Tanks with Mixers	200000	gal	$1.50	$ 300,000
2	Anoxic Tanks with Mixers	720000	gal	$1.50	$ 1,080,000
3	Site Work	1	LS	15%	$ 207,000
4	Yard Piping	1	LS	25%	$ 345,000

Construction Subtotal	**$ 1,932,000**
Mobilization, Bonding, Administration (12%)	$ 231,800
Site Electrical, Controls and Testing (20%)	$ 432,800
Construction Total	**$ 2,596,600**
Engineering and Administration (25%)	$ 649,200
Construction Reserve Contingency (20%)	$ 519,300
Total Capital	**$ 3,770,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	326310	kW-Hr	$0.07	$ 22,842
2	Chemical		LS		$ -
3	Operator Time (Annual Man-Hours) (4hrs/week)	208	HR	$30.00	$ 6,240
4	Equipment Costs (annual)	1	% of capital	1.50%	$ 2,070
				Annnual O&M	**$ 31,000**
	Power Costs (over 20 years)				$ 456,834
	Chemical Costs (over 20 years)				$ -
	Operator Time (over 20 years)				$ 124,800
	Equipment Costs (over 20 years)				$ 41,400
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 623,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 4,393,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Secondary Treatment
Secondary Clarifier (60 ft)

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	18" ML	1	LS	$51,840	$ 51,840
2	RAS/WAS Piping	1	LS	$50,000	$ 50,000
3	18" SE	1	LS	$17,600	$ 17,600
4	2" UW	1		$4,000	$ 4,000
5	6"SC to Existing Scum Pit	75	LF	$125	$ 9,375
6	Mass Excavation	1	LS	$22,000	$ 22,000
7	Structural Backfill	1	LS	$20,000	$ 20,000
8	Gravel Base Course	1	LS	$4,500	$ 4,500
9	FRP Concrete Structure	1	LS	$241,750	$ 241,750
10	FRP Sidewalk	1	LS	$18,135	$ 18,135
11	Paint Mechanism	1	LS	$40,300	$ 40,300
12	Stamford Baffle, Weir and Scum Baffle	1	LS	$22,150	$ 22,150
13	Mechanism	1	LS	$143,791	$ 143,791
14	Handrail	210	LF	$40	$ 8,400
15	Pump Pads	2	LS	$2,000	$ 4,000
16	RAS Pump	1	LS	$19,300	$ 19,300
17	WAS Pump	1	LS	$36,000	$ 36,000
18	Basement Process Piping	1	LS	$22,000	$ 22,000

Construction Subtotal	$	**677,100**
Mobilization, Bonding, Administration (12%)	$	81,300
Site Electrical, Controls and Testing (20%)	$	151,700
Construction Total	$	**910,100**
Engineering and Administration (25%)	$	227,500
Construction Reserve Contingency (20%)	$	182,000
Total Capital	$	**1,320,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	O&M costs included in escalated costs of existing facility				
		O&M Costs (20 Year Lifecycle) Subtotal			
		PRESENT WORTH CAPTITAL AND O&M			$ 1,320,000

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Appendix 7-A

Engineer's Opinion of Probable Cost

Tertiary Treatment

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Coagulation Settling
Coagulation and Tertiary Clarification

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SCHEDULE OF VALUES			
1	2500 gal Rapid Mix Box	1	LS	$50,000	$ 50,000
2	70 ft dia flocculating clarifier	2	EA	$900,000	$ 1,800,000
3	Sludge Pumping				
4	Structure	300	SF	$350	$ 105,000
5	Pumps	3	EA	$20,000	$ 60,000
6	Mechanical and Installation	1	LS	50%	$ 30,000
7	Alum Feed System	1	LS	$30,000	$ 30,000
8	Polymer System	1	LS	$30,000	$ 30,000
9	Caustic Feed System	1	LS	$30,000	$ 30,000
10	Site Work and Yard Piping	1	LS	5%	$ 107,000

Construction Subtotal	**$ 2,242,000**
Mobilization, Bonding, Administration (10%)	$ 224,200
Site Electrical, Controls and Testing (25%)	$ 616,600
Construction Total	**$ 3,082,800**
Engineering and Administration (25%)	$ 770,700
Construction Reserve Contingency (20%)	$ 616,600
Total Capital	**$ 4,470,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT PRICE	TOTAL COST
		SCHEDULE OF VALUES			
1	Power Cost (annual)	199400	kW-Hr	$0.07	$ 13,958
2	Chemical	1	LS	$ 69,500	$ 69,500
3	Operator Time (Annual Man-Hours) (4hrs/week)	416	HR	$30.00	$ 12,480
4	Equipment Costs (annual)	1	% of capital	0.75%	$ 13,500
				Annnual O&M	**$ 109,000**
	Power Costs (over 20 years)				$ 279,159
	Chemical Costs (over 20 years)				$ 69,500
	Operator Time (over 20 years)				$ 249,600
	Equipment Costs (over 20 years)				$ 270,000
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 868,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 5,338,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB WWTP Facility Plan

DATE: May 24, 2012

PROJECT DESCRIPTION: Coagulation Settling
Coagulation Sedimentation Package Plant (Corix)

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Corix Coagulation-Sedimentation Package Plant (600 gpm)	5	EA	$315,000	$ 1,575,000
2	Mechanical and Installation	1	LS	25%	$ 394,000
3	Polymer System	1	LS	$30,000	$ 30,000
4	Support Systems				
5	Structure (50 x 100)	5000	SF	$175	$ 875,000
6	Feed Pumps	6	EA	$20,000	$ 120,000
7	Mechanical and Installation	1	LS	50%	$ 60,000
8	Site Work and Yard Piping	1	LS	5%	$ 153,000
9					
10					

Construction Subtotal	**$ 3,207,000**
Mobilization, Bonding, Administration (10%)	$ 320,700
Site Electrical, Controls and Testing (25%)	$ 881,900
Construction Total	**$ 4,409,600**
Engineering and Administration (25%)	$ 1,102,400
Construction Reserve Contingency (20%)	$ 881,900
Total Capital	**$ 6,390,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	288642	kW-Hr	$0.07	$ 20,205
2	Chemical	1	LS	$ 104,250	$ 104,250
3	Operator Time (Annual Man-Hours) (8hrs/week)	416	HR	$30.00	$ 12,480
4	Equipment Costs (annual)	1	% of capital	1.25%	$ 19,688
				Annual O&M	**$ 157,000**
	Power Costs (over 20 years)				$ 404,099
	Chemical Costs (over 20 years)				$ 104,250
	Operator Time (over 20 years)				$ 249,600
	Equipment Costs (over 20 years)				$ 393,750
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,152,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 7,542,000**

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Coagulation Settling
Kruger Actiflo Ballasted Sedimentation

CLIENT: **HARSB**

CLIENT PROJ. NO.   J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Ballasted Sedimentation Package Plant	2	EA	$600,000	$ 1,200,000
2	Mechanical and Installation	1	LS	25%	$ 300,000
3	Polymer System	1	LS	$25,000	$ 25,000
4	Support Systems				
5	Structure (50 x 100)	5000	SF	$175	$ 875,000
6	Feed Pumps	3	EA	$20,000	$ 60,000
7	Mechanical and Installation	1	LS	50%	$ 30,000
8	Site Work and Yard Piping	1	LS	5%	$ 125,000
9					
10					

Construction Subtotal	**$ 2,615,000**
Mobilization, Bonding, Administration (10%)	$ 261,500
Site Electrical, Controls and Testing (25%)	$ 719,100
Construction Total	**$ 3,595,600**
Engineering and Administration (25%)	$ 898,900
Construction Reserve Contingency (20%)	$ 719,100
Total Capital	**$ 5,210,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	288642	kW-Hr	$0.07	$ 20,205
2	Chemical	1	LS	$ 104,250	$ 104,250
3	Operator Time (Annual Man-Hours) (8hrs/week)	416	HR	$30.00	$ 12,480
4	Equipment Costs (annual)	1	% of capital	1.75%	$ 27,825
				Annnual O&M	**$ 165,000**
	Power Costs (over 20 years)				$ 404,099
	Chemical Costs (over 20 years)				$ 104,250
	Operator Time (over 20 years)				$ 249,600
	Equipment Costs (over 20 years)				$ 556,500
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,314,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 6,524,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB WWTP Facility Plan

DATE: May 24, 2012

PROJECT DESCRIPTION: Filtration
Two Pass CBUF Filtration

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Blue Pro Filtration System	40	EA	$50,000	$ 2,000,000
2	Concrete Tanks	40	EA	$25,000	$ 1,000,000
3	Building	13,000	SF	$175	$ 2,275,000
4	Interior Mechanical Piping and Weir Boxes	1	LS	10%	$ 528,000
5	Alum or Ferric Feed System	1	LS	$50,000	$ 50,000
6	Caustic Feed System	1	LS	$50,000	$ 50,000
7	Feed Pump Station	1	LS	$225,000	$ 225,000
8	Reject Pump Station	1	LS	$225,000	$ 225,000
9	Site Work and Yard Piping	1	LS	5%	$ 318,000
10					
11					

Construction Subtotal	**$ 6,671,000**
Mobilization, Bonding, Administration (10%)	$ 667,100
Site Electrical, Controls and Testing (25%)	$ 1,834,500
Construction Total	**$ 9,172,600**
Engineering and Administration (25%)	$ 2,293,200
Construction Reserve Contingency (20%)	$ 1,834,500
Total Capital	**$ 13,300,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	385002	kW-Hr	$0.07	$ 26,950
2	Chemical	1	LS	$ 208,500	$ 208,500
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	$30.00	$ 24,960
4	Equipment Costs (annual)	1	% of capital	1.25%	$ 25,000
				Annnual O&M	**$ 285,000**
	Power Costs (over 20 years)				$ 539,003
	Chemical Costs (over 20 years)				$ 208,500
	Operator Time (over 20 years)				$ 499,200
	Equipment Costs (over 20 years)				$ 500,000
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,747,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 15,047,000**

J-U-B ENGINEERS, INC.
7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: HARSB WWTP Facility Plan

DATE: May 24, 2012

PROJECT DESCRIPTION: Filtration
GE-Zenon Microfiltration Tertiary Filtration

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	GE Zenon MF Submerged Filters (with blowers, strainers)	1	LS	$2,460,000	$ 2,460,000
2	Installation	1	LS	5%	$ 123,000
3	Concrete Tanks	150	CY	$800	$ 120,000
4	Building	9,000	SF	$175	$ 1,575,000
5	Interior Mechanical Piping	1	LS	5%	$ 214,000
6	Alum or Ferric Feed System	1	LS	$50,000	$ 50,000
7	Caustic Feed System	1	LS	$50,000	$ 50,000
8	Filter Feed Pump Station	1	LS	$225,000	$ 225,000
9	Reject Pump Station	1	LS	$225,000	$ 225,000
10	Site Work and Yard Piping	1	LS	5%	$ 252,000
11	Backpulse Tank	1	LS	$50,000	$ 50,000
12					

Construction Subtotal	**$ 5,344,000**
Mobilization, Bonding, Administration (10%)	$ 534,400
Site Electrical, Controls and Testing (30%)	$ 1,763,500
Construction Total	**$ 7,641,900**
Engineering and Administration (25%)	$ 1,910,500
Construction Reserve Contingency (20%)	$ 1,528,400
Total Capital	**$ 11,080,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	230224	kW-Hr	$0.07	$ 16,116
2	Chemical	1	LS	$ 134,000	$ 134,000
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	$30.00	$ 24,960
4	Equipment Costs (annual) (including membrane replace)	1	% of capital	4.00%	$ 98,400
				Annnual O&M	**$ 273,000**
	Power Costs (over 20 years)				$ 322,313
	Chemical Costs (over 20 years)				$ 134,000
	Operator Time (over 20 years)				$ 499,200
	Equipment Costs (over 20 years)				$ 1,968,000
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 2,924,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 14,004,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 24, 2012

PROJECT DESCRIPTION: Filtration
Dual Media Down-flow Filtration

CLIENT: **HARSB**

CLIENT PROJ. NO. J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Coagualation and Filtration Units	4	EA	$325,000	$ 1,300,000
2	Installation	1	LS	25%	$ 325,000
3	Building	11,000	SF	$175	$ 1,925,000
4	Interior Mechanical Piping	1	LS	5%	$ 178,000
5	Alum or Ferric Feed System	1	LS	$50,000	$ 50,000
6	Caustic Feed System	1	LS	$50,000	$ 50,000
7	Filter Feed Pump Station	1	LS	$225,000	$ 225,000
8	Reject Pump Station	1	LS	$225,000	$ 225,000
9	Site Work and Yard Piping	1	LS	5%	$ 214,000
10	Backpulse Tank	1	LS	$50,000	$ 50,000
11					

Construction Subtotal	**$ 4,542,000**
Mobilization, Bonding, Administration (10%)	$ 454,200
Site Electrical, Controls and Testing (25%)	$ 1,249,100
Construction Total	**$ 6,245,300**
Engineering and Administration (25%)	$ 1,561,300
Construction Reserve Contingency (20%)	$ 1,249,100
Total Capital	**$ 9,060,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Power Cost (annual)	360912	kW-Hr	$0.07	$ 25,264
2	Chemical	1	LS	$ 139,000	$ 139,000
3	Operator Time (Annual Man-Hours) (16 hrs/week)	832	HR	$30.00	$ 24,960
4	Equipment Costs (annual)	1	% of capital	1.50%	$ 19,500
				Annnual O&M	**$ 209,000**
	Power Costs (over 20 years)				$ 505,277
	Chemical Costs (over 20 years)				$ 139,000
	Operator Time (over 20 years)				$ 499,200
	Equipment Costs (over 20 years)				$ 390,000
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,533,000**
		PRESENT WORTH CAPTITAL AND O&M			**$ 10,593,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Appendix 8-A

Engineer's Opinion of Probable Cost

Disinfection

JUB J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Gas Chlorination**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	W&T Micro/2000 chlorine residual analyzer	1	ea	$ 8,800	$ 8,800
2	W&T V10k chlorinator w/ controller	1	ea	$ 12,600	$ 12,600
3	Sample pump	1	ea	$ 1,700	$ 1,700
4	piping	1	ls	$ 2,000	$ 2,000
5	Scales for one-ton cylinders	4	ea	$ 1,750	$ 7,000
6	Cradles for on-ton cylinders	6	ea	$ 600	$ 3,600
7	Automatic-closing fail-safe valves	4	ea	$ 2,000	$ 8,000
8	Fail-safe valve controller	1	ea	$ 5,000	$ 5,000
9	Gas leak detection system	1	ls	$ 5,000	$ 5,000
10	Crane system to handle one-ton cylinders	1	ls	$ 20,000	$ 20,000
11	Concrete Contact Basin	150000	gal	1.75	$ 262,500
12	Building	2000	sf	$ 175	$ 350,000

Construction Subtotal	**$ 686,200**
Mobilization, Bonding, Administration (12%)	$ 82,300
Site Electrical, Controls and Testing (35%)	$ 269,000
Site Work (20%)	$ 153,700
Construction Total	**$1,191,200**
Engineering and Administration (25%)	$ 297,800
Construction Reserve Contingency (20%)	$ 238,200
Total Capital	**$ 1,730,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Chemical Cost	1	LS	$34,542	**$ 34,542**
	Equipment	1	LS	**$ 1,106**	**$ 1,106**
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	$35.00	**$ 3,640**
			Total Annual O&M Costs		***$ 39,288***
	Chemical Cost over 20 years				**$ 690,840**
	Equipment over 20 years				**$ 22,110**
	Operator Time (over 20 years)				**$ 72,800**
		O&M Costs (20 Year Lifecycle) Subtotal			$ **786,000**
		TOTAL Present Worth (O&M and Capital)			$ **2,516,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: Bulk Sodium Hypochlorite

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	W&T Micro/2000 chlorine residual analyzer	1	ea	$ 8,800	$ 8,800
2	Sample pump	1	ea	$ 1,700	$ 1,700
3	piping	1	ls	$ 4,000	$ 4,000
4	Double walled crosslink polyethylene tank w/leak detection and accessories for hypochlorite; 4,400 gal	2	ea	$ 35,000	$ 70,000
5	Three skid mounted metering pumps with accessories	1	ls	$ 33,000	$ 33,000
6	Containment system	1	ls	$ 5,000	$ 5,000
7	Concrete Contact Basin	150000	gal	1.75	$ 262,500
8	Building	2000	sf	$ 175	$ 350,000

Construction Subtotal	**$735,000**
Mobilization, Bonding, Administration (12%)	$ 88,200
Site Electrical, Controls and Testing (35%)	$ 288,100
Site Work (20%)	$ 164,600
Construction Total	**$1,275,900**
Engineering and Administration (25%)	$ 319,000
Construction Reserve Contingency (20%)	$ 255,200
Total Capital	**$ 1,850,000**

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Chemical Costs	1	LS	**$181,938**	**$ 181,938**
	Equipment	1	LS	**$ 1,838**	**$ 1,838**
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	**$35.00**	**$ 3,640**
				Total Annual O&M Costs	***$ 187,416***
	Chemical Cost over 20 years				**$ 3,638,769**
	Equipment over 20 years				**$ 36,750**
	Operator Time (over 20 years)				**$ 72,800**
				O&M Costs (20 Year Lifecycle) Subtotal	**$ 3,748,000**
				TOTAL Present Worth (O&M and Capital)	**$ 5,598,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: On-Site Sodium Hypochlorite Generation

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	300 ppd sodium hypochlorite generation system with water softener and brine tank	1	ea	$ 350,000	$ 350,000
2	W&T Micro/2000 chlorine residual analyzer	1	ea	$ 8,800	$ 8,800
3	Sample pump	1	ea	$ 1,700	$ 1,700
4	piping	1	ls	$ 4,000	$ 4,000
5	Double walled crosslink polyethylene tank w/leak detection and accessories for hypochlorite; 4,400 gal	2	ea	$ 35,000	$ 70,000
6	Three skid mounted metering pumps with accessories	1	ls	$ 33,000	$ 33,000
7	Containment system	1	ls	$ 5,000	$ 5,000
8	Concrete Contact Basin	150000	gal	1.75	$ 262,500
9	Building	2000	sf	$ 175	$ 350,000

Construction Subtotal	**$ 1,085,000**
Mobilization, Bonding, Administration (12%)	$ 130,200
Site Electrical, Controls and Testing (35%)	$ 425,300
Site Work (20%)	$ 243,000
Construction Total	**$1,883,500**
Engineering and Administration (25%)	$ 470,900
Construction Reserve Contingency (20%)	$ 376,700
Total Capital	**$ 2,730,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Power	219175	KWH	$0.07	$ 15,342
	Chemical Cost	306845	lb	$0.21	$ 64,437
	Equipment	1	LS	$ 7,088	$ 7,088
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	$35.00	$ 3,640
				Total Annual O&M Costs	*$ 90,507*
	Power over 20 years				$ 306,845
	Chemical Cost over 20 years				$ 1,288,749
	Equipment over 20 years				$ 141,750
	Operator Time (over 20 years)				$ 72,800
		O&M Costs (20 Year Lifecycle) Subtotal			$ 1,503,000
		TOTAL Present Worth (O&M and Capital)			$ 4,233,000

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: Sodium Bisulfite Dechlorination

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Double walled crosslink polyethylene tank w/leak detection and accessories; 540 gal	2	ea	$ 1,400	$ 2,800
2	Two skid mounted metering pumps with accessories	1	ls	$ 22,000	$ 22,000
3	Containment system	1	ls	$ 5,000	$ 5,000
4	W&T Deox/2000 sulfide/chlorine residual analyzer	1	ea	$ 10,700	$ 10,700
5	Sample pump	1	ea	$ 1,700	$ 1,700
6	piping	1	ls	$ 4,000	$ 4,000
7					
8	Building	500	sf	$ 175	$ 87,500

Construction Subtotal	**$133,700**
Mobilization, Bonding, Administration (12%)	$ 16,000
Site Electrical, Controls and Testing (35%)	$ 52,400
Site Work (20%)	$ 29,900
Construction Total	**$232,000**
Engineering and Administration (25%)	$ 58,000
Construction Reserve Contingency (20%)	$ 46,400
Total Capital	**$ 340,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Chemical Costs	1	LS	**$19,672**	**$ 19,672**
	Equipment	1	LS	**$633**	**$ 633**
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	**$35.00**	**$ 3,640**
				Total Annual O&M Costs	***$ 23,945***
	Chemical Cost over 20 years				**$ 393,440**
	Equipment over 20 years				**$ 12,660**
	Operator Time (over 20 years)				**$ 72,800**
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 479,000**
		TOTAL Present Worth (O&M and Capital)			**$ 819,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: Sulfur Dioxide Gas Dechlorination

CLIENT: HARSB

CLIENT PROJ. NO. | J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1					
2	W&T Deox/2000 sulfide/chlorine residual analyzer	1	ea	$ 10,700	$ 10,700
3	W&T V10k chlorinator w/ controller	1	ea	$ 12,600	$ 12,600
4	Sample pump	1	ea	$ 1,700	$ 1,700
5	piping	1	ls	$ 2,000	$ 2,000
6	Scales for 150 pound cylinders	6	ea	$ 1,750	$ 10,500
7	Automatic-closing fail-safe valves	6	ea	$ 2,000	$ 12,000
8	Fail-safe valve controller	1	ea	$ 5,000	$ 5,000
9	Gas leak detection system	1	ls	$ 5,000	$ 5,000
10					
11	Building	500	sf	$ 175	$ 87,500

Construction Subtotal	**$147,000**
Mobilization, Bonding, Administration (12%)	$ 17,600
Site Electrical, Controls and Testing (35%)	$ 57,600
Site Work (20%)	$ 32,900
Construction Total	**$255,100**
Engineering and Administration (25%)	$ 63,800
Construction Reserve Contingency (20%)	$ 51,000
Total Capital	**$ 370,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Chemical Costs	1	LS	**$12,403**	**$ 12,403**
	Equipment	1	LS	**$893**	**$ 893**
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	**$35.00**	**$ 3,640**
			Total Annual O&M Costs		***$ 16,936***
	Chemical Cost over 20 years				**$ 248,060**
	Equipment over 20 years				**$ 17,850**
	Operator Time (over 20 years)				**$ 72,800**
		O&M Costs (20 Year Lifecycle) Subtotal			$ 339,000
		TOTAL Present Worth (O&M and Capital)			$ 709,000

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: HARSB Wastewater Facility Plan	DATE: May 31, 2012
PROJECT DESCRIPTION: UV Light Disinfection	
CLIENT: HARSB	
CLIENT PROJ. NO.	J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	New UV Reactors with Independent Control Panel	5	EA	$ 123,500	$ 617,500
2	Installation and Markup	1	LS	30%	$185,250
3	New Piping and Mechanical	6	EA	$ 15,000	$ 90,000
4	Additional Building Space (20 x 30)	600	SF	$ 175	$ 105,000
				Construction Subtotal	**$ 997,800**
				Mobilization, Bonding, Administration (12%)	$ 119,700
				Site Electrical, Controls and Testing (35%)	$ 391,100
				Site Work (20%)	$ 223,500
				Construction Total	**$ 1,732,100**
				Engineering and Administration (25%)	$ 433,000
				Construction Reserve Contingency (20%)	$ 346,400
				Total Capital	**$ 2,510,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Power Costs	1	LS	**$23,841**	**$ 23,841**
	Equipment	1	LS	**$14,872**	**$ 14,872**
	Operator Time (Annual Man-Hours) (2 hrs/week)	104	HR	**$35.00**	**$ 3,640**
				Total Annual O&M Costs	***$ 42,353***
	Power over 20 years				**$ 476,820**
	Equipment over 20 years				**$ 297,440**
	Operator Time (over 20 years)				**$ 72,800**
				O&M Costs (20 Year Lifecycle) Subtotal	**$ 847,000**
				TOTAL Present Worth (O&M and Capital)	**$ 3,357,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Ozone**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Equipment	2	ea	$ 500,000	$ 1,000,000
2	Contact Tanks	2	ea	$ 250,000	$ 500,000
3	Building	2000	sf	$ 175	$ 350,000

Construction Subtotal	**$ 1,850,000**
Mobilization, Bonding, Administration (12%)	$ 222,000
Site Electrical, Controls and Testing (35%)	$ 725,200
Site Work (20%)	$ 414,400
Construction Total	**$3,211,600**
Engineering and Administration (25%)	$ 802,900
Construction Reserve Contingency (20%)	$ 642,300
Total Capital	**$ 4,660,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
	Power Annual (400 lb/day average)	876,000	kwH	$0.07	$61,320
				Total Annual O&M Costs	*$61,320*
		O&M Costs (20 Year Lifecycle) Subtotal			**$ 1,226,400**
		TOTAL Present Worth (O&M and Capital)			**$ 5,886,400**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Appendix 9-B

Engineer's
Opinions of Probable Costs

outfalls

ENGINEER'S OPINION OF PROBABLE COST

J-U-B ENGINEERS, INC.

PROJECT: HARSB WWTP Facility Plan

DATE: May 1, 2012

PROJECT DESCRIPTION: Phase 1 Project: River Outfall Pipe - Huetter Road Alternative

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Construction Costs *from Welch Comer 2008 Study*	1	LS	$3,358,900	$ 3,358,900
2	Non-Construction Costs *from Welch Comer 2008 Study*	1	LS	$329,500.00	$ 329,500
				Total	**$ 3,688,400**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 1, 2012

PROJECT DESCRIPTION:

Phase 2 Project: Outfall Pipe - WWTP to Huetter Road (south of Wyoming)

CLIENT:

HARSB

CLIENT PROJ. NO. J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Construction Costs - *(based on 24-inch pipe unit costs from Welch Comer 2008 study)*	5,280	LF	$117	$ 615,800
2	Remove 10" piping restriction	100	LF	$200	$ 20,000

Construction Total	**$ 635,800**
Engineering and Administration (25%)	$ 159,000
Contingency (included in unit costs)	
Total Capital	**$ 790,000**

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J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP Facility Plan**

DATE: May 1, 2012

PROJECT DESCRIPTION:

Phase 3 Project: Outfall Pipe -Huetter Road (south of Wyoming) to Land App Site

CLIENT:

HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Construction Costs - *(based on 24-inch pipe unit costs from Welch Comer 2008 study)*	11,510	LF	$117	$ 1,342,400

Construction Total	**$ 1,342,400**
Engineering and Administration (25%)	$ 335,600
Contingency (included in unit costs)	
Total Capital	**$ 1,680,000**

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J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT:

HARSB WWTP Facility Plan

DATE:
May 1, 2012

PROJECT DESCRIPTION:

Phase 4 Project: H-3 Pumping Improvements

CLIENT:

HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Pump Station Wet Well Improvements	1	LS	$25,000	$ 25,000
2	Pump Improvements	3	EA	$25,000	$ 75,000
3	Site Piping and Mechanical	1	LS	$30,000	$ 30,000
4	Structure Improvemens	200	SF	$300	$ 60,000
				Construction Subtotal	**$ 190,000**
				Mobilization, Bonding, Administration (12%)	$ 22,800
				Site Electrical, Controls and Testing (30%)	$ 63,800
				Construction Total	**$ 276,600**
				Engineering and Administration (25%)	$ 69,200
				Construction Reserve Contingency (20%)	$ 55,300
				Total Capital	**$ 400,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

Appendix 10-A

Calculations and Supporting Information for Cost Development

Biosolids

5-30-12

HARSB - Sludge Production

2010-2011

Total WAS = 1,500,218 lbs

Total INF = 904.081 MG

Sludge Produced per influent

$$Px = \frac{1,500,218 \text{ lbs}}{(904.081 \text{ MG})\ 8.34} = 199 \text{ mg/l}$$

HARSE Facilities Plan
Purpose: Estimated **average** sludge production by adding alum at 3 location

user inputs in shaded cells		MW Al		27
		MW P		31
		MW alum: Al2(SO4)3-14H2O		594
		MW AlPO4		122
		MW Al(OH)3		78
Total solids produced		199 mg/l	avg	
Influent TP	7.21 mg/l			
TP after BPR	1.5 mg/l			
Excess Bio-P removal	5.7			
mg solids/mg P removed	4.5			
Additional Solids from BPR	0.0		<<<<<<	
1st alum dose	50 mg/l			
Aluminum dosage	4.5 mg Al /l			
TP after this alum dose	0.1 mg/l			
P to be removed chemically	1.4 mg/l			
Molar Ratio AL:P	3.5			
ALPO4 Precip	5.5 mg/l	<		
alum used	13.4 mg/l			
unused alum	36.6 mg/l			
AL(OH)3 Precip	9.6 mg/l	<		
Alum sludge from this dose		15.12 mg/l	<<	
2nd alum dose	50 mg/l			
Aluminum dosage	4.5 mg Al /l			
TP after this alum dose	0.05 mg/l			
P to be removed chemically	0.050 mg/l			
Molar Ratio AL:P	52			
ALPO4 Precip	0.2 mg/l	<		
alum used	0.5 mg/l			
unused alum	49.5 mg/l			
AL(OH)3 Precip	13.0 mg/l	<		
Alum sludge from this dose		13.20 mg/l	<<	

3rd alum dose	50 mg/l				
Aluminum dosage	4.5 mg Al /l				
TP after this alum dose	0.030 mg/l				
P to be removed chemically	0.020 mg/l				
Molar Ratio AL:P	52				
ALPO4 Precip	0.1 mg/l			<	
alum used	0.2 mg/l				
unused alum	49.8 mg/l				
AL(OH)3 Precip	13.1 mg/l			<	
Alum sludge from this dose		13.16	mg/l		<<
Total Sludge from alum		41	mg/l		
SF		35%			35% SF is recommended by the EPA Design Manual - Phosphorus Removal, p. 90
Estimated total sludge from alum w/SF		56	mg/l		
Est. Total Sludge Produced w/Alum		255	mg/l		

Estimated Year	Flow, mgd [mgd]	Est. Total Sludge Produced NO ALUM [dry lbs/day]	Est. Total Sludge Produced w/Alum [dry lbs/day]		Year
2011	1.21	2,008	2,008		
2012	1.27	2,102	2,102		0
2013	1.32	2,196	2,196		1
2014	1.38	2,290	2,290		2
2015	1.44	2,384	2,384		3
2016	1.49	2,478	2,478		4
2017	1.55	2,572	2,572		5
2018	1.61	2,667	3,417	begin alum addition	6
2019	1.66	2,761	3,537		7
2020	1.72	2,855	3,658		8
2021	1.78	2,949	3,778		9
2022	1.83	3,043	3,899		10
2023	1.89	3,137	4,019		11
2024	1.95	3,231	4,140		12
2025	2.00	3,325	4,260		13
2026	2.06	3,419	4,381		14
2027	2.12	3,513	4,501		15
2028	2.17	3,607	4,622		16
2029	2.23	3,701	4,743		17
2030	2.29	3,795	4,863		18
2031	2.34	3,889	4,984		19
2032	2.40	3983	5,104		20

Sludge Thickening by GBT, Rotary Drum Thickener, etc.

Xwas	13,900 mg/l	
Thickened solids concentration	30,000 mg/l	70,000 mg/l

Year	Flow	Dry Solids Wasted	WAS Volume	Thickened sludge Volume	Thickened sludge Volume	
	[mgd]	[dry lbs/day]	[gpd]	[gpd]	[gpd]	
2012	1.27	2,102	18,134	8,402	3,601	
2013	1.32	2,196	18,946	8,778	3,762	
2014	1.38	2,290	19,757	9,154	3,923	
2015	1.44	2,384	20,568	9,530	4,084	
2016	1.49	2,478	21,379	9,906	4,245	
2017	1.55	2,572	22,191	10,282	4,406	
2018	1.61	3,417	29,475	13,657	5,853	
2019	1.66	3,537	30,514	14,138	6,059	begin alum addiiton
2020	1.72	3,658	31,554	14,620	6,266	
2021	1.78	3,778	32,593	15,102	6,472	
2022	1.83	3,899	33,633	15,583	6,679	
2023	1.89	4,019	34,672	16,065	6,885	
2024	1.95	4,140	35,712	16,547	7,091	
2025	2.00	4,260	36,752	17,028	7,298	
2026	2.06	4,381	37,791	17,510	7,504	
2027	2.12	4,501	38,831	17,992	7,711	
2028	2.17	4,622	39,870	18,473	7,917	
2029	2.23	4,743	40,910	18,955	8,124	
2030	2.29	4,863	41,949	19,437	8,330	
2031	2.34	4,984	42,989	19,918	8,536	
2032	2.40	5,104	44,029	20,400	8,743	

Gravity belt thickener estimate					
Inputs:					
Initial Equipment Cost, 2 meter with appurtenances	$ 200,000			verbal quote from gobie sampson 12-12-11	
Equipment installation (15%)	$ 30,000		15%		
Support equipment (20%)	$ 40,000		20%		
Building to house equipment, 3000sf @ $200/sf	$ 600,000				
Subtotal		$ 870,000			
Electrical, Controls (20%)	$ 174,000		20%		
Site work and piping (20%)	$ 174,000		20%		
Mobilization, Bonding, Administration (12%)	$ 104,400		12%		
Subtotal		$ 452,400			
Engineering and CMS (20%)	$ 90,480		20%		
Contingincy (30%)	$ 135,720		30%		
Subtotal		$ 226,200			
Total capital costs		$ 1,548,600	(present worth)		

6-4-12

Aerobic Sludge Storage Sizing

1/1

Criteria

HRT 5 day

Feed solids 5104 lbs/day

at 25,000 mg/l

Vol w/o thickening:

$$V = \frac{5104 \text{ ppd}}{8.34 (13,900)} (5 \text{ days}) = 0.2201 \text{ MG}$$

Add 20% for free board = 0.2642 MG

= 264,000 gal

Vol Needed when thickening to 2.5%

$$\forall = \frac{5104 \text{ lb/day}}{(8.34)(25{,}000 \text{ mg/l})} (5\text{days}) = 0.1224 \text{ MG}$$

Add 20% for freeboard = 0.1469 MG
= 146,878 gal

Note: Volume of existing tank ~ 220,000 gal

Conclusion: Existing tank volume of (220,000 gal) is adequate to be a holding tank

Aerobic Holding Tank

Existing tank is adequate volume, but aeration system will not be.

Blowers (2 + redundant)	$ 90,000		3	ea	$ 30,000.00
Diffuser system	$ 50,000		1	ea	$ 50,000.00
Subtotal	$ 140,000				
Misc equipment (5%)	$ 7,000				5%
Site work (10%)	$ 14,000				10%
Electrical, Controls (20%)	$ 28,000				20%
Mobilization, Bonding, Administration (12%)	$ 16,800				12%
Subtotal	$ 65,800				
Construction subtotal	$ 205,800				
Engineering and CMS (20%)	$ 41,160.00				20%
Contingincy (30%)	$ 61,740.00				30%
Subtotal	$ 102,900				
Total capital costs	$ **308,700**	(present worth)			

Electrical cost to Operate Aerobic Holding Tank

Annual cost escalation	3.0%	Elec cost per kWhr	$ 0.08
Interest rate	3.0%		
VSS	78%	blower discharge pressure	7.0 psi
VSS destruction	20%	blower mechanical efficiency	70%
O2 reqd/lb solids destroyed	2.3	table 12-24, M&E	
AOR/SOR ratio	0.33		
O2 transfer efficiency per foot	2%		
diffuser submergence depth	14.00 ft		

Year	Flow	Dry Solids Wasted	VSS destroyed	TSS remaining after minimal digestion during holding
	[mgd]	[ppd]	[lbs/day]	[lbs/day]
2012	1.27	2,102	328	1,774
2013	1.32	2,196	343	1,854
2014	1.38	2,290	357	1,933
2015	1.44	2,384	372	2,012
2016	1.49	2,478	387	2,092
2017	1.55	2,572	401	2,171
2018	1.61	3,417	533	2,884
2019	1.66	3,537	552	2,986
2020	1.72	3,658	571	3,087
2021	1.78	3,778	589	3,189
2022	1.83	3,899	608	3,291
2023	1.89	4,019	627	3,392
2024	1.95	4,140	646	3,494
2025	2.00	4,260	665	3,596
2026	2.06	4,381	683	3,698
2027	2.12	4,501	702	3,799
2028	2.17	4,622	721	3,901
2029	2.23	4,743	740	4,003
2030	2.29	4,863	759	4,104
2031	2.34	4,984	777	4,206
2032	2.40	5,104	796	4,308

Electrical cost to Operate Aerobic Holding Tank

	AOR	SOR	Vol air Req'd	BHP req'd		Elect Unit Cost	Elec cost	Present worth of Elec cost
	[lbs O2/day]	[lbs O2/day]	[SCFM]	[BHP]	[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
0	754	2,286	326	12	81,514	$ 0.080	$ 6,521.10	$6,521.10
1	788	2,388	340	13	85,160	$ 0.082	$ 7,017.22	$6,812.84
2	822	2,490	355	14	88,807	$ 0.085	$ 7,537.24	$7,104.57
3	856	2,592	370	14	92,454	$ 0.087	$ 8,082.14	$7,396.30
4	889	2,695	384	15	96,100	$ 0.090	$ 8,652.95	$7,688.04
5	923	2,797	399	15	99,747	$ 0.093	$ 9,250.74	$7,979.77
6	1,226	3,715	530	20	132,489	$ 0.096	$ 12,655.88	$10,599.10
7	1,269	3,846	548	21	137,162	$ 0.098	$ 13,495.32	$10,972.93
8	1,312	3,977	567	22	141,834	$ 0.101	$ 14,373.73	$11,346.75
9	1,356	4,108	586	22	146,507	$ 0.104	$ 15,292.70	$11,720.58
10	1,399	4,239	604	23	151,180	$ 0.108	$ 16,253.87	$12,094.41
11	1,442	4,370	623	24	155,853	$ 0.111	$ 17,258.96	$12,468.24
12	1,485	4,501	642	25	160,526	$ 0.114	$ 18,309.71	$12,842.06
13	1,529	4,632	660	25	165,199	$ 0.117	$ 19,407.98	$13,215.89
14	1,572	4,763	679	26	169,871	$ 0.121	$ 20,555.67	$13,589.72
15	1,615	4,894	698	27	174,544	$ 0.125	$ 21,754.75	$13,963.55
16	1,658	5,025	716	27	179,217	$ 0.128	$ 23,007.27	$14,337.37
17	1,702	5,156	735	28	183,890	$ 0.132	$ 24,315.37	$14,711.20
18	1,745	5,287	754	29	188,563	$ 0.136	$ 25,681.25	$15,085.03
19	1,788	5,418	772	30	193,236	$ 0.140	$ 27,107.19	$15,458.85
20	1,831	5,549	791	30	197,909	$ 0.144	$ 28,595.58	$15,832.68
							present value	$ 241,741

Cost to dispose of dewatered sludge

%TS of dewatered sludge		17%
Initial contracted hauling/disposal cost per wet ton		$ 65.00

Period	Weight of digested sludge to BFP [dry lbs/day]	Weight of dewatered sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year
0	1,774	1,905	$ 65.00	$ 123,809	$123,809
1	1,854	1,990	$ 66.95	$ 133,228	$129,348
2	1,933	2,075	$ 68.96	$ 143,101	$134,886
3	2,012	2,160	$ 71.03	$ 153,446	$140,425
4	2,092	2,246	$ 73.16	$ 164,284	$145,964
5	2,171	2,331	$ 75.35	$ 175,633	$151,503
6	2,884	3,096	$ 77.61	$ 240,283	$201,233
7	2,986	3,205	$ 79.94	$ 256,220	$208,330
8	3,087	3,314	$ 82.34	$ 272,898	$215,428
9	3,189	3,423	$ 84.81	$ 290,345	$222,525
10	3,291	3,533	$ 87.35	$ 308,594	$229,623
11	3,392	3,642	$ 89.98	$ 327,676	$236,720
12	3,494	3,751	$ 92.67	$ 347,626	$243,818
13	3,596	3,860	$ 95.45	$ 368,477	$250,915
14	3,698	3,969	$ 98.32	$ 390,267	$258,012
15	3,799	4,079	$ 101.27	$ 413,033	$265,110
16	3,901	4,188	$ 104.31	$ 436,813	$272,207
17	4,003	4,297	$ 107.44	$ 461,648	$279,305
18	4,104	4,406	$ 110.66	$ 487,581	$286,402
19	4,206	4,515	$ 113.98	$ 514,653	$293,500
20	4,308	4,625	$ 117.40	$ 542,912	$300,597
			present value		$ 4,589,660

Total Life Cycle cost (present value)		
Capital cost	$	309,000
Elec cost	$	242,000
Total	$	551,000
Hauling/disposal	$	4,590,000
Total	$	5,141,000

Aerobic digester sizing

Year 0	Flow [mgd]	Dry Solids Wasted (Average) [dry lbs/day]
2012	1.27	2,102
2013	1.32	2,196
2014	1.38	2,290
2015	1.44	2,384
2016	1.49	2,478
2017	1.55	2,572
2018	1.61	3,417
2019	1.66	3,537
2020	1.72	3,658
2021	1.78	3,778
2022	1.83	3,899
2023	1.89	4,019
2024	1.95	4,140
2025	2.00	4,260
2026	2.06	4,381
2027	2.12	4,501
2028	2.17	4,622
2029	2.23	4,743
2030	2.29	4,863
2031	2.34	4,984
2032	2.40	5,104

Aerobic digester sizing

degree days req'd for 38% VSR	450	C-days
Xi, influent suspended solids	25,000	mg/l
f, sludge fraction in digester relative to influent	0.7	
X, digester suspended solids	17,500	mg/l
Kd, reaction rate constant	0.06	d^{-1}
Pv, volatile fraction of digester suspended solids	0.8	as a decimal
Y, fraction of inf BOD consisting of raw primary sludge	0	as a decimal
Si, Influent BOD	257	mg/L
minimum temperature =	10	C
SRT needed at minimum temperature	45.0	days

maximum temperature =	22	C
degree days at max temp and SRT=	990	
VSR from M&E fig 12-25 =	45%	
Oxygen requirment from M&E table 12-24 =	2.3	lbs O2/lb VSR

$$Req'd\ Volume = \frac{Q_i\,(Xi + YS_i)}{X\,(Kd\,Pv + 1/\Theta_c)}$$

Year	Thickened WAS Volume [gpd]	Q was [cf/day]	Req'd Vol at 10C [cf]	Req'd Vol at 10C [Mgal]	VSR lbs/d	O2 Reqd at max temp lbs O2/d
2012	10,083	1,348	27,422	0.205	757	1,741
2013	10,534	1,408	28,649	0.214	791	1,819
2014	10,985	1,469	29,876	0.223	825	1,896
2015	11,436	1,529	31,102	0.233	858	1,974
2016	11,887	1,589	32,329	0.242	892	2,052
2017	12,338	1,649	33,556	0.251	926	2,130
2018	16,388	2,191	44,571	0.333	1,230	2,829
2019	16,966	2,268	46,143	0.345	1,273	2,929
2020	17,544	2,345	47,715	0.357	1,317	3,029
2021	18,122	2,423	49,287	0.369	1,360	3,129
2022	18,700	2,500	50,859	0.380	1,404	3,228
2023	19,278	2,577	52,431	0.392	1,447	3,328
2024	19,856	2,655	54,003	0.404	1,490	3,428
2025	20,434	2,732	55,575	0.416	1,534	3,528
2026	21,012	2,809	57,147	0.427	1,577	3,627
2027	21,590	2,886	58,719	0.439	1,621	3,727
2028	22,168	2,964	60,291	0.451	1,664	3,827
2029	22,746	3,041	61,863	0.463	1,707	3,927
2030	23,324	3,118	63,435	0.474	1,751	4,027
2031	23,902	3,195	65,007	0.486	1,794	4,126
2032	24,480	3,273	66,579	0.498	1,837	4,226

Add 20% to volume for
working space
✓ = 576,000 gal

Aerobic digester estimated costs

Inputs:					
Tank (1$/gal , 576000gal)	$ 576,000		1.00 $/gal	576,000	gallons
Blowers	$ 250,000		5 ea	$ 50,000.00	
Diffuser system	$ 234,000		2 ea	$ 117,000.00	
Misc equipment (10%)	$ 57,600			10%	
Building to house blowers and equipment (1500sf at $ 200/sf)	$ 300,000		1500 sf	$ 200.00	
Subtotal	$ 1,417,600				
Site work (10%)	$ 141,760			10%	
Electrical, Controls (20%)	$ 283,520			20%	
Mobilization, Bonding, Administration (12%)	$ 170,112			12%	
Subtotal	$ 595,392				
Construction subtotal	$ 2,012,992				
Engineering and CMS (20%)	$ 402,598.40			20%	
Contingincy (30%)	$ 603,897.60			30%	
Subtotal	$ 1,006,496				
Total capital costs	$ 3,019,488	(present worth)			

Annual cost escalation	3.0%		Elec cost per kWhr	$ 0.08			
Interest rate	3.0%						
		78%		blower discharge pressure		7.0	psi
Average VSS destruction		45%		blower mechanical efficiency		70%	
O2 reqd/lb solids destroyed		2.3	table 12-24, M&E				
AOR/SOR ratio		0.33					
O2 transfer efficiency per foot		2%					
diffuser submergence depth		14.00 ft					

Year	Flow	Dry Solids Wasted	VSS destroyed		TSS after Digestion
	[mgd]	[ppd]	[lbs/day]		[lbs/day]
2012	1.27	2102	757		1,345
2013	1.32	2196	791		1,406
2014	1.38	2290	825		1,466
2015	1.44	2384	858		1,526
2016	1.49	2478	892		1,586
2017	1.55	2572	926		1,646
2018	1.61	3417	1,230		2,187
2019	1.66	3537	1,273		2,264
2020	1.72	3658	1,317		2,341
2021	1.78	3778	1,360		2,418
2022	1.83	3899	1,404		2,495
2023	1.89	4019	1,447		2,572
2024	1.95	4140	1,490		2,650
2025	2.00	4260	1,534		2,727
2026	2.06	4381	1,577		2,804
2027	2.12	4501	1,621		2,881
2028	2.17	4622	1,664		2,958
2029	2.23	4743	1,707		3,035
2030	2.29	4863	1,751		3,112
2031	2.34	4984	1,794		3,189
2032	2.40	5104	1,837		3,267

Period	AOR	SOR	Vol air Req'd	BHP req'd		Elect Unit Cost	Elec cost	Present worth of Elec cost
	[lbs O2/day]	[lbs O2/day]	[SCFM]	[BHP]	[kWhr/yr]	[$/kWhr]	[$/year]	[$/year]
0	1,741	5,275	752	29	188,109	$ 0.080	$ 15,048.70	$15,048.70
1	1,819	5,511	785	30	196,524	$ 0.082	$ 16,193.59	$15,721.93
2	1,896	5,747	819	31	204,939	$ 0.085	$ 17,393.62	$16,395.16
3	1,974	5,983	853	33	213,355	$ 0.087	$ 18,651.09	$17,068.39
4	2,052	6,219	886	34	221,770	$ 0.090	$ 19,968.35	$17,741.62
5	2,130	6,455	920	35	230,186	$ 0.093	$ 21,347.86	$18,414.85
6	2,829	8,573	1,222	47	305,743	$ 0.096	$ 29,205.88	$24,459.46
7	2,929	8,876	1,265	48	316,527	$ 0.098	$ 31,143.04	$25,322.14
8	3,029	9,178	1,308	50	327,310	$ 0.101	$ 33,170.15	$26,184.82
9	3,129	9,480	1,351	52	338,094	$ 0.104	$ 35,290.85	$27,047.50
10	3,228	9,783	1,394	53	348,877	$ 0.108	$ 37,508.94	$27,910.18
11	3,328	10,085	1,438	55	359,661	$ 0.111	$ 39,828.36	$28,772.85
12	3,428	10,388	1,481	57	370,444	$ 0.114	$ 42,253.18	$29,635.53
13	3,528	10,690	1,524	58	381,228	$ 0.117	$ 44,787.65	$30,498.21
14	3,627	10,992	1,567	60	392,011	$ 0.121	$ 47,436.16	$31,360.89
15	3,727	11,295	1,610	62	402,795	$ 0.125	$ 50,203.27	$32,223.57
16	3,827	11,597	1,653	63	413,578	$ 0.128	$ 53,093.71	$33,086.24
17	3,927	11,899	1,696	65	424,362	$ 0.132	$ 56,112.40	$33,948.92
18	4,027	12,202	1,739	67	435,145	$ 0.136	$ 59,264.42	$34,811.60
19	4,126	12,504	1,782	68	445,928	$ 0.140	$ 62,555.06	$35,674.28
20	4,226	12,807	1,825	70	456,712	$ 0.144	$ 65,989.81	$36,536.96
							present value	$ 557,864

	%TS of dewatered sludge		16%			
Period		Weight of digested sludge to BFP [dry lbs/day]	Weight of dewaterd sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year
0		1,345	1,534.6	$ 45.00	$ 69,058	$69,058
1		1,406	1,603.3	$ 46.35	$ 74,312	$72,148
2		1,466	1,671.9	$ 47.74	$ 79,819	$75,237
3		1,526	1,740.6	$ 49.17	$ 85,590	$78,327
4		1,586	1,809.3	$ 50.65	$ 91,635	$81,416
5		1,646	1,877.9	$ 52.17	$ 97,965	$84,506
6		2,187	2,494.3	$ 53.73	$ 134,026	$112,244
7		2,264	2,582.3	$ 55.34	$ 142,915	$116,203
8		2,341	2,670.3	$ 57.00	$ 152,218	$120,162
9		2,418	2,758.2	$ 58.71	$ 161,950	$124,121
10		2,495	2,846.2	$ 60.48	$ 172,128	$128,080
11		2,572	2,934.2	$ 62.29	$ 182,772	$132,039
12		2,650	3,022.2	$ 64.16	$ 193,900	$135,997
13		2,727	3,110.1	$ 66.08	$ 205,530	$139,956
14		2,804	3,198.1	$ 68.07	$ 217,684	$143,915
15		2,881	3,286.1	$ 70.11	$ 230,383	$147,874
16		2,958	3,374.1	$ 72.21	$ 243,647	$151,833
17		3,035	3,462.0	$ 74.38	$ 257,500	$155,792
18		3,112	3,550.0	$ 76.61	$ 271,964	$159,750
19		3,189	3,638.0	$ 78.91	$ 287,065	$163,709
20		3,267	3,726.0	$ 81.28	$ 302,827	$167,668
				present value		$ 2,560,036
	Total Life Cycle cost (present value)					
	Capital cost	$ 3,020,000				
	Elec cost	$ 560,000				
	Total	$ 3,580,000				
	Disposal cost	$ 2,560,000				
	Total	$ 6,140,000				

Anaerobic digester sizing (complete mix, high-rate)

MCRT design =	10	days	M&E Table 12-18
WAS load =	12,250	lbs dry solids	[max week = 2.4 x Avg]
Sludge feed =	50,000	mg/l	thickening assumed
Sludge Volume =	29,376	gpd	
	3,927	cf/day	
Digester liquid volume =	39,272	cf	
	293,755	gal	
Side water depth	25	ft	
additional working depth	10	ft	
total wall height	35		
Tank Area	1,571	sq ft	
Tank diameter	45	ft	
Roundup dia to nearest 10ft increment	50	ft	
Total digester vol neglecting cone	68,720	cf	
	514,028	gal	
circumference	157	ft	
wall thickness	2	ft	
Wall volume	407	cy	<<<<<
floor thickness	1.5	ft	
Floor Volume	109	cy	<<<<<

Anerobic digester estimated costs

Item			Qty	Unit	Unit cost	Cost
Excavation			8000	cy	$ 4	$ 32,000
Primary tank	514,028	total volume, gal				
Walls			407	cy	$ 1,000	$ 407,231
Bottom			109	cy	$ 800	$ 87,264
Secondary tank	514,028	total volume, gal				
Walls			407	cy	$ 1,000	$ 407,231
Bottom			109	cy	$ 800	$ 87,264
Building : Pumping/piping/compressors/biolers			3000	sf	$ 220	$ 660,000
Steel covers			2	ea	$ 90,000	$ 180,000
Paint covers			1	ls	$ 100,000	$ 100,000
Piping			1	ls	$ 105,000	$ 105,000
Heat exchangers			2	ea	$ 25,000	$ 50,000
Boilers and piping			2	ea	$ 100,000	$ 200,000
Gas mixing system and gas equipment			1	ls	$ 500,000	$ 500,000
Sludge pumping			1	ls	$ 75,000	$ 75,000
Subtotal						$ 2,890,991
Site work			20%			$ 578,198
Electrical, controls and instrumentation			20%			$ 578,198
Mobilization, Bonding, Administration			12%			$ 346,919
Subtotal						$ 1,503,315
Construction subtotal						$ 4,394,306
Engineering and CMS			20%			$ 878,861.19
Contingincy			30%			$ 1,318,291.78
Subtotal						$ 2,197,153
Total capital costs					(present worth)	$ 6,591,459

Mixing electrical cost

Annual cost escalation	3.0%	
Interest rate	3.0%	
Elec cost per kWhr	$ 0.08	
Digester liquid volume	514,028	gallons
Mixing energy input	$ 0.05	hp/1000 gal
Total mixing hp	$ 25.70	hp/1000 gal

Year	Period	[kWhr/yr]	Elect Unit Cost [$/kWhr]	Elec cost [$/year]	Present worth of Elec cost [$/year]
2012	0	167,958	$ 0.080	$ 13,436.61	$13,436.61
2013	1	167,958	$ 0.082	$ 13,839.71	$13,436.61
2014	2	167,958	$ 0.085	$ 14,254.90	$13,436.61
2015	3	167,958	$ 0.087	$ 14,682.54	$13,436.61
2016	4	167,958	$ 0.090	$ 15,123.02	$13,436.61
2017	5	167,958	$ 0.093	$ 15,576.71	$13,436.61
2018	6	167,958	$ 0.096	$ 16,044.01	$13,436.61
2019	7	167,958	$ 0.098	$ 16,525.33	$13,436.61
2020	8	167,958	$ 0.101	$ 17,021.09	$13,436.61
2021	9	167,958	$ 0.104	$ 17,531.73	$13,436.61
2022	10	167,958	$ 0.108	$ 18,057.68	$13,436.61
2023	11	167,958	$ 0.111	$ 18,599.41	$13,436.61
2024	12	167,958	$ 0.114	$ 19,157.39	$13,436.61
2025	13	167,958	$ 0.117	$ 19,732.11	$13,436.61
2026	14	167,958	$ 0.121	$ 20,324.08	$13,436.61
2027	15	167,958	$ 0.125	$ 20,933.80	$13,436.61
2028	16	167,958	$ 0.128	$ 21,561.81	$13,436.61
2029	17	167,958	$ 0.132	$ 22,208.67	$13,436.61
2030	18	167,958	$ 0.136	$ 22,874.93	$13,436.61
2031	19	167,958	$ 0.140	$ 23,561.17	$13,436.61
2032	20	167,958	$ 0.144	$ 24,268.01	$13,436.61
				present value	$ 282,169

Haul and disposal cost							
VSS			78%				
Average VSS destruction			50%				
%TS of dewatered sludge			20%				
Initial contracted hauling/disposal cost per wet ton			$ 45.00				
Period	Dry Solids Wasted to digester	VSS destroyed in digestion	TSS after Digestion	Weight of dewatered sludge	Disposal Unit Cost	Disposal Cost	Present worth of disposal cost
	[ppd]	[ppd]	[lbs/day]	[wet tons/year]	[$/wet ton]	[$/year/wet ton]	$/year
0	2102	820	1,282	1,170	$ 45.00	$ 52,657	$52,657
1	2196	857	1,340	1,223	$ 46.35	$ 56,663	$55,013
2	2290	893	1,397	1,275	$ 47.74	$ 60,862	$57,368
3	2384	930	1,454	1,327	$ 49.17	$ 65,262	$59,724
4	2478	967	1,512	1,380	$ 50.65	$ 69,871	$62,080
5	2572	1,003	1,569	1,432	$ 52.17	$ 74,699	$64,436
6	3417	1,333	2,084	1,902	$ 53.73	$ 102,195	$85,586
7	3537	1,380	2,158	1,969	$ 55.34	$ 108,973	$88,605
8	3658	1,427	2,231	2,036	$ 57.00	$ 116,066	$91,624
9	3778	1,474	2,305	2,103	$ 58.71	$ 123,487	$94,642
10	3899	1,521	2,378	2,170	$ 60.48	$ 131,248	$97,661
11	4019	1,568	2,452	2,237	$ 62.29	$ 139,364	$100,679
12	4140	1,615	2,525	2,304	$ 64.16	$ 147,849	$103,698
13	4260	1,662	2,599	2,371	$ 66.08	$ 156,717	$106,717
14	4381	1,709	2,672	2,439	$ 68.07	$ 165,984	$109,735
15	4501	1,756	2,746	2,506	$ 70.11	$ 175,667	$112,754
16	4622	1,803	2,819	2,573	$ 72.21	$ 185,781	$115,772
17	4743	1,850	2,893	2,640	$ 74.38	$ 196,344	$118,791
18	4863	1,897	2,966	2,707	$ 76.61	$ 207,373	$121,810
19	4984	1,944	3,040	2,774	$ 78.91	$ 218,887	$124,828
20	5104	1,991	3,113	2,841	$ 81.28	$ 230,906	$127,847
						present value	$ 1,952,028

Total Life Cycle cost (present value)		
Capital cost	$	6,591,000
Mixing costs	$	282,000
Total	$	6,870,000
Haul/disposal cost	$	1,950,000
Total	$	8,820,000

Screw Press estimate				
Design year			2032	
Design Inf Flow			2.40	mgd
Design thickened solids concentration			30,000	mg/l
Design thickened sludge volume			20,400	gpd
Throughput of Huber RoS3.2 at 3% feed			36	gpm
Operating days per week			6	days/week
Operating hours per day			7	hours/day
Number of screw presses needed			1.6	units
round up			2.0	units
	Qty	Unit	Unit cost	Cost
Huber RoS3	2	ls	$ 225,000	$ 450,000
Huber dewatered sludge screw conveyor	2	ls	$ 70,000	$ 140,000
feed pumps	3	ls	$ 30,000	$ 90,000
Polymer system	2	ls	$ 18,000	$ 36,000
Subtotal				$ 716,000
Installation	1	ls	15%	$ 107,400
Site work and piping	1	ls	10%	$ 71,600
Electrical and instrumentation	1	ls	20%	$ 143,200
Subtotal				$ 1,038,200
Contractor markup	$ 103,820	%	10%	$ 10,382
Construction total				$ 1,048,582
Bonding, Administration	$ 1,048,582	%	12%	$ 125,830
Engineering and CMS	$ 1,048,582	%	20%	$ 209,716
Contingincy	$ 1,048,582	%	30%	$ 314,575
Total capital costs	(present worth)			$ 1,699,000

Screw Press estimate				
				No thickening
Design year			2032	
Design Inf Flow			2.40	mgd
Design thickened solids concentration			13,900	mg/l
Design thickened sludge volume			44,029	gpd
Throughput of Huber RoS3.2 at 1% feed			54	gpm
Operating days per week			5	days/week
Operating hours per day			10	hours/day
Number of screw presses needed	2 units [illegible]		1.9	units
round up	[illegible]		2.0	units needed
	Qty	Unit	Unit cost	Cost
Huber RoS3	2.0	ls	$ 225,000	$ 450,000
Huber dewatered sludge screw conveyor	2.0	ls	$ 70,000	$ 140,000
feed pumps	3	ls	$ 30,000	$ 90,000
Polymer system	2	ls	$ 18,000	$ 36,000
Subtotal				$ 716,000
Installation	1	ls	15%	$ 107,400
Site work and piping	1	ls	10%	$ 71,600
Electrical and instrumentation	1	ls	20%	$ 143,200
Subtotal				$ 1,038,200
Contractor markup	$ 103,820	%	10%	$ 10,382
Construction total				$ 1,048,582
Bonding, Administration	$ 1,048,582	%	12%	$ 125,830
Engineering and CMS	$ 1,048,582	%	20%	$ 209,716
Contingincy	$ 1,048,582	%	30%	$ 314,575
Total capital costs	(present worth)			$ 1,699,000

Screw Press estimate				
Dewatered Solids, %TS	0.17	[enter as a decimal]		
Note: the dry solids wasted assumes no sludge digestion				
Year	Flow	Dry Solids Wasted	Dewatered Sludge	Dewatered Sludge
	[mgd]	[dry lbs/day]	[wet ppd]	[wet tons/yr]
2012	1.27	2,102	12,366	2,257
2013	1.32	2,196	12,919	2,358
2014	1.38	2,290	13,473	2,459
2015	1.44	2,384	14,026	2,560
2016	1.49	2,478	14,579	2,661
2017	1.55	2,572	15,132	2,762
begin alum addiiton 2018	1.61	3,417	20,099	3,668
2019	1.66	3,537	20,808	3,797
2020	1.72	3,658	21,517	3,927
2021	1.78	3,778	22,226	4,056
2022	1.83	3,899	22,935	4,186
2023	1.89	4,019	23,644	4,315
2024	1.95	4,140	24,353	4,444
2025	2.00	4,260	25,062	4,574
2026	2.06	4,381	25,770	4,703
2027	2.12	4,501	26,479	4,832
2028	2.17	4,622	27,188	4,962
2029	2.23	4,743	27,897	5,091
2030	2.29	4,863	28,606	5,221
2031	2.34	4,984	29,315	5,350
2032	2.40	5,104	30,024	5,479

Scott Krallman

From:	John Simon <jsimon@goblesampson.com>
Sent:	Friday, March 18, 2011 8:57 AM
To:	Scott Krallman
Cc:	Levi Shoolroy
Subject:	Huber performance data

Scott,

Specifying a feed range from 1% to 3% would be appropriate. Please use the values sent over earlier.

Approximate throughput at 1% feed

- *RoS3.2: 54 gpm*

Approximate throughput at 2% feed

- *RoS3.2: 45 gpm*

Approximate throughput at 3% feed

- *RoS3.2: 36 gpm*

We can discuss polymer further. 20lbs/dt is probably accurate; however without onsite testing we need to allow for the chance that the polymer rates may be higher.

Regards,

John Simon
Goble Sampson Associates
(425) 392 0491 phone
(425) 736 4584 cell
(425) 392 9615 fax
jsimon@goblesampson.com

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From: Scott Krallman [mailto:skrallman@jub.com]
Sent: Friday, March 18, 2011 8:31 AM
To: John Simon
Cc: Levi Shoolroy
Subject: Huber performance data

John,
I'll need to specify a range since we won't be able to match the conditions exactly.
I was thinking something like this:
50 gpm at 1.5% = 375 lbs/hr
to
40 gpm at 3.0% = 600 lbs/hr
with a linear interpolation in between

That's a lot more polymer than I was anticipating.
I was thinking a maximum of 20 lbs/dt

I'll discuss with Levi.

From: John Simon [mailto:jsimon@goblesampson.com]
Sent: Thursday, March 17, 2011 2:26 PM
To: Scott Krallman
Subject - Huber performance data

Scott,

Per your phone message this morning. Huber would be comfortable offering the following.

- 3% Feed
- Max feed rate: 36 gpm

- 18% cake
- 20 lbs/dt - 30 lbs/dt polymer consumption
- >95% capture rate

Please give me a call in the morning if you would like to discuss.

John Simon
Goble Sampson Associates
(425) 392 0491 phone
(425) 736 4584 cell
(425) 392 9615 fax
jsimon@goblesampson.com

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The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

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The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

__________ Information from ESET NOD32 Antivirus, version of virus signature database 5477 (20100924) __________

The message was checked by ESET NOD32 Antivirus.

Scott Krallman

From: John Simon <jsimon@goblesampson.com>
Sent: Thursday, June 23, 2011 1:37 PM
To: Scott Krallman
Subject: Huber Screw Press Updated Costs
Attachments: Budget- ID; RoS3; 6-23-11.pdf

Importance: High

Scott,

See attached proposal for Huber's updated costs on the Grangeville, ID screw press. The scope includes the RoS3/2 as well as the following additional support items:

- 28 ft. of Ro8t/273 shafted screw conveyor
- Veloblend Liquid polymer system model VM-2.5P-600-E

Itemized costs would be as follows:

- Screw Press and Controls = $215,000
- Conveyor = $43,000
- Polymer and Controls = $17,000

Regards,

John Simon
Goble Sampson Associates
(425) 392 0491 phone
(425) 736 4584 cell
(425) 392 9615 fax
jsimon@goblesampson.com

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Belt filter Press estimate

Inputs:

	Qty	Unit	Unit cost	Cost
1.5m BDP belt filter press	1	ls	$ 340,000	$ 340,000
sludge conveyor	1	ls	$ 90,000	$ 90,000
feed pumps	1	ls	$ 30,000	$ 30,000
Polymer system	1	ls	$ 18,000	$ 18,000
Subtotal				$ 478,000
Installation	1	%	15%	$ 71,700
Site work and piping	$ 1	%	10%	$ 47,800
Electrical and instrumentation	$ 1	%	20%	$ 95,600
Subtotal				$ 693,100
Contractor markup	$ 69,310	%	10%	$ 6,931
Construction total				$ 700,031
Bonding, Administration	$ 700,031	%	12%	$ 84,004
Engineering and CMS	$ 700,031	%	20%	$ 140,006
Contingincy	$ 700,031	%	30%	$ 210,009
Total capital costs	(present worth)			$ 1,134,000

Scott Krallman

From: John Simon <jsimon@goblesampson.com>
Sent: Tuesday, February 23, 2010 9:20 AM
To: Scott Krallman
Subject: Hayden, ID - BDP BFP Proposal
Attachments: Budget Proposal Dual Mode 2 17 2010.doc

Importance: High

Scott,

See attached budget proposal from BDP regarding their dual-mode BFP.

Please let me know if you have any questions.

Regards,

John Simon
Goble Sampson Associates
(425) 392 0491 phone
(425) 736 4584 cell
(425) 392 9615 fax
jsimon@goblesampson.com

For information regarding the manufacturers and products we represent, please visit www.goblesampson.com

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From: Scott Krallman [mailto:skrallman@jub.com]
Sent: Tuesday, February 16, 2010 3:31 PM
To: John Simon
Subject: HARSB master planning

John,
Can you get me a budget/planning cost for

- a 1.5 m 3 belt BDP with the thickening diverter gate and a progressing cavity pump?
- A wet/dry polymer system that would handle two 1.5m BFP's

thanks

Scott Krallman
J-U-B Engineers, Inc.
208-762-8787
fax 208-762-9797

__________ Information from ESET NOD32 Antivirus, version of virus signature database 4872 (20100216)
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The message was checked by ESET NOD32 Antivirus.

http://www.eset.com

Engineered Compost System

Item		Qty	Unit	Unit cost	Cost
Capital costs					
Land: (20 acres + 75ft buffer = 27 acres)		27	acre	$ 30,000	$ 810,000
Office bldg on site		2,000	sf	$ 100	$ 200,000
Asphalt paving on site		10,000	sf	$ 8	$ 80,000
Engineered Compost System: bunkers with in-floor aeration		1	ls	$ 260,000	$ 260,000
biosolids mixer		1	ls	$ 200,000	$ 200,000
Screening system (from Cheney WWTP experience)		1	ls	$ 185,000	$ 185,000
Front end loader		1	ls	$ 100,000	$ 100,000
Bunker walls		255	cy	$ 1,000	$ 255,000
Compost area slab with in floor aeration		342	cy	$ 1,000	$ 342,000
biofilter walls		50	cy	$ 1,000	$ 50,000
biofilter slab		70	cy	$ 800	$ 56,000
Subtotal					$ 2,538,000
Site work and piping		$ 2,538,000	%	20%	$ 507,600
Electrical and instrumentation		$ 2,538,000	%	20%	$ 507,600
Subtotal					$ 3,553,200
Contractor markup		$ 355,320	%	10%	$ 35,532
Construction total					$ 3,588,732
Bonding, Administration		$ 3,588,732.00	%	12%	$ 430,648
Engineering and CMS		$ 3,588,732.00	%	20%	$ 717,746
Contingincy		$ 3,588,732.00	%	30%	$ 1,076,620
Total capital costs	(present worth)				$ 5,813,746

Cost to truck sludge to compost site

Dewatered Sludge Cake	15%
Annual cost escalation	3.0%
Interest rate	3.0%

round trip truck time to compost site	1.00 /hr
trucking cost	$ 100.00 /hr
Tuck capacity	12.00 cy

Year	Period	Annual Dewatered Wet tons	Sludge vol @ 1600 lbs/cy	Truck time	Trucking cost	trucking cost to compost site	Present worth of trucking cost to compost site
		[Wtons/yr]	[cy/yr]	hr/yr	[$/hr]	[$/yr]	[$/year]
2012	0	2,558	3,197	266	$ 100.00	$ 26,643	$26,643
2013	1	2,672	3,340	278	$ 103.00	$ 28,670	$27,835
2014	2	2,787	3,483	290	$ 106.09	$ 30,794	$29,027
2015	3	2,901	3,626	302	$ 109.27	$ 33,021	$30,219
2016	4	3,015	3,769	314	$ 112.55	$ 35,353	$31,411
2017	5	3,130	3,912	326	$ 115.93	$ 37,795	$32,603
2018	6	4,157	5,197	433	$ 119.41	$ 51,707	$43,304
2019	7	4,304	5,380	448	$ 122.99	$ 55,137	$44,832
2020	8	4,450	5,563	464	$ 126.68	$ 58,726	$46,359
2021	9	4,597	5,746	479	$ 130.48	$ 62,481	$47,886
2022	10	4,744	5,930	494	$ 134.39	$ 66,408	$49,413
2023	11	4,890	6,113	509	$ 138.42	$ 70,514	$50,941
2024	12	5,037	6,296	525	$ 142.58	$ 74,807	$52,468
2025	13	5,184	6,479	540	$ 146.85	$ 79,294	$53,995
2026	14	5,330	6,663	555	$ 151.26	$ 83,983	$55,523
2027	15	5,477	6,846	571	$ 155.80	$ 88,882	$57,050
2028	16	5,623	7,029	586	$ 160.47	$ 94,000	$58,577
2029	17	5,770	7,213	601	$ 165.28	$ 99,344	$60,105
2030	18	5,917	7,396	616	$ 170.24	$ 104,925	$61,632
2031	19	6,063	7,579	632	$ 175.35	$ 110,750	$63,159
2032	20	6,210	7,762	647	$ 180.61	$ 116,831	$64,687
					total present value		$ 987,668

Cost of bulking agent

Bulking agent ratio 3.90 to 1, volume

Bulking agent $ 22.00 /cy (CDA's cost per email)

Period	Bulking agent Volume	Bulking agent Cost	Bulking agent Cost	Present worth cost of bulking agent
	[cy/yr]	[$/cy]	[$/yr]	[$/year]
0	12,469	$ 22.00	$ 274,316	$274,316
1	13,027	$ 22.66	$ 295,185	$286,588
2	13,585	$ 23.34	$ 317,060	$298,860
3	14,142	$ 24.04	$ 339,982	$311,132
4	14,700	$ 24.76	$ 363,994	$323,404
5	15,258	$ 25.50	$ 389,140	$335,676
6	20,266	$ 26.27	$ 532,380	$445,860
7	20,981	$ 27.06	$ 567,692	$461,585
8	21,696	$ 27.87	$ 604,643	$477,311
9	22,411	$ 28.71	$ 643,300	$493,036
10	23,126	$ 29.57	$ 683,733	$508,761
11	23,840	$ 30.45	$ 726,012	$524,487
12	24,555	$ 31.37	$ 770,213	$540,212
13	25,270	$ 32.31	$ 816,413	$555,937
14	25,985	$ 33.28	$ 864,691	$571,663
15	26,699	$ 34.28	$ 915,131	$587,388
16	27,414	$ 35.30	$ 967,820	$603,113
17	28,129	$ 36.36	$ 1,022,846	$618,839
18	28,844	$ 37.45	$ 1,080,303	$634,564
19	29,559	$ 38.58	$ 1,140,286	$650,289
20	30,273	$ 39.73	$ 1,202,897	$666,015
		total present value		$ 10,169,034

Cost of aeration power				
Cost of electricity		$ 0.08	/kWhr	
Avg continuous fan power		$ 20.00	hp	
Period	Power [kWhr/yr	Elect Unit Cost [$/kWhr]	Elect Unit Cost [$/yr]	Present worth of Elec cost [$/yr]
0	130,699	$ 0.080	$ 10,456	$10,456
1	130,699	$ 0.082	$ 10,770	$10,456
2	130,699	$ 0.085	$ 11,093	$10,456
3	130,699	$ 0.087	$ 11,425	$10,456
4	130,699	$ 0.090	$ 11,768	$10,456
5	130,699	$ 0.093	$ 12,121	$10,456
6	130,699	$ 0.096	$ 12,485	$10,456
7	130,699	$ 0.098	$ 12,859	$10,456
8	130,699	$ 0.101	$ 13,245	$10,456
9	130,699	$ 0.104	$ 13,643	$10,456
10	130,699	$ 0.108	$ 14,052	$10,456
11	130,699	$ 0.111	$ 14,473	$10,456
12	130,699	$ 0.114	$ 14,908	$10,456
13	130,699	$ 0.117	$ 15,355	$10,456
14	130,699	$ 0.121	$ 15,816	$10,456
15	130,699	$ 0.125	$ 16,290	$10,456
16	130,699	$ 0.128	$ 16,779	$10,456
17	130,699	$ 0.132	$ 17,282	$10,456
18	130,699	$ 0.136	$ 17,801	$10,456
19	130,699	$ 0.140	$ 18,335	$10,456
20	130,699	$ 0.144	$ 18,885	$10,456
		total present value		$ 219,575

Cost to dispose of compost

ratio of finished compost to initial sludge — 1.4 tons compost/ton starting wet sludge

Disposal cost — $ 45.00 per wet ton

Period	Tons of compost [tons/yr]	Disposal Unit Cost [$/wet ton]	Disposal Unit Cost [$/yr]	Present worth of Elec cost [$/yr]
0	3,581	$ 45.00	$ 161,136	$161,136
1	3,741	$ 46.35	$ 173,395	$168,345
2	3,901	$ 47.74	$ 186,245	$175,554
3	4,061	$ 49.17	$ 199,710	$182,763
4	4,222	$ 50.65	$ 213,814	$189,971
5	4,382	$ 52.17	$ 228,586	$197,180
6	5,820	$ 53.73	$ 312,727	$261,904
7	6,025	$ 55.34	$ 333,469	$271,141
8	6,231	$ 57.00	$ 355,175	$280,378
9	6,436	$ 58.71	$ 377,883	$289,616
10	6,641	$ 60.48	$ 401,633	$298,853
11	6,846	$ 62.29	$ 426,469	$308,090
12	7,052	$ 64.16	$ 452,433	$317,327
13	7,257	$ 66.08	$ 479,571	$326,565
14	7,462	$ 68.07	$ 507,930	$335,802
15	7,668	$ 70.11	$ 537,560	$345,039
16	7,873	$ 72.21	$ 568,510	$354,276
17	8,078	$ 74.38	$ 600,833	$363,514
18	8,283	$ 76.61	$ 634,584	$372,751
19	8,489	$ 78.91	$ 669,819	$381,988
20	8,694	$ 81.28	$ 706,597	$391,225
		total present value		$ 5,973,418

Total Life Cycle cost (present value)		
Capital cost	$	5,813,746
Haul cost to site	$	987,668
bulking agent	$	10,169,034
Power cost	$	219,575
Total	$	17,190,000
Disposal cost	$	5,973,000
Total	$	23,163,000

Sludge treatment by Drying for Class A

Inputs:				
Initial Equipment Cost	$ 2,420,700			
Equipment installation (15%)	$ 363,105		15%	
Support equipment (20%)	$ 484,140		20%	
Building to house equipment, 3000sf @ $200/sf	$ 600,000			
Subtotal		$ 3,867,945		
Electrical, Controls (20%)	$ 773,589		20%	
Mobilization, Bonding, Administration (12%)	$ 464,153		12%	
Subtotal		$ 1,237,742		
Construction costs		$ 5,105,687		
Engineering and CMS (20%)	$ 1,021,137.48		20%	
Contingincy (30%)	$ 1,531,706.22		30%	
Engr and admin costs		$ 2,552,844		
Total capital costs		$ 7,658,531	(present worth)	

Dewatered Sludge Cake	15%						
Annual cost escalation	3.0%		Elec cost per kWhr	$ 0.08			
Interest rate	3.0%		NG cost per Mmbtu	$ 6.70	$ 0.67	$/therm	
Hp	118		Btu/lb H2O	1500	(1400 to 1700 Btu/lb H2O is typical)		
Hp utilized	70%						
Hp utilized	82.6	61.6	kW				
				1 therm = 100,000 Btu			
hourly feed rate	8,400	wet lbs/hr		1 therm = 0.1 MMBtu			

Year	Flow	Dry Solids Wasted (Average)	Dewatered Sludge	Annual Dewatered Wet tons		Weight of H2O in Dewatered Sludge	
	[mgd]	[ppd]	[Wtons/day]	[Wtons/yr]		[ppd]	
2012	1.27	2,102	7.0	2,558		11,913	
2013	1.32	2,196	7.3	2,672		12,446	
2014	1.38	2,290	7.6	2,787		12,979	
2015	1.44	2,384	7.9	2,901		13,511	
2016	1.49	2,478	8.3	3,015		14,044	
2017	1.55	2,572	8.6	3,130		14,577	
2018	1.61	3,417	11.4	4,157		19,362	
2019	1.66	3,537	11.8	4,304		20,045	
2020	1.72	3,658	12.2	4,450		20,728	
2021	1.78	3,778	12.6	4,597		21,411	
2022	1.83	3,899	13.0	4,744		22,094	
2023	1.89	4,019	13.4	4,890		22,777	
2024	1.95	4,140	13.8	5,037		23,460	
2025	2.00	4,260	14.2	5,184		24,143	
2026	2.06	4,381	14.6	5,330		24,826	
2027	2.12	4,501	15.0	5,477		25,508	
2028	2.17	4,622	15.4	5,623		26,191	
2029	2.23	4,743	15.8	5,770		26,874	
2030	2.29	4,863	16.2	5,917		27,557	
2031	2.34	4,984	16.6	6,063		28,240	
2032	2.40	5,104	17.0	6,210		28,923	

	run time per day	Elect Unit Cost	Elec cost	Elec cost	Present worth of Elec cost
	[hrs/day]	[$/kWhr]	[$/day]	[$/year]	[$/year]
0	1.7	$ 0.080	$ 8.22	$ 3,000.81	$3,000.81
1	1.7	$ 0.082	$ 8.85	$ 3,229.10	$3,135.05
2	1.8	$ 0.085	$ 9.50	$ 3,468.40	$3,269.30
3	1.9	$ 0.087	$ 10.19	$ 3,719.15	$3,403.55
4	2.0	$ 0.090	$ 10.91	$ 3,981.82	$3,537.79
5	2.0	$ 0.093	$ 11.66	$ 4,256.90	$3,672.04
6	2.7	$ 0.096	$ 15.96	$ 5,823.84	$4,877.37
7	2.8	$ 0.098	$ 17.01	$ 6,210.12	$5,049.40
8	2.9	$ 0.101	$ 18.12	$ 6,614.34	$5,221.42
9	3.0	$ 0.104	$ 19.28	$ 7,037.22	$5,393.44
10	3.1	$ 0.108	$ 20.49	$ 7,479.52	$5,565.47
11	3.2	$ 0.111	$ 21.76	$ 7,942.03	$5,737.49
12	3.3	$ 0.114	$ 23.08	$ 8,425.55	$5,909.51
13	3.4	$ 0.117	$ 24.47	$ 8,930.94	$6,081.54
14	3.5	$ 0.121	$ 25.92	$ 9,459.07	$6,253.56
15	3.6	$ 0.125	$ 27.43	$ 10,010.85	$6,425.59
16	3.7	$ 0.128	$ 29.01	$ 10,587.23	$6,597.61
17	3.8	$ 0.132	$ 30.66	$ 11,189.17	$6,769.63
18	3.9	$ 0.136	$ 32.38	$ 11,817.70	$6,941.66
19	4.0	$ 0.140	$ 34.18	$ 12,473.88	$7,113.68
20	4.1	$ 0.144	$ 36.05	$ 13,158.79	$7,285.70
				present value	$ 111,242

	H2O to be evaporated for 90% TS	Btus needed to evaporate H2O	therms needed to evaporate H2O	NG cost to evaporate H2O	NG cost to evaporate H2O	Present worth of NG cost
	[lbs H2O/day]	[MMBtu/day]	[therms/day]	[$/day]	[$/year]	[$/year]
0	10,721	16.1	160.82	$ 107.75	$ 39,328.79	$39,329
1	11,201	16.8	168.02	$ 112.57	$ 41,088.23	$39,891
2	11,681	17.5	175.21	$ 117.39	$ 42,847.68	$40,388
3	12,160	18.2	182.40	$ 122.21	$ 44,607.13	$40,822
4	12,640	19.0	189.60	$ 127.03	$ 46,366.57	$41,196
5	13,120	19.7	196.79	$ 131.85	$ 48,126.02	$41,514
6	17,426	26.1	261.39	$ 175.13	$ 63,923.22	$53,535
7	18,041	27.1	270.61	$ 181.31	$ 66,177.77	$53,809
8	18,655	28.0	279.83	$ 187.49	$ 68,432.32	$54,021
9	19,270	28.9	289.05	$ 193.66	$ 70,686.87	$54,176
10	19,885	29.8	298.27	$ 199.84	$ 72,941.43	$54,275
11	20,499	30.7	307.49	$ 206.02	$ 75,195.98	$54,323
12	21,114	31.7	316.71	$ 212.19	$ 77,450.53	$54,322
13	21,728	32.6	325.93	$ 218.37	$ 79,705.09	$54,275
14	22,343	33.5	335.14	$ 224.55	$ 81,959.64	$54,185
15	22,958	34.4	344.36	$ 230.72	$ 84,214.19	$54,054
16	23,572	35.4	353.58	$ 236.90	$ 86,468.75	$53,884
17	24,187	36.3	362.80	$ 243.08	$ 88,723.30	$53,679
18	24,801	37.2	372.02	$ 249.25	$ 90,977.85	$53,440
19	25,416	38.1	381.24	$ 255.43	$ 93,232.41	$53,169
20	26,031	39.0	390.46	$ 261.61	$ 95,486.96	$52,869
					present value	$ 1,051,156

Mnf. Proposal assumed the sludge initial temp was 70F.

