RECLAMATION

Managing Water in the West

Draft Environmental Assessment

Use Authorization Application from Sorrento Lactalis, Inc.

Purdam Drain and Mason Creek

Canyon County, Idaho

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
Boise, Idaho

June 2016

U.S. Department of the Interior

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

Mission of the Bureau of Reclamation

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
AHPA	Archaeological and Historic Preservation Act
APE	Area of Potential Effect
Application	Application for Transportation and Utility Systems and Facilities on Federal Lands (filed by Sorrento Lactalis, Inc.)
ARPA	Archaeological Resources Protection Act
BOD	Biochemical Oxygen Demand
BPA	Bonneville Power Administration
CAFOs	concentrated animal feeding operations
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
cfu	colony forming units
CMP	corregated metal pipe
COMPASS	Community Planning Association of Southwest Idaho
CWA	Clean Water Act
CWAL	cold water aquatic life
DO	dissolved oxygen
EA	Environmental Assessment
Effluent	wastewater effluent
EJ	Environmental Justice
EO	Executive Order
EPA	Environmental Protection Agency

ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIS	Flood Insurance Study
FONSI	Finding of No Significant Impact
FWCA	Fish and Wildlife Coordination Act
gcm	global circulation modules
gpd	gallons per dam
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Labor
IDWR	Idaho Department of Water Resources
ISDA	Idaho State Department of Agriculture
ITAs	Indian Trust Assets
kg	kilograms
LA	load allocation
Lactalis	Sorrento Lactalis, Inc.
lb	Pound
MCL	maximum contaminant level
mg/L	milligrams per liter
MGD	million gallons per day
NAGPRA	Native American Graves Protection and Reparation Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMID	Nampa and Meridian Irrigation District
NOAA Fisheries	National Oceanic and Atmospheric Administration National Marine Fisheries Service

NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
PID	Pioneer Irrigation District
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
Reclamation	U.S. Bureau of Reclamation
RMJOC	River Management Joint Operating Committee
SCR	secondary contact recreation
SHPO	State Historic Preservation Office
TES	threatened and endangered species
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSS	Total Suspended Solids
USACE	U.S. Army Corps of Engineers
USCB	U.S. Census Bureau
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WLA	wasteload allocation

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Chapter 1 PURPOSE AND NEED

1.1 Introduction

The U.S. Department of the Interior Bureau of Reclamation (Reclamation) has prepared this Draft Environmental Assessment (EA) pursuant to the National Environmental Policy Act of 1969 (NEPA), as implemented by the regulations promulgated by the President's Council on Environmental Quality (CEQ), the Department of Interior's NEPA regulations (43 Code of Federal Regulations [CFR] Part 46), and the Reclamation's NEPA Handbook (Reclamation, 2012) to ensure compliance with NEPA and CEQ regulations. The objective of an environmental analysis under the NEPA is to ensure that the federal decision-making process recognizes natural and cultural resources and considers the potential environmental impacts of proposed federal actions before decisions are made and actions are taken.

This Draft EA analyzes potential impacts associated with an Application for Transportation and Utility Systems and Facilities on Federal Lands (Application) filed by Sorrento Lactalis, Inc. (Lactalis). Lactalis operates an existing cheese processing plant in Canyon County, Idaho that discharges treated wastewater effluent into a drain system that connects to the Boise River (Figure 1-1 and Figure 1-2). The Application requests Reclamation's approval to increase wastewater discharge rates associated with Lactalis' existing National Pollutant Discharge Elimination System (NPDES)-permitted wastewater discharge to the Purdam Drain.