This is an estimate of energy cost to raise temp from avg of 16C to 21.1C

specific heat of water, [J/kg*C] =		4186		delta T, [C] =	5.1		
Joules per kWhr =	3,600,000						
heating efficiency =	90%						
	Annual Dewatered sludge	Annual Dewatered sludge	joules to heat sludge	electricity used	cost of electricity	cost	Present worth of Energy cost
	[Wet lbs/yr]	[Wet kg/yr]	[J/year]	[kWhrs]		$	$/year
0	5,115,441	2,314,679	49,415,159,416	15,252	$ 0.080	$ 1,220	$1,220
1	5,344,290	2,418,231	51,625,837,600	15,934	$ 0.082	$ 1,313	$1,275
2	5,573,138	2,521,782	53,836,515,785	16,616	$ 0.085	$ 1,410	$1,329
3	5,801,987	2,625,333	56,047,193,969	17,299	$ 0.087	$ 1,512	$1,384
4	6,030,836	2,728,885	58,257,872,154	17,981	$ 0.090	$ 1,619	$1,438
5	6,259,684	2,832,436	60,468,550,338	18,663	$ 0.093	$ 1,731	$1,493
6	8,314,404	3,762,174	80,317,140,706	24,789	$ 0.096	$ 2,368	$1,983
7	8,607,650	3,894,864	83,149,902,930	25,664	$ 0.098	$ 2,525	$2,053
8	8,900,897	4,027,555	85,982,665,155	26,538	$ 0.101	$ 2,689	$2,123
9	9,194,144	4,160,246	88,815,427,379	27,412	$ 0.104	$ 2,861	$2,193
10	9,487,390	4,292,937	91,648,189,603	28,286	$ 0.108	$ 3,041	$2,263
11	9,780,637	4,425,628	94,480,951,827	29,161	$ 0.111	$ 3,229	$2,333
12	10,073,883	4,558,318	97,313,714,051	30,035	$ 0.114	$ 3,426	$2,403
13	10,367,130	4,691,009	100,146,476,275	30,909	$ 0.117	$ 3,631	$2,473
14	10,660,377	4,823,700	102,979,238,499	31,784	$ 0.121	$ 3,846	$2,543
15	10,953,623	4,956,391	105,812,000,723	32,658	$ 0.125	$ 4,070	$2,613
16	11,246,870	5,089,081	108,644,762,947	33,532	$ 0.128	$ 4,305	$2,683
17	11,540,116	5,221,772	111,477,525,171	34,407	$ 0.132	$ 4,550	$2,753
18	11,833,363	5,354,463	114,310,287,395	35,281	$ 0.136	$ 4,805	$2,822
19	12,126,610	5,487,154	117,143,049,619	36,155	$ 0.140	$ 5,072	$2,892
20	12,419,856	5,619,844	119,975,811,844	37,030	$ 0.144	$ 5,350	$2,962
						present value	$ 45,231

Cost to haul and dispose

%TS of dried sludge: 90%

Initial contracted hauling/disposal cost per wet ton: $ 45.00

	Weight of Processed Sludge [wet lbs/day]	Weight of Processed Sludge [wet tons/year]	Disposal Unit Cost [$/wet ton]	Disposal Cost [$/year/wet ton]	Present worth of disposal cost $/year
0	2,336	426	$ 45.00	$ 19,183	$19,183
1	2,440	445	$ 46.35	$ 20,642	$20,041
2	2,545	464	$ 47.74	$ 22,172	$20,899
3	2,649	483	$ 49.17	$ 23,775	$21,757
4	2,754	503	$ 50.65	$ 25,454	$22,616
5	2,858	522	$ 52.17	$ 27,213	$23,474
6	3,797	693	$ 53.73	$ 37,229	$31,179
7	3,930	717	$ 55.34	$ 39,699	$32,279
8	4,064	742	$ 57.00	$ 42,283	$33,378
9	4,198	766	$ 58.71	$ 44,986	$34,478
10	4,332	791	$ 60.48	$ 47,813	$35,578
11	4,466	815	$ 62.29	$ 50,770	$36,677
12	4,600	839	$ 64.16	$ 53,861	$37,777
13	4,734	864	$ 66.08	$ 57,092	$38,877
14	4,868	888	$ 68.07	$ 60,468	$39,976
15	5,002	913	$ 70.11	$ 63,995	$41,076
16	5,136	937	$ 72.21	$ 67,680	$42,176
17	5,269	962	$ 74.38	$ 71,528	$43,275
18	5,403	986	$ 76.61	$ 75,546	$44,375
19	5,537	1,011	$ 78.91	$ 79,740	$45,475
20	5,671	1,035	$ 81.28	$ 84,119	$46,574
			present value		$ 711,121

Total Life Cycle cost (present value)	
Capital cost	$ 7,659,000
Elec cost	$ 111,000
NG cost	$ 1,051,000
pre-heating cost	$ 45,000
Total	$ 8,870,000
Dispoal costs	$ 711,000
Total	$ 9,581,000

Alkaline Stabilization to Class A

Inputs:			
Initial Equipment Cost	$ 688,200		
Equipment installation (15%)	$ 103,230		15%
Support equipment (20%)	$ 137,640		20%
Building to house equipment, 3000sf @ $200/sf	$ 600,000		
Subtotal		$ 1,529,070	
Electrical, Controls (20%)	$ 305,814		20%
Mobilization, Bonding, Administration (12%)	$ 183,488		12%
Subtotal		$ 489,302	
Construction subtotal		$ 2,018,372	
Engineering and CMS (20%)	$ 403,674.48		20%
Contingincy (30%)	$ 605,511.72		30%
Engr and admin subtotal		$ 1,009,186	-
Total capital costs		$ 3,027,559	(present worth)

Operating costs								
Dewatered Sludge Cake	15%							
Annual cost escalation	3.0%							
Interest rate	3.0%							
Operating cost from manf. Proposal		$ 23.51	per wet ton					
Year	Flow	Dry Solids Wasted (Average)	Dewatered Sludge Feed	Annual Dewatered Wet tons	Operating cost per wet ton	Annual operating cost	PW period	Present worth of operating cost
	[mgd]	[ppd]	[Wet tons/day]	[Wet tons/yr]	$	$/year		$/year
2012	1.27	2,102	7.01	2,558	$ 23.51	$ 60,132	0	$60,132
2013	1.32	2,196	7.32	2,672	$ 24.22	$ 64,707	1	$62,822
2014	1.38	2,290	7.63	2,787	$ 24.94	$ 69,502	2	$65,512
2015	1.44	2,384	7.95	2,901	$ 25.69	$ 74,527	3	$68,202
2016	1.49	2,478	8.26	3,015	$ 26.46	$ 79,790	4	$70,892
2017	1.55	2,572	8.57	3,130	$ 27.25	$ 85,302	5	$73,583
2018	1.61	3,417	11.39	4,157	$ 28.07	$ 116,702	6	$97,736
2019	1.66	3,537	11.79	4,304	$ 28.91	$ 124,442	7	$101,183
2020	1.72	3,658	12.19	4,450	$ 29.78	$ 132,542	8	$104,630
2021	1.78	3,778	12.59	4,597	$ 30.68	$ 141,016	9	$108,077
2022	1.83	3,899	13.00	4,744	$ 31.60	$ 149,879	10	$111,524
2023	1.89	4,019	13.40	4,890	$ 32.54	$ 159,147	11	$114,971
2024	1.95	4,140	13.80	5,037	$ 33.52	$ 168,836	12	$118,418
2025	2.00	4,260	14.20	5,184	$ 34.53	$ 178,964	13	$121,866
2026	2.06	4,381	14.60	5,330	$ 35.56	$ 189,547	14	$125,313
2027	2.12	4,501	15.00	5,477	$ 36.63	$ 200,604	15	$128,760
2028	2.17	4,622	15.41	5,623	$ 37.73	$ 212,153	16	$132,207
2029	2.23	4,743	15.81	5,770	$ 38.86	$ 224,216	17	$135,654
2030	2.29	4,863	16.21	5,917	$ 40.02	$ 236,810	18	$139,101
2031	2.34	4,984	16.61	6,063	$ 41.22	$ 249,959	19	$142,548
2032	2.40	5,104	17.01	6,210	$ 42.46	$ 263,684	20	$145,995
				94,816				
							present value	$2,229,128

Cost to pre heat sludge before lime stabilizing

Mnf. Proposal assumed the sludge initial temp was 85F.
This is an estimate of energy cost to raise temp from avg of 16C to 29.4C

delta Temp 13.4 degrees C
cost of electricity $ 0.080 per kWhr

PW Period	Annual Dewatered sludge	Annual Dewatered sludge	joules to raise temp from 16C to 29.4C	electricity used with 90% eff	cost of electricity	cost	Present worth
	[Wet lbs/yr]	[Wet kg/yr]	[J/year]	[kWhrs]	[$/kWhrs]	[$/year]	[$/year]
0	5,115,441	2,314,679	129,835,909,054	40,072.81	$ 0.080	$ 3,206	$3,206
1	5,344,290	2,418,231	135,644,357,617	41,865.54	$ 0.082	$ 3,450	$3,349
2	5,573,138	2,521,782	141,452,806,180	43,658.27	$ 0.085	$ 3,705	$3,493
3	5,801,987	2,625,333	147,261,254,743	45,451.00	$ 0.087	$ 3,973	$3,636
4	6,030,836	2,728,885	153,069,703,306	47,243.74	$ 0.090	$ 4,254	$3,779
5	6,259,684	2,832,436	158,878,151,868	49,036.47	$ 0.093	$ 4,548	$3,923
6	8,314,404	3,762,174	211,029,350,091	65,132.52	$ 0.096	$ 6,222	$5,211
7	8,607,650	3,894,864	218,472,293,974	67,429.72	$ 0.098	$ 6,634	$5,394
8	8,900,897	4,027,555	225,915,237,857	69,726.93	$ 0.101	$ 7,066	$5,578
9	9,194,144	4,160,246	233,358,181,740	72,024.13	$ 0.104	$ 7,518	$5,762
10	9,487,390	4,292,937	240,801,125,623	74,321.34	$ 0.108	$ 7,991	$5,946
11	9,780,637	4,425,628	248,244,069,506	76,618.54	$ 0.111	$ 8,485	$6,129
12	10,073,883	4,558,318	255,687,013,389	78,915.74	$ 0.114	$ 9,001	$6,313
13	10,367,130	4,691,009	263,129,957,271	81,212.95	$ 0.117	$ 9,541	$6,497
14	10,660,377	4,823,700	270,572,901,154	83,510.15	$ 0.121	$ 10,105	$6,681
15	10,953,623	4,956,391	278,015,845,037	85,807.36	$ 0.125	$ 10,695	$6,865
16	11,246,870	5,089,081	285,458,788,920	88,104.56	$ 0.128	$ 11,311	$7,048
17	11,540,116	5,221,772	292,901,732,803	90,401.77	$ 0.132	$ 11,954	$7,232
18	11,833,363	5,354,463	300,344,676,686	92,698.97	$ 0.136	$ 12,625	$7,416
19	12,126,610	5,487,154	307,787,620,569	94,996.18	$ 0.140	$ 13,326	$7,600
20	12,419,856	5,619,844	315,230,564,452	97,293.38	$ 0.144	$ 14,058	$7,783
					present value		$118,842

Cost to haul and dispose of stabilized sludge

%TS of processed sludge			28.97%	%
Weight of lime and acid added			0.139	lbs/lb wet sludge
Initial contracted hauling/disposal cost			$ 45.00	per wet ton

	Weight of Lime and Acid Added	Wet wt of stablized Sludge	Wet wt of stablized Sludge	Disposal Unit Cost	Disposal Cost	Present worth of disposal cost
	[dry lbs/day]	[wet lbs/day]	[wet tons/year]	[$/wet ton]	[$/year	$/year
0	1,948	13,981	2,552	$ 45.00	$ 114,819	$114,819
1	2,035	14,607	2,666	$ 46.35	$ 123,555	$119,956
2	2,122	15,232	2,780	$ 47.74	$ 132,711	$125,093
3	2,210	15,857	2,894	$ 49.17	$ 142,305	$130,229
4	2,297	16,483	3,008	$ 50.65	$ 152,356	$135,366
5	2,384	17,108	3,122	$ 52.17	$ 162,881	$140,503
6	3,166	22,724	4,147	$ 53.73	$ 222,836	$186,622
7	3,278	23,526	4,293	$ 55.34	$ 237,617	$193,204
8	3,390	24,327	4,440	$ 57.00	$ 253,083	$199,786
9	3,501	25,129	4,586	$ 58.71	$ 269,264	$206,368
10	3,613	25,930	4,732	$ 60.48	$ 286,188	$212,950
11	3,725	26,732	4,879	$ 62.29	$ 303,884	$219,533
12	3,836	27,533	5,025	$ 64.16	$ 322,385	$226,115
13	3,948	28,334	5,171	$ 66.08	$ 341,723	$232,697
14	4,060	29,136	5,317	$ 68.07	$ 361,931	$239,279
15	4,171	29,937	5,464	$ 70.11	$ 383,043	$245,861
16	4,283	30,739	5,610	$ 72.21	$ 405,097	$252,443
17	4,395	31,540	5,756	$ 74.38	$ 428,129	$259,025
18	4,506	32,342	5,902	$ 76.61	$ 452,179	$265,607
19	4,618	33,143	6,049	$ 78.91	$ 477,286	$272,189
20	4,730	33,945	6,195	$ 81.28	$ 503,492	$278,772
			94,587	present value>>		$ 4,256,418

Total Life Cycle cost (present value)		
Capital cost	$	3,028,000
O&M costs	$	2,229,000
pre-heating cost	$	119,000
Total	$	5,376,000
Dispoal costs	$	4,260,000
Total	$	**9,636,000**

Determine the payback period for a Solar Dryer

Inputs:

Beginning cost per wet ton	$ 45.00
Interest rate	3.0%
Annual cost escalation	3.0%

Year	Flow	Dry Solids Wasted
	[mgd]	[ppd]
2012	1.27	2,102
2013	1.32	2,196
2014	1.38	2,290
2015	1.44	2,384
2016	1.49	2,478
2017	1.55	2,572
2018	1.61	3,417
2019	1.66	3,537
2020	1.72	3,658
2021	1.78	3,778
2022	1.83	3,899
2023	1.89	4,019
2024	1.95	4,140
2025	2.00	4,260
2026	2.06	4,381
2027	2.12	4,501
2028	2.17	4,622
2029	2.23	4,743
2030	2.29	4,863
2031	2.34	4,984
2032	2.40	5,104

Year	Flow	Dewatered Sludge 20.0%	Dewatered Sludge	Disposal cost per ton	Disposal cost	PW period	Present worth of disposal cost
	[mgd]	[Wtons/day]	[Wtons/yr]	[$]	[$/year]		[$/year]
2012	1.27	5.3	1,918	$ 65.00	$ 124,689	0	$124,689
2013	1.32	5.5	2,004	$ 66.95	$ 134,175	1	$130,267
2014	1.38	5.7	2,090	$ 68.96	$ 144,118	2	$135,845
2015	1.44	6.0	2,176	$ 71.03	$ 154,537	3	$141,423
2016	1.49	6.2	2,262	$ 73.16	$ 165,452	4	$147,002
2017	1.55	6.4	2,347	$ 75.35	$ 176,882	5	$152,580
2018	1.61	8.5	3,118	$ 77.61	$ 241,991	6	$202,664
2019	1.66	8.8	3,228	$ 79.94	$ 258,042	7	$209,811
2020	1.72	9.1	3,338	$ 82.34	$ 274,838	8	$216,959
2021	1.78	9.4	3,448	$ 84.81	$ 292,409	9	$224,107
2022	1.83	9.7	3,558	$ 87.35	$ 310,788	10	$231,255
2023	1.89	10.0	3,668	$ 89.98	$ 330,006	11	$238,403
2024	1.95	10.3	3,778	$ 92.67	$ 350,097	12	$245,551
2025	2.00	10.7	3,888	$ 95.45	$ 371,097	13	$252,699
2026	2.06	11.0	3,998	$ 98.32	$ 393,041	14	$259,847
2027	2.12	11.3	4,108	$ 101.27	$ 415,969	15	$266,995
2028	2.17	11.6	4,218	$ 104.31	$ 439,918	16	$274,142
2029	2.23	11.9	4,328	$ 107.44	$ 464,930	17	$281,290
2030	2.29	12.2	4,438	$ 110.66	$ 491,047	18	$288,438
2031	2.34	12.5	4,547	$ 113.98	$ 518,312	19	$295,586
2032	2.40	12.8	4,657	$ 117.40	$ 546,771	20	$302,734
			71,112		total present value		$ 4,620,000

Solar Dryer Capital Cost (Parkson)			$ 2,080,000	15% markup >>>	$ 2,392,000.00		
Year	Flow	Dewatered Sludge	Dewatered Sludge	Disposal cost per ton	Disposal cost	PW period	Present worth of disposal cost
		50.0%					
	[mgd]	[Wtons/day]	[Wtons/yr]	[$]	[$/year]		[$/year]
2012	1.27	2.1	767	$ 65.00	$ 49,876	0	$49,876
2013	1.32	2.2	802	$ 66.95	$ 53,670	1	$52,107
2014	1.38	2.3	836	$ 68.96	$ 57,647	2	$54,338
2015	1.44	2.4	870	$ 71.03	$ 61,815	3	$56,569
2016	1.49	2.5	905	$ 73.16	$ 66,181	4	$58,801
2017	1.55	2.6	939	$ 75.35	$ 70,753	5	$61,032
2018	1.61	3.4	1,247	$ 77.61	$ 96,796	6	$81,065
2019	1.66	3.5	1,291	$ 79.94	$ 103,217	7	$83,925
2020	1.72	3.7	1,335	$ 82.34	$ 109,935	8	$86,784
2021	1.78	3.8	1,379	$ 84.81	$ 116,964	9	$89,643
2022	1.83	3.9	1,423	$ 87.35	$ 124,315	10	$92,502
2023	1.89	4.0	1,467	$ 89.98	$ 132,002	11	$95,361
2024	1.95	4.1	1,511	$ 92.67	$ 140,039	12	$98,220
2025	2.00	4.3	1,555	$ 95.45	$ 148,439	13	$101,080
2026	2.06	4.4	1,599	$ 98.32	$ 157,217	14	$103,939
2027	2.12	4.5	1,643	$ 101.27	$ 166,388	15	$106,798
2028	2.17	4.6	1,687	$ 104.31	$ 175,967	16	$109,657
2029	2.23	4.7	1,731	$ 107.44	$ 185,972	17	$112,516
2030	2.29	4.9	1,775	$ 110.66	$ 196,419	18	$115,375
2031	2.34	5.0	1,819	$ 113.98	$ 207,325	19	$118,234
			26,582		total present value		$ 1,730,000

Year	Flow	PW period	PW Savings	Cumulative PW Savings
	[mgd]			
2012	1.27	0	$74,813	$74,813
2013	1.32	1	$78,160	$152,974
2014	1.38	2	$81,507	$234,481
2015	1.44	3	$84,854	$319,335
2016	1.49	4	$88,201	$407,536
2017	1.55	5	$91,548	$499,084
2018	1.61	6	$121,598	$620,682
2019	1.66	7	$125,887	$746,569
2020	1.72	8	$130,176	$876,744
2021	1.78	9	$134,464	$1,011,209
2022	1.83	10	$138,753	$1,149,962
2023	1.89	11	$143,042	$1,293,004
2024	1.95	12	$147,331	$1,440,334
2025	2.00	13	$151,619	$1,591,953
2026	2.06	14	$155,908	$1,747,861
2027	2.12	15	$160,197	$1,908,058
2028	2.17	16	$164,485	$2,072,544
2029	2.23	17	$168,774	$2,241,318
2030	2.29	18	$173,063	$2,414,381
2031	2.34	20	$177,352	$2,591,732
			$2,591,732	

Appendix 11-A

Engineer's Opinion of Probable Cost

Reclaimed Water Recycle
and Reuse

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Year Round Reuse System (2.4 mgd firm capacity)**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Woodland Waters Infrastructure				
3	100 Million $ for Total 15 MGD ADF System				
4	HARSB Cost (for their portion)	20%	COST	$ 100,000,000	$ 20,000,000
5	Land	1018	ACRE	$ 20,000	$ 20,360,000

Construction Subtotal	**$ 40,360,000**
Construction Reserve Contingency (20%)	$ 8,072,000
Total Capital	**$ 48,430,000**
Total with -50% variability in land cost	**$ 36,220,000**
Total with +50% variability in land cost	**$ 60,650,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

JUB
J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB Wastewater Facility Plan**

DATE: May 31, 2012

PROJECT DESCRIPTION: **Expanded Reuse System (2.4 mgd firm capacity)**

CLIENT: **HARSB**

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
2	Transmission Piping (assume 2 miles)	10,560	LF	$175	$ 1,848,000
3	Pumping Station (to irrigation from WRF (3 @ 60 HP)	3	EA	$ 40,000	$ 120,000
4	Installation and Piping	3	EA	$ 50,000	$ 150,000
5	Building 15' x 15' per pump	675	SF	$ 300	$ 202,500
6	Irrigation System	222	ACRE	$ 2,400	$ 532,800
7	Irrigation Pumping Station (Lagoon to Irrigation (3 @ 75 HP)	3	EA	$ 50,000	$ 150,000
8	Installation and Piping	3	EA	$ 50,000	$ 150,000
9	Building 15' x 15' per pump	675	SF	$ 300	$ 202,500
10	Monitoring Wells	4	EA	$ 50,000	$ 200,000
11	Soil Moisture Monitoring	16	EA	$ 10,000	$ 160,000
12	Storage (7 days, 2.4 mgd)	16.8	MG	$ 40,000	$ 672,000
14	***Disinfection (Costs for disinfection included in Disinfection Evaluation)***				
				Construction Subtotal	**$ 4,387,800**
				Mobilization, Bonding, Administration (12%)	$ 526,500
				Site Electrical, Controls and Testing (15%)	$ 737,100
				Construction Total	**$ 5,651,400**
				Engineering and Administration (25%)	$ 1,412,900
				Construction Reserve Contingency (20%)	$ 1,130,300
1	**Land Acquisition**	**222**	**ACRE**	**$20,000**	**$ 4,440,000**
				Total Capital	**$ 12,630,000**
				Total with -50% variability in land cost	**$ 12,150,000**
				Total with +50% variability in land cost	**$ 20,070,000**

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: Maintain Existing Reuse System

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES				
		QTY	UNIT	UNIT PRICE	TOTAL COST	
1	Repair/Replace Existing Lagoon liner	130,680	SF	$1.50	$	196,020

Construction Subtotal	**$**	**196,000**
Mobilization, Bonding, Administration (12%)	$	23,500
Site Electrical, Controls and Testing (0%)	$	-
Construction Total	**$**	**219,500**
Engineering and Administration (25%)	$	54,900
Construction Reserve Contingency (20%)	$	43,900
Total Capital	**$**	**320,000**

J-U-B ENGINEERS, INC.

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J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB Wastewater Facility Plan

DATE: May 31, 2012

PROJECT DESCRIPTION: Sell Existing Reuse System

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-08-037

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Sell Existing Reuse System	472	AC	$20,000.00	$ 9,448,000

Total Capital	$ 9,450,000
Total with -50% variability in land cost	$ 4,724,000
Total with +50% variability in land cost	$ 14,172,000

Appendix 12-A

Engineer's Opinion of Probable Cost

Administration and Acillary Support

J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP**

DATE: November 1, 2011

PROJECT DESCRIPTION: **Utility Water Pump Station**

CLIENT:

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Demo Existing Structure	1	LS	$2,500.00	$ 2,500
2	**Pumps**				$ -
3	3 each at 150 gpm at 40-60 psi	3	EA	$ 10,000	$ 30,000
4	Screening Eqpt	1	EA	$ 5,000	$ 5,000
5	Piping and Mechanical	3	EA	$ 5,000	$ 15,000
6	**Pump Building**				
7	Excavation and Site Work	75	CY	$ 5	$ 375
8	Pump Station (20 x20 Building/Tank)	400	SF	$ 175	$ 70,000

Construction Subtotal	**$ 120,400**
Mobilization, Bonding, Administration (12%)	$ 14,400
Site Electrical, Controls and Testing (25%)	$ 33,700
Construction Total	**$ 168,500**
Engineering and Adminstation (25%)	$ 42,100
Construction Reserve Contingincy (20%)	$ 33,700
Total Capital	**$ 244,300**

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J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: **HARSB WWTP**

DATE: October 1, 2011

PROJECT DESCRIPTION: **Operations Building**

CLIENT:

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1					
1	Excavation and Backfill	1000	CY	$ 5	$ 5,000
2	Modify Existing Building (20 x 30)	600	SF	$ 100	$ 60,000
3	New Office, Block Building (40 x 60)	2,400	SF	$ 125	$ 300,000
3	Site Work	1	LS	5%	$ 3,000

Construction Subtotal	**$ 368,000**
Mobilization, Bonding, Administration (12%)	$ 44,200
Site Electrical, Controls and Testing (15%)	$ 61,800
Construction Total	**$ 474,000**
Engineering and Adminstation (25%)	$ 118,500
Construction Reserve Contingency (10%)	$ 47,400
Total Capital	**$ 639,900**

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J-U-B ENGINEERS, INC.

ENGINEER'S OPINION OF PROBABLE COST

PROJECT: HARSB WWTP

DATE: October 1, 2011

PROJECT DESCRIPTION: Emergency Power and Metering

CLIENT: HARSB

CLIENT PROJ. NO.

J-U-B PROJ. NO.: 20-11-022

CAPITAL COSTS

ITEM NO.	DESCRIPTION	SCHEDULE OF VALUES			
		QTY	UNIT	UNIT PRICE	TOTAL COST
1	Generator	1	LS	$ 275,000	$ 275,000
2	Metering modifications	1	LS	$ 25,000	$ 25,000

Construction Subtotal	**$**	**300,000**
Mobilization, Bonding, Administration (12%)	$	36,000
Site Electrical, Controls and Testing (10%)	$	33,600
Construction Total	**$**	**369,600**
Engineering and Adminstation (25%)	$	92,400
Construction Reserve Contingency (10%)	$	37,000
Total Capital	**$**	**499,000**

J-U-B ENGINEERS, INC.

7825 Meadowlark Way, COEUR D'ALENE, IDAHO 83815 (208) 762-8787

HAYDEN AREA REGIONAL SEWER BOARD - Wastewater Treatment Facility Plan
Capital Improvement Project Table

Capital Improvement Project Title	*Description of Project*	*Targeted Date When Project will Start (based on 3.5% growth curve and regulatory timelines)*	Improvement (Alternative 2) Additional Treatment with Year Round River Discharge (maintain current reuse system)	Alt 2 (20-year O&M)	Improvement (Alternative 3) Additional Treatment combined with Expanded Seasonal Reuse (expansion of reuse)	Alt 3 (20-year O&M)	Improvement (Alternative 4) Additional Treatment with Year Round River Discharge (sell off and abandon current reuse system)	Alt 4 (20-year O&M)
Headworks	*New HW, Concrete to 4.8 MGD, Eqpt to 2.4*	2013	$ 2,770,000		$ 2,770,000	$ -	$ 2,770,000	
Equalization	*2.4 MGD capacity*	2013	$ 3,640,000	$ 586,000	$ 3,640,000	$ 586,000	$ 3,640,000	$ 586,000
BNR	*2.4 MGD capacity*	2013	$ 3,770,000	$ 623,000	$ 3,770,000	$ 623,000	$ 3,770,000	$ 623,000
Pilot Study		2013	$ 1,000,000		$ 1,000,000			
Electrical (Emergency/Metering)	*New Gen set for BNR and Tertiary Systems*	2013	$ 500,000		$ 500,000		$ 500,000	
Admin & Sludge Storage Shed Relocation	*Relocated admin building and shed*	2013	$ 40,000		$ 40,000		$ 40,000	
Dewatering Improvements (in existing bldg)	*Cost for 1 screw press eqpt in current dewatering bldg (1.75 mgd) retain BFP.*	2017	$ 889,500	$ 4,590,000	$ 889,500	$ 4,590,000	$ 889,500	$ 4,590,000
Admin Buildings [1]	*New building and cost to remodel and expand current lab.*	2017	$ 639,900		$ 639,900		$ 639,900	
Tertiary Clarification	*2.4 MGD capacity (if Reuse abandoned) (Growth Driven)*	2018					$ 1,980,000	$ 3,050,000
Filtration	*2.4 MGD capacity*	2018	$ 11,100,000	$ 6,100,000	$ 11,100,000	$ 4,066,667	$ 11,100,000	$ 6,100,000
UV Light	*New, 2.4 mgd capacity pressurized system downstream of filtration*	2018	$ 2,510,000	$ 847,000	$ 2,510,000	$ 847,000	$ 2,510,000	$ 847,000
Effluent Pump Station (New H3)	*New H3 downstream of Filtration*	2018	$ 400,000		$ 400,000		$ 400,000	
Utility Water	*Expansion of H3 pump station for NPW Utility Water*	2018	$ 244,300		$ 244,300		$ 244,300	
Expansion to 2.4 MGD ADF	*New land and irrigation eqpt (land at $20,000/ac)*	2020			$ 12,630,000			
Cost if Existing Land App System Sold	*Sale price of land ($20,000/acre)*	2020					$ (9,450,000)	
Expand irrigation on current land and Lagoon maintenance	*Lagoon liner/plantings to expand current land*	2023	$ 1,400,000		$ 1,400,000		$ 320,000	
Aerobic Holding Tank Improvements (aeration)	*New blower/diffusers to 2.4 mgd*	2023	$ 308,700		$ 308,700		$ 308,700	
New Dewatering Building, Enclosed Truck Loading & Conveyor (per site build-out) [2]	*Truck loading station, with relocated dewatering building (2.4 mgd)*	2023	$ 3,864,500		$ 3,864,500		$ 3,864,500	
Treatment to Class B (Aerobic Digester and Thickening per site build-out) [1,2]	*(Treatment and Thickening)*	2023	$ 4,568,600	$ (2,030,000)	$ 4,568,600	$ (2,030,000)	$ 4,568,600	$ (2,030,000)
15" Force Main Replacement & Upgrade	*H1 Lift Station to WWTP*	2025	$ 5,336,000		$ 5,336,000		$ 5,336,000	
Expand irrigation on current land and Lagoon maintenance	*Lagoon liner/plantings to expand current land*	2025	$ 1,400,000		$ 1,400,000			
Expand irrigation on current land and Lagoon maintenance	*Lagoon liner/plantings to expand current land*	2027	$ 1,400,000		$ 1,400,000			
Aeration	*2.4 MGD capacity*	2028	$ 1,160,000		$ 1,160,000	$ -	$ 1,160,000	
Clarification	*New 60 ' clarifier*	2028	$ 1,320,000		$ 1,320,000	$ -	$ 1,320,000	
River Pipe (Huetter Road)	*Wyoming/Huetter to River*	2028	$ 3,688,400		$ 3,688,400		$ 3,688,400	
WWTP to Huetter/Wyoming Intersection	*WWTP to Huetter/Wy*	2028			$ 790,000			
Huetter/Wyoming to Reuse Site (current)	*Huetter/Wy to Land App Site (current)*	2028			$ 1,610,000			
Expand irrigation on current land and Lagoon maintenance	*Lagoon liner/plantings to expand current land*	2029	$ 1,400,000		$ 1,400,000			
TOTAL			$ 53,349,900	$ 10,700,000	$ 67,000,000	$ 8,700,000	$ 39,600,000	$ 13,800,000
				$ 64,049,900		$ 75,700,000		$ 53,400,000

[1] Recommended for long-term facility planning but not mandatory.
[2] At the time this project is implemented, the O&M cost changes to the listed value, compared to dewatering improvements in existing building.

Hayden Area Regional Sewer Board

Report for FINANCIAL PLAN AND CAPACITY FEE UPDATE

November 2012

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TABLE OF CONTENTS

FINANCIAL PLAN AND CAPACITY FEE UPDATE

INTRODUCTION

The Hayden Area Regional Sewer Board (HARSB) provides wastewater management services to the City of Hayden (City), Hayden Lake Recreational Water and Sewer District (District), and the Kootenai County Airport (County) also referred to as Members. This financial plan and capacity fee update is intended to evaluate the rate and fee impacts related to the completion of the Capital Improvement Projects (CIP) identified in the HARSB Wastewater Treatment Facility Plan.

OVERVIEW

The primary goal of the financial plan is to develop a multi-year strategy that will provide stable revenue and allow HARSB to meet the total operating and capital costs of providing sewer service to its Members. The financial analysis focuses on evaluating three key areas:

1. Ongoing operating and maintenance costs recovered from monthly fees;
2. Capital costs recovered from existing fund balances and/or direct Member contributions; and
3. Capitalization fee update paid by new customer service connections

PURCHASED AND CONNECTED EQUIVALENT RESIDENCES (ERS)

HARSB allocates costs to Members based on either the purchased or connected ERs of each Member. Purchased ERs represents capacity that was originally prepaid. Most of the purchased ERs are connected; however, some prepaid (reserved) capacity still remains. Since purchased and connected ERs form the basis for how operating, maintenance and capital costs are allocated, it is important to understand the existing purchased and connected ERs and how these ERs will change in the 20-year time period being reviewed.

Purchased ERs

Currently there are 10,061 purchased ERs, of which 1,104 are HARSB ERs that are held for sale to Members. New capacity becomes available in 2025 with the additional treatment plant facility improvements, which will increase the total purchased ERs to 12,000. Table 1 shows snapshots of the purchased ER forecast through 2032. A detailed annual forecast is provided in the Appendix.

Table 1: Purchased ER Forecast

Purchased ER Forecast [a]	2013	2014	2017	2018	2023	2028	2032
City	6,239	6,288	6,472	6,548	7,083	8,003	9,197
District	2,645	2,645	2,645	2,645	2,645	2,645	2,645
County	119	120	123	124	129	134	138
HARSB	1,059	1,008	821	744	204	1,218	20
Total	10,061	10,061	10,061	10,061	10,061	12,000	12,000

[a] ERs as of 9-1-12; District growth expected to use pre-purchased ERs, City & County growth expected to purchase all new ERs from HARSB; HARSB includes Misc. allocated capacity

Connected ERs

Anticipated growth ranges from 45 to 349 new connected units per year. This number only reflects City and County new connections and does not include District growth which is expected to use pre-purchased ERs. The County is expected to grow 1 ER per year and the remaining growth is anticipated from the City. Connected ERs in 2012 totaled 7,962 and are expected to increase to 11,384 by 2032.

Table 2 shows snapshots of the connected ER forecast through 2032. A detailed annual forecast is provided in the Appendix.

Table 2: Connected ER Forecast

Connected ER Forecast [a]	2013	2014	2017	2018	2023	2028	2032
City	5,987	6,036	6,221	6,297	6,831	7,752	8,946
District	1,959	1,979	2,039	2,059	2,159	2,259	2,339
County	81	82	85	86	91	96	100
HARSB							
Total	8,027	8,097	8,344	8,442	9,081	10,106	11,384

[a] District connections expected to use pre-purchased ERs, City & County new connections expected to pay Cap Fee to purchase new ERs

OPERATING COSTS

HARSB incurs ongoing costs related to administrative, operating, maintenance and capital to operate the system and satisfy regulatory requirements. The financial plan establishes the required revenue to meet the ongoing system costs of providing sewer service and fully recovering the cost of operating the utility.

Operating costs are initially developed from the 2013 budget documents. Costs were split into administration, plant operating and maintenance, land application, treatment O&M, interceptor, H-4, collector, and replacement funding. Future costs are adjusted annually for inflationary increases. Any known future changes such as new or enhanced programs or additional staffing needs and operating costs associated with maintaining the system are added in the year they are planned. The following is a list of the key expense factors and assumptions used to develop the financial forecast.

- **Annual Inflation Factors** – General cost escalation 2.23 percent; construction cost 3.19 percent.
- **Additional capital Operating & Maintenance (O&M)** – Increased costs are identified in the Facility Plan and are expected to be approximately $60,000 in 2015, $230,000 in 2019, and $350,000 in 2020. O&M costs are also expected to decrease approximately $102,000 in 2025 due to a 15" force main replacement and upgrade.

- **Replacement Capital Funding** – The replacement funding included in the operating and maintenance costs is used to provide for the replacement of aging system facilities to ensure sustainability of the system for ongoing operation. Each year, HARSB assets lose value, and as they lose value they are moving toward eventual replacement. That accumulating loss in value and future liability is measured for reporting purposes through an annual depreciation expense, which is based on the original cost of the asset. While this reported expense reflects the consumption of the existing asset and its original investment, the replacement of that asset will likely cost much more, factoring in inflation and construction conditions. Therefore, the actual annual replacement liability is even greater than the annual depreciation expense.

  HARSB's current depreciation expense is $624,000. With the addition of new capital assets listed in the capital plan, the depreciation expense is anticipated to increase to $2.9 million by the end of the 20-year planning period. Replacement funding began being collected from Members in 2010. HARSB has this funding budgeted for $400,000 in 2013 and is expected to continue increasing this by $100,000 per year until deprecation is matched. The financial analysis deposits this funding into the Replacement Fund where it is made available to fund replacement capital expenses.

O&M Cost Allocation

Most O&M costs, including all administration, treatment, land application, replacement funding and 65 percent of O&M costs, are allocated to each Member based on connected ERs. Collector costs and related O&M costs (28 percent) are allocated based on staff time spent. Interceptor costs and related O&M costs (7 percent) are allocated 50 percent to the City and 50 percent to the District, except for H-4 specific interceptor costs, which are allocated 100 percent to the County. Since HARSB has no connected ERs, O&M costs and the replacement fee are not allocated to HARSB.

O&M costs, including replacement funding, range from $2.09 million in 2013 to $5.46 million in 2032. Based on the allocations described above, 2013 costs are allocated approximately 71 percent to the City, 28 percent to the District, and 1 percent to the County. Table 3 shows selected year O&M revenue requirements and allocations in more detail.

Table 3: O&M Revenue Requirement

O&M Revenue Requirement (O&M RR)	2013	2014	2017	2018	2023	2028	2032
Admin	$ 383,852	$ 392,399	$ 419,198	$ 428,532	$ 478,414	$ 534,101	$ 583,283
Plant O&M	359,888	367,901	456,199	466,357	1,142,348	1,166,885	1,274,337
Land Application	132,225	135,169	144,401	147,616	164,799	183,981	200,923
Treatment O&M	490,635	501,560	535,815	547,746	611,504	682,683	745,547
Interceptor	61,238	62,601	66,877	68,366	76,324	85,208	93,054
H-4	2,000	2,045	2,184	2,233	2,493	2,783	3,039
Collector	261,601	267,426	285,690	292,051	326,046	363,998	397,516
Total O&M Expenses	$ 1,691,438	$ 1,729,100	$ 1,910,364	$ 1,952,901	$ 2,801,925	$ 3,019,639	$ 3,297,699
Replacement Funding	400,000	500,000	800,000	900,000	1,400,000	1,900,000	2,163,020
Total O&M RR	**$ 2,091,438**	**$ 2,229,100**	**$ 2,710,364**	**$ 2,852,901**	**$ 4,201,925**	**$ 4,919,639**	**$ 5,460,719**
Allocation per Member [a]							
City	$ 1,482,775	$ 1,582,992	$ 1,936,376	$ 2,041,862	$ 3,062,151	$ 3,656,436	$ 4,153,918
District	588,902	624,922	747,893	783,524	1,099,357	1,218,115	1,260,261
County	19,761	21,186	26,095	27,514	40,417	45,088	46,540
Total O&M RR by Member	**$ 2,091,438**	**$ 2,229,100**	**$ 2,710,364**	**$ 2,852,901**	**$ 4,201,925**	**$ 4,919,639**	**$ 5,460,719**

[a] Costs are allocated based on Connected ERs and therefore not allocated to HARSB

Based on the O&M revenue requirement, the average system cost per connected ER is $21.71 per month in 2013, increasing to $39.97 per month in 2032. Snapshots of the costs per connected ER can be seen in Table 4. More detail is provided in the Appendix.

Table 4: O&M Cost per Connected ER

O&M Cost Per Connected ER	2013	2014	2017	2018	2023	2028	2032
Average System Cost per Connected ER/Mo	$ 21.71	$ 22.94	$ 27.07	$ 28.16	$ 38.56	$ 40.57	$ 39.97
Monthly Difference per ER	0.57	1.23	1.14	1.10	0.84	0.38	(0.28)
Cumulative Difference per ER	0.57	1.80	5.93	7.02	17.42	19.42	18.83

CAPITAL COSTS

The CIP developed for the Facility Plan identifies the total capital obligations of the 20-year planning period. Once the capital costs are identified, a capital funding plan defines a strategy for funding the CIP considering available funding sources such as existing reserves, capacity fees, replacement fees, and external contributions from grants/developers.

The CIP identifies $27.5 million in project costs over the 6-year planning horizon and $53.3 million in the 20-year period. This CIP consists of 48 percent expansion projects and 52 percent regulatory and replacement projects. Costs are stated in 2012 dollars and are escalated by 3.19 percent annually to the year of construction for financing projections.

A summary of the 20-year CIP is shown in Table 5. As shown, each year has varied capital cost obligations depending on construction schedules and infrastructure planning needs. Approximately 44.2 percent (inflated dollars) of the capital costs are included in the 6-year planning period with the filtration project accounting for 43.1 percent of this total. Table 6 provides additional detail for the 6-year CIP.

Table 5: 6 and 20-Year CIP

Year	2012$	Inflated
2013	$ 11,720,000	$ 11,720,000
2014	-	-
2015	-	-
2016	-	-
2017	1,529,400	1,734,304
2018	14,254,300	16,680,195
6-Year Total	**$ 27,503,700**	**$ 30,134,500**
2019-2032	25,846,200	38,082,887
20-Year Total	**$ 53,349,900**	**$ 68,217,386**

Table 6: Detailed 6-Year CIP (Inflated $)

Project	2013	2017	2018	2023	2025	2027	2028	2029
Headworks	2,770,000	-	-	-	-	-	-	-
Equalization	3,640,000	-	-	-	-	-	-	-
BNR	3,770,000	-	-	-	-	-	-	-
Pilot Study	1,000,000	-	-	-	-	-	-	-
Electrical (Emergency/Metering)	500,000	-	-	-	-	-	-	-
Admin & Sludge Storage Shed Relocation	40,000	-	-	-	-	-	-	-
Dewatering Improvements (in existing bldg)	-	1,008,672	-	-	-	-	-	-
Admin Buildings	-	725,632	-	-	-	-	-	-
Filtration	-	-	12,989,075	-	-	-	-	-
UV Light	-	-	2,937,169	-	-	-	-	-
Effluent Pump Station (New H3)	-	-	468,075	-	-	-	-	-
Utility Water	-	-	285,877	-	-	-	-	-
Expand irrigation and Lagoon maintenance	-	-	-	1,917,072	2,041,459	2,173,916	-	2,314,967
Aerobic Holding Tank Improvements	-	-	-	422,714	-	-	-	-
New Dewatering Building	-	-	-	5,291,804	-	-	-	-
Treatment to Class	-	-	-	6,255,955	-	-	-	-
15" Force Main Replacement & Upgrade	-	-	-	-	7,780,874	-	-	-
Aeration	-	-	-	-	-	-	1,858,762	-
Clarification	-	-	-	-	-	-	2,115,143	-
River Pipe (Huetter Road)	-	-	-	-	-	-	5,910,221	-
Total	**$11,720,000**	**$ 1,734,304**	**$16,680,195**	**$13,887,546**	**$ 9,822,333**	**$ 2,173,916**	**$ 9,884,125**	**$ 2,314,967**

To assist with the development of a funding strategy that targets funding resources with the appropriate funding mechanism, each capital project is identified as expansion capital, regulatory capital or replacement capital. Total capital costs are identified as follows:

- Expansion capital = $35.7 million
- Regulatory capital = $23.5 million
- Replacement capital = $9.0 million

Capital Financing Strategy

The capital financing strategy developed to fund the CIP identified in the Facility Plan assumes the following funding resources:

- Accumulated cash reserves from the capital fund
- Annual revenue collections from capacity fees
- Annual revenue collections from the O&M rate for replacement funding

HARSB maintains two funds that are used to manage capital funding resources. The capital fund is used to cover expansion capital costs and the replacement fund is used to cover replacement capital costs. HARSB funds do not have minimum target balances. Any cash needed above the balance available in the funds is covered proportionately by each Member.

The Capital Fund will begin 2013 with $4.32 million in cash reserves and is funded with capacity fee revenue and interest. This fund is used only for expansion capital projects. Annual capacity fee revenue collections are budgeted at an annual amount of $293,000 in 2013 and increase to $2.3 million in 2032 based on HARSB's current capacity fee of $6,515. This revenue represents new connections ranging from 45 to 349 per year. The capacity fee has been updated as part of this plan and will be discussed further in the capacity fee section below. The capital fund applies all available fund balances and annual cap fee toward expansion capital until depleted. Those costs not covered by the capital fund will be funded by the Member requiring additional ERs at that time. It is anticipated that $19.1 million in additional funding will be required to cover the total expansion capital identified in the Facility Plan.

Regulatory costs are allocated based on purchased ERs and are funded with direct contributions from each Member. It is up to the individual Member as to how this funding will be secured from their customers. The Capital Fund covers HARSB portion of regulatory costs since HARSB does not have a direct funding source for those ERs that are held for sale to Members.

The Replacement Fund will begin 2013 with $752,000 and is funded with replacement fee revenue and interest. Replacement fee revenue, ranging from $400,000 in 2013 to $2.2 million in 2032, is placed in the Replacement Fund and is used only for replacement capital projects. Routine replacement funding from the replacement fee did not begin until 2010 and is below target annual funding levels. For this reason, the fund balance will not be used for replacement projects for the first ten years while it accumulates funds for future replacement projects. During this initial ten year period, replacement projects will be covered with direct contributions from each Member. The one exception is the replacement costs allocated to HARSB ERs that will be paid for with this fund since HARSB does not have a direct funding source.

The detailed flow of funds and fund balances can be found in the Appendix.

Capital Cost Allocation

Any cash needed above the balance available in the funds is covered proportionately by each Member. All capital costs are allocated to Members based on purchased ERs. The funding source for the capital projects identified depends on why the capital cost is being incurred.

Table 7 shows capital cost allocations, by Member, for each of the capital cost categories. As previously discussed, all capital costs are allocated to Members based on purchased ERs.

Table 7: Capital Costs Allocation

Capital Financing [a]	2013	2014	2017	2018	2023	2028	2032
Funds Needed for Capital							
Expansion	$ -	$ -	$ -	$ 1,970,999	$ 4,651,117	$ 8,031,467	$ -
Regulatory	6,980,300	-	-	10,780,932	5,721,623	-	-
Replacement	1,433,400	-	1,371,488	2,356,347	-	-	-
Total Funding Needed	**$ 8,413,700**	**$ -**	**$ 1,371,488**	**$ 15,108,277**	**$ 10,372,740**	**$ 8,031,467**	**$ -**
Total Expansion	**$ -**	**$ -**	**$ -**	**$ 1,970,999**	**$ 4,651,117**	**$ 8,031,467**	**$ -**
Capital Allocation Regulatory [b]							
City	$ 4,328,202	$ -	$ -	$ 7,016,590	$ 4,027,828	$ -	$ -
District	1,835,141	-	-	2,834,338	1,504,231	-	-
County	82,561	-	-	132,871	73,360	-	-
HARSB	734,396	-	-	797,133	116,204	-	-
Total Regulatory Allocation	**$ 6,980,300**	**$ -**	**$ -**	**$ 10,780,932**	**$ 5,721,623**	**$ -**	**$ -**
Capital Allocation Replacement [b]							
City	$ 888,793	$ -	$ 882,226	$ 1,533,589	$ -	$ -	$ -
District	376,845	-	360,568	619,490	-	-	-
County	16,954	-	16,767	29,041	-	-	-
HARSB	150,808	-	111,927	174,226	-	-	-
Total Replacement Allocation	**$ 1,433,400**	**$ -**	**$ 1,371,488**	**$ 2,356,347**	**$ -**	**$ -**	**$ -**
Total Capital Allocation [b]							
Expansion Costs	$ -	$ -	$ -	$ 1,970,999	$ 4,651,117	$ 8,031,467	$ -
City Regulatory & Replacement Costs	5,216,995	-	882,226	8,550,179	4,027,828	-	-
District Regulatory & Replacement Costs	2,211,986	-	360,568	3,453,828	1,504,231	-	-
County Regulatory & Replacement Costs	99,515	-	16,767	161,912	73,360	-	-
HARSB Regulatory & Replacement Costs	885,204	-	111,927	971,359	116,204	-	-
Total Capital Allocation	**$ 8,413,700**	**$ -**	**$ 1,371,488**	**$ 15,108,277**	**$ 10,372,740**	**$ 8,031,467**	**$ -**

[a] Costs do not include issuance costs and possible reserve requirement since members are responsible for securing debt if needed

[b] Debt allocations split based on Purchased ERs. HARSB allocation funded through reserves not debt.

Each Member is ultimately responsible for securing the needed funds to cover their capital cost allocation. It was assumed that each Member would likely secure debt to cover their capital costs. The analysis has provided a sample monthly capital cost rate impact assuming a 20 year term and interest rates ranging from 3 percent to 5 percent. The cost was developed based on the assumption that rates will be paid by connected ERs. Table 8 shows average monthly capital costs per connected ER. Average capital costs per ER ranged from $5.25 to $20.84 by 2032. More detail is provided in the Appendix

Table 8: Capital Costs per Connected ER

Capital Cost Per Connected ER	2013	2014	2017	2018	2023	2028	2032
Average Debt Cost per Connected ER/mo	$ 5.25	$ -	$ 0.64	$ 10.01	$ 4.94	$ -	$ -
Cumulative Debt Cost per Connected ER/mo	$ 5.25	$ 5.25	$ 5.89	$ 15.90	$ 20.84	$ 20.84	$ 20.84

RATE IMPACT

The total rate impact to cover both O&M revenue requirements and capital related costs is shown in Table 9. The rates shown are average total costs per connected ER per month. Actual rates will vary and will be established by each individual Member.

Table 9: Total Costs per Connected ER

Total Cost Per Connected ER	2013	2014	2017	2018	2023	2028	2032
Prior Year Monthly Rate	$ 21.14	$ 26.97	$ 31.18	$ 32.96	$ 53.61	$ 61.02	$ 61.09
Monthly O&M RR Cost per ER	0.57	1.23	1.14	1.10	0.84	0.38	(0.28)
Monthly Capital Cost per ER	5.25	-	0.64	10.01	4.94	-	-
Average Total Cost per Connected ER/mo	**$ 26.97**	**$ 28.19**	**$ 32.96**	**$ 44.06**	**$ 59.40**	**$ 61.40**	**$ 60.81**
Cumulative Difference per ER/mo	5.83	7.05	11.82	22.92	38.26	40.26	39.67

CAPACITY FEE

HARSB's capacity fee is a one-time charge paid for by new customers for system capacity. Capacity fees are an allocation of capital costs on a proportional basis. They are based on capacity demand and the cost to provide that capacity. Properties which are already connected do not pay capacity fees unless they "redevelop" and require increased capacity.

In the absence of a capacity fee, growth related capital costs would be borne in large part by existing customers. In addition, the net investment in the utility already collected from existing customers through rates, charges, and fees would be diluted by the addition of new customers, effectively subsidizing new customers with prior customers' payments. To establish equity, a capacity fee should recover a proportionate share of the existing and future infrastructure costs from a new customer. From a financial perspective, a new customer should become financially equivalent to an existing customer by paying the capacity fee. Consistent with this, HARSB requires that "growth pay for growth".

The method used to determine the capacity fee includes provisions for both HARSB's investment in existing system capacity and its planned future investments to meet future system needs. The resulting system cost is then spread proportionally over the total customer base served. The components of the capacity fee are described below.

- **Existing System Costs** – This capacity fee update focused first on existing assets. The original cost of existing system assets is determined from utility asset records, including only those assets that were paid for by HARSB and excluding any assets paid for by the City, District, County, or otherwise donated. The replacement cost is then calculated based on the Engineering News-Record (ENR) Construction Cost Index (CCI). Adjustments to the existing system replacement costs include:

  Plus: Construction work in progress. To acknowledge that HARSB may have investments in capital projects that are currently underway – these projects are not completed or booked as assets, but do represent an investment made by HARSB in the system. Consequently, the cost of construction work in progress is added to the existing system cost basis.

Less: Depreciation. The replacement cost of depreciation is calculated based on the Engineering News-Record Construction Cost Index (ENR-CCI) and is subtracted from the replacement cost to recognize the remaining value of the system.

Less: Existing capacity. Existing system value associated with current connections on the system and no longer available.

Net calculations, including adjustments identified above, represents the existing system available capacity costs that are included in the capacity fee. These costs are shown in Table 10. All existing connected and purchased ERs consume the entirety of the existing system, therefore, no existing system costs are included.

Table 10: Existing System Costs

Existing System Costs		
Plant-in-Service	$	37,083,041
plus: Construction Work in Progress		-
less: Depreciation		(9,193,346)
TOTAL NET ASSETS	$	27,889,695
less: Existing Connected Capacity		(27,889,695)
TOTAL NET EXISTING SYSTEM COSTS	**$**	**-**

- **Future System Costs** – Includes total capital projects planned for construction and identified in an approved comprehensive system planning document. All projects occur within the 20-year horizon of this financial analysis. Adjustments to the future system costs include:

  Less: Existing user capital costs. The capital improvement program has been allocated based on engineering and planning criteria between those projects benefitting existing users, those projects benefitting new users or a combination. Except for the portion that would be needed to increase the size of the system, the existing user related regulatory and replacement projects are excluded from the calculation.

  Net calculation represents the future system capacity costs, including adjustments identified above. Table 11 shows net future system costs needed to serve HARSB's future system capacity needs and improve the system for regulatory compliance for future customers.

  It is important to note that current-year dollars, not inflated dollars, are used when calculating the capacity fee. This approach assumes that the capacity fee will be updated annually to track construction cost inflation.

Table 11: Future System Costs

Future System Costs		
Total Capital Improvement Program	$	53,349,900
less: Regulatory and Replacement		(27,696,188)
NET FUTURE SYSTEM COSTS	**$**	**25,653,712**

- **Customer Base/System Capacity** – The system capacity is shown in Equivalent Residences (ERs) and is calculated based on 200 gallons per day (gpd) per ER. Future capacity available is identified by deducting current existing connected capacity from total future capacity. Table 12 shows the total future available capacity.

Table 12: Customer Base

Customer Base	
Future Capacity	12,000
Existing Connected Capacity	8,950
FUTURE AVAILABLE CAPACITY	**3,050**

- **Capacity Fee** – The sum of the available existing system costs and the future system costs is divided by the future available system capacity to determine the maximum allowable capacity fee. Table 13 shows the results of this calculation.

Table 13: Capacity Fee

Capacity Fee Update	
Net Existing Cost Basis	$ -
Future Cost Basis	25,653,712
Total Cost Basis	$ 25,653,712
Allocable Customer Base	3,050
MAXIMUM CAPACITY FEE PER ER	**$ 8,411**

The updated capacity fee has increased by $1,896 from the previous fee of $6,515. This fee is the maximum calculated defensible capacity fee for HARSB. The Board has the policy option to phase in the increase over time. As mentioned above, the capacity fee should be updated annually to track construction cost inflation. This should be done with an accredited escalation index, such as the ENR CCI.

CONCLUSION

The results of this analysis indicate that increased Member charges are necessary to fund ongoing operating needs and fund the future capital improvement projects identified in the Facility Plan. Implementation of the proposed increases should provide for continued financial viability.

In addition, the capacity fee update shows the need for a capacity fee increase to ensure that new customers pay an equitable portion of capital costs. This increase can be made at one time or phased in over time.

It is recommended that HARSB regularly review and update the key underlying assumptions that compose the multi-year financial plan to ensure that adequate revenues are collected to meet the total sewer utility financial obligations and that fund balances are sufficient to meet capital needs.

APPENDIX

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Assumptions

FY 2012/13

Economic & Financial Factors	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
1 General Cost Inflation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.23%	2.23%	2.23%	2.23%	2.23%
2 Construction Cost Inflation	[illegible]	[illegible]	3.19%	[illegible]	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%
3 Labor Cost Inflation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.23%	2.23%	2.23%	2.23%	2.23%
4 Medical	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2.23%
Fund Earnings [a]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.91%	1.91%	1.91%

Economic & Financial Factors	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1 General Cost Inflation	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	[illegible]	[illegible]
2 Construction Cost Inflation	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	3.19%	[illegible]	[illegible]
3 Labor Cost Inflation	2.23%	[illegible]	2.23%	2.23%	2.23%	2.23%	2.23%	2.23%	[illegible]	[illegible]
4 Medical	2.23%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fund Earnings [a]	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%	1.91%

[a] Starts near current interest rate and increases to match most recent 5-year average of Idaho LGIP

Accounting Assumptions	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
FISCAL POLICY RESTRICTIONS										
Min. Op. Fund Balance Target (days of O&M expense)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max. Op. Fund Balance (days of O&M expense)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Minimum Capital Fund Balance - % of plant assets	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2 - Amount at Right ==>	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 - Equal to Amount at Right ==>	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Accounting Assumptions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Min. Op. Fund Balance Target (days of O&M expense)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Max. Op. Fund Balance (days of O&M expense)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Minimum Capital Fund Balance - % of plant assets	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2 - Amount at Right ==>	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3 - Equal to Amount at Right ==>	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Minimum Capital Fund Balance Target

Select Minimum Capital Fund Balance Target	1	**Defined as % of Plant**

1 - Defined as % of Plant

Plant-in-Service in 2012: $ 16,431,895

RATE FUNDED SYSTEM REINVESTMENT

Select Reinvestment Funding Strategy	3	**User Input**

Amount of Annual Cash Funding from Rates

1 - Equal to Annual Depreciation Expense
2 - Equal to Annual Depreciation Expense less Annual Debt Principal Payments
3 - Equal to Amount at Right ==>
4 - Do Not Fund System Reinvestment

Capital Financing Assumptions

Right to Connect Charge

Select Cap Fee Alternative	1	**Current Charge is in use**
1 - User Input (Current Charge)	$ [illegible]	
2 - Calculated Charge		

Capital Financing Assumptions	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total ERs Paying Cap Fee (Estimate)	[illegible]	50	56	62	69	77	86	96	107	119
Total Capacity Fee Revenue	$ 293,175	$ 326,573	$ 363,776	$ 405,216	$ 451,378	$ 502,798	$ 560,076	$ 623,879	$ 694,950	$ 774,118
REVENUE BONDS										
Term (years)	[illegible]	[illegible]	20	[illegible]	[illegible]	[illegible]	[illegible]	20	20	20
Interest Cost	[illegible]	[illegible]	4.00%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.00%	5.00%
Issuance Cost	[illegible]	[illegible]	2.00%	[illegible]	[illegible]	[illegible]	2.00%	2.00%	2.00%	2.00%
Revenue Bond Coverage Requirement 1.00										
OTHER LOAN										
Term (years, 10 year minimum and no more than 20 years)	[illegible]	[illegible]	20	20	20	20	20	20	20	20
Interest Cost	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
GO BONDS										
Term (years)	[illegible]	[illegible]	[illegible]	20	20	[illegible]	[illegible]	20	20	20
Interest Cost	[illegible]	4.00%	[illegible]	4.00%	4.00%	[illegible]	[illegible]	[illegible]	4.00%	4.00%
Issuance Cost	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.00%

Capital Financing Assumptions	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total ERs Paying Cap Fee (Estimate)	132	147	164	183	204	227	253	282	314	349
Total Capacity Fee Revenue	$ 862,304	$ 960,536	$ 1,069,958	$ 1,191,846	$ 1,327,619	$ 1,478,859	$ 1,647,328	$ 1,834,989	$ 2,044,028	$ 2,276,890
REVENUE BONDS										
Term (years)	20	20	[illegible]	20	20	20	20	20	20	[illegible]
Interest Cost	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	[illegible]	[illegible]	5.00%	[illegible]
Issuance Cost	2.00%	[illegible]	2.00%	2.00%	[illegible]	2.00%	[illegible]	2.00%	2.00%	[illegible]
OTHER LOAN										
Term (years, 10 year minimum and no more than 20 years)	20	[illegible]	20	20	20	20	20	20	20	[illegible]
Interest Cost	[illegible]	[illegible]	2.00%	2.00%	2.00%	2.00%	2.00%	[illegible]	2.00%	[illegible]
GO BONDS										
Term (years)	20	20	20	20	20	20	20	20	20	[illegible]
Interest Cost	4.00%	4.00%	4.00%	4.00%	4.00%	[illegible]	[illegible]	4.00%	4.00%	4.00%
Issuance Cost	0.00%	0.00%	0.00%	0.00%	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Operating Revenue and Expenditure Forecast

Expenditures			Forecast Basis	Budget 2012	Budget 2013	Projection 2014	Projection 2015	Projection 2016	Projection 2017	Projection 2018	Projection 2019
	ADMINISTRATION										
501010	Salaries General - Adm	3	Labor Cost Inflation	$ 131,117	$ 136,725	$ 139,821	$ 142,934	$ 146,117	$ 149,370	$ 152,696	$ 156,096
501210	Administrator Mileage Reimburse	12	No Escalation	-	-	-	-	-	-	-	-
502110	FICA General - Adm	3	Labor Cost Inflation	8,371	8,400	8,669	8,862	9,059	9,261	9,467	9,678
502210	Medicare General - Adm	3	Labor Cost Inflation	2,027	2,053	2,097	2,144	2,192	2,241	2,290	2,341
502410	PERSI General - Adm	3	Labor Cost Inflation	14,038	14,211	14,527	14,851	15,182	15,520	15,865	16,218
502510	Medical Ins - Adm	4	Medical	21,776	25,400	26,176	26,759	27,355	27,964	28,586	29,223
502610	Unemployment General - Adm	3	Labor Cost Inflation	3,027	3,041	3,132	3,202	3,273	3,346	3,420	3,497
502710	Workman Compensation Gen	3	Labor Cost Inflation	11,000	11,000	11,245	11,495	11,751	12,013	12,280	12,554
510010	Veolia Contract	3	Labor Cost Inflation	-	-	-	-	-	-	-	-
511210	Legal Services General	3	Labor Cost Inflation	100,000	100,000	102,227	104,503	106,830	109,208	111,640	114,126
511310	Audit	3	Labor Cost Inflation	6,500	6,500	6,645	6,793	6,944	7,099	7,257	7,418
511510	Testing/Immunizations/Training	1	General Cost Inflation	300	300	307	314	320	328	335	342
511610	Consulting General - Adm	1	General Cost Inflation	12,000	20,000	20,445	20,901	21,366	21,842	22,328	22,825
521110	Building Maintenance Gen	1	General Cost Inflation	1,800	1,800	1,840	1,881	1,923	1,966	2,010	2,054
522010	Equip/Maint Agreement Gen	1	General Cost Inflation	900	1,200	1,227	1,254	1,282	1,311	1,340	1,370
522210	Gas/Oil/Car Repairs	1	General Cost Inflation	1,000	1,000	1,022	1,045	1,068	1,092	1,116	1,141
525110	Claims/Losses General	1	General Cost Inflation	1,000	1,000	1,022	1,045	1,068	1,092	1,116	1,141
531110	Insurance General - Adm	1	General Cost Inflation	27,100	24,364	24,906	25,461	26,028	26,608	27,200	27,806
531210	Postage General - Adm	1	General Cost Inflation	600	600	613	627	641	655	670	685
531310	Telephone/Comm Services	1	General Cost Inflation	4,250	4,250	4,345	4,441	4,540	4,641	4,745	4,850
531410	Advertising General - Adm	1	General Cost Inflation	1,200	2,000	2,045	2,090	2,137	2,184	2,233	2,283
532110	Meal Expense General - Adm	1	General Cost Inflation	1,000	1,000	1,022	1,045	1,068	1,092	1,116	1,141
532210	Travel Expense - Mileage	1	General Cost Inflation	1,500	1,500	1,533	1,568	1,602	1,638	1,675	1,712
532310	Lodging General - Adm	1	General Cost Inflation	1,500	1,500	1,533	1,568	1,602	1,638	1,675	1,712
541210	Office Supplies General	1	General Cost Inflation	2,000	2,000	2,045	2,090	2,137	2,184	2,233	2,283
541310	Books/Photos/Printed Materials	1	General Cost Inflation	1,000	1,000	1,022	1,045	1,068	1,092	1,116	1,141
541410	Computer Software Adm	1	General Cost Inflation	3,000	3,000	3,067	3,135	3,205	3,276	3,349	3,424
546010	Uniforms	1	General Cost Inflation	400	400	409	418	427	437	447	457
549110	Dues and Fees/Registration Adm	1	General Cost Inflation	1,800	1,800	1,840	1,881	1,923	1,966	2,010	2,054
549210	Bank Charges/Misc. Fees Gen	1	General Cost Inflation	500	500	511	523	534	546	558	571
563310	Janitorial Supplies General	1	General Cost Inflation	400	400	409	418	427	437	447	457
564010	Electricity General - Adm	1	General Cost Inflation	1,800	1,800	1,840	1,881	1,923	1,966	2,010	2,054
564110	Water and Garbage Adm	1	General Cost Inflation	1,200	1,200	1,227	1,254	1,282	1,311	1,340	1,370
631010	Furniture Purchased Gen	1	General Cost Inflation	600	600	613	627	641	655	670	685
641010	Equipment Purchase General	1	General Cost Inflation	150	150	153	157	160	164	167	171
645010	Office Equipment Purchases	1	General Cost Inflation	800	800	818	836	855	874	893	913
646010	Docuware System	1	General Cost Inflation	1,600	2,000	2,045	2,090	2,137	2,184	2,233	2,283
	Total Administration Expenses			**$ 374,458**	**$ 383,852**	**$ 392,399**	**$ 401,136**	**$ 410,068**	**$ 419,198**	**$ 428,532**	**$ 438,074**
	TREATMENT										
511311	Engineer/Consulting	3	Labor Cost Inflation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
511811	Compliance Procedures	1	General Cost Inflation	25,000	20,000	20,445	20,901	21,366	21,842	22,328	22,825
526011	LS-H-3	1	General Cost Inflation	13,000	13,000	13,289	13,585	13,888	14,197	14,513	14,836
526111	Biosolids Handling	1	General Cost Inflation	115,000	125,000	127,783	130,629	133,537	136,510	139,550	142,657
541411	SCADA - Computer	1	General Cost Inflation	40,000	20,000	20,445	20,901	21,366	21,842	22,328	22,825
563011	Chemicals - Chlorine/SO2	1	General Cost Inflation	78,500	38,500	39,357	40,234	41,129	42,045	42,981	43,938
563611	Landscaping/Supplies/Repairs	1	General Cost Inflation	700	700	716	732	748	764	781	799
563811	Landscaping Treatment Plant	1	General Cost Inflation	-	-	-	-	-	-	-	-
564011	Electricity Treatment Plant	1	General Cost Inflation	131,250	135,178	138,198	141,275	144,420	147,636	150,923	154,284
564111	Garbage and Sewer Treatment Plant	1	General Cost Inflation	3,000	3,000	3,067	3,135	3,205	3,276	3,349	3,424
566011	LS H-3 M/R	1	General Cost Inflation	-	-	-	-	-	-	-	-
572111	Reserve Fund	1	General Cost Inflation	2,000	2,000	2,045	2,090	2,137	2,184	2,233	2,283
641111	Equipment/Landscaping	1	General Cost Inflation	500	500	511	523	534	546	558	571
641211	Equipment/Vise, Pallets	1	General Cost Inflation	2,000	2,000	2,045	2,090	2,137	2,184	2,233	2,283
641311	H-3 VFD Pump	1	General Cost Inflation	-	-	-	-	-	-	-	-
	Total Treatment Expenses			**$ 370,950**	**$ 359,888**	**$ 367,901**	**$ 376,073**	**$ 384,467**	**$ 393,027**	**$ 401,779**	**$ 410,725**

Expenditures		Projection 2020	Projection 2021	Projection 2022	Projection 2023	Projection 2024	Projection 2025	Projection 2026	Projection 2027	Projection 2028	Projection 2029	Projection 2030	Projection 2031	Projection 2032
	ADMINISTRATION													
501010	Salaries General - Adm	$ 159,572	$ 163,125	$ 166,757	$ 170,470	$ 174,266	$ 178,146	$ 182,113	$ 186,167	$ 190,313	$ 194,550	$ 198,882	$ 203,311	$ 207,887
501210	Administrator Mileage Reimburse	-	-	-	-	-	-	-	-	-	-	-	-	-
502110	FICA General - Adm	9,893	10,114	10,339	10,569	10,804	11,045	11,291	11,542	11,799	12,062	12,331	12,605	12,885
502210	Medicare General - Adm	2,394	2,447	2,501	2,557	2,614	2,672	2,732	2,793	2,855	2,918	2,983	3,050	3,118
502410	PERSI General - Adm	16,580	16,949	17,326	17,712	18,106	18,509	18,921	19,343	19,773	20,214	20,664	21,124	21,594
502510	Medical Ins - Adm	29,874	30,539	31,219	31,914	32,625	33,351	34,094	34,853	35,629	36,422	37,233	38,062	38,910
502610	Unemployment General - Adm	3,574	3,654	3,735	3,819	3,904	3,990	4,079	4,170	4,263	4,358	4,455	4,554	4,656
502710	Workman Compensation Gen	12,833	13,119	13,411	13,710	14,015	14,327	14,646	14,972	15,306	15,646	15,995	16,351	16,715
510010	Veolia Contract	-	-	-	-	-	-	-	-	-	-	-	-	-
511210	Legal Services General	116,667	119,265	121,920	124,635	127,410	130,247	133,147	136,112	139,143	142,241	145,408	148,646	151,955
511310	Audit	7,583	7,752	7,925	8,101	8,282	8,466	8,655	8,847	9,044	9,246	9,452	9,662	9,877
511510	Testing/Immunizations/Training	350	358	366	374	382	391	399	408	417	427	436	446	456
511610	Consulting General - Adm	23,333	23,853	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
521110	Building Maintenance Gen	2,100	2,147	2,195	2,243	2,293	2,344	2,397	2,450	2,505	2,560	2,617	2,676	2,735
522010	Equip/Maint Agreement Gen	1,400	1,431	1,463	1,496	1,529	1,563	1,598	1,633	1,670	1,707	1,745	1,784	1,823
522210	Gas/Oil/Car Repairs	1,167	1,193	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
525110	Claims/Losses General	1,167	1,193	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
531110	Insurance General - Adm	28,425	29,058	29,705	30,366	31,042	31,733	32,440	33,162	33,901	34,656	35,427	36,216	37,022
531210	Postage General - Adm	700	716	732	748	765	781	799	817	835	853	872	892	912
531310	Telephone/Comm Services	4,958	5,069	5,182	5,297	5,415	5,536	5,659	5,785	5,914	6,045	6,180	6,317	6,458
531410	Advertising General - Adm	2,333	2,385	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
532110	Meal Expense General - Adm	1,167	1,193	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
532210	Travel Expense - Mileage	1,750	1,789	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
532310	Lodging General - Adm	1,750	1,789	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
541210	Office Supplies General	2,333	2,385	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
541310	Books/Photos/Printed Materials	1,167	1,193	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
541410	Computer Software Adm	3,500	3,578	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
546010	Uniforms	467	477	488	499	510	521	533	544	557	569	582	595	608
549110	Dues and Fees/Registration Adm	2,100	2,147	2,195	2,243	2,293	2,344	2,397	2,450	2,505	2,560	2,617	2,676	2,735
549210	Bank Charges/Misc. Fees Gen	583	596	610	623	637	651	666	681	696	711	727	743	760
563310	Janitorial Supplies General	467	477	488	499	510	521	533	544	557	569	582	595	608
564010	Electricity General - Adm	2,100	2,147	2,195	2,243	2,293	2,344	2,397	2,450	2,505	2,560	2,617	2,676	2,735
564110	Water and Garbage Adm	1,400	1,431	1,463	1,496	1,529	1,563	1,598	1,633	1,670	1,707	1,745	1,784	1,823
631010	Furniture Purchased Gen	700	716	732	748	765	781	799	817	835	853	872	892	912
641010	Equipment Purchase General	175	179	183	187	191	195	200	204	209	213	218	223	228
645010	Office Equipment Purchases	933	954	975	997	1,019	1,042	1,065	1,089	1,113	1,138	1,163	1,189	1,216
646010	Docuware System	2,333	2,385	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
	Total Administration Expenses	**$ 447,828**	**$ 457,800**	**$ 467,993**	**$ 478,414**	**$ 489,066**	**$ 499,954**	**$ 511,088**	**$ 522,468**	**$ 534,101**	**$ 545,994**	**$ 558,151**	**$ 570,579**	**$ 583,283**
	TREATMENT													
511311	Engineer/Consulting	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
511811	Compliance Procedures	23,333	23,853	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
526011	LS-H-3	15,167	15,504	15,850	16,203	16,563	16,932	17,309	17,695	18,089	18,491	18,903	19,324	19,754
526111	Biosolids Handling	145,834	149,081	152,400	155,794	159,263	162,809	166,434	170,140	173,928	177,801	181,760	185,807	189,944
541411	SCADA - Computer	23,333	23,853	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
563011	Chemicals - Chlorine/SO2	44,917	45,917	46,939	47,984	49,053	50,145	51,262	52,403	53,570	54,763	55,982	57,229	58,503
563611	Landscaping/Supplies/Repairs	817	835	853	872	892	912	932	953	974	996	1,018	1,041	1,064
563811	Landscaping Treatment Plant	-	-	-	-	-	-	-	-	-	-	-	-	-
564011	Electricity Treatment Plant	157,717	161,231	164,821	168,491	172,243	176,078	179,998	184,006	188,103	192,292	196,573	200,950	205,425
564111	Garbage and Sewer Treatment Plant	3,500	3,578	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
566011	LS H-3 M/R	-	-	-	-	-	-	-	-	-	-	-	-	-
572111	Reserve Fund	2,333	2,385	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
641111	Equipment/Landscaping	583	596	610	623	637	651	666	681	696	711	727	743	760
641211	Equipment/Vise, Pallets	2,333	2,385	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
641311	H-3 VFD Pump	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Treatment Expenses	**$ 419,870**	**$ 429,219**	**$ 438,776**	**$ 448,546**	**$ 458,533**	**$ 468,743**	**$ 479,180**	**$ 489,850**	**$ 500,757**	**$ 511,907**	**$ 523,305**	**$ 534,957**	**$ 546,868**

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Operating Revenue and Expenditure Forecast

Expenditures		Forecast Basis	Budget 2012	Budget 2013	Projection 2014	Projection 2015	Projection 2016	Projection 2017	Projection 2018	Projection 2019	Projection 2020	Projection 2021
LAND APPLICATION												
511022 Salaries	3	Labor Cost Inflation	$ [illegible]	$ [illegible]	$ 47,771	$ 48,834	$ 49,922	$ 51,033	$ 52,169	$ 53,331	$ 54,519	$ 55,732
502122 FICA	3	Labor Cost Inflation	[illegible]	[illegible]	2,962	3,026	3,095	3,164	3,235	3,307	3,380	3,455
502222 Medicare	3	Labor Cost Inflation	[illegible]	[illegible]	717	733	749	765	783	800	818	836
502622 Unemployment	3	Labor Cost Inflation	[illegible]	[illegible]	1,070	1,094	1,118	1,143	1,169	1,195	1,221	1,246
511622 Permits - Consulting/Testing	1	General Cost Inflation	[illegible]	[illegible]	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771
511822 Compliance/Eng Consulting	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
521322 Building Rental	1	General Cost Inflation	[illegible]	[illegible]	716	732	749	764	781	799	817	835
524522 Spraying Services	1	General Cost Inflation	[illegible]	[illegible]	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963
525022 Testing	1	General Cost Inflation	[illegible]	[illegible]	13,289	13,585	13,888	14,197	14,513	14,836	15,167	15,504
581122 Chlorine	1	General Cost Inflation	[illegible]	[illegible]	16,356	16,720	17,093	17,473	17,862	18,260	18,667	19,082
584022 Electricity/Telephone	1	General Cost Inflation	[illegible]	[illegible]	20,445	20,901	21,366	21,842	22,328	22,825	23,333	23,853
586022 Repairs/Misc Parts	1	General Cost Inflation	[illegible]	[illegible]	35,779	36,576	37,390	38,223	39,074	39,944	40,833	41,743
589022 Taxes/Ins	1	General Cost Inflation	[illegible]	[illegible]	153	157	160	164	167	171	175	179
641222 Land Applications/Equipment	1	General Cost Inflation	[illegible]	[illegible]	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385
Total Land Application Expenses			**$ 128,748**	**$ 146,225**	**$ 151,525**	**$ 154,899**	**$ 158,348**	**$ 161,874**	**$ 165,478**	**$ 169,163**	**$ 172,930**	**$ 176,780**
O&M TREATMENT												
501012 Salaries	3	Labor Cost Inflation	$ [illegible]	$ [illegible]	$ 366,996	$ 375,166	$ 383,522	$ 392,061	$ 400,791	$ 409,715	$ 418,838	$ 428,164
501112 Salaries Treatment-Overtime	3	Labor Cost Inflation	[illegible]	[illegible]	37,197	38,025	38,872	39,738	40,622	41,527	42,452	43,397
502112 FICA	3	Labor Cost Inflation	[illegible]	[illegible]	25,060	25,618	26,188	26,772	27,368	27,977	28,600	29,237
502212 Medicare	3	Labor Cost Inflation	[illegible]	[illegible]	6,063	6,198	6,336	6,477	6,621	6,769	6,919	7,073
502412 PERSI	3	Labor Cost Inflation	[illegible]	[illegible]	41,996	42,931	43,887	44,864	45,862	46,884	47,928	48,995
503512 Medical Insurance	8	Medical	[illegible]	[illegible]	87,712	89,665	91,661	93,702	95,789	97,921	100,102	102,331
502612 Unemployment	3	Labor Cost Inflation	[illegible]	[illegible]	9,054	9,256	9,462	9,672	9,888	10,108	10,333	10,563
511512 Drug Testing Services	1	General Cost Inflation	[illegible]	[illegible]	511	523	534	546	558	571	583	596
511712 Temporary Help/Flaggers	3	Labor Cost Inflation	[illegible]	[illegible]	307	314	320	328	335	342	350	358
551112 Custodial Services	3	Labor Cost Inflation	[illegible]	[illegible]	6,134	6,270	6,410	6,553	6,699	6,848	7,000	7,156
522112 Outside Vehicle Services	1	General Cost Inflation	[illegible]	[illegible]	10,223	10,450	10,683	10,921	11,164	11,413	11,667	11,926
522212 Fuel Vehicles	1	General Cost Inflation	[illegible]	[illegible]	6,134	6,270	6,410	6,553	6,699	6,848	7,000	7,156
524212 Generator M&R	1	General Cost Inflation	[illegible]	[illegible]	8,178	8,360	8,546	8,737	8,931	9,130	9,333	9,541
524312 Plant M/P Equipment/Building	1	General Cost Inflation	[illegible]	[illegible]	30,668	31,351	32,049	32,763	33,492	34,238	35,000	35,779
525012 Lab Testing - Outside Serv	1	General Cost Inflation	[illegible]	[illegible]	38,846	39,711	40,595	41,499	42,423	43,368	44,333	45,321
531212 Postage - Lab	1	General Cost Inflation	[illegible]	[illegible]	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963
531312 Telephone/Comm Services	1	General Cost Inflation	[illegible]	[illegible]	8,178	8,360	8,546	8,737	8,931	9,130	9,333	9,541
531612 Uniforms/Cleaning Plant	1	General Cost Inflation	[illegible]	[illegible]	4,600	4,703	4,807	4,914	5,024	5,136	5,250	5,367
532112 Meal Expense	1	General Cost Inflation	[illegible]	[illegible]	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789
532212 Travel Expense - Mileage	1	General Cost Inflation	[illegible]	[illegible]	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789
532312 Lodging	1	General Cost Inflation	[illegible]	[illegible]	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789
541212 Office Supplies	1	General Cost Inflation	[illegible]	[illegible]	1,533	1,568	1,602	1,638	1,675	1,712	1,750	1,789
541312 Books	1	General Cost Inflation	[illegible]	[illegible]	511	523	534	546	558	571	583	596
541412 Computer Supplies	1	General Cost Inflation	[illegible]	[illegible]	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963
541512 Office Equipment/Maintenance	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
541612 Immunization Services	1	General Cost Inflation	[illegible]	[illegible]	307	314	320	328	335	342	350	358
545012 Safety Supplies	1	General Cost Inflation	[illegible]	[illegible]	5,111	5,225	5,341	5,460	5,582	5,706	5,833	5,963
546012 Uniform Cold Gear Allowance	1	General Cost Inflation	[illegible]	[illegible]	2,249	2,299	2,350	2,403	2,456	2,511	2,567	2,624
549112 Dues and Registration Fees	1	General Cost Inflation	[illegible]	[illegible]	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771
561012 Winter Maintenance	1	General Cost Inflation	[illegible]	[illegible]	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385
561112 Building Repair and Maintenance	1	General Cost Inflation	[illegible]	[illegible]	8,178	8,360	8,546	8,737	8,931	9,130	9,333	9,541
561212 Shop Supplies	1	General Cost Inflation	[illegible]	[illegible]	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578
561312 Equipment Repairs	1	General Cost Inflation	-	[illegible]	-	-	-	-	-	-	-	-
561412 Lab Equipment Repairs	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
563012 Chemicals/Polymer	1	General Cost Inflation	[illegible]	[illegible]	8,178	8,360	8,546	8,737	8,931	9,130	9,333	9,541
563112 Tools	1	General Cost Inflation	[illegible]	[illegible]	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385
563212 Bulk Fuel/Lubes & Oils	1	General Cost Inflation	[illegible]	[illegible]	3,271	3,344	3,419	3,495	3,572	3,652	3,733	3,816
563312 Janitorial Supplies	1	General Cost Inflation	[illegible]	[illegible]	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771
563412 Lab Testing/Supplies Etc	1	General Cost Inflation	[illegible]	[illegible]	15,334	15,675	16,024	16,381	16,746	17,119	17,500	17,890
563812 Vehicle Repair/Parts	1	General Cost Inflation	[illegible]	[illegible]	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578
569112 Generator Rental	1	General Cost Inflation	[illegible]	-	-	-	-	-	-	-	-	-
651012 Furniture Purchased	1	General Cost Inflation	[illegible]	[illegible]	767	784	801	819	837	856	875	894
641012 Equipment Purchase	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,065	1,092	1,116	1,141	1,167	1,193
641112 Lab Equipment	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
645012 Office Equipment	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
651112 Vehicles/Loader/Truck	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-
Total O&M Treatment Expenses			**$ 755,052**	**$ 754,824**	**$ 771,631**	**$ 788,812**	**$ 806,376**	**$ 824,331**	**$ 842,686**	**$ 861,449**	**$ 880,630**	**$ 900,239**
INTERCEPTOR												
571312 Telephone/Electricity/H4	1	General Cost Inflation	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
571412 Interceptor Elect/Tele Emer	1	General Cost Inflation	[illegible]	[illegible]	407	418	427	437	447	457	467	477
572112 Reserve Fund	1	General Cost Inflation	[illegible]	[illegible]	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578
576011 Interceptor/ H-4 Repair	1	General Cost Inflation	[illegible]	[illegible]	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,385
576111 Interceptor Repairs Treatment	1	General Cost Inflation	[illegible]	[illegible]	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771
576213 Interceptor/ Empire Feeder	1	General Cost Inflation	[illegible]	[illegible]	1,022	1,045	1,068	1,092	1,116	1,141	1,167	1,193
Total Interceptor Expenses			**$ 10,500**	**$ 10,400**	**$ 10,632**	**$ 10,868**	**$ 11,110**	**$ 11,358**	**$ 11,611**	**$ 11,869**	**$ 12,133**	**$ 12,404**

Expenditures	Projection 2022	Projection 2023	Projection 2024	Projection 2025	Projection 2026	Projection 2027	Projection 2028	Projection 2029	Projection 2030	Projection 2031	Projection 2032
LAND APPLICATION											
511022 Salaries	$ 56,973	$ 58,242	$ 59,539	$ 60,865	$ 62,220	$ 63,605	$ 65,021	$ 66,469	$ 67,949	$ 69,462	$ 71,009
502122 FICA	3,532	3,611	3,691	3,774	3,858	3,944	4,031	4,121	4,213	4,307	4,403
502222 Medicare	855	874	893	913	933	954	975	997	1,019	1,042	1,065
502622 Unemployment	1,276	1,305	1,334	1,363	1,394	1,425	1,456	1,489	1,522	1,556	1,591
511622 Permits - Consulting/Testing	4,877	4,985	5,096	5,210	5,326	5,444	5,566	5,690	5,816	5,946	6,078
511822 Compliance/Eng Consulting	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
521322 Building Rental	853	872	892	912	932	953	974	996	1,018	1,041	1,064
524522 Spraying Services	6,096	6,232	6,371	6,512	6,657	6,806	6,957	7,112	7,270	7,432	7,598
525022 Testing	15,850	16,203	16,563	16,932	17,309	17,695	18,089	18,491	18,903	19,324	19,754
581122 Chlorine	19,507	19,942	20,386	20,840	21,304	21,778	22,263	22,759	23,266	23,783	24,313
584022 Electricity/Telephone	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
586022 Repairs/Misc Parts	42,672	43,622	44,594	45,586	46,602	47,639	48,700	49,784	50,893	52,026	53,184
589022 Taxes/Ins	183	187	191	195	200	204	209	213	218	223	228
641222 Land Applications/Equipment	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
Total Land Application Expenses	**$ 180,716**	**$ 184,740**	**$ 188,854**	**$ 193,059**	**$ 197,357**	**$ 201,752**	**$ 206,244**	**$ 210,836**	**$ 215,531**	**$ 220,330**	**$ 225,234**
O&M TREATMENT											
501012 Salaries	$ 437,697	$ 447,443	$ 457,406	$ 467,591	$ 478,002	$ 488,645	$ 499,526	$ 510,648	$ 522,019	$ 533,642	$ 545,524
501112 Salaries Treatment-Overtime	44,363	45,351	46,361	47,393	48,448	49,527	50,630	51,757	52,910	54,088	55,292
502112 FICA	29,888	30,553	31,234	31,929	32,640	33,367	34,110	34,869	35,646	36,439	37,251
502212 Medicare	7,231	7,392	7,557	7,725	7,897	8,073	8,252	8,436	8,624	8,816	9,012
502412 PERSI	50,086	51,201	52,341	53,507	54,698	55,916	57,161	58,434	59,735	61,065	62,425
503512 Medical Insurance	104,609	106,938	109,320	111,754	114,242	116,786	119,386	122,044	124,762	127,540	130,380
502612 Unemployment	10,798	11,039	11,284	11,536	11,792	12,055	12,323	12,598	12,878	13,165	13,458
511512 Drug Testing Services	610	623	637	651	666	681	696	711	727	743	760
511712 Temporary Help/Flaggers	366	374	382	391	399	408	417	427	436	446	456
551112 Custodial Services	7,315	7,478	7,645	7,815	7,989	8,167	8,349	8,534	8,724	8,919	9,117
522112 Outside Vehicle Services	12,192	12,464	12,741	13,025	13,315	13,611	13,914	14,224	14,541	14,865	15,196
522212 Fuel Vehicles	7,315	7,478	7,645	7,815	7,989	8,167	8,349	8,534	8,724	8,919	9,117
524212 Generator M&R	9,754	9,971	10,193	10,420	10,652	10,889	11,131	11,379	11,633	11,892	12,156
524312 Plant M/P Equipment/Building	36,576	37,391	38,223	39,074	39,944	40,833	41,743	42,672	43,622	44,594	45,587
525012 Lab Testing - Outside Serv	46,330	47,361	48,416	49,494	50,596	51,723	52,874	54,051	55,255	56,485	57,743
531212 Postage - Lab	6,096	6,232	6,371	6,512	6,657	6,806	6,957	7,112	7,270	7,432	7,598
531312 Telephone/Comm Services	9,754	9,971	10,193	10,420	10,652	10,889	11,131	11,379	11,633	11,892	12,156
531612 Uniforms/Cleaning Plant	5,486	5,607	5,733	5,861	5,992	6,125	6,261	6,401	6,543	6,689	6,838
532112 Meal Expense	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
532212 Travel Expense - Mileage	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
532312 Lodging	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
541212 Office Supplies	1,829	1,870	1,911	1,954	1,997	2,042	2,087	2,134	2,181	2,230	2,279
541312 Books	610	623	637	651	666	681	696	711	727	743	760
541412 Computer Supplies	6,096	6,232	6,371	6,512	6,657	6,806	6,957	7,112	7,270	7,432	7,598
541512 Office Equipment/Maintenance	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
541612 Immunization Services	366	374	382	391	399	408	417	427	436	446	456
545012 Safety Supplies	6,096	6,232	6,371	6,512	6,657	6,806	6,957	7,112	7,270	7,432	7,598
546012 Uniform Cold Gear Allowance	2,682	2,742	2,803	2,865	2,929	2,994	3,061	3,129	3,199	3,270	3,343
549112 Dues and Registration Fees	4,877	4,985	5,096	5,210	5,326	5,444	5,566	5,690	5,816	5,946	6,078
561012 Winter Maintenance	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
561112 Building Repair and Maintenance	9,754	9,971	10,193	10,420	10,652	10,889	11,131	11,379	11,633	11,892	12,156
561212 Shop Supplies	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
561312 Equipment Repairs	-	-	-	-	-	-	-	-	-	-	-
561412 Lab Equipment Repairs	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
563012 Chemicals/Polymer	9,754	9,971	10,193	10,420	10,652	10,889	11,131	11,379	11,633	11,892	12,156
563112 Tools	2,438	2,493	2,548	2,608	2,663	2,722	2,783	2,845	2,908	2,973	3,039
563212 Bulk Fuel/Lubes & Oils	3,901	3,988	4,077	4,168	4,261	4,356	4,453	4,552	4,653	4,757	4,863
563312 Janitorial Supplies	4,877	4,985	5,096	5,210	5,326	5,444	5,566	5,690	5,816	5,946	6,078
563412 Lab Testing/Supplies Etc	18,288	18,695	19,112	19,537	19,972	20,417	20,871	21,336	21,811	22,297	22,793
563812 Vehicle Repair/Parts	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
569112 Generator Rental	-	-	-	-	-	-	-	-	-	-	-
651012 Furniture Purchased	914	935	956	977	999	1,021	1,044	1,067	1,091	1,115	1,140
641012 Equipment Purchase	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
641112 Lab Equipment	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
645012 Office Equipment	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
651112 Vehicles/Loader/Truck	-	-	-	-	-	-	-	-	-	-	-
Total O&M Treatment Expenses	**$ 920,283**	**$ 940,775**	**$ 961,722**	**$ 983,136**	**$ 1,005,027**	**$ 1,027,405**	**$ 1,050,281**	**$ 1,073,447**	**$ 1,097,574**	**$ 1,122,012**	**$ 1,146,995**
INTERCEPTOR											
571312 Telephone/Electricity/H4	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
571412 Interceptor Elect/Tele Emer	488	499	510	521	533	544	557	569	582	595	608
572112 Reserve Fund	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
576011 Interceptor/ H-4 Repair	2,438	2,493	2,548	2,608	2,663	2,722	2,783	2,845	2,908	2,973	3,039
576111 Interceptor Repairs Treatment	4,877	4,985	5,096	5,210	5,326	5,444	5,564	5,690	5,816	5,946	6,078
576213 Interceptor/ Empire Feeder	1,219	1,246	1,274	1,302	1,331	1,361	1,391	1,422	1,454	1,486	1,520
Total Interceptor Expenses	**$ 12,680**	**$ 12,962**	**$ 13,251**	**$ 13,546**	**$ 13,847**	**$ 14,156**	**$ 14,471**	**$ 14,793**	**$ 15,122**	**$ 15,459**	**$ 15,803**

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Operating Revenue and Expenditure Forecast

Expenditures		Forecast Basis	Budget 2012	Budget 2013	Projection 2014	Projection 2015	Projection 2016	Projection 2017	Projection 2018	Projection 2019	Projection 2020	Projection 2021
COLLECTOR												
581314 Telephone	1	General Cost Inflation	$ 1,750	$ 1,750	$ 1,789	$ 1,829	$ 1,870	$ 1,911	$ 1,954	$ 1,997	$ 2,042	$ 2,087
582114 Reserve Fund	1	General Cost Inflation	3,000	3,000	3,067	3,135	3,205	3,276	3,349	3,424	3,500	3,578
583514 Collector Supplies	1	General Cost Inflation	3,500	3,500	3,578	3,658	3,739	3,822	3,907	3,994	4,083	4,174
583614 Vac Truck/Parts/Repairs	1	General Cost Inflation	4,000	4,000	4,089	4,180	4,273	4,368	4,466	4,565	4,667	4,771
586014 Collector M&F Expense	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-
522214 Collector Fuel	1	General Cost Inflation	-	18,000	18,401	18,811	19,229	19,658	20,095	20,543	21,000	21,468
641014 Collection System Video Equipment	1	General Cost Inflation	80,000	20,000	20,445	20,901	21,366	21,842	22,328	22,825	23,333	23,853
Total Collector Expenses			**$ 92,250**	**$ 50,250**	**$ 51,369**	**$ 52,513**	**$ 53,682**	**$ 54,877**	**$ 56,099**	**$ 57,348**	**$ 58,625**	**$ 59,931**
CAPITAL O&M INCREASES												
CIP	1	General Cost Inflation	$ -	$ -	$ -	$ 60,450	$ 61,796	$ 63,172	$ 64,579	$ 215,516	$ 649,447	$ 663,907
(Other)	1	General Cost Inflation	-	-	-	-	-	-	-	-	-	-
			$ -	$ -	$ -	$ 60,450	$ 61,796	$ 63,172	$ 64,579	$ 215,516	$ 649,447	$ 663,907
Add'l O&M from CIP		From CIP	-	-	-	-	-	-	-	-	-	-
Total Cash O&M Expenditures			$ 1,732,179	$ 1,707,438	$ 1,745,456	$ 1,844,771	$ 1,885,847	$ 1,927,837	$ 1,970,763	$ 2,244,144	$ 2,641,465	$ 2,700,278
Depreciation Expense in	2012	423,993										
Depreciation Expense (b)		last year's plus annual additions from CIP	$ 423,993	$ 1,060,593	$ 1,060,593	$ 1,060,593	$ 1,060,593	$ 1,129,167	$ 1,746,693	$ 1,746,693	$ 1,746,693	$ 1,746,693
TOTAL EXPENSES			$ 2,356,172	$ 2,768,031	$ 2,806,049	$ 2,905,364	$ 2,946,440	$ 3,057,005	$ 3,717,456	$ 3,990,837	$ 4,388,156	$ 4,446,971

Expenditures	Projection 2022	Projection 2023	Projection 2024	Projection 2025	Projection 2026	Projection 2027	Projection 2028	Projection 2029	Projection 2030	Projection 2031	Projection 2032
COLLECTOR											
581314 Telephone	$ 2,134	$ 2,181	$ 2,230	$ 2,279	$ 2,330	$ 2,382	$ 2,435	$ 2,489	$ 2,545	$ 2,601	$ 2,659
582114 Reserve Fund	3,658	3,739	3,822	3,907	3,994	4,083	4,174	4,267	4,362	4,459	4,559
583514 Collector Supplies	4,267	4,362	4,459	4,559	4,660	4,764	4,870	4,978	5,089	5,203	5,318
583614 Vac Truck/Parts/Repairs	4,877	4,986	5,096	5,210	5,326	5,444	5,566	5,690	5,816	5,946	6,078
586014 Collector M&F Expense	-	-	-	-	-	-	-	-	-	-	-
522214 Collector Fuel	21,946	22,434	22,934	23,444	23,966	24,500	25,046	25,603	26,173	26,756	27,352
641014 Collection System Video Equipment	24,384	24,927	25,482	26,049	26,629	27,222	27,829	28,448	29,082	29,729	30,391
Total Collector Expenses	**$ 61,265**	**$ 62,629**	**$ 64,024**	**$ 65,449**	**$ 66,906**	**$ 68,396**	**$ 69,919**	**$ 71,474**	**$ 73,067**	**$ 74,694**	**$ 76,358**
CAPITAL O&M INCREASES											
CIP	$ 678,690	$ 693,802	$ 709,250	$ 623,542	$ 637,424	$ 651,619	$ 666,128	$ 680,961	$ 696,123	$ 711,623	$ 727,468
(Other)	-	-	-	-	-	-	-	-	-	-	-
	$ 678,690	$ 693,802	$ 709,250	$ 623,542	$ 637,424	$ 651,619	$ 666,128	$ 680,961	$ 696,123	$ 711,623	$ 727,468
Add'l O&M from CIP	-	-	-	-	-	-	-	-	-	-	-
Total Cash O&M Expenditures	$ 2,760,403	$ 2,821,847	$ 2,884,699	$ 2,847,431	$ 2,910,832	$ 2,975,445	$ 3,041,102	$ 3,109,433	$ 3,178,873	$ 3,249,654	$ 3,322,012
Depreciation Expense in											
Depreciation Expense (b)	$ 1,746,693	$ 2,121,096	$ 2,121,096	$ 2,378,787	$ 2,378,787	$ 2,487,482	$ 2,740,928	$ 2,856,676	$ 2,856,676	$ 2,856,676	$ 2,856,676
TOTAL EXPENSES	$ 4,507,096	$ 4,942,943	$ 5,005,795	$ 5,226,217	$ 5,289,619	$ 5,463,128	$ 5,782,029	$ 5,966,109	$ 6,035,549	$ 6,106,330	$ 6,178,688

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Connected and Purchased ERs

Purchased ER Forecast [a]	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	6,195	6,239	6,288	6,342	6,404	6,472	6,548	6,633	6,728	6,834	6,951	7,083	7,229	7,392	7,574	7,777	8,003	8,255	8,536	8,848	9,197
District	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645	2,645
County	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138
HARSB	1,104	1,059	1,008	953	890	821	744	658	562	456	337	204	57	1,832	1,649	1,445	1,218	965	683	370	20
Total	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	10,061	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000

[a] ERs as of 9-1-12: District growth expected to use pre-purchased ERs. City & County growth expected to purchase all new ERs from HARSB (new capacity added in 2026); HARSB includes Misc. allocated capacity

Purchased ER Forecast	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	61.57%	62.01%	62.49%	63.04%	63.65%	64.33%	65.08%	65.93%	66.87%	67.92%	69.09%	70.40%	71.85%	61.60%	63.12%	64.81%	66.69%	68.79%	71.13%	73.74%	76.64%
District	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	26.29%	22.04%	22.04%	22.04%	22.04%	22.04%	22.04%	22.04%	22.04%
County	1.17%	1.18%	1.19%	1.20%	1.21%	1.22%	1.23%	1.24%	1.25%	1.26%	1.27%	1.28%	1.29%	1.09%	1.10%	1.11%	1.12%	1.13%	1.13%	1.14%	1.15%
HARSB	10.97%	10.52%	10.02%	9.47%	8.85%	8.16%	7.39%	6.54%	5.59%	4.53%	3.35%	2.03%	0.57%	15.26%	13.74%	12.04%	10.15%	8.04%	5.69%	3.08%	0.17%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Growth Connected ER Forecast [b]	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	5,943	5,987	6,036	6,091	6,152	6,221	6,297	6,382	6,477	6,582	6,700	6,831	6,978	7,141	7,323	7,526	7,752	8,004	8,284	8,597	8,946
District	1,939	1,959	1,979	1,999	2,019	2,039	2,059	2,079	2,099	2,119	2,139	2,159	2,179	2,199	2,219	2,239	2,259	2,279	2,299	2,319	2,339
County	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
HARSB	-																				
Total	7,962	8,027	8,097	8,173	8,255	8,344	8,442	8,548	8,663	8,790	8,929	9,081	9,249	9,433	9,636	9,859	10,106	10,379	10,681	11,015	11,384

[b] District connections expected to use pre-purchased ERs. City & County new connections expected to pay Cap Fee to purchase new ERs

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Anticipated Purchased ER Growth per Year		45	50	56	62	69	77	86	96	107	119	132	147	164	183	204	227	253	282	314	349

Growth	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City		44	49	55	61	68	76	85	95	106	118	131	146	163	182	203	226	252	281	313	348
District		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
County		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
HARSB		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		45	50	56	62	69	77	86	96	107	119	132	147	164	183	204	227	253	282	314	349

Connected ERs % of Total	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	74.65%	74.59%	74.55%	74.53%	74.53%	74.55%	74.59%	74.66%	74.76%	74.88%	75.04%	75.23%	75.45%	75.70%	76.00%	76.33%	76.70%	77.11%	77.56%	78.05%	78.59%
District	24.35%	24.41%	24.44%	24.46%	24.46%	24.44%	24.39%	24.30%	24.23%	24.11%	23.96%	23.77%	23.56%	23.31%	23.03%	22.71%	22.35%	21.96%	21.52%	21.05%	20.55%
County	1.00%	1.01%	1.01%	1.01%	1.01%	1.02%	1.02%	1.01%	1.01%	1.01%	1.00%	1.00%	0.99%	0.98%	0.97%	0.96%	0.95%	0.93%	0.91%	0.90%	0.88%
HARSB	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Operations & Maintenance Rate
Cost Allocations per Connection

O&M Revenue Requirement (O&M RR)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Admin	$ 374,658	$ 383,852	$ 392,399	$ 401,136	$ 410,068	$ 419,198	$ 428,532	$ 438,074	$ 447,828	$ 457,800
Plant O&M	370,950	359,889	367,901	436,543	446,263	456,199	466,357	706,241	1,069,316	1,093,126
Land Application	116,468	132,225	135,169	138,179	141,256	144,401	147,616	150,903	154,263	157,698
Treatment O&M	490,784	490,635	501,560	512,728	524,144	535,815	547,746	559,942	572,410	585,155
Interceptor	61,354	61,238	62,601	63,995	65,420	66,877	68,366	69,888	71,444	73,035
I-I	2,000	2,000	2,045	2,090	2,137	2,184	2,233	2,283	2,333	2,383
Collector	303,665	261,601	267,426	273,380	279,467	285,690	292,051	298,554	305,202	311,997
Total O&M Expenses	$ 1,719,879	$ 1,691,438	$ 1,729,100	$ 1,828,050	$ 1,868,754	$ 1,910,264	$ 1,952,901	$ 2,225,884	$ 2,622,796	$ 2,681,196
Replacement Funding	300,000	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000	1,200,000
Total O&M Revenue Requirement (O&M RR)	**$ 2,019,879**	**$ 2,091,438**	**$ 2,229,100**	**$ 2,428,050**	**$ 2,568,754**	**$ 2,710,364**	**$ 2,852,901**	**$ 3,225,884**	**$ 3,722,796**	**$ 3,881,196**
Allocation per Member [a]										
City	**$ 1,420,547**	**$ 1,482,775**	**$ 1,582,992**	**$ 1,729,120**	**$ 1,832,176**	**$ 1,936,376**	**$ 2,041,862**	**$ 2,320,143**	**$ 2,692,398**	**$ 2,813,157**
District	**580,784**	**588,902**	**624,922**	**675,706**	**711,914**	**747,893**	**783,524**	**874,498**	**994,215**	**1,030,397**
County	**18,545**	**19,761**	**21,186**	**23,224**	**24,663**	**26,095**	**27,514**	**31,243**	**36,183**	**37,641**
Total O&M RR by Member	**$ 2,019,879**	**$ 2,091,438**	**$ 2,229,100**	**$ 2,428,050**	**$ 2,568,754**	**$ 2,710,364**	**$ 2,852,901**	**$ 3,225,884**	**$ 3,722,796**	**$ 3,881,196**