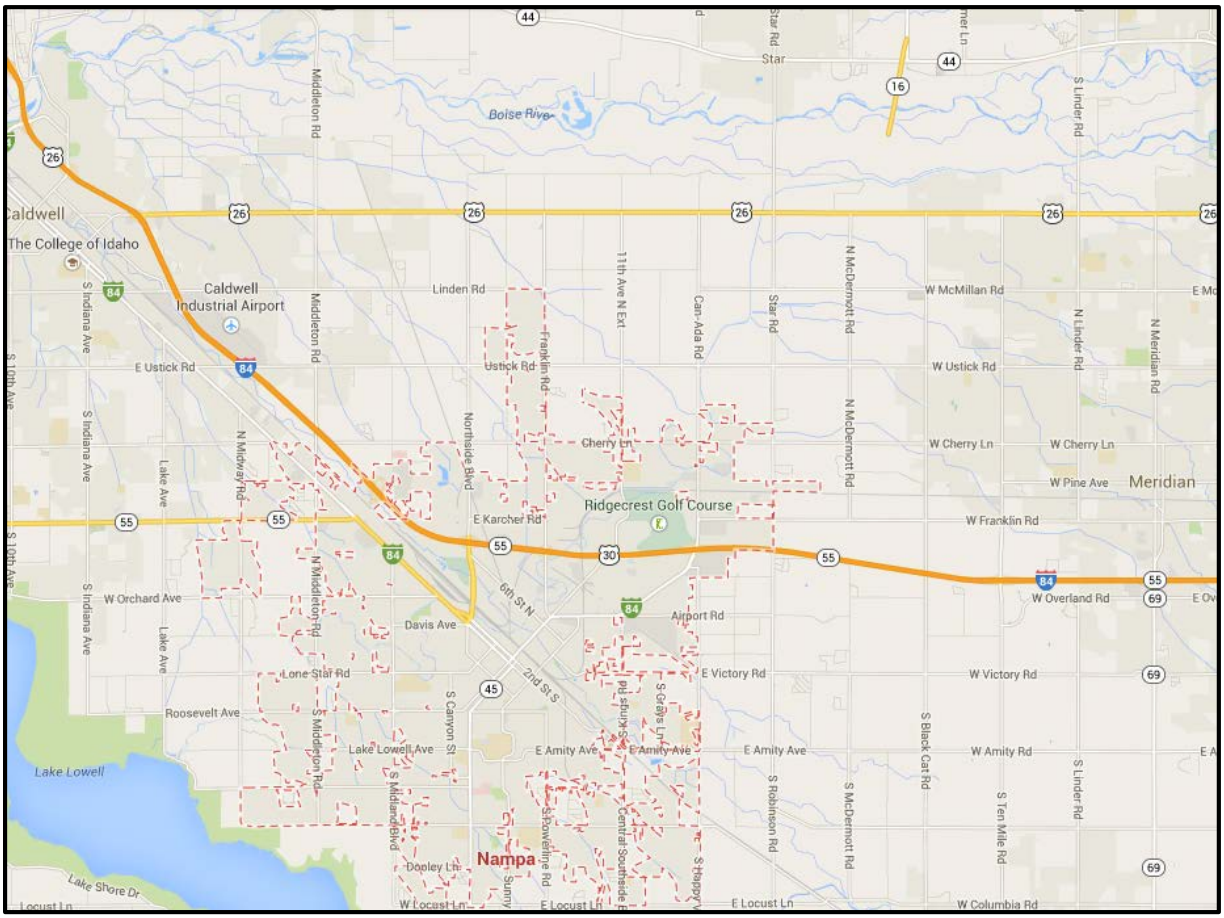

Figure 1-1. Location of Lactalis Cheese Processing Plant and Outfall, Purdam Drain and Mason Creek in Canyon County, Idaho.