O&M Revenue Requirement (O&M RR)	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Admin	$ 467,993	$ 478,414	$ 489,066	$ 499,956	$ 511,088	$ 522,468	$ 534,101	$ 545,994	$ 558,151	$ 570,579	$ 583,283
Plant O&M	1,117,466	1,142,348	1,167,783	1,092,285	1,116,606	1,141,469	1,166,885	1,192,867	1,219,428	1,246,580	1,274,337
Land Application	161,209	164,799	168,468	172,219	176,054	179,974	183,981	188,078	192,266	196,547	200,923
Treatment O&M	598,184	611,504	625,119	639,038	653,267	667,813	682,683	697,884	713,423	729,308	745,547
Interceptor	74,661	76,324	78,023	79,760	81,536	83,352	85,208	87,105	89,044	91,027	93,054
I-I	2,438	2,493	2,548	2,605	2,663	2,722	2,783	2,845	2,908	2,973	3,039
Collector	318,944	326,046	333,306	340,727	348,314	356,070	363,998	372,103	380,388	388,858	397,516
Total O&M Expenses	$ 2,740,896	$ 2,801,925	$ 2,864,314	$ 2,826,591	$ 2,889,529	$ 2,953,867	$ 3,019,639	$ 3,086,875	$ 3,155,608	$ 3,225,871	$ 3,297,699
Replacement Funding	1,300,000	1,400,000	1,500,000	1,600,000	1,700,000	1,800,000	1,900,000	1,962,593	2,027,249	2,094,034	2,163,020
Total O&M Revenue Requirement (O&M RR)	**$ 4,040,896**	**$ 4,201,925**	**$ 4,364,314**	**$ 4,426,591**	**$ 4,589,529**	**$ 4,753,867**	**$ 4,919,639**	**$ 5,049,468**	**$ 5,182,856**	**$ 5,319,905**	**$ 5,460,719**
Allocation per Member [a]											
City	**$ 2,936,331**	**$ 3,062,151**	**$ 3,190,858**	**$ 3,245,840**	**$ 3,379,078**	**$ 3,515,853**	**$ 3,654,436**	**$ 3,772,227**	**$ 3,893,569**	**$ 4,020,717**	**$ 4,153,918**
District	**1,065,509**	**1,099,357**	**1,131,739**	**1,138,782**	**1,167,364**	**1,193,878**	**1,218,115**	**1,231,657**	**1,243,292**	**1,252,872**	**1,260,241**
County	**39,055**	**40,417**	**41,717**	**41,949**	**43,087**	**44,136**	**45,088**	**45,584**	**45,996**	**46,316**	**46,540**
Total O&M RR by Member	**$ 4,040,896**	**$ 4,201,925**	**$ 4,364,314**	**$ 4,426,591**	**$ 4,589,529**	**$ 4,753,867**	**$ 4,919,639**	**$ 5,049,468**	**$ 5,182,856**	**$ 5,319,905**	**$ 5,460,719**

[a] Costs are allocated based on Connected ERs and therefore not allocated to HARSB

Connected ER Forecast	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
City	5,943	5,987	6,036	6,091	6,152	6,221	6,297	6,382	6,477	6,582
District	1,939	1,959	1,979	1,999	2,019	2,039	2,059	2,079	2,099	2,119
County	80	81	82	83	84	85	86	87	88	89
Total	7,962	8,027	8,097	8,173	8,255	8,344	8,442	8,548	8,663	8,790

Connected ER Forecast	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	6,700	6,831	6,978	7,141	7,323	7,526	7,752	8,004	8,284	8,597	6,946
District	2,139	2,159	2,179	2,199	2,219	2,239	2,259	2,279	2,299	2,319	2,339
County	90	91	92	93	94	95	96	97	98	99	100
Total	8,929	9,081	9,249	9,433	9,636	9,859	10,106	10,379	10,681	11,015	11,384

Cost Per Connected ER	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
City	$ 19.92	$ 20.64	$ 21.85	$ 23.66	$ 24.82	$ 25.94	$ 27.02	$ 30.30	$ 34.64	$ 35.62
District	24.96	25.05	26.31	28.17	29.38	30.57	31.71	35.05	39.47	40.52
County	19.39	20.41	21.61	23.40	24.56	25.67	26.75	30.03	34.38	35.36
Average System Cost per Connected ER/Mo	$ 21.14	$ 21.71	$ 22.94	$ 24.76	$ 25.93	$ 27.07	$ 28.16	$ 31.45	$ 35.81	$ 36.80
Monthly Difference per ER		$ 0.57	$ 1.23	$ 1.82	$ 1.17	$ 1.14	$ 1.10	$ 3.27	$ 4.36	$ 0.99
Cumulative Difference per ER		$ 0.57	$ 1.80	$ 3.62	$ 4.79	$ 5.93	$ 7.02	$ 10.31	$ 14.67	$ 15.65

Cost Per Connected ER	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	$ 36.52	$ 37.35	$ 38.11	$ 37.88	$ 38.45	$ 38.93	$ 39.31	$ 39.28	$ 39.17	$ 38.97	$ 38.70
District	41.51	42.43	43.28	43.16	43.84	44.43	44.94	45.04	45.07	45.02	44.90
County	36.28	37.13	37.91	37.71	38.32	38.84	39.26	39.28	39.23	39.11	38.90
Average System Cost per Connected ER/Mo	$ 37.71	$ 38.56	$ 39.32	$ 39.11	$ 39.69	$ 40.18	$ 40.57	$ 40.54	$ 40.44	$ 40.25	$ 39.97
Monthly Difference per ER	$ 0.92	$ 0.84	$ 0.77	$ (0.22)	$ 0.59	$ 0.49	$ 0.38	$ (0.02)	$ (0.10)	$ (0.19)	$ (0.28)
Cumulative Difference per ER	$ 16.57	$ 17.42	$ 18.18	$ 17.97	$ 18.55	$ 19.04	$ 19.42	$ 19.40	$ 19.30	$ 19.11	$ 18.83

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Capital Improvement Program

Alternative 2 (8-22-12)

Project Costs and O&M Impacts in Year:	2013

Costs shown here in 2012$

No.	Description	2013	2017	2018	2023	2025	2027	2028	2029	Useful Life	For Cap Fee: % Expansion	For Cap Fee: % Reg & Repl	For Debt Allocation: % Regulatory	For Debt Allocation: % Replacement
1	[illegible]	$ 2,770,000								50	58%	42%	0%	100%
2	[illegible]	3,640,000								50	17%	83%	100%	0%
3	[illegible]	3,770,000								[illegible]	17%	83%	100%	0%
4	[illegible]	1,000,000								[illegible]	17%	83%	100%	0%
5	[illegible]	500,000								[illegible]	50%	50%	0%	100%
6	[illegible]	40,000								[illegible]	50%	50%	0%	100%
7	[illegible]		[illegible]							20	0%	100%	0%	100%
8	[illegible]		[illegible]							40	50%	50%	0%	100%
9	[illegible]			-						50	0%	100%	100%	0%
10	[illegible]			[illegible]						[illegible]	17%	83%	100%	0%
11	[illegible]			[illegible]						20	35%	65%	0%	100%
12	[illegible]			[illegible]						20	35%	65%	0%	100%
13	[illegible]			[illegible]						20	50%	50%	0%	100%
14	[illegible]									25	0%	100%	100%	0%
15	[illegible]									50	0%	100%	100%	0%
16	[illegible]				[illegible]	[illegible]	[illegible]		[illegible]	25	100%	0%	100%	0%
17	[illegible]				[illegible]					[illegible]	100%	0%	100%	0%
18	[illegible]				[illegible]					40	90%	10%	100%	0%
19	[illegible]				[illegible]					30	17%	83%	100%	0%
20	[illegible]					[illegible]				50	50%	50%	0%	100%
21	[illegible]							[illegible]		20	100%	0%	100%	0%
22	[illegible]							[illegible]		20	100%	0%	100%	0%
23	[illegible]							[illegible]		[illegible]	100%	0%	100%	0%
24	[illegible]							-		[illegible]	100%	0%	100%	0%
25	[illegible]							-		[illegible]	100%	0%	100%	0%
26										50	100%	0%	100%	0%
	Total Capital Projects	**$ 11,720,000**	**$ 1,529,400**	**$ 14,254,300**	**$ 10,141,800**	**$ 6,736,000**	**$ 1,400,000**	**$ 6,168,400**	**$ 1,400,000**		**48%**	**52%**	**74%**	**26%**
	Total Expansion Projects	3,306,300	319,950	3,027,650	5,963,412	4,068,000	1,400,000	6,168,400	1,400,000		25,653,712	27,696,188	20,371,688	7,324,500
	Total Regulatory Projects	6,930,300	-	9,213,000	4,178,398	-	-	-	-					
	Total Replacement Projects	1,433,400	1,209,450	2,013,650	-	2,668,000	-	-	-					
	Projects by Grants / Developer Donations													
	Projects by Enterprise Fund													

TOTAL FORECASTED PROJECT COSTS - Escalated by CCI to year of construction

No.	Upgrade / Expansion	R&R	TOTAL ESCALATED COSTS	2013	2017	2018	2023	2025	2027	2028	2029
1	$1,606,600	$1,163,400	$ 2,770,000	$ 2,770,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2	618,800	3,021,200	3,640,000	3,640,000	-	-	-	-	-	-	-
3	640,900	3,129,100	3,770,000	3,770,000	-	-	-	-	-	-	-
4	170,000	830,000	1,000,000	1,000,000	-	-	-	-	-	-	-
5	250,000	250,000	500,000	500,000	-	-	-	-	-	-	-
6	20,000	20,000	40,000	40,000	-	-	-	-	-	-	-
7	-	889,500	1,008,672	-	1,008,672	-	-	-	-	-	-
8	319,950	319,950	725,632	-	725,632	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-
10	1,887,000	9,213,000	12,989,075	-	-	12,989,075	-	-	-	-	-
11	878,500	1,631,500	2,937,169	-	-	2,937,169	-	-	-	-	-
12	140,000	260,000	468,075	-	-	468,075	-	-	-	-	-
13	122,150	122,150	285,877	-	-	285,877	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-	-	-	-
16	5,600,000	-	8,447,414	-	-	-	1,917,072	2,041,459	2,173,916	-	2,314,967
17	308,700	-	422,714	-	-	-	422,714	-	-	-	-
18	3,478,050	386,450	5,291,804	-	-	-	5,291,804	-	-	-	-
19	776,662	3,791,938	6,255,955	-	-	-	6,255,955	-	-	-	-
20	2,668,000	2,668,000	7,780,874	-	-	-	-	7,780,874	-	-	-
21	1,160,000	-	1,858,762	-	-	-	-	-	-	1,858,762	-
22	1,320,000	-	2,115,143	-	-	-	-	-	-	2,115,143	-
23	3,688,400	-	5,910,221	-	-	-	-	-	-	5,910,221	-
24	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-
Total Capital Projects	**$ 25,653,712**	**$ 27,696,188**	**$ 68,217,386**	**$11,720,000**	**$ 1,734,304**	**$16,680,195**	**$13,887,546**	**$ 9,822,333**	**$ 2,173,916**	**$ 9,884,125**	**$ 2,314,967**
Total Expansion Projects			35,682,859	3,306,300	362,816	3,542,916	8,165,923	5,931,896	2,173,916	9,884,125	2,314,967
Total Regulatory Projects			23,482,855	6,980,300	-	10,780,932	5,721,623	-	-	-	-
Total Replacement Projects			9,051,672	1,433,400	1,371,488	2,356,347	-	3,890,437	-	-	-
Projects by Grants / Developer Donations	-	-	-	-	-	-	-	-	-	-	-
Projects by Enterprise Fund	25,653,712	27,696,188	68,217,386	11,720,000	1,734,304	16,680,195	13,887,546	9,822,333	2,173,916	9,884,125	2,314,967

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Reserve Analysis

Capital Fund	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capital Fund Beginning Balance	$ 4,319,149	$ 593,223	$ 924,245	$ 1,297,264	$ 1,718,696	$ 1,833,038	$ -	$ 560,076	$ 1,194,103	$ 1,910,690	$ 2,719,430	$ -	$ 960,536	$ -	$ 1,191,846	$ 367,146	$ -	$ -	$ 1,834,989	$ 3,912,267
Plus: Capacity Fee Revenues (a)	293,175	326,573	263,776	405,216	451,378	502,798	560,076	623,879	694,950	774,118	862,304	960,536	1,069,958	1,191,846	1,327,619	1,478,859	1,647,328	1,834,989	2,044,028	2,276,880
Plus: Interest Earnings (b)	21,596	4,449	9,242	16,216	25,780	33,215	-	10,149	21,637	34,622	49,276	-	17,405	-	21,596	6,653	-	-	33,250	70,890
Subtotal Capital Funding Sources	$ 4,633,920	$ 924,245	$ 1,297,264	$ 1,718,696	$ 2,195,854	$ 2,369,051	$ 560,076	$ 1,194,103	$ 1,910,690	$ 2,719,430	$ 3,631,009	$ 960,536	$ 2,047,899	$ 1,191,846	$ 2,541,062	$ 1,852,658	$ 1,647,328	$ 1,834,989	$ 3,912,267	$ 6,260,038
Less: HARSB Regulatory Capital Costs	(734,396)	-	-	-	-	(797,133)	-	-	-	-	(116,204)	-	-	-	-	-	-	-	-	-
Less: HARSB Expansion Capital Costs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Capital Funding Sources	$ 3,899,523	$ 924,245	$ 1,297,264	$ 1,718,696	$ 2,195,854	$ 1,571,918	$ 560,076	$ 1,194,103	$ 1,910,690	$ 2,719,430	$ 3,514,806	$ 960,536	$ 2,047,899	$ 1,191,846	$ 2,541,062	$ 1,852,658	$ 1,647,328	$ 1,834,989	$ 3,912,267	$ 6,260,038
Plus: Cash Contributions CITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions COUNTY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Capital Fund Balance	$ 3,899,523	$ 924,245	$ 1,297,264	$ 1,718,696	$ 2,195,854	$ 1,571,918	$ 560,076	$ 1,194,103	$ 1,910,690	$ 2,719,430	$ 3,514,806	$ 960,536	$ 2,047,899	$ 1,191,846	$ 2,541,062	$ 1,852,658	$ 1,647,328	$ 1,834,989	$ 3,912,267	$ 6,260,038
Less: Expansion Capital Expenses (c)	**(3,306,300)**	-	-	-	**(362,816)**	**(3,542,916)**	-	-	-	-	**(8,165,923)**	-	**(5,931,896)**	-	**(2,173,916)**	**(9,884,125)**	**(2,314,967)**	-	-	-
Ending Capital Fund Balance	$ 593,223	$ 924,245	$ 1,297,264	$ 1,718,696	$ 1,833,038	$ (1,970,999)	$ 560,076	$ 1,194,103	$ 1,910,690	$ 2,719,430	$ (4,651,117)	$ 960,536	$ (3,883,997)	$ 1,191,846	$ 367,146	$ (8,031,467)	$ (667,639)	$ 1,834,989	$ 3,912,267	$ 6,260,038
Plus: Expansion Debt Proceeds	-	-	-	-	-	1,970,999	-	-	-	-	4,651,117	-	3,883,997	-	-	8,031,467	667,639	-	-	-
Net Ending Fund Balance	**$ 593,223**	**$ 924,245**	**$ 1,297,264**	**$ 1,718,696**	**$ 1,833,038**	**$ -**	**$ 560,076**	**$ 1,194,103**	**$ 1,910,690**	**$ 2,719,430**	**$ -**	**$ 960,536**	**$ -**	**$ 1,191,846**	**$ 367,146**	**$ -**	**$ -**	**$ 1,834,989**	**$ 3,912,267**	**$ 6,260,038**

(a) Revenues are based on current cap fee of $6,515
(b) Interest rate of return starts at current 0.5% interest rate and increases to match most recent 5-year average of Idaho LGIP at 1.81%
(c) Costs are shown in inflated dollars for the year of each project

Regulatory Costs	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
No Regulatory 'Fund' - Costs to be Recovered from Entities																				
Plus: HARSB Regulatory Costs (Covered by Cap Fund)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Plus: Cash Contributions CITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions COUNTY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Regulatory Funding Sources	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Less: Regulatory Capital Expenses (a)	**(6,980,300)**	-	-	-	-	**(10,780,932)**	-	-	-	-	**(5,721,623)**	-	-	-	-	-	-	-	-	-
Ending Regulatory Costs	$ (6,980,300)	$ -	$ -	$ -	$ -	$ (10,780,932)	$ -	$ -	$ -	$ -	$ (5,721,623)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Plus: Regulatory Debt Proceeds	6,980,300	-	-	-	-	10,780,932	-	-	-	-	5,721,623	-	-	-	-	-	-	-	-	-
Net Ending Fund Balance	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

(a) Costs are shown in inflated dollars for the year of each project

Replacement Fund	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Replacement Fund Beginning Balance	$ 751,942	$ 1,004,894	$ 1,512,430	$ 2,127,555	$ 2,854,149	$ 3,585,035	$ 4,375,769	$ 5,455,058	$ 6,653,904	$ 7,974,472	$ 9,418,970	$ 10,989,642	$ 12,688,774	$ 10,628,257	$ 12,520,841	$ 14,547,719	$ 16,711,324	$ 18,976,726	$ 21,347,833	$ 23,828,690
Plus: Replacement Fee Revenues (a)	400,000	500,000	600,000	700,000	800,000	900,000	1,000,000	1,100,000	1,200,000	1,300,000	1,400,000	1,500,000	1,600,000	1,700,000	1,800,000	1,900,000	1,962,593	2,027,249	2,094,034	2,163,020
Plus: Interest Earnings (b)	3,760	7,537	15,124	26,594	42,812	64,961	79,289	98,846	120,569	144,497	170,672	199,132	229,921	192,584	226,878	263,605	302,809	343,858	386,823	431,776
Subtotal Replacement Funding Sources	$ 1,155,702	$ 1,512,430	$ 2,127,555	$ 2,854,149	$ 3,696,961	$ 4,549,995	$ 5,455,058	$ 6,653,904	$ 7,974,472	$ 9,418,970	$ 10,989,642	$ 12,688,774	$ 14,518,695	$ 12,520,841	$ 14,547,719	$ 16,711,324	$ 18,976,726	$ 21,347,833	$ 23,828,690	$ 26,423,486
Less: HARSB Replacement Capital Costs	(150,808)	-	-	-	(111,927)	(174,226)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Replacement Funding Sources	$ 1,004,894	$ 1,512,430	$ 2,127,555	$ 2,854,149	$ 3,585,035	$ 4,375,769	$ 5,455,058	$ 6,653,904	$ 7,974,472	$ 9,418,970	$ 10,989,642	$ 12,688,774	$ 14,518,695	$ 12,520,841	$ 14,547,719	$ 16,711,324	$ 18,976,726	$ 21,347,833	$ 23,828,690	$ 26,423,486
Plus: Cash Contributions CITY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions DISTRICT	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Plus: Cash Contributions COUNTY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subtotal Replacement Fund Balance	$ 1,004,894	$ 1,512,430	$ 2,127,555	$ 2,854,149	$ 3,585,035	$ 4,375,769	$ 5,455,058	$ 6,653,904	$ 7,974,472	$ 9,418,970	$ 10,989,642	$ 12,688,774	$ 14,518,695	$ 12,520,841	$ 14,547,719	$ 16,711,324	$ 18,976,726	$ 21,347,833	$ 23,828,690	$ 26,423,486
Less: Replacement Capital Expenses (c)	**(1,433,400)**	-	-	-	**(1,371,488)**	**(2,356,347)**	-	-	-	-	-	-	**(3,890,437)**	-	-	-	-	-	-	-
Ending Replacement Fund Balance	(428,506)	1,512,430	2,127,555	2,854,149	2,213,546	2,019,422	5,455,058	6,653,904	7,974,472	9,418,970	10,989,642	12,688,774	10,628,257	12,520,841	14,547,719	16,711,324	18,976,726	21,347,833	23,828,690	26,423,486
Plus: Replacement Debt Proceeds	1,433,400	-	-	-	1,371,488	2,356,347	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net Ending Fund Balance	1,004,894	1,512,430	2,127,555	2,854,149	3,585,035	4,375,769	5,455,058	6,653,904	7,974,472	9,418,970	10,989,642	12,688,774	10,628,257	12,520,841	14,547,719	16,711,324	18,976,726	21,347,833	23,828,690	26,423,486

(a) Revenues are based on $100,000/yr increase until depreciation is matched in 2029, then increased by most recent 5-year average of ENR CCI at 3.19%
(b) Interest rate of return starts at current 0.5% interest rate and increases to match most recent 5-year average of Idaho LGIP at 1.81%
(c) Costs are shown in inflated dollars for the year of each project; projects in the first ten years are funded by all entities proportionately and later years are fully funded by HARSB

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Inflated Expansion Capital Costs	3,306,300	-	-	-	362,816	3,542,916	-	-	-	-	8,165,923	-	5,931,896	-	2,173,916	9,884,125	2,314,967	-	-	-
Inflated Regulatory Capital Costs	6,980,300	-	-	-	-	10,780,932	-	-	-	-	5,721,623	-	-	-	-	-	-	-	-	-
Inflated Replacement Capital Costs	1,433,400	-	-	-	1,371,488	2,356,347	-	-	-	-	-	-	3,890,437	-	-	-	-	-	-	-
Inflated Total Capital Costs	**11,720,000**	-	-	-	**1,734,304**	**16,680,195**	-	-	-	-	**13,887,546**	-	**9,822,333**	-	**2,173,916**	**9,884,125**	**2,314,967**	-	-	-
Expansion Funds Needed	-	-	-	-	-	1,970,999	-	-	-	-	4,651,117	-	3,883,997	-	-	8,031,467	667,639	-	-	-
Regulatory Funds Needed	6,980,300	-	-	-	-	10,780,932	-	-	-	-	5,721,623	-	-	-	-	-	-	-	-	-
Replacement Funds Needed	1,433,400	-	-	-	1,371,488	2,356,347	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Funds Needed	**8,413,700**	-	-	-	**1,371,488**	**15,108,277**	-	-	-	-	**10,372,740**	-	**3,883,997**	-	-	**8,031,467**	**667,639**	-	-	-

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Capital Cost Allocation to Members by Purchased ERs

Capital Financing [a]	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Funds Needed for Capital																				
Expansion	$ -	$ -	$ -	$ -	$ -	$ 1,970,999	$ -	$ -	$ -	$ -	$ 4,651,117	$ -	$ 3,883,997	$ -	$ -	$ 8,031,467	$ 667,639	$ -	$ -	$ -
Regulatory	6,980,300	-	-	-	-	10,780,932	-	-	-	-	5,721,623	-	-	-	-	-	-	-	-	-
Replacement	1,433,400	-	-	-	1,371,488	2,356,347	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Funding Needed	$ 8,413,700	$ -	$ -	$ -	$ 1,371,488	$ 15,108,277	$ -	$ -	$ -	$ -	$ 10,372,740	$ -	$ 3,883,997	$ -	$ -	$ 8,031,467	$ 667,639	$ -	$ -	$ -
Total Expansion	$ -	$ -	$ -	$ -	$ -	$ 1,970,999	$ -	$ -	$ -	$ -	$ 4,651,117	$ -	$ 3,883,997	$ -	$ -	$ 8,031,467	$ 667,639	$ -	$ -	$ -
Capital Allocation Regulatory [b]																				
City	$ 4,328,202	$ -	$ -	$ -	$ -	$ 7,016,590	$ -	$ -	$ -	$ -	$ 4,027,828	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	1,835,141	-	-	-	-	2,834,338	-	-	-	-	1,504,231	-	-	-	-	-	-	-	-	-
County	82,561	-	-	-	-	132,871	-	-	-	-	73,360	-	-	-	-	-	-	-	-	-
HARSB	734,396	-	-	-	-	797,133	-	-	-	-	116,204	-	-	-	-	-	-	-	-	-
Total Regulatory Allocation	$ 6,980,300	$ -	$ -	$ -	$ -	$ 10,780,932	$ -	$ -	$ -	$ -	$ 5,721,623	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Capital Allocation Replacement [b]																				
City	$ 888,793	$ -	$ -	$ -	$ 882,226	$ 1,533,589	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	376,845	-	-	-	360,568	619,490	-	-	-	-	-	-	-	-	-	-	-	-	-	-
County	16,954	-	-	-	16,767	29,041	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HARSB	150,808	-	-	-	111,927	174,226	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Replacement Allocation	$ 1,433,400	$ -	$ -	$ -	$ 1,371,488	$ 2,356,347	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Capital Allocation [b]																				
Expansion Costs	$ -	$ -	$ -	$ -	$ -	$ 1,970,999	$ -	$ -	$ -	$ -	$ 4,651,117	$ -	$ 3,883,997	$ -	$ -	$ 8,031,467	$ 667,639	$ -	$ -	$ -
City Regulatory & Replacement Costs	5,216,995	-	-	-	882,226	8,550,179	-	-	-	-	4,027,828	-	-	-	-	-	-	-	-	-
District Regulatory & Replacement Costs	2,211,986	-	-	-	360,568	3,453,828	-	-	-	-	1,504,231	-	-	-	-	-	-	-	-	-
County Regulatory & Replacement Costs	99,515	-	-	-	16,767	161,912	-	-	-	-	73,360	-	-	-	-	-	-	-	-	-
HARSB Regulatory & Replacement Costs	885,204	-	-	-	111,927	971,359	-	-	-	-	116,204	-	-	-	-	-	-	-	-	-
Total Capital Allocation	$ 8,413,700	$ -	$ -	$ -	$ 1,371,488	$ 15,108,277	$ -	$ -	$ -	$ -	$ 10,372,740	$ -	$ 3,883,997	$ -	$ -	$ 8,031,467	$ 667,639	$ -	$ -	$ -

[a] Costs do not include issuance costs and possible reserve requirement since members are responsible for securing debt if needed
[b] Debt allocations split based on Purchased ERs

Debt Service Allocation	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Annual Expansion Debt Service																				
Expansion Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Expansion Debt Service Allocation																				
City	$ -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
District	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
County	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HARSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Expansion Debt Service	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Annual Regulatory & Replacement Debt Service																				
Regulatory Debt Service	419,823	-	-	-	-	831,947	-	-	-	-	538,364	-	-	-	-	-	-	-	-	-
Replacement Debt Service	86,210	-	-	-	63,825	181,835	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Annual Reg. & Replace. Debt Service	$ 506,033	$ -	$ -	$ -	$ 63,825	$ 1,013,783	$ -	$ -	$ -	$ -	$ 538,364	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Regulatory Debt Service Allocation																				
City	$ 290,923	$ -	$ -	$ -	$ -	$ 584,690	$ -	$ -	$ -	$ -	$ 386,847	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	123,350	-	-	-	-	236,185	-	-	-	-	144,472	-	-	-	-	-	-	-	-	-
County	5,549	-	-	-	-	11,072	-	-	-	-	7,046	-	-	-	-	-	-	-	-	-
HARSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Upgrade Debt Service	$ 419,823	$ -	$ -	$ -	$ -	$ 831,947	$ -	$ -	$ -	$ -	$ 538,364	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Replacement Debt Service Allocation																				
City	$ 57,741	$ -	$ -	$ -	$ 44,704	$ 127,794	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	25,330	-	-	-	18,271	51,622	-	-	-	-	-	-	-	-	-	-	-	-	-	-
County	1,140	-	-	-	850	2,420	-	-	-	-	-	-	-	-	-	-	-	-	-	-
HARSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Upgrade Debt Service	$ 86,210	$ -	$ -	$ -	$ 63,825	$ 181,835	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Regulatory & Replacement Debt Service																				
City	$ 350,664	$ -	$ -	$ -	$ 44,704	$ 712,484	$ -	$ -	$ -	$ -	$ 386,847	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	148,680	-	-	-	18,271	287,807	-	-	-	-	144,472	-	-	-	-	-	-	-	-	-
County	6,689	-	-	-	850	13,492	-	-	-	-	7,046	-	-	-	-	-	-	-	-	-
HARSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Annual Debt Service	$ 506,033	$ -	$ -	$ -	$ 63,825	$ 1,013,783	$ -	$ -	$ -	$ -	$ 538,364	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

[b] Debt service allocations split based on Purchased ERs

Average Debt Cost per Connected ER [a]	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Regulatory	$ 4.36	$ -	$ -	$ -	$ -	$ 8.21	$ -	$ -	$ -	$ -	$ 4.94	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Replacement	0.90	-	-	-	0.64	1.80	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	$ 5.25	$ -	$ -	$ -	$ 0.64	$ 10.01	$ -	$ -	$ -	$ -	$ 4.94	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cumulative Debt Cost per Connected ER	$ 5.25	$ 5.25	$ 5.25	$ 5.25	$ 5.89	$ 15.90	$ 15.90	$ 15.90	$ 15.90	$ 15.90	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84	$ 20.84

[a] Costs do not include issuance costs and possible reserve requirement since members are responsible for securing debt if needed

Regulatory & Replacement Debt Cost per Connected ER [a]	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
City	$ 4.88	$ -	$ -	$ -	$ 0.60	$ 9.43	$ -	$ -	$ -	$ -	$ 4.72	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
District	6.32	-	-	-	0.75	11.65	-	-	-	-	5.58	-	-	-	-	-	-	-	-	-
County	6.91	-	-	-	0.84	13.12	-	-	-	-	6.47	-	-	-	-	-	-	-	-	-
HARSB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average Debt Cost per Connected ER	$ 5.25	$ -	$ -	$ -	$ 0.64	$ 10.01	$ -	$ -	$ -	$ -	$ 4.94	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -

[a] Costs do not include issuance costs and possible reserve requirement since members are responsible for securing debt if needed

Hayden Area Regional Sewer Board
Financial Plan and Capitalization Fee Update
Capacity Fee

Capacity Fee - FY 2012/13	
Existing Cost Basis	
Plant-in-Service	$ 37,083,041
plus: Construction work in progress	-
less: Depreciation	(9,193,346)
EXISTING COST BASIS	27,889,695
less: Existing Capacity	(27,889,695)
TOTAL NET EXISTING COST BASIS	$ -
Future Cost Basis	
Total Capital Improvement Program	$ 53,349,900
less: Regulatory and Replacement	(27,696,188)
NET FUTURE COST BASIS	**$ 25,653,712**
Customer Base	
Future Capacity	12,000
Existing Connected Capacity	8,950
FUTURE AVAILABLE CAPACITY	**3,050**
Capitalization Fee	
Existing Cost Basis	$ -
Future Cost Basis	25,653,712
Total Costs Basis	$ 25,653,712
Allocable Customer Base	3,050
MAXIMUM CAP FEE PER ER	**$ 8,411**
Current Cap Fee	*6,515*
Difference	*$ 1,896*

Expanded Plant Breakdown, MGD, ER's	MGD	ERs
Current Total Connections (Occupied Existing Capacity)	1.790	8,950
Free Existing Capacity	-	-
Expansion Capacity	0.610	3,050
Total Expanded Plant Capacity	2.400	12,000

2.400	Enter Expanded Plant Capacity (MGD)
1.790	Enter Current Plant Capacity Sold (MGD)
200	Enter Definition of ER (gpd)

Environmental Criteria	Alternative 1 No Improvements	Alternative 2 Additional Treatment with Year Round River Discharge (current reuse land to 1.65 mgd)	Alternative 3 Additional Treatment combined with Expanded Seasonal Reuse (expansion of reuse land to 2.4 mgd)	Alternative 4 Additional Treatment combined with Abandoning Reuse (abandon reuse in 10 years)
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)	Yes – Excavation for treatment facilities, expanded reuse and pipeline (Short-Term and Minor Long-Term Impact)	Yes – Excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – Potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact	No Impact	Yes – Potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact
Land Use	No Impact	No Impact	Yes – Expanded reuse will potentially re-purpose land identified for reuse expansion (Potential Long-Term Impact)	Yes – Abandoned reuse will potentially re-purpose land currently utilized for reuse (Potential Long-Term Impact)
Floodplain Development	No Impact	Yes – Excavation for pipeline in River floodplain (Short-Term Impact)	Yes – Excavation for pipeline in River floodplain (Short-Term Impact)	Yes – Excavation for pipeline in River floodplain (Short-Term Impact)
Wetlands	No Impact	No Impact	No Impact	No Impact
Water Quality	Yes – Significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact	Yes – Potential risk as system grows and inability to consistently treat wastewater to meet water quality requirements (Potential Long-Term Impact)	No Impact	Yes – Significant risk as system grows and inability to consistently treat wastewater to meet water quality requirements (Potential Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact

Environmental Criteria	Alternative 1 No Improvements	Alternative 2 Additional Treatment with Year Round River Discharge (current reuse land to 1.65 mgd)	Alternative 3 Additional Treatment combined with Expanded Seasonal Reuse (expansion of reuse land to 2.4 mgd)	Alternative 4 Additional Treatment combined with Abandoning Reuse (abandon reuse in 10 years)
Cultural Resources	No Impact	Yes – Potential impact if cultural resources are identified in pipeline corridors (Potential Short- and Long-Term Impact	Yes – Potential impact if cultural resources are identified in pipeline corridors (Potential Short- and Long-Term Impact	Yes – Potential impact if cultural resources are identified in pipeline corridors (Potential Short- and Long-Term Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact (no change to land classification)	No Impact (no change to land classification)	Yes – Current reuse agricultural land would be sold (Potential Long-Term Impact)
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	Yes – Increased energy consumption with facility upgrades (Long-Term Impact)	Yes – Increased energy consumption with facility upgrades (Long-Term Impact)	Yes – Increased energy consumption with facility upgrades (Long-Term Impact)
Public Health	Yes – Water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost	$0	$64.0 million (with O&M)	$75.7 million (with O&M)	$53.4 million (with O&M)

Environmental Criteria	No Action	Headworks Improvements	Flow Equalization Improvements
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact
Water Quality	Yes – Significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Reducing likelihood of failures and impacts (POSITIVE Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Reducing likelihood of failures and impacts (POSITIVE Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, mitigated through odor control containment, and treatment measures (Long-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, mitigated through odor control containment, and treatment measures (Long-Term Impact)

Environmental Criteria	No Action	Headworks Improvements	Flow Equalization Improvements
Energy	No Impact	No Impact	Yes – Increased energy consumption with facility upgrades (Long-Term Impact)
Public Health	Yes – Water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost	$0	$2.8 million (with O&M)	$4.2 million (with O&M)

Environmental Criteria	No Action	Aeration Basin Improvements	Biological Phosphorus and Nitrogen Removal Improvements	Secondary Clarifiers and Sludge Pumping Improvements
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact	No Impact
Water Quality	Yes – Significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Reducing likelihood of failures and impacts (POSITIVE Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting discharge requirements (POSITIVE Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Reducing likelihood of failures and impacts (POSITIVE Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact	No Adverse Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact	No Impact

Environmental Criteria	**No Action**	**Aeration Basin Improvements**	**Biological Phosphorus and Nitrogen Removal Improvements**	**Secondary Clarifiers and Sludge Pumping Improvements**
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, mitigated through odor control containment, and treatment measures (Long-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	No Impact	Yes – Increased energy consumption with facility installation (Long-Term Impact)	No Impact
Public Health	Yes – Water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost	$0	$1.2/$1.3 million (with O&M)	$4.4 million (with O&M)	$1.3 million (with O&M)

Environmental Criteria	No Action	Chemical Coagulation and Settling	Tertiary-Filtration
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Minor Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Minor Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact
Water Quality	Yes – Significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting discharge requirements (POSITIVE Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting discharge requirements (POSITIVE Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)

Environmental Criteria	No Action	Aeration Basin Improvements	Biological Phosphorus and Nitrogen Removal Improvements
Energy	No Impact	Yes – Increased energy consumption with facility installation (Long-Term Impact)	Yes – Increased energy consumption with facility installation (Long-Term Impact)
Public Health	Yes – Water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost	$0	$5.3 to $7.5 million (with O&M)	$10.6 to $15.0 million (with O&M)

Environmental Criteria	No Action	Chemical Disinfection	UV Disinfection
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact
Water Quality	Yes – Significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting discharge requirements (POSITIVE Long-Term Impact); Potential byproduct material concern for chemical disinfection options (Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting discharge requirements (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)

Environmental Criteria	No Action	Chemical Disinfection	UV Disinfection
Energy	No Impact	No Impact	Yes – Increased energy consumption with facility installation (Long-Term Impact)
Public Health	Yes – Water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact); Potential increased risk for chemical disinfection options (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost	$0	$3.2 to $6.4 million (with O&M)	$3.4 million (with O&M)

Environmental Criteria	No Action	River Outfall	Land Application Force Main	H-3 Effluent Lift Station
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact	No Impact	No Impact
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact	No Impact
Water Quality	No Impact	Yes – Construction impacts mitigated through BMPs (Short-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact	No Adverse Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	Yes – Ground disturbance in agricultural areas, but no irreversible conversion (Short-Term Impact)	Yes – Ground disturbance in agricultural areas, but no irreversible conversion (Short-Term Impact)	Yes – Ground disturbance in agricultural areas, but no irreversible conversion (Short-Term Impact)

Environmental Criteria	No Action	River Outfall	Land Application Force Main	H-3 Effluent Lift Station
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact);	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	No Impact	No Impact	Yes – Increased energy costs for increased pumping (Minor Long-Term Impact)
Public Health	No Impact	No Impact	No Impact	No Impact
Option Cost	$0	$3.7 million	$2.4 million	$0.4 million

Environmental Criteria	No Action	Waste Sludge Storage
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	No Impact
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	Yes – Potential impact to surrounding water quality related to inability to treat biosolids (Short- and Long-Term Impact)	Yes – POSITIVE, meeting discharge requirements (Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	No Impact
Public Health	Yes – Potential impact to surrounding community related to inability to treat biosolids and manage vector attraction/pathogens (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet treatment requirements (Long-Term Impact);
Option Cost	$0	$551,000 (with O&M)

Environmental Criteria	No Action	Sludge Thickening
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	Yes – Potential impact to surrounding water quality related to inability to treat biosolids (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting treatment requirements (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	No Impact
Public Health	Yes – Potential impact to surrounding community related to inability to treat biosolids and manage vector attraction/pathogens (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet treatment requirements (Long-Term Impact);
Option Cost	$0	$1.5 million (with O&M)

Environmental Criteria	No Action	Processes to Reduce Pathogens and Vector Attraction
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	Yes – Potential impact to surrounding water quality related to inability to treat biosolids (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting treatment requirements (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, managed through containment and on-site treatment (Long-Term Impact)

Environmental Criteria	No Action	Processes to Reduce Pathogens and Vector Attraction
Energy	No Impact	Yes – Increased energy consumption due to new treatment processes (Long-Term Impact)
Public Health	Yes – Potential impact to surrounding community related to inability to treat biosolids and manage vector attraction/pathogens (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet tertiary treatment requirements and managing vector attraction and odors (Long-Term Impact);
Option Cost	$0	$3.6 to $17.2 million (with O&M)

Environmental Criteria	No Action	Sludge Dewatering
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	Yes – Potential impact to surrounding water quality related to inability to treat biosolids (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting treatment requirements (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, managed through containment and on-site treatment (Long-Term Impact)

Environmental Criteria	No Action	Sludge Dewatering
Energy	No Impact	Yes – Increased energy consumption due to new treatment processes (Long-Term Impact)
Public Health	Yes – Potential impact to surrounding community related to inability to treat biosolids and manage vector attraction/pathogens (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet tertiary treatment requirements and managing vector attraction and odors (Long-Term Impact);
Option Cost	$0	$1.8 million (with O&M)

Environmental Criteria	No Action	Disposal
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	No Impact
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	No Impact	No Impact
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	No Impact
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Trucking emissions from trucking solids (Long-Term Impact)
Energy	No Impact	Yes – Increased energy consumption from fuel for solids trucking (Long-Term Impact)
Public Health	No Impact	Yes – POSITIVE, improved ability to appropriately dispose of biosolids (Long-Term Impact);
Option Cost	$0	$711,000 to $6.0 million (with O&M)

Environmental Criteria	No Action	Other Biosolids Options
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Water Quality	Yes – Potential impact to surrounding water quality related to inability to treat biosolids (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting treatment requirements (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Odor generation, managed through containment and on-site treatment (Long-Term Impact)

Environmental Criteria	No Action	Other Biosolids Options
Energy	No Impact	Yes – Increased energy consumption due to new treatment processes (Long-Term Impact)
Public Health	Yes – Potential impact to surrounding community related to inability to treat biosolids and manage vector attraction/pathogens (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet tertiary treatment requirements and managing vector attraction and odors (Long-Term Impact);
Option Cost	$0	$2.4 to $33.9 million (with O&M)

Environmental Criteria	No Action	Expand Reuse (on Existing Property or to New Property)	Abandon Reuse Activity
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	Yes – Potential impact if new land is purchased and re-purposed *for* agricultural purposes *from* non-agricultural purposes (Long-Term Impact)	Yes – Potential impact if new land is purchased and re-purposed *from* agricultural purposes *for* non-agricultural purposes (Long-Term Impact)
Floodplain Development	No Impact	No Impact	No Impact
Wetlands	No Impact	No Impact	No Impact
Water Quality	Yes – Neglected maintenance and expansion could lead to un-monitored discharges to surrounding water bodies (Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); POSITIVE impacts from continued protection of water bodies through maintenance and monitoring of reuse system (Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); POSITIVE impacts from continued protection of water bodies through maintenance and monitoring of reuse system (Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Yes – Potential impact to newly purchased areas (Potential Long-Term Impact)	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact

Environmental Criteria	No Action	Expand Reuse (on Existing Property or to New Property)	Abandon Reuse Activity
Agricultural Lands	No Impact	Yes – Excavation in agricultural area for expansion (Short-Term Impact)	Yes – Potential impact if new land is purchased and re-purposed *from* agricultural purposes *for* non-agricultural purposes (Long-Term Impact)
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact);
Energy	No Impact	No Impact	No Impact
Public Health	Yes – Neglected maintenance and expansion could lead to un-monitored discharges and inability to meet future demand (Long-Term Impact)	Yes – POSITIVE, continued protection of community through maintenance and monitoring of reuse system (Long-Term Impact)	Yes – POSITIVE, continued protection of community through maintenance and monitoring of reuse system (Long-Term Impact)
Option Cost	$0	$5.6 to $44.4 million	($9.5 million)

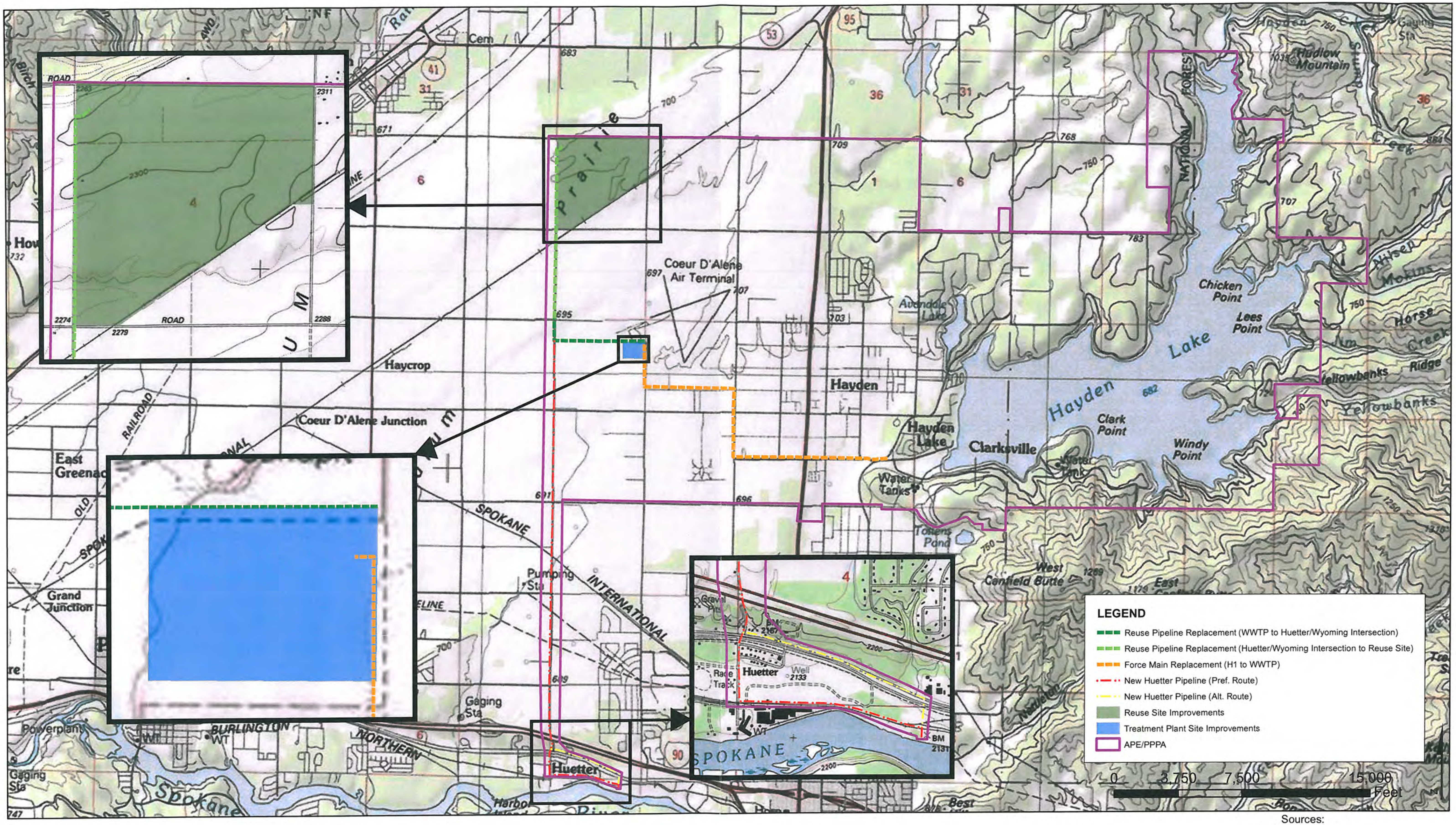
Environmental Criteria	No Action	Administration and Ancillary Support Systems
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – Excavation for Facilities (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes – No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes – POSITIVE, ability to expand system and provide for growth (Long-Term Impact)
Land Use	No Impact	No Impact
Floodplain Development	No Impact	No Impact
Wetlands	No Impact	No Impact
Wetlands and Water Quality	Yes – Potential impact to surrounding water quality related to inability to support expanded treatment needs (Short- and Long-Term Impact)	Yes – Construction impacts mitigated through BMPs (Short-Term Impact); Meeting treatment requirements through administration and ancillary support (POSITIVE Long-Term Impact);
Wild and Scenic Rivers	No Impact	No Impact
Cultural Resources	No Impact	No Adverse Impact
Flora and Fauna	No Impact	Yes – Temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact
Agricultural Lands	No Impact	No Impact
Air Quality	No Impact	Yes – Temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact); Intermittent emissions for back-up power generation (Long-Term Impact)

Environmental Criteria	No Action	Administration and Ancillary Support Systems
Energy	No Impact	Yes – Increased energy consumption due to new facilities and intermittent use of back-up power (Long-Term Impact)
Public Health	Yes – Potential impact to surrounding community related to inability to support expanded treatment and manage odors (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet tertiary treatment needs and managing odors (Long-Term Impact);
Option Cost	$0	$0.04 to $5.3 million

APPENDIX E

Physical Information

- Topography Map
- Geologic Information
- Soils Information



Sources:
USA Topo Maps
Idaho State Tax Commission
Kootenai County GIS Department

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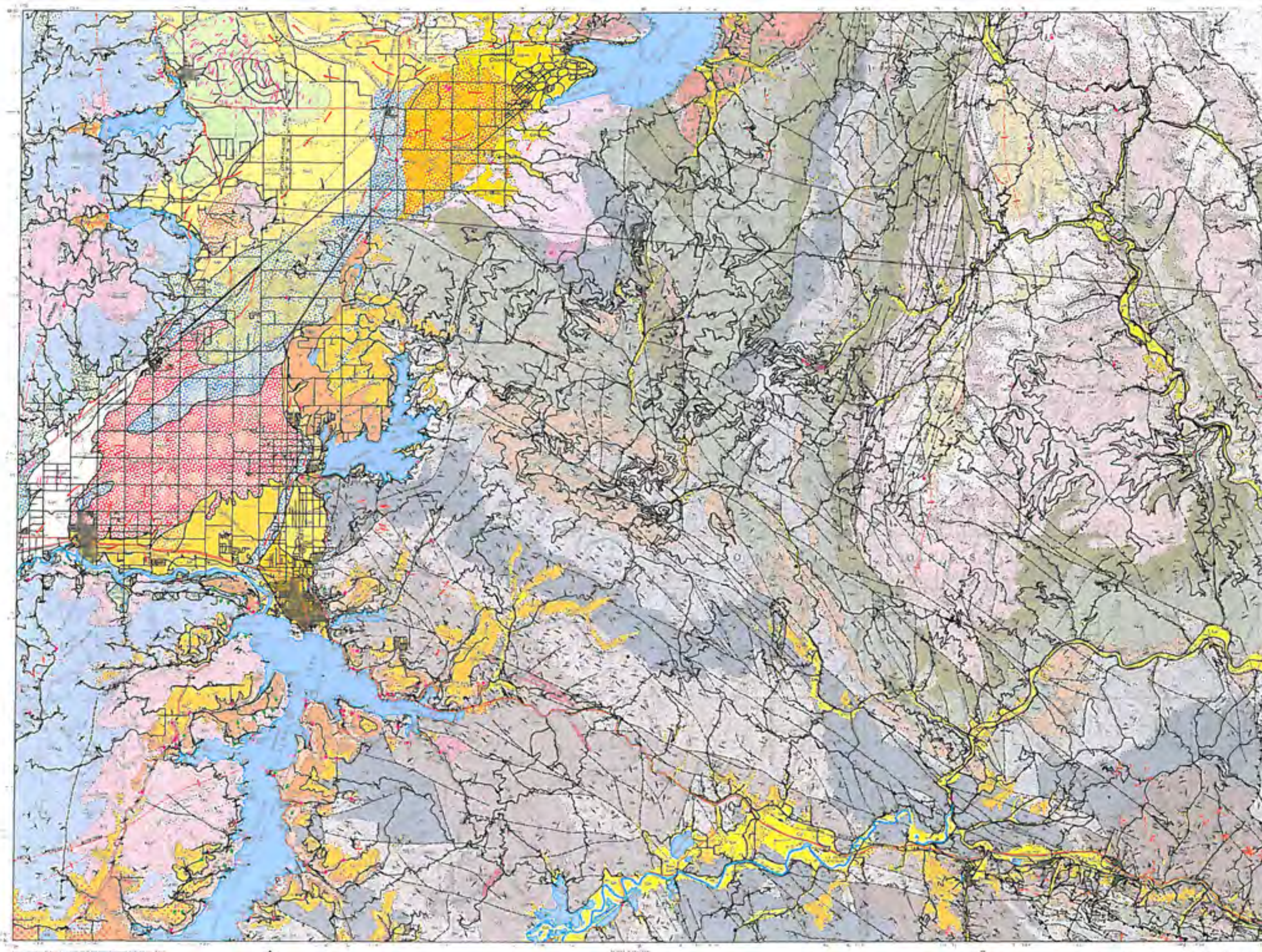
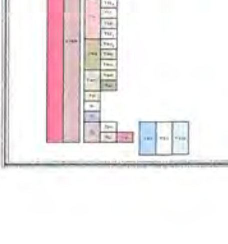
HARSB

Topography

PROJECT NO.................................41104
DRAWN BY...AW
FILENAME.......................................Topography_11x17L
DATE...11/14/12



CORRELATION OF MAP UNITS



Geologic Map of the Coeur d'Alene 30 x 60 Minute Quadrangle, Idaho

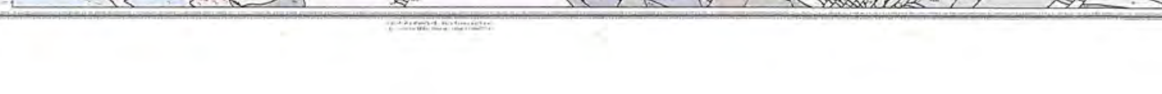
Compiled and mapped by

Reed S. Lewis, Russell F. Burmester, Roy M. Breckenridge, Mark D. McFaddan, and John D. Kauffman

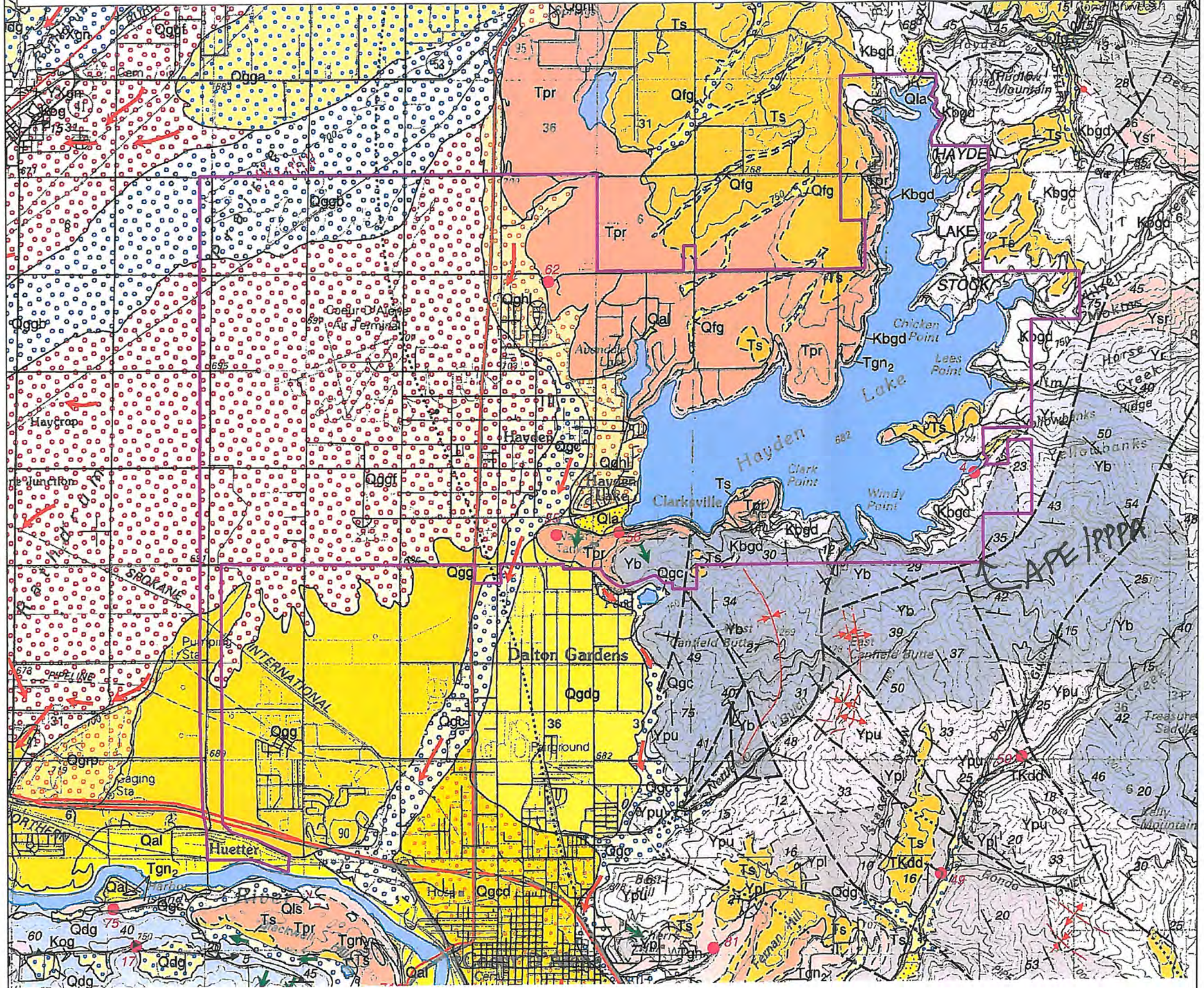
2002

MAP UNITS

MAP SYMBOLS



Derived from the Geologic Map for the Coeur d'Alene 30 x 60 Minute Quadrangle, Idaho



MAP UNITS

Unit descriptions in accompanying booklet

HOLOCENE DEPOSITS

- Qal — Alluvial deposits (Holocene)
- Qla — Lacustrine sediments and alluvium (Holocene)
- Qfg — Fluvial gravel (Pleistocene and Holocene)

CATASTROPHIC FLOOD DEPOSITS AND REWORKED OUTWASH

- Qgdg — Gravel of Dalton Gardens fan (Pleistocene)
- Qgg — Gravel of Green Ferry (Pleistocene)
- Qggf — Gravel of Green Ferry, fan facies (Pleistocene)
- Qggb — Gravel of Green Ferry, bar facies (Pleistocene)
- Qghl — Gravel of Hayden Lake (Pleistocene)

OLDER SEDIMENTS

- Ts — Sediment (Miocene)

COLUMBIA RIVER BASALT GROUP

Wanapum Formation

- Tpr — Priest Rapids Member (Miocene)

Grande Ronde Formation

- Tgn_2 — Grande Ronde N_2 magnetostratigraphic unit (Miocene)

INTRUSIVE ROCKS

- Kbgd — Biotite granodiorite (Cretaceous)

BELT SUPERGROUP

- Yr — Revett Formation (Middle Proterozoic)
- Yb — Burke Formation (Middle Proterozoic)

MAP SYMBOLS

- Contact: dashed where approximately located
- High-angle fault: dashed where approximately located; dotted where concealed
- Normal fault: dashed where approximately located, dotted where concealed; ball and bar on downthrown side
- Detachment fault: dashed where approximately located, dotted where concealed; hachures on downthrown side
- Strike-slip fault: dashed where approximately located; dotted where concealed
- Thrust fault: approximately located; dotted where concealed; teeth on upper plate; includes steep (reverse) faults
- Fold axis: dotted where concealed; arrow indicates plunge direction
- Syncline
- Anticline
- Overturned syncline
- Overturned anticline
- Strike and dip of compositional layering interpreted as bedding
- Strike of vertical bedding
- Horizontal bedding
- Strike and dip of bedding; ball indicates bedding known to be upright
- Overturned bedding
- Strike and dip of foliation
- Strike of vertical foliation
- Bearing and plunge of lineation, type unknown
- Bearing and plunge of mineral lineation
- Bearing and plunge of crenulation lineation
- Bearing and plunge of small fold axis
- Bearing and plunge of asymmetrical small fold showing counterclockwise rotation viewed down plunge
- Bearing and plunge of asymmetrical small fold showing clockwise rotation viewed down plunge
- Strike and dip of fracture cleavage
- Strike of vertical fracture cleavage
- Vein
- Sample location
- Giant current ripple field
- Abandoned channels of Glacial Lake Missoula floods drainageways
- Channels scoured in bedrock by Glacial Lake Missoula floods
- Mylonite (cross section only)

Geologic Map of the Coeur d'Alene 30 X 60 Minute Quadrangle, Idaho

Compiled and Mapped by Reed S. Lewis, Russell F. Burmester, Roy M. Breckenridge, Mark D. McFaddan, and John D. Kauffman

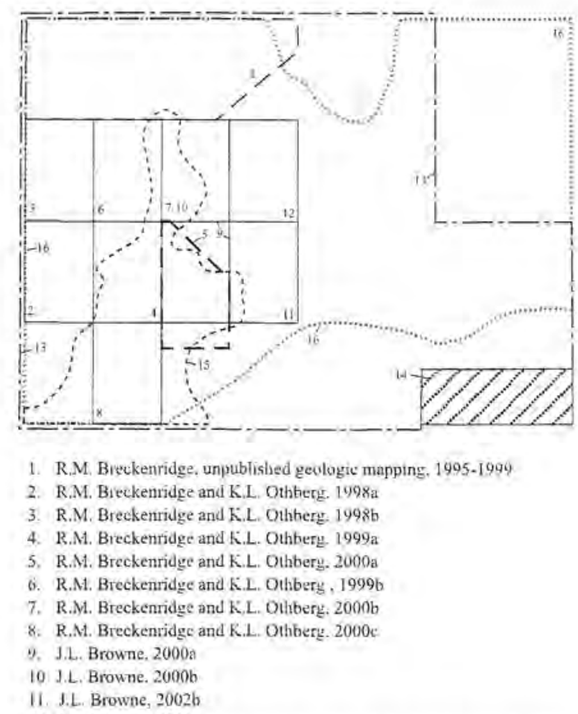
2002

INTRODUCTION

This compilation of the geology of the 1:100,000-scale Coeur d'Alene 30' x 60' quadrangle relied extensively on previous mapping. The principal sources were the seven unpublished 1:62,500-scale field maps used to prepare the 1:250,000-scale map of Griggs (1973). We supplemented Griggs' data with extensive field work in 1999, primarily in the northeast corner of the quadrangle. Basalt stratigraphy is based on the regional framework developed by Wright and others (1973) and Swanson and others (1979a, 1979b). Quaternary mapping in the Rathdrum Prairie area is based on our past unpublished and new work. The areal extent of the sources are shown on Figures 1 and 2. The geology of the Coeur d'Alene 1:100,000 quadrangle will also be published as a digital version in the Digital Data Series (see the Idaho Geological Survey's Web site: www.idahogeology.org).

The oldest and most abundant rocks in the Coeur d'Alene quadrangle are Precambrian (Figures 3 and 4). These include low-grade metasedimentary rocks of the Belt Supergroup and high-grade (amphibolite facies) metamorphic rocks whose protolith is either the Belt Supergroup or the basement rocks that predate the Belt metasedimentary rocks. The high-grade rocks are exposed in a metamorphic core complex in the western part of the map area (Priest River complex in Figure 4). Previously unmapped, deformed granitic rock (orthogneiss) of probable Cretaceous age is included in the core complex. Plutonic rocks of Cretaceous age are also present as intrusions within the low-grade Belt Supergroup. Relatively undeformed Eocene igneous rocks are exposed as plutons in the northwestern part of the map area and as a few rhyolite and dacite dikes in the central part. Flows of Miocene Columbia River basalt cover much of the western part of the quadrangle, although in places these flows are covered with Miocene sediments. Abundant Quaternary gravels in and near the Rathdrum Prairie were deposited by catastrophic floods derived from Glacial Lake Missoula.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.



1. R.M. Breckenridge, unpublished geologic mapping, 1995-1999
2. R.M. Breckenridge and K.L. Othberg, 1998a
3. R.M. Breckenridge and K.L. Othberg, 1998b
4. R.M. Breckenridge and K.L. Othberg, 1999a
5. R.M. Breckenridge and K.L. Othberg, 2000a
6. R.M. Breckenridge and K.L. Othberg, 1999b
7. R.M. Breckenridge and K.L. Othberg, 2000b
8. R.M. Breckenridge and K.L. Othberg, 2000c
9. J.L. Browne, 2000a
10. J.L. Browne, 2000b
11. J.L. Browne, 2002b
12. J.L. Browne, 2002a
13. A.B. Griggs, unpublished geologic maps of the Athol, Coeur d'Alene, Kellogg, Kingston, Lakeview, Lane, and Spirit Lake quadrangles, Idaho: U.S. Geological Survey Field Records Library, Denver, Colorado, scale 1:62,5000
14. S.W. Hobbs and others, 1965
15. J.D. Kauffman, R.M. Breckenridge, and K.L. Othberg, unpublished basalt mapping, 1998-1999
16. R.S. Lewis, R. F. Burmester, and M.D. McFaddan, unpublished geologic mapping, 1999

Figure 1. *Previous mapping used as primary sources of data.*

River. Graded to the outlet of Pend Oreille Lake at Bayview at an elevation of 670 m (2,200 feet). Contains kettles from melted blocks of ice. Probably records overflow of the lake during the last phase of alpine glaciation in the region. Moraines of alpine valley glaciers in the Selkirk and Cabinet Mountains are still intact and postdate the retreat of Cordilleran ice from the southern end of the Purcell Trench. Postdates the last Cordilleran ice dam at Clark Fork about 12,000 years ago. Thickness as much as 18 m.

Qghcm—Gravel of Hoodoo channel, middle (late Pleistocene)—Poorly sorted very coarse boulder gravel with a granule and sand matrix; the gravel forms the middle terrace of Hoodoo channel and records the lowest elevation of flow through the Spirit Lake part of the Hoodoo channel. Graded to an elevation of 700 m (2,300 feet). Probably resulted from overflow of the Pend Oreille Lake basin during Cordilleran deglaciation of the Purcell Trench, or from a late ice-marginal and noncatastrophic drainage of Glacial Lake Missoula. Thickness as much as 30 m.

Qghco—Gravel of Hoodoo channel, older (late Pleistocene)—Poorly sorted, very coarse boulder gravel that forms the highest terrace of Hoodoo channel; graded to approximately 730 m (2,400 feet). Probably represents the last emptying cycle of a much diminished and shallow Glacial Lake Missoula. Thickness as much as 30 m.

Qgtow—Bouldery till and outwash deposits (late Pleistocene)—Nonsorted, bouldery clay till and boulder outwash deposits that form a modified end moraine at the south end of Lake Pend Oreille. Clay till recorded in well logs and exposed by excavations in Farragut State Park. Probably equivalent in age to the gravel of Farragut State Park and the distal facies of the oldest gravel of Hoodoo channel (*Qghco*). Thickness as much as 25 m.

CATASTROPHIC FLOOD DEPOSITS AND REWORKED OUTWASH

Qgu—Gravel, undivided (Pleistocene)—Shown only in cross section. Bouldery flood gravels of Rathdrum Prairie undivided for the purpose of the cross section. Fills a deep paleovalley between Round Mountain and Twin Lakes (Adema, 1999). Thickness as much as 180 m.

Qgf—Gravel of Farragut State Park (Pleistocene)—Poorly sorted, sandy boulder gravel at the Glacial Lake Missoula flood breakout from the south end of Lake Pend Oreille. Probably represents the last drainage from Glacial Lake Missoula and outwash from late Wisconsin glacial retreat. Includes reworked outwash facies from the bouldery till moraine (*Qgtow*) at the southern end of Lake Pend Oreille. Thickness from 10 to 30 m.

Qgc—Channel gravel, undivided (Pleistocene)—Latest Wisconsin catastrophic flood and outwash gravel and sand deposited in channelways cut into high energy fans and bars of Glacial Lake Missoula flood origin. Deposited during declining stages of last catastrophic flood event. The last overland flood event was post-"S" ash (13,000 years ago) and pre-Glacier Peak ash (11,200 years ago), perhaps 12,800 years ago (Stradling and Kiver, 1986). Moderately sorted and stratified in the lower flow regimes. The channels are commonly developed at the margin of the Rathdrum Prairie because the larger boulders armor the center of the flood path. Locally includes angular basalt columns derived from the basalt rimrock. Soil is gravelly loam of the Kootenai series (Weisel, 1981). Thickness from 3 to 12 m.

Qdg—Distal gravel deposits (Pleistocene)—Moderately sorted, sandy flood gravels. These deposits form eddy bars at the mouths of the tributary valleys to the Rathdrum Prairie. Lower energy eddy flows deposit finer facies behind the main bar form. May be mantled by post-Glacial Lake Missoula flood lacustrine silt and alluvial deposits. Thickness as much as 60 m.

Qds—Distal sand and silt deposits (Pleistocene)—Moderately sorted sand and silt with some gravel deposited in a lower energy, Glacial Lake Missoula flood regime; represents slack-water sediments in waning floodwaters or finer facies of pendant bar deposits. Includes planar medium-bedded sand of low flow regime. Overlain by postflood lacustrine silt and peat deposits in local basins. Thickness from 3 to 10 m.

Qgb—Gravel of Beck Road (Pleistocene)—Poorly sorted flood gravel graded to the lowest valley-filling episode of flooding continuous with the Spokane Valley, about 640 m (2,100 feet) at the Idaho-Washington state line. The gravel is associated with the most developed incision representing a large abandoned river channel meandering westward into Washington (Gerstel and Palmer, 1994). Two separate sets of thick-bedded foresets are exposed in deep gravel pits. Soil is very stony and includes the gravelly silt loam of the Garrison series (Weisel, 1981). Thickness in excess of 25 m.

Qgcd—Gravel of Coeur d'Alene (Pleistocene)—Mixed deposits of poorly to moderately sorted, stratified cobbly sand and sandy gravel carried by outburst floods and currents of reverse outflow from inundation of the Coeur d'Alene basin. Composes the deposits damming Coeur d'Alene Lake and forming giant current ripples on the lake bottom shown silt loam and silt loam of the Kootenai-Rathdrum association mantled by loess and Mazama volcanic ash (Weisel, 1981). Thickness in excess of 30 m.

Qgrp—Gravel of Ross Point (Pleistocene)—Poorly to moderately sorted, coarse, stratified sandy gravel forms the highest preserved remnant flood terrace south of Spirit Lake at about 713 m (2,340 feet) in elevation. Represents the earliest of the flood deposits recognized in the area; may be equivalent to the gravel of Spirit Lake. Has the most soil development of all the Rathdrum Prairie gravel units: the gravelly and sandy silt loam of the Avonville series and the McGuire-Marble association (Weisel, 1981). Thickness in excess of 50 m.

OLDER SEDIMENTS

Ts—Sediment (Miocene)—Mostly deeply weathered yellow to orange silt and clay, but also quartzite pebbles and cobbles, and sand. Clasts derived primarily from the Belt Supergroup. Typical thickness is 5-15 m. Cobble and pebble gravels consist of mature, rounded quartzite and other rock types derived from the Precambrian Belt Supergroup and the Mesozoic-Tertiary intrusions. In the western part of the area, the unit forms a flat to gently sloping upland surface 730-790 m (2,400-2,600 feet) in elevation that is underlain by basalt of the Priest Rapids Member (Wanapum Basalt). The unit grades laterally into thick colluvium or residuum of pre-Tertiary rocks. These deposits are probably graded to high base levels formed when the Miocene plateau basalt flows blocked and diverted stream drainages (McDaniel and others, 1998). These basalt-related sediments are considered part of the Latah Formation. The age of the deposits in the eastern part of the area is unknown, and these deposits are not included in the Latah Formation. Unit includes clay-rich interbeds of sediment between flows of Columbia River Basalt Group exposed 2 km west of Coeur d'Alene. Most interbeds are too poorly exposed or too thin to show at map scale, so they are included in the basalt map units.

COLUMBIA RIVER BASALT GROUP

Saddle Mountains Formation(?)

Tmfb—Basalt of Mica Flats (Miocene)—Medium gray to dark gray, fine-grained basalt. Microphyric with abundant plagioclase laths and needles, typically < 1 mm in length; a few scattered plagioclase phenocrysts as laths as much as 4 mm in length, or as clear to waxy clots and clusters as much as 4 mm across. Diktytaxitic cavities common but irregularly distributed. Freshly broken surfaces commonly have a rough, irregular texture. Known only from outcrops along U.S. Highway 95 and in a small rock quarry west of the highway, just south of Mica, and in the Idaho Highway Department's quarry east of Mica. Stratigraphically above Priest Rapids Member (Rosalia chemical type) where exposed along the highway. Probably underlain there by an interbed containing quartzite pebbles and cobbles. Unit consists of one known flow having reverse magnetic polarity. The mean paleomagnetic direction for the basalt of Mica Flats is distinct from the mean direction for Priest Rapids' Rosalia flows from nearby locations. Chemically the unit is also distinct from Priest Rapids, as well as from other known Wanapum and Saddle Mountains Basalt chemical types. Because of its position above Priest Rapids (Rosalia chemical type), it is tentatively correlated with Saddle Mountains Basalt. Additionally, it does not appear to be time-correlative with younger Priest Rapids (Lolo chemical type), the uppermost Wanapum unit found farther to the south, because the paleomagnetic direction differs significantly from that of the Lolo unit. At least 12 m is exposed in the quarry east of Mica, although the base of the unit has not been uncovered.

Wanapum Formation

Tpr—Priest Rapids Member (Miocene)—Medium gray to dark gray basalt. Typically has a grainy, felty texture caused by abundant small plagioclase and olivine phenocrysts and by microvesicles and diktytaxitic cavities. The denser parts of the flows are dark gray to black and fine grained; they lack the grainy texture, although small plagioclase phenocrysts are apparent. Outcrops weather gray-brown to reddish brown. In thick flows, large, poorly defined basal columnar zones 3-6 m thick change upward to slabby, platy zones that are typically medium bluish gray on fresh surfaces. Above the platy zones, flows commonly have a thick blocky to hackly entablature, 15 m or more thick, and in places well-developed thin, vertical to radiating columns. The top of the entablature grades upward into an increasingly vesicular, rubbly in places, flow top. Thin flows are more vesicular throughout and generally have only weakly developed basal columns and a vesicular flow top. Pillow-palagonite complexes are locally common at the base of flows or flow units (series of chemically similar thin flows that grade laterally into a single flow). The Priest Rapids Member consists of one or more flows of Rosalia chemical type and has reverse magnetic polarity. Thicknesses of individual flow units range from 8 to 25 m for thin units and as much as 180 m for thick units.

Grande Ronde Formation

Tgn$_2$—Grande Ronde N_2 magnetostratigraphic unit

1940). K-Ar date on biotite is 83.8 Ma (recalculated from Miller and Engels, 1975).

Khgd—Hornblende-biotite granodiorite (Cretaceous)—Gray, medium-grained, hornblende-biotite granodiorite. Mafic mineral content varies, and unit probably is composed of multiple plutons or plutonic phases. Three typical samples contain 22-23 percent quartz, 41-43 percent plagioclase, 10-19 percent microcline, 11-13 percent biotite, and 6-15 percent hornblende (Gillson, 1927). A mafic marginal phase at Cape Horn east of Bayview contains 25 percent biotite and 5 percent hornblende (Gillson, 1927). Biotite is typically in thick euhedral books. Mafic phase mapped to the north as granodiorite of Salee Creek (Miller and others, 1999). Includes hornblende-bearing phases of the Kelso Lake pluton. Termed the Bayview batholith by Gillson, (1927) and Anderson (1940). A K-Ar date on biotite of 74.6 Ma (recalculated from Miller and Engels, 1975) is from the less mafic central part of the exposed pluton or plutons.

Kqd—Biotite-hornblende quartz diorite (Cretaceous)—Dark gray, equigranular, medium-grained quartz diorite. Rock contains about 13 percent quartz, 55 percent plagioclase, 15 percent biotite, 30 percent altered hornblende, and no potassium feldspar. Trace amounts of sphene, apatite, magnetite, and zircon; trace pyroxene in cores of hornblende. Appears to be a marginal phase to the *Khgd* unit. Extent is uncertain.

Kog—Orthogneiss (Cretaceous)—Gray, moderately to strongly foliated, moderately lineated biotite- and hornblende-biotite tonalite, granodiorite, granite, and quartz diorite. Muscovite bearing at the eastern edge of Round Mountain and magnetite-rich phase in roadcuts along U.S. Highway 95 near the mouth of Cougar Creek. Rocks mapped as *Kog* are heterogeneous and range in composition from granite to quartz diorite. Contains amphibolite bodies up to 100 m wide with contacts approximately parallel to foliation. Foliation is overprinted locally by s-c fabric (see Simpson and Schmid, 1983) with top-to-the-east sense of shear. Radiometric dates do not exist, but orthogneiss is considered to be Cretaceous based on similarities with deformed, approximately 94-Ma phases of the Cretaceous Idaho batholith near Lowell (Toth and Stacey, 1992) and to the Cretaceous Newman Lake orthogneiss exposed immediately west of the map area (Armstrong and others, 1987).

KYam—Amphibolite (Cretaceous or Proterozoic)—Black to dark gray, fine- to medium-grained, foliated to lineated hornblende-plagioclase meta-igneous rock. Present in schist considered by some workers as metamorphosed Prichard Formation (Griggs, 1973) and thus may be metamorphosed Proterozoic basaltic sills. However, those associated with *Kog* unit and those with relict pyroxene are probably Cretaceous.

PALEOZOIC ROCKS

Ꞓl—Lakeview Limestone (Cambrian)—Light to dark gray, thin- to thick-bedded, blocky limestone (Griggs, 1973). Includes blocky gray dolomite unit in upper part; contains some silty to sandy intervals and is metamorphosed to marble or hornfels adjacent to granitic intrusive rocks. Unit was mined for lime at Bayview (Savage, 1969). Thickness at least 2,000 feet (610 m), with the top eroded (Griggs, 1973).

Ꞓrg—Rennie Shale and Gold Creek Quartzite (Cambrian)—Rennie Shale is a fissile olive-colored fossiliferous shale, about 30 m (100 feet) thick, that is poorly exposed (Griggs, 1973). Underlying the shale is white to pale pink, vitreous coarse-grained quartzite. Contains some pebble conglomerate at its base. Thickness according to Griggs (1973) is about 500 feet (152 m).

BELT SUPERGROUP

Yl—Libby Formation (Middle Proterozoic)—Dark gray argillite and light gray to green siltite, green and red siltite, pink, fine-grained quartzite, and minor chert. Nonresistant and poorly exposed. Lower part is predominantly dark gray argillite and lighter-colored siltite. Coarsens upward into siltite and quartzite that contain dark green chert as thin beds and rounded clasts. Upper part eroded, but at least 200 m remain.

Ysp—Striped Peak Formation, undivided (Middle Proterozoic)—Quartzite and interbedded siltite and argillite. Probably consists largely (or entirely?) of Ysp_1. Shown only where lack of mapping prevented subdivision.

Ysp_4—Striped Peak Formation, member four (Middle Proterozoic)—Light gray to red, fine- to medium-grained arkosic quartzite and interbedded siltite and argillite. Characterized by 30- to 40-cm-thick tabular beds of flat-laminated, pink quartzite with red argillite caps and wavy laminated green siltite-green argillite in zones 10-30 cm thick. Less common are centimeter-scale-thick "apple green" argillite-siltite beds, and 1- to 2-m-thick beds of pink quartzite that locally contain large-scale, tangential cross-stratification. Thickest quartzite beds and quartzite with medium-grained sand lag deposits are present low in the unit. Mudchips are common throughout, as are conspicuous detrital muscovite flakes. Quartzite contains less potassium feldspar and more plagioclase (as much as 20 percent) than is present to the south (Lewis and others, 2000) and southeast (Lewis, 1998).

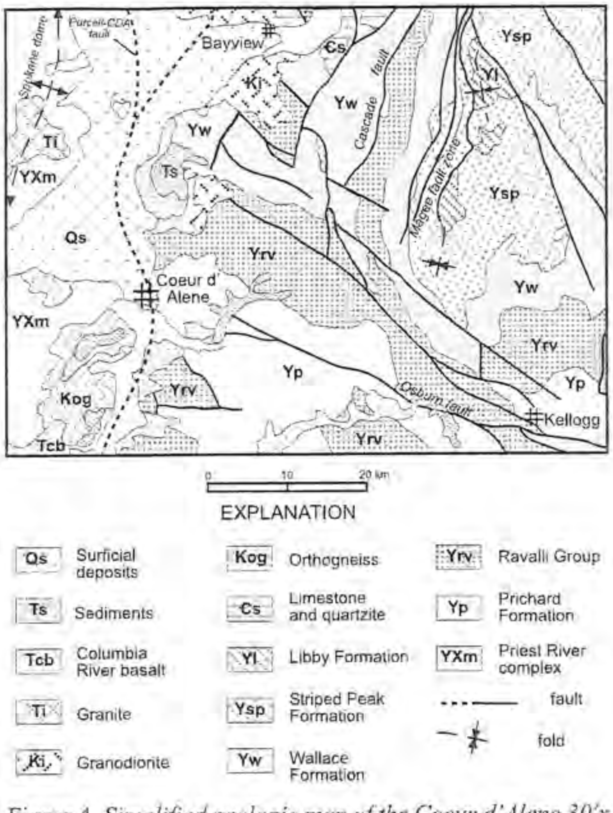


Figure 4. *Simplified geologic map of the Coeur d'Alene 30'x 60' quadrangle.*

Red chert clasts were noted at one quartzite locality on the ridge east of Calamity Creek in the northeast corner of the map area. Below this quartzite at this locality is a 20-cm-thick ash(?) bed with no internal structure and a conchoidal fracture pattern. Base of *Ysp_4* is drawn at the lowest appearance of 20- to 30-cm-thick tabular light green quartzite. Upper contact is the lowest appearance of dark gray argillite and gray siltite of *Yl*. Equivalent to uppermost Striped Peak Formation (quartzite member of Harrison and Jobin, 1963) near Clark Fork and to the Bonner Quartzite (Nelson and Dobell, 1961) present in the Missoula area (Figure 3). Thickness approximately 280 m in the northeastern part of the area.

Ysp_3—Striped Peak Formation, member three (Middle Proterozoic)—Rusty weathering, wavy laminated, dark gray siltite and dark gray to black argillite, and lesser amounts of gray to greenish gray quartzite in thin beds as much as 10-cm thick. Totally black argillite is rare. Thin, dark gray argillite chips occur sparsely within some 10-cm-thick, dark gray argillite layers. Unit is equivalent to member six of the Mount Shields Formation (Figure 3) described to the northeast in the Kalispell quadrangle (Harrison and others, 1992) and to the laminated argillite and siltite member of the Striped Peak Formation in the Clark Fork area (Harrison and Jobin, 1963). Thickness approximately 120 m in the northeastern part of the area.

Ysp_2—Striped Peak Formation, member two (Middle Proterozoic)—Tan-weathering, white stromatolitic dolomite and tan-weathering, green dolomitic siltite. The dolomitic siltite is low in the unit and grades upward from carbonate-free siltite and argillite of *Ysp_1*. Unit weathers recessively, forming benches. Distinctive "boxwork" weathering pattern formed by resistant, millimeter-scale-thick vertical and horizontal siliceous stringers. Algal mats typically flat, rarely as scattered, low algal domes. Rare 5- to 10-cm-thick layers of ooids. This carbonate interval is mapped as the dolomite member of the Striped Peak Formation to the north near Clark Fork (Harrison and Jobin, 1963) and as members four (green dolomitic siltite) and five (boxwork dolomite) of the Mount Shields Formation (Figure 3) to the northeast in the Kalispell quadrangle (Harrison and others, 1992). Thickness approximately 100 m in the northeastern part of the area.

Ysp_1—Striped Peak Formation, member one (Middle Proterozoic)—Pale purplish red, fine-grained, flat-laminated quartzite and green and red argillite and siltite. Equivalent to the argillite, siltite, and quartzite member of the Striped Peak Formation near Clark Fork (Harrison and Jobin, 1963) and to the lower three members of the Mount Shields Formation to the northeast (Harrison and others, 1992). Lowest part (Mt. Shields member 1 equivalent; Figure 3) is characterized by fine- to very fine-grained, pink, flat-laminated quartzite in beds 20-30 cm thick, capped by red argillite layers as much as 3 cm thick. Mudcracks, mudchips, and ripple marks common. Uncommon 20-cm-thick beds of pale green quartzite are present near the base.

Middle part (Mt. Shields member 2 equivalent) is characterized by flat-laminated 0.5- to 1.0-m-thick beds of fine- to medium-grained quartzite that form 15- to 30-m-thick cliffs with blocky talus. Diffuse brown wisps of carbonate in the quartzite average a few centimeters in thickness and 10-15 cm in length. Uppermost part of this quartzite is medium grained and distinctly coarser than all other quartzite in the area except the thin sand lags in the *Ysp_4* unit. Thin red argillite drapes at the tops of the quartzite beds are commonly rippled. Mudcracks and mudchips are less common than in the underlying interval. Flat-laminated to low domal stromatolites occur both near the base and at the top of this quartzite interval. The stromatolites are interbedded with centimeter-scale-thick calcitic white quartzite and locally with layers as much as 20 cm thick of cross-stratified ooids. Salt casts increase in abundance noncalcareous white quartzite. A green dolomitic siltite and argillite interval may also be present, but it was only observed east of the map area. Alternatively, the green interval might represent the upper part of the lower member. Vertical calcite ribbons, horizontal pods, and molar tooth structures are common in some siltites over 20 cm thick. White quartzite also occurs as hummocky cross-stratified planar beds 15-30 cm thick. Quartzite contains 5-13 percent potassium feldspar and approximately 15-20 percent plagioclase. Characterized by graded beds (couplets and couples) that have the pinch and swell sediment type of Winston (1986) in which scours and loads of quartzite cut or deform the tops of subjacent black argillite. Argillite caps commonly contain ptygmatically folded siltite- or quartzite-filled cracks that taper downward. On bedding plane surfaces, the cracks are generally discontinuous and sinuous, occurring as isolated "birdsfoot" cracks, short parallel cracks, or radial cracks around loads. Relatively thin interval of green, dolomitic siltite and argillite that closely resembles the lower member may be present in the lower third of the unit. Equivalent to the middle member of Wallace as mapped by Harrison and others (1986). Mapped as part of the lower Wallace by Griggs (1973). Thickness highly uncertain but about 1,000 m.

Ywl—Wallace Formation, lower member (Middle Proterozoic)—Massive green siltite and thinly laminated green siltite-argillite couplets with varied amounts of carbonate (dolomite) and recessive-weathering calcite pods. Subdivided only in a few localities. Best exposed east of the area at the mouth of Shoshone Creek, where an orange-weathering dolomitic siltite appears to be at the top of the unit. Equivalent to the lower member of Wallace as mapped by Harrison and others (1986). Thickness highly uncertain but about 200 m.

Ysr—St. Regis Formation (Middle Proterozoic)—Pale purple to gray siltite, argillite, and quartzite. Also, light green siltite and darker green argillite or dark green siltite and light green argillite couplets. Typically mudcracked, 1-cm-thick siltite-argillite couplets but with thin (2-5 cm) and rarer thick (10-20 cm), tabular, fine-grained quartzite beds with green argillite caps similar to those of the Revett Formation. Abundant mudchips. Thickness about 250 m.

Yr—Revett Formation (Middle Proterozoic)—Quartzite with siltite and argillite. Characteristically 20-cm- to rare 1-m-thick beds of fine-grained to rare medium-grained quartzite. Some vitreous; most feldspathic with orange-brown spots. Feldspar is mostly potassium feldspar in the central and eastern part of the area (12-20 percent; 3 percent plagioclase), but two samples from the southwestern part contain subequal amounts of plagioclase and potassium feldspar. Rippled tops and ripple cross lamination more common than trough cross lamination; much is flat laminated. Thickness about 600 m.

Yb—Burke Formation (Middle Proterozoic)—Siltite and quartzite. Pale green siltite in 10- to 20-cm-thick beds, typically with macroscopic magnetite octahedra and darker green argillite partings. Includes some flat-laminated, fine-grained, gray to white quartzite in scattered beds and zones. Includes hornfelsed siltite and quartzite in the South Chilco Mountain area south of Lake Pend Oreille (Griggs, 1973) that may alternatively be a downdropped block of the Striped Peak Formation. Thickness uncertain but about 1,000 m.

Yp—Prichard Formation, undivided (Middle Proterozoic)—Gray, rusty-weathering siltite and minor quartzite. Minor discontinuous carbonate layers. Rare mudcracks. Shown where the lack of mapping or poor exposure prevents subdivision. See Hobbs and others (1965), Griggs (1973), or Cressman (1989) for more detail.

Ypu—Prichard Formation, upper part (Middle Proterozoic)—Map unit of Griggs (1973) described as dark to medium gray, very thinly bedded argillite commonly interlaminated with light gray siltite and also containing some thicker siltite beds. Grades upward into an interbedded and interzoned argillite, siltite, and quartzite sequence. Upper contact placed at highest dark gray argillite by Browne (2000a), similar to mapping by Griggs (1973), but ASARCO geologists placed contact lower than these two workers (at first light-colored quartzitic interval; Larry Appelgate, written commun., 1998). Total thickness is 2,500-3,500 feet (760-1070 m) according to Griggs (1973).

Ypl—Prichard Formation, lower part (Middle Proterozoic)—Map unit of Griggs (1973) described as predominantly medium to light gray, thin- and evenly bedded siltite, and laminated in part; some argillite laminae and beds. Some beds or zones of gray to white quartzite have been subdivided locally (*Yqp* unit). Thickness according to Griggs (1973) 7,500+ feet (2,290+ m); base not exposed.

Yqp—Quartzite of the Prichard Formation (Middle Proterozoic)—Nearly white to light gray impure to pure quartzite mapped by Hobbs and others (1965) in the southeast part of the area. Individual quartzite zones probably as much as 50 m thick are discontinuous laterally.

BELT SUPERGROUP OR PRE-BELT METAMORPHIC ROCKS

High-grade (amphibolite facies) metasedimentary rocks in

Cretaceous and refer to them as thrust faults regardless of present dip. An example is the Alhambra fault south of Kellogg. During this time, rocks in the western part of the area were deformed at deeper levels and acquired a foliation (S_2 of Rehrig and others, 1987) as well as a lineation defined by sillimanite.

Magmatism in the Cretaceous affected the western half of the quadrangle (Figure 4). The Hayden Lake stock and similar rocks to the north were intruded into the Belt Supergroup. These plutonic rocks lack significant fabric and presumably were emplaced at relatively shallow crustal levels or after much of the deformation in the area. Biotite K-Ar dates of 75 Ma and 83 Ma provide minimum emplacement ages. Even less certain are the ages of some of the other intrusive rock units (*TKdd, TKla, TKg, TYqd*). The greatest uncertainty is for quartz diorite dikes (*TYqd*) that were previously assigned to the Proterozoic and thought to represent sills in the Prichard Formation (Griggs, 1973). Some may indeed be Proterozoic, but because many tend to be discordant to bedding and are concentrated in areas of faulting, a Cretaceous or Eocene age seems more likely.

Orthogneiss southwest of Coeur d'Alene (*Kog*) formed from plutons that resided at deeper crustal levels than the Hayden Lake stock and related rocks. The Cretaceous age is suggested because chemically and mineralogically the orthogneiss more closely resembles the Na- and Ca-rich Idaho batholith than the K-rich Proterozoic orthogneiss in the region. Widespread K-Ar cooling ages of 46-52 Ma (Miller and Engels, 1975; Harms and Price, 1992; Doughty and Price, 1999) indicate that this orthogneiss and the surrounding amphibolite facies metasedimentary rocks of the Priest River metamorphic complex were brought to near-surface levels during the Eocene. The timing details and the role that the Purcell-Coeur d'Alene detachment fault played in this unroofing event are still being debated.

Most of the mylonites in the footwall of the Purcell-Coeur d'Alene fault may have formed during late Cretaceous compressional strain before the intrusion of the fine-grained biotite granite of Rathdrum Mountain (*Tbgf*) at about 52 Ma (Rhodes and Hyndman, 1984, 1988; Rhodes and others, 1989; Doughty and Price, 1999). Of the three foliations in the area, only the latest may have formed or been superimposed upon earlier fabrics during down-to-the-east faulting along the Purcell-Coeur d'Alene fault in the Eocene (Rehrig and others, 1987). The mylonitic fabric in the footwall of the fault has kinematic indicators that show top-to-the-east motion. This mylonitic fabric was later folded into the Spokane dome (Rhodes and Hyndman, 1984) contemporaneously with uplift.

Doughty and Price (1999) have suggested that there is a relatively steep normal fault within the Purcell Trench to the north that cuts the Spokane dome mylonite zone. One is likely to be present in the Coeur d'Alene area as well. We speculate that a relatively steep normal fault extends from north of Athol south through Coeur d'Alene Lake. It appears to intersect (and cut) the Purcell-Coeur d'Alene fault southeast of Round Mountain but is entirely covered by surficial deposits. Alternatively, the Purcell-Coeur d'Alene fault may extend the entire length of the map area and not be offset by a younger fault. The trace of the northern extension of the Purcell-Coeur d'Alene fault from Athol north to Sandpoint is uncertain, partly because of cover by glacial deposits and partly because the exposed bedrock is largely granitic rocks that have little or no fabric. We show the Purcell-Coeur d'Alene fault (mylonite zone) continuing due north from Round Mountain more or less where McCarthy and others (1993) suggested it might be located. Alternatively, it may continue as a steeper structure north of Athol.

Extension in the central and eastern part of the quadrangle was probably localized along north-northeast-striking faults such as the Cascade fault. Both the steep bedding and some faults in the Magee fault zone probably originated during contractional deformation, but the present configuration appears strongly dependent on down-to-the-west normal faulting. West-northwest faults such as the Osburn fault are thought to have had right-lateral strike-slip motion at this time and served to transfer the extension from the area of the Priest River metamorphic complex eastward into Montana (Sheriff and others, 1984; Rehrig and others, 1987). Movement on the Purcell-Coeur d'Alene fault had ended by Miocene time (about 16 Ma) when drainages in the area were invaded by Columbia River basalt. No offset of basalt is apparent across the fault. The Columbia River basalt disrupted drainages in the area and established a new base level. Drainage systems that previously had transported sediment out of the area now deposited their sediment at the margins of the basalt flows, or upstream from them. These sediments (*Ts*) are widespread in the region south of the map area.

During the Pleistocene, a lobe of the Cordilleran ice sheet moved south down the Purcell Trench from Canada into northern Idaho. Glacial Lake Missoula was formed when this lobe blocked the Clark Fork drainage near its mouth into Lake Pend Oreille. At its maximum, the lake was over 610 m (2,000 feet) deep against the ice dam. Repeated failures and re-formations of the Clark Fork ice dams resulted in catastrophic outbursts of as much as 2,000 cubic km (500 cubic miles) of water flowing across northern Idaho and into the Channeled Scabland of Washington (Waitt, a result consistent with those of previous workers (e.g., Harrison and Grimes, 1970; Harrison and Hamilton, 1971). Concentrations of Sr are higher in the siltite-argillite and siltite samples of the Prichard Formation (111 and 76 ppm) relative to other noncarbonate-bearing siltite or argillite samples in the Belt (58 ppm or less). This distinction was originally noted by Jack Harrison (written commun., 1991). Copper concentrations are 44 ppm or less in all samples, with the exception of 99RL251, an argillite-siltite from the lower part of the Libby Formation that contains 148 ppm Cu. Zinc concentrations exceed 100 ppm in only two samples (99RL279 and 98RL052), both from the Prichard Formation. Concentrations of K_2O are highest (greater than 4 percent) in the argillite-siltite samples from the Prichard, St. Regis, lower Wallace, and Striped Peak Formations. K_2O content of siltite-argillite in the middle and upper members of the Wallace and in the Libby Formation ranges more widely (2.6 to 5.4 percent K_2O). Carbonate-bearing samples have low total oxides because CO_2 was not analyzed. These carbonate-bearing rocks also have low K_2O concentrations (0.8-3.8 percent) relative to the noncarbonate rocks and, as expected, high CaO concentrations. Quartzite samples have lower K_2O concentrations (1.4 to 3.8 percent) as a result of the high quartz sand content in these rocks. Sample 98RL176 is from the "lower green marker" in the Sunshine Mine and has an unusually high silica content (80.35%).

Seven samples of metasedimentary gneiss and schist from the Priest River metamorphic complex (units *YXgn* and *YXs*) have an expected moderate range in chemical composition. The most schistose sample (99RL244) also has the lowest SiO_2 content (62 percent) and the highest Al_2O_3 content (23 percent). This sample is from just south of the map area. Metasedimentary rocks from the Priest River metamorphic complex are compositionally similar in many respects to the Belt Supergroup. However, they typically have higher Sr concentrations (all but one sample exceed 143 ppm). This may be a metamorphic effect, as Sr is known to increase with increasing metamorphic grade in this region (Harrison and Hamilton, 1971). Alternatively, all or some of the metasedimentary rocks of the Priest River complex may predate the Belt Supergroup, as discussed in the previous section. All of the analyses of Columbia River basalt (Table 3) match well with previously published results (Griggs, 1978; Swanson and others, 1979b; Wright and others, 1973, 1979, 1980). Significant differences exist in both major and trace element contents of the different units, but variations within the units are small. One important result was from an analysis of samples collected on Mica Flat southwest of Coeur d'Alene. These samples are from a previously unknown flow with a chemical composition unlike that of the underlying Priest Rapids member.

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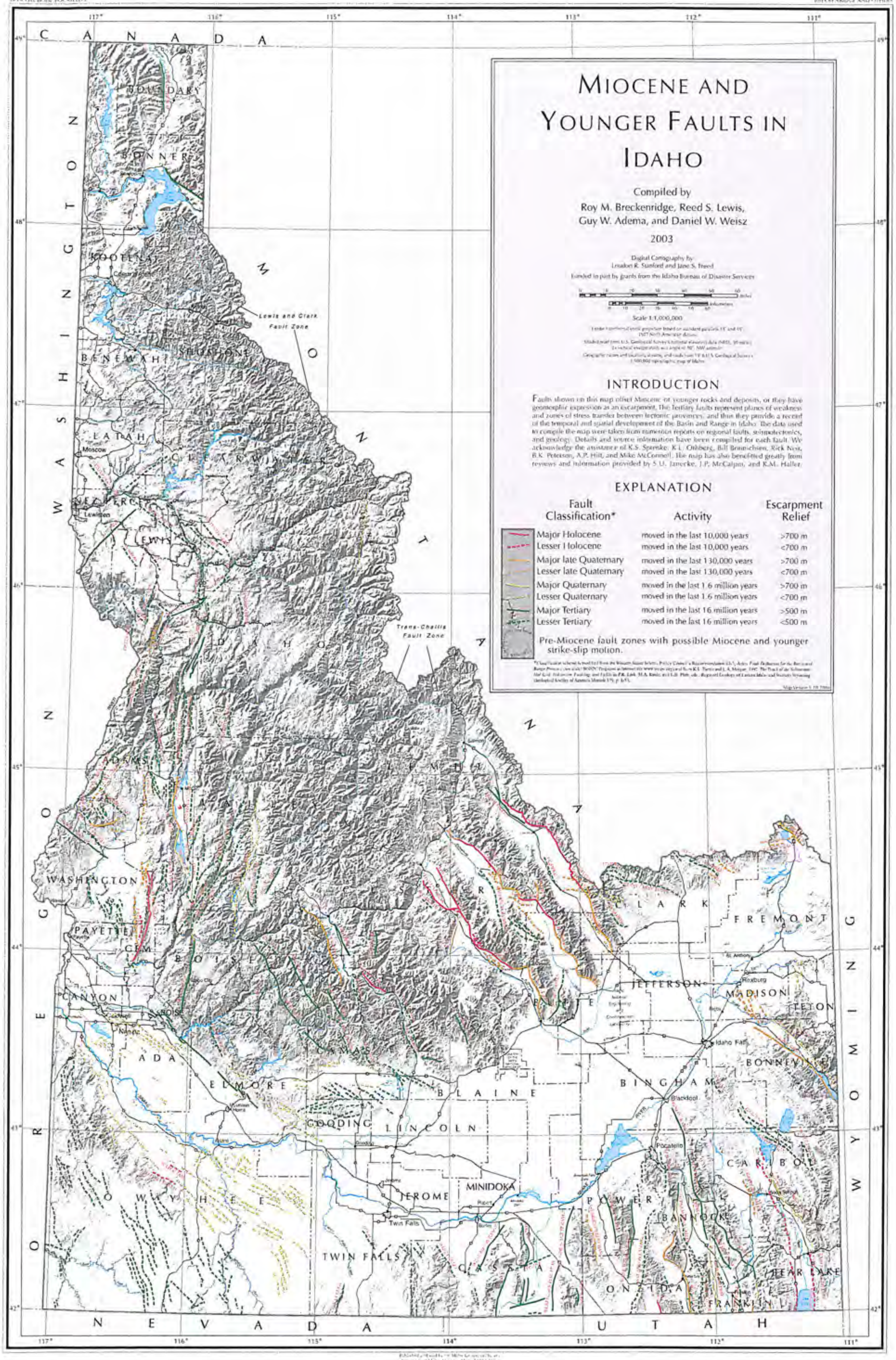
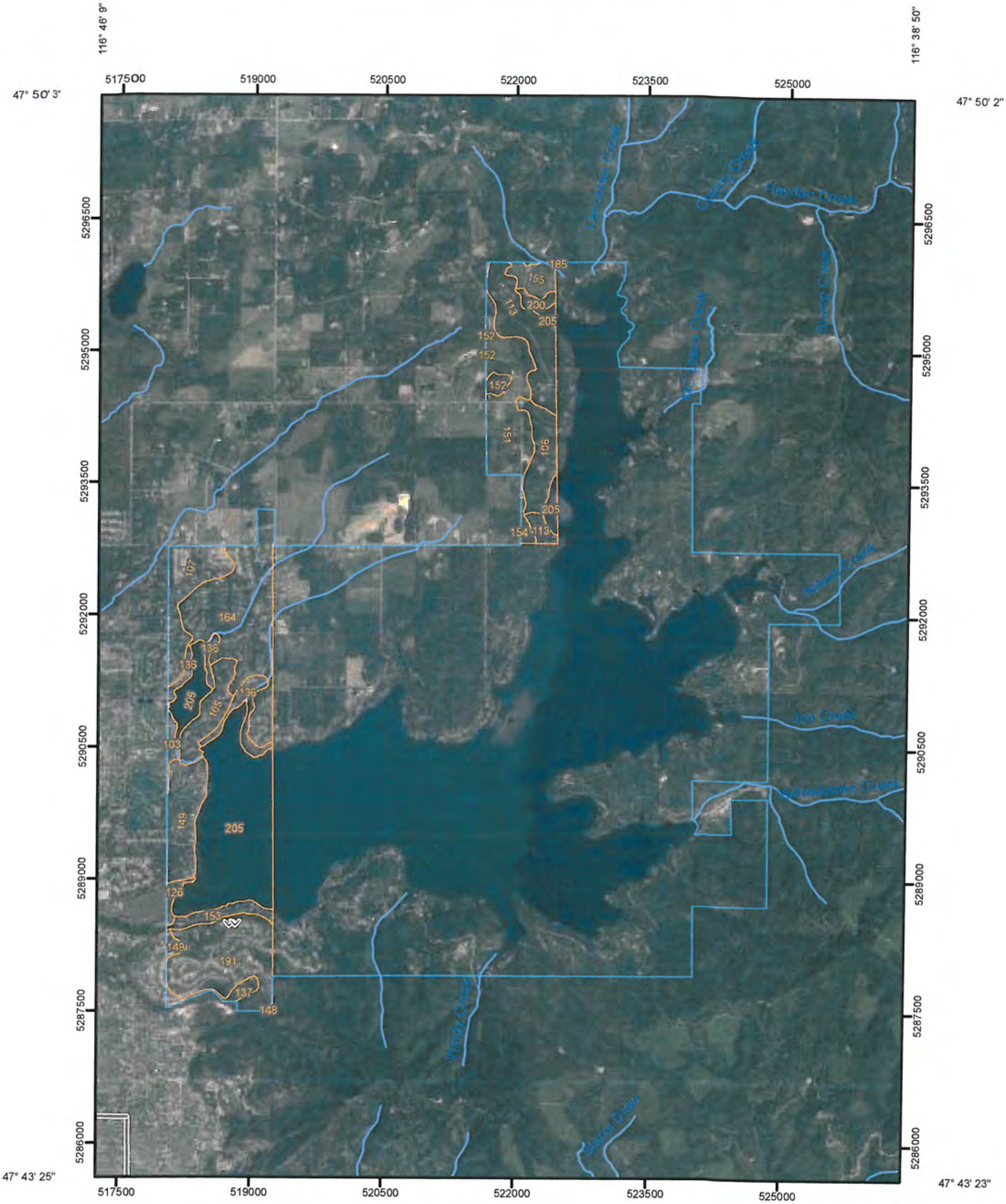

MIOCENE AND YOUNGER FAULTS IN IDAHO
Compiled by
Roy M. Breckenridge, Reed S. Lewis,
Guy W. Adema, and Daniel W. Weisz
2003
Digital Cartography by
Loudon R. Stanford and Jane S. Freed
Funded in part by grants from the Idaho Bureau of Disaster Services
Scale 1:1,000,000
INTRODUCTION
Faults shown on this map offset Miocene or younger rocks and deposits, or they have geomorphic expression as an escarpment. The Tertiary faults represent planes of weakness and zones of stress transfer between tectonic provinces, and thus they provide a record of the temporal and spatial development of the Basin and Range in Idaho. The data used to compile the map were taken from numerous reports on regional faults, seismotectonics, and geology. Details and source information have been compiled for each fault. We acknowledge the assistance of K.S. Sprenke, K.L. Othberg, Bill Bonnichsen, Rick Nest, B.K. Peterson, A.P. Hill, and Mike McConnell. The map has also benefitted greatly from reviews and information provided by S.U. Janecke, J.P. McCalpin, and K.M. Haller.
EXPLANATION
Fault Classification*
Activity
Escarpment Relief
Major Holocene | moved in the last 10,000 years | >700 m
Lesser Holocene | moved in the last 10,000 years | <700 m
Major late Quaternary | moved in the last 130,000 years | >700 m
Lesser late Quaternary | moved in the last 130,000 years | <700 m
Major Quaternary | moved in the last 1.6 million years | >700 m
Lesser Quaternary | moved in the last 1.6 million years | <700 m
Major Tertiary | moved in the last 16 million years | >500 m
Lesser Tertiary | moved in the last 16 million years | <500 m
Pre-Miocene fault zones with possible Miocene and younger strike-slip motion.
CANADA
NEVADA
UTAH
WASHINGTON
OREGON
MONTANA
WYOMING
Lewis and Clark Fault Zone
Trans-Challis Fault Zone
BOUNDARY
BONNER
KOOTENAI
BENEWAH
SHOSHONE
LATAH
CLEARWATER
NEZ PERCE
LEWIS
IDAHO
ADAMS
VALLEY
LEMHI
WASHINGTON
PAYETTE
GEM
BOISE
CANYON
ADA
ELMORE
CAMAS
BLAINE
GOODING
LINCOLN
JEROME
MINIDOKA
OWYHEE
TWIN FALLS
CASSIA
POWER
BANNOCK
ONEIDA
FRANKLIN
BEAR LAKE
CARIBOU
BINGHAM
BONNEVILLE
JEFFERSON
MADISON
TETON
FREMONT
CLARK
BUTTE
CUSTER
Moscow
Lewiston
Boise
Idaho Falls
Pocatello
Twin Falls
Rexburg
Blackfoot
117°
116°
115°
114°
113°
112°
111°
49°
48°
47°
46°
45°
44°
43°
42°

Soil Map—Idaho Panhandle National Forest, Idaho, and Kootenai County Area, Idaho
(HARSB Area (part 1))



Map Scale: 1:58,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 500, 1,000, 2,000, 3,000

Feet: 0, 2,000, 4,000, 8,000, 12,000

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:58,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Idaho Panhandle National Forest. Idaho
Survey Area Data: Not available

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Idaho Panhandle National Forest, Idaho (ID670)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
No soil data available for this soil survey area.			
Subtotals for Soil Survey Area		—	—
Totals for Area of Interest		9,806.4	100.0%

Kootenai County Area, Idaho (ID606)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	15.0	0.2%
105	Blinn loam, 5 to 35 percent slopes, very stony	80.4	0.8%
106	Blinn loam, 35 to 65 percent slopes, very stony	90.4	0.9%
107	Bonner silt loam, 0 to 8 percent slopes	122.4	1.2%
113	Chatcolet cobbly loam, 25 to 65 percent slopes	165.3	1.7%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	14.1	0.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	71.8	0.7%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	18.9	0.2%
148	McCrosket-Tekoa association, 35 to 65 percent slopes	1.4	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes	137.4	1.4%
151	Mokins silt loam, 5 to 20 percent slopes	192.5	2.0%
152	Mokins silt loam, 20 to 35 percent slopes	14.6	0.1%
153	Mokins silt loam, 35 to 65 percent slopes	39.1	0.4%
154	Mokins-Chatcolet complex, 5 to 20 percent slopes	11.2	0.1%
155	Moscow loam, 5 to 35 percent slopes	41.8	0.4%
164	Rubson-Mokins complex, 0 to 20 percent slopes	342.1	3.5%
185	Spokane-Moscow association, 35 to 65 percent slopes	0.0	0.0%
191	Tekoa gravelly silt loam, 35 to 65 percent slopes	244.3	2.5%
200	Vassar-Rock outcrop complex, 20 to 55 percent slopes	16.1	0.2%
205	Water	506.3	5.2%
Subtotals for Soil Survey Area		2,124.9	21.7%
Totals for Area of Interest		9,806.4	100.0%

Soil Map—Kootenai County Area, Idaho
(HARSB Area (part 2))

Map Scale: 1:46,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 400 800 1,600 2,400

Feet: 0 1,500 3,000 6,000 9,000

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:46,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

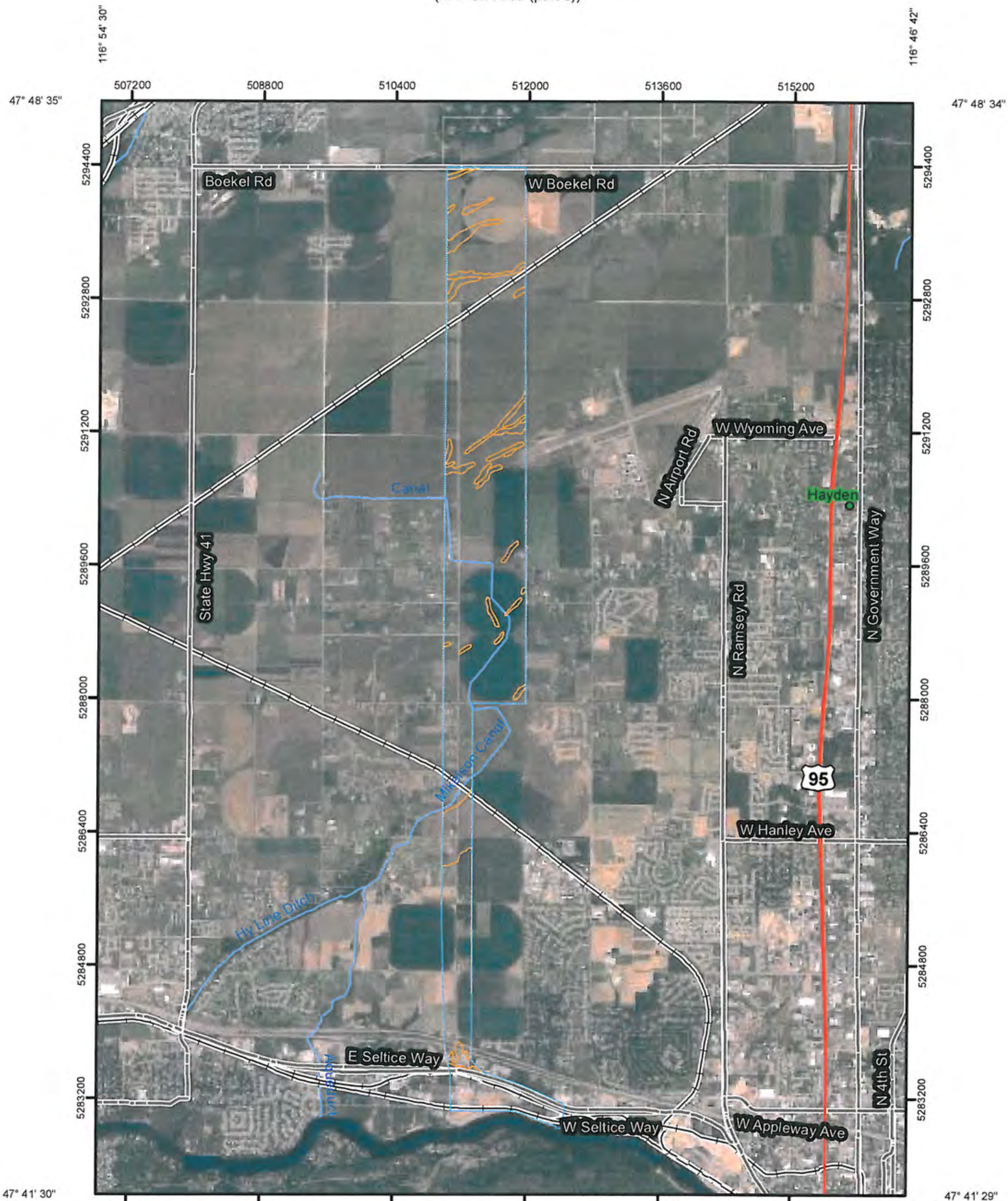
Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Kootenai County Area, Idaho (ID606)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	6,844.2	71.4%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	105.6	1.1%
105	Blinn loam, 5 to 35 percent slopes, very stony	81.1	0.8%
107	Bonner silt loam, 0 to 8 percent slopes	315.8	3.3%
108	Bonner gravelly silt loam, 0 to 8 percent slopes	75.4	0.8%
121	Pits, gravel	26.7	0.3%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	1,065.4	11.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	203.5	2.1%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	50.0	0.5%
149	McGuire-Marble association, 0 to 7 percent slopes	332.7	3.5%
153	Mokins silt loam, 35 to 65 percent slopes	33.2	0.3%
156	Narcisse silt loam, 0 to 5 percent slopes	120.8	1.3%
158	Potlatch silt loam	137.1	1.4%
160	Ramsdell silt loam	49.3	0.5%
161	Rathdrum silt loam, 0 to 7 percent slopes	14.4	0.2%
163	Rock outcrop	121.0	1.3%
173	Seelovers-Potlatch complex	8.7	0.1%
205	Water	0.0	0.0%
Totals for Area of Interest		**9,585.0**	**100.0%**



Map Scale: 1:62,600 if printed on A size (8.5" x 11") sheet.

Meters: 0, 500, 1,000, 2,000, 3,000

Feet: 0, 2,000, 4,000, 8,000, 12,000

N

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:62,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 7/2/2006; 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Kootenai County Area, Idaho (ID606)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
102	Avonville gravelly coarse sandy loam, 0 to 20 percent slopes	57.5	2.8%
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	1,542.4	74.9%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	45.5	2.2%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes	0.8	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes	337.0	16.4%
150	McGuire-Marble association, 20 to 45 percent slopes	12.7	0.6%
156	Narcisse silt loam, 0 to 5 percent slopes	62.4	3.0%
Totals for Area of Interest		**2,058.4**	**100.0%**

Kootenai County Area, Idaho

102—Avonville gravelly coarse sandy loam, 0 to 20 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,400 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 140 to 150 days

Map Unit Composition

Avonville and similar soils: 70 percent

Description of Avonville

Setting

Landform: Outwash terraces
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e

Typical profile

0 to 16 inches: Gravelly ashy coarse sandy loam
16 to 25 inches: Very gravelly silt loam
25 to 37 inches: Extremely gravelly sandy loam
37 to 60 inches: Extremely gravelly sand

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

103—Avonville fine gravelly silt loam, 0 to 7 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,400 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 140 to 150 days

Map Unit Composition

Avonville and similar soils: 70 percent

Description of Avonville

Setting

Landform: Outwash terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability (nonirrigated): 3s

Typical profile

0 to 16 inches: Fine gravelly ashy silt loam
16 to 25 inches: Very gravelly silt loam
25 to 37 inches: Extremely gravelly sandy loam
37 to 60 inches: Extremely gravelly sand

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

104—Avonville fine gravelly silt loam, 7 to 20 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,400 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 140 to 150 days

Map Unit Composition

Avonville and similar soils: 75 percent

Description of Avonville

Setting

Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Properties and qualities

Slope: 7 to 20 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 16 inches: Fine gravelly ashy silt loam
16 to 25 inches: Very gravelly silt loam
25 to 37 inches: Extremely gravelly sandy loam
37 to 60 inches: Extremely gravelly sand

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

105—Blinn loam, 5 to 35 percent slopes, very stony

Map Unit Setting

Elevation: 2,100 to 3,200 feet
Mean annual precipitation: 25 to 28 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 110 days

Map Unit Composition

Blinn, very stony surface, and similar soils: 85 percent

Description of Blinn, Very Stony Surface

Setting

Landform: Escarpments
Landform position (two-dimensional): Backslope, footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over bedrock derived from basalt

Properties and qualities

Slope: 5 to 35 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 11 inches: Loam
11 to 23 inches: Stony loam
23 to 32 inches: Extremely stony loam

32 to 42 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

106—Blinn loam, 35 to 65 percent slopes, very stony

Map Unit Setting

Elevation: 2,100 to 3,200 feet
Mean annual precipitation: 25 to 28 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 110 days

Map Unit Composition

Blinn, very stony surface, and similar soils: 90 percent

Description of Blinn, Very Stony Surface

Setting

Landform: Escarpments
Landform position (two-dimensional): Backslope, footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over bedrock derived from basalt

Properties and qualities

Slope: 35 to 65 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 11 inches: Loam
11 to 23 inches: Stony loam
23 to 32 inches: Extremely stony loam

32 to 42 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

107—Bonner silt loam, 0 to 8 percent slopes

Map Unit Setting

Elevation: 2,000 to 3,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days

Map Unit Composition

Bonner and similar soils: 85 percent

Description of Bonner

Setting

Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or schist and/or gneiss

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/ninebark (CN506)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 10 inches: Ashy silt loam
10 to 20 inches: Gravelly silt loam
20 to 28 inches: Gravelly sandy loam

28 to 62 inches: Very gravelly loamy sand

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

108—Bonner gravelly silt loam, 0 to 8 percent slopes

Map Unit Setting

Elevation: 2,000 to 3,000 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days

Map Unit Composition

Bonner and similar soils: 90 percent

Description of Bonner

Setting

Landform: Outwash terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or schist and/or gneiss

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/ninebark (CN506)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 10 inches: Gravelly ashy silt loam
10 to 20 inches: Gravelly silt loam
20 to 28 inches: Gravelly sandy loam
28 to 62 inches: Very gravelly loamy sand

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

113—Chatcolet cobbly loam, 25 to 65 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 37 to 43 degrees F
Frost-free period: 70 to 90 days

Map Unit Composition

Chatcolet and similar soils: 85 percent

Description of Chatcolet

Setting

Landform: Lake terraces
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Volcanic ash and/or loess over glaciolacustrine deposits and/or lacustrine deposits

Properties and qualities

Slope: 25 to 65 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.7 inches)

Interpretive groups

Other vegetative classification: western redcedar/ladyfern (CN540)

Typical profile

0 to 8 inches: Cobbly loam
8 to 17 inches: Cobbly loam
17 to 60 inches: Silty clay loam

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

121—Pits, gravel

Map Unit Composition

Pits, gravel: 100 percent

Description of Pits, Gravel

Interpretive groups

Land capability (nonirrigated): 8

Typical profile

0 to 60 inches: Gravel, cobbles

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

126—Kootenai gravelly silt loam, 0 to 7 percent slopes

Map Unit Setting

Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days

Map Unit Composition

Kootenai and similar soils: 75 percent

Description of Kootenai

Setting

Landform: Outwash terraces, moraines
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability (nonirrigated): 4s
Other vegetative classification: Douglas-fir/common snowberry (CN310)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 8 inches: Gravelly silt loam
8 to 24 inches: Gravelly silt loam
24 to 28 inches: Very gravelly loam

28 to 62 inches: Extremely gravelly coarse sand

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

127—Kootenai gravelly silt loam, 20 to 45 percent slopes

Map Unit Setting

Elevation: 2,100 to 2,700 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 90 to 120 days

Map Unit Composition

Kootenai and similar soils: 90 percent

Description of Kootenai

Setting

Landform: Outwash terraces, escarpments
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash derived from granite and/or gneiss and/or schist

Properties and qualities

Slope: 20 to 45 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: Douglas-fir/common snowberry (CN310)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 8 inches: Gravelly silt loam
8 to 24 inches: Gravelly silt loam
24 to 28 inches: Very gravelly loam
28 to 62 inches: Extremely gravelly coarse sand

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

136—Lacy-Bobbitt association, 5 to 35 percent slopes, very stony

Map Unit Setting

Elevation: 1,500 to 3,200 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days

Map Unit Composition

Lacy, very stony surface, and similar soils: 55 percent
Bobbitt, very stony surface, and similar soils: 35 percent

Description of Lacy, Very Stony Surface

Setting

Landform: Canyons, escarpments
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loess and/or colluvium over bedrock derived from basalt

Properties and qualities

Slope: 5 to 35 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 8 inches: Gravelly loam
8 to 15 inches: Stony clay loam
15 to 20 inches: Extremely stony clay loam
20 to 30 inches: Bedrock

Description of Bobbitt, Very Stony Surface

Setting

Landform: Mountain slopes, escarpments
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Volcanic ash and/or loess over colluvium over bedrock derived from basalt

Properties and qualities

Slope: 5 to 35 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: Douglas-fir/common snowberry (CN310)

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 11 inches: Stony loam
11 to 36 inches: Very stony clay loam
36 to 46 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

137—Lacy-Bobbitt association, 35 to 65 percent slopes, very stony

Map Unit Setting

Elevation: 1,500 to 3,200 feet
Mean annual precipitation: 22 to 28 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 100 to 140 days

Map Unit Composition

Lacy, very stony surface, and similar soils: 55 percent
Bobbitt, very stony surface, and similar soils: 35 percent

Description of Lacy, Very Stony Surface

Setting

Landform: Canyons, escarpments
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess and/or colluvium over bedrock derived from basalt

Properties and qualities

Slope: 35 to 65 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 8 inches: Gravelly loam
8 to 15 inches: Stony clay loam
15 to 20 inches: Extremely stony clay loam
20 to 30 inches: Bedrock

Description of Bobbitt, Very Stony Surface

Setting

Landform: Mountain slopes, escarpments
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Volcanic ash and/or loess over colluvium over bedrock derived from basalt

Properties and qualities

Slope: 35 to 65 percent
Surface area covered with cobbles, stones or boulders: 2.0 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: Douglas-fir/common snowberry (CN310)

Typical profile

0 to 1 inches: Moderately decomposed plant material
1 to 11 inches: Stony loam
11 to 36 inches: Very stony clay loam
36 to 46 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

148—McCrosket-Tekoa association, 35 to 65 percent slopes

Map Unit Setting

Elevation: 2,000 to 4,000 feet
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 90 to 140 days

Map Unit Composition

Mccrosket and similar soils: 60 percent
Tekoa and similar soils: 35 percent

Description of Mccrosket

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Volcanic ash and/or loess over residuum weathered from metasedimentary rock

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 10 inches: Gravelly silt loam
10 to 48 inches: Extremely cobbly silt loam
48 to 58 inches: Bedrock

Description of Tekoa

Setting

Landform: Mountains, ridges
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash and loess over residuum weathered from quartzite

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 9 inches: Gravelly silt loam
9 to 16 inches: Very gravelly silt loam
16 to 32 inches: Very gravelly silt loam
32 to 42 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

149—McGuire-Marble association, 0 to 7 percent slopes

Map Unit Setting

Elevation: 1,500 to 2,500 feet
Mean annual precipitation: 15 to 26 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 110 to 150 days

Map Unit Composition

Mcguire and similar soils: 60 percent
Marble and similar soils: 30 percent

Description of Mcguire

Setting

Landform: Outwash terraces
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Other vegetative classification: ponderosa pine/common snowberry (CN170)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 9 inches: Gravelly sandy loam
9 to 23 inches: Very gravelly sandy loam
23 to 27 inches: Extremely gravelly coarse sandy loam
27 to 61 inches: Extremely gravelly coarse sand

Description of Marble

Setting

Landform: Outwash terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Reworked sandy outwash

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability (nonirrigated): 4e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 3 inches: Moderately decomposed plant material
3 to 9 inches: Sandy loam
9 to 63 inches: Loamy sand

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

150—McGuire-Marble association, 20 to 45 percent slopes

Map Unit Setting

Elevation: 1,500 to 2,500 feet
Mean annual precipitation: 15 to 26 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 110 to 150 days

Map Unit Composition

Mcguire and similar soils: 70 percent
Marble and similar soils: 25 percent

Description of Mcguire

Setting

Landform: Outwash terraces, escarpments
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Volcanic ash and loess over outwash

Properties and qualities

Slope: 20 to 45 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: ponderosa pine/common snowberry (CN170)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 9 inches: Gravelly sandy loam
9 to 23 inches: Very gravelly sandy loam
23 to 27 inches: Extremely gravelly coarse sandy loam
27 to 61 inches: Extremely gravelly coarse sand

Description of Marble

Setting

Landform: Outwash terraces, escarpments
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Reworked sandy outwash

Properties and qualities

Slope: 20 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 3 inches: Moderately decomposed plant material
3 to 9 inches: Sandy loam
9 to 63 inches: Loamy sand

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

151—Mokins silt loam, 5 to 20 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 80 to 100 days

Map Unit Composition

Mokins and similar soils: 80 percent

Description of Mokins

Setting

Landform: Lake terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over lacustrine deposits

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 8 inches: Silt loam
8 to 16 inches: Gravelly silt loam
16 to 22 inches: Silt loam
22 to 62 inches: Silty clay

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

152—Mokins silt loam, 20 to 35 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 80 to 100 days

Map Unit Composition

Mokins and similar soils: 85 percent

Description of Mokins

Setting

Landform: Lake terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Volcanic ash and loess over lacustrine deposits

Properties and qualities

Slope: 20 to 35 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability (nonirrigated): 6e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 8 inches: Silt loam
8 to 16 inches: Gravelly silt loam
16 to 22 inches: Silt loam
22 to 62 inches: Silty clay

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

153—Mokins silt loam, 35 to 65 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 80 to 100 days

Map Unit Composition

Mokins and similar soils: 90 percent

Description of Mokins

Setting

Landform: Lake terraces, escarpments
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Volcanic ash and loess over lacustrine deposits

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 8 inches: Silt loam
8 to 16 inches: Gravelly silt loam
16 to 22 inches: Silt loam
22 to 62 inches: Silty clay

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

154—Mokins-Chatcolet complex, 5 to 20 percent slopes

Map Unit Setting

Elevation: 2,200 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 70 to 100 days

Map Unit Composition

Mokins and similar soils: 55 percent
Chatcolet and similar soils: 35 percent

Description of Mokins

Setting

Landform: Lake terraces
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Volcanic ash and loess over lacustrine deposits

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 8 inches: Silt loam
8 to 16 inches: Gravelly silt loam
16 to 22 inches: Silt loam
22 to 62 inches: Silty clay

Description of Chatcolet

Setting

Landform: Lake terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Volcanic ash and/or loess over glaciolacustrine deposits and/or lacustrine deposits

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.7 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Other vegetative classification: western redcedar/ladyfern (CN540)

Typical profile

0 to 8 inches: Cobbly loam
8 to 17 inches: Cobbly loam
17 to 60 inches: Silty clay loam

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

155—Moscow loam, 5 to 35 percent slopes

Map Unit Setting

Elevation: 2,200 to 5,000 feet
Mean annual precipitation: 18 to 30 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 80 to 120 days

Map Unit Composition

Moscow and similar soils: 80 percent

Description of Moscow

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and loess over residuum weathered from schist and/or gneiss and/or granite

Properties and qualities

Slope: 5 to 35 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 3 inches: Moderately decomposed plant material
3 to 4 inches: Ashy loam
4 to 26 inches: Loam
26 to 29 inches: Gravelly sandy loam
29 to 39 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

156—Narcisse silt loam, 0 to 5 percent slopes

Map Unit Setting

Elevation: 2,000 to 2,500 feet
Mean annual precipitation: 22 to 26 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 90 to 130 days

Map Unit Composition

Narcisse and similar soils: 80 percent

Description of Narcisse

Setting

Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: 40 to 60 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 36 to 60 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water capacity: High (about 9.4 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 18 inches: Silt loam
18 to 36 inches: Silt loam
36 to 51 inches: Very fine sandy loam
51 to 60 inches: Very cobbly fine sandy loam

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

158—Potlatch silt loam

Map Unit Setting

Elevation: 2,100 to 3,000 feet
Mean annual precipitation: 24 to 35 inches
Mean annual air temperature: 41 to 45 degrees F
Frost-free period: 60 to 110 days

Map Unit Composition

Potlatch and similar soils: 80 percent
Minor components: 10 percent

Description of Potlatch

Setting

Landform: Stream terraces, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed alluvium and/or loess

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 5w

Typical profile

0 to 4 inches: Silt loam
4 to 12 inches: Silt loam
12 to 22 inches: Silt loam
22 to 44 inches: Silty clay
44 to 60 inches: Silty clay loam

Minor Components

Porrett

Percent of map unit: 5 percent
Landform: Flood plains

Seelovers

Percent of map unit: 5 percent
Landform: Flood plains

Other vegetative classification: western redcedar/devil's club (CN550)

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

160—Ramsdell silt loam

Map Unit Setting

Elevation: 2,100 to 2,800 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 80 to 130 days

Map Unit Composition

Ramsdell and similar soils: 90 percent
Minor components: 10 percent

Description of Ramsdell

Setting

Landform: Flood plains, stream terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Mixed alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 9.7 inches)

Interpretive groups

Land capability (nonirrigated): 5w
Other vegetative classification: western redcedar/devil's club (CN550)

Typical profile

0 to 8 inches: Ashy silt loam
8 to 15 inches: Silt loam
15 to 60 inches: Silt loam

Minor Components

Cougarbay

Percent of map unit: 5 percent
Landform: Flood plains

Pywell

Percent of map unit: 5 percent

Landform: Flood plains

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

161—Rathdrum silt loam, 0 to 7 percent slopes

Map Unit Setting

Elevation: 2,000 to 2,600 feet
Mean annual precipitation: 25 to 35 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 90 to 110 days

Map Unit Composition

Rathdrum and similar soils: 85 percent

Description of Rathdrum

Setting

Landform: Outwash terraces, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and/or loess over alluvium and/or outwash

Properties and qualities

Slope: 0 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.7 inches)

Interpretive groups

Land capability classification (irrigated): 3c
Land capability (nonirrigated): 3c
Other vegetative classification: western redcedar/ladyfern (CN540)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 24 inches: Ashy silt loam
24 to 46 inches: Silt loam
46 to 56 inches: Very fine sandy loam
56 to 62 inches: Silt loam

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

163—Rock outcrop

Map Unit Composition
Rock outcrop: 100 percent

Description of Rock Outcrop

Properties and qualities
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups
Land capability (nonirrigated): 8

Typical profile
0 to 60 inches: Bedrock

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

164—Rubson-Mokins complex, 0 to 20 percent slopes

Map Unit Setting

Elevation: 2,100 to 2,800 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 43 to 45 degrees F
Frost-free period: 80 to 135 days

Map Unit Composition

Rubson and similar soils: 55 percent
Mokins and similar soils: 35 percent

Description of Rubson

Setting

Landform: Terraces
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Volcanic ash and/or loess over glaciolacustrine deposits

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.1 inches)

Interpretive groups

Land capability (nonirrigated): 3e
Other vegetative classification: western hemlock/oakfern (CN565)

Typical profile

0 to 6 inches: Silt loam
6 to 16 inches: Silt loam
16 to 60 inches: Silt loam

Description of Mokins

Setting

Landform: Lake terraces
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Volcanic ash and loess over lacustrine deposits

Properties and qualities

Slope: 0 to 20 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change

Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.6 inches)

Interpretive groups

Land capability (nonirrigated): 4e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 8 inches: Silt loam
8 to 16 inches: Gravelly silt loam
16 to 22 inches: Silt loam
22 to 62 inches: Silty clay

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

173—Seelovers-Potlatch complex

Map Unit Setting

Elevation: 2,100 to 3,000 feet
Mean annual precipitation: 24 to 35 inches
Mean annual air temperature: 41 to 46 degrees F
Frost-free period: 60 to 130 days

Map Unit Composition

Seelovers and similar soils: 55 percent
Potlatch and similar soils: 35 percent
Minor components: 7 percent

Description of Seelovers

Setting

Landform: Drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed fine-silty alluvium

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: High (about 11.6 inches)

Interpretive groups

Land capability (nonirrigated): 4w
Other vegetative classification: western redcedar/devil's club (CN550)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 11 inches: Silt loam
11 to 28 inches: Silt loam
28 to 30 inches: Sandy loam
30 to 40 inches: Silty clay loam
40 to 42 inches: Sandy loam
42 to 62 inches: Silty clay loam

Description of Potlatch

Setting

Landform: Drainageways
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Mixed alluvium and/or loess

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to abrupt textural change
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Low (about 4.4 inches)

Interpretive groups

Land capability (nonirrigated): 5w

Typical profile

0 to 4 inches: Silt loam
4 to 12 inches: Silt loam
12 to 22 inches: Silt loam
22 to 44 inches: Silty clay
44 to 60 inches: Silty clay loam

Minor Components

Porrett

Percent of map unit: 3 percent
Landform: Flood plains

Ramsdell

Percent of map unit: 2 percent
Landform: Flood plains
Other vegetative classification: western redcedar/devil's club (CN550)

Pywell

Percent of map unit: 2 percent
Landform: Marshes

Data Source Information

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

185—Spokane-Moscow association, 35 to 65 percent slopes

Map Unit Setting

Elevation: 1,800 to 5,000 feet
Mean annual precipitation: 15 to 30 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 80 to 140 days

Map Unit Composition

Spokane and similar soils: 45 percent
Moscow and similar soils: 35 percent

Description of Spokane

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over residuum weathered from granite and/or gneiss and/or schist

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: Douglas-fir/common snowberry (CN310)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 9 inches: Ashy loam
9 to 28 inches: Gravelly loam
28 to 38 inches: Bedrock

Description of Moscow

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Volcanic ash and loess over residuum weathered from schist and/or gneiss and/or granite

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 6.0 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: grand fir/twinflower (CN590)

Typical profile

0 to 2 inches: Slightly decomposed plant material
2 to 3 inches: Moderately decomposed plant material
3 to 4 inches: Ashy loam
4 to 26 inches: Loam
26 to 29 inches: Gravelly sandy loam
29 to 39 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

191—Tekoa gravelly silt loam, 35 to 65 percent slopes

Map Unit Setting

Elevation: 2,000 to 4,000 feet
Mean annual precipitation: 20 to 30 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 100 to 140 days

Map Unit Composition

Tekoa and similar soils: 90 percent

Description of Tekoa

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Volcanic ash and loess over residuum weathered from quartzite

Properties and qualities

Slope: 35 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: ponderosa pine/Idaho fescue (CN140)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 9 inches: Gravelly silt loam
9 to 16 inches: Very gravelly silt loam
16 to 32 inches: Very gravelly silt loam

32 to 42 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Kootenai County Area, Idaho

200—Vassar-Rock outcrop complex, 20 to 55 percent slopes

Map Unit Setting

Elevation: 2,500 to 5,000 feet
Mean annual precipitation: 30 to 45 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 50 to 110 days

Map Unit Composition

Vassar and similar soils: 55 percent
Rock outcrop: 35 percent

Description of Vassar

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Volcanic ash over residuum weathered from granite and/or gneiss and/or schist

Properties and qualities

Slope: 20 to 55 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 7e
Other vegetative classification: western redcedar/queencup beadlily (CN530)

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 2 inches: Moderately decomposed plant material
2 to 22 inches: Ashy silt loam
22 to 62 inches: Coarse sandy loam

Description of Rock Outcrop

Properties and qualities

Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Typical profile

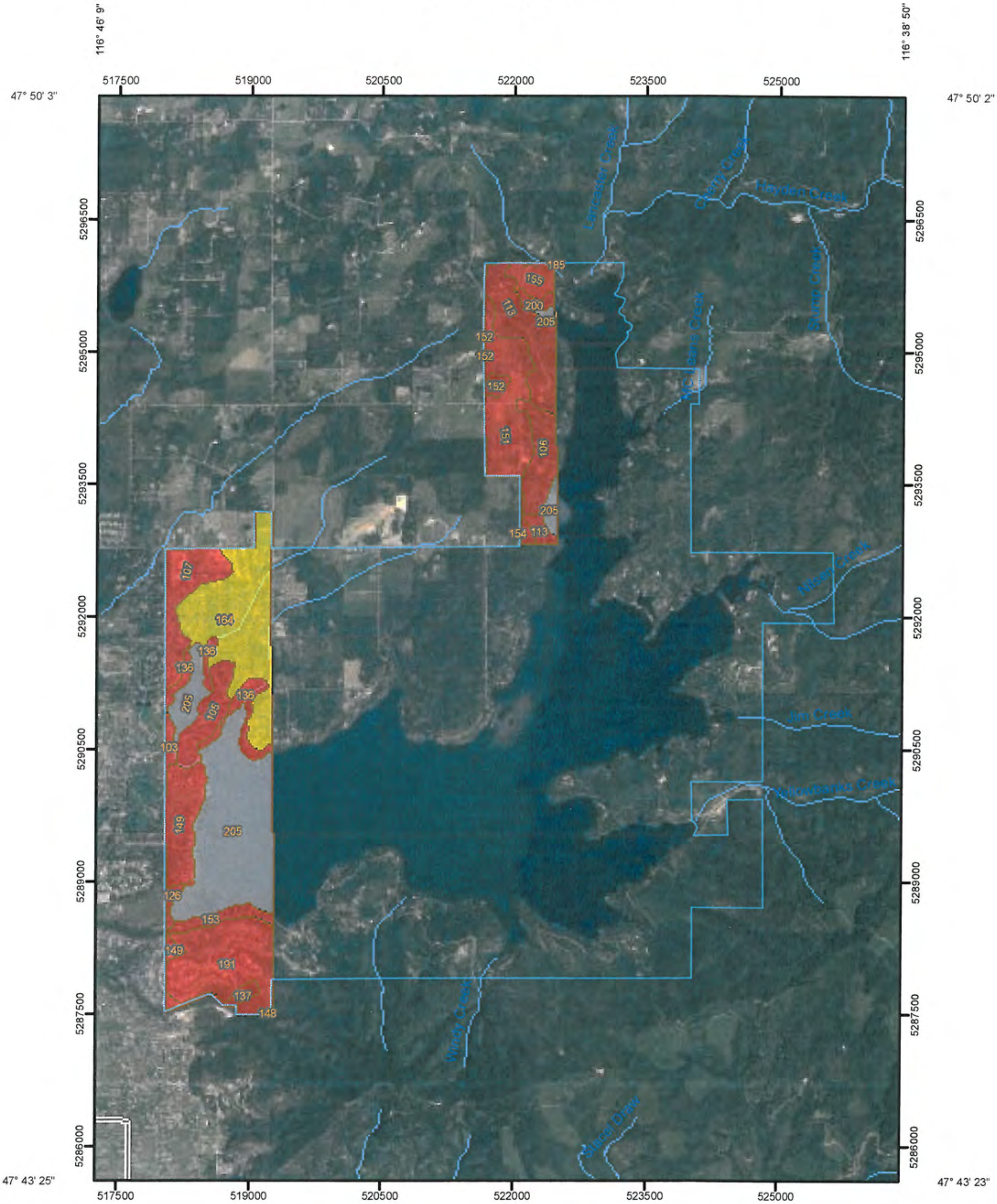
0 to 60 inches: Bedrock

Data Source Information

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Version 0, Jan 1, 0001

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Shallow Excavations—Idaho Panhandle National Forest, Idaho, and Kootenai County Area, Idaho
(HARSB Area (part 1))



Map Scale: 1:58,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 500 1,000 2,000 3,000

Feet: 0 2,000 4,000 8,000 12,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:58,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Not available

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Shallow Excavations

Shallow Excavations— Summary by Map Unit — Idaho Panhandle National Forest, Idaho (ID670)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
No soil data available for this soil survey area.						
Subtotals for Soil Survey Area					—	—
Totals for Area of Interest					9,806.4	100.0%

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Very limited	Avonville (70%)	Unstable excavation walls (1.00)	15.0	0.2%
105	Blinn loam, 5 to 35 percent slopes, very stony	Very limited	Blinn, very stony surface (85%)	Depth to hard bedrock (1.00)	80.4	0.8%
				Slope (1.00)		
				Large stones (0.37)		
				Unstable excavation walls (0.10)		
106	Blinn loam, 35 to 65 percent slopes, very stony	Very limited	Blinn, very stony surface (90%)	Depth to hard bedrock (1.00)	90.4	0.9%
				Slope (1.00)		
				Large stones (0.37)		
				Unstable excavation walls (0.10)		
107	Bonner silt loam, 0 to 8 percent slopes	Very limited	Bonner (85%)	Unstable excavation walls (1.00)	122.4	1.2%
113	Chatcolet cobbly loam, 25 to 65 percent slopes	Very limited	Chatcolet (85%)	Slope (1.00)	165.3	1.7%
				Unstable excavation walls (0.10)		
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	Very limited	Kootenai (75%)	Unstable excavation walls (1.00)	14.1	0.1%

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	Very limited	Lacy, very stony surface (55%)	Depth to hard bedrock (1.00)	71.8	0.7%
				Slope (1.00)		
				Unstable excavation walls (0.10)		
				Large stones (0.03)		
			Bobbitt, very stony surface (35%)	Depth to hard bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.25)		
				Unstable excavation walls (0.10)		
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	Very limited	Lacy, very stony surface (55%)	Depth to hard bedrock (1.00)	18.9	0.2%
				Slope (1.00)		
				Unstable excavation walls (0.10)		
				Large stones (0.03)		
			Bobbitt, very stony surface (35%)	Depth to hard bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.25)		
				Unstable excavation walls (0.10)		
148	McCrosket-Tekoa association, 35 to 65 percent slopes	Very limited	McCrosket (60%)	Slope (1.00)	1.4	0.0%
				Unstable excavation walls (0.10)		
			Tekoa (35%)	Slope (1.00)		
				Unstable excavation walls (1.00)		
				Depth to soft bedrock (0.46)		
149	McGuire-Marble association, 0 to 7 percent slopes	Very limited	McGuire (60%)	Unstable excavation walls (1.00)	137.4	1.4%
			Marble (30%)	Unstable excavation walls (1.00)		
151	Mokins silt loam, 5 to 20 percent slopes	Very limited	Mokins (80%)	Depth to saturated zone (1.00)	192.5	2.0%
				Slope (0.84)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
152	Mokins silt loam, 20 to 35 percent slopes	Very limited	Mokins (85%)	Slope (1.00)	14.6	0.1%
				Depth to saturated zone (1.00)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		
153	Mokins silt loam, 35 to 65 percent slopes	Very limited	Mokins (90%)	Slope (1.00)	39.1	0.4%
				Depth to saturated zone (1.00)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		
154	Mokins-Chatcolet complex, 5 to 20 percent slopes	Very limited	Mokins (55%)	Depth to saturated zone (1.00)	11.2	0.1%
				Slope (0.84)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		
155	Moscow loam, 5 to 35 percent slopes	Very limited	Moscow (80%)	Unstable excavation walls (1.00)	41.8	0.4%
				Slope (1.00)		
				Depth to soft bedrock (0.79)		
164	Rubson-Mokins complex, 0 to 20 percent slopes	Somewhat limited	Rubson (55%)	Slope (0.16)	342.1	3.5%
				Unstable excavation walls (0.10)		
185	Spokane-Moscow association, 35 to 65 percent slopes	Very limited	Spokane (45%)	Slope (1.00)	0.0	0.0%
				Unstable excavation walls (1.00)		
				Depth to soft bedrock (0.71)		
			Moscow (35%)	Slope (1.00)		
				Unstable excavation walls (1.00)		
				Depth to soft bedrock (0.79)		
191	Tekoa gravelly silt loam, 35 to 65 percent slopes	Very limited	Tekoa (90%)	Slope (1.00)	244.3	2.5%
				Unstable excavation walls (1.00)		
				Depth to soft bedrock (0.46)		
200	Vassar-Rock outcrop complex, 20 to 55 percent slopes	Very limited	Vassar (55%)	Slope (1.00)	16.1	0.2%
				Unstable excavation walls (0.10)		

Description

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

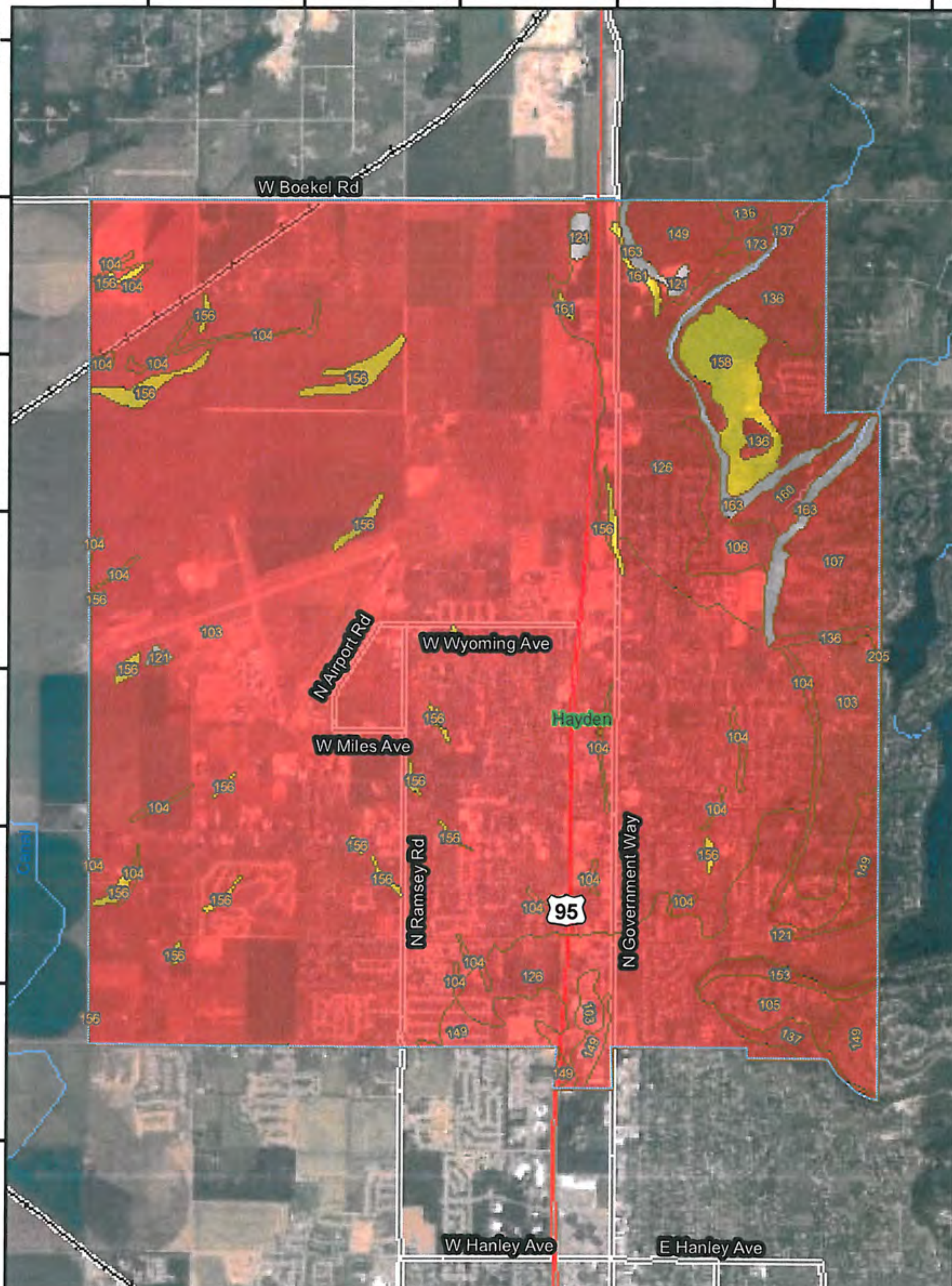
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Shallow Excavations—Kootenai County Area, Idaho
(HARSB Area (part 2))



Map Scale: 1:46,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 400, 800, 1,600, 2,400

Feet: 0, 1,500, 3,000, 6,000, 9,000

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

Very limited

Somewhat limited

Not limited

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:46,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Shallow Excavations

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Very limited	Avonville (70%)	Unstable excavation walls (1.00)	6,844.2	71.4%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	Very limited	Avonville (75%)	Unstable excavation walls (1.00)	105.6	1.1%
				Slope (0.96)		
105	Blinn loam, 5 to 35 percent slopes, very stony	Very limited	Blinn, very stony surface (85%)	Depth to hard bedrock (1.00)	81.1	0.8%
				Slope (1.00)		
				Large stones (0.37)		
				Unstable excavation walls (0.10)		
107	Bonner silt loam, 0 to 8 percent slopes	Very limited	Bonner (85%)	Unstable excavation walls (1.00)	315.8	3.3%
108	Bonner gravelly silt loam, 0 to 8 percent slopes	Very limited	Bonner (90%)	Unstable excavation walls (1.00)	75.4	0.8%
121	Pits, gravel	Not rated	Pits, gravel (100%)		26.7	0.3%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	Very limited	Kootenai (75%)	Unstable excavation walls (1.00)	1,065.4	11.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	Very limited	Lacy, very stony surface (55%)	Depth to hard bedrock (1.00)	203.5	2.1%
				Slope (1.00)		
				Unstable excavation walls (0.10)		
				Large stones (0.03)		
			Bobbitt, very stony surface (35%)	Depth to hard bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.25)		
				Unstable excavation walls (0.10)		

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	**Map unit name**	**Rating**	**Component name (percent)**	**Rating reasons (numeric values)**	**Acres in AOI**	**Percent of AOI**
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	Very limited	Lacy, very stony surface (55%)	Depth to hard bedrock (1.00)	50.0	0.5%
				Slope (1.00)		
				Unstable excavation walls (0.10)		
				Large stones (0.03)		
			Bobbitt, very stony surface (35%)	Depth to hard bedrock (1.00)		
				Slope (1.00)		
				Large stones (0.25)		
				Unstable excavation walls (0.10)		
149	McGuire-Marble association, 0 to 7 percent slopes	Very limited	McGuire (60%)	Unstable excavation walls (1.00)	332.7	3.5%
			Marble (30%)	Unstable excavation walls (1.00)		
153	Mokins silt loam, 35 to 65 percent slopes	Very limited	Mokins (90%)	Slope (1.00)	33.2	0.3%
				Depth to saturated zone (1.00)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		
156	Narcisse silt loam, 0 to 5 percent slopes	Somewhat limited	Narcisse (80%)	Depth to saturated zone (0.61)	120.8	1.3%
				Flooding (0.60)		
				Unstable excavation walls (0.10)		
158	Potlatch silt loam	Somewhat limited	Potlatch (80%)	Depth to saturated zone (1.00)	137.1	1.4%
				Flooding (0.80)		
				Unstable excavation walls (0.10)		
				Too clayey (0.03)		

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
160	Ramsdell silt loam	Very limited	Ramsdell (90%)	Depth to saturated zone (1.00)	49.3	0.5%
				Flooding (0.80)		
				Unstable excavation walls (0.10)		
			Cougarbay (5%)	Depth to saturated zone (1.00)		
				Unstable excavation walls (1.00)		
				Flooding (0.80)		
			Pywell (5%)	Depth to saturated zone (1.00)		
				Organic matter content (1.00)		
				Flooding (0.80)		
161	Rathdrum silt loam, 0 to 7 percent slopes	Somewhat limited	Rathdrum (85%)	Unstable excavation walls (0.10)	14.4	0.2%
163	Rock outcrop	Not rated	Rock outcrop (100%)		121.0	1.3%
173	Seelovers-Potlatch complex	Very limited	Seelovers (55%)	Depth to saturated zone (1.00)	8.7	0.1%
				Flooding (0.80)		
				Unstable excavation walls (0.10)		
			Porrett (3%)	Depth to saturated zone (1.00)		
				Flooding (0.80)		
				Unstable excavation walls (0.10)		
			Ramsdell (2%)	Depth to saturated zone (1.00)		
				Flooding (0.80)		
				Unstable excavation walls (0.10)		
			Pywell (2%)	Depth to saturated zone (1.00)		
				Organic matter content (1.00)		
				Flooding (0.80)		
205	Water	Not rated	Water (100%)		0.0	0.0%
Totals for Area of Interest					**9,585.0**	**100.0%**

Shallow Excavations— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Very limited	9,165.0	95.6%

Shallow Excavations— Summary by Rating Value		
Rating	**Acres in AOI**	**Percent of AOI**
Somewhat limited	272.3	2.8%
Null or Not Rated	147.7	1.5%
Totals for Area of Interest	**9,585.0**	**100.0%**

Description

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

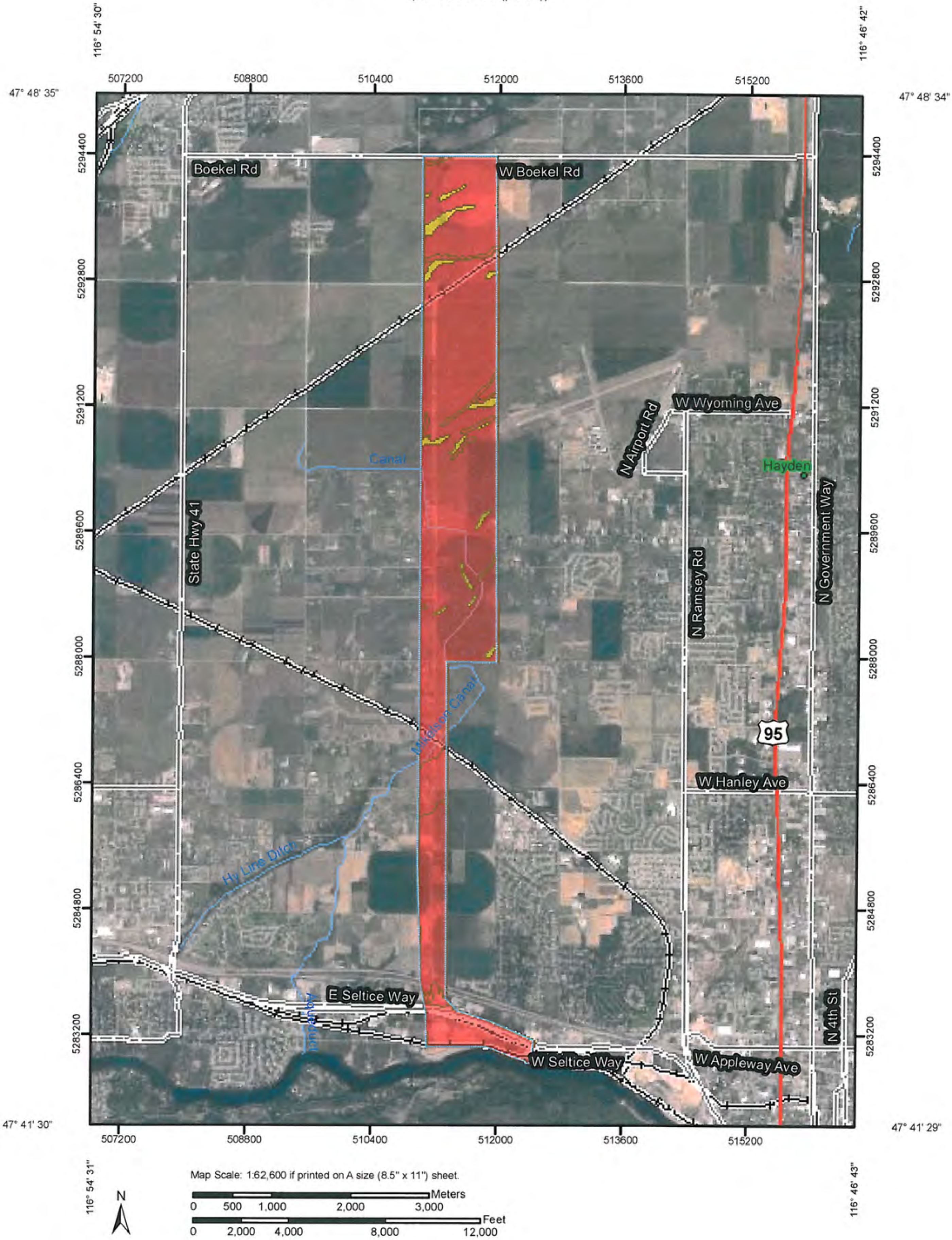
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Shallow Excavations—Kootenai County Area, Idaho
(HARSB Area (part 3))



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:62,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 7/2/2006; 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Shallow Excavations

Shallow Excavations— Summary by Map Unit — Kootenai County Area, Idaho (ID606)						
Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
102	Avonville gravelly coarse sandy loam, 0 to 20 percent slopes	Very limited	Avonville (70%)	Unstable excavation walls (1.00)	57.5	2.8%
				Slope (0.16)		
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Very limited	Avonville (70%)	Unstable excavation walls (1.00)	1,542.4	74.9%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	Very limited	Avonville (75%)	Unstable excavation walls (1.00)	45.5	2.2%
				Slope (0.96)		
127	Kootenai gravelly silt loam, 20 to 45 percent slopes	Very limited	Kootenai (90%)	Slope (1.00)	0.8	0.0%
				Unstable excavation walls (1.00)		
149	McGuire-Marble association, 0 to 7 percent slopes	Very limited	McGuire (60%)	Unstable excavation walls (1.00)	337.0	16.4%
			Marble (30%)	Unstable excavation walls (1.00)		
150	McGuire-Marble association, 20 to 45 percent slopes	Very limited	McGuire (70%)	Slope (1.00)	12.7	0.6%
				Unstable excavation walls (1.00)		
			Marble (25%)	Slope (1.00)		
				Unstable excavation walls (1.00)		
156	Narcisse silt loam, 0 to 5 percent slopes	Somewhat limited	Narcisse (80%)	Depth to saturated zone (0.61)	62.4	3.0%
				Flooding (0.60)		
				Unstable excavation walls (0.10)		
Totals for Area of Interest					**2,058.4**	**100.0%**

Shallow Excavations— Summary by Rating Value		
Rating	Acres in AOI	Percent of AOI
Very limited	1,995.9	97.0%
Somewhat limited	62.4	3.0%
Totals for Area of Interest	**2,058.4**	**100.0%**

Description

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

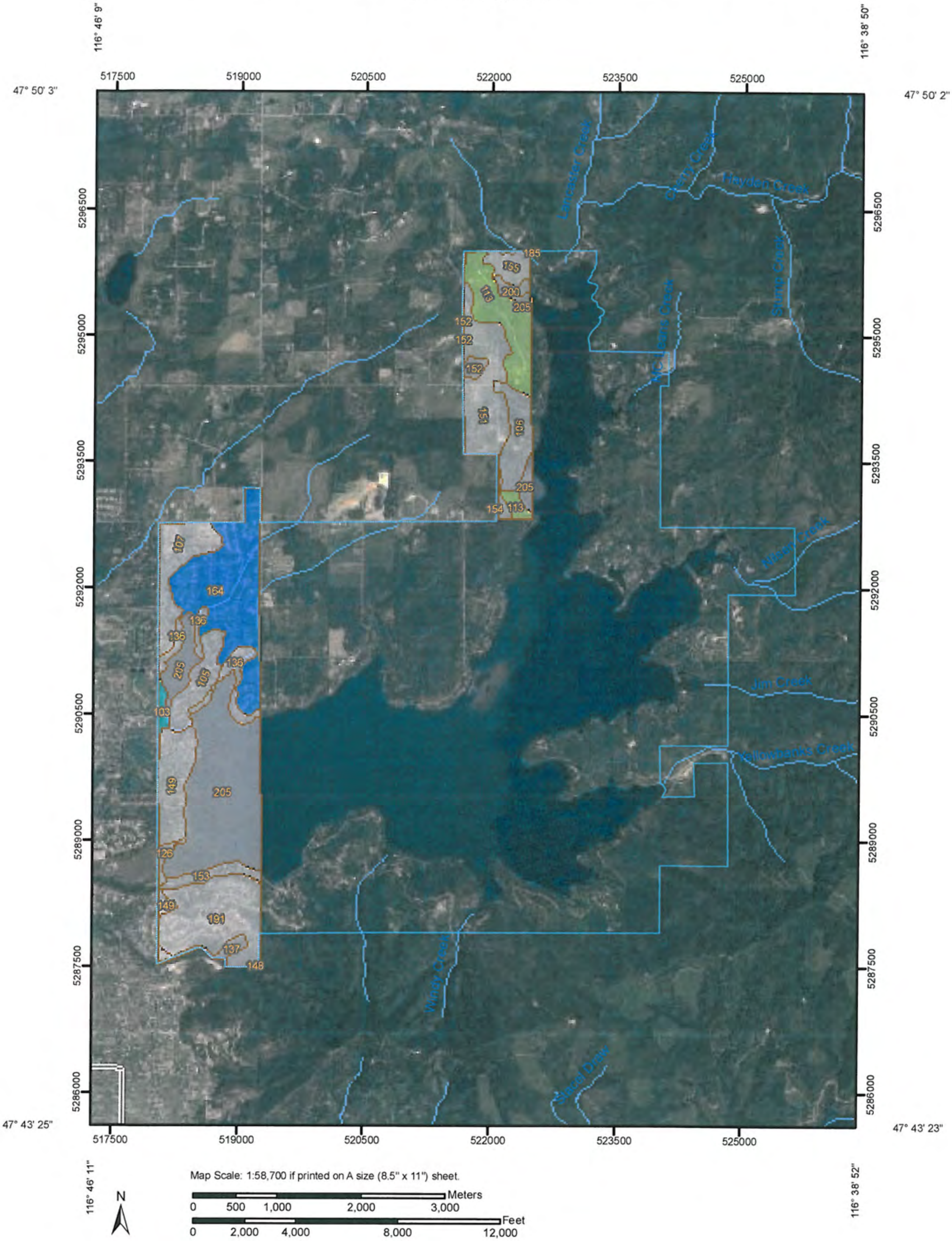
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

K Factor, Whole Soil—Idaho Panhandle National Forest, Idaho, and Kootenai County Area, Idaho
(HARSB Area (part 1))



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:58,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Not available

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Idaho Panhandle National Forest, Idaho (ID670)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
No soil data available for this soil survey area.				
Subtotals for Soil Survey Area			—	—
Totals for Area of Interest			**9,806.4**	**100.0%**

K Factor, Whole Soil— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	.32	15.0	0.2%
105	Blinn loam, 5 to 35 percent slopes, very stony		80.4	0.8%
106	Blinn loam, 35 to 65 percent slopes, very stony		90.4	0.9%
107	Bonner silt loam, 0 to 8 percent slopes		122.4	1.2%
113	Chatcolet cobbly loam, 25 to 65 percent slopes	.24	165.3	1.7%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes		14.1	0.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony		71.8	0.7%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony		18.9	0.2%
148	McCrosket-Tekoa association, 35 to 65 percent slopes		1.4	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes		137.4	1.4%
151	Mokins silt loam, 5 to 20 percent slopes		192.5	2.0%
152	Mokins silt loam, 20 to 35 percent slopes		14.6	0.1%
153	Mokins silt loam, 35 to 65 percent slopes		39.1	0.4%
154	Mokins-Chatcolet complex, 5 to 20 percent slopes		11.2	0.1%
155	Moscow loam, 5 to 35 percent slopes		41.8	0.4%
164	Rubson-Mokins complex, 0 to 20 percent slopes	.49	342.1	3.5%
185	Spokane-Moscow association, 35 to 65 percent slopes		0.0	0.0%
191	Tekoa gravelly silt loam, 35 to 65 percent slopes		244.3	2.5%
200	Vassar-Rock outcrop complex, 20 to 55 percent slopes		16.1	0.2%
205	Water		506.3	5.2%

K Factor, Whole Soil— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
Subtotals for Soil Survey Area			**2,124.9**	**21.7%**
Totals for Area of Interest			**9,806.4**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

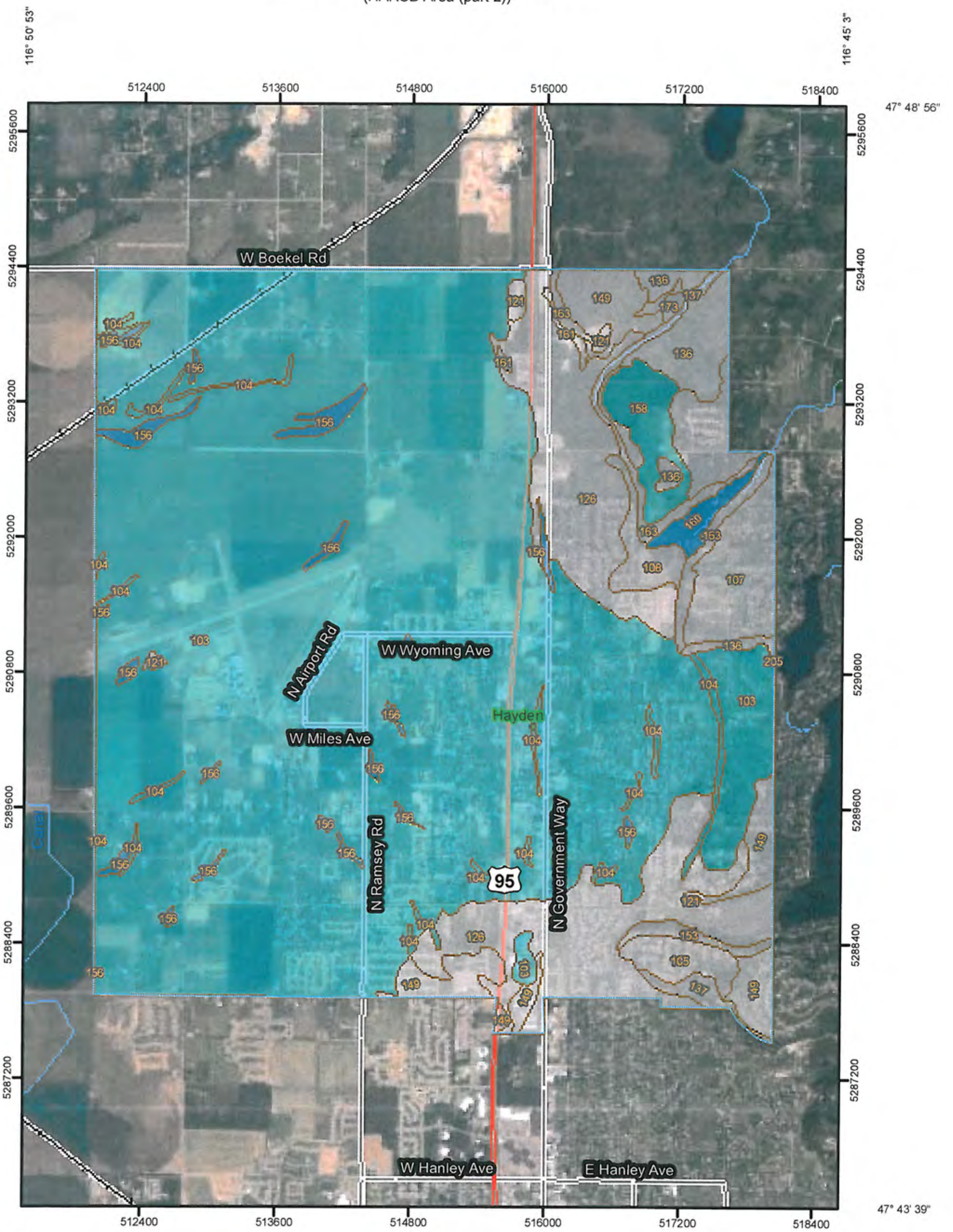
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options: Surface Layer

K Factor, Whole Soil—Kootenai County Area, Idaho
(HARSB Area (part 2))



Map Scale: 1:46,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 400, 800, 1,600, 2,400

Feet: 0, 1,500, 3,000, 6,000, 9,000

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:46,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	.32	6,844.2	71.4%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	.32	105.6	1.1%
105	Blinn loam, 5 to 35 percent slopes, very stony		81.1	0.8%
107	Bonner silt loam, 0 to 8 percent slopes		315.8	3.3%
108	Bonner gravelly silt loam, 0 to 8 percent slopes		75.4	0.8%
121	Pits, gravel		26.7	0.3%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes		1,065.4	11.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony		203.5	2.1%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony		50.0	0.5%
149	McGuire-Marble association, 0 to 7 percent slopes		332.7	3.5%
153	Mokins silt loam, 35 to 65 percent slopes		33.2	0.3%
156	Narcisse silt loam, 0 to 5 percent slopes	.43	120.8	1.3%
158	Potlatch silt loam	.32	137.1	1.4%
160	Ramsdell silt loam	.43	49.3	0.5%
161	Rathdrum silt loam, 0 to 7 percent slopes		14.4	0.2%
163	Rock outcrop		121.0	1.3%
173	Seelovers-Potlatch complex		8.7	0.1%
205	Water		0.0	0.0%
Totals for Area of Interest			**9,585.0**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

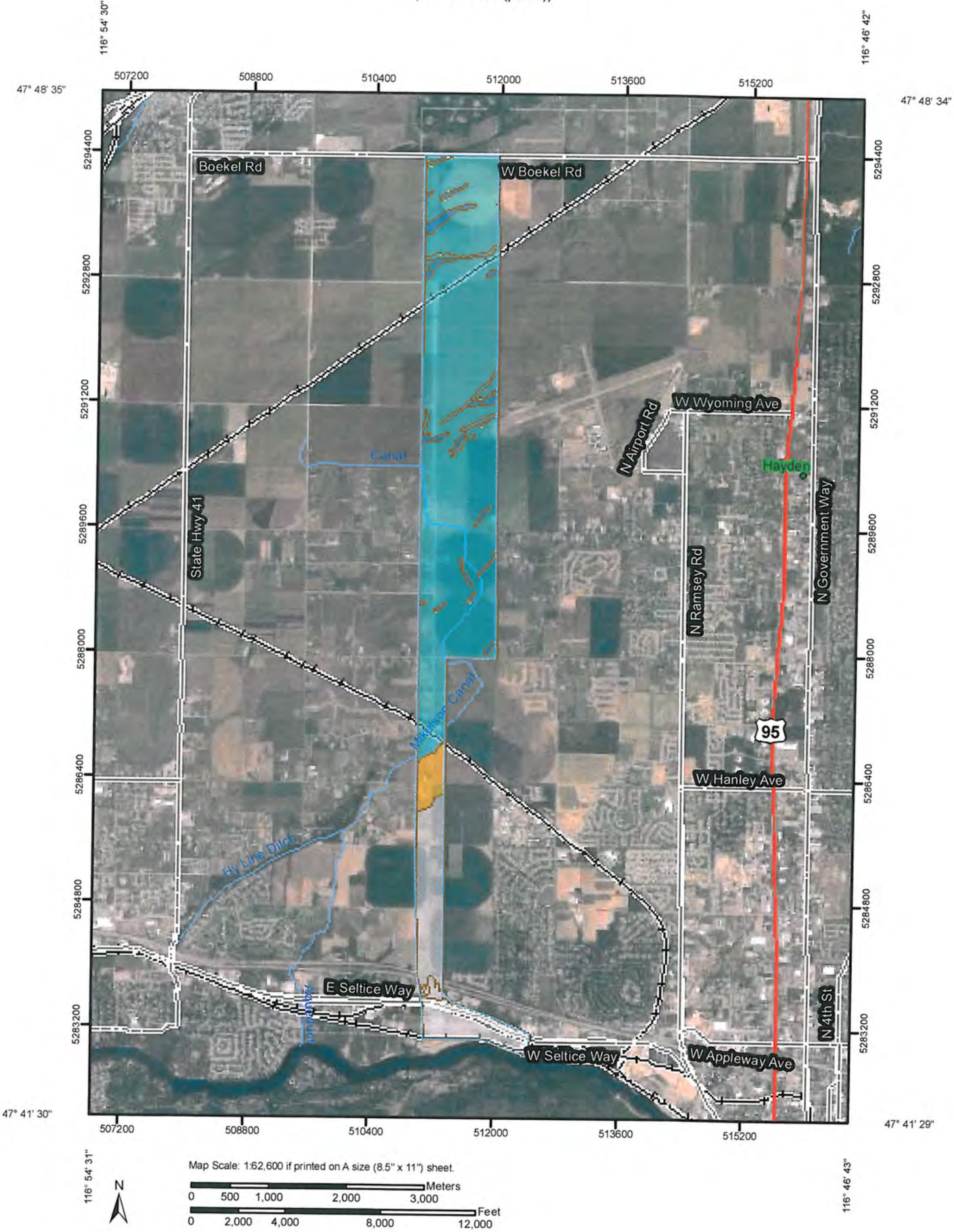
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Layer Options: Surface Layer

K Factor, Whole Soil—Kootenai County Area, Idaho
(HARSB Area (part 3))



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

.02

.05

.10

.15

.17

.20

.24

.28

.32

.37

.43

.49

.55

.64

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

MAP INFORMATION

Map Scale: 1:62,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 7/2/2006; 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
102	Avonville gravelly coarse sandy loam, 0 to 20 percent slopes	.15	57.5	2.8%
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	.32	1,542.4	74.9%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	.32	45.5	2.2%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes		0.8	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes		337.0	16.4%
150	McGuire-Marble association, 20 to 45 percent slopes		12.7	0.6%
156	Narcisse silt loam, 0 to 5 percent slopes	.43	62.4	3.0%
Totals for Area of Interest			**2,058.4**	**100.0%**

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

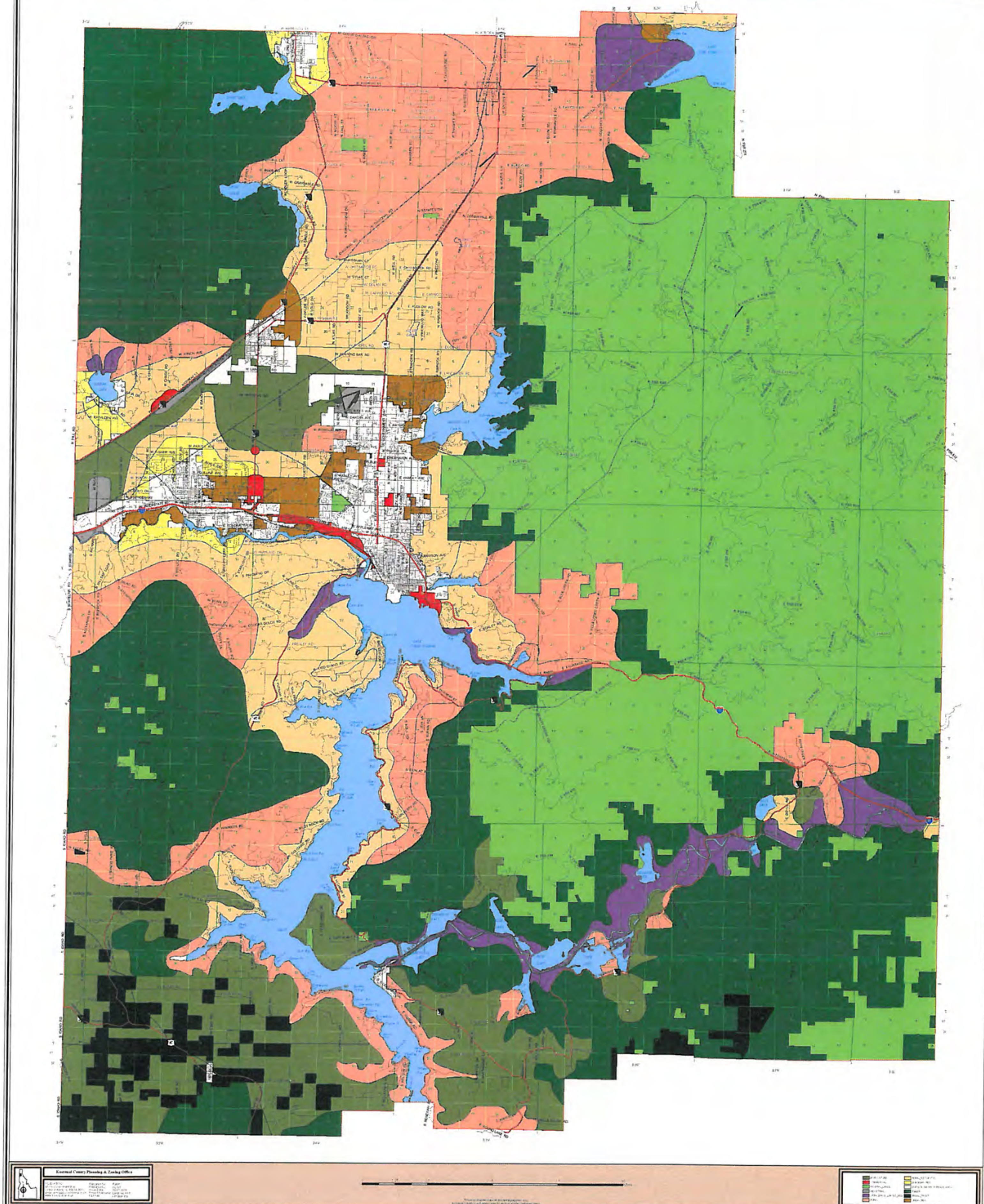
Tie-break Rule: Higher

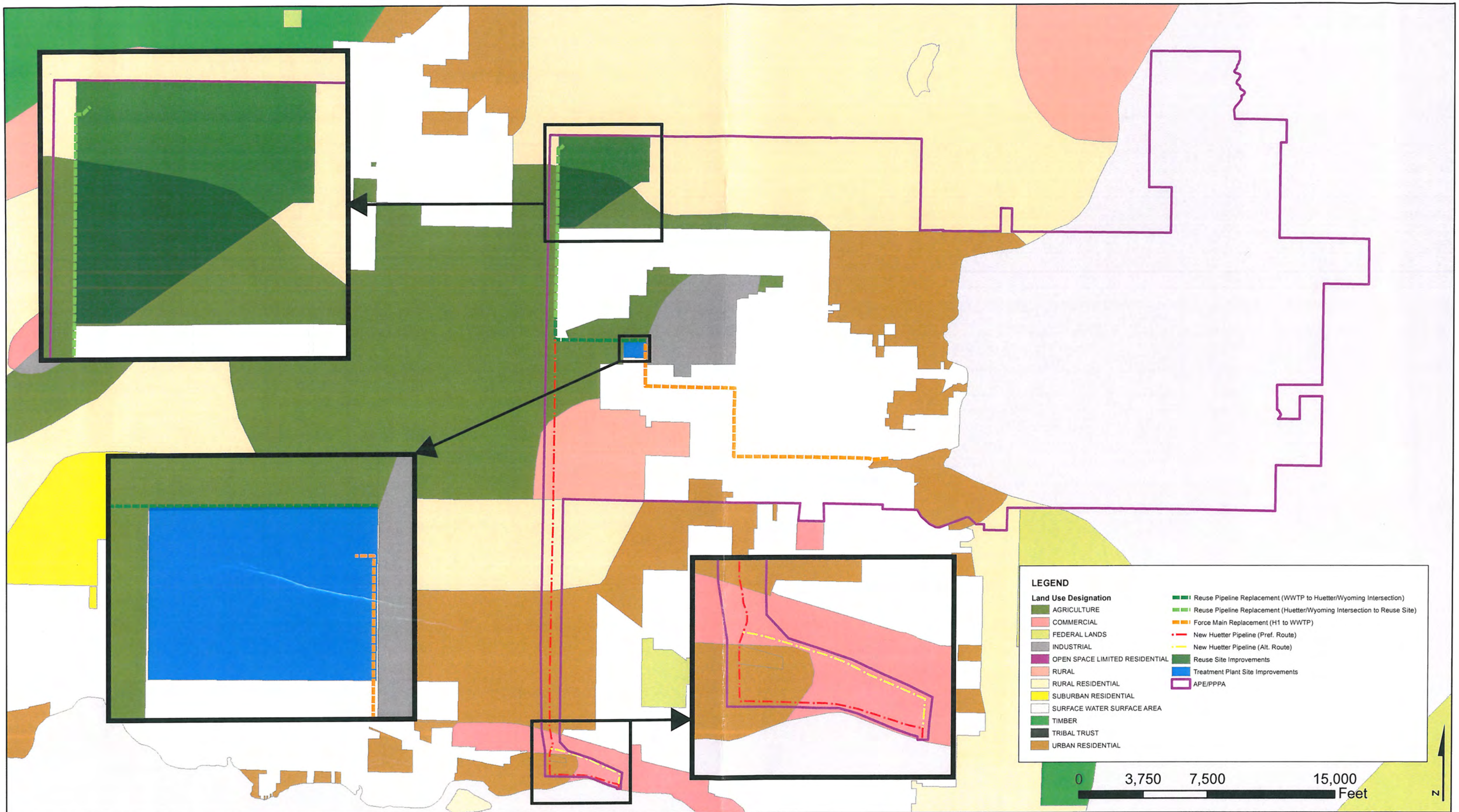
Layer Options: Surface Layer

APPENDIX F

Land Use Information

Kootenai County Comprehensive Plan
Land Use





Sources:
Idaho State Tax Commission
Kootenai County GIS Department

WELCH-COMER
ENGINEERS | SURVEYORS

www.welchcomer.com
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

208-664-9382
(toll free) 877-815-5762
(fax) 208-664-5946

HARSB

Land Use (Kootenai County)

PROJECT NO.....................................41104
DRAWN BY...AW
FILENAME..LandUse_11x17L
DATE..11/14/12

FUTURE LAND USE MAP LEGEND

Central Business District: Activities that are pedestrian-friendly and require minimal parking areas. A well defined mix of uses, including small scale retail activity, restaurants, professional services and other activities that enhance the future identity of the corridor as the downtown "Main Street" business district. Promote a mixture of activities, including residential uses on upper floors of multi-storied buildings in the district and community activity centers.

General Commercial: Retail and service oriented activities that are primarily accessed by vehicle and may require larger parking and/or service areas than that required in the Central Business District. Any manufacturing and processing activity shall be directly related to onsite retail and professional services

Highway Commercial: Commercial activities dependent on high visibility and oriented to servicing traffic along Highway 95, as well as the community. Retail and service oriented activities that are primarily accessed by vehicle and that may require a moderate amount of parking and service areas and have an acceptable impact on local roads.

Light Industrial: Manufacturing and wholesale businesses. Activities include manufacturing, processing, fabrication, assemblage, warehousing, freight-handling and similar operations.

Low-Impact Commercial/Light Industrial: Commercial and light industrial activity with minimal aesthetic impact from noise, odor and visual character. Commercial and light industrial activities that are customer-oriented and do not require large parking areas or large service areas. Types of allowed activities include, but are not limited to, service-oriented businesses, retail and low-impact light industrial manufacturing.

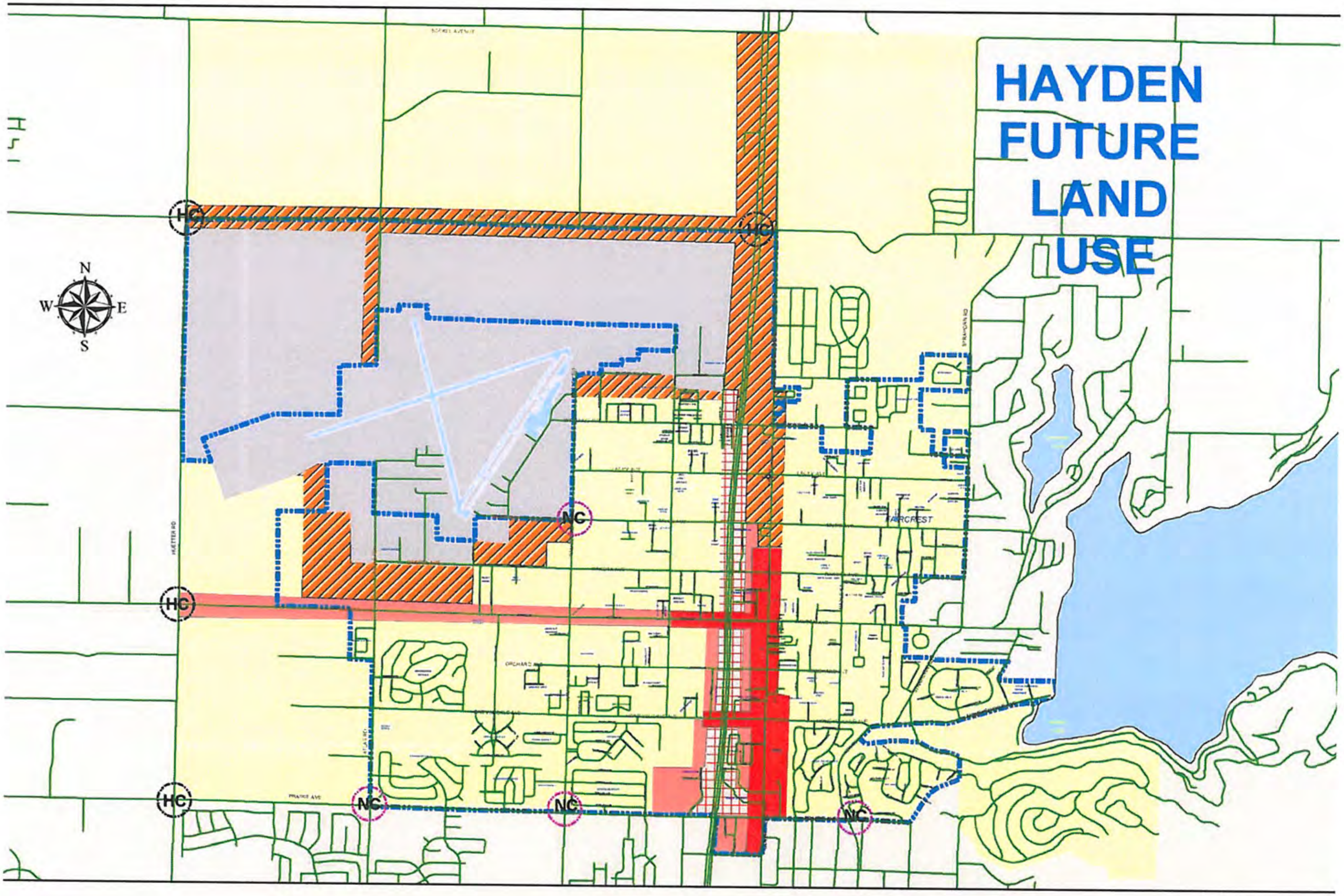
Neighborhood Commercial Overlay District: Neighborhood-oriented business located in small pockets at the intersection of arterial & collector streets within residential neighborhoods, as may be allowed through special use permit. Commercial activities include retail and professional service businesses designed to provide local service to residential areas, with limited hours of operation, signage, building dimensions, and parking, as may be appropriate for a residential neighborhood.

Highway Commercial Overlay District: Commercial activities dependent on high visibility and oriented to servicing traffic, located at designated intersections with planned interchanges, to be allowed by special permit only after the construction of the interchange proposed for said intersection.

Residential: Areas where a variety of residential types and densities are allowed, ranging from larger lots to higher densities, as based upon the Residential Densities Map.

PLEASE NOTE: The boundaries delineating types of uses are not finite but outline a general area for designated activities. Boundary lines for types of use are generally within three hundred feet (300) feet of delineating the proposed area.

FUTURE LAND USE MAP



FUTURE RESIDENTIAL DENSITY MAP

LEGEND RESIDENTIAL DENSITIES MAP

Low Density: Average density of 1 to 4 dwelling units per acre [1,2]

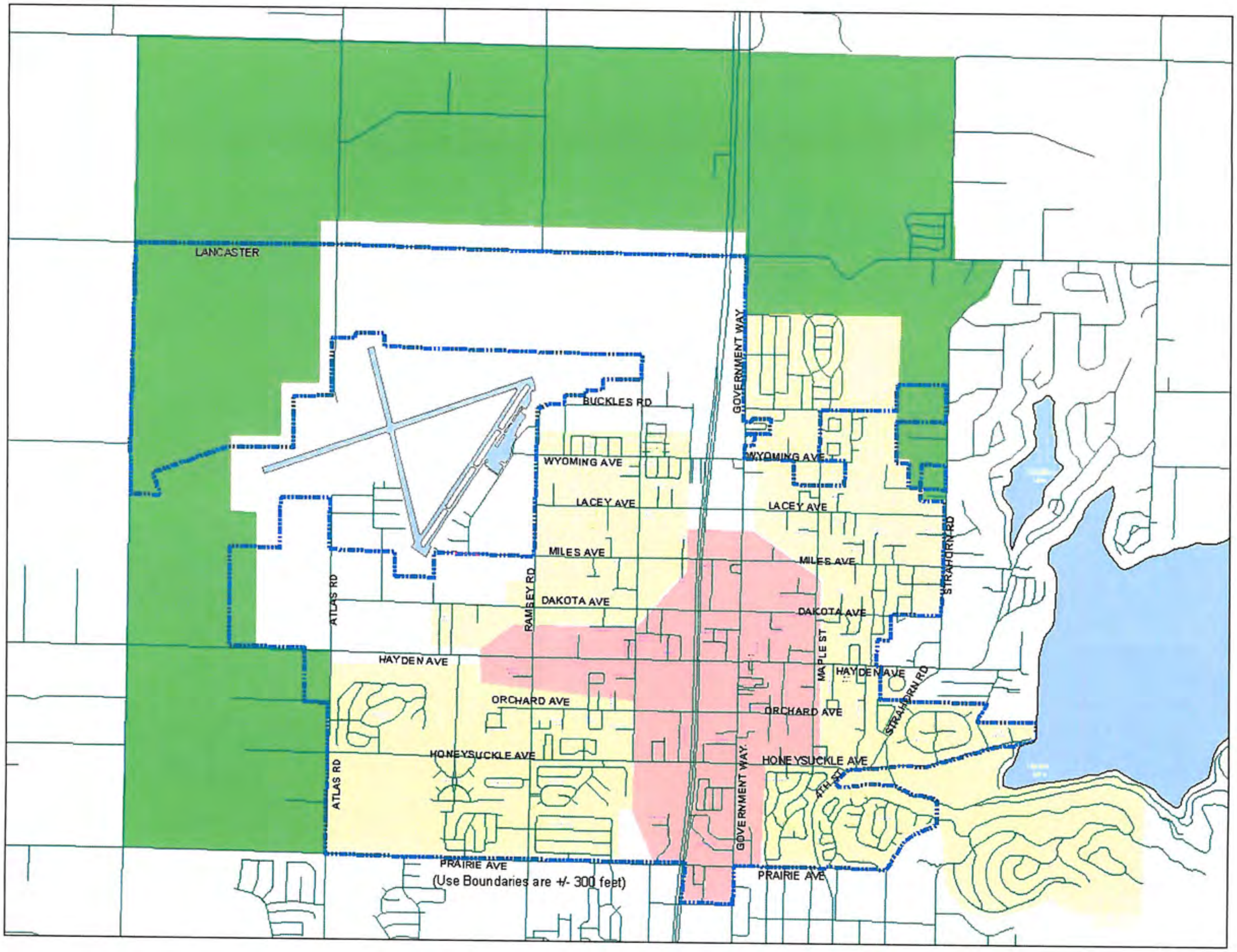
Medium Density: Average density of 4 to 7 dwelling units per acre [2]

High Density: Average density of 7 to 12 dwelling units per acre [2]

Note 1: North of Lancaster, for average densities of greater than 2 units to the acre, a controlled access MUST be installed at the intersection of Lancaster Road & US 95, or an equivalent transportation system mitigation must be implemented. In all other areas, for average densities of greater than 2 units per acre, the developer MUST demonstrate the adequacy of the transportation system to handle the cumulative traffic impacts with such a density of development.

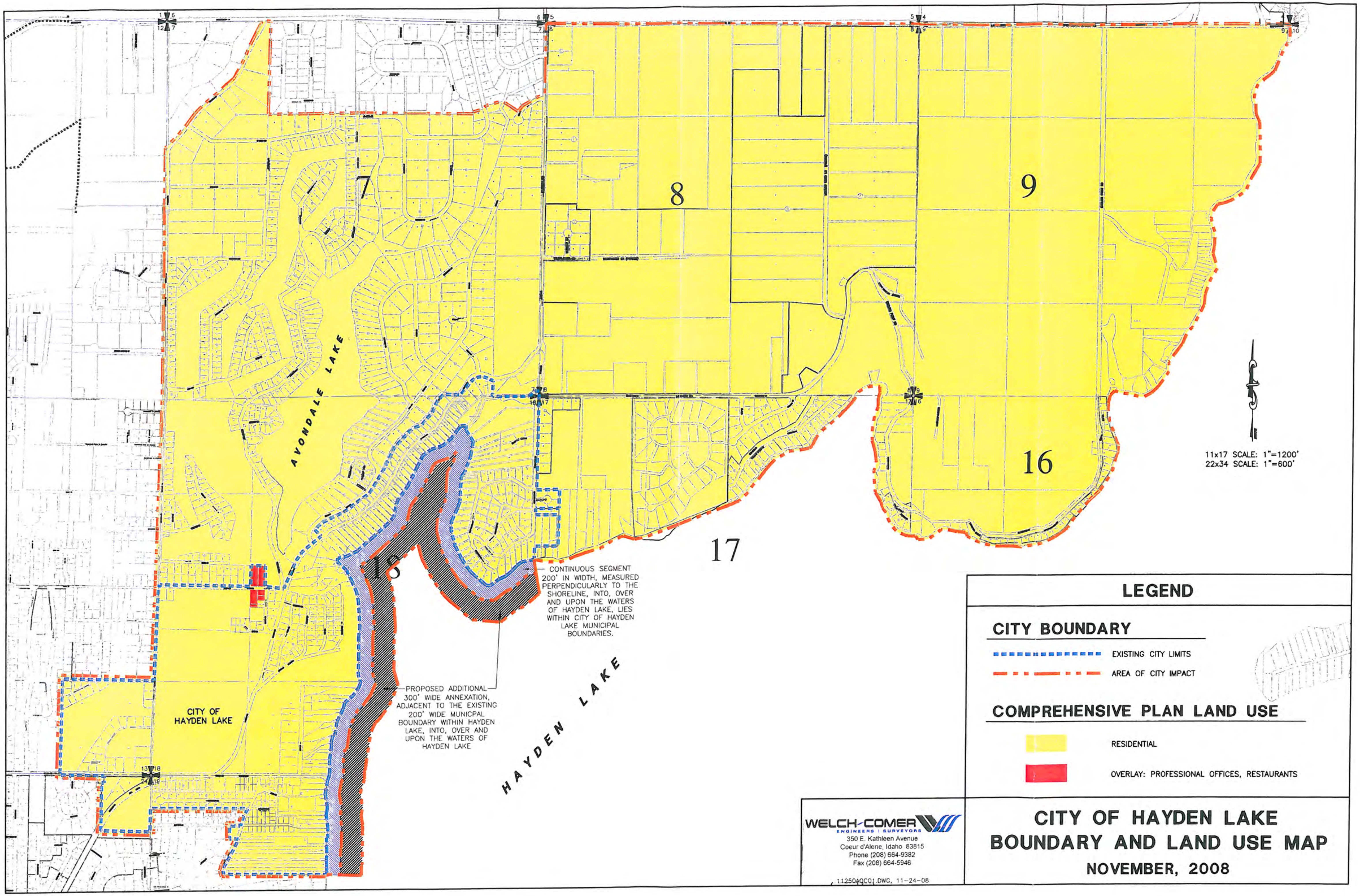
Note 2: Mid-range to higher-range densities of development as identified in each category listed above will only be allowed in appropriate areas when balanced with:

- Dedicated public space, common areas, and park facilities, with connected green space between developments;
- Quality of development, design features and architectural styles;
- Clustered development, mixed use concepts, provision of affordable housing and/or a variety of housing types; and,
- Adequacy of transportation network, with an emphasis on connectivity and walk-ability.



City of Hayden

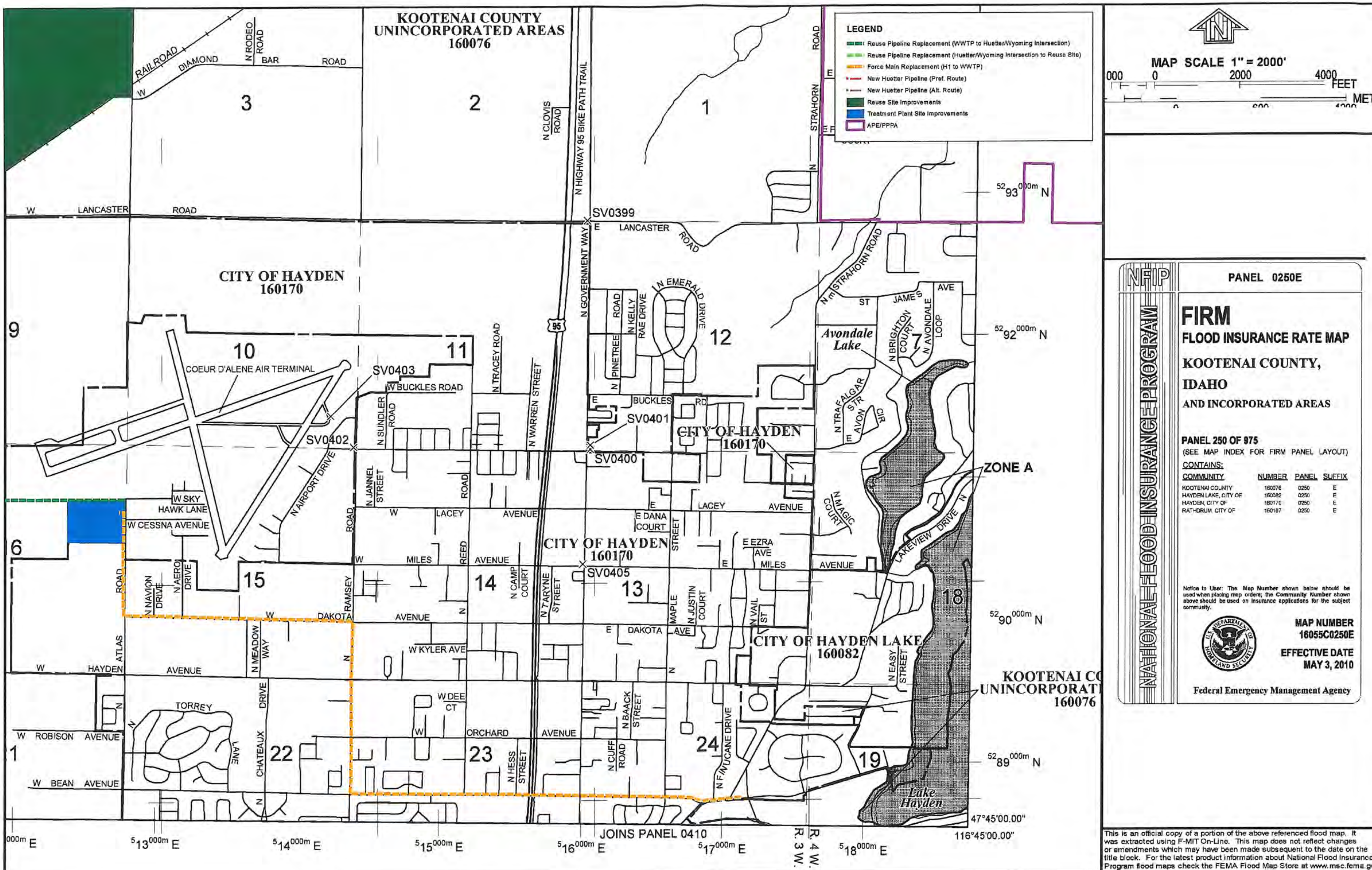
Future Residential Densities



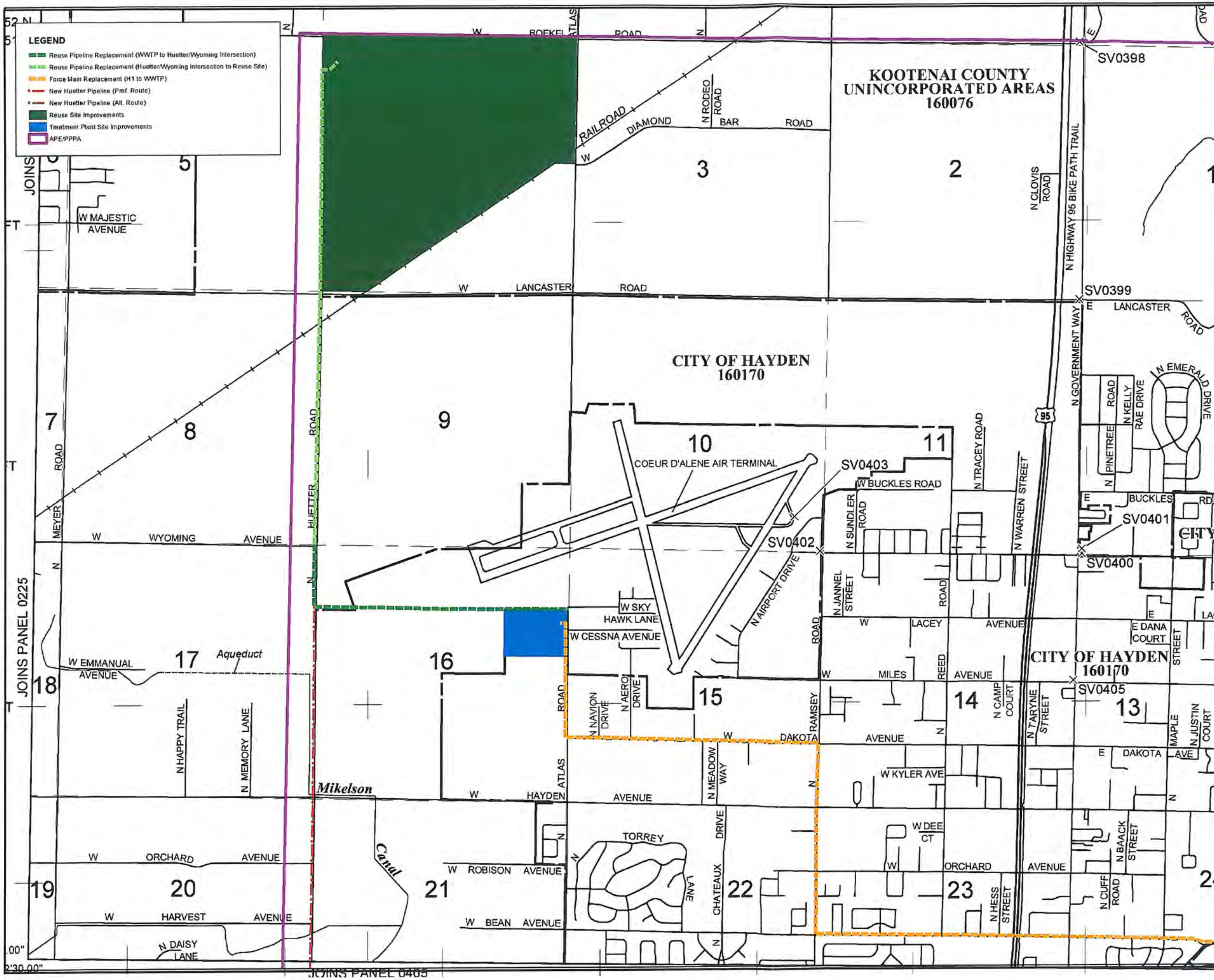
7
8
9
16
17
18
AVONDALE LAKE
HAYDEN LAKE
CITY OF HAYDEN LAKE
CONTINUOUS SEGMENT 200' IN WIDTH, MEASURED PERPENDICULARLY TO THE SHORELINE, INTO, OVER AND UPON THE WATERS OF HAYDEN LAKE, LIES WITHIN CITY OF HAYDEN LAKE MUNICIPAL BOUNDARIES.
PROPOSED ADDITIONAL 300' WIDE ANNEXATION, ADJACENT TO THE EXISTING 200' WIDE MUNICIPAL BOUNDARY WITHIN HAYDEN LAKE, INTO, OVER AND UPON THE WATERS OF HAYDEN LAKE
11x17 SCALE: 1"=1200'
22x34 SCALE: 1"=600'
LEGEND
CITY BOUNDARY
EXISTING CITY LIMITS
AREA OF CITY IMPACT
COMPREHENSIVE PLAN LAND USE
RESIDENTIAL
OVERLAY: PROFESSIONAL OFFICES, RESTAURANTS
WELCH-COMER
ENGINEERS | SURVEYORS
350 E. Kathleen Avenue
Coeur d'Alene, Idaho 83815
Phone (208) 664-9382
Fax (208) 664-5946
11250AQC01.DWG, 11-24-08
CITY OF HAYDEN LAKE
BOUNDARY AND LAND USE MAP
NOVEMBER, 2008

APPENDIX G

Floodplains and Wetlands Maps



LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetter Pipeline (Pref. Route)
New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 2000'
FEET
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
CITY OF HAYDEN
160170
CITY OF HAYDEN LAKE
160082
COEUR D'ALENE AIR TERMINAL
ZONE A
Avondale Lake
Lake Hayden
SV0399
SV0400
SV0401
SV0402
SV0403
SV0405
W LANCASTER ROAD
W DIAMOND BAR ROAD
RAILROAD
N HIGHWAY 95 BIKE PATH TRAIL
N GOVERNMENT WAY
N STRAHORN ROAD
W BUCKLES ROAD
W LACEY AVENUE
W MILES AVENUE
W DAKOTA AVENUE
W HAYDEN AVENUE
W ORCHARD AVENUE
W ROBISON AVENUE
W BEAN AVENUE
LAKEVIEW DRIVE
JOINS PANEL 0410
R. 4 W.
R. 3 W.
47°45'00.00"
116°45'00.00"
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0250E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 250 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0250 E
HAYDEN LAKE, CITY OF 160082 0250 E
HAYDEN, CITY OF 160170 0250 E
RATHDRUM, CITY OF 160187 0250 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
16055C0250E
EFFECTIVE DATE
MAY 3, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



NFIP

PANEL 0250E

FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 250 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KOOTENAI COUNTY	160076	0250	E
HAYDEN LAKE, CITY OF	160082	0250	E
HAYDEN, CITY OF	160170	0250	E
RATHDRUM, CITY OF	160187	0250	E

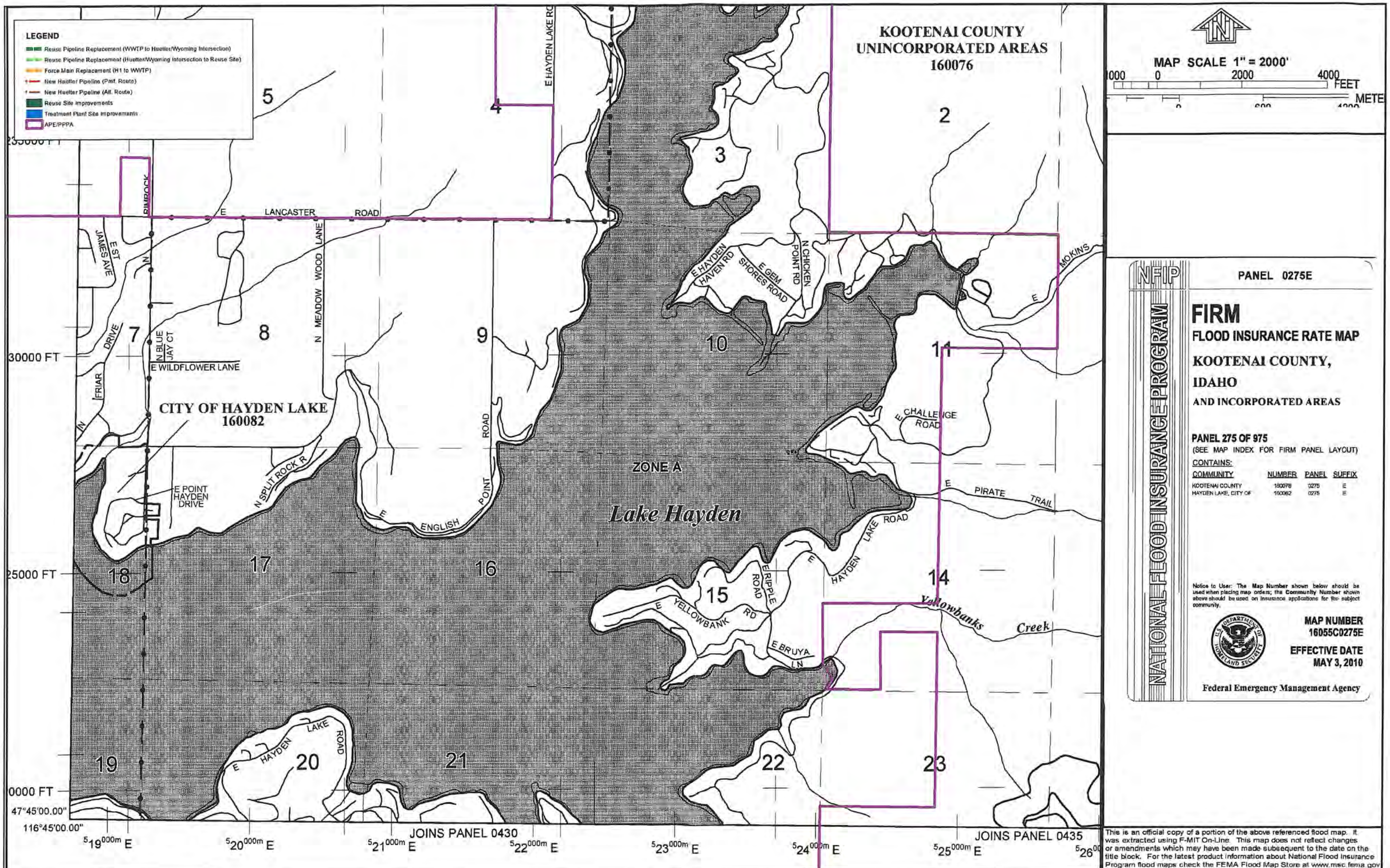
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

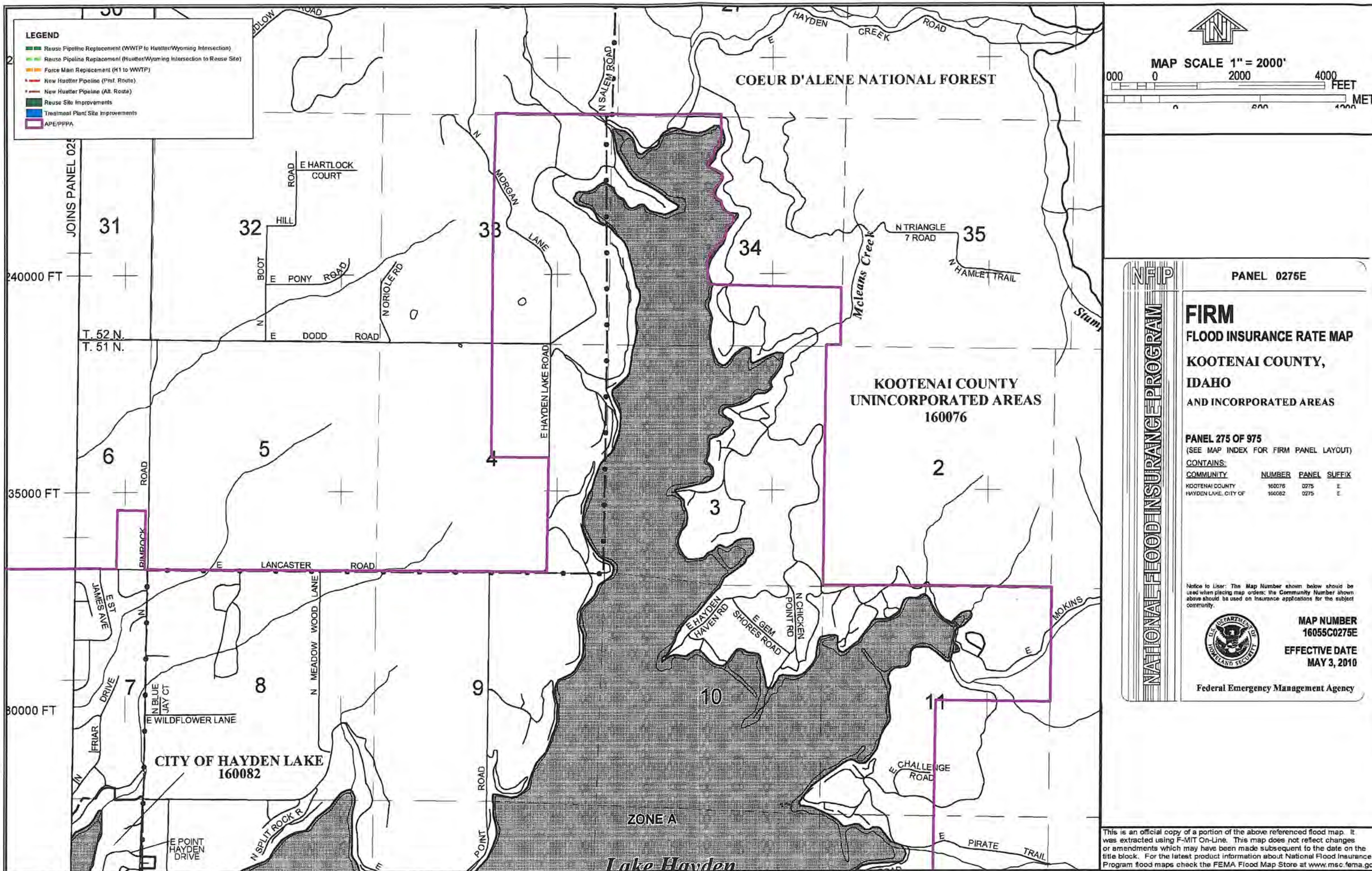
MAP NUMBER
16055C0250E

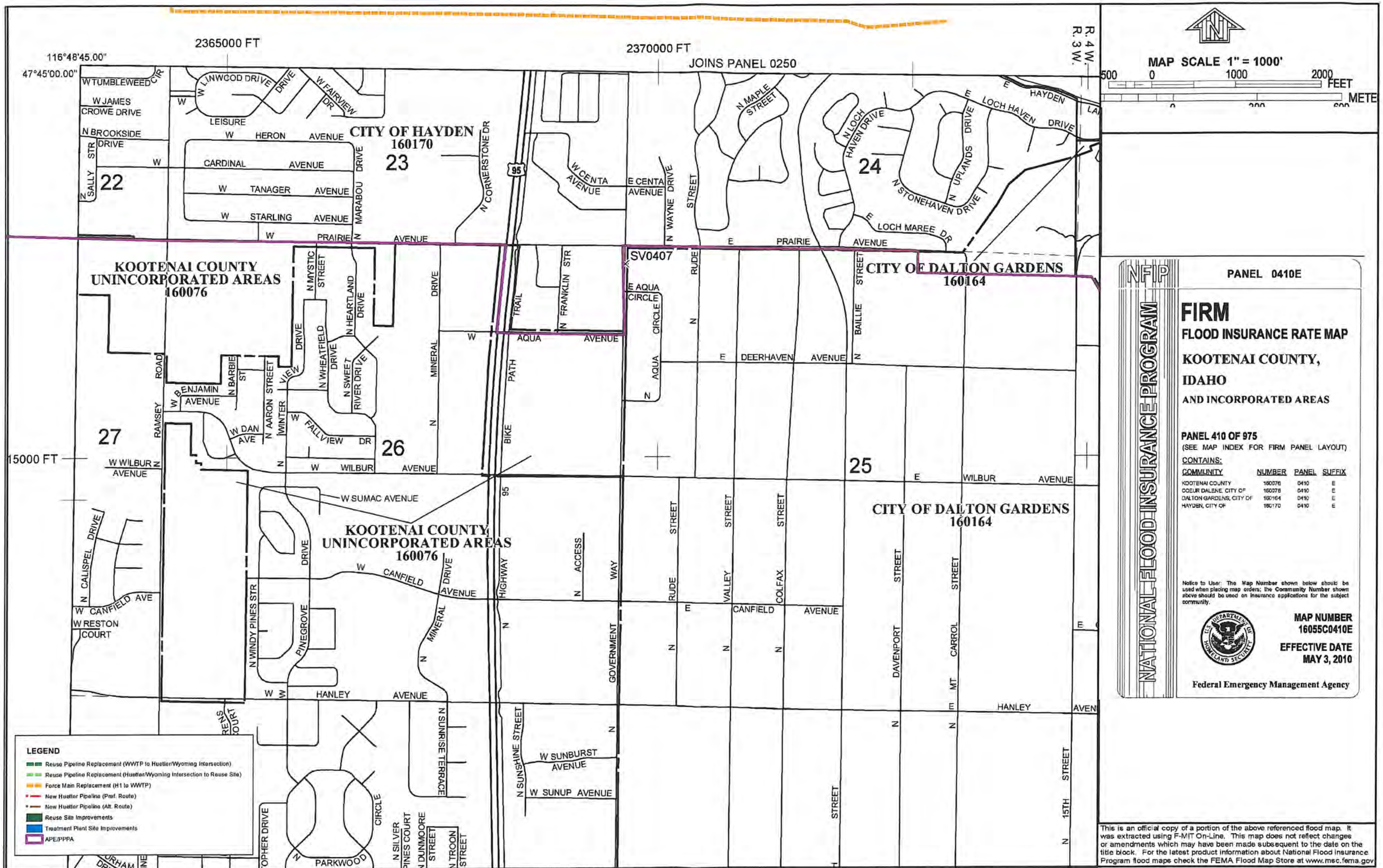
EFFECTIVE DATE
MAY 3, 2010

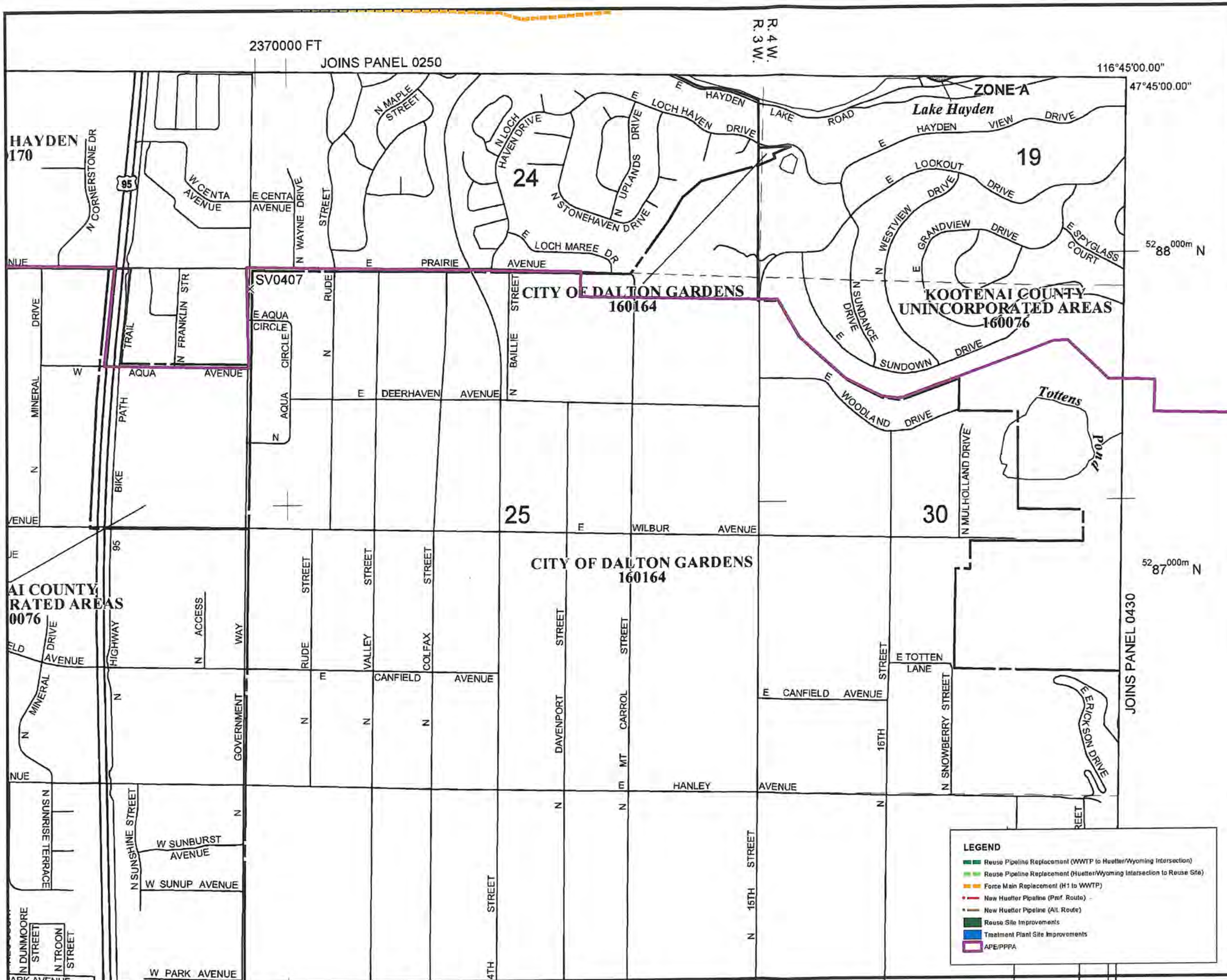
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


LEGEND
Reuse Pipeline Replacement (WWTP to Hueiter/Wyoming Intersection)
Reuse Pipeline Replacement (Hueiter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Hueiter Pipeline (Pref. Route)
New Hueiter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
CITY OF HAYDEN LAKE
160082
ZONE A
Lake Hayden
Yellowbanks Creek
E LANCASTER ROAD
E HAYDEN LAKE RD
N RIMROCK
N MEADOW WOOD LANE
E WILDFLOWER LANE
N BLUE JAY CT
FRIAR DRIVE
JAMES AVE
E POINT HAYDEN DRIVE
N SPLIT ROCK R
E ENGLISH POINT ROAD
E HAYDEN HAVEN RD
E GEM SHORES ROAD
N CHICKEN POINT RD
E CHALLENGE ROAD
E PIRATE TRAIL
E HAYDEN LAKE ROAD
E RIPPLE ROAD
E YELLOWBANK RD
E BRUYA LN
E HAYDEN LAKE ROAD
30000 FT
25000 FT
0000 FT
47°45'00.00"
116°45'00.00"
JOINS PANEL 0430
JOINS PANEL 0435
MAP SCALE 1" = 2000'
FEET
METE
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0275E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 275 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0275 E
HAYDEN LAKE, CITY OF 160082 0275 E
MAP NUMBER 16055C0275E
EFFECTIVE DATE MAY 3, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetter Pipeline (Pref. Route)
New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 2000'
FEET
COEUR D'ALENE NATIONAL FOREST
HAYDEN CREEK ROAD
N SALEM ROAD
JOINS PANEL 025
E HARTLOCK COURT
HILL
BOOT
E PONY ROAD
N ORIOLE RD
N MORGAN LANE
N TRIANGLE 7 ROAD
N HAMLET TRAIL
Mcleans Creek
240000 FT
T. 52 N.
T. 51 N.
E DODD ROAD
E HAYDEN LAKE ROAD
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
35000 FT
RIMROCK
E LANCASTER ROAD
JAMES AVE
N MEADOW WOOD LANE
E HAYDEN HAVEN RD
E GEM SHORES ROAD
N CHICKEN POINT RD
MOKINS
30000 FT
N BLUE JAY CT
E WILDFLOWER LANE
FRIAR
DRIVE
CITY OF HAYDEN LAKE
160082
ZONE A
E CHALLENGE ROAD
N SPLIT ROCK R
E POINT HAYDEN DRIVE
POINT ROAD
E PIRATE TRAIL
Lake Hayden
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0275E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY,
IDAHO
AND INCORPORATED AREAS
PANEL 275 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0275 E
HAYDEN LAKE, CITY OF 160082 0275 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
16055C0275E
EFFECTIVE DATE
MAY 3, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov


JOINS PANEL 0250
2365000 FT
2370000 FT
116°48'45.00"
47°45'00.00"
15000 FT
R. 4 W.
R. 3 W.
MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
METERS
CITY OF HAYDEN
160170
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
CITY OF DALTON GARDENS
160164
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
CITY OF DALTON GARDENS
160164
22
23
24
25
26
27
95
SV0407
W TUMBLEWEED CIR
W JAMES CROWE DRIVE
N BROOKSIDE DRIVE
N SALLY STR
W LINWOOD DRIVE
W FAIRVIEW DR
LEISURE
W HERON AVENUE
W CARDINAL AVENUE
W TANAGER AVENUE
W STARLING AVENUE
W PRAIRIE AVENUE
N MARABOU DRIVE
N CORNERSTONE DR
W CENTA AVENUE
E CENTA AVENUE
N WAYNE DRIVE
N MAPLE STREET
N LOCH HAVEN DRIVE
E LOCH HAVEN DRIVE
E HAYDEN
N UPLANDS DRIVE
N STONEHAVEN DRIVE
E LOCH MAREE DR
E PRAIRIE AVENUE
N MYSTIC STREET
N HEARTLAND DRIVE
N FRANKLIN STR
TRAIL
E AQUA CIRCLE
N AQUA CIRCLE
N RUDE STREET
N BAILLIE STREET
W AQUA AVENUE
E DEERHAVEN AVENUE
N MINERAL DRIVE
N WHEATFIELD DRIVE
N SWEET RIVER DRIVE
N BARBIE ST
N AARON STREET
WINTER VIEW DRIVE
RAMSEY ROAD
W BENJAMIN AVENUE
W DAN AVE
W FALLVIEW DR
BIKE PATH
W WILBUR AVENUE
E WILBUR AVENUE
W SUMAC AVENUE
N CALISPEL DRIVE
W CANFIELD AVE
W RESTON COURT
N WINDY PINES STR
N PINEGROVE DRIVE
W CANFIELD AVENUE
N MINERAL DRIVE
N HIGHWAY 95
N ACCESS WAY
N GOVERNMENT WAY
N RUDE STREET
N VALLEY STREET
N COLFAX STREET
E CANFIELD AVENUE
N DAVENPORT STREET
N MT CARROL STREET
W HANLEY AVENUE
E HANLEY AVENUE
N SUNRISE TERRACE
N SUNSHINE STREET
W SUNBURST AVENUE
W SUNUP AVENUE
N 15TH STREET
PARKWOOD CIRCLE
N SILVER PINES COURT
N DUNMOORE STREET
N TROON STREET
W PARK AVENUE
LEGEND
Reuse Pipeline Replacement (WWTP to Huetler/Wyoming Intersection)
Reuse Pipeline Replacement (Huetler/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetler Pipeline (Pref. Route)
New Huetler Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
PANEL 0410E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 410 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0410 E
COEUR DALENE, CITY OF 160078 0410 E
DALTON GARDENS, CITY OF 160164 0410 E
HAYDEN, CITY OF 160170 0410 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER 16055C0410E
EFFECTIVE DATE MAY 3, 2010
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METERS

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0410E

FIRM
FLOOD INSURANCE RATE MAP

KOOTENAI COUNTY, IDAHO

AND INCORPORATED AREAS

PANEL 410 OF 975

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KOOTENAI COUNTY	160076	0410	E
COEUR D'ALENE, CITY OF	160078	0410	E
DALTON GARDENS, CITY OF	160164	0410	E
HAYDEN, CITY OF	160170	0410	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
16055C0410E

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

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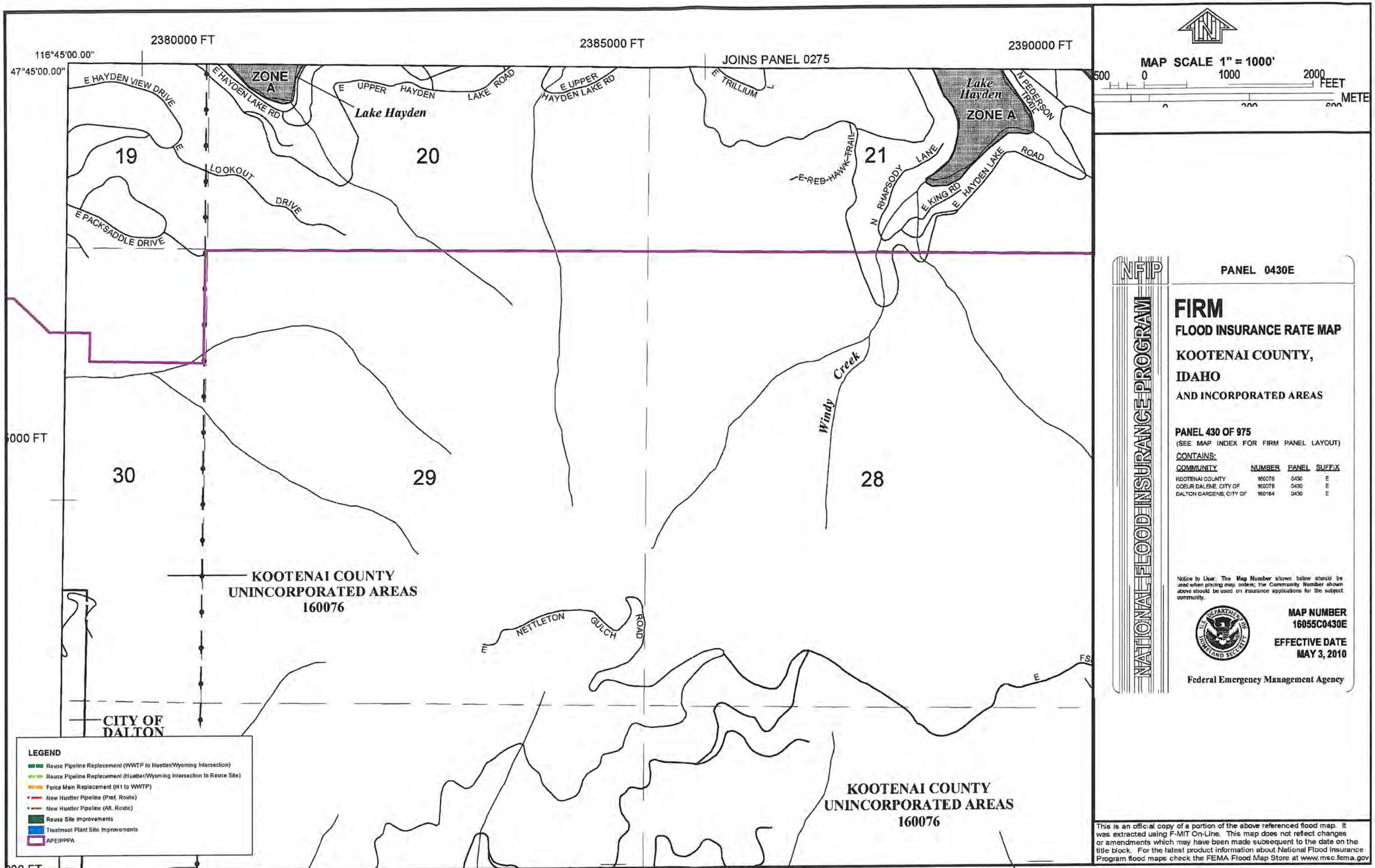

2380000 FT
2385000 FT
2390000 FT
116°45'00.00"
47°45'00.00"
JOINS PANEL 0275
E HAYDEN VIEW DRIVE
E HAYDEN LAKE RD
ZONE A
E UPPER HAYDEN LAKE ROAD
Lake Hayden
E UPPER HAYDEN LAKE RD
E TRILLIUM
Lake Hayden
ZONE A
N PEDERSON TRAIL
19
20
21
LOOKOUT DRIVE
E PACKSADDLE DRIVE
E RED HAWK TRAIL
N RHAPSODY LANE
E KING RD
E HAYDEN LAKE ROAD
Windy Creek
30
29
28
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
NETTLETON GULCH ROAD
CITY OF DALTON
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetter Pipeline (Pref. Route)
New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 1000'
500 0 1000 2000
FEET
METERS
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
PANEL 0430E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY,
IDAHO
AND INCORPORATED AREAS
PANEL 430 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0430 E
COEUR DALENE, CITY OF 160078 0430 E
DALTON GARDENS, CITY OF 160164 0430 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER
16055C0430E
EFFECTIVE DATE
MAY 3, 2010
Federal Emergency Management Agency
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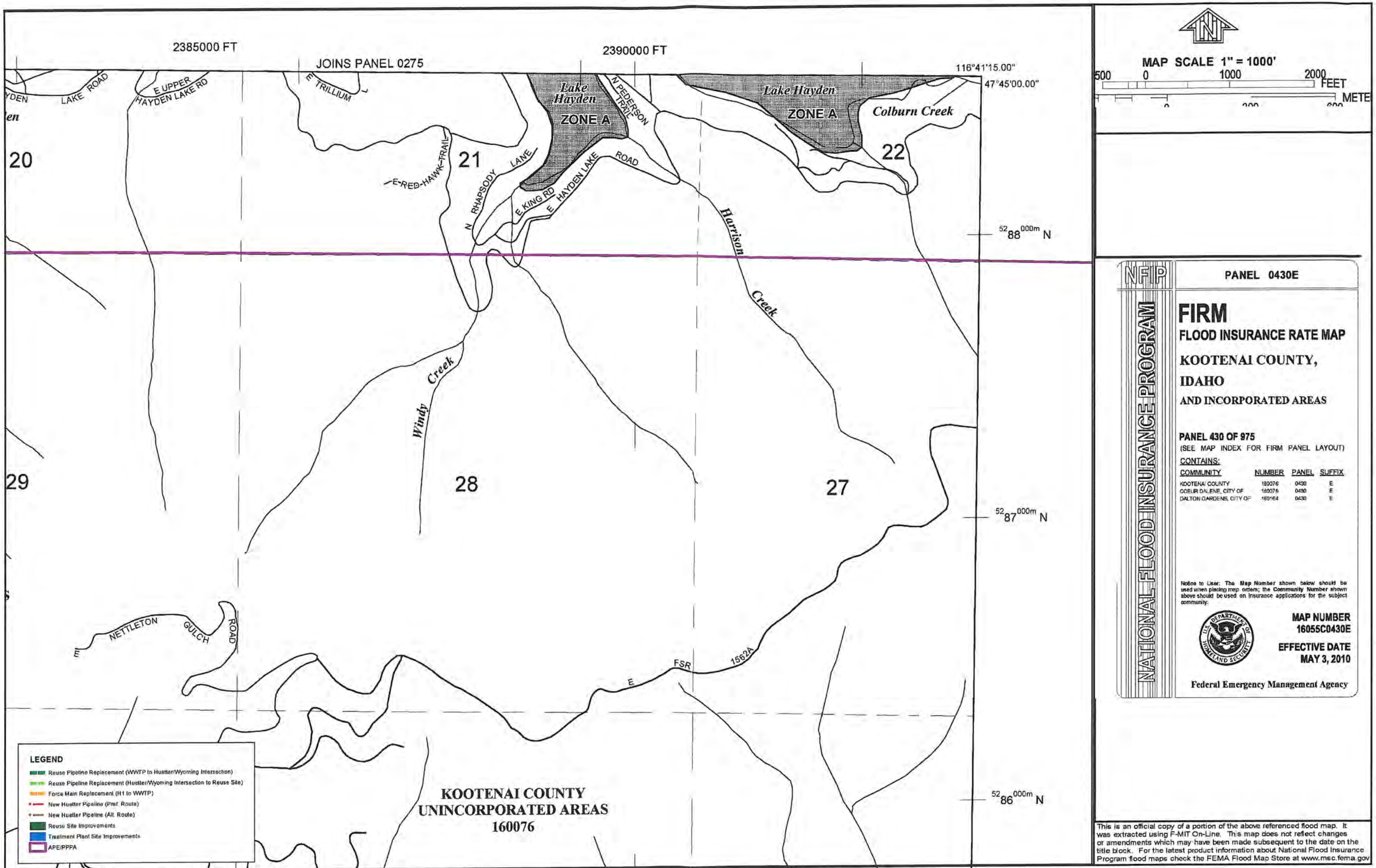
2385000 FT
JOINS PANEL 0275
2390000 FT
116°41'15.00"
47°45'00.00"
LAKE ROAD
E UPPER HAYDEN LAKE RD
E TRILLIUM
Lake Hayden
ZONE A
N PEDERSON TRAIL
Lake Hayden
ZONE A
Colburn Creek
20
21
22
E RED HAWK TRAIL
N RHAPSODY LANE
E KING RD
E HAYDEN LAKE ROAD
Harrison Creek
$^{52}88^{000m}$ N
Windy Creek
29
28
27
$^{52}87^{000m}$ N
E NETTLETON GULCH ROAD
E FSR 1562A
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
$^{52}86^{000m}$ N
LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
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New Huetter Pipeline (Pref. Route)
New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0430E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY,
IDAHO
AND INCORPORATED AREAS
PANEL 430 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0430 E
COEUR DALENE, CITY OF 160078 0430 E
DALTON GARDENS, CITY OF 160164 0430 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
U.S. DEPARTMENT OF HOMELAND SECURITY
MAP NUMBER
16055C0430E
EFFECTIVE DATE
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Federal Emergency Management Agency
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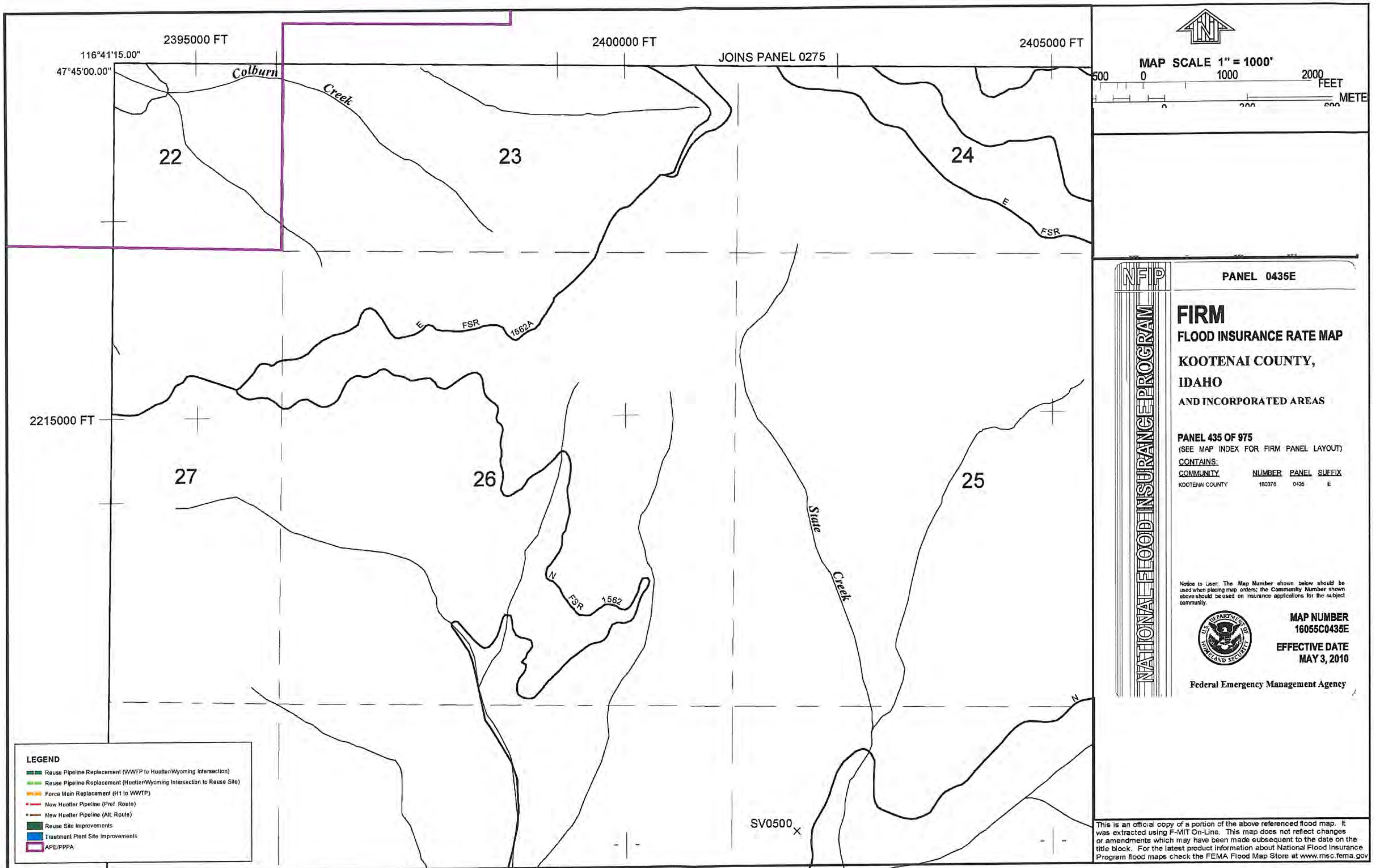

2395000 FT
2400000 FT
2405000 FT
JOINS PANEL 0275
116°41'15.00"
47°45'00.00"
Colburn Creek
22
23
24
27
26
25
2215000 FT
E FSR 1562A
E FSR
N FSR 1562
State Creek
SV0500
N
LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetter Pipeline (Pref. Route)
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Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 1000'
500
0
1000
2000
FEET
METE
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
PANEL 0435E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 435 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0435 E
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MAP NUMBER
16055C0435E
EFFECTIVE DATE
MAY 3, 2010
Federal Emergency Management Agency
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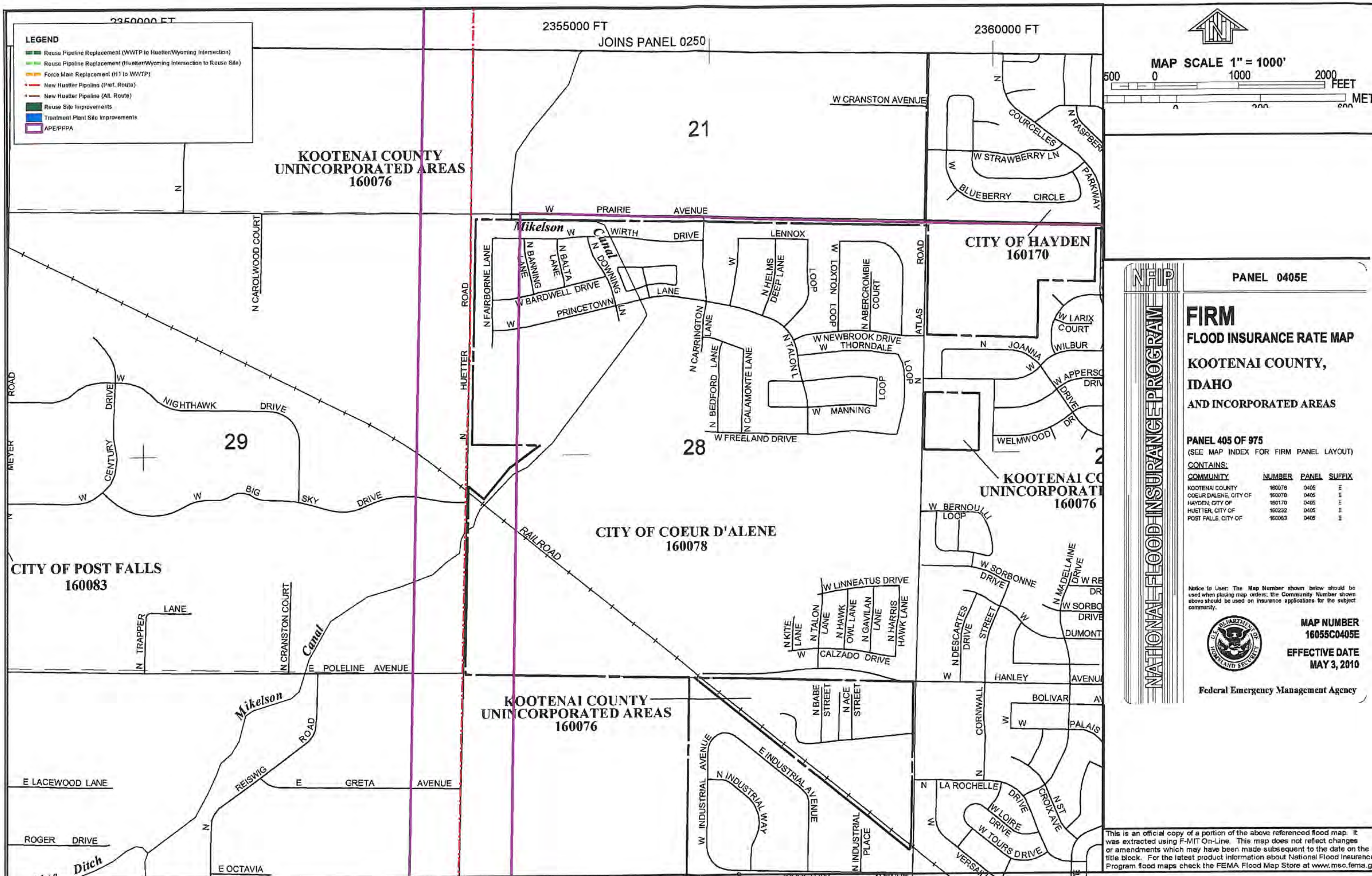

NATIONAL FLOOD INSURANCE PROGRAM

NFIP

PANEL 0405E

FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS

PANEL 405 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KOOTENAI COUNTY	160076	0405	E
COEUR DALENE, CITY OF	160078	0405	E
HAYDEN, CITY OF	160170	0405	E
HUETTER, CITY OF	160232	0405	E
POST FALLS, CITY OF	160083	0405	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
16055C0405E

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

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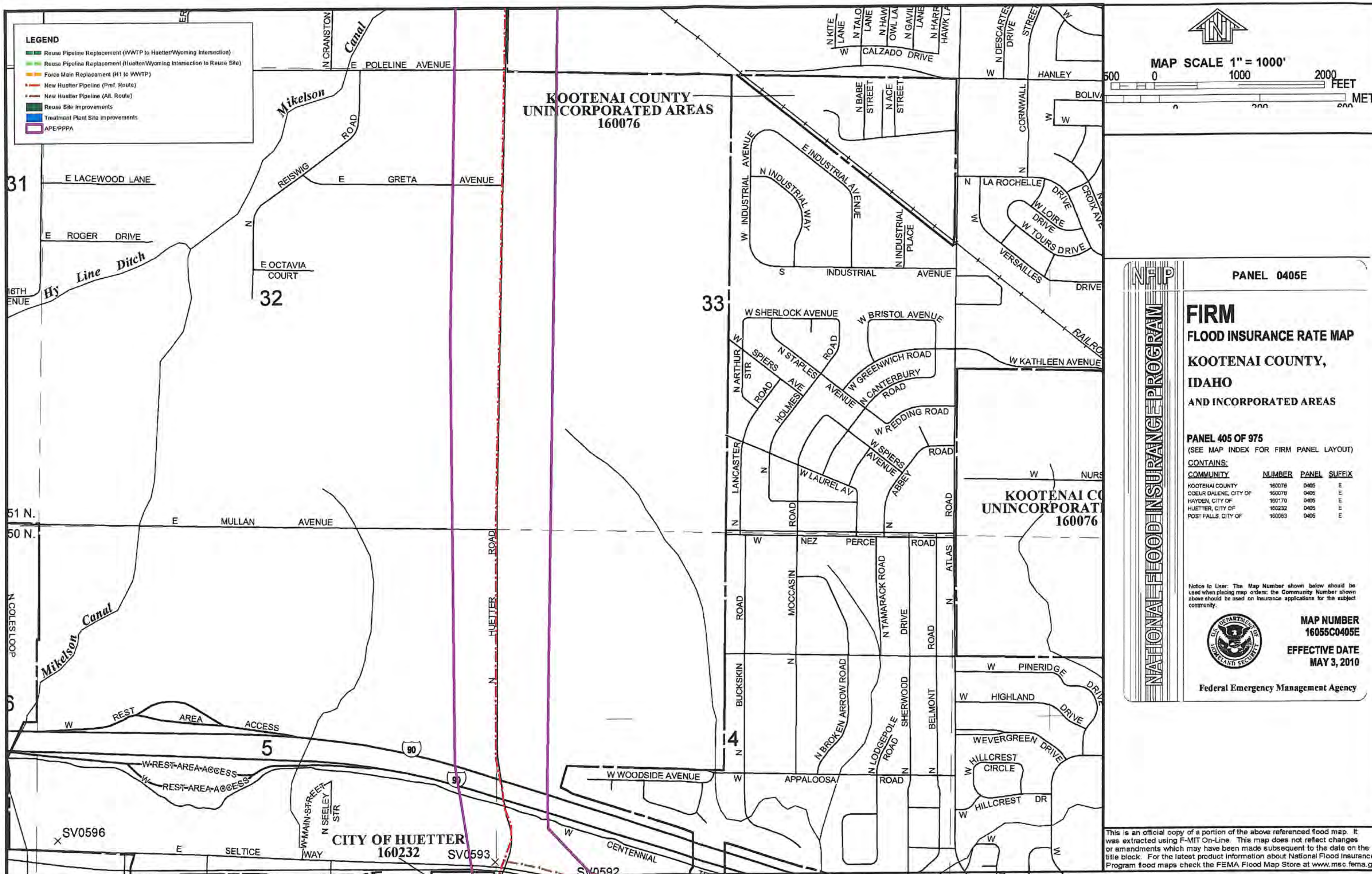
LEGEND
Reuse Pipeline Replacement (WWTP to Huetter/Wyoming Intersection)
Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
New Huetter Pipeline (Pref. Route)
New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
METERS
KOOTENAI COUNTY UNINCORPORATED AREAS 160076
CITY OF HUETTER 160232
SV0596
SV0593
SV0592
31
32
33
4
5
E POLELINE AVENUE
Mikelson Canal
Mikelson ROAD
REISWIG
E GRETA AVENUE
E LACEWOOD LANE
E ROGER DRIVE
Hy Line Ditch
E OCTAVIA COURT
E MULLAN AVENUE
N HUETTER ROAD
W REST AREA ACCESS
W REST AREA ACCESS
E SELTICE WAY
W CENTENNIAL TRAIL
W WOODSIDE AVENUE
W APPALOOSA ROAD
N INDUSTRIAL AVENUE
E INDUSTRIAL AVENUE
N INDUSTRIAL WAY
S INDUSTRIAL AVENUE
N INDUSTRIAL PLACE
W SHERLOCK AVENUE
W BRISTOL AVENUE
W GREENWICH ROAD
W CANTERBURY ROAD
W REDDING ROAD
W SPIERS AVENUE
W LAUREL AV
N LANCASTER ROAD
W NEZ PERCE ROAD
N MOCCASIN ROAD
N TAMARACK ROAD
N ATLAS ROAD
N BUCKSKIN ROAD
N BROKEN ARROW ROAD
N LODGEPOLE ROAD
N SHERWOOD DRIVE
N BELMONT ROAD
W KATHLEEN AVENUE
W HANLEY
W CALZADO DRIVE
N CORNWALL
W LA ROCHELLE DRIVE
W LOIRE DRIVE
W TOURS DRIVE
VERSAILLES DRIVE
W PINERIDGE DRIVE
W HIGHLAND DRIVE
WEVERGREEN DRIVE
W HILLCREST CIRCLE
W HILLCREST DR
RAILROAD
N COLES LOOP
N SEELEY STR
W MAIN STREET
N CRANSTON
PANEL 0405E
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 405 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0405 E
COEUR DALENE, CITY OF 160078 0405 E
HAYDEN, CITY OF 160170 0405 E
HUETTER, CITY OF 160232 0405 E
POST FALLS, CITY OF 160083 0405 E
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER 16055C0405E
EFFECTIVE DATE MAY 3, 2010
Federal Emergency Management Agency
NATIONAL FLOOD INSURANCE PROGRAM
NFIP
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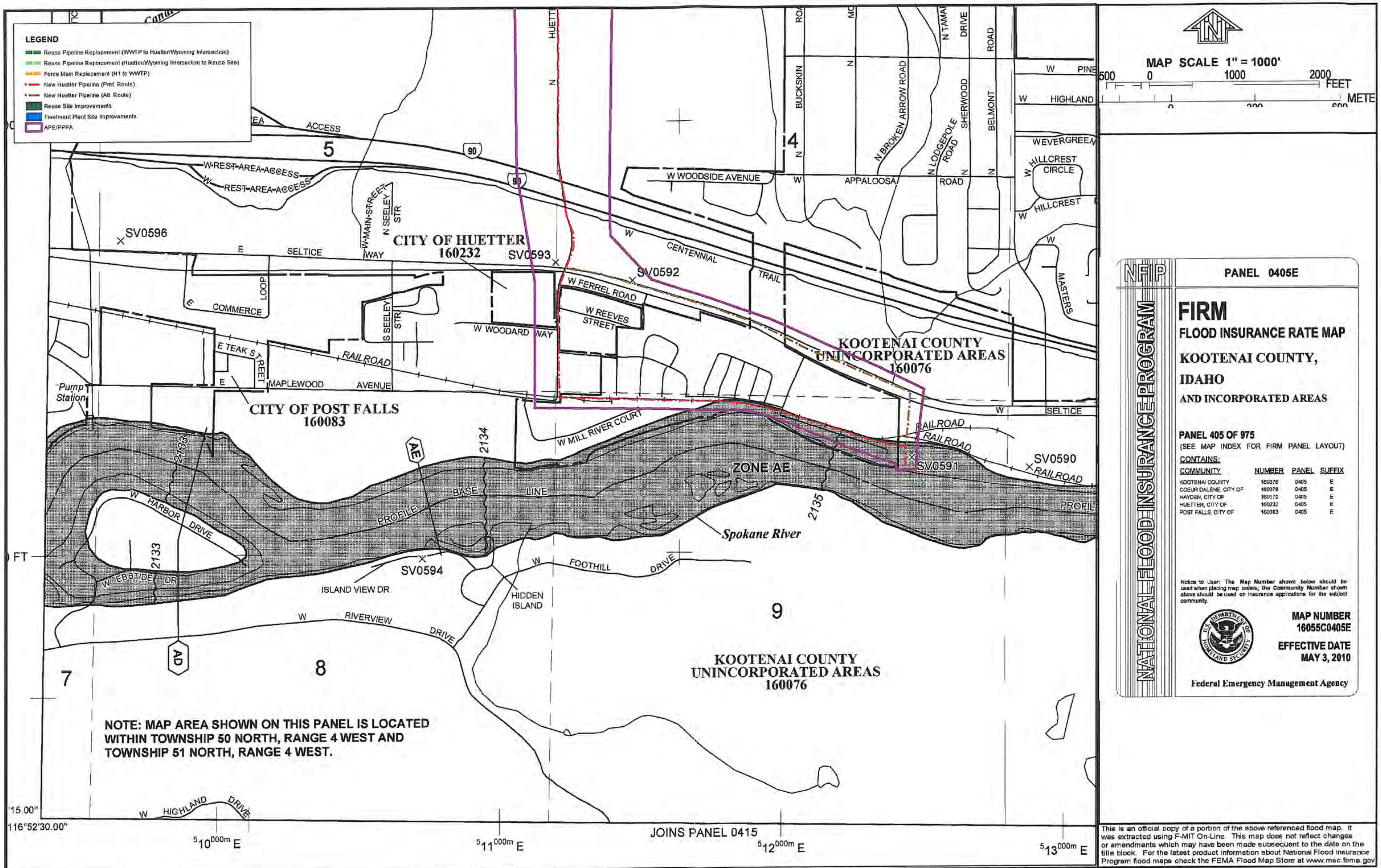
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Reuse Pipeline Replacement (Huetter/Wyoming Intersection to Reuse Site)
Force Main Replacement (H1 to WWTP)
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New Huetter Pipeline (Alt. Route)
Reuse Site Improvements
Treatment Plant Site Improvements
APE/PPPA
CITY OF HUETTER
160232
CITY OF POST FALLS
160083
KOOTENAI COUNTY
UNINCORPORATED AREAS
160076
ZONE AE
Spokane River
SV0596
SV0593
SV0592
SV0591
SV0590
SV0594
W CENTENNIAL TRAIL
W FERREL ROAD
W REEVES STREET
W WOODARD WAY
W WOODSIDE AVENUE
E SELTICE WAY
W SELTICE
E COMMERCE LOOP
E TEAK STREET
E MAPLEWOOD AVENUE
RAILROAD
W MILL RIVER COURT
W HARBOR DRIVE
W EBBTIDE DR
ISLAND VIEW DR
HIDDEN ISLAND
W FOOTHILL DRIVE
W RIVERVIEW DRIVE
W HIGHLAND DRIVE
W REST AREA ACCESS
Pump Station
PROFILE BASE LINE
NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 50 NORTH, RANGE 4 WEST AND TOWNSHIP 51 NORTH, RANGE 4 WEST.
JOINS PANEL 0415
MAP SCALE 1" = 1000'
NFIP
PANEL 0405E
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
KOOTENAI COUNTY, IDAHO
AND INCORPORATED AREAS
PANEL 405 OF 975
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
KOOTENAI COUNTY 160076 0405 E
COEUR DALENE, CITY OF 160076 0405 E
HAYDEN, CITY OF 160170 0405 E
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LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

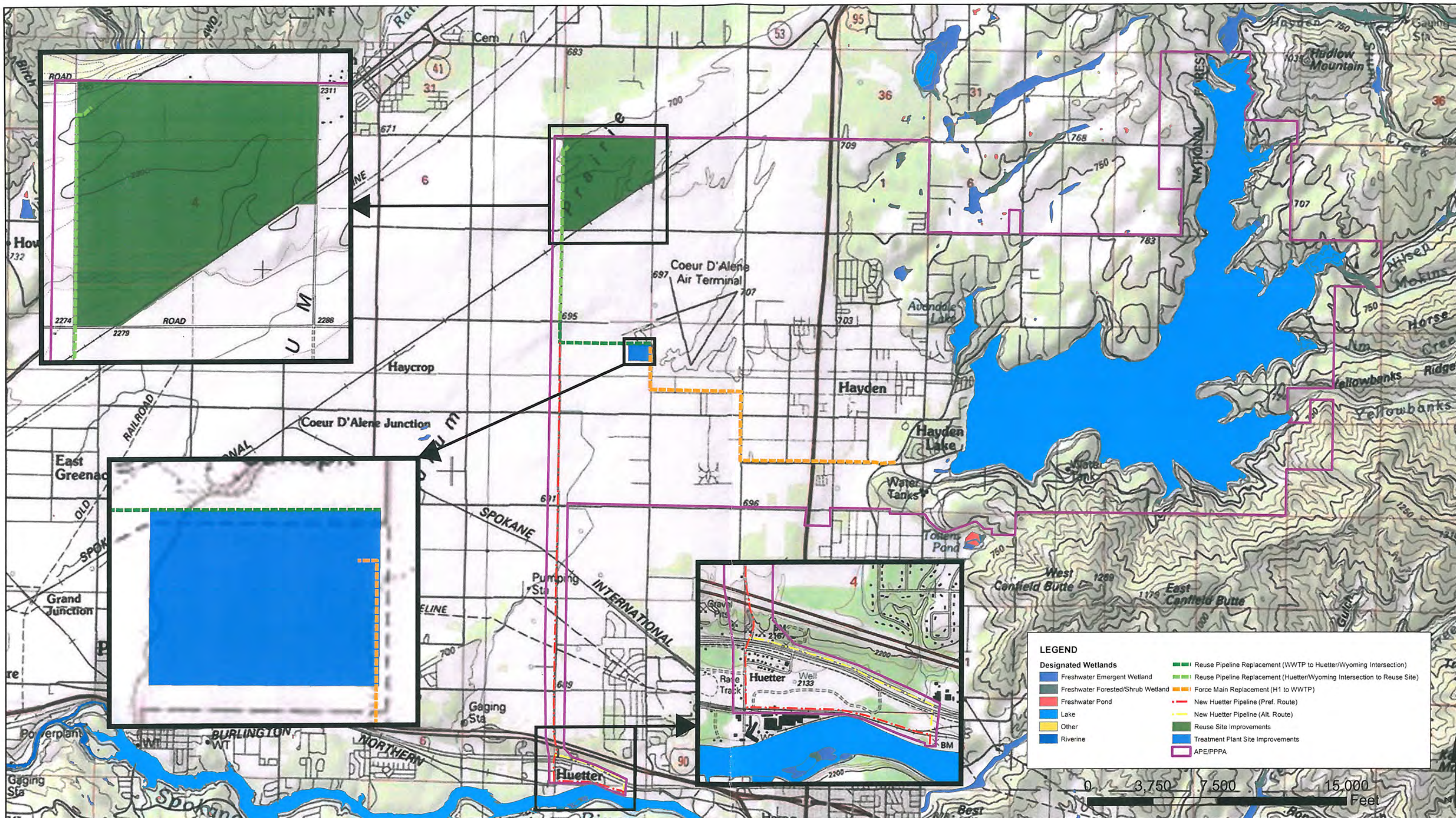
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
$^{42}75^{000m}$N	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT	5000-foot grid ticks: Idaho State Plane coordinate system, west zone (FIPSZONE 1103), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
May 3, 2010
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL



Sources:
Idaho State Tax Commission
Kootenai County GIS Department
US Fish and Wildlife National Wetland Inventory, 2012

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(toll free) 877-815-5762
(fax) 208-664-5946

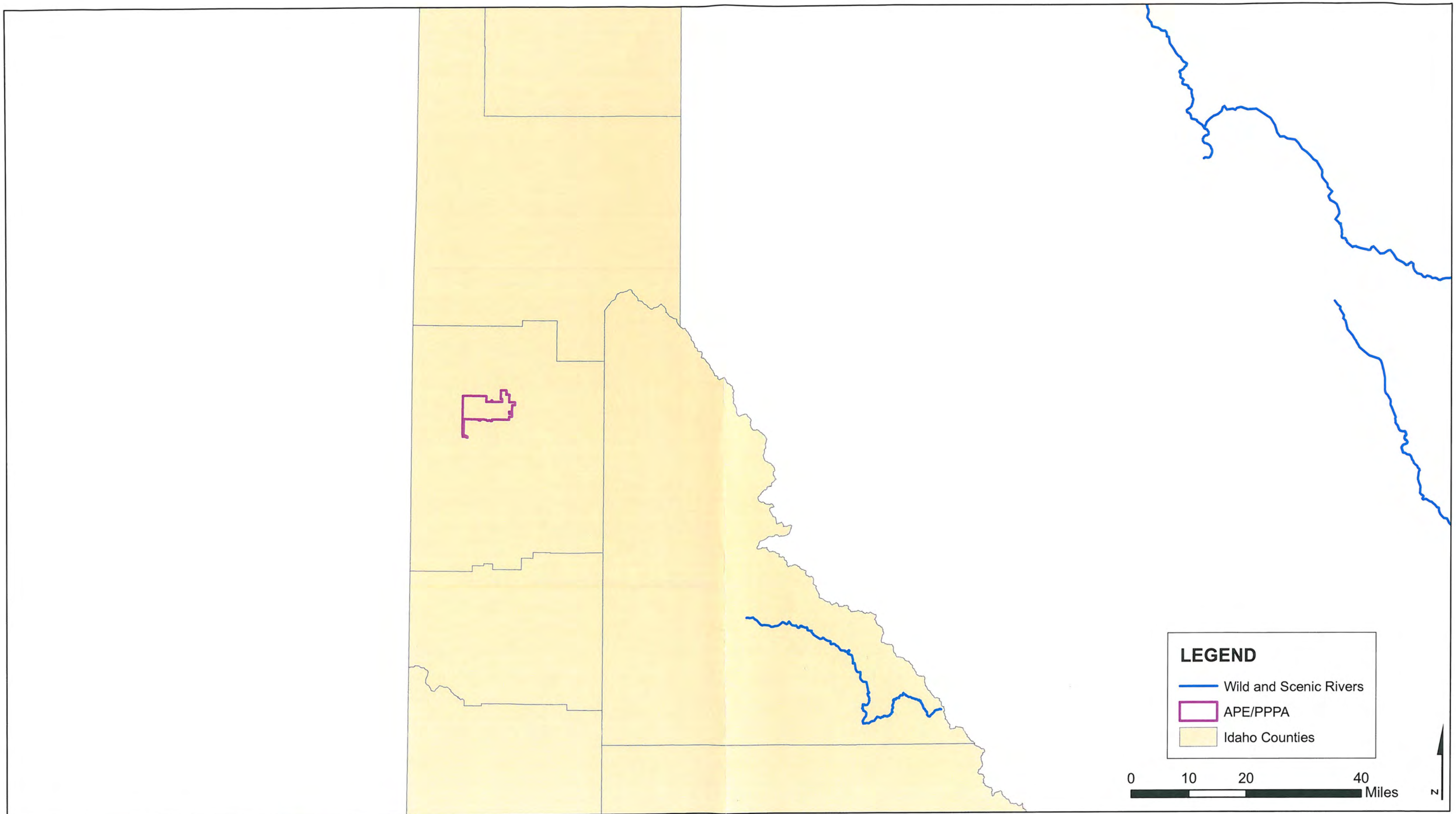
HARSB

Wetlands

PROJECT NO.................................41104
DRAWN BY.......................................AW
FILENAME.......................................Wetlands_11x17L
DATE...11/14/12

APPENDIX H

Wild and Scenic River Information



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(fax) 208-664-5946

HARSB

Wild and Scenic Rivers

Sources:
Idaho State Tax Commission
Kootenai County GIS Department
Wild and Scenic Rivers Database (2009)

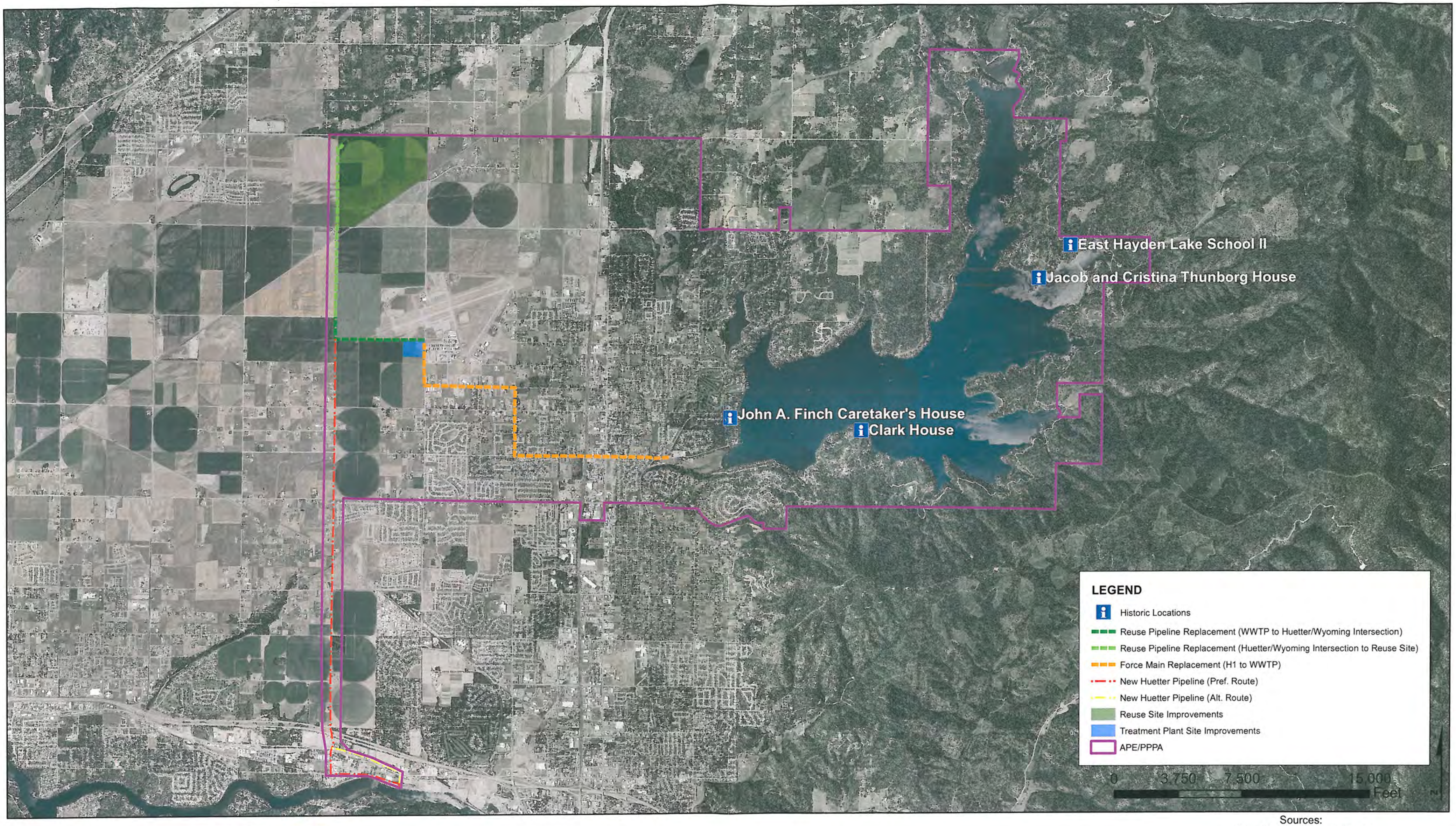
PROJECT NO.................................41104
DRAWN BY.......................................AW
FILENAME.......................................WildnScenic_11x17L
DATE...11/14/12

APPENDIX I

Historic Locations Information

National Register of Historic Places: Listed Properties as of October 1, 2011

85002090	IDAHO	Kootenai	Bayview	Bayview School II	Careywood Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
85002091	IDAHO	Kootenai	Rockford Bay	Bellgrove School II	Hamaker Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
66000312	IDAHO	Kootenai	Cataldo	Cataldo Mission	Off U.S. 10	19661015	BUILDING	
85002092	IDAHO	Kootenai	Medimont	Cave Lake School	ID 3	19850912	BUILDING	Kootenai County Rural Schools TR
85002093	IDAHO	Kootenai	Athol	Cedar Mountain School	Parks and Lewellyn Creek Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
78001070	IDAHO	Kootenai	Clarksville	Clark House	On Hayden Lake	19781212	BUILDING	
79000792	IDAHO	Kootenai	Coeur d'Alene	Coeur d'Alene City Hall	5th and Sherman Sts.	19790803	BUILDING	
77000461	IDAHO	Kootenai	Coeur d'Alene	Coeur d'Alene Federal Building	4th and Lakeside	19771216	BUILDING	
78001071	IDAHO	Kootenai	Coeur d'Alene	Coeur d'Alene Masonic Temple	525 Sherman Ave.	19780522	BUILDING	
85002094	IDAHO	Kootenai	Post Falls	Cougar Gulch School III	Cougar Gulch Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
99001476	IDAHO	Kootenai	Harrison	Crane, Silas W., and Elizabeth, House	201 S. Coeur d'Alene Ave.	19991209	BUILDING	
85001126	IDAHO	Kootenai	Coeur d'Alene	Davey, Harvey M., House	315 Wallace Ave.	19850523	BUILDING	
85002095	IDAHO	Kootenai	Camp Mivoden	East Hayden Lake School II	Hayden Lake Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
87001562	IDAHO	Kootenai	Hayden Lake	Finch, John A., Caretaker's House	2160 Finch Rd.	19870914	BUILDING	
79000793	IDAHO	Kootenai	Coeur d'Alene	First United Methodist Church	618 Wallace Ave.	19790618	BUILDING	
79000794	IDAHO	Kootenai	Coeur d'Alene	Fort Sherman Buildings	North Idaho Junior College campus	19791025	DISTRICT	
88000272	IDAHO	Kootenai	Coeur d'Alene	Gray, John P. and Stella, House	521 S. Thirteenth St.	19880331	BUILDING	
96001505	IDAHO	Kootenai	Harrison	Harrison Commercial Historic District	Roughly bounded by N. Lake Ave., W. Harrison St., N. Coeur d'Alene., and I	19961220	DISTRICT	
85002096	IDAHO	Kootenai	Medimont	Indian Springs School II	ID 3	19850912	BUILDING	Kootenai County Rural Schools TR
75000633	IDAHO	Kootenai	Coeur d'Alene	Inland Empire Electric Railway Substation	Mullan Rd. and Northwest Blvd.	19750627	BUILDING	
77000462	IDAHO	Kootenai	Coeur d'Alene	Kootenai County Courthouse	501 Government Way	19771223	BUILDING	
01000834	IDAHO	Kootenai	Rathdrum	Kootenai County Jail	802 Second St.	20010810	BUILDING	
85002097	IDAHO	Kootenai	Lane	Lane School II	Lane Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
85002098	IDAHO	Kootenai	McGuire	McGuires School	Corbin Rd. and Old Hwy. 10	19850912	BUILDING	Kootenai County Rural Schools TR
09001163	IDAHO	Kootenai	Coeur d'Alene	Mooney-Dahlberg Farmstead	5803 Riverview Dr.	20091230	BUILDING	
90000548	IDAHO	Kootenai	Coeur d'Alene	Mullan Road	3 segments:1)between Aldar Creek and Cedar Creek;2)Fourth of July Pass I	19900405	SITE	
85002099	IDAHO	Kootenai	Pleasant View	Pleasant View School II	Pleasant View Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
84003851	IDAHO	Kootenai	Post Falls	Post Falls Community United Presbyterian Church	4th and William Sts.	19840907	BUILDING	
85002100	IDAHO	Kootenai	Coeur d'Alene	Prairie School II	Prairie Ave.	19850912	BUILDING	Kootenai County Rural Schools TR
74000742	IDAHO	Kootenai	Rathdrum	Rathdrum State Bank	1st and Mills Sts.	19741108	BUILDING	
76000676	IDAHO	Kootenai	Coeur d'Alene	Roosevelt School	1st and Wallace Sts.	19760730	BUILDING	
85002101	IDAHO	Kootenai	Rose Lake	Rose Lake School II	Queen St. and ID 3	19850912	BUILDING	Kootenai County Rural Schools TR
92000418	IDAHO	Kootenai	Coeur d'Alene	Sherman Park Addition	Bounded by Garden Ave., Hubbard St., Lakeshore Dr. and Park Dr.	19920427	DISTRICT	
79000795	IDAHO	Kootenai	Spirit Lake	Spirit Lake Historic District	Maine St.	19790208	DISTRICT	
03000124	IDAHO	Kootenai	Post Falls	Spokane Valley Land and Water Company Canal	Diverts in Falls Park, Fourth St.	20030320	STRUCTURE	
77000464	IDAHO	Kootenai	Rathdrum	St. Stanislaus Kostka Mission	McCartney and 3rd Sts.	19771117	BUILDING	
77000463	IDAHO	Kootenai	Coeur d'Alene	St. Thomas Catholic Church	919 Indiana Ave.	19771005	BUILDING	
85002156	IDAHO	Kootenai	Hayden Lake	Thunborg, Jacob and Cristina, House	Chicken Point	19850912	BUILDING	
92000420	IDAHO	Kootenai	Post Falls	Treaty Rock	N of I-90, NE of Spokane R. falls	19920430	SITE	
85002102	IDAHO	Kootenai	Silver Sands Beach	Upper Twin Lakes School	Twin Lakes Rd.	19850912	BUILDING	Kootenai County Rural Schools TR
96001507	IDAHO	Kootenai	Post Falls	Washington Water Power Bridges	.5 mi. W of jct. of Spokane and 4th Sts.	19961220	STRUCTURE	
97000765	IDAHO	Kootenai	Post Falls	Young, Samuel and Ann, House	120 4th Ave.	19970709	BUILDING	



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(fax) 208-664-5946

HARSB

Historic Locations

Sources:
Idaho State Tax Commission
Kootenai County GIS Department
USDA, NAIP 2009
NPS National Register of Historic Places

PROJECT NO..................................41104
DRAWN BY.......................................AW
FILENAME..HistoricLoc_11x17L
DATE...11/14/12

APPENDIX J

Endangered Species and Critical Habitat Information

United States Department of the Interior
Fish and Wildlife Service
Idaho Fish And Wildlife Office
1387 S. Vinnell Way, Room 368
Boise, Idaho 83709
Telephone (208) 378-5243
http://www.fws.gov/idaho

U.S. Fish and Wildlife Service - Idaho Fish and Wildlife Office
Endangered, Threatened, Proposed, and Candidate Species
With Associated Proposed and Critical Habitats in Idaho

November 14, 2012

This Letter and Species List
The U.S. Fish and Wildlife Service (Service) is providing this letter in response to your inquiry regarding federally listed, proposed, and candidate species, and proposed and designated critical habitats that may occur in Idaho. Use the attached Species List to ensure compliance with Sections 7 and 9 of the Endangered Species Act (Act). As a federal agent or designated non-federal representative, use this list in conjunction with best available information to assess whether a proposed action may affect these species or their habitats. If you determine a proposed action may affect a species or their habitats, contact the Service to initiate informal or formal consultation. This list is only valid for a period of 90 days. An updated list can be obtained by downloading the PDF file: www.fws.gov/idaho/species/IdahoSpeciesList.pdf.

Candidate Species Conservation
Though Candidate species have no protection under the Act, they are included in the Species List for early planning consideration. Candidate species could be proposed or listed during the project planning period. The Service advises project proponents to evaluate potential effects to Candidate species that may occur in the project area. Should the species be listed, this may expedite Section 7 consultation under the Act.

Effects Beyond Idaho
If the anticipated effects of an action extend beyond the range of Idaho, please contact the appropriate Service Contact for lists of species and habitats occurring in those adjacent states.

U.S. Fish and Wildlife Service Contacts
Idaho - Idaho Fish and Wildlife Office, Bob Kibler, bob_kibler@fws.gov, (208) 378-5255
Montana - Montana Ecological Services Field Office, (406) 449-5225
Nevada - Nevada Fish and Wildlife Office, (775) 861-6300
Oregon - LaGrande Field Office, (541) 962-8584
Utah - Utah Ecological Service Field Office, (801) 975-3330
Washington - Eastern Washington Field Office, (509) 891-6839
Wyoming - Wyoming Ecological Services Field Office, (307) 772-2374

NOAA Fisheries Species
Listed or proposed species that are under National Marine Fisheries Service's (NOAA Fisheries) jurisdiction do NOT appear on the Service's Species Lists. In Idaho, please contact NOAA Fisheries at (208) 378-5696 or visit NOAA Fisheries' webpage at http://www.nwr.noaa.gov/Species-Lists.cfm for consultation information.

Additional Information
To obtain additional information about the Act, please visit one of the Service's internet sites at http://www.fws.gov/endangered/laws-policies/index.html; http://www.fws.gov/idaho/agencies.htm; or speak with a Service Contact.

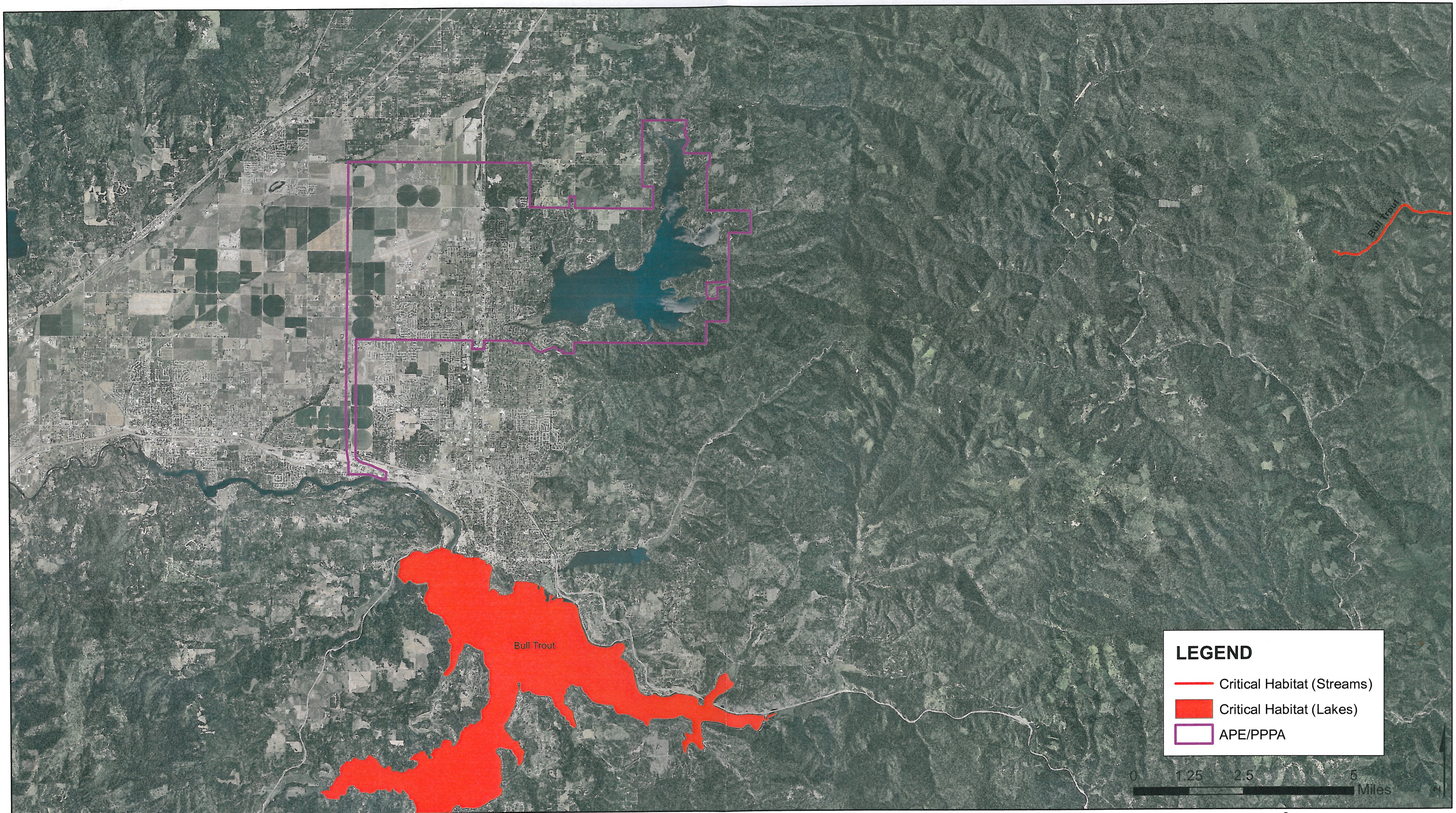
This species list was revised by the USFWS on 09/17/2012, and is valid for 90 days after

U.S. Fish and Wildlife Service • Idaho Fish and Wildlife Office

CANDIDATE, PROPOSED AND LISTED SPECIES & PROPOSED AND DESIGNATED CRITICAL HABITAT IN IDAHO

	Herps	Birds		Mammals						Fish		Mollusks				Plants							
Common Name	Columbia Spotted Frog (Great Basin Population)	Greater Sage-Grouse	Yellow-Billed Cuckoo	Canada Lynx	Grizzly Bear	Northern Idaho Ground Squirrel	Selkirk Mountains Woodland Caribou	Southern Idaho Ground Squirrel	North American Wolverine	Bull Trout	Kootenai River White Sturgeon	Banbury Springs Lanx	Bliss Rapids Snail	Bruneau Hot Springsnail	Snake River Physa	Christ's Paintbrush	Goose Creek Milkvetch	MacFarlane's Four-O'Clock	Packard's Milkvetch	Spalding's Catchfly	Ute Ladies'-Tresses	Water Howellia	Whitebark Pine
Scientific Name	*Rana luteiventris*	*Centrocercus urophasianus*	*Coccyzus americanus*	*Lynx canadensis*	*Ursus arctos horribilis*	*Spermophilus brunneus brunneus*	*Rangifer tarandus caribou*	*Spermophilus brunneus endemicus*	*Gulo gulo luscus*	*Salvelinus confluentus*	*Acipenser transmontanus*	*Lanx sp.*	*Taylorconcha serpenticola*	*Pyrgulopsis bruneauensis*	*Haitia (Physa) natricina*	*Castilleja christii*	*Astragalus anserinus*	*Mirabilis macfarlanei*	*Astragalus cusickii var. parkardiae*	*Silene spaldingii*	*Spiranthes diluvialis*	*Howellia aquatilis*	*Pinus albicaulis*
Gooding		C							C			E	T		E								
Idaho			C	T					C	T-DCH								T		T			C
Jefferson		C	C	T					C												T		
Jerome		C											T		E								
Kootenai			C	T					C	T-DCH										T		T	
Latah			C	T					C											T		T	
Lemhi		C	C	T					C	T-DCH													
Lewis			C						C	T-DCH										T			
Lincoln		C							C														
Madison		C	C	T					C												T		
Minidoka		C	C												E								
Nez Perce				T					C	T-DCH										T			
Oneida		C																					
Owyhee	C	C	C							T-DCH				E	E								
Payette		C						C		T					E				C				
Power		C																					
Shoshone				T					C	T-DCH										T		T	C
Teton				T	T				C														C
Twin Falls	C	C	C						C				T		E								
Valley				T		T			C	T-DCH													C
Washington		C				T		C	C	T-DCH					E								C

Table Key: C = Candidate Species P= Proposed Species T=Threatened Species E=Endangered Species PCH= Proposed Critical Habitat DCH=Designated Critical Habitat



Sources:
Idaho State Tax Commission
Kootenai County GIS Department
US Fish and Wildlife Critical Habitat Database

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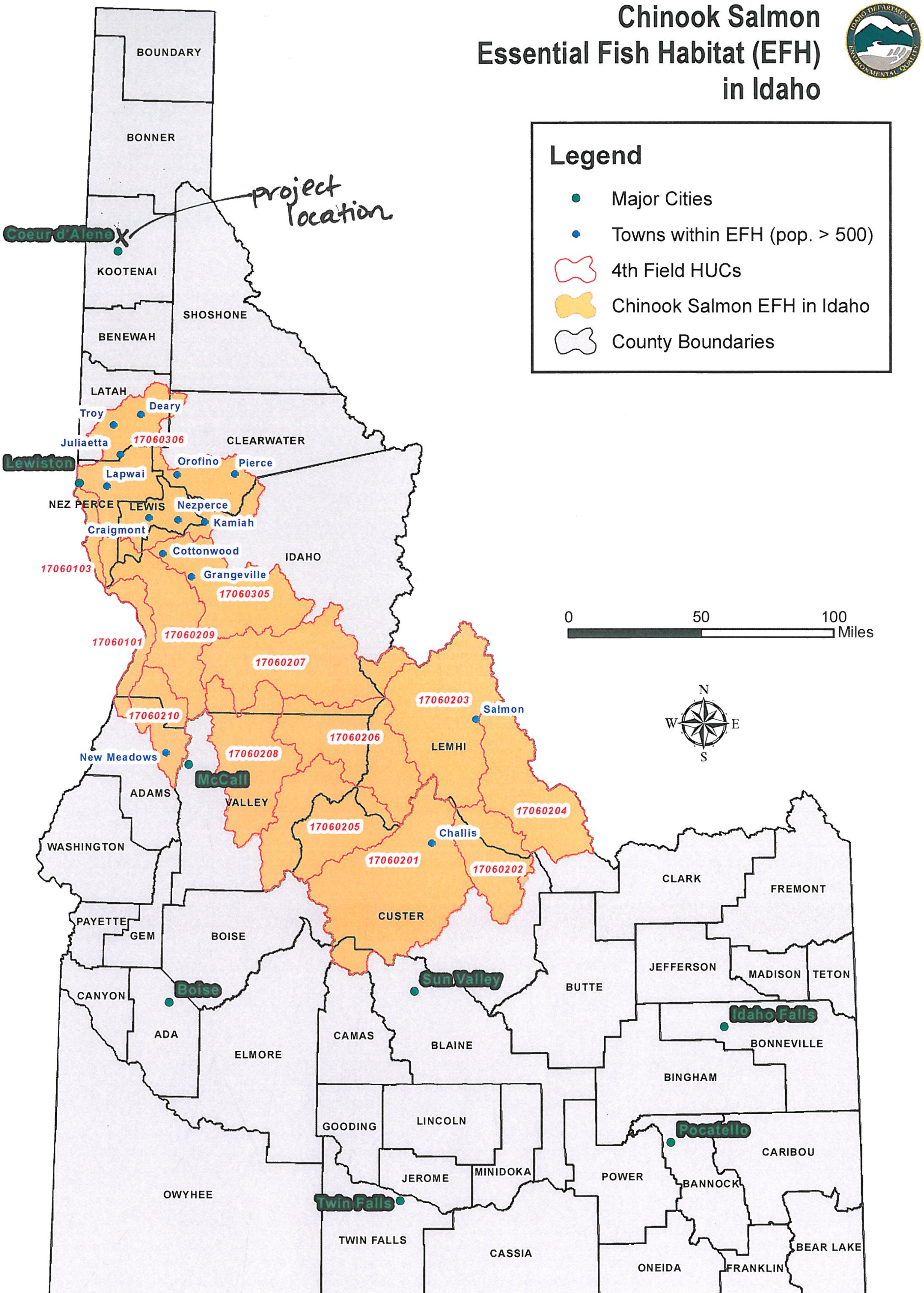
HARSB

Critical Habitat

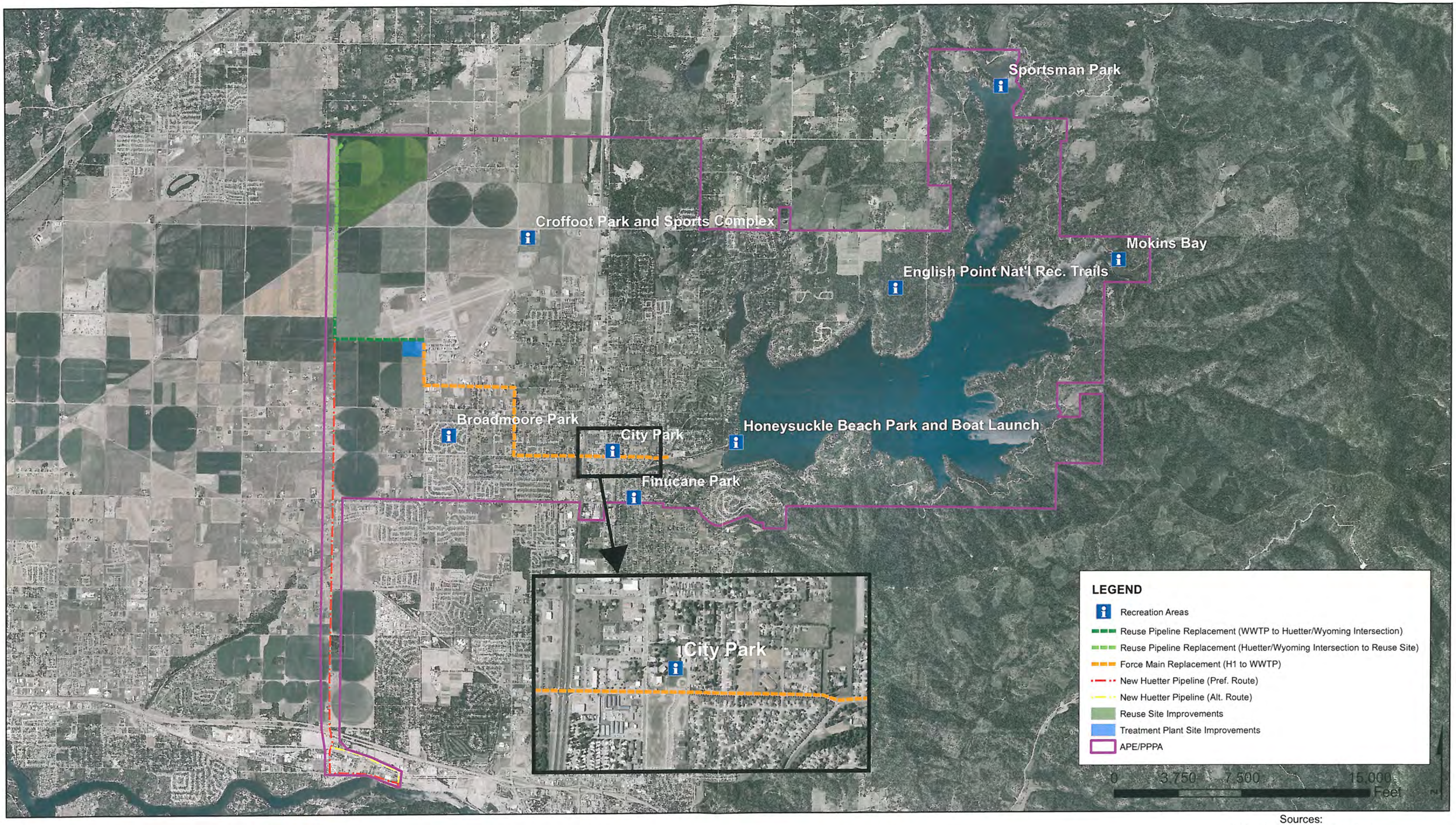
PROJECT NO.....................................41104
DRAWN BY.......................................AW
FILENAME.......................................Critical Habitat_11x17L
DATE...11/14/12

Chinook Salmon Essential Fish Habitat (EFH) in Idaho



APPENDIX K

Recreation and Open Spaces Map



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(fax) 208-664-5946

HARSB

Recreation and Open Spaces

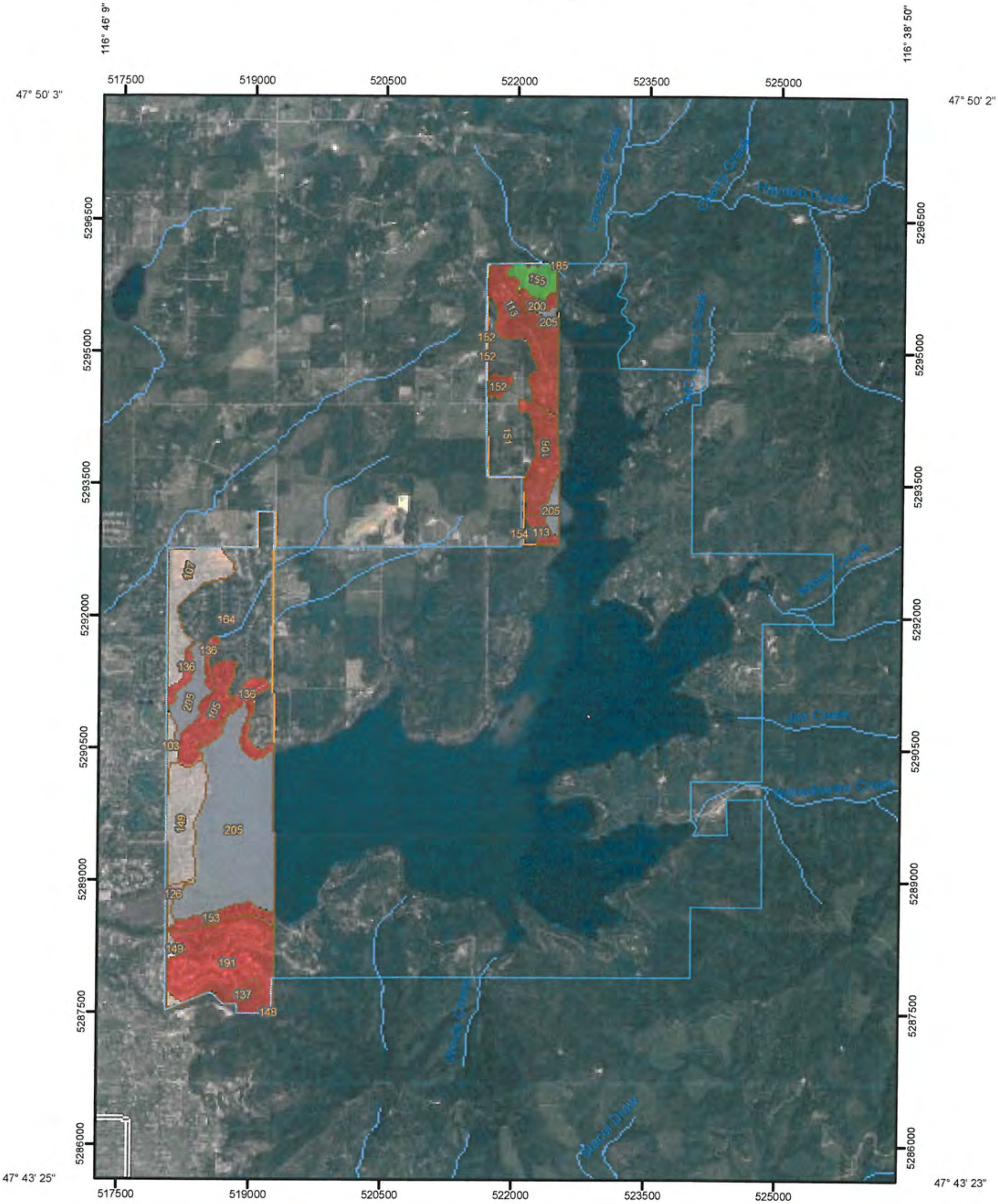
Sources:
Idaho State Tax Commission
Kootenai County GIS Department
USDA, NAIP 2009

PROJECT NO.................................41104
DRAWN BY......................................AW
FILENAME.......................................Recreation_11x17L
DATE...11/14/12

APPENDIX L

Farmland Classification Information

Farmland Classification—Idaho Panhandle National Forest, Idaho, and Kootenai County Area, Idaho
(HARSB Area (part 1))



Map Scale: 1:58,700 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 500 1,000 2,000 3,000

Feet: 0 2,000 4,000 8,000 12,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:58,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Idaho Panhandle National Forest, Idaho
Survey Area Data: Not available

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Idaho Panhandle National Forest, Idaho (ID670)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
No soil data available for this soil survey area.				
Subtotals for Soil Survey Area			—	—
Totals for Area of Interest			**9,806.4**	**100.0%**

Farmland Classification— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	15.0	0.2%
105	Blinn loam, 5 to 35 percent slopes, very stony	Not prime farmland	80.4	0.8%
106	Blinn loam, 35 to 65 percent slopes, very stony	Not prime farmland	90.4	0.9%
107	Bonner silt loam, 0 to 8 percent slopes	Prime farmland if irrigated	122.4	1.2%
113	Chatcolet cobbly loam, 25 to 65 percent slopes	Not prime farmland	165.3	1.7%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	14.1	0.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	Not prime farmland	71.8	0.7%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	Not prime farmland	18.9	0.2%
148	McCrosket-Tekoa association, 35 to 65 percent slopes	Not prime farmland	1.4	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes	Prime farmland if irrigated	137.4	1.4%
151	Mokins silt loam, 5 to 20 percent slopes	Farmland of statewide importance, if drained	192.5	2.0%
152	Mokins silt loam, 20 to 35 percent slopes	Not prime farmland	14.6	0.1%
153	Mokins silt loam, 35 to 65 percent slopes	Not prime farmland	39.1	0.4%
154	Mokins-Chatcolet complex, 5 to 20 percent slopes	Farmland of statewide importance, if drained	11.2	0.1%
155	Moscow loam, 5 to 35 percent slopes	Farmland of statewide importance	41.8	0.4%
164	Rubson-Mokins complex, 0 to 20 percent slopes	Farmland of statewide importance, if drained	342.1	3.5%
185	Spokane-Moscow association, 35 to 65 percent slopes	Not prime farmland	0.0	0.0%

Farmland Classification— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
191	Tekoa gravelly silt loam, 35 to 65 percent slopes	Not prime farmland	244.3	2.5%
200	Vassar-Rock outcrop complex, 20 to 55 percent slopes	Not prime farmland	16.1	0.2%
205	Water		506.3	5.2%
Subtotals for Soil Survey Area			**2,124.9**	**21.7%**
Totals for Area of Interest			**9,806.4**	**100.0%**

Description

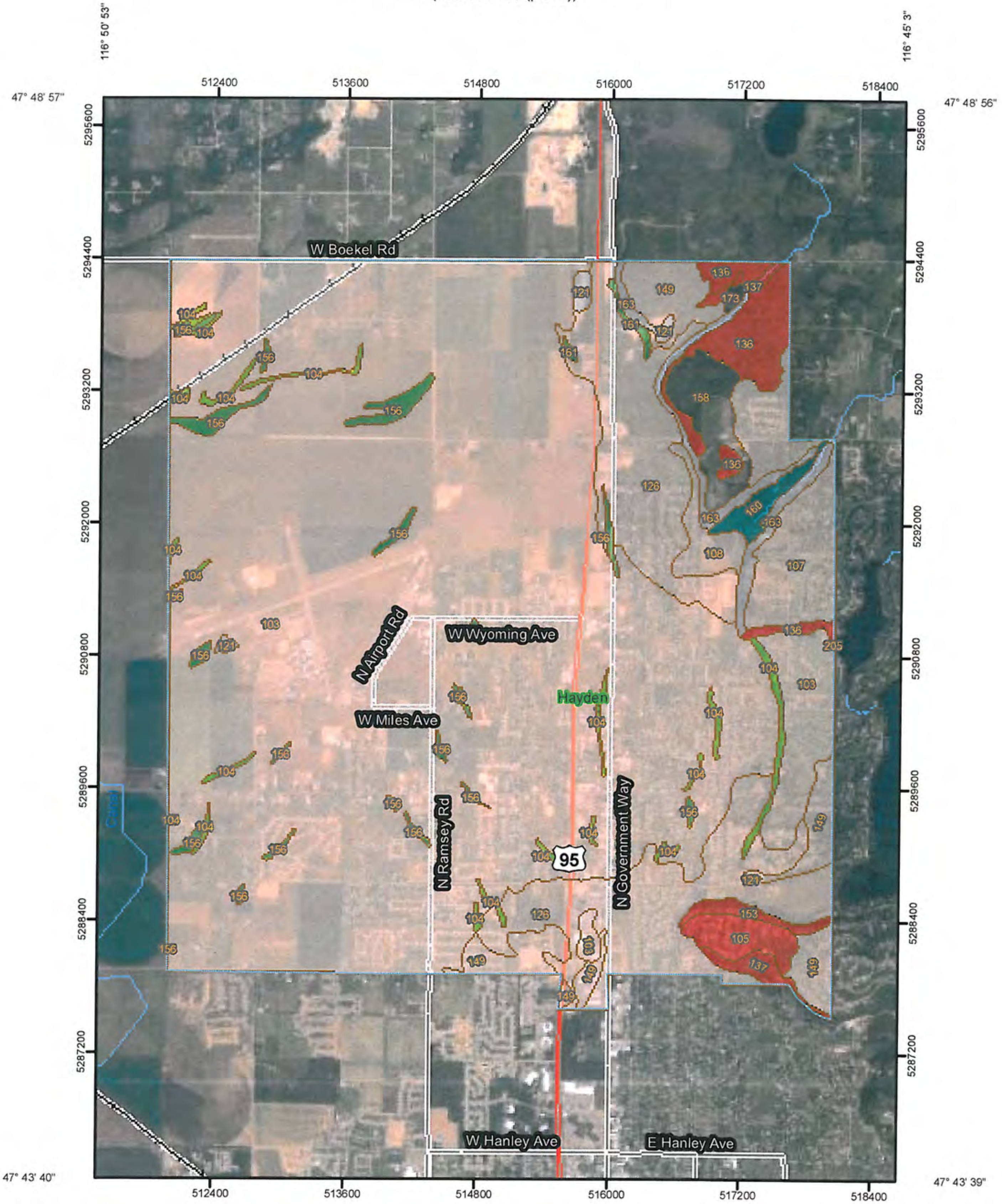
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Kootenai County Area, Idaho
(HARSB Area (part 2))



Map Scale: 1:46,700 if printed on A size (8.5" x 11") sheet.

N

0 400 800 1,600 2,400 Meters

0 1,500 3,000 6,000 9,000 Feet

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:46,700 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	6,844.2	71.4%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	Farmland of statewide importance	105.6	1.1%
105	Blinn loam, 5 to 35 percent slopes, very stony	Not prime farmland	81.1	0.8%
107	Bonner silt loam, 0 to 8 percent slopes	Prime farmland if irrigated	315.8	3.3%
108	Bonner gravelly silt loam, 0 to 8 percent slopes	Prime farmland if irrigated	75.4	0.8%
121	Pits, gravel		26.7	0.3%
126	Kootenai gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	1,065.4	11.1%
136	Lacy-Bobbitt association, 5 to 35 percent slopes, very stony	Not prime farmland	203.5	2.1%
137	Lacy-Bobbitt association, 35 to 65 percent slopes, very stony	Not prime farmland	50.0	0.5%
149	McGuire-Marble association, 0 to 7 percent slopes	Prime farmland if irrigated	332.7	3.5%
153	Mokins silt loam, 35 to 65 percent slopes	Not prime farmland	33.2	0.3%
156	Narcisse silt loam, 0 to 5 percent slopes	All areas are prime farmland	120.8	1.3%
158	Potlatch silt loam	Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season	137.1	1.4%
160	Ramsdell silt loam	Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season	49.3	0.5%
161	Rathdrum silt loam, 0 to 7 percent slopes	All areas are prime farmland	14.4	0.2%
163	Rock outcrop		121.0	1.3%
173	Seelovers-Potlatch complex	Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season	8.7	0.1%
205	Water		0.0	0.0%
Totals for Area of Interest			**9,585.0**	**100.0%**

Description

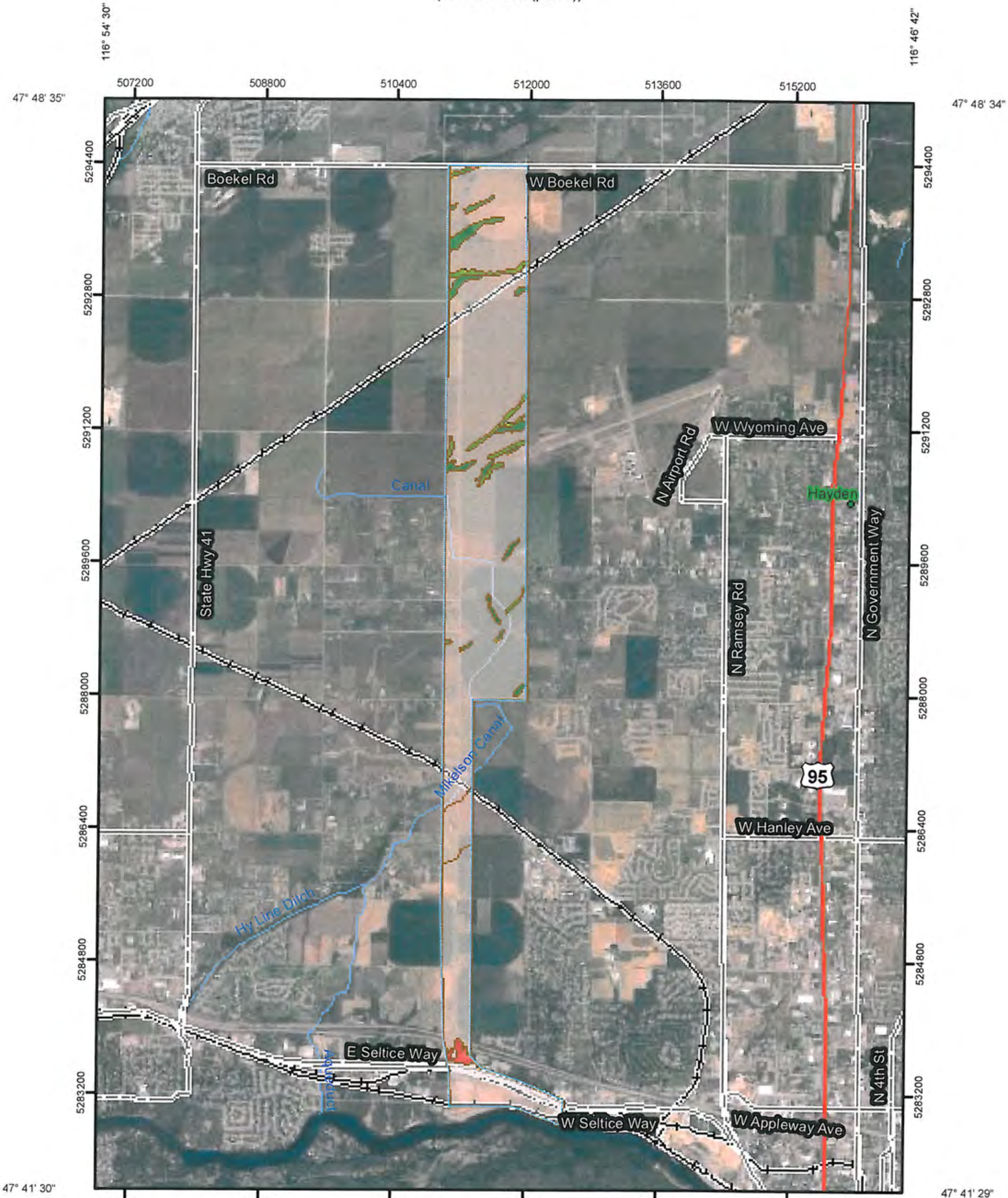
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Farmland Classification—Kootenai County Area, Idaho
(HARSB Area (part 3))



Map Scale: 1:62,600 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 500, 1,000, 2,000, 3,000

Feet: 0, 2,000, 4,000, 8,000, 12,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:62,600 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kootenai County Area, Idaho
Survey Area Data: Version 8, Sep 28, 2012

Date(s) aerial images were photographed: 7/2/2006; 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Kootenai County Area, Idaho (ID606)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
102	Avonville gravelly coarse sandy loam, 0 to 20 percent slopes	Prime farmland if irrigated	57.5	2.8%
103	Avonville fine gravelly silt loam, 0 to 7 percent slopes	Prime farmland if irrigated	1,542.4	74.9%
104	Avonville fine gravelly silt loam, 7 to 20 percent slopes	Farmland of statewide importance	45.5	2.2%
127	Kootenai gravelly silt loam, 20 to 45 percent slopes	Not prime farmland	0.8	0.0%
149	McGuire-Marble association, 0 to 7 percent slopes	Prime farmland if irrigated	337.0	16.4%
150	McGuire-Marble association, 20 to 45 percent slopes	Not prime farmland	12.7	0.6%
156	Narcisse silt loam, 0 to 5 percent slopes	All areas are prime farmland	62.4	3.0%
Totals for Area of Interest			**2,058.4**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

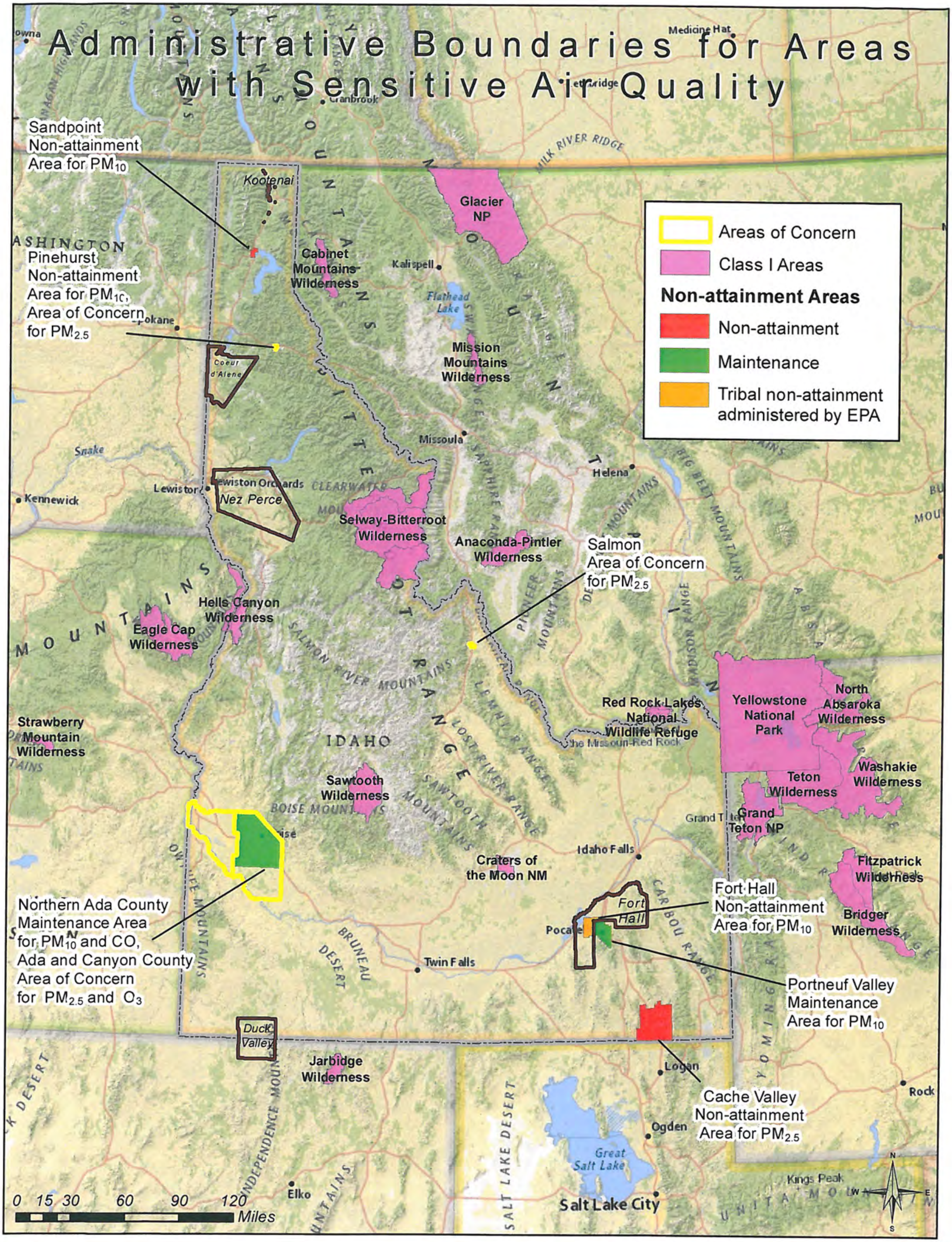
Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

APPENDIX M

Air Quality Map



Administrative Boundaries for Areas with Sensitive Air Quality
Areas of Concern
Class I Areas
Non-attainment Areas
Non-attainment
Maintenance
Tribal non-attainment administered by EPA
Sandpoint Non-attainment Area for PM_{10}
Pinehurst Non-attainment Area for PM_{10}, Area of Concern for $PM_{2.5}$
Salmon Area of Concern for $PM_{2.5}$
Northern Ada County Maintenance Area for PM_{10} and CO, Ada and Canyon County Area of Concern for $PM_{2.5}$ and O_3
Fort Hall Non-attainment Area for PM_{10}
Portneuf Valley Maintenance Area for PM_{10}
Cache Valley Non-attainment Area for $PM_{2.5}$
Kootenai
Coeur d'Alene
Nez Perce
Fort Hall
Duck Valley
Glacier NP
Cabinet Mountains Wilderness
Mission Mountains Wilderness
Selway-Bitterroot Wilderness
Anaconda-Pintler Wilderness
Hells Canyon Wilderness
Eagle Cap Wilderness
Strawberry Mountain Wilderness
Sawtooth Wilderness
Craters of the Moon NM
Red Rock Lakes National Wildlife Refuge
Yellowstone National Park
North Absaroka Wilderness
Washakie Wilderness
Teton Wilderness
Grand Teton NP
Fitzpatrick Wilderness
Bridger Wilderness
Jarbidge Wilderness
IDAHO
Spokane
Kalispell
Missoula
Helena
Lewiston
Kennewick
Idaho Falls
Twin Falls
Logan
Ogden
Salt Lake City
Elko
Great Salt Lake
0 15 30 60 90 120 Miles

APPENDIX N

Water Quality Information

SUB-BASIN ASSESSMENT AND TOTAL MAXIMUM DAILY LOADS OF LAKES AND STREAMS LOCATED ON OR DRAINING TO THE RATHDRUM PRAIRIE (17010305)

November 22, 2000

Idaho Department of Environmental Quality
Coeur d'Alene Regional Office
2110 Ironwood Parkway
Coeur d'Alene ID 83814

Table of Contents

1. Executive Summary

The streams and lakes flowing or draining to the Rathdrum-Spokane Aquifer are assessed. The section 303(d) listed streams are Fish and Rathdrum Creeks. The listed lakes are Hauser, Hayden, Spirit and Twin Lakes. The sub-basin assessment reviews the existing data for the streams and lakes. The Spokane River's water temperature is assessed. Sediment model results are provided for Fish and Rathdrum Creek. The assessment finds that the temperature limitation of the Spokane River is caused by natural conditions. It recommends the river be redesignated as a seasonal cold water biota supported by a temperature standard reflecting temperatures attained during hot, dry summers. The assessment recommends nutrient total maximum daily loads (TMDLs) be developed for Hauser, Hayden and Twin Lakes. Dissolved oxygen limitation of Hauser Lake is dependent on total phosphorous reductions. The most recent monitoring data (1993-1999) indicates that Spirit Lake is meeting and is often below its total phosphorous goal of 12 ug/L. Dissolved oxygen data indicates the lake meets the standards. Biotic data and sediment modeling of Fish and Rathdrum Creeks indicate these water bodies are not water quality limited by sediment. Both water bodies are well below or near the threshold of 50% above background sedimentation rates. Bacteria analyses indicate the standards are met for Fish and Rathdrum Creeks as well as Upper Twin Lake. Although nutrient data demonstrates Fish and Rathdrum Creeks are not limited by nutrients, the nutrient TMDL developed for Twin Lakes will, by necessity, address Fish and Rathdrum Creeks.

No TMDLs are required for the Fish Creek, Rathdrum Creek and Spirit Lake. Bacteria and sediment TMDLs are not required for Twin Lakes. Sediment TMDLs are not required for Hayden, Spirit or Twin Lakes. The Department of Environmental Quality will be de-listing these segments for these pollutants as part of its 2002 303(d) listing process.

If the Spokane River is redesignated as recommended, its three segments will meet the more appropriate standards. The TMDLs for temperature of the Spokane River are deferred until the redesignation process has proceeded to its end point. The nutrient TMDL should address the dissolved oxygen limitation of Hauser Lake. The dissolved oxygen TMDL for Hauser Lake is deferred until nutrient limitation has an opportunity to reduce the lake productivity and oxygen demand. The recommendations of the sub-basin assessment for TMDL development, segment - pollutant de-listing and TMDL deferment are summarized in Table 1.

Total phosphorous total maximum daily loads (TMDLs) have been developed for Hauser, Hayden and Twin Lakes based on the goals of their respective lake management plans and nutrient loading analyses. The TMDLs allocate yearly total phosphorous loads to the sources of phosphorous to the lakes and apportions total phosphorous load reductions required of the manageable sources.

Lake management plans addressing nutrients reductions have been developed for Hauser, Hayden, and Twin Lakes. These plans will serve as the starting points for TMDL implementation plans for the three lakes.

Table 1: Results of sub-basin assessment based on application of the available data.

Water body Name and HUC Number	Assessed Support Status	Reasons segment to be de-listed for pollutant	Reason TMDL deferred
Spokane River 17010305 3552	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
Spokane River 17010305 3553	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
Spokane River 17010305 4554	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
FishCreek 17010305 3561	Sediment modeling and nutrient data indicate cold water biota supported.	Sediment modeled at below 50% above background. Nutrients concentrations of Fish Creek well below stream guidelines. Twin Lakes nutrient TMDL will address Fish Creek	N.A.
Twin Lakes 17010305 7561	CWB impaired by nutrients; nutrient TMDL required.	CWB not impaired by sediment. Sediment not impacting salmonid sight feeding beneficial use directly; listing in error	N.A.
Rathdrum Creek 17010305 3560	Sediment modeling and nutrient data indicate cold water biota supported. Bacteria standard not exceeded indicating secondary contact recreation supported.	Sediment below 100% above background and near lowest threshold of 50% above background. Nutrient concentrations below stream guidelines. Nutrient TMDL for Twin Lakes will address Rathdrum Creek. Bacteria standard not exceeded.	N.A.
Hauser Lake17010305 3562	CWB impaired by nutrients; nutrient TMDL required. CWB impaired by dissolved oxygen deficit created by organic matter resulting from lake productivity	N.A.	Dissolved oxygen TMDL deferred until nutrient reduction approach is assessed to determine if dissolved oxygen recovers.
Hayden Lake 17010305 7555	CWB threatened by nutrients; nutrient TMDL required.	CWB not impaired by sediment. Sediment not impacting salmonid sight feeding beneficial use directly; listing in error	N.A.
Spirit Lake 17010305 3438	CWB supported by measured dissolved oxygen, and nutrients. CWB not impaired by sediment.	Sediment not impacting salmonid sight feeding beneficial use directly; listing in error. Dissolved oxygen meeting water quality standards. Total phosphorous at or below the lake plan goals.	N.A.

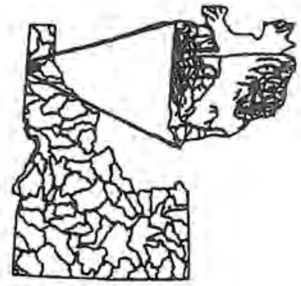
Note: N.A. - Not Applicable

2. SUB-BASIN ASSESSMENT OF LAKES AND STREAMS LOCATED ON OR DRAINING TO THE RATHDRUM PRAIRIE (17010305)

2.0 Rathdrum-Spokane Sub-basin Water Quality at a Glance

Water Quality at a Glance:

Hydrologic Unit Code.................... 17010305
Water Quality Limited Segments..... Hauser Lake; Hayden Lake; Spirit Lake; Fish Creek-Twin Lakes-Rathdrum Creek
Beneficial Uses affected................. Cold Water Biota, salmonid Spawning, Primary Contact Recreation
Pollutants of Concern..................... Nutrients, sediment, D.O. and bacteria
Known Land Uses........................... Forestry, agriculture, urban



2.0.1 Prologue:

The impact of the trace (heavy) metals cadmium, lead and zinc on the Spokane River has been addressed in assessments of the Spokane River and the Coeur d'Alene Lake Plan (Gugliomone, 1992; IDEQ, 1996a). A total maximum daily load document has been developed for these pollutants (IDEQ, 1998a; EPA, 2000). This subbasin assessment addresses the nonmetallic pollutants of concern for the entire subbasin. For background on the Spokane River, the reader is referred to the documents cited.

2.1. Characterization of the Watershed

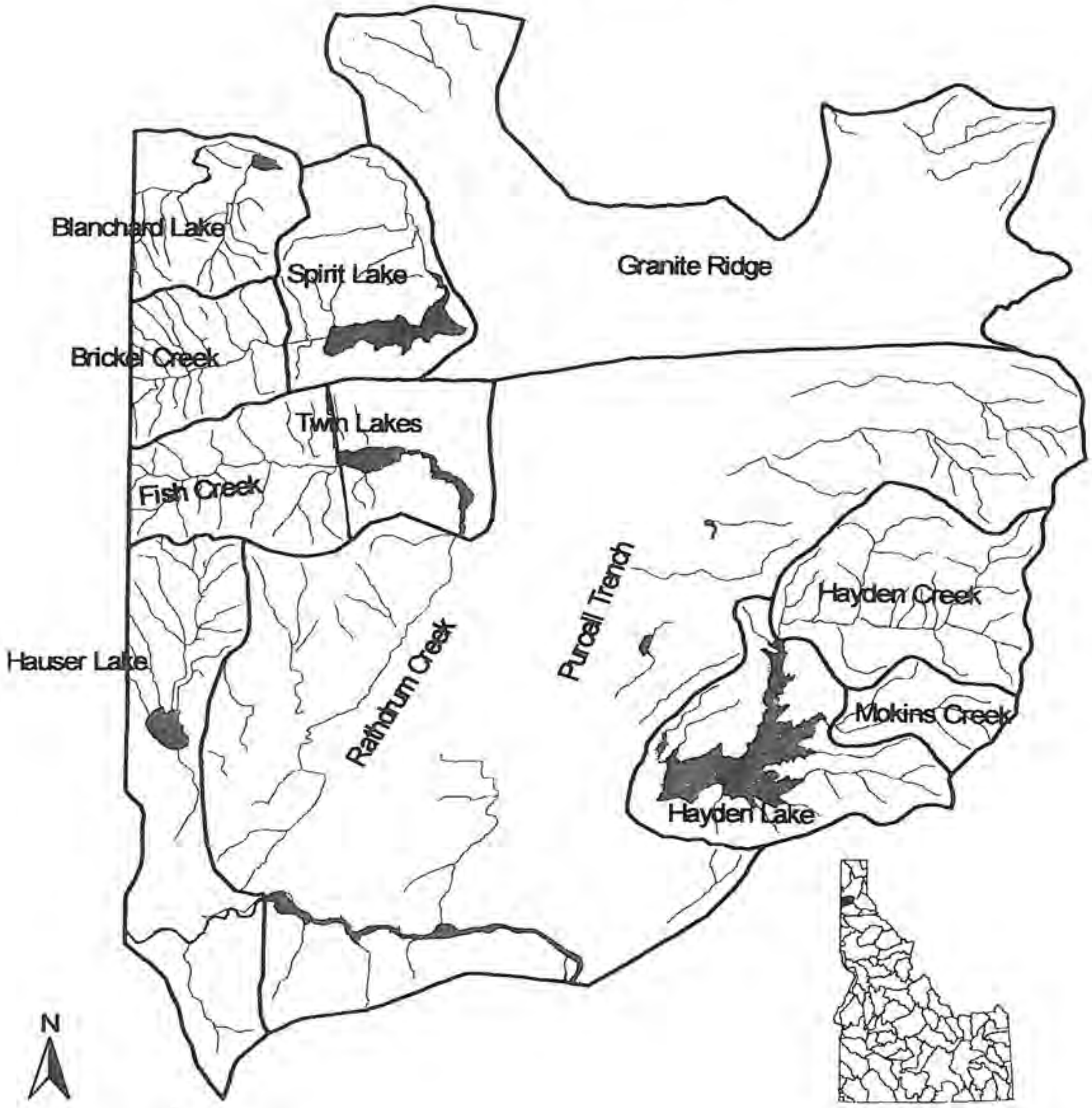
The Rathdrum Prairie is a 209 square mile area located west of the Coeur d'Alene Mountains, north of Coeur d'Alene Lake and south of Lake Pend Oreille (Figure 1). In addition to the two large lakes, five smaller lakes (Blanchard, Hauser, Hayden, Spirit and Twin) are located at the fringes of the prairie. Streams flow from the mountains adjacent to the prairie, either into the lake basins or onto the prairie, where these streams dewater rapidly to the underlying Rathdrum-Spokane Aquifer. The lakes at the margin of the prairie discharge in part, (Blanchard, Coeur d'Alene, Pend Oreille and Twin), or nearly wholly, to the aquifer (Hauser, Spirit and Hayden). The Spokane River traces the southern boundary of the watershed on its route from Coeur d'Alene Lake to the Washington border. The majority of the population of northern Idaho lives in the subbasin on or adjacent to the prairie.

2.1.1. Physical and Biological Characteristics

2.1.1.1 Climate

The Rathdrum Prairie sub-basin is located in the Northern Rocky Mountain physiographic region

Figure 1: Rathdrum Aquifer Watershed (HUC 17010305)

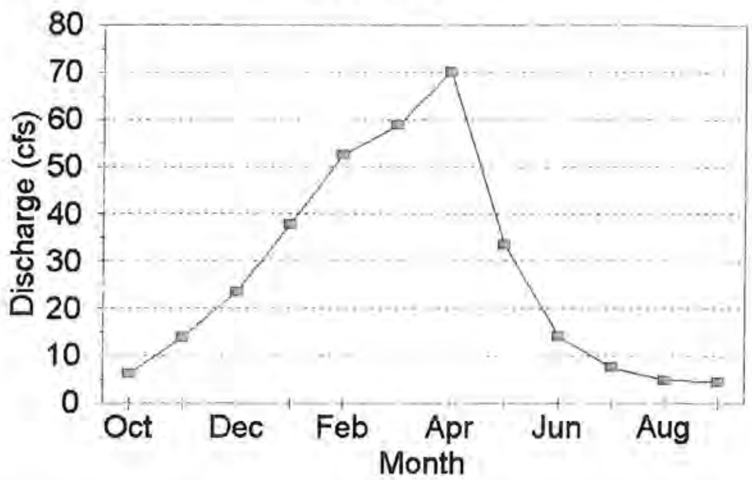


to the west of the Bitterroot Mountains. The local climate is influenced by both pacific maritime air masses from the west as well as continental air masses from Canada to the north. The annual weather cycle generally consists of cool to warm summers with cold and wet winters. The relative warmth of summers or winters depends on the dominance of pacific or continental air masses. Precipitation amounts are most generous in the winter months. Precipitation takes the form of rain on the prairie and in the adjacent mountains below 3,000 feet of elevation, while it is in the form of snow in the mountains above 4,500 feet. The transitional zone between 3,000 and 4,500 feet holds a transient snow pack, which is subject to rapid melt when warm wet pacific air masses predominate. The result of these snow melt events is high discharge rain on snow events.

2.1.1.2. Hydrology

The average discharge hydrograph of Hayden Creek near its mouth is provided in Figure 2 (USGS, 1992-1997). The hydrograph is representative of streams of the sub-basin. The discharge of the streams of the sub-basin is dominated by the spring snowmelt. The streams draining the Coeur d'Alene and Selkirk Mountains have watersheds predominantly in the elevation range (3,000 - 4,500 feet) subject to winter "rain on snow" discharge events. The relative low elevation of the watersheds causes earlier maximum discharge (early-April), than from the majority of the watersheds of the Coeur d'Alene Mountains to the east or the Selkirk Mountains to the north. The lakes discharge to the aquifer with no back flow from the aquifer to the lakes. Lake levels are controlled by tributary stream discharge from their watersheds and the rate of discharge to the aquifer. The levels of Coeur d'Alene, Pend Oreille and Twin Lakes are controlled by discharge structures.

Figure 2: Hayden Creek Discharge
1992-1997



2.1.1.3 Land Forms, Geology and Soils

The Rathdrum Prairie is a large sand, gravel and cobble deposit resulting from the out wash of the Pleistocene Missoulian floods. The deposit is believed to have partially or wholly impounded Coeur d'Alene Lake as well as Hayden, Hauser, Twin and Spirit Lakes (Anderson, 1927). The prairie deposit is ringed by mountainous lands to the east (Coeur d'Alene Mountains), north, west and south (Selkirk Range). A gap in the Selkirk Range at the southwest edge of the prairie is the outlet for both the Spokane River as well as the Rathdrum-Spokane Aquifer.

The watersheds of the sub-basin draining the western flank of the Coeur d'Alene Mountains are generally underlain by rocks of the Belt Supergroup meta-sedimentary terrain. Isolated granitic intrusions and Miocene basalt flow formations are found in these watersheds as well. The Belt terrene weathers to predominantly silt size particles with rounded cobbles as the primary transitional material found in the higher gradient streams. The Selkirk Range forms the watersheds of streams flowing from the north and west to the lakes or the prairie. The range is a granitic formation. However, some remnant Belt geologies exist in some watersheds. These granitic substrates weather to sandy substrates. The predominant bedload of these streams is sand. Soils of the Coeur d'Alene Mountain watersheds are silty and stony podzols developed under predominantly cool conditions and mixed coniferous forest. Soils of the Selkirk Mountain watersheds are sandy podzols developed under predominantly cool conditions and mixed coniferous forest.

Tributaries to the lakes flowing from the mountains are high gradient streams (Rosgen B) channels. Streams flowing onto the prairie are similar. As these streams enter the prairie formation, an abrupt transition to lower gradient channels occurs in their final half miles. Streams quickly dewater into the sands and gravels. The lakes discharge to the prairie formation to feed the Rathdrum-Spokane Aquifer. Blanchard, Hauser Hayden and Spirit Lakes have either no or modest outlets which rapidly dewater. The exception is Twin Lakes, which forms Rathdrum Creek. This Creek flows at the edge of the prairie for approximately seven miles before it dewaters into the prairie gravels.

2.1.1.4. Vegetation

The predominant vegetation of the Coeur d'Alene and Selkirk Mountains, adjacent to the prairie, is mixed coniferous forest at higher elevations. Dominant conifers of the mixed forest are pines, true fir, Douglas fir, tamarack and red cedar. Cottonwood, aspen and alder are the predominant broadleaf species. Lower elevation slopes supported a dryer ponderosa pine forest, which was kept sparse by a more frequent fire occurrence. Fire suppression in the past ninety years has caused the conversion of most of these stands to Douglas fir forest. Riparian areas would be dominated by cottonwood, alder and red cedar. The prairie was grassland with a stony surface prior to European settlement. This vegetation formation was likely maintained by frequent burning practiced by the indigenous peoples. The grasslands and wooded areas would have expanded and contracted dependent on the fire cycle.

2.1.1.5. Aquatic Fauna

The native salmonids of the sub-basin's streams are cutthroat trout, whitefish and bull trout. Sculpin, shiners and bullhead catfish are also natives. The tailed frog, giant salamander and turtles completed the vertebrate species. The fish fauna of the lakes and some streams have been greatly altered by the introduction of several trouts, salmon and warm water species. A detailed discussion of the current fishery of Coeur d'Alene Lake is available in the Coeur d'Alene Lake Management Plan (IDEQ, 1996a). Similar introductions were made to the smaller lakes of the sub-basin with the collateral impact to their tributary streams. Although the lakes and some streams have highly altered aquatic fauna due to introductions, some headwater streams retain native species with the addition of rainbow and brook trout and the loss of bull trout. Although fish composition appears stable in the headwaters, fish abundance is generally believed to be reduced from historic levels observed during settlement of the area.

2.1.2 Cultural Impacts:

The watersheds of the Coeur d'Alene and Selkirk Mountains which drain to the lakes or directly to the prairie formation are managed primarily for timber production and dispersed recreation. Timber management has been moderately intense with large clear-cut areas and dense road development. Land management in this area is primarily by the U.S. Forest Service in the Coeur d'Alene Mountains. Large tracts of private industrial and private forestland exist in the Selkirk Mountains. The Inland Empire Paper Company has large timber land holdings in the watersheds of Hauser, Twin and Spirit Lakes as well as the watersheds draining south to the prairie formation. Near the population center of Coeur d'Alene, Hayden Lake and Dalton, timber management has been less intense to protect scenic values. Some forested watersheds were logged using railroad systems (Hayden and Fish Creeks).

Agriculture on the Rathdrum Prairie is primarily bluegrass seed and small grain production. No streams are present on the prairie to be affected by these practices. Agricultural burning (Falter and Hallock, 1987) has been suggested as a source of atmospheric nutrient deposition to the lakes, but the level of contribution has not been quantified. Grazing occurs on some tributaries to the lakes. Lancaster Creek, a tributary to Hayden Creek, and Fish Creek, as well as the shoreline of Upper Twin Lake, remain areas of intense cattle grazing. Grazing continues in the Brickel Creek watershed, which is the primary tributary to Spirit Lake. Cattle have been excluded from the stream by fencing.

The Rathdrum Prairie sub-basin has the largest population concentration in northern Idaho. The main population center in the sub-basin is the City of Coeur d'Alene on the northern shore of the lake. The Hayden, Hayden Lake and Dalton communities are arrayed along the eastern edge of the prairie. Many residences are located in the watersheds of tributaries to the lakes or streams flowing onto the prairie. The city of Post Falls is located along the Spokane River six miles west of Coeur d'Alene. Rathdrum is located on the western edge of the prairie. Twin Lakes Village is located at the foot of Twin Lakes, while the City of Spirit Lake is located to the north near Spirit Lake. The town of Athol is situated on the northeast edge of the prairie. Rural residences and businesses are found across the prairie and in the adjacent mountains. Lakeside residences and cabins fill the shores of all the lakes. The cities of Coeur d'Alene, Post Falls, Hayden, Hayden Lake, Dalton and Rathdrum have centralized sewage collection and treatment. Many rural residences and lakeside homes or cabins use on-site wastewater treatment systems of varying efficiency. Lot size restrictions have been imposed on the Rathdrum Prairie to protect the Rathdrum-Spokane Aquifer from contamination. For additional information on the land use and demographics of the Coeur d'Alene Basin refer to the Coeur d'Alene Lake Management Plan (IDEQ, 1996a).

2.2. Regulatory Requirements:

2.2.1. Segments of Concern:

The stream segments listed in 1998 under Section 303(d) Clean Water Act for nonmetallic pollutants in sub-basin 17010305 are provided in Table 1. Two additional water bodies had been listed on the 1996 list. These were Mokins Creek (17010305 3557), which was listed for nutrients, sediment and habitat alteration and Brickel Creek (17010305 3437, which was listed for sediment. Mokins and Brickel Creeks were removed from the list when analysis of more recent water quality data provided scores sufficiently high for delisting (IDEQ 1996b).

Table 1: List of 1998 Section 303(d) Clean Water Act listed water bodies.

Water body Name	HUC Number	Boundaries	Pollutant(s)
Spokane River	17010305 3552	CdA Lake to Huetter	Temperature
Spokane River	17010305 3553	Huetter to Post Falls Bridge	Temperature
Spokane River	17010305 4554	Post Falls Bridge to WA Border	Temperature
Fish Creek	17010305 3561	WA Border to Twin lakes	Nutrients and sediment
Twin Lakes	17010305 7561		Bacteria, nutrients and sediment
Rathdrum Creek	17010305 3560	Twin Lks Outlet to E. Green acres Diversion	Nutrients and sediment
Hauser Lake	17010305 3562		Dissolved oxygen and nutrients
Hayden Lake	17010305 7555		Nutrients and sediment
Spirit Lake	17010305 3438		Nutrients, dissolved oxygen and sediment

2.2.2 Beneficial uses:

Of the listed water bodies, the Spokane River, Hauser, Hayden, Spirit and Twin Lakes have beneficial uses specifically designated in the Idaho Water Quality Standards (IDAPA 58.01.02.)(IDEQ, 2000). Beneficial uses of the other water bodies listed (Fish and Rathdrum Creeks) would be by interpretation of the standards, cold water biota and secondary contact recreation (IDAPA 58.01.02101.01.a).

The Spokane River (P-3, P-4) has designated uses in the Idaho water quality standards (IDAPA 58.01.02110.12.) of domestic water supply, agricultural water supply, cold water biota, primary and secondary contact recreation and salmonid spawning. Twin Lakes (P-13) have designated uses of domestic water supply, agricultural water supply, cold water biota, primary and secondary contact recreation (IDAPA 58.01.02110.12.). Hayden Lake (P-5) has designated uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning and primary and secondary contact recreation (IDAPA 58.01.02110.12.). It is designated as a special resource water as well. Hauser Lake (P-16) has designated uses of domestic water supply, agricultural water supply, cold water biota, primary and secondary contact recreation (IDAPA 58.01.02110.12.). Hauser and Twin Lakes have salmonid spawning protected for future use. Spirit Lake (P-9) has designated beneficial uses of domestic water supply, agricultural water supply, cold water biota, salmonid spawning, primary and secondary contact recreation and special resource water (IDAPA 58.01.02110.05.)

The Idaho Water Quality Standards and Wastewater Treatment Requirements are currently undergoing major revision under the Idaho Administrative Procedures Act requirements. Among the revisions are changes to the designated uses of several water bodies including those listed in Table 1. Agricultural water use would be dropped from all these water bodies. Secondary contact recreation is dropped as redundant, when primary contact recreation is designated. Primary contact recreation requires more stringent support criteria than secondary contact recreation. The protection of salmonid spawning for future use is dropped for Hauser and Twin Lakes. These changes have been adopted by the Idaho Board of Health & Welfare and approved by the Legislature. These changes are currently under review by the EPA.

2.2.3. Water Quality Criteria:

Water quality criteria supportive of the beneficial uses are stated in the Idaho Water Quality Standards and Wastewater Treatment Requirements (IDHW 1996b). The standards supporting the beneficial uses are outlined in Table 2. In addition to these standards cold water biota and salmonid spawning are supported by two narrative standards. The narrative sediment standard states:

Sediment shall not exceed quantities specified in section 250 or, in the absence of specific sediment criteria, quantities, which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b. (IDAPA 58.01.02.200.08).

The excess nutrients standard states:

Surface waters of the state shall be free from excess nutrients that can cause visible slime growths or other aquatic growths impairing designated beneficial uses. (IDAPA 58.01.02.200.06).

Table 2. Water quality criteria supportive of beneficial uses.

Designated Use	Primary Contact Recreation	Secondary Contact Recreation	Cold Water Biota	Salmonid Spawning
Coliforms and pH	406 EC/100mL	576 EC/100mL	pH between 6.5 and 9.5	pH between 6.5 and 9.5
Coliforms and dissolved gas	126 EC/100mL geometric mean over 30days	126 FC/100mL geometric mean over 30 days	dissolved gas not exceeding 110%	dissolved gas not exceeding 110%
chlorine			total chlorine residual less than 19 ug/L/hr or an average 11 ug/L/4 day period	total chlorine residual less than 19 ug/L/hr or an average 11 ug/L/4 day period
toxics substances			less than toxic substances set forth in 40 CFR 131.36(b)(1) Columns B1, B2, D2	less than toxic substances set forth in 40 CFR 131.36(b)(1) Columns B1, B2, D2
dissolved oxygen			exceeding 6 mg/L D.O.	exceeding 5 mg/L intergraval D. O.; exceeding 6 mg/L surface
temperature			less than 22°C (72°F) instantaneous; 19°C (66°F) daily average	less than 13°C (55°F) instantaneous; 9°C (48°F) daily average
ammonia			low ammonia (formula/tables for exact concentration	low ammonia (formula/tables for exact concentration
turbidity			less than 50 NTU instantaneous greater than background; 25 NTU over 10 days greater than background	

2.3. Water Quality Concerns and Status:

2.3.1 Pollutant Sources

The water bodies listed in the sub-basin have reported pollutant exceedences for one or more of the following pollutants: bacteria, nutrients, sediment, dissolved oxygen and temperature. Bacterial contamination would be predominantly from livestock grazing. Some bacterial contamination may be from insufficient treatment of human wastes at lakeshore cabins. Excess nutrients normally are the result of human residential development or livestock grazing activities in the waters under assessment. Nutrients may also naturally build up in a lake over time causing a naturally eutrophic lake. Shallow lakes, which have limited water flow through the lake on an annual basis, are more likely to be eutrophic. Any water body, which has its source in a nutrient enriched lake, will itself be rich in nutrients. Sediment is a water constituent naturally yielded by watersheds to water bodies.

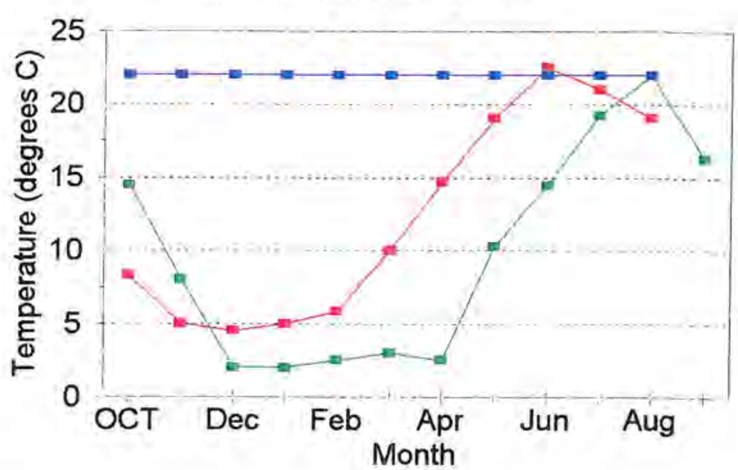
Excess sedimentation most often has its origin in roads developed for logging or access to a watershed. Roads may yield sediment directly from their surfaces or bed through mass wasting or their locations may cause the adjacent stream to begin bank and channel cutting. Dissolved oxygen may be deficient in lakes and some streams as the result of the presence of biological oxygen demanding materials. Often eutrophic lakes have sufficient algal and weed growth to engender dissolved oxygen problems. Dissolved oxygen deficits normally appear initially in the hypolimnetic waters of lakes, which thermally stratify. Streams often have insufficient dissolved oxygen as a result of temperature exceedences. Oxygen solubility declines with increased water temperature. Temperature exceedences in these waters are often due either to insufficient water flow, alteration of the stream structure to a broad shallow morphology or lack of riparian vegetation to supply shading. Streams which have their source in shallow warm lakes often are warm as well.

2.3.2. Available Water Quality Data:

2.3.2.1. Spokane River

Water temperature data has been collected on the Spokane River by the US Geological Survey at its Post Falls gauging station, Idaho Department of Environmental Quality, Spokane River Dischargers Group and others. Gugliomone (1992) summarized much of this data. During the late summer months of drought years, the Spokane River exceeds the temperature criteria (Figure 3) for cold water biota and salmonid spawning.

Figure 3: Spokane River Temperature
Low and High Discharge Years



Note: Red: Low discharge year; Green: High discharge year; Blue: Temperature standard

The river is formed by the discharge of Lake Coeur d'Alene. A natural discharge control at the outlet of the lake governed discharge from the lake prior to creation of the Post Falls impoundment (Davenport, 1921). Water entering the river is epilimnion water from the upper surface of the lake. During summer conditions this water is the warmest in the lake (Woods and Beckwith, 1996).

The Post Falls, prior to impoundment, was 8 feet lower than the lake outlet. Surveys completed by the Army Corp of Engineers in the late 1940s indicate the lowest elevation of the outlet cross section is 2,118 feet, while the lowest point of the pre-development Post Falls is 2,110 feet (Stockinger, 1998). Under pre-development conditions, the mid to late summer flow of the Spokane River would have been low, dependent on the year. This discharge would consist of warm epilimnion water. The water would traverse a channel capable of carrying up to 30,000 cubic feet per second high flow discharges. It is most probable that the Spokane River was generally shallow and not well shaded during the summer low flow conditions. The Spokane River below the Post Falls Dam generally meets this description today under low flow conditions. Thus the warm water from the lake may have been further heated as it traversed the Spokane River. Thermal exceedence most likely occurred during summer low flow conditions prior to dam development.

The effect of the Post Falls Dam has been to impound the river upstream to the lake, enlarge the lake surface area and increase the retention time of water in the channel above the dam. The river continues to receive warm epilimnetic water during the summer months. The water held in the channel above the dam is deeper, but is retained for a longer period. For this reason it is more resistant to warming than a shallower stream configuration, but the water is retained for a longer period to warm. The Post Falls Dam might function to marginally increase thermal gain by the river during summer low flow conditions as a result of lake surface augmentation and change in the retention time of the water. The marginal increase would be in the range of one or two degrees centigrade. Since the lake epilimnion can exceed the cold water biota standard by four to five degrees centigrade during a warm summer (Woods and Beckwith, 1996), the effect of the dam is not critical to the temperature exceedences. The only feasible remedy would be dam removal.

The summer thermal limitation of the Spokane River is probably a natural situation caused by its source of lake epilimnion water and some additional warming in the channel. These conditions would occur with or without human intervention, although the Post Falls Dam likely adds some thermal gain. Since the limitation is of natural origins, no feasible corrective strategy exists. The Spokane River should be redesignated as seasonal cold water biota to account for its natural thermal gain and delisted for temperature.

2.3.2.2. Twin Lakes Watershed (Fish Creek -Twin Lakes - Rathdrum Creek):

2.3.2.2.1 Fish Creek:

Fish Creek is the largest tributary to Upper Twin Lake accounting for 88.6% of the annual discharge to Twin Lakes (Falter and Hallock, 1987). Waters of Upper Twin Lakes move through a narrow channel into Lower Twin Lake.

Habitat assessment by DEQ beneficial use reconnaissance teams of two reaches of the stream indicated an average residual pool volume of 9,181 ft^3/mile. Compared to other streams of its size in granitic terrenes, this is a respectable level of pool volume (IDEQ, 1998b). Macroinvertebrate

Estimated backgrounds based on the assumption of totally forested watersheds would be 567.8 and 115 tons per year. Fish Creek sediment modeling provides a value 21.7% above the natural background, while Rathdrum Creek sediment modeling provides a value 54% above natural background. Model results for neither creek exceed the 100% above natural background and threshold indicative of water quality impairment, while Fish Creek is below the 50% above natural background lower limit and Rathdrum Creek is only 4% above this lower limit (Washington Forest Practices Board, 1995).

2.3.2.2.5 Fish Population Data:

Sedimentation can interfere with natural trout recruitment and cause the filling of pools. The impact should be reflected in the trout populations. Trout population density has been assessed in some tributaries of the lakes by DEQ beneficial use reconnaissance teams (IDEQ, 1998b). Brook and cutthroat trout are the salmonids found in Fish Creek. Trout population densities (salmonid/m^2/ hour effort) were 0.072 and 0.230 in the two reaches of Fish Creek assessed. Sculpin populations (sculpin/m^2/ hour effort) were 0.028 and 0.061. Three age classes of brook trout, the most abundant fish, were found. Fish populations were not assessed in Rathdrum Creek. Reference streams, in the Priest Lake Basin (Two Mouth and Trapper Creeks), range from 0.1 - 0.3 salmonid/m^2/hour effort and 0.1 - 0.5 sculpin/m^2/hour effort (IDEQ, 1999). It is necessary to default to these reference streams, because no appropriate references have been assessed in the sub-basin. Fish density can be affected by other factors such as harvest and disease. In this case, however, fish densities and age class distribution data support the conclusion that Fish Creek is not water quality limited by sediment.

Twin Lakes was a west slope cutthroat trout fishery prior to European settlement of the area. Trout remains an important part of the fishery with some tributary production of trout. Tributary trout production is insufficient to support the lake population under fishing pressure. The trout population is augmented by stocking. Upper Twin Lake becomes too warm to support trout during August and September of most summers. Warm water species have been introduced to the lakes. Bass, pike, crappie, sunfish and bullhead catfish make up the important warm water biota (Horner, 1999).

2.3.2.3. Hayden Lake:

2.3.2.3.1 Limnology and Nutrient Loading

The limnology of the Hayden Lake was investigated in depth by Soltero and Associates (1986) and Bellatty (IDEQ, 1990). Hayden Lake was assessed as oligotrophic bordering on mesotrophy. The assessment was based on nutrient concentration, primary productivity and chlorophyll a concentrations. Algal bioassay of an earlier eutrophication survey indicated that phosphorous was the limiting nutrient to vegetation growth. During spring and fall, while nitrogen limits growth during the summer (USEPA, 1977b). Later more detailed investigations, by Soltero and his associates (1986), Bellatty (1990) and the Panhandle Health District (PHD 1994) indicate that phosphorous is the nutrient limiting algal growth in Hayden Lake. Volunteer monitoring completed between 1990 and 1999 indicates that phosphorous, chlorophyll a and clarity have remained rather stable at the mid lake station. The ten-year average total phosphorous concentration for the lake in its photic zone is 7.75 ug/L. The ten-year average chlorophyll a concentration in the Secchi zone is 1.4 ug/L, while the ten-year average Secchi depth is 8.4 meters (Appendix C). These values are consistent with an oligotrophic lake, limited by phosphorous concentration (Ryding and Rast, 1989). Chlorophyll a and total phosphorous are considerably higher in near shore areas (Honeysuckle Beach) and in the shallow northern arm of the lake, while Secchi depths are more shallow. (Mosier, 1999).

Soltero and associates (1986) and later data (PHD, 1994) estimated the annual phosphorous loading at 3610 kg P/yr. The source of phosphorous loadings was estimated as 33% (1,200 kg P/yr) from the Hayden Creek watershed, 7% (240 kg P/yr) from Mokins Creek, 7% (250 kg P/yr) from the other tributaries, 17% (630 kg P/yr) from atmospheric fallout, 32% (1,170 kg P/yr) from residential storm water and 3% (120 kg P/yr) from shoreline septic systems. Water leaves Hayden Lake by evaporation, discharge to the Rathdrum Prairie Aquifer or through a very limited seasonal outlet. Effectively, phosphorous entering the lake remains in the lake system primarily in the bottom sediments.

Sediment contribution to Hayden Lake is primarily from Hayden Creek. Sediment contribution from the other tributaries is minimal. Examination of Secchi measurements of the lake early in the season (May and early June) indicates a pattern of higher clarity (5-7 meters) during and shortly after the high runoff period (Appendix C). This result indicates that fine sediment delivery is not exceeding the salmonid sight-feeding standard. Fisheries population information provided by Fish and Game do not indicate that sediment impairs in lake spawning. The original listing that sediment was exceeding a water quality standard was in error. Other than the impact of sediment bound phosphorous on the phosphorous concentration of the lake, an impact of sediment to a beneficial use of the lake could not be demonstrated.

2.3.2.3.2 Fisheries

Hayden Lake was a west slope cutthroat trout fishery prior to settlement of the area. Trout remains an important part of the fishery with significant tributary production of trout. Most trout production occurs in Hayden Creek where fishing is prohibited. Tributary trout production is insufficient to support the lake population under fishing pressure. The trout population is augmented by stocking. Warm water species have been introduced to the lake. Bass, pike, crappie, sunfish and bullhead catfish make up the important warm water biota. This fishery is limited to the bays and northern arm of this cold and deep lake. The small mouth bass, largemouth bass and crappie are managed as high quality fisheries (Horner, 1999).

2.3.3 Beneficial Use Support Status

The assessed support status of the water bodies based on the data available is provided in Table 10. The need for development of a TMDL is noted.

Table 10: Results of sub-basin assessment based on application of the available data.

Water body Name and HUC Number	Assessed Support Status	Reasons segment to be de-listed for pollutant	Reason TMDL deferred
Spokane River 17010305 3552	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
Spokane River 17010305 3553	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
Spokane River 17010305 4554	CWB temperature standard exceeded	N.A.	TMDL deferred until temperature and/or beneficial use standards reviewed/revised
Fish Creek 17010305 3561	Sediment modeling and nutrient data indicate cold water biota supported.	Sediment modeled at below 50% above background. Nutrients concentrations of Fish Creek well below stream guidelines. Twin Lakes nutrient TMDL will address Fish Creek	N.A.
Twin Lakes 17010305 7561	CWB impaired by nutrients; nutrient TMDL required.	CWB not impaired by sediment. Sediment not impacting salmonid sight feeding beneficial use directly; listing in error	N.A
Water body Name and HUC Number	**Assessed Support Status**	**Reasons segment to be de-listed for pollutant**	**Reason TMDL deferred**
Rathdrum Creek 17010305 3560	Sediment modeling and nutrient data indicate cold water biota supported. Bacteria standard not exceeded indicating secondary contact recreation supported.	Sediment below 100% above background and near lowest threshold of 50% above background. Nutrient concentrations below stream guidelines. Nutrient TMDL for Twin Lakes will address Rathdrum Creek. Bacteria standard not exceeded.	N.A.
Hauser Lake17010305 3562	CWB impaired by nutrients; nutrient TMDL required. CWB impaired by dissolved oxygen deficit created by organic matter resulting from lake productivity	N.A.	Dissolved oxygen TMDL deferred until nutrient reduction approach is assessed to determine if dissolved oxygen recovers.
Hayden Lake 17010305 7555	CWB threatened by nutrients; nutrient TMDL required.	CWB not impaired by sediment. Sediment not impacting salmonid sight feeding beneficial use directly; listing in error	N.A.
Spirit Lake 17010305 3438	CWB supported by measured dissolved oxygen, and nutrients. CWB not impaired by sediment.	Sediment not impacting salmonid sight feeding beneficial use directly; listing in error. Dissolved oxygen meeting water quality standards. Total phosphorous at or below the lake plan goals.	N.A.

Note: N.A. - Not Applicable

The TMDLs required for HUC 17010305 can be grouped in one case. A nutrient TMDL addressing Fish Creek, Twin Lakes and Rathdrum Creek can be prepared with a nutrient TMDL for Lower Twin Lake. Sedimentation of Rathdrum Creek is low. Sediment TMDLs are not required for Fish and Rathdrum Creeks. Nutrient TMDLs are required for Hauser and Hayden Lakes.

Lake management plans have been developed for Hauser, Hayden, Spirit and Twin Lakes (CLCC, 1990; PHD, 1994; PHD, 1993; CLCC, 1991). These plans contain the necessary information for TMDL development and constitute the start of implementation plans. Three lakes require total phosphorous TMDLs, while Spirit Lake is meeting or below its total phosphorous goal and for this reason does not require a TMDL.

The Spokane River exceeds temperature standards as a result of natural conditions. The stream should be redesignated as a seasonal cold water biota protected with a standard reflecting the upper limit of lake epilimnion temperatures observed during warm dry summers. This approach will recognize natural conditions. A temperature TMDL should be deferred until water quality standards issues are resolved.

2.4. Pollution Control

2.4.1. Control Efforts to Date

Pollution control efforts to date have been in place on some of the watershed requiring additional TMDL measures.

Analysis of sediment in the two watersheds of the basin listed indicates roads are the primary sediment producing infrastructures. Forest harvest methods have progressed from logging systems heavily dependent on harvest roads to those less dependent of high road densities. Most forest roads in the Fish, Hauser and Brickel and Birch Creeks watersheds belong to Inland Empire Paper Company. The company has a program through which ten miles of road are reclaimed per year in these watersheds and main haul roads have gravel applied. Application of gravel decreases the fine sediment yield by roads nearly 80%. These activities are likely responsible for lower combined CWE scores (28 -1995 to 12.5 -2000) in the Fish Creek watershed. A grazing management plan has been developed for livestock using pastures adjacent to lower Fish Creek and Upper Twin Lake (Brown, 1999) and Brickel Creek (Brown, 2000). Implementation of Fish Creek and Upper Twin Lakes grazing plans on the ground has not fully occurred. Grazing plans have been implemented on Brickel Creek. This implementation coincides with the lower total phosphorous concentrations observed in Spirit Lake since 1993.

Lake management plans have been developed for the three water quality limited lakes. These plans identify the nutrient sources and prescribe remedial approaches to limit some nutrient sources. Some approaches have been implemented. Kootenai County has implemented a "grading ordinance" as part of its building codes. A set of storm water runoff best management practices has been developed for urbanized areas around the lakes, especially Hayden Lake. Many of the residences on the shore of Hayden Lake are now served by the Hayden Area Regional Sewer Board, which collects and treats wastewater at a centralized facility (PHD, 1994). Twin Lakes Village near Twin Lakes has a sewage collection and treatment at a community facility remote from the lake (Gaffney, 1999).

2.4.2. Pollution Control Strategies

Pollution control strategies have been developed for the three lakes assessed as water quality limited. The required TMDLs for nutrient in Twin, Hauser and Hayden Lakes will closely mirror the existing lake management plans. Nutrient management of Twin Lakes will address the nutrient yield to Fish Creek both from grazing and logging practices. The Twin Lakes nutrient TMDL should address the nutrient problems in Rathdrum Creek.

Phosphorous attached to sediment can be controlled in Fish Creek by the obliteration of unnecessary encroaching forest roads and graveling of those roads still needed. Bank erosion related to grazing must also be addressed as a part of nutrients from grazing activities.

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3.0 Total Maximum Daily Loads for the Water Quality Limited Water Bodies Located on or Draining to the Rathdrum Prairie (17010305)

3.1. Hayden Lake Total Maximum Daily Load

3.1.1. Introduction

The limnology and water quality of Hayden Lake has been investigated in depth (Soltero et. al., 1986; Bellatty, 1990). The lake has the nutrient status and biological productivity consistent with oligotrophy bordering on mesotrophy. The lake is phosphorous limited. Phosphorous entering the lake remains in the lake or its bottom sediments, because the lake discharges nearly completely to the Rathdrum-Spokane Aquifer.

The phosphorous loading budget of the lake is provided in Table 1.

Table 1: Total Phosphorous budget of Hayden Lake (Saltero et. al., 1986; PHD, 1994)

Phosphorous Source	**Phosphorous Load (kg/year)**	**Percentage**
Hayden Creek	1,200	33%
Mokins Creek	240	7%
Other Tributaries	250	7%
Atmospheric Fallout	630	17%
Residential Storm Water	1,170	32%
Shoreline Septic Systems	120	3%
Total	3,610	99%

The Hayden Lake Watershed Management Plan (PHD, 1994) has a goal for Hayden Lake of:

: Total Phosphorous at Secchi depth of 7 ug/L (10-year average)

: Average secchi depth of 10 meters

: Minimum dissolved oxygen of 6 mg/L or 90% of saturation whichever is greater.

Average total phosphorous is designated as the primary indicator of lake productivity and water quality (PHD, 1994).

The total phosphorous ten-year average in the Secchi zone is 7.75 ug/L (Mossier, 1993; CVMP, 1992-1999, Appendix C). The ten-year total phosphorous average is 10.7% above the Hayden Lake Management Plan goal.

3.1.2. TMDL Authority

Section 303(d)(1) of the Clean Water Act requires states to prepare a list of waters not meeting state water quality standards in spite of technology based pollution control efforts and the application of best management practices for nonpoint sources. This list must include a priority ranking "... taking into account severity of the pollution and the uses to be made of such waters." The prescribed remedy for these water quality limited waters is for states to determine the total maximum daily load (TMDL) for pollutants □... at a level necessary to implement applicable water quality standards with seasonal variations and a margin of safety ...□ A margin of safety is included to account for any lack of knowledge about how limiting pollutant loads will attain water quality.

Section 303(d)(2) requires both the list and any total maximum daily loads developed by the state be submitted to the Environmental Protection Agency (EPA). The EPA is given thirty days to either approve or disapprove the state's submission. If the EPA disapproves, the agency has another thirty days to develop a list or TMDL for the state. Both the list and all TMDLs, either approved or developed by EPA, are incorporated into the state's continuing planning process as required by section 303(e).

3.1.3. Loading Capacity

Based on the management plan goal of 7 ug/L in the Secchi zone and the ten-year average phosphorous of 7.75 ug/L, a 10.7% (7.75/7.0 x 100) reduction in total phosphorous is required by the plan. Since the measured load to the lake is 3,610 kilograms total phosphorous per year, the loading capacity required to meet the management plan is 3,223 kilograms total phosphorous per year ((3,610- (3,610 X 0.107). This value is the total phosphorous loading capacity of Hayden Lake. An estimated total phosphorous load reduction of 386.3 kilograms phosphorous per year is required to meet the lake plan goal.

3.1.4. Margins of Safety

The chemical measurements used to develop the ten-year total phosphorous average and nutrient loads have a precision margin of error of 5%. Discharge measurements contain a margin of error of 5%. Based on these two errors an additive margin of safety of 10% is applied. This additional total phosphorous load is deducted from the loading capacity to develop an allocable phosphorous load of 2,901 kilograms per year (3,223 - (3,223 X 0.1). An additional margin of safety is the deposition of phosphorous mineral in the lake bottom. The level of this mechanism has not been estimated and is ignored in the loading capacity calculations.

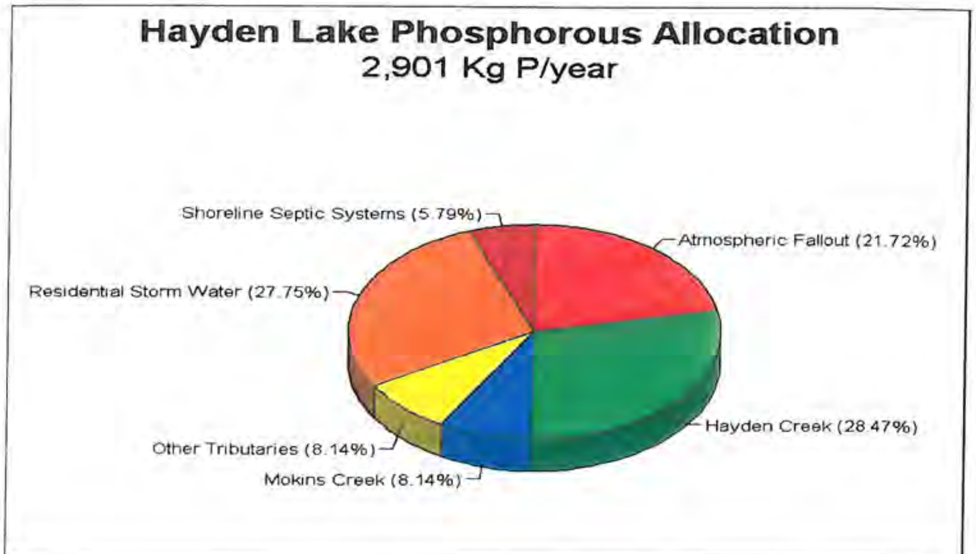
3.1.5. Total Phosphorous Load Allocation

All sources of phosphorous to Hayden Lake are nonpoint sources. Phosphorous load cannot be allocated evenly to the sources to the lake. Atmospheric fallout cannot realistically be controlled. The load allocation is constructed by removing the full load of atmospheric fallout from the allocable phosphorous load. Atmospheric fallout is 17% of the phosphorous load to the lake. Three and four-tenths percent (17%/5) is deducted from the load percentage of the five controllable sources to develop the load allocation (Table 2) (Figure 1).

Table 1: Total phosphorous allocation for Hayden Lake.

Phosphorous Source	Adjusted Percentage after Fallout Removed	Allocated Phosphorous Load (kilograms/year)	Total phosphorous load reduction required.
Atmospheric Fallout	-	630	0
Hayden Creek	36.4%	826	257
Mokins Creek	10.4%	236	74
Other Tributaries	10.4%	236	74
Residential Storm Water	35.4%	805	251
Shoreline Septic Systems	7.4%	168	53
Total	100%	2,901	709

Figure 1: Total phosphorous allocation for Hayden Lake.



3.1.6. Total Phosphorous Load Reduction Allocation

Phosphorous load reduction actions are discussed in depth in the Hayden Lake Management Plan (PHD, 1994). The sources and the responsible agencies or governments are designated in the plan's action items. The load reduction required, including the margin of safety (10%; 322 kilograms phosphorous per year) is 709 kilograms per year. The load reductions required of each source are provided in Table 2, column 4. The reductions are provided graphically in Figure 2.

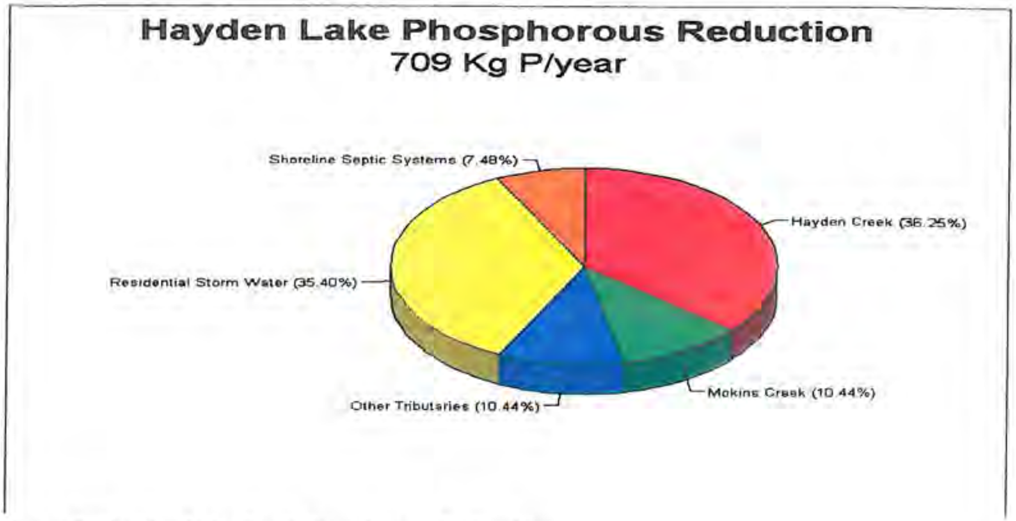


Figure 2: Hayden Lake Total Phosphorous Reductions

3.1.7. Seasonal critical conditions

The issue of critical conditions has importance in a stream which experiences radical changes in discharge (water volume) throughout the year. A lake, by its very nature as a watershed sink integrates and buffers seasonal flows. Plant growth conditions are critical during the summer months, but the growth nutrients are conserved by the lake. For this reason, lake nutrient TMDLs seek yearly reductions in the nutrient load without regard to seasonality.

3.1.8. Reasonable assurance

No point sources of nutrients are present in the watershed. The only assurance that the TMDL will be implemented is the ongoing implementation of remedial actions by Kootenai County, lakeshore owner's association and the State.

3.1.9. Monitoring Provisions

Hayden Lake has been monitored by a Citizens Volunteer Monitoring Program (CVMP) for the past ten years. The program has reliably provided phosphorous, clarity and chlorophyll a data collected during four and some years five summer months. This program will be relied upon to provide the water column data necessary to assess the effectiveness of the phosphorous load reductions required by the TMDL.

3.1.10. Feedback Provisions

Data from which the problem assessment and TMDL for Hayden Lake were developed are fairly accurate measurements. The loading analysis was completed more than a decade ago. As more up to date measurements are developed, these will be added to a revised TMDL as required.

When total phosphorous concentration declines below 7 ug/L, and remains at this level, further phosphorous load reduction will not be required of the sources. Best management practices for forest and road practices will be prescribed by a revised TMDL with erosion abatement structure maintenance provisions. Regular monitoring of the lake will be continued for an appropriate period to document maintenance of the full support.

3.1.11. References:

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4.0 Response to Comments on the Upper Spokane (Rathdrum - Spokane Sub-basin Assessment and Hauser, Hayden and Twin Lakes TMDLs.

4.1. Introduction

The Upper Spokane (Rathdrum-Spokane) Sub-basin Assessment and the Hauser, Hayden and Twin Lakes TMDLs were submitted for a thirty-day public comment period between August 25, 2000 and September 25, 2000. The public comment period was advertised in three local newspapers: the Coeur d'Alene Press, Bonner County Daily Bee and the Spokesman Review. During the public comment period the Panhandle Basin Area Group met on September 20, 2000. The Upper Spokane Sub-basin Assessment and TMDLs were on the agenda of this meeting. The opportunity was afforded the public to comment on the documents. A copy of the documents was supplied to the EPA point of contact.

No written comment on the documents was received during the comment period. A single verbal comment was telephoned to IDEQ by Marita Little of Upper Twin Lake. This comment was followed up with a further discussion with the commenting party. A letter of comment was received from EPA on November 2, 2000. These comments are addressed in the text of the sub-basin assessment and TMDLs, where appropriate, and in the responsiveness summary.

4.2 Comment Received

4.2.1 Comment of Marita Little

Marita Little: She felt that even though livestock grazing is being managed many betters than in previous years, the cattle were still a source of bacteria at times. She also believes logging activities contribute to the sediment problems. She estimated that sedimentation has reduced the upper lake's depth by 3-5 feet over a 35-year period. She would rather not see the lake de-listed for bacteria and sediment.

Response: The filling of a lake by sediment is not a water quality impact addressed in the state standards. It may be an issue of water quantity. The sediment model applied to Fish Creek, the primary lake tributary, indicated an acceptable level of sediment yield, below 50% above background. The cumulative watershed impact assessment made preparatory to the modeling indicated that sedimentation sources had declined in the basin since a similar assessment was completed in 1994. Sediment will be addressed in the nutrient TMDL prepared for Twin Lakes. Almost all phosphorous entering the lake will be attached to sediment particles. Phosphorous controls will, in part, necessitate sediment control in the implementation plan.

Bacteria (pathogen) exceedences were not found in the lake or the streams. Based on these data and the improvement of grazing practices, a bacterial problem was not demonstrated. In a manner analogous to sediment, bacteria contamination should be further controlled by the nutrient TMDL. Animal wastes are the source of both bacteria and nutrients. The grazing at the head of Upper Twin Lake and along lower Fish Creek has a phosphorous allocation made to it and a phosphorous reduction goal assigned. Steps taken to meet the allocation and reduction goal will limit bacterial contamination as well.

4.2.2 Comment of EPA

4.2.2.1 Comments on TMDLs

Comment 1: The relationship between the goals of the lake nutrient TMDLs and the Idaho water quality standards for nutrients is questioned.

Response: The Idaho water quality standards do not contain numeric nutrient standards. The functional standard is the nuisance weed growth standard stated in the sub-basin assessment (page 7). In the case of lakes, the nuisance weeds are phytoplankton, which initially affect water clarity and as the situation becomes more extreme can affect dissolved oxygen concentration. The standard must be applied based on the perceived trophic status of the lake and the ability to affect that trophic status. Each of the lake studies cited in the sub-basin assessment made an assessment of the lake, its limiting nutrient to plant growth and the trophic status of the lake. Hayden Lake is an oligotrophic lake, while Hauser and Lower Twin Lake are mesotrophic and Upper Twin Lake is eutrophic. Based on this information, each of the lake plans developed a nutrient reduction goal that would reduce the nuisance weed growth and was achievable in the lake addressed by the management plan. The difference in lake plan goals and TMDL goals arise from the difference in the lakes documented briefly in the sub-basin assessment and more fully in the cited lake studies and management plans.

Comment 2: Points on the TMDL checklist concerning critical periods (seasonality) and reasonable assurance were not addressed in the three TMDLs.

Response: Sections have been added to the TMDLs addressing these points. These points were overlooked because lakes integrate seasonal discharge and these lakes have no point discharges of nutrients.

Comment 3: The lake plans are provided as the implementation plans, but are not up to date with the TMDLs. A relationship between the proposed actions of the lake plans and nutrient reduction must be demonstrated.

Response: The lake plans are certainly starting points for TMDL implementation plans. The action items in each plan are designed to reduce erosion of sediment, which carries phosphorous into the lakes and nutrients from other sources. Some action items in these plans have been applied, notably the Kootenai County site grading ordinance. Others have not. In certain cases only alum treatment will achieve the goals of the TMDL. These plans will be revised after approval of the nutrient TMDLs by EPA. The relationship between action items developed. In cases where additional action items are required (alum treatment of Hauser and lower Twin Lake), these should be added.

Comment 4: Forest practices best management practices (BMPs) should be included in this TMDL.

Response: The Idaho Forest Practices Rules and Regulations are the BMPs for forest practices in Idaho and are required by law. By their very nature BMPs are preventive of water quality pollution, but are not typically remedial. The BMPs are currently prescribed. However, they should not be a part of the TMDL until such time that the beneficial use is fully supported. At that time, the BMPs' preventive role becomes important.

Comment 5: Age of the water quality studies on the lakes noted.

Response: TMDLs are to be developed with the best available data. The lake studies employed as the basis of the TMDLs are the best available data. In addition the Citizens Volunteer Monitoring Program (CVMP) results (Appendix C) link the earlier data to the present. These trends indicate that the nutrient status of the four lakes has not changed. We did not expect the nutrient loading percentages to change radically without implementation of remedial activities. The state cannot develop new water quality studies and meet the TMDL deadlines. It must abide by the rule of best available data.

Comment 6: It should be demonstrated how reduction in total phosphorous in Hauser Lake would cause increases in oxygen concentration in Hauser Lake. Regular monitoring of Hauser Lake should be implemented. The State of Washington should comment on the Hauser Lake TMDL and a discussion added on how Washington will address the TMDL.

Response: It is common limnological science that oxygen deficits in lakes are caused by increase of organic matter decomposition. It is also common knowledge that reduction in total phosphorous decreases plant biomass productivity. The Hauser Lake study, as well as its management plan, points these facts out. The text of the sub-basin assessment points out this relationship. In addition, alum treatment of a lake not only binds phosphorous into the sediments, it removes organic matter. The reduction of phosphorous inputs due to watershed management and alum treatment removal of self fertilization will result in less organic matter production and hence, less oxygen demand. A secondary benefit of alum is the binding of colloidal organic matter. The TMDL, which is a prescriptive document, does assume the reader has some knowledge of limnology from the sub-basin assessment and references.

Regular monitoring of Hauser Lake has occurred through the CVMP program through the 1990s and is expected to continue. Dissolved oxygen measurements are part of this assessment during four or five months of the spring and summer.

A good point is made concerning the across boundary nature of the Hauser Lake watershed. It is also an issue for the Twin Lakes TMDL because the upper watershed of Fish Creek is within the State of Washington. It is, however, the responsibility of EPA to address and coordinate across boundary issues between the states. The sub-basin assessment and TMDLs were supplied to EPA well in advance that this responsibility could be discharged. The State of Idaho would not write an implementation plan for that part of the watershed in the State of Washington. This is the responsibility of either the State of Washington or EPA, but certainly not the responsibility of Idaho.

Comment 7: The Twin Lakes TMDL does not address a nutrient limitation of Fish Creek or Rathdrum Creek. Dissolved oxygen limitation of lower Twin Lakes is suggested in the Twin Lakes Management Plan.

Response: Plant growth nutrients were monitored in Fish Creek during the Twin Lakes study. These levels of nutrients do not exceed the guidelines stated in the sub-basin assessment. The TMDL calls for a 47.7% reduction of phosphorous from the tributaries to Upper Twin Lake. There is only one major tributary, Fish Creek. The lower Twin lake allocation calls for a 33.4 % reduction from the tributaries, which includes the major tributary, the upper lake. These reductions dictate nutrient and sediment, to which phosphorous is attached, reductions from Fish Creek.

The sub-basin assessment demonstrates that Rathdrum Creek does not have total phosphorous concentrations above the guidelines, while on an average, nitrogen is not above the guidelines. The assessment also catalogs the possible sources along the creek. These are few. Given that the creek typically meets the nutrient guidelines for streams, we believe it safe to assume that it will after nutrients are reduced in its main source of nutrients, lower Twin Lake.

The CVMP monitoring provided in Appendix C clearly demonstrates that low dissolved oxygen concentrations are found in the hypolimnion of the lake where such departures are permitted by State standards. In any case, reduction in plant growth nutrients in this lake in a manner similar to that in Hauser Lake decreases productivity, which in turn decreases the biological demand for oxygen, hence increasing oxygen concentrations.

Editorial Comments:

Comment 1: Table 2 shows water quality criteria for streams, it would be helpful to have these for lakes.

Response: Table 2 is meant as a general summary of the standards. Dissolved oxygen standards are more complex for the oxygen level in lakes. These would be difficult to summarize. As noted earlier, dissolved oxygen standards do not apply to hypolimnetic waters.

Comment 2: Low sculpin densities contradict the conclusion that fishery not impaired.

Response: Low sculpin densities are not atypical of streams draining granitic terrane with relatively more sand bottom. Similar low levels were observed in sandy bottom streams of granitic terrane flowing from the west into Coeur d'Alene Lake, even though trout were present in densities typical of full support. The important species is the fishable species, trout.

Comment 3: Upper Twin Lake becomes too warm to support salmonids in the summer months. Should it be listed as temperature limited?

Response: In the sub-basin assessment, it is pointed out that the Upper Lake is 5 meters deep. It is a shallow eutrophic lake, which warms above cold water biota temperature standards during the summer. Records indicate it has always been shallow. A better approach is to designate the Upper Lake as seasonal cold water biota.

Comment 4: Editorial

Response: Change made

Comment 5: Editorial

Response: First error corrected; second error was not found. The second error may have been corrected earlier.

Comment 6: Editorial

Response: Correction was made.

Comment 7: Editorial

Response: Correction was made

4.2.2.2 Comments on proposed de-listings

Comment 1: Those streams recommended for de-listing should be clearly identified and the reasons clearly laid out.

Response: These points have been clarified in a revised Table 10 on pages 22 and 23. This table is also placed in the Executive Summary. The table identifies each listed segment by name and number. It provides an assessment of the support status and recommends a TMDL allocation where appropriate. It provides the reasons a stream should be de-listed for each specific pollutant. It provides a reason for the deferment of a TMDL, if appropriate.

Comment 2: The relationship between nutrients and dissolved oxygen in lakes should be further explained. However, a TMDL addressing nutrients would not cause the de-listing of the related dissolved oxygen listing.

Response: The effect of nutrients of lake productivity and hence on biological oxygen demand and dissolved oxygen concentration has been referred to in the assessment and certainly in the attached lake management plans. The dissolved oxygen limitation on Hauser Lake has not been recommended for de-listing in Table 10, but rather for deferment until the expected results of nutrient reduction on lake water oxygen concentration can be assessed.

Comment 3: In reference to the Spokane River, standard must be changed and approved before the segment can be de-listed based on the new standard.

Response: The sub-basin assessment recommends the standard be changed to seasonal cold water biota with a specific support standard based on the temperature observed during hot dry summers as 1992 and 1994. The temperature TMDL is deferred until this standard change is made or is disapproved.

Comment 4: The definition of secchi depth and what it measures requested.

Response: Secchi depths as a measure of clarity are a technique in use since the 1850s. It is understandable that its meaning in a limnological discussion would be assumed as understood. However a brief statement of the technique and what it measures has been added to page 12.

Comment 5: A CWE process explanation was requested.

Response: The Cumulative Watershed Effects process and the measurements it makes are described in Appendix A, Sediment Model Assumptions and Documentation.

4.2.2.3 Comments on individual sections

4.2.2.3.1 Impact of sediments

Comment 1: The impact of sediment or lack thereof on the lake's beneficial use is not properly documented to permit de-listing.

Response: In the three cases where sediment is listed as limiting to lakes, Hayden, Twin and Spirit Lakes, the most reasonable impacts are to the salmonid sight feeding turbidity standard or to some narrative interference with the fishery. Secchi depths were measured by CVMP volunteers during or shortly after the high flow period (May and early June) on all the lakes. These ranges are now stated in the text for each lake. These range from 3 -7 meters. The 25 NTU chronic standard would equate to a Secchi depth of less than one-half meter. The fisheries of each lake were described from Fish and Game accounts. These accounts indicate self-sustaining fisheries with the exception of fishing pressure. In neither case were the two sediment standards exceeded. The evidence indicates sediment was listed as a pollutant of concern in error. The text still notes the role of sediment as a nutrient carrier, but in all fairness this is a nutrient and not a sediment issue.

Comment 2: The WBAG process was departed from in favor of sediment modeling a fish density data.

Response: The BURP macro invertebrate data for Fish and Rathdrum Creeks have been added to the text and as Appendix D. The vast majority of the macro invertebrate biotic indices (MBIs) for Fish Creek are above the full support level of 3.5, while the one value for Rathdrum Creeks is quite low. The sub-basin assessment process is to use the BURP information as well as other pertinent data to come to support conclusions. This WBAG+ process recognizes that MBI scores are not sufficient and often misleading for purposes of listing or de-listing. Hence, the assessment has where data is available, looked at fish densities and compared them to control streams in the Priest Basin as noted in the sub-basin assessment text. It has looked at other fish species, at residual pool volume and has modeled the sediment contributions from actual sediment sources. On the weight of the evidence, the additional data reinforces the Fish Creek MBIs. Trout densities are comparable to control streams in the Priest Basin which is also granitic even though sculpins are in lower density which is often seen in streams on granitic terrane with relatively more sand. Model results are well below the 50% above background threshold cited by the referenced Washington Forest Practices Board (1995) as the lowest threshold for sediment impacts. In the case of Rathdrum Creek, less data is available. It is a sand bottom low gradient stream over most of its length as pointed out in the text. Such a stream is a possible candidate for lower macro invertebrate species diversity and hence a lower MBI. The stream flows from a lake; hence there is not an upstream sediment source. The two sediment sources, its banks and Spring Creek are modeled. The creek models at 54% above background, which is very close to the 50% threshold discussed above. On the weight of this evidence, the assessment concludes that neither Fish nor Rathdrum Creeks is sediment limited.

The author of the comment grossly misinterprets the goal of previous sediment TMDLs developed in the Northern Region. The natural background goals of these TMDLs are clearly stated as "interim" goals, which are believed to be well below the level of sedimentation at which uses are fully supported. Verification of the sediment models clearly demonstrates that only unentered watersheds approach natural background sedimentation levels and often these do not because of forest fire impacts. For the interpretation of model sediment results, the cited reference is the Washington Forest Practices Board (1995) publication which indicates that water quality impacts from sediment are likely above at 100% of background and are not predicted below 50% above natural background. It is disingenuous to apply interim TMDL sedimentation goals, chosen specifically to be below a level where sediment impacts to water quality occur, to benchmarks by which the modeled sediment data is compared to assess sediment impacts.

4.2.2.3.2 Fish population data

Comment 1: Why was electrofishing from which fish population data could be developed not conducted on Rathdrum Creek?

Response: It was not among the subset of streams chosen to be electrofished in the BURP process. Even though it was not electrofished, BURP assessors did observe fish in the stream and fishing is conducted along the stream primarily by children.

4.2.2.3.3 Beneficial support status

Comment 1: Several issues are raised concerning the clarity and logic of Table 10.

Response: Table 10 has been revised. The boundaries column is omitted as redundant of earlier tables. The stream name and HUC number are combined into a single column. The assessed support status is stated in the second column, as is the reason for the determination. The reason a stream is proposed for de-listing is provided in the third column. If this column is not applicable, it is so marked. The reason a TMDL is proposed to be deferred is stated in the fourth column. If this is not applicable, it is so marked. The new table addresses the issues raised in the comment except for the issue of upstream effects to Coeur d'Alene Lake.

An assessment of the impact of impoundment of Coeur d'Alene Lake is provided in the sub-basin assessment. The comment suggests human activities may have raised the temperature of the lake, presumably in its tributaries, or possibly by use (boating, swimming). The portion of the lake that feeds the Spokane River is its epilimnetic waters. This top approximately ten meters of the lake increase in temperature each summer from direct exposure to the sun. The sun's impact on the many square miles of exposed lake surface far outweighs the thermal inputs from streams or human activities on the lake. A further quantitative argument can be made if deemed necessary by EPA.

4.3 *References*

Washington Forest Practices Board, 1995. Board Manual: Standard Methodology for Conducting Watershed Analysis under Chapter 222-22 WAC Version 3.0 November 1995.

5.0 Implementation Plans

5.1 Background:

During the 1980's and early 1990's the large lakes (Pend Orielle, Coeur d'Alene and Priest) and many of the heavily developed smaller lakes (Cocollala, Hauser, Hayden, Spirit and Twin Lakes) received limnological study and based on these studies lake management plans were developed. This work was completed as a result of the Idaho Nutrient Management Act and legislation creating the Clean Lakes Coordinating Council. Lake plans have been in place for all the lakes listed above for several years. Implementation of these plans is in many cases well advanced. The Hayden Lake, Hauser Lake and Twin Lakes plans set nutrient goals, recognize that actions which remove phosphorous loading will remove nitrogen loading and provide concrete action items to reduce nutrient loading. These plans with minor revision in some cases are applicable TMDL implementation plans.

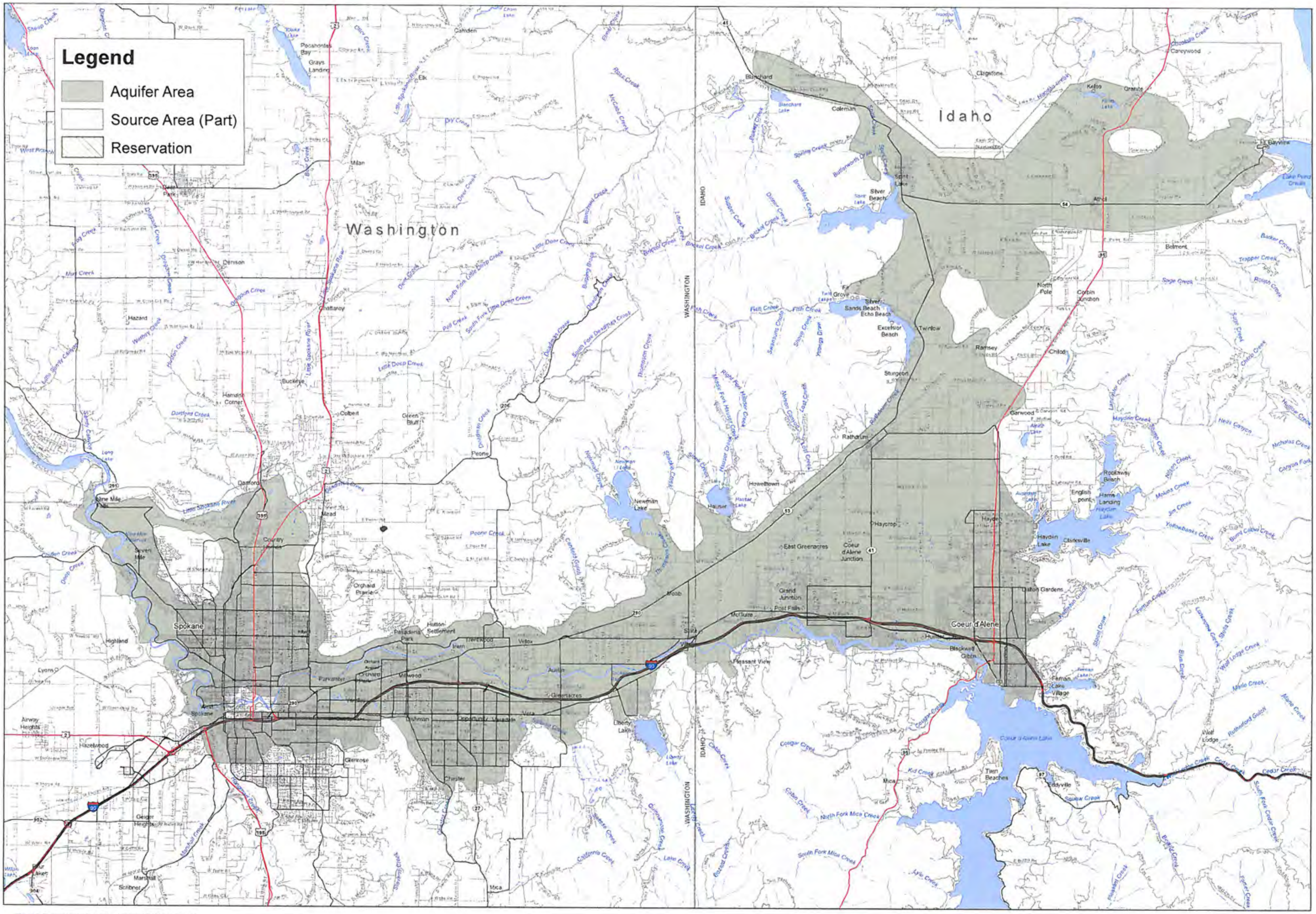
5.2 List of lake Management Implementation Plans:

Hauser Lake Management Plan (Appendix D)

Hayden Lake Watershed Management Plan (Appendix E)

Twin Lakes Management Plan (Appendix F)

Spirit Lake Watershed Management Plan (Appendix G)



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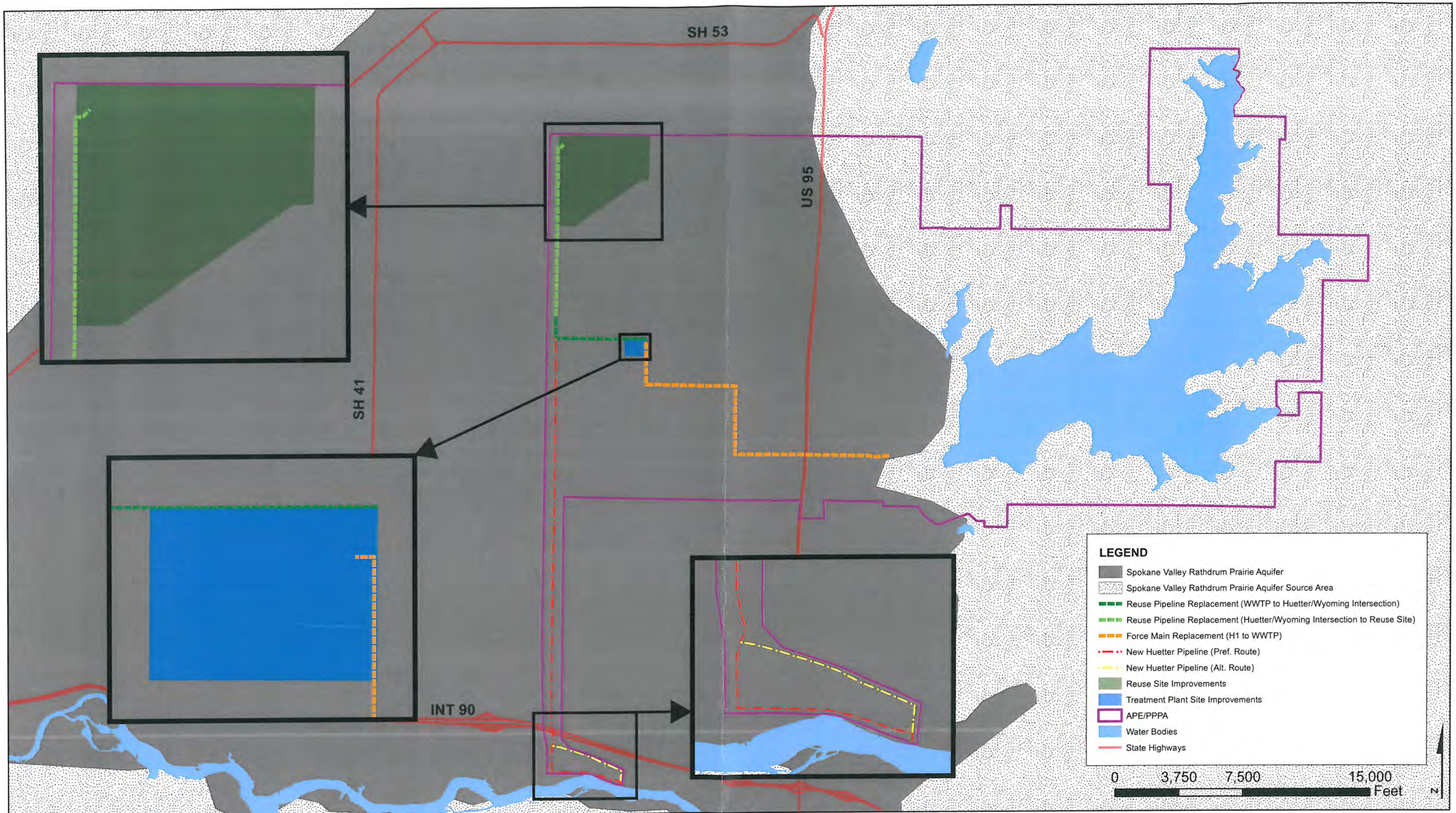
Spokane-Rathdrum Sole Source Aquifer

Aquifer Area and Part of Source Area

0 5 10 20 Kilometers

Map Created 11/04/2008 EPA Region 10



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HARSB

Sole Source Aquifer Map

Sources:
EPA Sole Source Aquifer Program
Idaho Department of Water Resources
Idaho State Tax Commission
Kootenai County GIS Department

PROJECT NO..................................41104
DRAWN BY.......................................AW
FILENAME.......................................Aquifer_11x17L
DATE...11/05/12

APPENDIX O

Public Participation Information

- October Legal Notice, Advertisement, and Article
- Public Comment Form
- November 1st Agenda, Presentation, Meeting Minutes, and Sign-In
- November 1st Meeting Attendee Summary

Emailed to
Steve + Paul

PRESS Oct. 17, 2012

HAYDEN AREA REGIONAL SEWER PROJECT PUBLIC MEETING

The Hayden Area Regional Sewer Board (HARSB) will hold a public meeting November 1, 2012 at Hayden City Hall at 8930 N Government Way at 3:00 p.m. The purpose of the public meeting is to present recommendations for improvements from the Draft HARSB Wastewater Treatment Facility Plan. The meeting will: present the increased regulatory requirements, treatment system deficiencies, and proposed improvement options, as well as discuss the environmental impacts associated with each option, funding options, and potential financial impact to HARSB customers. Written comments will be accepted by the Board from October 17, 2012 to November 1, 2012. Verbal comments will be accepted at the public meeting. A copy of the facility plan is available for public review at J-U-B Engineers, Inc. (7825 Meadowlark Way in Coeur d'Alene ID 83815), HARSB, and Hayden City Hall during normal business hours. Please send your written comments to J-U-B Engineers. After considering and addressing comments, the Board will determine which improvement option to implement and document the selection no earlier than the Board meeting on November 1, 2012. The Board may elect to select an alternative at a later date. A detailed environmental evaluation will then be performed based on the selected option.

Legal 7330
October 17, 2012

by Seth Owens, Info: 773-5016

Kootenai County Reagan Republicans: Noon, Fedora Pub and Grille, Cd'A. Speaker: Kootenai County Commissioner Dan Green, Power point pre-

Renewal Agency: 7 a.m., City Hall, 408 N. Spokane St.

Kootenai County Genealogical Society: Topic: "Founding Families of Rathdrum." Speaker: Ellen Larsen. 7 p.m., Hayden Library. Free

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economic development and the upcoming legislative session. Info: Luke Sommer 661-7597 or fastball46@hotmail.com

Rising Stars: Music by local youth Jordan and Ally Gibbs, 7 p.m., Jacklin Arts and Cultural Center, Post Falls, 457-8950, art@thejacklincenter.org, $5

Democratic Club Program: "Proposed Optional Form of County Government" presentation by County Commissioner Dan Green and County Assessor Mike McDowell. Noon. Iron Horse, downtown Cd'A.

see CALENDAR, C5

PUBLIC MEETING

HAYDEN AREA REGIONAL SEWER BOARD

The Hayden Area Regional Sewer Board (HARSB) values your opinion. That's why we want you to participate in a public comment period and attend a public meeting to discuss the Draft Wastewater Facility Plan. The Plan discusses improvements to meet the more stringent treatment requirements as well as other upgrade and capacity improvements to the plant. Information on the proposed improvement options, environmental impacts associated with each option, funding options, and potential financial impact to HARSB customers is provided in the Plan.

WHERE and WHEN can I review the Plan and submit written comments about the Plan?

Review and submit written comments at J-U-B Engineers, Inc. (7825 Meadowlark Way, Coeur d'Alene, ID 83815) during normal business hours October 17, 2012 to November 1, 2012. Copies are also available at HARSB and Hayden City Hall.

WHERE and WHEN is the Public Meeting?

Hayden City Hall (8930 Government Way, Hayden, ID 83835) November 1, 2012 at 3:00pm

WHEN will the Board decide about the Plan?

At the earliest, the Public Meeting on November 1, 2012 (the Board may elect to select their preferred alternative at a later date).

Assistance for persons with disabilities will be provided upon 24-hour notice prior to the meeting by calling HARSB (office) at 208/772-0672 during regular business hours.

strations, $5 spaghetti lunch and more to benefit Kootenai Humane Society. Also holding dog food drive for KHS.

Book Reading: Author Kathy Saugen-Erickson will discuss and read from her book, "Never Turn Back: Bicycling 2,850 Miles With No Support System," Coeur d'Alene Public Library, Free. Information: 769-2315.

Book Signing: Phyllis Horne will sign "The Carnival Girl," 1-4, Hastings in Cd'A.

A Night of Edgar Allan Poe: Live readings, modern dance interpretations and musical compositions, theatrical performance, 7:30 p.m., $10. Lake City Playhouse.

Kootenai Amateur Radio Society: 10 a.m. to 1 p.m., Ham radio class, Hayden Library. Info: Bob, 667-3372

Haunted House: Fundraiser for Post Falls Lions Club, Fourth and Post, Post Falls, 6 p.m.-midnight. Admission is $7, concessions available.

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her Moose-stroni was **Shelli Halloran**, with **Josh Studor** taking 2nd place for his Cave Man Stew. Third and fourth place awarded to **Kim Thorogood** and **Eric Hart**.

• • •

If you were watching "Good Morning America" last Friday you might have been surprised to see a familiar local face in a segment from New York City. **Marla Lopez** and a reporter were visiting a grocery store while Marla talked about a lifetime of eating only bread, potatoes and milk. I know Marla and she's beautiful, successful and normal. The eating condition is as fascinating to us as it is

see THORESON, C10

Central Bark is for sale.

The 1.8-acre dog park, adjacent to the city of Coeur d'Alene's Northshire Park at the intersection of Atlas and Nez Perce roads, is part of the most popular dog parks we have," said Bob MacDonald, chair of the Kootenai County Dog Park Association.

Central Bark, opened with the volunteer dog park association, the city of Coeur d'Alene and the Coeur d'Alene School District.

"I'd hate to lose it. I'd hope we would come up

The dog park was built through the fundraising efforts of the dog park association.

see BARK, C9

Anyone with information should call the NIVCTF at 665-4455. The identity of callers will remain confidential and reward money is available.

10/31/12 CDA PRESS

Sewage treatment options to be discussed

By DAVID COLE
Staff writer

HAYDEN — The Hayden Area Regional Sewer Board is considering four options in response to new federal water-quality requirements for water that's treated and discharged into the Spokane River.

At 3 p.m. Thursday, at Hayden City Hall, the sewer board will conduct a public meeting to receive comments regarding those options.

The U.S. Environmental Protection Agency is requiring the sewer board's treatment facility in Hayden to undergo improvements. It must meet significantly higher water-quality standards in the near future in order to continue discharging reuse water into the river.

Reuse water treated at the plant, located at 10789 N. Atlas Road in Hayden, discharges into the river for a portion of the year and is applied to sewer board land to irrigate trees and alfalfa fields during the growing season.

The sewer board provides wastewater treatment service to the city of Hayden, the Hayden Lake Recreation Water and Sewer District and the Kootenai County airport.

Ken Windram, administrator of the treatment facility, said the sewer board recognizes the long-term financial impact the treatment improvements will have on the citizens it serves.

"The board hopes the citizens will take time to attend the meeting and learn more about their wastewater future," Windram said.

Option one: The sewer board could take no action and risk paying $37,500 per day in EPA fines until the current water-quality standards are returned to the 1999 permit levels. That would be costly, as the 2013 approved sewer board operating budget was only $1.7 million.

see SEWAGE, C9

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city, with the city taking responsibility for zoning, regulations and maintenance of the property.

During the planning of the agreement in 2009, school officials said it would be a temporary agreement for two or three years.

"It was with the express understanding that the school district could need the property at any time," said Wendell Wardell, the school district's chief operations officer.

The school district is accepting sealed bids on the property until Nov. 13.

Coeur d'Alene school trustees approved the sale of the Northshire land during their Oct. 15 meeting. They also approved putting the school district's portion of Person Field, a downtown sports field, up for bid as well. School trustees pulled the field back from the sealed bid process after Coeur d'Alene City Council members, during their Oct. 16 meeting, requested additional time to come up with a plan that will allow the city to

Wardell said the school district offered the Northshire property to the city at the same time Person Field was offered, and moved forward with the sealed bid sale after city staff members told school staff members that they weren't interested in acquiring the land.

Doug Eastwood, the city's parks director, told The Press Tuesday that he told school officials the city was interested, but didn't have the money to buy the land.

"The school district was not interested in doing terms with us," Eastwood said.

Wardell said he was surprised to hear of the city's interest in the land. He said he and Superintendent Hazel Bauman, Associate Superintendent Matt Handelman, district Maintenance Director Bryan Martin and the school district's legal counsel met with city staff members on Oct. 10. At that time, Wardell said they were told the city didn't want the property.

"They could have said something during that

they focused on Person, that that's where their only interest was."

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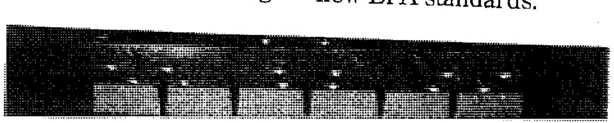
SEWAGE

from C1

Option two: Treatment facility improvements could be made to allow for year-round discharge into the river, and to the current water reuse system. These 20-year treatment improvements would cost an estimated $53 million. The first 10 years is estimated to cost $27.5 million, and would be shared by the three sewer-board entities. The second 10 years of construction costs would be shared by those with new connections to the system, and not existing users.

Option 3: Additional treatment facility improvements (the same as Option two), plus storage and additional land for expanded water reuse to eliminate discharge to the river during the entire growing season. The additional land-cost estimate is $13 million. The total would reach $66 million when added to the second option treatment improvement costs.

Option 4: Additional treatment facility improvements for year-round river discharge, eliminate land application and sell the current water reuse farm land. The cost estimate for this option is $40 million, but has a $3.1 million higher estimated operating and maintenance costs compared with the second option. The land could not be sold for 10 years until the treatment system fully meets the new EPA standards.



Religious Servic

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INDEPENDENT BAPTIST

Zion Baptist Church - 1527 E. 16th, Post Falls 687-2600 Pastor Seth Hohenstreet Sunday School 10:00 am Sunday Worship 11:00 am and 5:00 pm

BAPTIST - SOUTHERN

NorthStar Church - New facility and location in Hayden. 8145 Ramsey Road just north of Prairie Avenue. Sunday worship is at 10:30 weekly. Call 208-762-7600 or go to www.northstarchurch.us for more information.

Post Falls Baptist Church - 1608 N. Spokane St., 773-5870 Sun Worship Srvc 8 a.m. & 11 a.m. Pstr Bill Hohenstreet

BIBLE

Bayview Bible Chapel - Sun. at the Bayview Comm. Ctr, 20298 E. Perimeter Rd, Bayview, ID. Assoc. Pastor - Alvin Wilkie; Worship Srvc 9:30 a.m. email: bayviewbc@peoplepc.com

Website: www.bayviewbiblechapel.org.

Coeur d'Alene Bible - CBC is located across the street from Cd'A High School at 5350 N. 4th Street. Sunday Worship Services begin at 8:30 am and 10:15 am. Sunday school for ages 2 years-5th grade and Adult Fellowships are offered at 8:30 am and 10:15 am. Middle School, College and High School Bible studies begins at 8:30 am. Nursery is available for infants-3 years during both services. Middle School & High School Youth Groups meet on Wednesday evenings. Ladies Bible Study is 9:00 am every Thursday (September-May). For information about Care Groups and weekly Bible study groups, call us at 208-664-4883 or visit us online at www.cdabible.org. Lead Pastor: Kurt Staeuble.

Fellowship Bible Church - 1220 N. Idaho St., Post Falls, 457-9345. Worship Srvcs: 10:15am. Pstr: Mark Hardy.

Grace Bible Church - 152 W Prairie Ave (across from Albertsons in Hayden). Sun: Worship & expository Bible teaching 11:00 a.m. Pstr: Paul Peabody (since 1993). 772-2717.

Rathdrum Bible Church - Worship at 8:30am & 10:45am. 15127 Stevens St. email: thepreacher@roadrunner.com.

CATHOLIC

St. George Roman Catholic Church – 2010 North Lucas 773-4715, Mon thru Thurs Mass 9:00 am; Fri Communion Srvc 9:00 am; Sat. confessions: 4:00-5:00 pm or by appt. Sat. Vigil Mass: 6:00 pm; Sun. Morning Masses: 8:30 am & 10:30 am. Father Timothy Ritchey.

St. Josephs - 33919 N. Hwy 41 - 687-6072. Spirit Lake - Masses are: Sun. 11 am.

St. Pius X Church – 625 East Haycraft, Coeur d'Alene, 765-5108 – Mass Times: Sat. 5:00 pm; Sun. 8:00am & 10:30 a.m. & 6:00 p.m. Fr. Roger LaChance.

St. Stanislaus - 8026 2nd St. Rathdrum - 687-6072. Masses are: Sat. 6 pm, Sun. 9 am

St. Thomas Church – 919 Indiana CD'A Sat. 5:00 p.m.; Sun. 8:00 & 10:00 a.m. Confessions Sat. 3:00-4:00 p.m.; Father William Crowley.

CHRISTIAN FELLOWSHIP

Living Word Fellowship

506 E. 5th, Post Falls, ID- Full Gospel service Sunday 10:30am Pastor James Pool.
964-6773 or 964-6569.

CHRISTIAN SCIENCE

Christian Science Society - Church & Sun. School 10:00 am, Christian Science Reading Room Monday, Wednesday & Friday 11:00am - 2:00pm. 2415 Gov't Way, Cd'A, ID 667-4669

CHURCH OF CHRIST

Dalton Gardens Church of Christ - 6439 N. 4th St. Dalton Gardens 772-0541, www.dgchurch.org. 10:15 am assembly worship. **Interpretive services** often available for worship. Cd'A Christian School

EVANGELICAL FRIENDS

Anthem Friends - 251 W. Miles, Hayden, Pastor Chris Lauri, Christ centered and Bible services on Sundays at 10:00 am., 6:00 pm

FOURSQUARE

Family Life Ctr Foursquare - 1502 Sherman Cd'A, 664-8745. Srvc; Sun. @ 10:00 am. Pstr: Lanphere.

LUTHERAN

Christ the King Lutheran - (Missouri Sy *Exists to bring people into a living relatio with Jesus Christ and nurture them in disciple* 1700 E. Pennsylvania Ave, Coeur d'Alene 9231, www.CTKCDA.org Services on Saturd 5:00pm and Sunday at 8:30 and 11:00am (nu available). Sunday school, Youth and Adult Classes at 9:45am. High School Youth Wednes at 6:00pm. Christian Pre-School, Kinderga Child Development Center and extended care school information call 765-2536 or check ou website. We welcome your participation in worship and the following ministry opportun Men's & Women's Ministries, Youth Minist Choir, Handbells, Confirmation & Vacation School (June 20-24) For further information 664-9231. St. Pastor Bob Sundquist. Assoc P Dan Webber.

Lutheran Church of the Master - 4800 Ra Road (Ramsey and Kathleen) CdA 765-1002 w lemcda.org Pastor Bob Albing (pastor808@ya com) Sunday Morning Services: 8:30 contempo worship, 11:00 traditional liturgical worship. Sacrament of Holy Communion is served e week. Visitors are always welcome. Nursery is provided. Sunday School for all ages, pre-school through adults at 9:45. There are different Women's Bible Studies meeting mont Call the church office for details. Men's B Study every Wednesday morning from 6:45 to and Confirmation instruction for 7 and 8th grac every Sunday at 12:30. Quilters meet Thursd from 10 to Noon and can always use help; a B Study follows.. The next Family Fun Nigh Sunday October 28 from 5-7PM Trunk or Trea the parking lot, invite your friends and family. V Community Garden of the Master any day and how our flowers and vegetables are growing. information on the following community gro call the church office: gardeners, Boy Scouts Tr 3, Log Cabin Spinners (they spin wool), Soc Tots, Audubon Society, CdA'leers (a wome singing group), Idaho Writers League.

Our Daily Bread is a free meal for disadvanta families served every Sunday at 1:30, all are invi to share this meal.

LAM Christian Academy is a Christian pre-sch and elementary school where "children experie the excitement and love of learning". For m information: lamcda.org.

Peace Lutheran Church (LCMC) *"Shar God's Word and the grace, truth, and peace Jesus Christ"*. We are a member church of Luther Congregations in Mission for Christ (LCMC, n Pastor Kurt Wandrey and the congregation inv you to worship with us Sundays at 10:00 AM a blended service that includes contempora and traditional worship styles, music, and Ho Communion. Fellowship and refreshments foll worship. Sunday School for all ages is at 8: AM. A Healing Prayer Service is held the seco Sunday of each month following worship servic Please join us at our new church! We are locat at 8134 N Meyer Rd. (at Prairie Ave.) in Post Fal and the Church office hours are 9:00 AM to 4: PM Tuesday through Friday (closed the noon hou Please visit our website at peace-lutheran.com call us at 765- 0727 for information. Let us sha the Gospel's Good News with you and grow in fai together!

Shepherd of the Hills Lutheran Church (LCM 13541 Hwy 53. Pstr Rev. Neil D. Bloom, 68 1809. Sunday School 9:30am, 10:45am Sunda Worship www.soth.rathdrum.org

Hayden Area Regional Sewer Board

Public Review Draft Wastewater Facility Plan

COMMENT / QUESTION FORM

Name:	
Address:	
Email:	

Please return your comments no later than
November 1, 2012:
Hayden Area Regional Sewer Board
c/o J-U-B Engineers, Inc.
7825 Meadowlark Way
Coeur d'Alene, ID 83815
mconn@jub.com

Hayden Area Regional Sewer Board

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HAYDEN AREA REGIONAL SEWER BOARD

SPECIAL MEETING

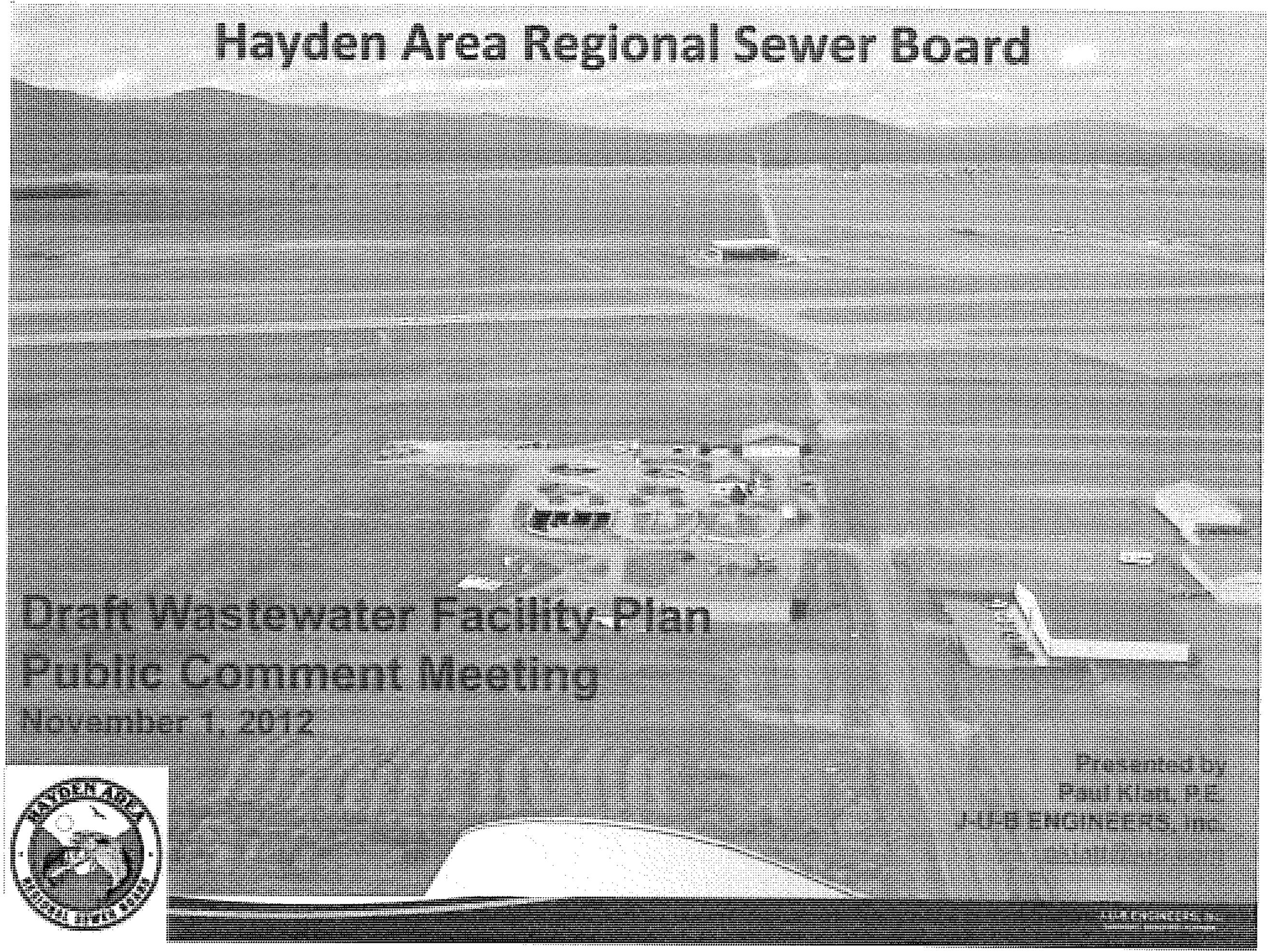
Thursday – November 1 – 3:00 P.M.
City of Hayden, City Council Chambers
8930 N. Government Way
Hayden, ID 83835

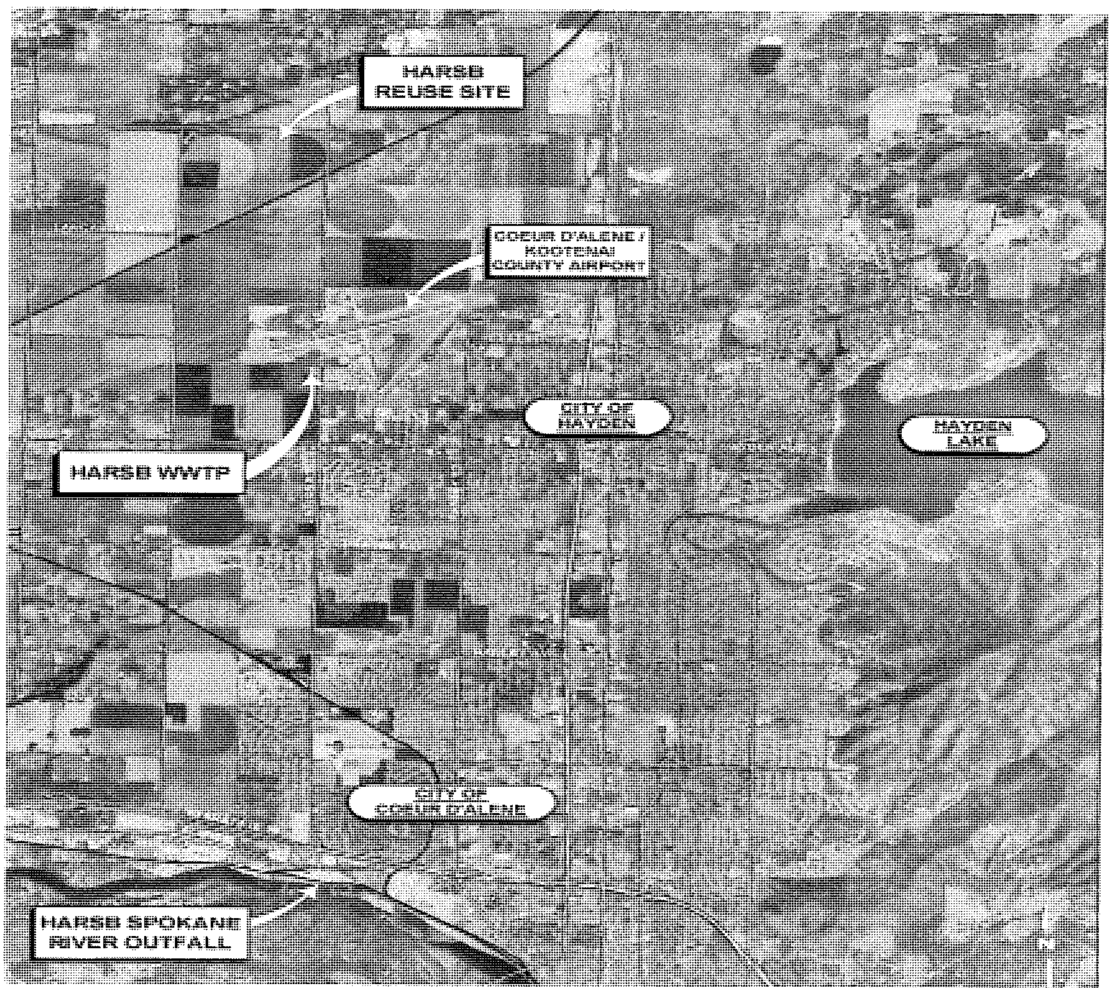
Meeting Agenda:

1. **Public Hearing - Hayden Area Regional Sewer Board Facility Plan alternatives.**

2. **Selection of Facility Plan Alternative**

Assistance for persons with disabilities will be provided upon 24-hour notice prior to the meeting.
The phone number for HARSB is (208) 772-0672.


Hayden Area Regional Sewer Board
Draft Wastewater Facility Plan
Public Comment Meeting
November 1, 2012
Presented by
Paul Klatt, P.E.
J-U-B ENGINEERS, Inc.


HARSB
REUSE SITE
COEUR D'ALENE /
KOOTENAI
COUNTY AIRPORT
CITY OF
HAYDEN
HAYDEN
LAKE
HARSB WWTP
CITY OF
COEUR D'ALENE
HARSB SPOKANE
RIVER OUTFALL

Reasons for the Facility Plan

- Regulations
  - Lake Spokane/Spokane River Dissolved Oxygen Total Maximum Daily Load (TMDL) by WA & EPA
    - Reduce phosphorus, ammonia & BOD by >99%
  - 401 Water Quality Certification by Idaho DEQ
    - Cadmium, lead, zinc & phosphorus
  - Reuse over Sensitive Resource Aquifer (IDEQ)
    - Non-degradation standard (nutrients, bacteria, agronomic)
  - Future?
    - Toxics (PCB, dioxins, PBDE) & PPCPs

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Reasons for the Facility Plan (cont.)

- Growth
  - Rapid through 2008
  - Mild to flat 2009 until now
  - Future? (service area seeing increasing interest)
- Financial Planning
  - Fiscally responsible with predictable rates
  - Growth pays for growth
  - Replacement/depreciation is underfunded

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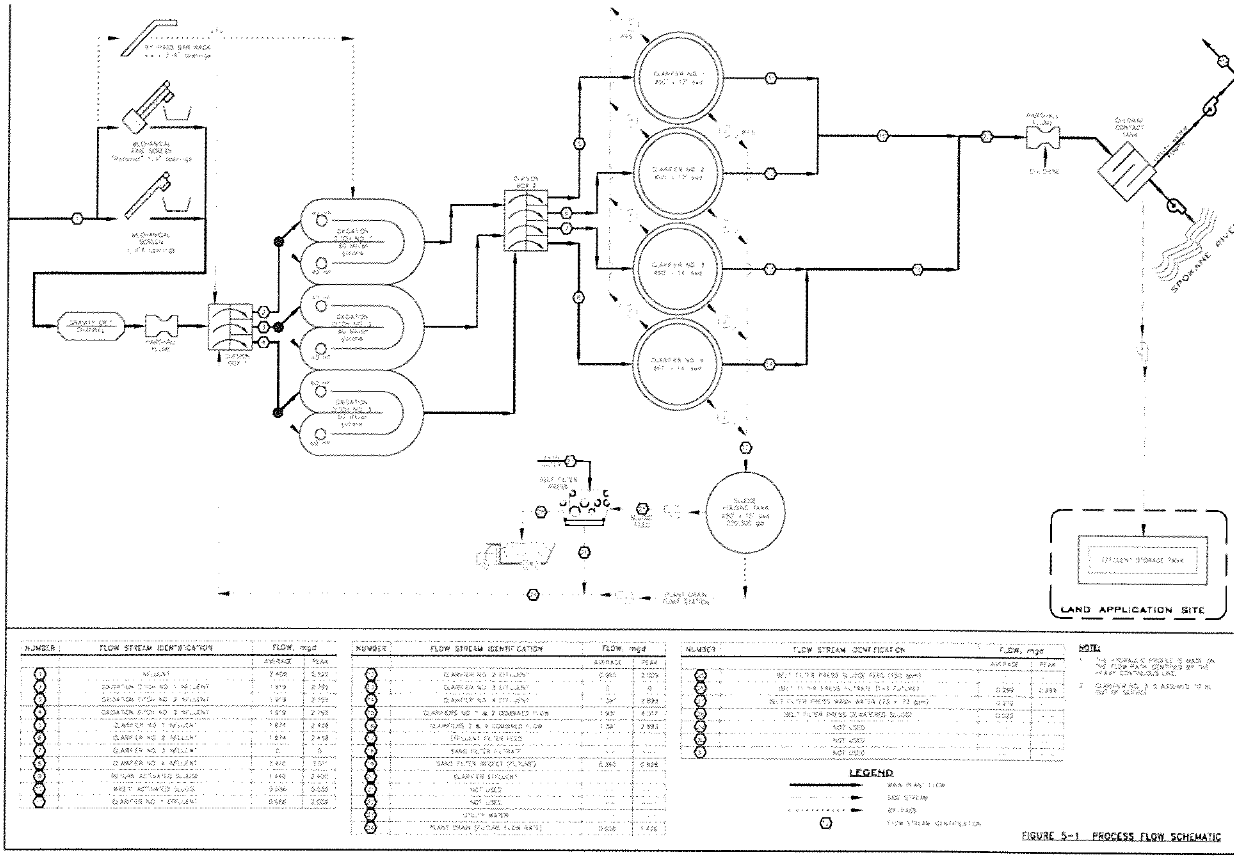
HARSB Existing Flow Schematic



Facility Plan Alternatives Considered

- Alternative 1 - No Action Alternative
  - Potential daily fines up to $37,500
- Alternative 2 – Upgrade river discharge and seasonal reuse to build-out of existing site
- Alternative 3 – Upgrade seasonal river discharge w/seasonal reuse expanded to 2.4 mgd
- Alternative 4 – Upgrade river discharge and sell reuse property infrastructure

Regulatory Driver Improvements

- Biological Nutrient Reduction – BNR
  - Headworks
  - Flow Equalization
  - Selector Basins and Division Boxes
  - Electrical/Mechanical Building
- Tertiary/Advanced Phosphorus (TP) Reduction
  - Pilot Testing to Select Technology
  - Chemical feed and filtration
- Metals and Toxics?

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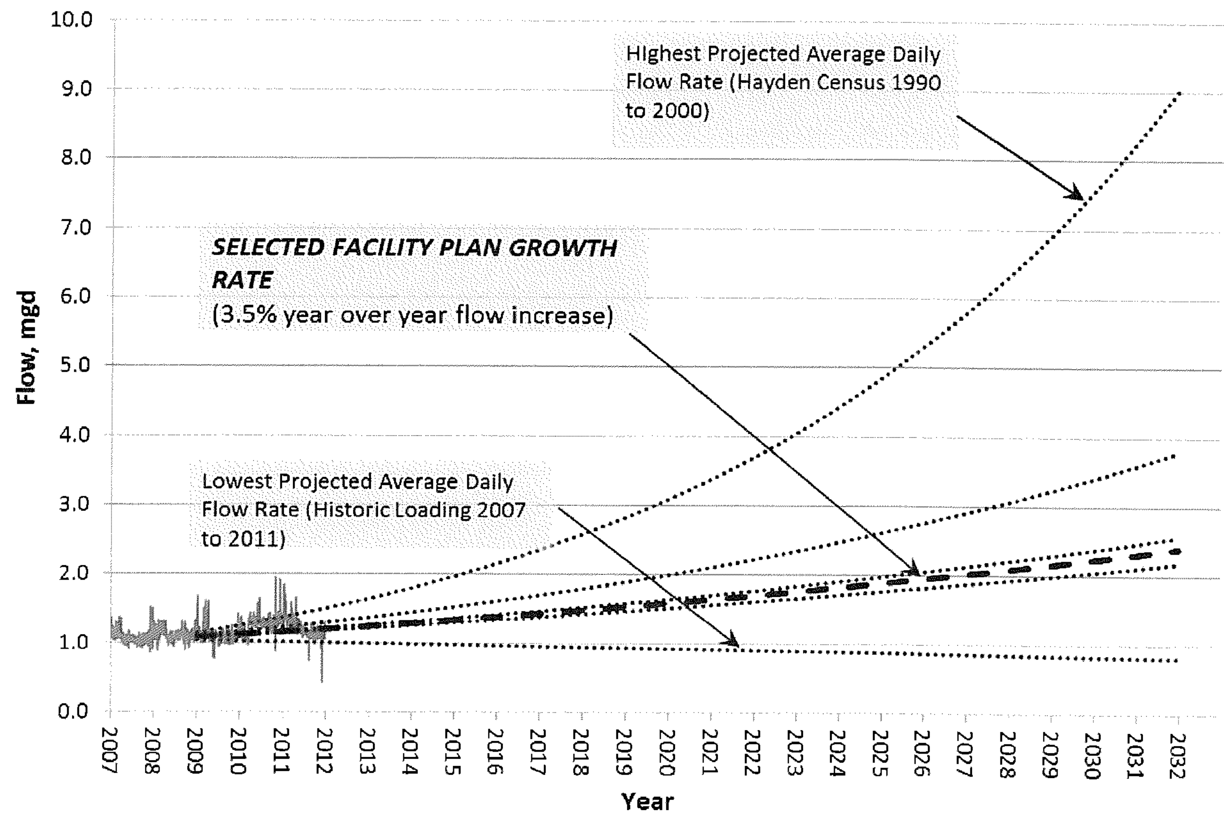
Growth Driver – Projection Factor Range



Growth Driver - Capacity Improvements

- % of all Regulatory Improvements
- Secondary Clarifier No. 5
- Aeration upgrades
- Potential Tertiary Clarifier (w/chem. addition)
- Complete existing reuse site irrigation & planting
- Potential reuse expansion (land, transmission, lagoon, irrigation, planting)

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Growth Driver - Capacity Improvements

- River outfall expansion
- Sludge holding, handling & dewatering
- % of Administration Building
- % of Relocated H3 Pump Station
- % of Disinfection (ultraviolet light vs. ton cylinder chlorine & sulfur dioxide)
- % of potential sludge treatment (digestion and/or drying to minimum Class B)
- % of 15-inch force main

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Replacements/General Upgrades

- Screw press to replace 1993 belt press
- % of Administration Building
- % of Relocated H3 Pump Station
- % of Disinfection (ultraviolet light for safety vs. ton cylinder chlorine & sulfur dioxide)
- % of potential sludge treatment (digestion and/or drying to minimum Class B)
- % of 15-inch force main replacement

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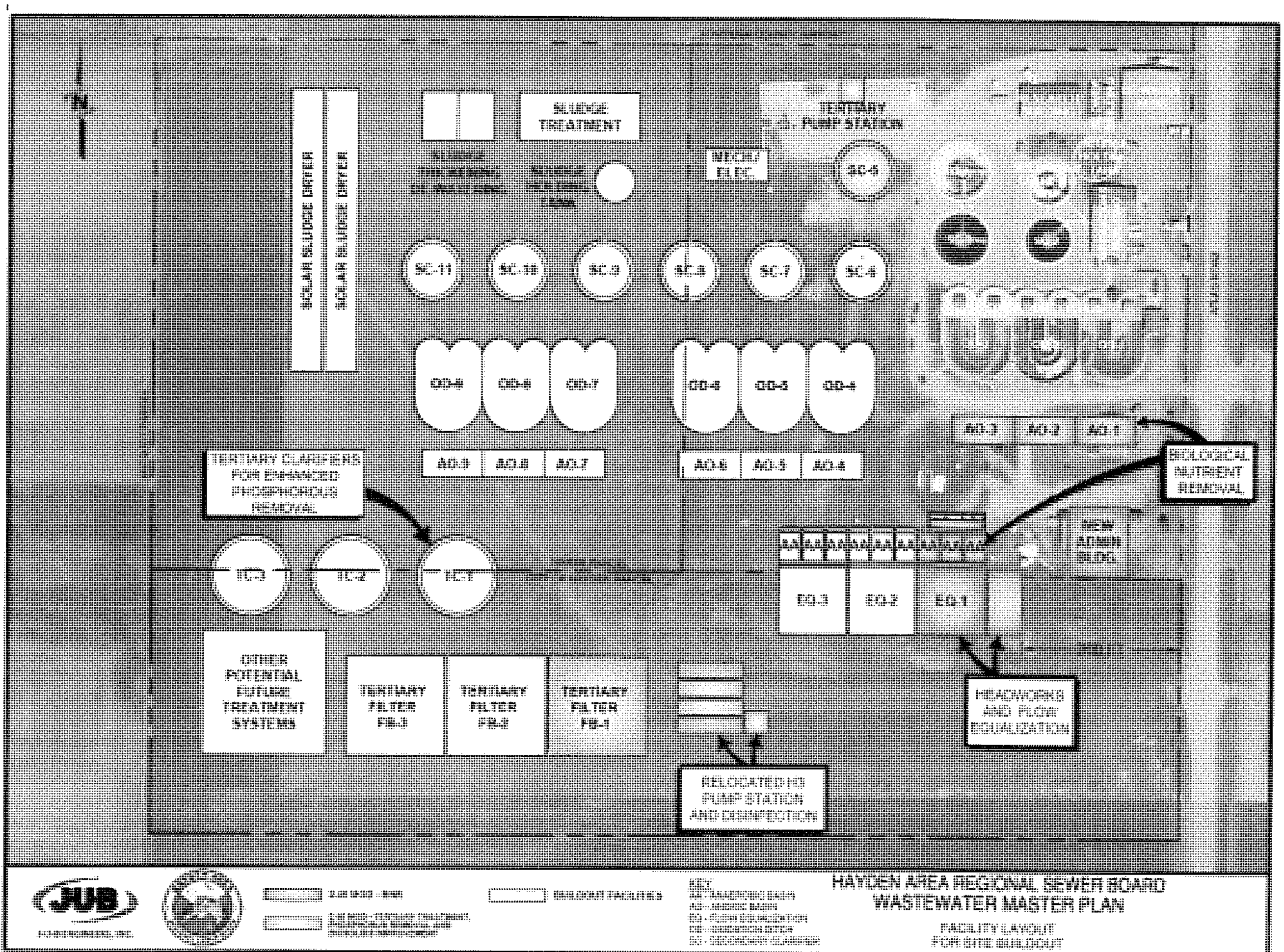

Environmental Criteria	No Improvements (Alternative 1)	(Alternative 2) Additional Treatment with Year Round River Discharge (current reuse land to 1.65 mgd)	(Alternative 3) Additional Treatment combined with Expanded Seasonal Reuse (expansion of reuse land to 2.4 mgd)	(Alternative 4) Additional Treatment combined Sell Current Reuse Property (abandon reuse in 10 years)
Climate and Physical Aspects (Topography, Geology, and Soils)	No Impact	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities, expanded reuse and pipeline (Short-Term and Minor Long-Term Impact)	Yes – excavation for treatment facilities and pipeline (Short-Term and Minor Long-Term Impact)
Population, Economic, and Social Profile	Yes - No ability to expand system. No growth allowed within system. (Short- and Long-Term Impact)	Yes - potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact)	No Impact	Yes - potential risk as system grows and inability to meet river discharge requirements year-round (Potential Long-Term Impact)
Land Use	No Impact	No Impact	Yes - expanded reuse will potentially re-purpose land identified for Reuse expansion (Potential Long-Term Impact)	Yes - abandoned reuse will potentially re-purpose land currently utilized for reuse (Potential Long-Term Impact)
Floodplain Development	No Impact	No Impact	No Impact	No Impact
Wetlands and Water Quality	Yes - significant water quality issues related to inability to treat wastewater (Short- and Long-Term Impact)	Yes - potential risk as system grows and inability to consistently treat wastewater to meet water quality requirements (Potential Long-Term Impact)	No Impact	Yes - significant risk as system grows and inability to consistently treat wastewater to meet water quality requirements (Long-Term Impact)
Wild and Scenic Rivers	No Impact	No Impact	No Impact	No Impact
Cultural Resources	No Impact	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)	Yes - potential Impact if cultural resources are identified in pipeline corridors (Potential Short-Term and Long-Term Impact)
Flora and Fauna	No Impact	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary site disturbance, but can be mitigated with BMPs (Short-Term Impact)
Recreation and Open Space	No Impact	No Impact	No Impact	No Impact
Agricultural Lands	No Impact	No Impact (no change to land classification)	No Impact (no change to land classification)	Yes- current reuse agricultural land would be sold (Potential Long-Term Impact)
Air Quality	No Impact	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)	Yes – temporary construction emissions, but can be mitigated with BMPs (Short-Term Impact)
Energy	No Impact	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)	Yes – increased energy consumption with facility upgrades (Long-Term Impact)
Public Health	Yes - water quality concerns with effluent discharge to river (Short- and Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)	Yes – POSITIVE, improved ability to meet discharge requirements to river (Long-Term Impact)
Option Cost (Total 2012$ Present Worth Capital + O&M)	---	$64.0 M	$74.9 M	$53.4 M

Year 1-5 Improvement Budgets (Alternative No. 2)

- Headworks: $2,770,000
- Flow equalization: $3,640,000
- Biological nutrient reduction: $3,770,000
- Electrical feed and generator: $500,000
- Relocate Maintenance Shed: $40,000
- Pilot test advanced TP reduction: $1,000,000
- Administration Building : $639,900
- Dewatering Improvements: $889,500
- Outfall and force main sections where opportunities arise

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Year 6-10 Improvement Budgets (Alternative No. 2)

- Advanced tertiary filters: $11,100,000
- UV Disinfection: $2,510,000
- Final Effluent Pump Station: $400,000
- Utility Water Pump Station: $244,300
- Outfall and force main sections where opportunities arise

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20-Year to Build-out Improvements (Alternative No. 2)

- Expand aeration to full 2.4 mgd
- Expand reuse to all existing land
- Additional secondary clarifier
- New Dewatering Building, sludge handling and treatment to Class B minimum
- Evaluate potential for fourth level treatment processes for future regulatory requirements (metals, PCBs, or other compounds)
- Complete outfall & influent force main

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Alternative 2 Capital Improvement Plan

Improvement	Targeted Project Start Date	2012 Total Cost Opinion	$ Expansion (New Users)	$ Regulatory (Existing Users)	$ Replacement (Existing Users)	20-year O&M Cost
Headworks	2013	$ 2,770,000	$ 1,615,833		$ 1,154,167	
Equalization	2013	$ 3,640,000	$ 618,800	$ 3,021,200		$ 586,000
BNR	2013	$ 3,770,000	$ 640,900	$ 3,129,100		$ 623,000
Pilot Study	2013	$ 1,000,000	$ 170,000	$ 830,000		
Electrical (Emergency/Metering)	2013	$ 500,000	$ 250,000		$ 250,000	
Admin & Sludge Storage Shed Relocation	2013	$ 40,000	$ 20,000		$ 20,000	
Dewatering Improvements (in existing bldg)	2017	$ 889,500	$ -		$ 889,500	$ 4,590,000
Admin Building [1]	2017	$ 639,900	$ 319,950		$ 319,950	
Filtration	2018	$ 11,100,000	$ 1,887,000	$ 9,213,000		$ 6,100,000
UV Light	2018	$ 2,510,000	$ 878,500		$ 1,631,500	$ 847,000
Effluent Pump Station (New	2018	$ 400,000	$ 140,000		$ 260,000	
Utility Water	2018	$ 244,300	$ 122,150		$ 122,150	
Expand irrigation on current land and Lagoon maintenance[3]	2023-2029	$ 5,600,000	$ 5,600,000			
Aerobic Holding Tank Improvements (aeration)	2023	$ 308,700	$ 308,700			
New Dewatering Building, Enclosed Truck Loading & Conveyor (per site build-out) [2]	2023	$ 3,864,500	$ 3,864,500			
Treatment to Class B (Aerobic Digester and Thickening per site build-out) [1,2]	2023	$ 4,568,600	$ 776,662	$ 3,791,938		$ (2,030,000)
15" Force Main Replacement & Upgrade	2025	$ 5,336,000	$ 2,668,000		$ 2,668,000	
Aeration	2028	$ 1,160,000	$ 1,160,000	$ -		
Clarification	2028	$ 1,320,000	$ 1,320,000	$ -		
River Pipe (Huetter Road)	2028	$ 3,688,400	$ 3,688,400			
TOTAL		$ 53,349,900	$ 26,049,395	$ 19,985,238	$ 7,315,267	$ 10,700,000

Alternative 2 Cost Distribution

			1st TEN YEARS Exisiting Users	2nd TEN YEARS Exisiting Users	1st TEN YEARS TOTAL (New & Existing)	2nd TEN YEARS TOTAL (New & Existing)
ER Distribution (as of 8/10/12)			$ 20,840,567	$ 6,459,938	$ 27,503,700	$ 25,846,200
	ER TOTAL	ER %				
City	6183.5	61.46%	$ 12,808,466	$ 3,970,233	$ 12,808,466	$ 3,970,233
District	2645.1	26.29%	$ 5,479,045	$ 1,698,336	$ 5,479,045	$ 1,698,336
County	118	1.17%	$ 244,425	$ 75,764	$ 244,425	$ 75,764
HARSB	1094.43	10.88%	$ 2,266,996	$ 702,699	$ 8,930,129	$ 20,088,961
Misc.	20.1	0.20%	$ 41,635	$ 12,906	$ 41,635	$ 12,906
			$ -	$ -	$ -	$ -
TOTAL	10061.13		$ 20,840,567	$ 6,459,938	$ 27,503,700	$ 25,846,200

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Preliminary Alt. 2 Monthly Rate Impact

	2013	2018	2023	2028	2032
Prior Year's Rate	$21.14	$33.17	$53.93	$60.97	$61.04
OM&R Rate Increase	$0.57	$1.10	$0.84	$0.38	($0.28)
Capital Project Increase	$5.41	$10.12	$4.57	$0	$0
Total Rate	$27.12	$44.39	$59.34	$61.35	$60.76
Average Annual Increase from 2012	28%	16%	10.9%	7.4%	5.4%

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CONCLUSIONS/NEXT STEPS

- Regulatory changes drive Facility Plan
- Final NPDES permit conditions expected in early 2013
- Preliminary Compliance Schedule has 3 years to complete BNR <u>and</u> pilot testing
- Alternative No. 2 recommended as most adaptable for meeting permit requirements

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CONCLUSIONS/NEXT STEPS (cont.)

- IDEQ approved Draft Facility Plan on October 15th for public input to inform Board decision
- With Board decision, J-U-B will finalize Facility Plan and financial model as required for Selected Alternative
- IDEQ must approve final Plan and EID for SRF loan
- City and District are currently ranked highest in state for one-time loans available in January
- Compliance schedule requires design and construction to begin in 2013

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OFFICIAL MINUTES
Facility Plan Public Hearing
HAYDEN AREA REGIONAL SEWER BOARD
November 1, 2012

The Special Meeting of the Hayden Area Regional Sewer Board was held on November 1, 2012, in the City of Hayden Council Chambers at 8930 N. Government Way, Hayden, ID.

Present: Stefan Chatwin, Dan Green, Ron McIntire, Kenneth Sewell, David Weinstein

Absent:

Also Present: Ken Windram, Hayden Area Regional Sewer Board-Administrator; Stephanie Oliver, Hayden Area Regional Sewer Board-Secretary; Paul Klatt, J-U-B Engineering; Larry Comer, Welch-Comer Engineering; Nancy Stricklin, Hayden Area Regional Sewer Board-Attorney; Sean Hoisington, City of Hayden- Public Works Director; Danielle Quade, Hawley Troxell; Angie Virnoche, FCS group; see enclosed attendance sheet for a listing of all attendees.
A total of 38 people attended the HARSB Facility Plan Public Hearing.

The meeting was called to order by Ron McIntire, Chairman at 3:00 p.m.

There were no additions or corrections to the posted agenda.

Public Hearing for Hayden Area Regional Sewer Board Facility Plan Alternatives

Ron McIntire informed the attendees that we need everyone to fill out a Public Hearing Comment Form and turn it into the secretary prior to speaking.

Paul Klatt discussed the Hayden Area Regional Sewer Board Wastewater Treatment Facility and the Draft Wastewater Facility Plan, see enclosed PowerPoint Presentation. Paul Klatt started with explaining who and what the Hayden Area Regional Sewer Board (HARSB) is and its current facilities, see page 1, slides 1 and 2. He then continued with the reasons that the facility plan was developed: regulations, growth and financial planning, see page 2, slides 3 and 4. Paul then talked about the wastewater flow and how it currently moves through our facility. He then introduced the Facility Plan alternatives for consideration: Alternative 1- No Action Alternative, Alternative 2- Upgrade river discharge and seasonal reuse to build-out of existing site, Alternative 3- Upgrade seasonal river discharge with seasonal reuse expanded to 2.4 mgd, Alternative 4- Upgrade river discharge and sell reuse property infrastructure. Paul Klatt informed everyone about the regulatory driver improvements, growth drivers and finally the replacement and general upgrade needs, see pages 4-6. He stressed the Boards sentiment that growth needs to pay for growth, and that existing users do not pay for growth. Paul then discussed the Environmental Criteria given to J-U-B Engineering by Idaho Department of Environmental Quality with Option Cost (Total estimated Capital and O& M) impacts; Alternative 2- 64 Million, Alternative 3- 74.9 Million, Alternative 4- 53.4 Million. Discussion occurred regarding the engineering recommended alternative #2, and reasons for the Board to consider it. See pages 7-10 of the presentation for the budgets presented from the engineering recommended alternative #2. Paul Klatt then brought the presentation to a close with letting the attendees know the next steps and the reasons we needed the facility plan, see pages 10-11.

Ron McIntire reminded everyone about the Public Hearing Comment Forms, and to bring them to the secretary if you were interested in speaking.

Public Comment:

Keith Knight located at 9075 Finucane Drive, Hayden, Idaho. Mr. Knight expressed his concern over being a frustrated tax payer, and that this is being fueled by the Phosphorus levels on Long Lake, which is not a Lake it is a Reservoir, and that we are being asked to reduce this when they are not cleaning up their own act. He continued his statement indicating that we are a good neighbor to Washington, but we are being pushed into this because the Environmental Protection Agency and Washington Department of Ecology say that this is a lake and not a reservoir. He indicated that we need more political pushback pressure from Boise and that even though it doesn't look like it with the possible daily fees that Alternative 1 would be his recommendation.

Nancy Henton located in Hayden Lake, Idaho. Ms. Henton asked about the cost per homeowner.

Paul Klatt informed her that the monthly fees would rise from $21.14 currently to about $60.00 per month. Discussion occurred regarding the difference between the Facility Plan rates, and the amount the residents are paying their respective entities. The rates shown in this presentation only represent the HARSB Treatment portion, and not the collection system that each of the entities operate.

Horst Bruehl, located at 1994 E. Lookout Drive, Hayden, Idaho. Mr. Bruehl would like to know how the rates are broken down between households.

Discussion occurred regarding the monthly fees, and the portion that goes to the treatment facility and the entity collection systems.

Larry Comer, Hayden Lake Recreational Water and Sewer District's (HLRWSD) Engineer informed the people attending about the upcoming Local Improvement District hearing that will be held November 14, 2012 at 6 p.m. Hayden Meadows Elementary School, this hearing will give more information regarding monthly rates to the HLRWSD audience in attendance.

Dan Green, Kootenai County Commissioner, asked Ken Windram to discuss what has been done in the way of pushback against the proposed regulation.

Ken Windram discussed regulatory efforts over the last several years, and talked about the Supreme Court ruling that allows downstream states to dictate to upstream states on water quality standards.

Ken Windram also discussed that everyone has a base of 1 ER, and that if an industry has more flow they are evaluated and pay more ER's based upon their flow.

Fran Davis, located at 1430 W. Hayden Avenue, Hayden, Idaho. Ms. Davis is wondering why everyone has not been forced to hook up to the sewer.

Discussion occurred regarding the availability of the sewer in certain areas and that as lots are sold and septic tanks fail they are required to hook onto the sewer if it is available.

Keith Knight, located at 9075 Finucane Drive, Hayden, Idaho. Mr. Knight asked about the political action that has occurred, and that the downstream users are not being held to the same standards as the upstream users.

Art Brown, located in Hayden Lake, Idaho. Mr. Brown asked about the NPDES permits, and if we were meeting current standards. He also asked if we will be issued the permit once the construction is done.

Ken Windram discussed that we are meeting current standards, and that the Facility Plan is to meet the upcoming standards on the new NPDES permit. He discussed that the new permit will be issued with a compliance schedule that we will have to meet.

Discussion occurred about what happens when additional new regulations come in the future, and do we anticipate meeting them in this facility plan. We do not know what new additional regulations levels to anticipate so they are not planned for at this time.

Mr. Brown asked about an accelerated schedule that would allow for growth, and if it would be too costly for growth to occur.

Paul Klatt discussed that the model would allow for growth and that the maximum capitalization fee cost would rise is up to a maximum amount of $8800.00 for the treatment portion.

Mr. Brown asked about the percentage of maintenance cost versus new standards over the 20 year period.

Paul Klatt discussed the funding needed to meet the replacement requirements, as well as the new growth requirements, see PowerPoint financial slide.

Steve Matheson, located at 3391 E. Hayden View Drive, Coeur d'Alene, Idaho. Mr. Matheson asked about the Supreme Court decision, and if it was based on a state taking another state to court regarding water quality standards.

Nancy Stricklin talked about the Supreme Court Case of Oklahoma vs. Arkansas, and that EPA is requiring us to comply with the standards due to the Supreme Court case. Discussion then occurred on the process that we went through regarding litigation, and the availability of future litigation. Discussion also occurred regarding Idaho being considered an upstream state, and that Tribal Standards also are taken into account regarding these negotiations, standard settings, etc.

Discussion occurred regarding the fact that all three Idaho area facilities (Coeur d'Alene, Post Falls and HARSB) are upgrading to meet the upcoming permit standards, and that we have a smaller base to pay for these treatment upgrades. Economy of scale for smaller entities makes it more expensive, than some of the upgrades occurring in the larger cities.

It was moved by Stefan Chatwin, and seconded by Kenneth Sewell, that the Board adopt alternative #2.

Roll call vote taken:

City of Hayden – Stefan Chatwin- Yes

Hayden Lake Recreational Water and Sewer District- Kenneth Sewell-Yes

Kootenai County– Dan Green-Yes
Motion carried.

Ron McIntire talked about the enormous amount of money we are discussing and the demands that are being placed upon us, and the challenges that we are facing with the systems in the area.

He reminded everyone to vote on November 6th, and to attend the Veterans Day program on Monday November 12th.

Moved to adjourn meeting by Kenneth Sewell, and seconded by Dan Green, at 4:25 p.m... Motion carried.

Ron McIntire Chairman Stephanie Oliver, Secretary

Hayden Area Regional Sewer Board

Members Present at November 1, 2012 Public Hearing

NAME	REPRESENTING
[illegible]	Hayden
STEFAN CHATWIN	HAYDEN
Ken Windram	HARSB
Danielle Quade	Hawley Troxell
Larry B. Henton	HAYDEN LAKE
Nancy Henton	Hayden Lake
ARDELL HOWES	HAYDEN
Angie Virnoche	FCS Group
[illegible]	KC
[illegible]	Hayden
[illegible]	Hayden
Ed Tulloch	Kootenai
[illegible]	Hayden
Paul Klatt	JUB Engineers
[illegible]	CITIZEN
[illegible] Williams	Welch-Comer
Mike Conn	J-UB Engineers
LARRY COMER	WELCH COMER
STEVE MATHESON	CITIZEN

Hayden Area Regional Sewer Board

Members Present at November 1, 2012 Public Hearing

NAME	REPRESENTING
Sean Holsinger	City of Hayden
HORST BRUEHL	SELF.
Katy Baker-Casile	IDEQ
Dennis Weinstein	HRRWSD
Ken Sever	〃
Nancy Stricklin	HARSB
Deborah Gondolfo	City of Hayden Lake
Art Brown	Blue Water Tech.
Dave Sheldon	Dave Sheldon
TERRY SNLL	TRINDERA ENG.
Barbara Ketchum	Lillian Jaynes
GRADY WEBB	TRINDERA ENGINEERING INC.
Jacob Oedekirk	Student
WENDY PHILLIPS	SELF
FRANK + LISA Kelley	Self + spouse
Joe Myers	USFS Coeur d'Alene Nursery
Ninja Krokenberg	Self
[illegible]	HARSB

NOVEMBER 1 MEETING ATTENDANCE SUMMARY

Meeting Attendees (*italics indicates guessed/researched address*)

- Larry and Nancy Henton (*12506 N Avondale Loop Hayden Lake, ID 83835*)
- Ardell Howes (*PO Box 698 Hayden Lake, ID 83835*)
- Fran Davis (1430 W. Hayden Avenue Hayden, ID 83835)
- Ed Tulloch (*12258 N Pinetree Road Hayden, ID 83835*)
- Robert and Joan Schaffer (?) (*284 W Vicki Ave Hayden Lake, ID 83835*)
- Keith Knight (9075 Finucane Drive Hayden, ID 83835)
- Steve Matheson (3391 E. Hayden View Drive Coeur d'Alene, ID 83815)
- Horst Bruehl (1994 E. Lookout Drive Coeur d'Alene, ID 83815)
- Deborah Gondolfo (*12483 N Avondale Loop Hayden, ID 83835*)
- Art Brown (PO Box 1290 Hayden, ID 83835)
- Dave Sheldon (could not find address)
- Barbara Ketchum (*12292 N Kensington Avenue Hayden, ID 83835*)
- Lillian Jaynes (*11295 N Avondale Loop Hayden, ID 83835*)
- Jacob Odekirk (could not find address)
- Wendy Phillips (could not find address)
- Frank and Lisa Kelley (*12449 N Avondale Loop Hayden, ID 83835*)
- Joe Myers (could not find address)
- Nina Krakenberg (?) (*PO Box 2243 Hayden, ID 83835*)

- Ron McIntire (City of Hayden)
- Stefan Chatwin (City of Hayden)
- Ken Windram (HARSB)
- Danielle Quade (Hawley Troxell)
- Angie Virnoche (FCS Group)
- Dan Green (Kootenai County)
- Paul Klatt (JUB Engineers)
- Ashley Williams (Welch-Comer Engineers)
- Mike Conn (JUB Engineers)
- Sean Hoisington (City of Hayden)
- Katy Baker-Casile (IDEQ)
- David Weinstein (HLRWSD)
- Ken Sewell (HLRWSD)
- Nancy Stricklin (HARSB)
- Terry Stulc (Trindera Engineering)
- Grady Weisz (Trindera Engineering)
- Stephanie Oliver (HARSB)

Meeting Speakers (public that asked question or spoke at the meeting)

- Keith Knight (9075 Finucane Drive Hayden, ID 83835)
- Nancy Henton (*12506 N Avondale Loop Hayden Lake, ID 83835*)

- Horst Bruehl (1994 E. Lookout Drive Coeur d'Alene, ID 83815)
- Fran Davis (1430 W. Hayden Avenue Hayden, ID 83835)
- Art Brown (PO Box 1290 Hayden, ID 83835)
- Steve Matheson (3391 E. Hayden View Drive Coeur d'Alene, ID 83815)

APPENDIX P

Agency Consultation Correspondence

- Example Agency Consultation Letter and Attachments
- Agency Responses

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208-664-5946 (fax)

350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Katy Baker-Casile
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Katy Baker-Casile:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[3] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

- H-1 Lift Station to WWTP: 15-inch force main pipeline replacement.
- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier, and converting the secondary treatment system to full biological nutrient

[3] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

- Effluent Filtration: Provide tertiary (third level) coagulation and filtration to meet more stringent river discharge effluent requirements for total phosphorus and oxygen-demanding particulates. This will also provide wider applicability of recycled water.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system for safety, operability, and capacity needs.
- Effluent Pump Station and Outfall/Land App Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall, minor modifications to existing land application reclaimed water pipeline (no expansion).
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Reuse: Repair and maintain existing system. Expand recycled water and application system on currently owned property with drip irrigation of hybrid poplars.
- Toxic Substances: Toxics (cadmium, zinc, lead, and refractory organics) are also a concern for this facility. The proposed project improvements will result in a facility which reduces levels of toxics to a limit of technology. Additional efforts to address toxics include a possible TMDL (for metals) to show how HARSB's recycled water meets the water quality standards (at the river discharge point) and actually adds assimilative capacity with the hardness available in the discharge. Other toxics reduction will likely occur through the source reduction efforts associated with the Regional Toxics Task Force in which HARSB currently participates.

Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

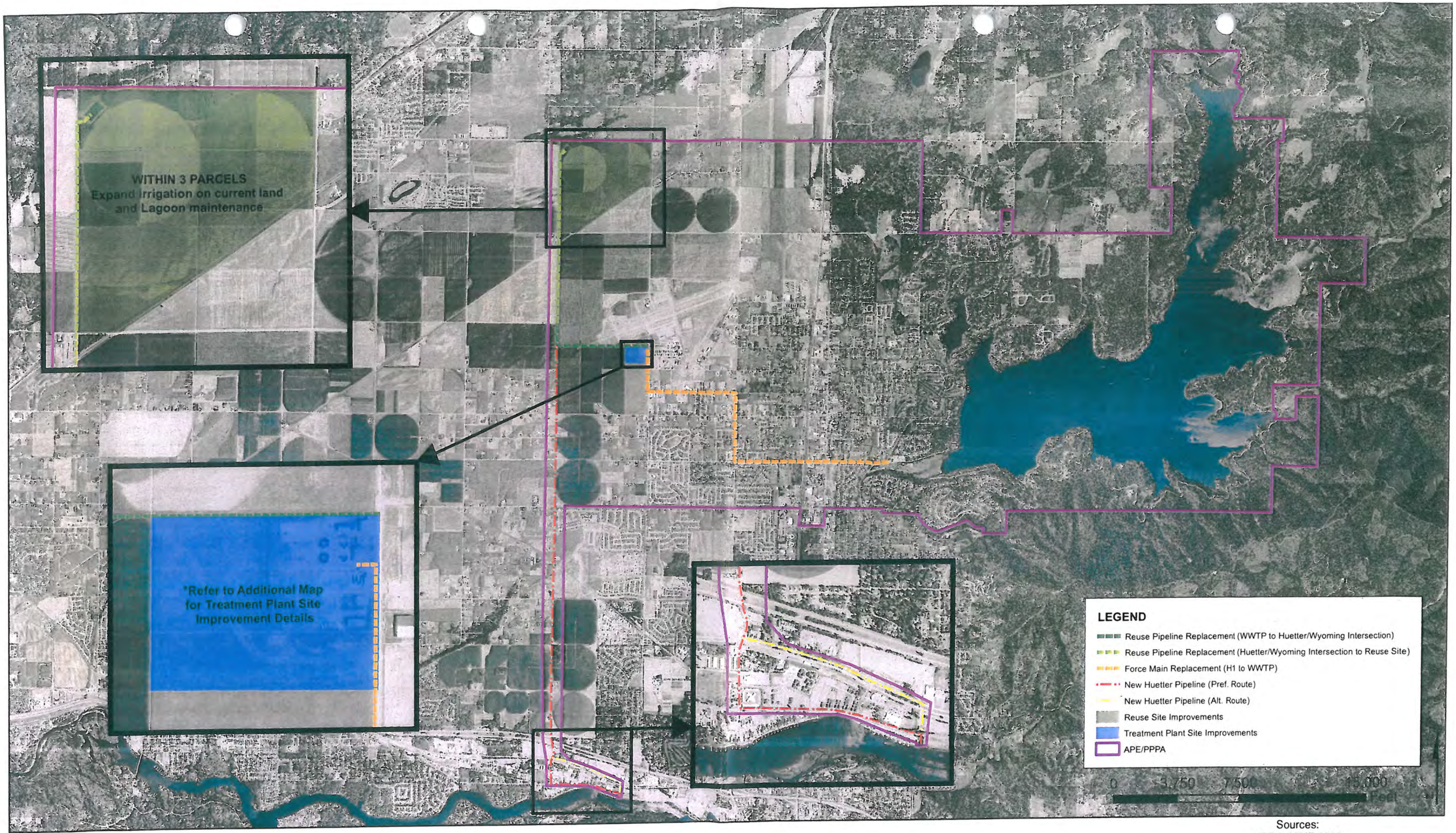
We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps



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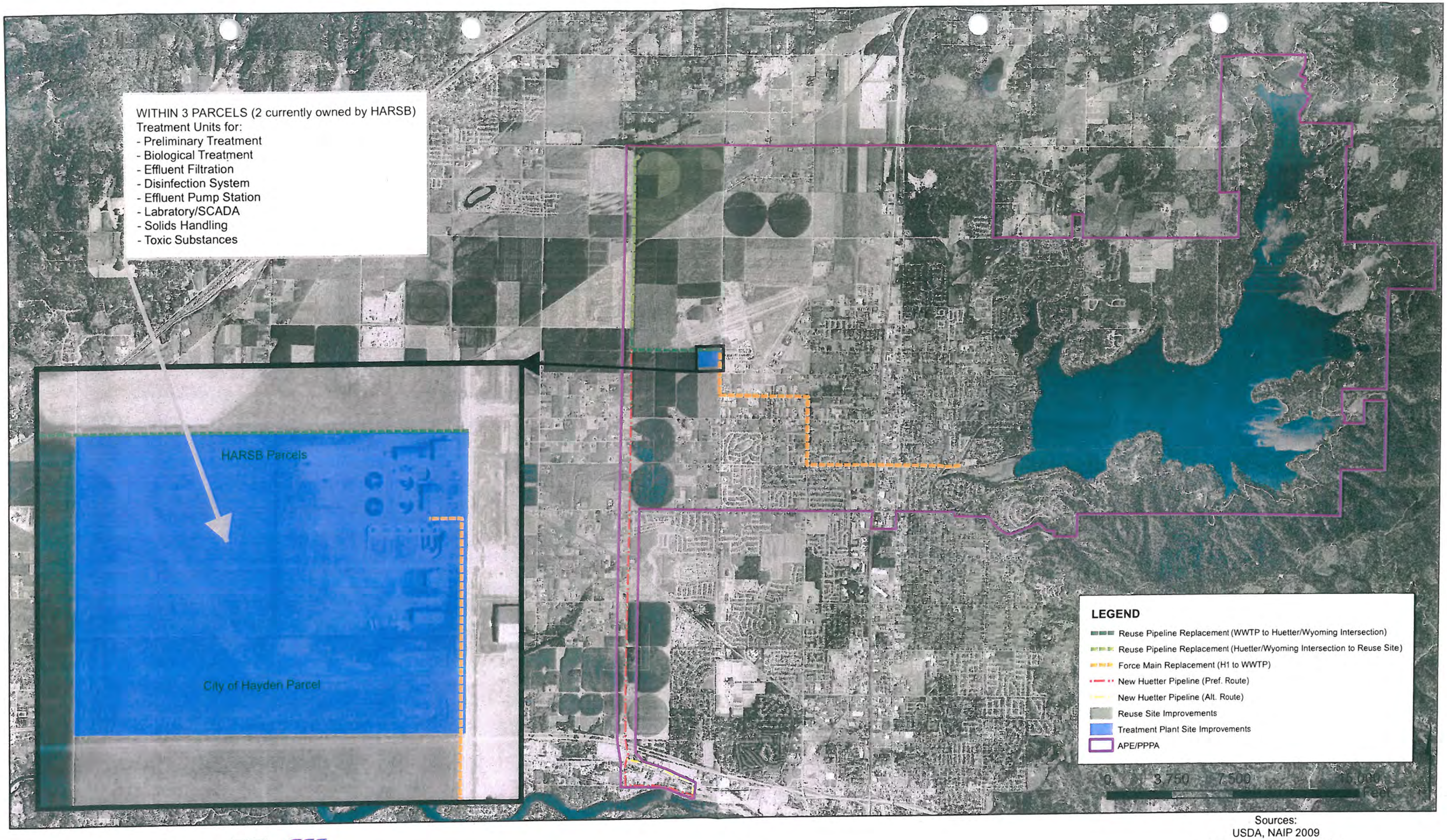
(fax) 208-664-5946

HARSB

Proposed Wastewater Improvements

Sources:
USDA, NAIP 2009
Idaho State Tax Commission
HLRWSD
Kootenai County GIS Department

PROJECT NO.....................................41104
DRAWN BY.......................................AW
FILENAME.......................................ProjectOverview_11x17L
DATE...10/10/12



Sources:
USDA, NAIP 2009
Idaho State Tax Commission
HLRWSD
Kootenai County GIS Department

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Coeur d'Alene, ID 83815 (fax) 208-664-5946

HARSB

Proposed Wastewater Treatment Plant Site Improvements

PROJECT NO. 41104
DRAWN BY. .... AW
FILENAME. .... ProjectOverviewWWTP_11x17L
DATE. 10/30/12

Williams, Ashley

From: Williams, Ashley
Sent: Thursday, December 06, 2012 4:25 PM
To: werntz.james@epa.gov; Lidgard.michael@Epamail.epa.gov; howard.lunderstadt@id.usda.gov; dennis.porter@commerce.idaho.gov
Subject: Hayden Area Regional Sewer Board Wastewater Project
Attachments: S45C-212110513560.pdf

Dear Agency Contacts,

We are writing to remind you that the 30 day period for agency consultation ended on December 5th (Wednesday) for the HARSB wastewater project. I have not heard from you yet and wanted to make sure you didn't have any questions or need any further information from me. For your reference, I have attached the letter that was sent to you last month (the example is addressed to DEQ, but you received an identical letter addressed to you).

Please provide any comments (or "no comment") to us as soon as possible so that we can proceed with the Environmental Information Document development.

Feel free to call or email if you have any questions or comments.

Thanks,

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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November 5, 2012

Beth Reinhart
2065 W. Riverstone Drive, Ste. 201
Coeur d'Alene, ID 83814

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Beth Reinhart:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[1] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

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- Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier, and converting the secondary treatment system to full biological nutrient

[1] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

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- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
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We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
COEUR D' ALENE REGULATORY OFFICE
2065 W Riverstone Drive, Suite 201
Coeur d'Alene, ID 83814

COPY

RECEIVED NOV 29 2012 By

November 28, 2012

Regulatory Division

SUBJECT: NWW-2012-635, HARSB Wastewater System Improvements

Ashley Williams, EIT
Welch-Comer
350 E Kathleen Ave
Coeur d'Alene, ID 83815

Dear Ms. Williams:

Enclosed is our Department of Army (DA) Approved Jurisdictional Determination (AJD) that there are no waters of the United States, including wetlands, within the Hayden Area Regional Sewer Board's (HARSB) proposed project impact area. Therefore, no DA authorization is required. This decision is based upon our review of the information you provided and additional information available to our office. This project is located within Sections 4 and 16, of Township 51 North, Range 4 West, near latitude 47.7969° N and longitude -116.8399° W, and latitude 47.7690° N and longitude -116.8315° W, in Kootenai County, Idaho. Your request has been assigned file number NWW-2012-635, which should be referred to in future correspondence with our office regarding this site.

The DA exerts regulatory jurisdiction over waters of the United States (U.S.), including wetlands, pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403). Section 404 of the Clean Water Act requires a DA permit be obtained prior to discharging dredged or fill material into Waters of the U.S., which includes most perennial and intermittent rivers and streams, natural and man-made lakes and ponds, irrigation and drainage canals and ditches that are tributaries to other waters, and wetlands. Section 10 requires that a DA permit be obtained prior to building structures or conducting work in or affecting navigable waters of the U.S.

The proposed project impact areas, as shown on the attached map, dated November 19, 2012, are upland land that does not contain waters of the U.S., including wetlands, under the Corps' regulatory jurisdiction. Therefore, a DA authorization is not required to develop the upland property.

This approved JD is valid for a period of 5-years from the date of this letter, unless new information supporting a revision is provided to this office before the expiration date. Also enclosed, you will find the Approved Jurisdictional Determination Form addressing wetlands and waters of the U.S. located within the JD review area, and a *Notification of Administrative Appeals Options and Process and Request for Appeal Form* (RFA) regarding this DA Approved Jurisdictional Determination. Should you disagree with certain terms and/or conditions this Approved JD, the Notification of Administrative Appeal Options form outlines the steps to take to file your objection. Please note, the RFA form must be received by the Northwest Division Office no later than **January 27, 2013**.

Nothing in this letter shall be construed as excusing you from compliance with other Federal, state, or local statutes, ordinances or regulations which may affect this work.

We are interested in your thoughts and opinions concerning the quality of service you received from the Walla Walla District, Corps of Engineers Regulatory Division. If you have Internet access, please visit our web site at http://per2.nwp.usace.army.mil/survey.html and complete an electronic version of our Customer Service Survey form, which will be automatically submitted to us. Also, for additional information about the Walla Walla District Regulatory program, please visit us on-line at our website at http://www.nww.usace.army.mil/BusinessWithUs/RegulatoryDivision.aspx .

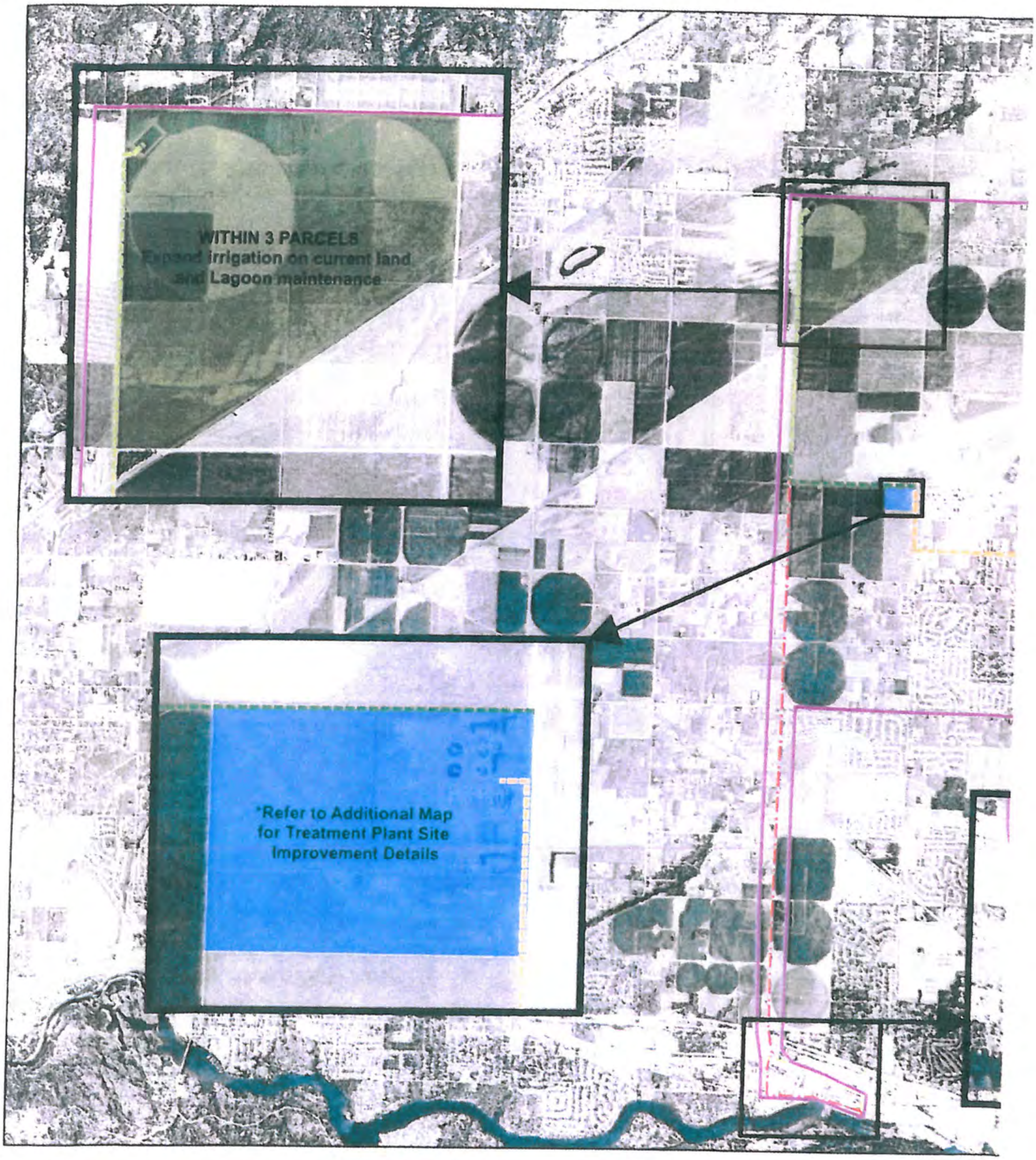
If you have any questions about this determination, please contact me by telephone at 208-765-8961, by mail at the address in the above letterhead, or via e-mail at shane.p.slate@usace.army.mil. We appreciate your cooperation with the Corps of Engineers' Regulatory Program.

Sincerely,

Shane Slate

Shane Slate
Project Manager, Regulatory

Enclosures:
- Project Map
- Approved JD Form
- Appeal Form



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Hayden Area Regional Sewer Board
File No. : NWW-2012-635
Project Area Map
Sec 4 & 16, T-51N, R-4W
Sheet 1 of 1 Date 11/19/2012

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): November 28, 2012

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Walla Walla District; NWW-2012-00635, Hayden Area Regional Sewer Board - Wastewater System Improvements

C. PROJECT LOCATION AND BACKGROUND INFORMATION: .

State: Idaho County/parish/borough: Kootenai City: Hayden
Center coordinates of site (lat/long in degree decimal format): 47.7823° Lat. -116.8403° Long.
Universal Transverse Mercator: Zone Northing **N**, Easting **E**.
Name of nearest waterbody: Rathdrum Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: N/A
Name of watershed or Hydrologic Unit Code (HUC): 17010305

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc...) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☒ Office (Desk) Determination. Date: November 19, 2012
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** *"navigable waters of the U.S."* within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain:

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** *"waters of the U.S."* within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
      - ☐ TNWs, including territorial seas
      - ☐ Wetlands adjacent to TNWs
      - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
      - ☐ Non-RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
      - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
      - ☐ Impoundments of jurisdictional waters
      - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
      Non-wetland waters: linear feet: width (ft) and/or acres.
      Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
      Elevation of established OHWM (if known):

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. **TNW**
   Identify TNW: .

   Summarize rationale supporting determination: .

2. **Wetland adjacent to TNW**
   Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. **Characteristics of non-TNWs that flow directly or indirectly into TNW**

   (i) General Area Conditions:
   Watershed size: **square miles**
   Drainage area: **acres**
   Average annual rainfall: inches
   Average annual snowfall: inches

   (ii) Physical Characteristics:
   (a) Relationship with TNW:
   ☐ Tributary flows directly into TNW.
   ☐ Tributary flows through **Pick List** tributaries before entering TNW.

   Project waters are **Pick List** river miles from TNW.
   Project waters are **Pick List** river miles from RPW.
   Project waters are **Pick List** aerial (straight) miles from TNW.
   Project waters are **Pick List** aerial (straight) miles from RPW.
   Project waters cross or serve as state boundaries. Explain:

   Identify flow route to TNW[5]: .
   Tributary stream order, if known: .

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain:
☐ Manipulated (man-altered). Explain:

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts ☐ Sands ☐ Concrete
☐ Cobbles ☐ Gravel ☐ Muck
☐ Bedrock ☐ Vegetation. Type/% cover:
☐ Other. Explain:

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain:
Presence of run/riffle/pool complexes. Explain:
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:

Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime:
Other information on duration and volume:

Surface flow is: **Pick List.** Characteristics:

Subsurface flow: **Pick List.** Explain findings:
☐ Dye (or other) test performed:

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank ☐ the presence of litter and debris
☐ changes in the character of soil ☐ destruction of terrestrial vegetation
☐ shelving ☐ the presence of wrack line
☐ vegetation matted down, bent, or absent ☐ sediment sorting
☐ leaf litter disturbed or washed away ☐ scour
☐ sediment deposition ☐ multiple observed or predicted flow events
☐ water staining ☐ abrupt change in plant community
☐ other (list):

☐ Discontinuous OHWM.[7] Explain:

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by: ☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects ☐ survey to available datum;
☐ fine shell or debris deposits (foreshore) ☐ physical markings;
☐ physical markings/characteristics ☐ vegetation lines/changes in vegetation types.
☐ tidal gauges
☐ other (list):

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain:
Identify specific pollutants, if known:

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7]Ibid.

(iv) **Biological Characteristics. Channel supports (check all that apply):**
- ☐ Riparian corridor. Characteristics (type, average width):
- ☐ Wetland fringe. Characteristics: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings:
  - ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) **Physical Characteristics:**

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain:

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
- ☐ Directly abutting
- ☐ Not directly abutting
  - ☐ Discrete wetland hydrologic connection. Explain: .
  - ☐ Ecological connection. Explain: .
  - ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) **Chemical Characteristics:**

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) **Biological Characteristics. Wetland supports (check all that apply):**
- ☐ Riparian buffer. Characteristics (type, average width):
- ☐ Vegetation type/percent cover. Explain: .
- ☐ Habitat for:
  - ☐ Federally Listed species. Explain findings: .
  - ☐ Fish/spawn areas. Explain findings: .
  - ☐ Other environmentally-sensitive species. Explain findings: .
  - ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N) Size (in acres) Directly abuts? (Y/N) Size (in acres)

Summarize overall biological, chemical and physical functions being performed:

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] **Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos*.**

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:10-10-12 Map of Proposed Wastewater Improvements and 10-30-12 Map of Proposed Wastewater Treatment Plant Site Improvements..
☐ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name:1:24k, ID-HAYDEN .
☐ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☒ National wetlands inventory map(s). Cite name:Online NWI Maps retrieved 19-Nov-12.
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☐ Photographs: ☐ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: No Waters of the US are located within the potential impact areas.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Hayden Area Regional Sewer Board		File Number: NWW-2012-00635	Date: 28 NOV 2012
Attached is:			See Section Below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of Permission)		A
	PROFFERED PERMIT (Standard Permit or Letter of Permission)		B
	PERMIT DENIAL		C
X	APPROVED JURISDICTIONAL DETERMINATION		D
	PRELIMINARY JURISDICTIONAL DETERMINATION		E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://usace.army.mil/inet/functions/cw/cecwo/reg or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations (JD) associated with the permit.

OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit,

ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.

APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.

APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMT

REASONS FOR APPEAL OR OBJECTIONS:

Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:

District Engineer
ATTN: David B. Barrows
Regulatory Division Walla Walla District
201 North 3rd Avenue
Walla Walla, Washington 99362-1876
Telephone (509) 527-7150

If you only have questions regarding the appeal process you may also contact:

U.S. Army Corps of Engineers
Northwestern Division
Attn: Mary Hoffman, Appeal Review Officer
P.O. Box 2870
Portland, Oregon 97208-2870
Telephone (503) 808-3825

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15 day notice of any site investigation, and will have the opportunity to participate in all site investigations.

Signature of appellant or agent:	*Date:*	*Telephone:*

WELCH, COMER & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS

PHONE LOG

DATE: 12/6/12 TIME: 3:00pm (approx.)

PROJECT NAME: HLRWSD Environmental Doc. / HARSB Environmental Doc.

PROJECT NUMBER: 41055 / 41104

WELCH-COMER REPRESENTATIVE: Ashley Williams

WHO INITIATED COMMUNICATION: Ashley Williams

NAME: Greg Taylor (IDWR) PHONE NUMBER: 208-762-2805

ADDRESS: 7600 Mineral Drive, Suite 100, Coeur d'Alene, ID 83815

SUBJECT: Wetlands (Jurisdiction) for proposed projects

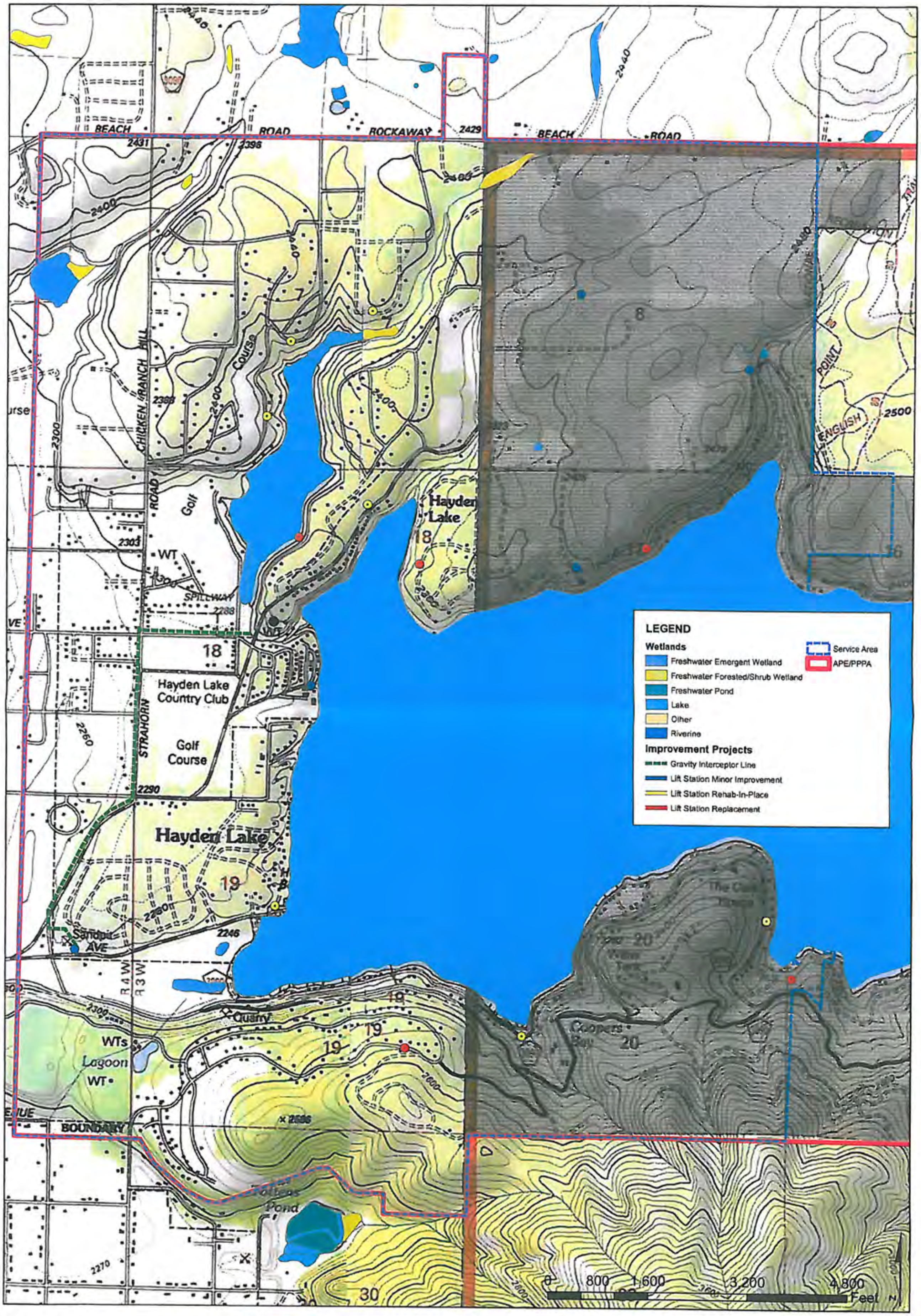
IDWR does not have jurisdiction over waters in Idaho unless they are continuously flowing, and below OHWM. Typically a lake is jurisdiction by IDL.

Thus, they have no jurisdiction or comment.

WELCH-COMER FOLLOW-UP REQUIRED? ☐ YES ☒ NO

FOLLOW-UP COMMUNICATION REQUIRED? ☐ YES ☒ NO

NOTES:



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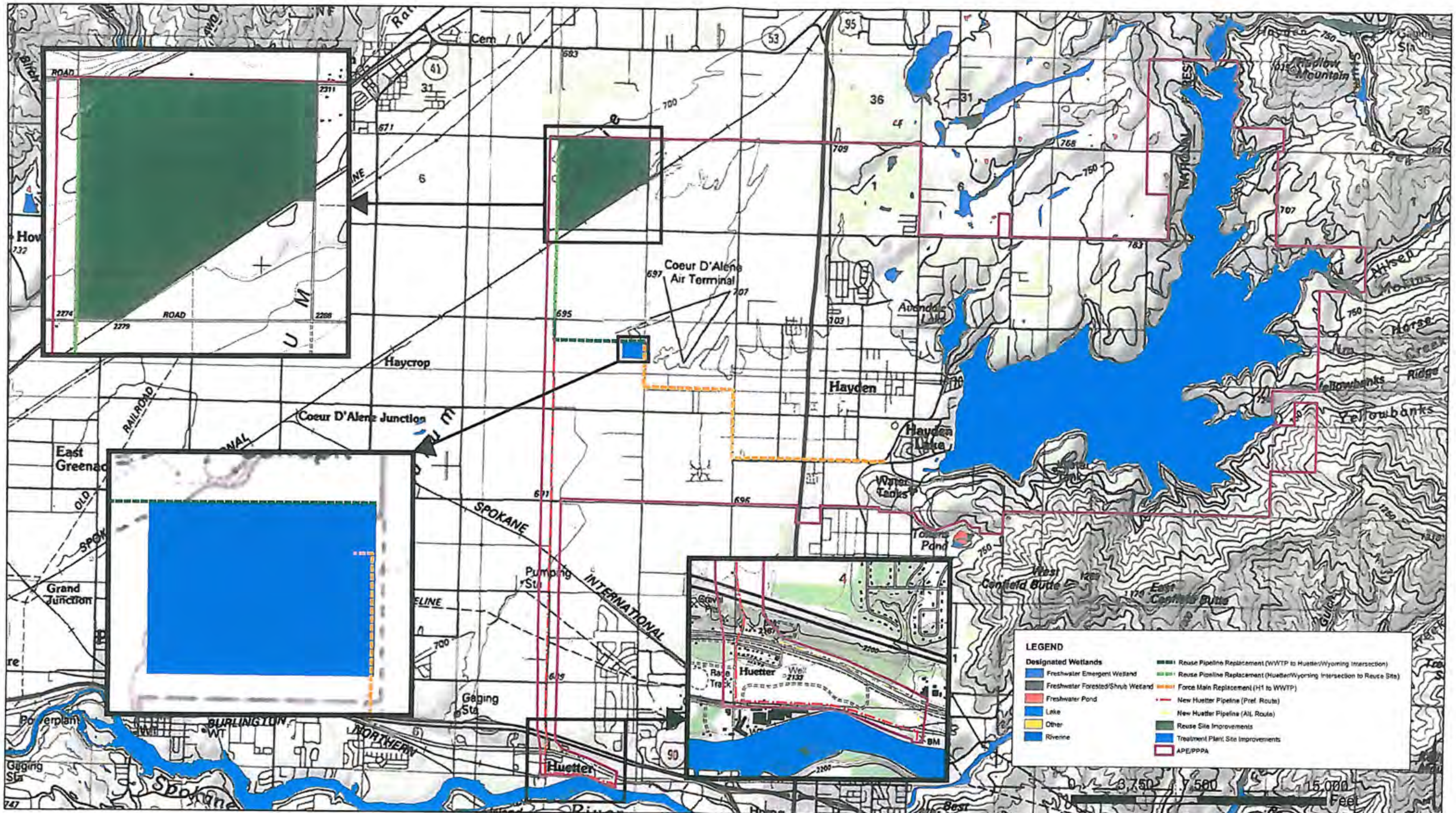
(toll free) 877-815-5762
(fax) 208-664-5946

HLRWSD

Wetlands

Sources:
USA Topo Maps
US Fish and Wildlife National Welland Inventory

PROJECT NO. 41055
DRAWN BY AW
FILENAME Wetlands_11x17P
DATE 10/17/12



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(fax) 208-664-5946

HARSB

Wetlands

Sources:
Idaho State Tax Commission
Kootenai County GIS Department
US Fish and Wildlife National Wetland Inventory, 2012

PROJECT NO. 41104
DRAWN BY .... AW
FILENAME .... Wetlands_11x17L
DATE 11/14/12

WELCH, COMER & ASSOCIATES, INC.
CONSULTING ENGINEERS & SURVEYORS

PHONE LOG

DATE: 12/7/12 TIME: 1:00 pm (approx.)

PROJECT NAME: HURWSD Environmental Doc. / HARSB Environmental Doc.

PROJECT NUMBER: 41055 / 41104

WELCH-COMER REPRESENTATIVE: Ashley Williams

WHO INITIATED COMMUNICATION: Ashley Williams

NAME: Jim Brady (IDL) PHONE NUMBER: 208-769-1577

ADDRESS: 3258 W. Industrial Loop Coeur d'Alene, ID 83815

SUBJECT: Wetlands (Jurisdiction) for proposed project

The maps provided have such a small scale, Jim couldn't tell what might be in his jurisdiction.

Normally, within Hayden Lake IDL will have jurisdiction if it is below 2239. If it is below 2128 in Spokane River, IDL will have jurisdiction (as well as corps). IDL does not have jurisdiction on on the smaller lakes in the project area$.

WELCH-COMER FOLLOW-UP REQUIRED? ☐ YES ☒ NO

FOLLOW-UP COMMUNICATION REQUIRED? ☐ YES ☒ NO

NOTES:

Williams, Ashley

From: Williams, Ashley
Sent: Friday, December 07, 2012 12:32 PM
To: 'Jim Brady'
Subject: Hayden Wetlands
Attachments: S45C-212120712110.pdf

Jim,

Thanks for calling me today to discuss the wetlands within the HARSB (Hayden Area Regional Sewer Board) and HLRWSD (Hayden Lake Recreational Water and Sewer District) project areas.

I have attached the wetlands map for each project. Please let me know if you need anything else from me.

Thanks!

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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November 5, 2012

State Supervisor
11103 East Montgomery Drive
Spokane, WA 99206-4779

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear State Supervisor:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[2] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

- H-1 Lift Station to WWTP: 15-inch force main pipeline replacement.
- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier, and converting the secondary treatment system to full biological nutrient

[2] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

- Effluent Filtration: Provide tertiary (third level) coagulation and filtration to meet more stringent river discharge effluent requirements for total phosphorus and oxygen-demanding particulates. This will also provide wider applicability of recycled water.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system for safety, operability, and capacity needs.
- Effluent Pump Station and Outfall/Land App Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall, minor modifications to existing land application reclaimed water pipeline (no expansion).
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Reuse: Repair and maintain existing system. Expand recycled water and application system on currently owned property with drip irrigation of hybrid poplars.
- Toxic Substances: Toxics (cadmium, zinc, lead, and refractory organics) are also a concern for this facility. The proposed project improvements will result in a facility which reduces levels of toxics to a limit of technology. Additional efforts to address toxics include a possible TMDL (for metals) to show how HARSB's recycled water meets the water quality standards (at the river discharge point) and actually adds assimilative capacity with the hardness available in the discharge. Other toxics reduction will likely occur through the source reduction efforts associated with the Regional Toxics Task Force in which HARSB currently participates.

Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Idaho Fish and Wildlife Office
Northern Idaho Field Office
11103 East Montgomery Drive
Spokane Valley, Washington 99206

U.S. FISH & WILDLIFE SERVICE
RECEIVED NOV 26 2012
By

November 21, 2012

Ashley Williams
Welch-Comer
350 E Kathleen Ave
Coeur d'Alene, ID 83815

Subject: Species List for Proposed Hayden Area Regional Wastewater Treatment Facility Improvement Project, Kootenai County, ID

Dear Ms. Williams:

This responds to your recent request for a list of threatened and endangered species. For your convenience, updated countywide species and habitat listings are now available on our website at http://www.fws.gov/idaho/species/IdahoSpeciesList.pdf. To view the listings in your area of concern, select "county species lists" within the ESA programs page, and then select the county of interest. The lists available on our website are compliant with Section 7(c) of the Endangered Species Act of 1973, as amended (Act), and are the most current available listings of endangered, threatened and proposed species and critical habitats in a given area. For optional consideration, the lists also contain updated candidate species.

If you would like information concerning state listed species or species of concern in Idaho, you may contact the Idaho Conservation Data Center, at (208) 334-3402, for fish and wildlife species. Species of anadromous fishes that have been listed by the National Marine Fisheries Service (NMFS) may also occur in your project area. Please contact NMFS in Ellensburg, WA, at (509) 962-8911 or NMFS in Boise, ID at (208) 378-5692, to request information on listed species within NMFS's jurisdiction.

When you submit a request for Section 7 consultation, we request that you include your downloaded species list and the date it was downloaded, as an attachment. If applicable, please also include the United States Fish and Wildlife Service reference number on your consultation request. This will document your compliance with 50 CFR 402.12 (c).

Should your project plans change significantly, or if the project is delayed more than 90 days, you should update your species lists through our website and through the above listed agencies.

Thank you for your efforts to protect our nation's species and their habitats. If you have any questions concerning the above information, please contact Bryon Holt at (509) 893-8014 or via email at Bryon_Holt@fws.gov.

Sincerely,

Bryon Holt

for Ben Conard
Field Supervisor

Williams, Ashley

From: Tom Duebendorfer <tduebe@gmail.com>
Sent: Wednesday, February 06, 2013 11:12 AM
To: Williams, Ashley
Subject: Re: Hayden Area Regional Sewer Board (HARSB) Wastewater Treatment Plant Upgrades
Attachments: PastedGraphic-1.pdf; PastedGraphic-2.pdf; PastedGraphic-3.pdf

Ashley:

With any disturbance on-site, I doubt that the species would be present. I don't think your project area has Palouse grasslands as normally defined.....

The following information (probably more than you need) is from the Draft Recovery Plan for Silene Spaldingii (October 2005).

The specific vegetation associations for *Silene spaldingii* (Spalding's catchfly) include **dry Palouse grasslands dominated by bluebunch wheatgrass (*Agropyron spicatum*) and Idaho fescue (*Festuca idahoensis*)** (USFWS, 2002) and open mesic (moist) grassland communities. The plant is found at elevations ranging from 420 to 1,555 meters (1,380 to 5,100 feet), usually in deep, productive loess soils (fine, windblown soils). Plants are generally found in swales or on north or east facing slopes where soil moisture is relatively higher. It is found around 3,000 feet in elevation in northeast Oregon, adjacent southeast Washington, adjacent northern Idaho, and a few scattered localities in northwest Montana.

Silene spaldingii is an herbaceous perennial, a plant that withers to the ground every fall and emerges again in spring. Plants range from 20 to 61 centimeters (8 to 24 inches) in height, occasionally up to 76 centimeters (30 inches). There is generally one light-green stem per plant, but sometimes there may be multiple stems. Each stem bears four to seven pairs of leaves that are 5 to 8 centimeters (2 to 3 inches) in length, and has swollen nodes where the leaves are attached to the stem. All green portions of the plant (leaves, stems, calyx [defined below]) are covered in dense sticky hairs that frequently trap dust and insects, hence the common name "catchfly." The plant has a persistent root crown atop a long taproot (1 meter [3 feet] or longer in length). The long taproot makes transplanting the species difficult at best, and perhaps impossible. Typically *S. spaldingii* blooms from mid-July through August, but it can bloom into September.

The distribution and habitat of *Silene spaldingii* are primarily restricted to mesic slopes, flats or depressions in grassland or steppe vegetation dominated by native perennial grasses such as *Festuca idahoensis* (Idaho fescue) or *Festuca scabrella* (rough fescue). Within its range, *S. spaldingii* occurs within five physiographic (physical geographic) regions: the Palouse Grasslands in west-central Idaho and southeastern Washington; the Channeled Scablands in eastern Washington; the Blue Mountain Basins in northeastern Oregon; the Canyon Grasslands of the Snake River and its tributaries in Washington and Idaho; and the Intermontane Valleys of northwestern Montana. The Palouse Grasslands, a subset of the Pacific Northwest bunchgrass habitat type (Tisdale 1986), are believed to have been at the center of *S. spaldingii's* historical range.

Idaho fescue/snowbery-open grassland/ponderosa pine mosaic, north face slope preference. Identifiable (blooms mid-July - September). Along with the native wheatgrass and Idaho fescue, common associated species include:

Adult plants emerge in spring, usually May, as either a stemmed plant, a rosette, or occasionally as a plant with both rosette(s) and stem(s) (Hill and Weddell 2003). Stemmed plants may remain vegetative or may become reproductive in July or August. Plants senesce or wither in fall (September or October), reappearing the next spring (Hill and Gray 2004a).

Silene spaldingii is generally found in deep loamy soils (fertile soils comprised of organic material, clay, sand, and silt) and in more mesic, moist sites such as northern slopes, swales, or other small landscape features (Hill and Gray 2004a). These mesic sites are highly productive, with total plant cover and forage dry weight sometimes three times greater than drier, more shallowly soiled bluebunch wheatgrass (Agropyron spicatum = Pseudoroegneria spicata) communities (Johnson and Simon 1987). Soils in the tri-state (Idaho, Oregon and Washington) area are loess (wind-dispersed) and ash (from volcanic eruptions) influenced (Tisdale 1986a; Johnson and Simon 1987), while soils in Montana are more glacially influenced (Schassberger 1988)

Silene spaldingii exhibits prolonged or summer dormancy; that is, plants can remain below the ground, without leaves, for up to 3 years when conditions are unfavorable (Lesica and Steele 1994; Lesica 1997). These unfavorable conditions are thought to be correlated with drought, although this is unclear. A preliminary analysis suggests prolonged dormancy tends to be higher in summers preceded by a wet summer and dry fall (P. Lesica, *in litt.* 2003). This prolonged dormancy can make population estimates and monitoring difficult. In one demography study, dormancy varied from a yearly low of 11 percent of individuals dormant to a high of 74 percent (Lesica 1997). Long-term monitoring is necessary to accurately assess population trends of *S. spaldingii.* Due to this ability to go dormant, population estimates of *S. spaldingii,* if based on visible plants, will always be lower than the actual population size (P. Lesica, *in litt.* 2003)
Geum triflorum, Geranium viscosissimum, Rosa woodsii, Lithospermum ruderale, Achillea millefolium, Potentilla gracilis

Silene spaldingii is reported to be primarily associated with relict flood channels within the Channeled Scablands (see Figure 4). More specifically, ***S. spaldingii* is generally found on northern facing slopes below talus or rock outcroppings, gentle northern slopes just above valley floors, or on the northern sides of biscuits (B. Benner, *in litt.* 1993).**

Silene spaldingii within the Palouse Grasslands is restricted to small fragmented populations ("eyebrows," field corners, cemeteries, rocky areas, and steptoes) on private lands, and in larger remnant habitats such as research lands owned by Washington State University. Elevations occupied by *S. spaldingii* within the Palouse Grasslands range from 700 to 1,340 meters (2,300 to 4,400 feet). Of all the places where *S. spaldingii* resides, the Palouse Grasslands are the most threatened, and care is needed to maintain occupied sites and representative genetic material from these sites.

Most populations of *Silene spaldingii* are restricted to small, remnant patches of native habitat (Gamon 1991; Lichthardt 1997; Idaho Conservation Data Center 2003; Montana Natural Heritage Program 2003; Oregon Natural Heritage Program 2003; Washington Natural Heritage Program 2003; Hill and Gray 2004a).

Hope this helps - actual surveys would have to be done in bluing period (summer/fall).

Tom Duebendorfer, PWS
PO Box 167
Elmira, ID 83865
(208) 290-5992
tduebe@gmail.com

On Feb 5, 2013, at 4:37 PM, Williams, Ashley wrote:

Tom,

We recently drafted an environmental document for the Hayden Area Regional Sewer Board (HARSB) treatment plant upgrades. The facility and land application area is located by the Kootenai County Airport (the facility is just south of the airport and the land application area is just north of the airport).

As part of the comments issued by DEQ for the draft document, it was discovered that the Spalding's Catchfly has been known to exist within Kootenai County. DEQ is requesting that we do some follow up work to determine if it might be likely that this species could exist in our project area (specifically at that the land application site). It appears that the locations that this species is found in are moist grasslands, sagebrush-steppe habitats, or pine forests. The concern is that the land application site may have this type of vegetation (or did in the past). To my knowledge, the area does not have these specific habitat types, but I'm wondering if you may have some additional experience with this or know of the area and can "settle" this issue for me.

Let me know if this may require some additional research on your part so that I can discuss this effort with HARSB and their Engineer. Also let me know if you have any questions or concerns.

Thanks!

<image001.jpg>

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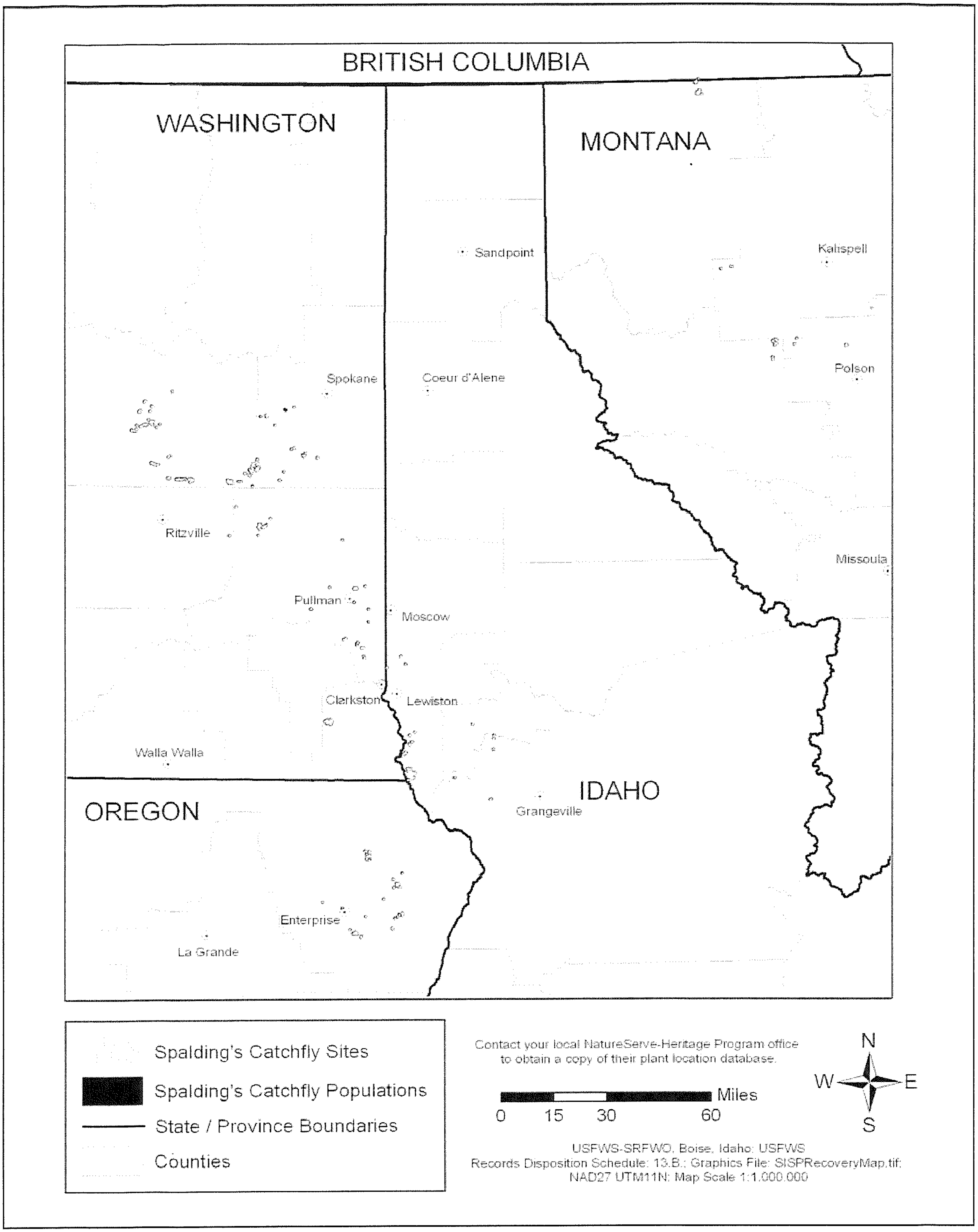
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Lewiston
Walla Walla
IDAHO
OREGON
Grangeville
Enterprise
La Grande
Spalding's Catchfly Sites
Spalding's Catchfly Populations
State / Province Boundaries
Counties
Contact your local NatureServe-Heritage Program office
to obtain a copy of their plant location database.
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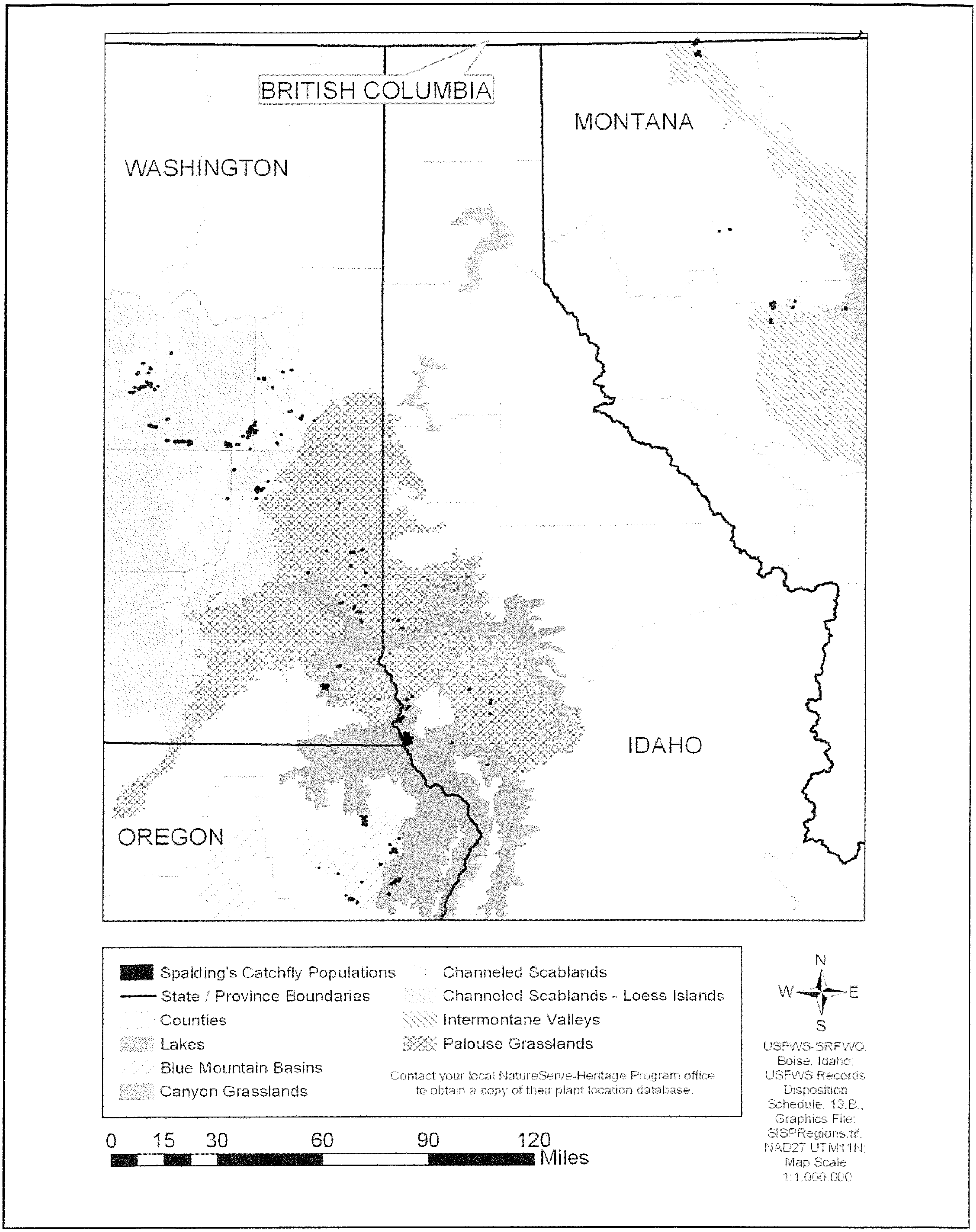

Figure 4. Physiographic regions where *Silene spaldingii* has been found.

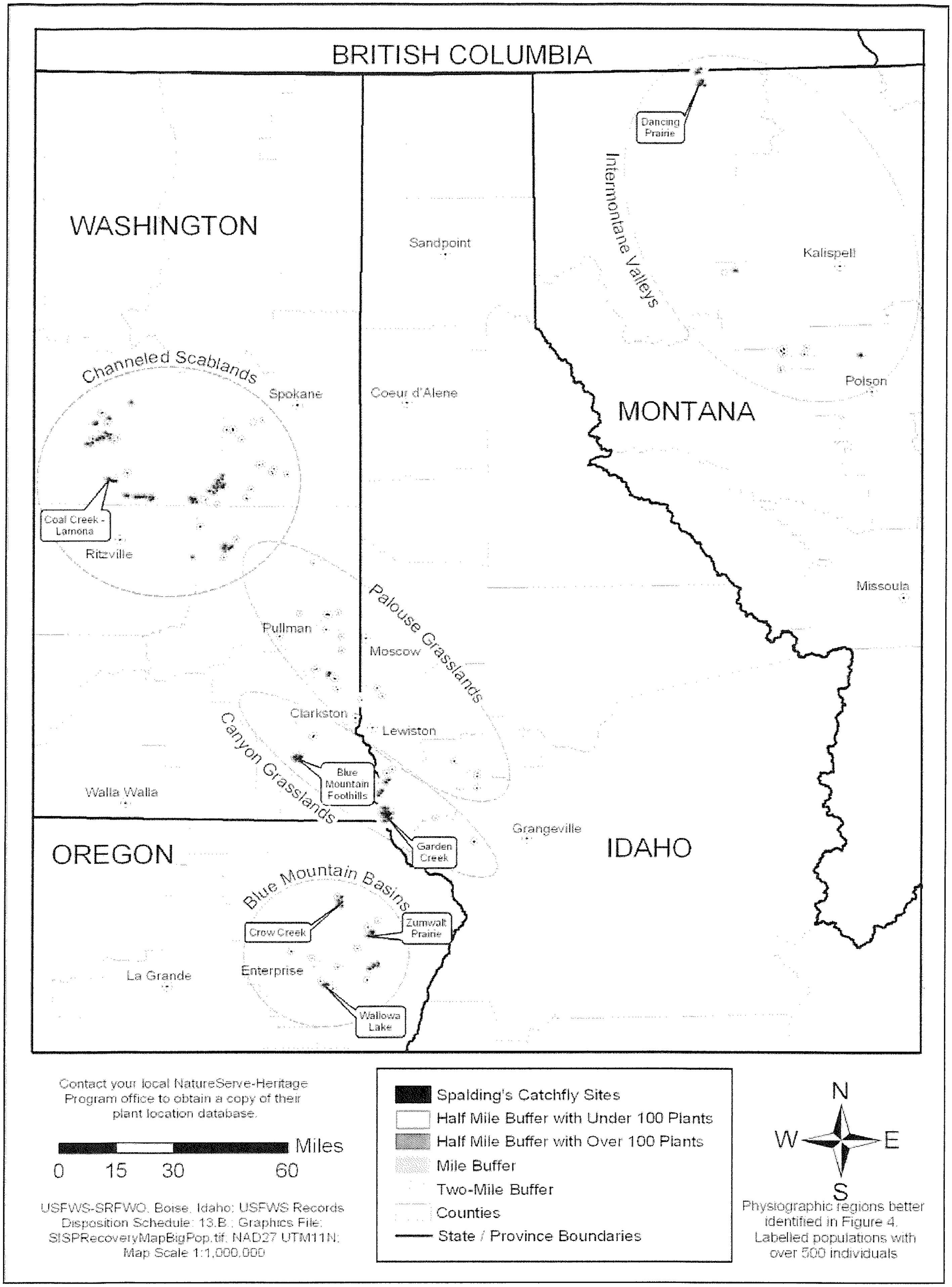

Figure 5. Known populations of *Silene spaldingii*.

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208-664-5946 (fax)

350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Katy Baker-Casile
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Katy Baker-Casile:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[3] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

- H-1 Lift Station to WWTP: 15-inch force main pipeline replacement.
- Preliminary Treatment: Add flow equalization to plant influent to decrease impacts of peak flows on downstream unit processes. Relocate and expand headworks with flow equalization.
- Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier, and converting the secondary treatment system to full biological nutrient

[3] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

- Effluent Filtration: Provide tertiary (third level) coagulation and filtration to meet more stringent river discharge effluent requirements for total phosphorus and oxygen-demanding particulates. This will also provide wider applicability of recycled water.
- Disinfection System: Relocate disinfection and convert to ultraviolet disinfection system for safety, operability, and capacity needs.
- Effluent Pump Station and Outfall/Land App Piping: Relocated and improved H3 effluent pump station, increased capacity of river outfall, minor modifications to existing land application reclaimed water pipeline (no expansion).
- Laboratory/SCADA: Improve laboratory and process control systems for increased analytical requirements.
- Solids Handling: Expand and improve solids handling and processing systems to handle increased chemical sludge generation from advanced phosphorous removal systems.
- Reuse: Repair and maintain existing system. Expand recycled water and application system on currently owned property with drip irrigation of hybrid poplars.
- Toxic Substances: Toxics (cadmium, zinc, lead, and refractory organics) are also a concern for this facility. The proposed project improvements will result in a facility which reduces levels of toxics to a limit of technology. Additional efforts to address toxics include a possible TMDL (for metals) to show how HARSB's recycled water meets the water quality standards (at the river discharge point) and actually adds assimilative capacity with the hardness available in the discharge. Other toxics reduction will likely occur through the source reduction efforts associated with the Regional Toxics Task Force in which HARSB currently participates.

Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

2110 Ironwood Parkway, Coeur d'Alene, ID 83814 (208) 769-1422

C. L. "Butch" Otter, Governor
Curt A. Fransen, Director

November 27, 2012

Ashley Williams, EIT
Welch Comer Engineers
350 E Kathleen Ave
Coeur d'Alene, ID 83815
awilliams@welchcomer.com
via: smacdonald@welchcomer.com

Subject: **Hayden Area Regional Sewer Board, Wastewater System Improvement Projects**, Idaho DEQ Comments on Environmental Impacts

Dear Ashley:

In your letter dated November 5, 2012, you requested comments from the Idaho Department of Environmental Quality (DEQ) on the environmental impacts from the proposed wastewater system improvements listed in the letter. The proposed projects are needed to improve the existing wastewater system owned and operated by the Hayden Area Regional Sewer Board (HARSB). The proposed projects are the following:

1. **Upgrade WWTP** - Upgrade of the existing HARSB wastewater treatment plant (WWTP) located on Atlas Rd. near the Coeur d'Alene Airport in the city of Hayden. All work will be done on adjoining land parcels (see map with letter) that are owned by HARSB or the city of Hayden. The main reason that the upgrades are needed is to comply with new NPDES permit limits for the discharge of total phosphorous into the Spokane River.
2. **Recycled Water Farm** - Continue to expand the existing recycled water farm irrigation system, located near Boekel and Huetter Roads in Rathdrum, to allow for irrigation with recycled water of the entire 476 acres. Currently about 300 acres can be irrigated.
3. **Force Main from H-1 Lift Station** – Replace the existing 15-inch force main from H-1 Lift Station through pipe bursting with an 18-inch force main.
4. **New Outfall and Force Main to Recycled Water Farm** – Construct a new 24-inch outfall line from the WWTP to Huetter Road (5,280 feet) then south on Huetter Road to connect into the existing outfall diffuser into the Spokane River (28,800 feet). Construct a parallel 24-inch force main along Huetter Road from south of Wyoming to the Recycled Water Farm (11,510 feet).
5. **Upgrade H-3 Effluent Lift Station** – Relocate H-3 Effluent Lift Station downstream from the new tertiary treatment and new disinfection system. Also upgrade the pumping capacity to 60 feet TDH at a minimum of 5.0 mgd.

DEQ is supportive of these projects which are needed to comply with future NPDES permit limits and provide for growth. The following are the DEQ comments on the proposed wastewater improvements and the potential environmental impacts from the proposed projects related to surface water quality/storm water control and air quality issues:

Wastewater
DEQ has received the reports titled "Wastewater Treatment Facility Plan, Agency Review Draft, Hayden Area Regional Sewer Board, June 2012" prepared by Mike Conn, P.E. and Paul Klatt, P.E. of J-U-B Engineers, and "Technical Memorandum for the city of Hayden, H-1 Lift Station Design Report, April 2012" prepared by Paul Klatt, P.E. and Jon Baune, P.E. of J-U-B Engineers. These reports provide the basis for the proposed improvement projects listed above. DEQ has provided comments on the "Facility Plan" report in an email dated October 16, 2012. The

facility plan, Environmental Information Document, and plans and specifications will need to be approved by DEQ prior to starting construction on any of these improvements.

Surface Water Quality and Storm Water Control
Storm water controls will need to be developed that adequately protect surface waters and ground water from being impacted during and after construction. The local stormwater control authority should be contacted for details on the appropriate collection/treatment/disposal requirements. Control of sedimentation and erosion during construction activities must be achieved by the use of acceptable best management practices (BMPs) and is considered the responsibility of the owner/developer/contractor for the project. The project may require compliance with the Construction General Permit, a program administered by the U.S. Environmental Protection Agency. This requirement is designed to prevent pollution of waters of the U.S. during construction projects. More information on this requirement can be found at:
http://yosemite.epa.gov/R10/WATER.NSF/NPDES+Permits/Region+10+CGP+resources/

Air Quality
Kootenai County is classified as "Attainment" or "Unclassified" for all Criteria Pollutants; however, it is an area of concern for particulate matter and currently includes the "Interim Air Quality Plan" for managing particulate matter emissions in the county. Potential air quality impacts may arise with land clearing, demolition, construction and the subsequent operational phases of the project.

The project plans must incorporate reasonable controls on fugitive dust sources during all phases of the project. All reasonable precautions shall be taken to prevent particulate matter (dust) from becoming airborne, as required in IDAPA 58.01.01.651. A project specific dust control plan that incorporates adequate levels of control measures is encouraged.

The project plan should describe the proper disposal of demolition and construction debris. Open burning of demolition or construction debris is not an allowable form of open burning as defined by IDAPA 58.01.01.600. Demolition and construction debris must be treated in accordance with solid waste regulations.

Depending on the facility's standby (emergency) power installations, the operation is likely exempt from permitting requirements and limited per IDAPA 58.01.01.222.02.**d.** "*Stationary internal combustion engines used exclusively for emergency purposes which are operated less than five hundred (500) hours per year and are fueled by natural gas, propane gas, liquefied petroleum gas, distillate fuel oils, residual fuel oils, and diesel fuel; waste oil, gasoline, or refined gasoline shall not be used.*" Additionally, proposed EPA MACT standards may apply to your standby generator. The web-based tool at: http://www.epa.gov/ttn/atw/rice/output/quiz.html may be able to assist you in determining applicable federal requirements.

If you have any questions about air quality issues, please call Mark Boyle at 769-1422 or email him at mark.boyle@deq.idaho.gov. Thank you for the opportunity to provide input on these projects.

Sincerely,

John Tindall

John C. Tindall, P.E.
John.tindall@deq.idaho.gov

File: HARSB EID TRIM
c: Katy Baker-Casile, P.E., DEQ, Coeur d'Alene katy.baker-casile@deq.idaho.gov
Ester Ceja, DEQ State Office, Boise ester.ceja@deq.idaho.gov
Paul Klatt, P.E., JUB Engineers, Coeur d'Alene pklatt@jub.com
Ken Windram, HARSB Administrator ken@harsb.org

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208-664-5946 (fax)

350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

James Werntz
1435 North Orchard
Boise, ID 83706

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear James Werntz:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

Williams, Ashley

From: Lopez.Maria@epamail.epa.gov
Sent: Friday, December 07, 2012 6:16 AM
To: Williams, Ashley
Cc: Werntz.James@epamail.epa.gov
Subject: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project

Hello Ashley,

Thank-you for the opportunity to comment on the Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project. At this time, we have no comments regarding the proposed project. Please note for future correspondence that our address has changed, it is as follows:

United States Environmental Protection Agency
Idaho Operations Office
950 W. Bannock Street
Suite 900
Boise, ID 83702

Thank-you

Maria Lopez
Environmental Scientist
950 W. Bannock Street
Idaho Operations Office
Boise, ID 83702
(208) 378-5616

www.welchcomer.com

208-664-9382
877-815-5672 (toll free)
208-664-5946 (fax)

350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

WELCH-COMER
ENGINEERS | SURVEYORS

November 5, 2012

NO response received (12/18/12)

Mike Lidgard, Manager, NPDES Unit
1200 6th Avenue, OWW 130
Seattle, WA 98101

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Mike Lidgard, Manager, NPDES Unit:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[5] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

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[5] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

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Sincerely,

Ashley Williams

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Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Sue Eastman, Hydrogeologist
1200 6th Avenue, OWW 136
Seattle, WA 98101

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Sue Eastman, Hydrogeologist:

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Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

Sole Source Aquifer Checklist

1. Location of Project and name of Sole Source Aquifer.

   Hayden area, Idaho (Hayden Area Regional Sewer treatment facility and entities – City of Hayden, Hayden Lake Recreational Water and Sewer District, Kootenai County Airport); Spokane Valley-Rathdrum Prairie Aquifer

2. Project description and federal funding source (e.g., Federal Highway Administration, Housing and Urban Development etc)

   The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

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   - Biological Treatment: Increase biological capacity by improving aeration, adding an additional secondary clarifier, and converting the secondary treatment system to full biological nutrient reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.
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Each entity is funding their share of the project costs individually. Two of the entities' shares will be funded through the Clean Water State Revolving Fund, which is a federally-funded program (through Idaho Dept. of Environmental Quality).

3. Is there any increase of impervious surface? If so, what is the area?

Yes, final areas and extents will be determined during the design phase. Storm water will be handled in accordance with local, state, and federal requirements.

4. Describe how storm water is currently treated on the site?

There is no storm water treatment facility for HARSB (Hayden Area Regional Sewer Board) although each entity has its own method of storm water treatment. For the treatment site: the storm water will be "treated" through grassy infiltrative swales with high volume storms overtopping raised drywell lids within the swales, upon completion of the project. For the entities: the storm water is collected in culverts and ditches, but is not treated through a treatment facility.

5. How will storm water be treated on this site during construction and after the project is complete?

Best Management Practices (BMPs) will be utilized during construction to minimize/eliminate effect of storm water to surface and ground water. The project will not involve treatment of storm water on-site after the project is complete, as this project manages sanitary sewer only.

6. Are there any underground storage tanks present or to be installed? Include details of such tanks.

   No

7. Will there be any liquid or solid waste generated? If so how will it be disposed of?

   There will be no liquid or solid waste generated as part of the project. The treatment system treats liquid and solid waste to a secondary level of treatment and discharges to the Spokane River or to its Reuse farm through permitted discharge facilities. The project will result in upgrading the current facility to a tertiary treatment facility, which will continue to discharge to the River and to the farm.

8. What is the depth of excavation?

   Excavation depth for the facilities will vary from 10 to 35 feet, depending on the facility. Excavation for the sewer lines will also vary from 4 to 10 feet depending on location in the proposed alignment.

9. Are there any wells in the area that may provide direct routes for contaminates to access the aquifer and how close are they to the project?

   Yes, there are wells in the vicinity of the District. There are wells shown within the reuse site, the closest well to the project (sewer lines) is 100 feet. The attached map from the Idaho Department of Water Resources gives approximate locations of other wells in the area. During construction, BMPs will be used to protect the water quality.

10. Are there any hazardous waste sites in the project area....especially if the waste site has an underground plume with monitoring wells that may be disturbed? Include details.

    No

11. Are there any deep pilings that may provide access to the aquifer?

    No

12. Are Best Management Practices planned to address any possible risks or concerns?

    Yes

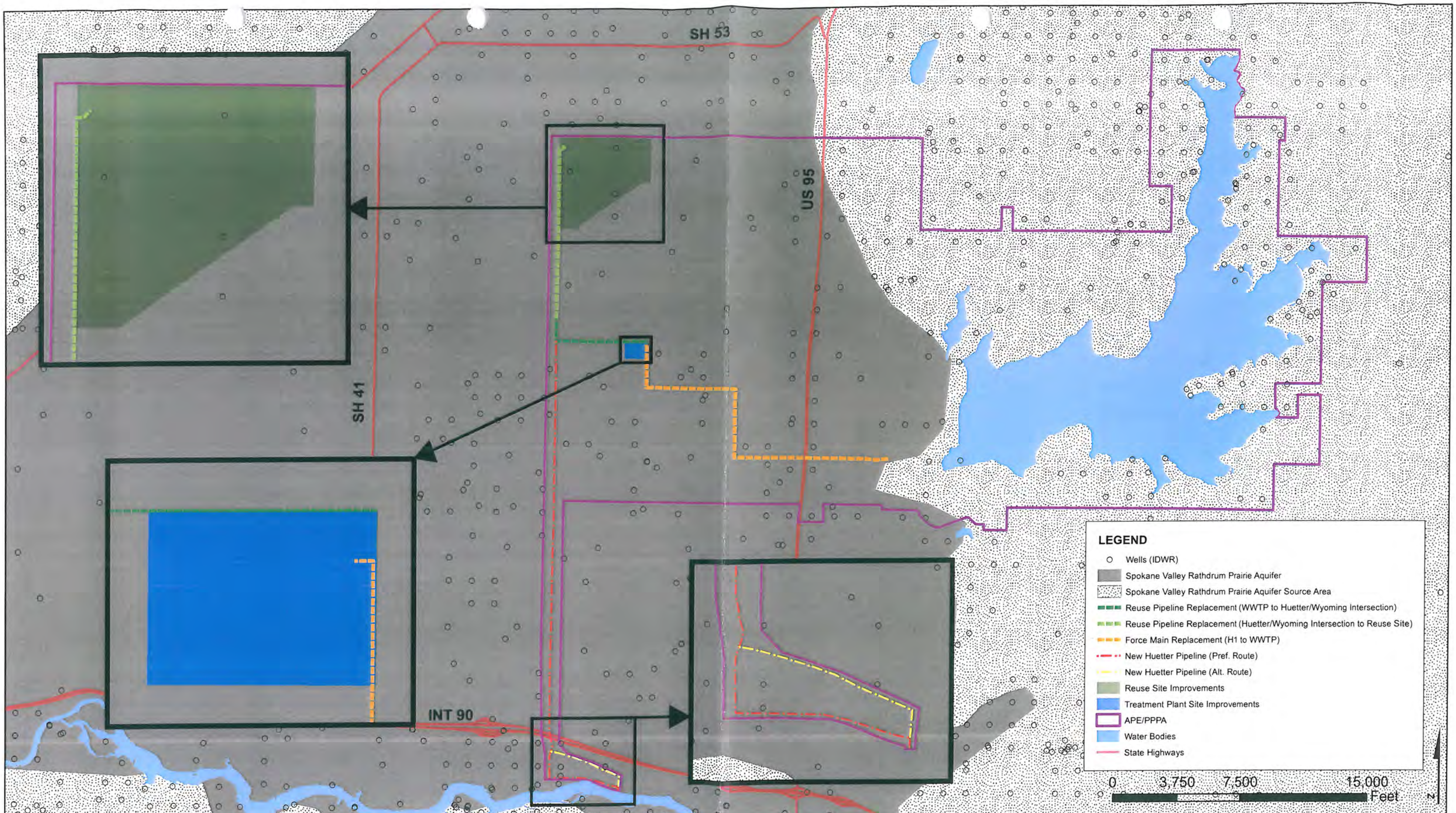
13. Is there any other information that could be helpful in determining if this project may have an affect on the aquifer?

    BMPs will be utilized during the construction phase to protect the quality of the aquifer and surface water bodies (Hayden Lake and Spokane River) nearby.

14. Does this Project include any improvements that may be beneficial to the aquifer, such as improvements to the wastewater treatment plan?

    All of these project elements will be implemented in order for the HARSB to meet more restrictive discharge requirements for their river discharge. Improvements will also improve the reliability and longevity of the existing treatment facilities presently serving the HARSB sewer service area (City of Hayden, HLRWSD, and Kootenai County airport). Meeting the requirements for the river discharge will ensure that the facility is in compliance and is meeting water quality standards for the Spokane River. Reliability and longevity of these facilities will reduce the likelihood of unmonitored, uncontrolled discharges of wastewater into the aquifer or the surface water bodies nearby. The entire purpose of the HARSB facility is to protect the quality of the Sole Source Aquifer and Hayden Lake (by providing a centralized system as opposed to individual septic systems).

The EPA Sole Source Aquifer Program may request additional information if impacts to the aquifer are questionable after this information is submitted for review.



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350 E. Kathleen Ave. (toll free) 877-815-5762
Coeur d'Alene, ID 83815 (fax) 208-664-5946

HARSB

Sole Source Aquifer Map

Sources:
EPA Sole Source Aquifer Program
Idaho Department of Water Resources
Idaho State Tax Commission
Kootenai County GIS Department

PROJECT NO.....................................41104
DRAWN BY..AW
FILENAME..Aquifer_11x17L
DATE..11/05/12

Williams, Ashley

From: Williams, Ashley
Sent: Thursday, December 06, 2012 4:26 PM
To: Eastman.Susan@epamail.epa.gov
Subject: HARSB Wastewater Project
Attachments: S45C-212110513560.pdf

Susan,

I am writing to remind you that the 30 day period for agency consultation is ending on December 5th (Wednesday) for the HARSB wastewater project. I have not heard from you yet and wanted to make sure you didn't have any questions or need any further information from me. **The project is federally funded through EPA (via Idaho DEQ).** For your reference, I have attached the letter that was sent to you last month (the example is addressed to DEQ, but you received an identical letter addressed to you).

Please provide any comments (or "no comment") to us as soon as possible so that we can proceed with the Environmental Information Document development.

Feel free to call or email if you have any questions or comments.

Thanks,

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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Williams, Ashley

From: Eastman.Susan@epamail.epa.gov
Sent: Wednesday, January 02, 2013 10:11 AM
To: Williams, Ashley
Subject: Re: HARSB Wastewater Project

Thank you for submitting your project for review. We have reviewed the information provided and find that the project will not have a significant adverse impact on the Spokane Valley Rathdrum Prairie Sole Source Aquifer and therefore the funding may proceed.

EPA reviews federally financially assisted projects that are proposed in federally designated Sole Source Aquifer review areas to determine if the projects have a potential to contaminate the aquifer through a recharge zone so as to create a significant hazard to public health. Such projects are submitted to EPA by federal, state, and local governments, and by the public.

This correspondence only addresses the Sole Source Aquifer Program, any other federal environmental requirements are your responsibility to ensure compliance. Please retain this email for your records.

Susan Eastman, Environmental Scientist
EPA Region 10
1200 Sixth Ave. Suite 900, OWW-136
Seattle, WA. 98101
SDWA Tribal & CWA Indian Set Aside Program, Sole Source Aquifer Program, Source Water Protection and ID 106

206-553-6249
EASTMAN.SUSAN@EPA.GOV

"Williams, Ashley" ---12/06/2012 04:27:28 PM---Susan, I am writing to remind you that the 30 day period for agency consultation is ending on Decemb

From: "Williams, Ashley" <awilliams@welchcomer.com>
To: Susan Eastman/R10/USEPA/US@EPA,
Date: 12/06/2012 04:27 PM
Subject: HARSB Wastewater Project

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Thanks,

This email and any attachments are intended solely for the use of the individual to whom they are addressed. If you are not the intended recipient, you must not keep, use, disclose, take action, copy or distribute this email. Please notify the sender immediately by e-mail if you have received this e-mail by mistake and delete this e-mail from your system. This email and any attachments are the property of Welch Comer Engineers and may contain information that is copyrighted, or confidential and privileged and must not be distributed without Welch Comer Engineers permission. If this email contains contracts, survey or engineering data, design information, recommendations, plans, specifications or GIS information, these documents should be considered draft documents unless explicitly stated otherwise in the email text.

*********************** ATTACHMENT NOT DELIVERED *******************

This Email message contained an attachment named
image001.jpg
which may be a computer program. This attached computer program could contain a computer virus which could cause harm to EPA's computers, network, and data. The attachment has been deleted.

This was done to limit the distribution of computer viruses introduced into the EPA network. EPA is deleting all computer program attachments sent from the Internet into the agency via Email.

If the message sender is known and the attachment was legitimate, you should contact the sender and request that they rename the file name extension and resend the Email with the renamed attachment. After receiving the revised Email, containing the renamed attachment, you can rename the file extension to its correct name.

For further information, please contact the EPA Call Center at
(866) 411-4EPA (4372). The TDD number is (866) 489-4900.

*********************** ATTACHMENT NOT DELIVERED ***********************

[attachment "S45C-212110513560.pdf" deleted by Susan Eastman/R10/USEPA/US]

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Aubrey Woodcock, District Conservationist
7830 Meadowlark Way, Suite C1
Coeur d'Alene, ID 83815

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Aubrey Woodcock, District Conservationist:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

United States Department of Agriculture

NRCS

Natural Resources Conservation Service
7830 Meadow lark Way, Suite C-1
Coeur d'Alene, Id 83815
Phone: 208-762-4939
Fax: 208-762-9859

RECEIVED NOV 09 2012 By

COPY

November 7, 2012

Ashley M Williams, E.I.T.
Welch-Comer Engineers
350 E Kathleen Ave
Coeur d'Alene, ID 83815

Dear Ashley,

I have recently reviewed the Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project and don't have any concerns, except, will the disturbed areas be reseeded after the mainline is replaced?

Sincerely,

Aubrey Woodcock

Aubrey Woodcock
DISTRICT CONSERVATIONIST

Williams, Ashley

From: Williams, Ashley
Sent: Monday, November 12, 2012 9:04 AM
To: Woodcock, Aubrey - NRCS, Coeur d Alene, ID <Aubrey.Woodcock@id.usda.gov> (Aubrey.Woodcock@id.usda.gov)
Cc: Michael Conn (mconn@jub.com)
Subject: HARSB Project Consultation

Aubrey,

Thank you for replying to my request for consultation on the HARSB wastewater treatment facility improvement project.

In your letter, you asked if the disturbed areas will be reseeded after the mainline is replaced. The areas to be disturbed due to the mainline will be restored to their pre-construction condition; for example, if 1) an area is currently grassy, the area will be reseeded after construction, 2) an area is currently asphalt, the area will be repaved, 3) an area is gravel, the area will be graveled after construction.

Let me know if you have any other questions or concerns.

Thanks!

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Mary McGown, State NFIP Coordinator
322 East Front Street PO Box 83720
Boise, ID 83720-0098

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Mary McGown, State NFIP Coordinator:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[8] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

The proposed project consists of upgrading the existing WWTP by maintaining the current reuse activities up to the capacity of the existing land (with no expansion), and convert to a system targeting year-round discharge to the Spokane River. The existing treatment system would be expanded to biological nutrient reduction, combined with effluent coagulation and filtration to reduce phosphorus, nitrogen, and oxygen-demanding substances. The following are the recommended improvements:

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[8] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

- Effluent Filtration: Provide tertiary (third level) coagulation and filtration to meet more stringent river discharge effluent requirements for total phosphorus and oxygen-demanding particulates. This will also provide wider applicability of recycled water.
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Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

Williams, Ashley

From: McGown, Mary <Mary.McGown@idwr.idaho.gov>
Sent: Tuesday, November 20, 2012 2:56 PM
To: Williams, Ashley
Cc: Justin Seier
Subject: HARSB WWT Facility
Attachments: 16055C0405EHARSB.pdf

Ms. Williams,

Thanks for the information about this project, especially the explanation of the partners. I was wondering how the pieces fit together as we have had a development review for another part of the project.

After looking at the Flood Insurance Rate Maps for the project area, it appears that only the outfall area intersects with any mapped flood hazard area. I am attaching a Firmette of the outfall area. The map shows that Kootenai County is the jurisdiction with land use authority.

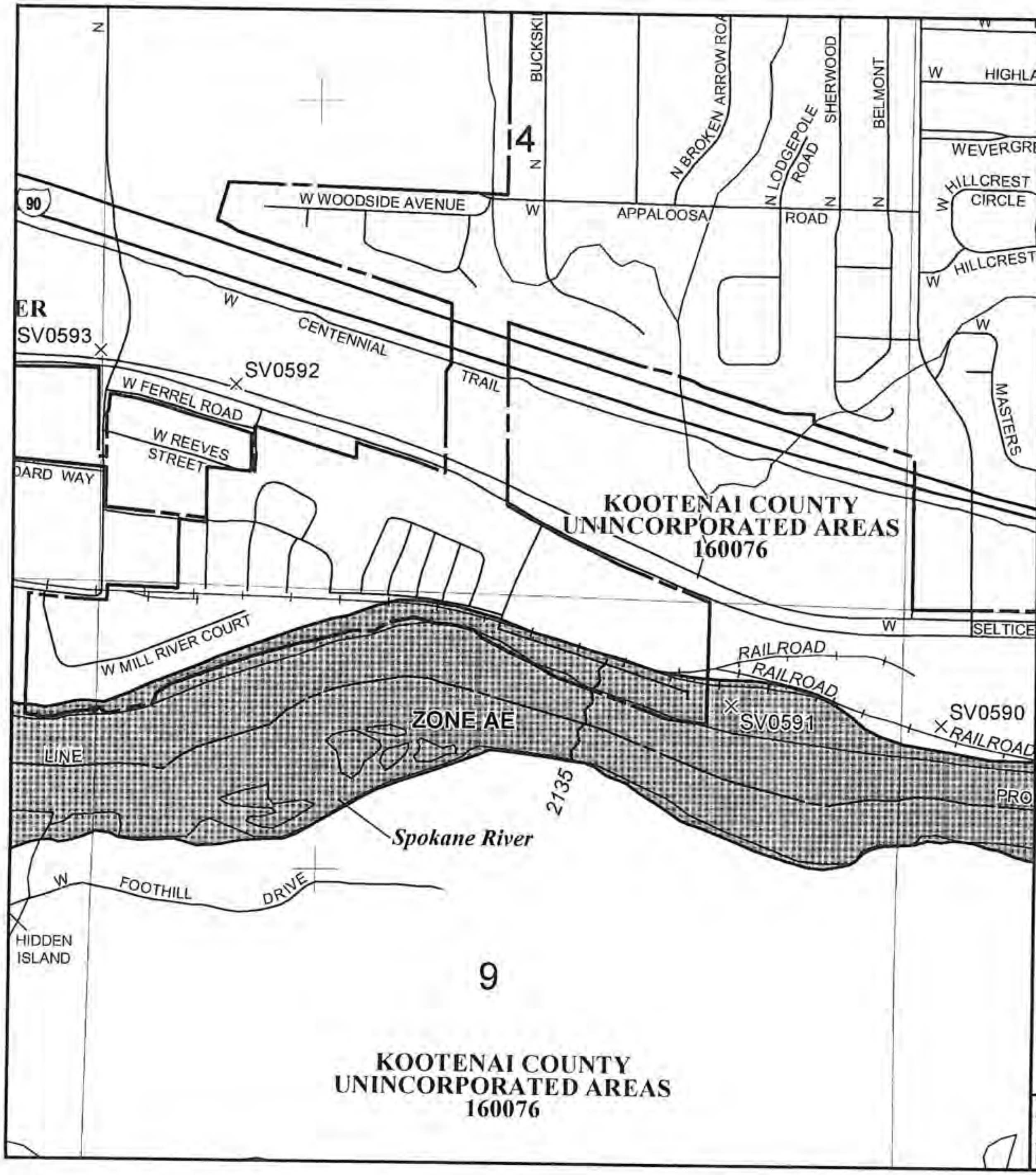
Please work with the Kootenai County floodplain administrator when the project nears construction for a decision on whether construction will occur in the mapped flood hazard area and whether a floodplain development permit is required.

Justin Seier is the Kootenai County floodplain administrator, 446-1083.

Mary G. McGown, Ph.D., CFM
State Floodplain Coordinator
Idaho Department of Water Resources
322 E. Front Street
P.O. Box 83720
Boise, ID 83720-0098
(208) 287-4928

(208) 830-4174 mobile
(208) 287-6700 fax

<<16055C0405EHARSB.pdf>>



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0405E

FIRM

FLOOD INSURANCE RATE MAP

KOOTENAI COUNTY, IDAHO

AND INCORPORATED AREAS

PANEL 405 OF 975

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KOOTENAI COUNTY	160076	0405	E
COEUR DALENE, CITY OF	160078	0405	E
HAYDEN, CITY OF	160170	0405	E
HUETTER, CITY OF	160232	0405	E
POST FALLS, CITY OF	160083	0405	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
16055C0405E

EFFECTIVE DATE
MAY 3, 2010

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Regional Supervisor
2885 Kathleen Avenue
Coeur d'Alene, ID 83815

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Regional Supervisor:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[9] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

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[9] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

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Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

COPY

IDAHO DEPARTMENT OF FISH AND GAME
PANHANDLE REGION
2885 West Kathleen Avenue
Coeur d' Alene, Idaho 83815

C.L. "Butch" Otter/Governor
Virgil Moore/Director

November 13, 2012

RECEIVED
NOV 15 2012
BY

Philip Boyd
Welch, Comer and Associates, Inc.
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

Dear Mr. Boyd:

REFERENCE: HAYDEN AREA REGIONAL SEWER BOARD WASTEWATER TREATMENT FACILITY IMPROVEMENT PROJECT

We have reviewed the information you provided regarding the proposed Hayden Area Wastewater Treatment Facility Improvement project. According to your document, the project is required to meet National Pollutant Discharge Elimination System discharge limits in the Spokane River. It appears from the information provided that all of the improvements fall along road right-of-ways in the project planning area.

Given the brief description and photos provided, IDFG does not anticipate that the proposed project will have significant impacts to fish or wildlife.

Thank you for the opportunity to comment.

Sincerely,

Charles E. Corsi
Regional Supervisor

CEC:MTB

C: Sharon Kiefer, IDFG Boise

File: Welch Comer Hayden Lake wastewater facility improv

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Gary Bahr
P.O. Box 790
Boise, ID 83701

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Gary Bahr:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

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Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

STATE OF IDAHO

RECEIVED
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C. L. "BUTCH" OTTER
GOVERNOR
CELIA R. GOULD
DIRECTOR

November 16, 2012

Ashley Williams, EIT
Welch-Comer
350 E. Kathleen Ave.
Coeur d Alene, Idaho 83815

Dear Ashley Williams:

Thank you for inquiring with the Idaho State Department of Agriculture (ISDA) with regards to your work with the Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project. The public works project being proposed will be an important project for the citizens of that area.

We have reviewed the planning documents provided to us. Your documents appear to be professional and informative. At this time we do not have comments or questions related to this project.

Thank you for contacting our agency. Feel free to contact us in the future (main number - 208-332-8500, my number - 208-332-8597).

Sincerely,

Gary Bahr

Gary Bahr

Water Quality Programs

PC: Water Program File

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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Dale Peck, Environmental Health Director
8500 N. Atlas Road
Hayden, ID 83835

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Dale Peck, Environmental Health Director:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

Williams, Ashley

From: Dick Martindale <DMartindale@phd1.idaho.gov>
Sent: Wednesday, November 07, 2012 12:17 PM
To: Williams, Ashley
Subject: RE: HARSB Treatment Plant Upgrades

Good summary of our conversation, thank you. We have no other comments or concerns.

From: Williams, Ashley [mailto:awilliams@welchcomer.com]
Sent: Wednesday, November 07, 2012 12:03 PM
To: Dick Martindale
Subject: HARSB Treatment Plant Upgrades

Dick,

I just wanted to follow up our phone conversation today with an email. We discussed that proposed project is not intended to discontinue use of the reuse farm (just no expansion). With the proposed improvements, HARSB intends to discharge to the River year-round (in addition to utilizing the reuse area). Based upon this discussion, you indicated that the Panhandle Health District supports the proposed improvements and does not have any concerns (assuming that the reuse farm continues to be utilized).

Let me know if you have any other comments or concerns.

Thanks!

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
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350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Roger Jansson, Operations Chief - North
3780 Industrial Avenue South
Coeur d'Alene, ID 83815

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Roger Jansson, Operations Chief - North:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[12] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

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[12] City of Hayden and HLRWSD will be pursuing IDEQ loan monies for their share of the improvement costs. Kootenai County will be funding their share through non-municipal financing.

reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

- Effluent Filtration: Provide tertiary (third level) coagulation and filtration to meet more stringent river discharge effluent requirements for total phosphorus and oxygen-demanding particulates. This will also provide wider applicability of recycled water.
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Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

Williams, Ashley

From: Jim Brady <jbrady@idl.idaho.gov>
Sent: Monday, November 26, 2012 11:48 AM
To: Williams, Ashley
Subject: RE: Hayden Sewer line

Thanks.

Jim Brady,
Navigable Waters & Minerals Resource Specialist, Sr.
Mica Supervisory Area
3258 W. Industrial Loop
Coeur d'Alene, ID 83815
(208) 769-1577
(208) 769-1597 Fax

From: Williams, Ashley [mailto:awilliams@welchcomer.com]
Sent: Monday, November 26, 2012 10:56 AM
To: Jim Brady
Subject: RE: Hayden Sewer line

Jim,

I believe that there will be no work in the water and that the discharge will not be moved or changed. The line will simply be reconnecting to the discharge prior to its River diffuser.

Let me know if you have any other questions.

Thanks!

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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From: Jim Brady [mailto:jbrady@idl.idaho.gov]
Sent: Monday, November 19, 2012 7:44 AM
To: Williams, Ashley
Subject: Hayden Sewer line

Ashley,

These folks have an easement from us for the discharge in the Spokane River. If there will be any modifications to that discharge or a change in location, they will need to contact us for possible permitting and an easement. Can you tell me if there will be any work in the water? Thanks.

Jim Brady,
Navigable Waters & Minerals Resource Specialist, Sr.
Mica Supervisory Area
3258 W. Industrial Loop
Coeur d'Alene, ID 83815
(208) 769-1577
(208) 769-1597 Fax

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877-815-5672 (toll free)
208-664-5946 (fax)

350 E. Kathleen Ave.
Coeur d'Alene, ID 83815

November 5, 2012

Howard Lunderstadt, Rural Development Specialist
7830 Meadowlark Way, Suite C3
Coeur d'Alene, ID 83815

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Howard Lunderstadt, Rural Development Specialist:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

The project is being funded by an Idaho Department of Environmental Quality (IDEQ) planning grant. Each entity is pursuing individual funding for their share of the project costs, and two of the entities' shares[13] will be funded by an IDEQ wastewater loan (which is comprised of federal funds). This type of funding (grant and loan) requires compliance with the Rules for Administration of Wastewater Treatment Facility Grants, IDAPA 58.01.04. The grant rule carries DEQ State Environmental Review Process requirements which mirror those of the National Environmental Policy Act (NEPA).

The primary reason for the proposed project improvements is to meet the increasingly stringent National Pollutant Discharge Elimination System (NPDES) discharge limits in the Spokane River (to which the treatment facility currently discharges). The NPDES permits are driven primarily by a concern for diminished dissolved oxygen in Lake Spokane about 60 miles downstream during low flow summer months. The new NPDES permit for HARSB will include these limits and it is anticipated that HARSB will have 10 years to fully meet these new requirements. The project improvements are proposed in order to meet these discharge limits and meet the needs of the facility through the next 20 years with some preliminary planning for expansion beyond the next 20 years.

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reduction (BNR) system, including anaerobic and anoxic tanks to reduce nitrogen, phosphorus, and other oxygen-demanding substances.

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Enclosed are maps of the proposed project area that depict the proposed improvements. The Area of Potential Effect and Proposed Project Planning Area (APE/PPPA) includes all three entities' service and growth areas: HLRWSD District boundary, City of Hayden City Limits and Area of City Impact, and the Kootenai County Airport properties. The APE/PPPA also includes the area for the river outfall pipeline (both the preferred and alternate routes). The improvements will only take place in a small area within the APE/PPPA.

We request that you advise us of any comments that you may have regarding this project within ***30 days***, so that HARSB can proceed with the completion of the Environmental Information Document. If you have any questions concerning this proposed project or if you need any further information, please feel free to contact me at Welch, Comer & Associates, Inc. at (208) 664-9382 at your convenience.

Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

awilliams@welchcomer.com

Williams, Ashley

From: Lunderstadt, Howard - RD, Coeur d' Alene, ID <Howard.Lunderstadt@id.usda.gov>
Sent: Friday, December 07, 2012 8:40 AM
To: Williams, Ashley
Subject: RE: Hayden Area Regional Sewer Board Wastewater Project

Ashley,

We have no comments

Howard R. Lunderstadt | Area Specialist (Community Programs)
Rural Development
U.S. Department of Agriculture
7830 Meadowlark Way, Suite C3 | Coeur d'Alene, ID 83815
(208) 762-4939 ext 126 | Fax# (208) 762-9799
www.rurdev.usda.gov

"Committed to the future of rural communities"
"Estamos dedicados al futuro de las comunidades rurales"

From: Williams, Ashley [mailto:awilliams@welchcomer.com]
Sent: Thursday, December 06, 2012 4:25 PM
To: werntz.james@epa.gov; Lidgard.michael@Epamail.epa.gov; Lunderstadt, Howard - RD, Coeur d' Alene, ID; dennis.porter@commerce.idaho.gov
Subject: Hayden Area Regional Sewer Board Wastewater Project

Dear Agency Contacts,

We are writing to remind you that the 30 day period for agency consultation ended on December 5th (Wednesday) for the HARSB wastewater project. I have not heard from you yet and wanted to make sure you didn't have any questions or need any further information from me. For your reference, I have attached the letter that was sent to you last month (the example is addressed to DEQ, but you received an identical letter addressed to you).

Please provide any comments (or "no comment") to us as soon as possible so that we can proceed with the Environmental Information Document development.

Feel free to call or email if you have any questions or comments.

Thanks,

Ashley Williams, E.I.T.
Staff Engineer
WELCH-COMER
208-664-9382
208-664-5946 (fax)
350 E. Kathleen Ave.
Coeur d'Alene, ID 83815
www.welchcomer.com

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Coeur d'Alene, ID 83815

November 5, 2012

No response received (12/10/12)

Dennis Porter, State Program Manager
700 West State Street, PO Box 83720
Boise, ID 83720

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Dennis Porter, State Program Manager:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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Sincerely,

Ashley Williams

Ashley M. Williams, E.I.T.
Staff Engineer

AMW/jlf
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Coeur d'Alene, ID 83815

November 5, 2012

Suzi Pengilly, Deputy SHPO
210 Main Street
Boise, ID 83702

Re: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project – Request for Comments for Preparation of an Environmental Informational Document

Dear Suzi Pengilly, Deputy SHPO:

The Hayden Area Regional Sewer Board (HARSB) is preparing a facility planning document to identify and make necessary improvements to their regional wastewater treatment facility that are cost effective and environmentally sound. The HARSB is comprised of three entities: City of Hayden, Hayden Lake Recreational Water and Sewer District (HLRWSD), and Kootenai County (for their airport facilities). These three entities have entered into an agreement to operate and finance necessary improvements to the treatment facility.

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Sincerely,

Ashley Williams

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Staff Engineer

AMW/jlf
Enclosure: Proposed Improvements Maps

www.history.idaho.gov

Idaho • State Historical Society

C.L. "Butch" Otter
Governor of Idaho

Janet Gallimore
Executive Director

Administration
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2682
Fax: (208) 334-2774

Membership and Fund Development
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 514-2310
Fax: (208) 334-2774

Historical Museum and Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

State Historic Preservation Office and Historic Sites
Archeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Statewide Sites:
- Franklin Historic Site
- Pierce Courthouse
- Rock Creek Station and
- Stricker Homesite

Old Penitentiary
2445 Old Penitentiary Road
Boise, Idaho 83712-8254
Office: (208) 334-2844
Fax: (208) 334-3225

Idaho State Archives
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2620
Fax: (208) 334-2626

North Idaho Office
112 West 4th Street, Suite #7
Moscow, Idaho 83843
Office: (208) 882-1540
Fax: (208) 882-1763

November 14, 2012

Ashley Williams
Welch Comer
350 E. Kathleen Ave.
Coeur d'Alene, Idaho 83815

RE: Hayden Area Regional Sewer Board Wastewater Treatment Facility Improvement Project, Kootenai County, Idaho

Dear Ashley:

Thank you for requesting our views on the proposed improvements to the wastewater treatment facility administered by the Hayden Area Regional Sewer Board in Kootenai County, Idaho. We are primarily concerned about excavation work at the outfall site along the river and expansion of the wastewater treatment plant.

Our records show that the project is located in areas where archaeological sites may exist. We are therefore recommending an archaeological survey the river outfall, treatment plant expansion, and any other areas requiring excavation of previously undisturbed ground. The survey should be conducted when ground visibility is good and a report sent to our office for review. Depending upon the results, we may recommend avoiding sensitive areas, archaeological testing or monitoring, or proceeding with the project as planned.

A list of archaeological consultants can be found on Preservation Idaho's website (www.preservationidaho.org) under Resources.

We appreciate your cooperation. If you have any questions, please feel free to contact me at 208-334-3847, ext. 107.

Sincerely,

Susan Pengilly

Susan Pengilly
Deputy SHPO

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www.history.idaho.gov

Idaho State Historical Society

C.L. "Butch" Otter
Governor of Idaho

Janet Gallimore
Executive Director

Administration
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Fax: (208) 334-2774

Membership and Fund Development
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 514-2310
Fax: (208) 334-2774

Historical Museum and Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

State Historic Preservation Office and Historic Sites Archeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Statewide Sites:
• Franklin Historic Site
• Pierce Courthouse
• Rock Creek Station and
• Stricker Homesite

Old Penitentiary
2445 Old Penitentiary Road
Boise, Idaho 83712-8254
Office: (208) 334-2844
Fax: (208) 334-3225

Idaho State Archives
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2620
Fax: (208) 334-2626

North Idaho Office
112 West 4th Street, Suite #7
Moscow, Idaho 83843
Office: (208) 882-1540
Fax: (208) 882-1763

DATE: January 17, 2013
TO: Ashley Williams, Welch Comer Engineers
FEDERAL AGENCY: EPA
PROJECT NAME: Hayden Area Regional Sewer Wastewater Treatment System Improvement, Kootenai County, Idaho; Archaeological Report by Stephen Emerson and Stan Gough, AHS, Cheney, Washington, dated 9 January 2013

Section 106 Evaluation

X The field work and documentation presented in this report meet the Secretary of the Interior's Standards.

X No additional investigations are recommended. Project can proceed as planned.

Additional information is required to complete the project review. (See comments below.)

Additional investigations are recommended. (See comments below).

Identification of Historic Properties (36 CFR 900.4):

X No historic properties were identified within the project area.

Property is not eligible. Reason:

Property is eligible for listing in the National Register of Historic Places.

Criterion: _ A _ B _ C _ D Context for Evaluation:

X *No historic properties* will be affected within the project area.

Assessment of Adverse Effects (36 CFR 800.5):

Project will have *no adverse effect* on historic properties.

Property will have an *adverse effect* on historic properties. Additional consultation is required.

Comments:
Your archaeological consultant should be notified immediately if archaeological remains are discovered during construction.

Susan Pengilly

Susan Pengilly, Deputy SHPO
State Historic Preservation Office

1/17/2013
Date

Historical Society is an Equal Opportunity Employer.

Williams, Ashley

From: Ester.Ceja@deq.idaho.gov
Sent: Wednesday, February 20, 2013 7:17 AM
To: Williams, Ashley
Subject: FW: HARSB Archeological Survey

Ashley,

Good morning. I was out of the office yesterday. I have not heard from the CDA tribe regarding the survey. Please include this into the EID and update the cultural resources section to reflect no comments from the CDA tribe.

Thank you,
Ester

From: Ester Ceja
Sent: Thursday, February 14, 2013 11:03 AM
To: jwagner@cdatribe-nsn.gov
Subject: HARSB Archeological Survey

Jill,

Good morning! I wanted to follow up on the archeological survey for the Hayden Area Regional Sewer Board's proposed project. I don't know if you've had a chance to review it. Please let me know if you have any questions and or concerns regarding the survey and/or the proposed project.

Thank you,
Ester Ceja

From: Ester Ceja
Sent: Friday, January 11, 2013 3:36 PM
To: jwagner@cdatribe-nsn.gov
Subject: HARSB Archeological Survey

Jill,

Good afternoon. I hope all is well. I was forwarded the archeological survey that was completed for the Hayden Area Regional Sewer Board's proposed project, of which I have attached for your review. Let me know if you have any concerns/comments regarding the survey.

Thank you,

Ester Ceja
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