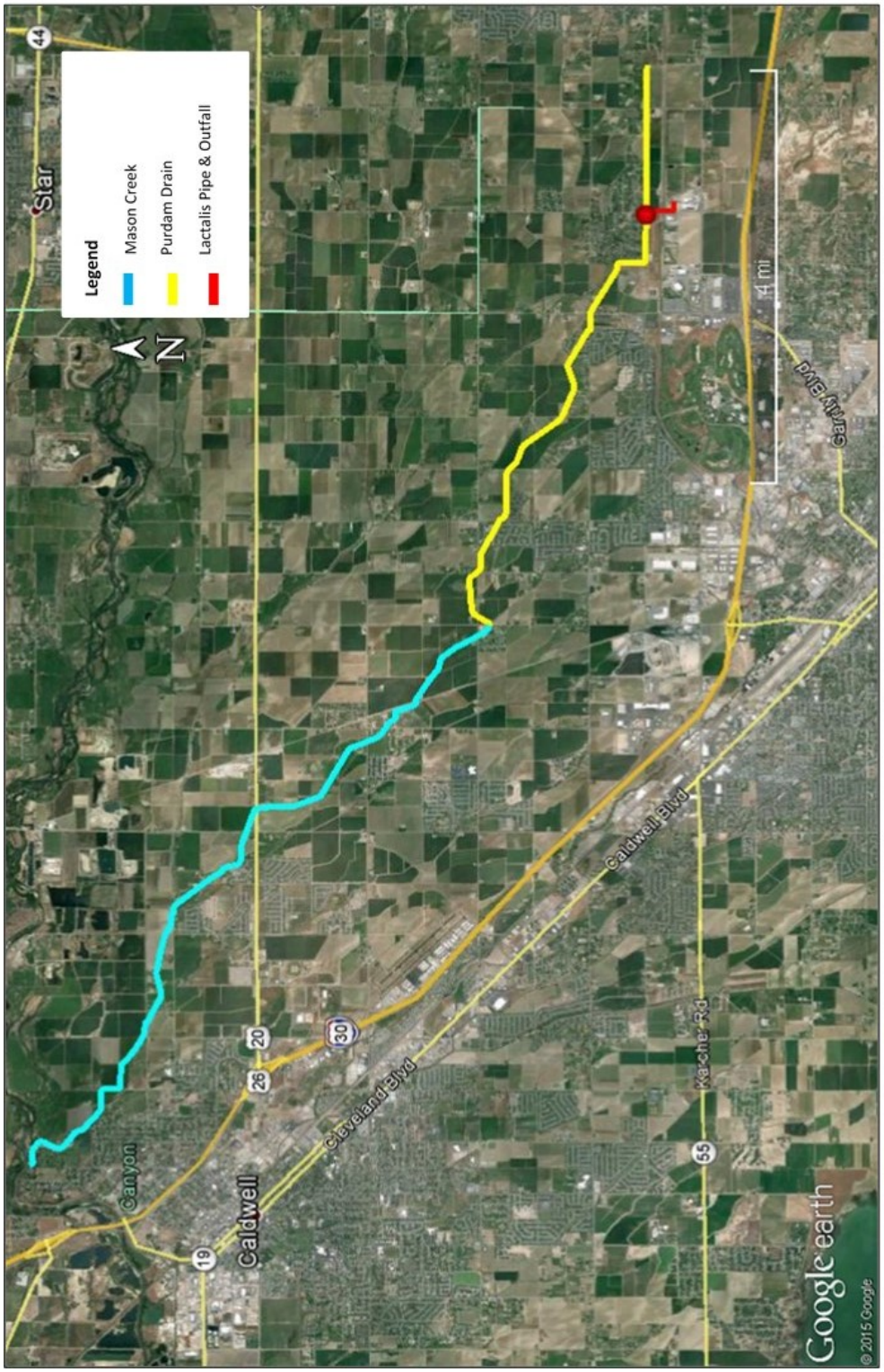

Figure 1-2. The area of the proposed action is from the outfall (red circle) north of the Lactalis Cheese Processing Plant at Purdam Drain northwest to its confluence with the Mason Creek and then the Lower Boise River.

The portion of the Purdam Drain lying westerly of its intersection with the Phyllis Canal in Canyon County, Idaho to its confluence with Mason Creek is a Reclamation facility. Lactalis' wastewater discharge outfall is located upstream of the Phyllis Canal within a portion of the Purdam Drain owned and operated by the Nampa and Meridian Irrigation District (NMID). The Purdam Drain serves lands located both upstream and downstream of Lactalis' facility.

The Application requests approval to increase its discharge into the Purdam Drain from the current average daily discharge rate of approximately 1.2 cubic foot per second (cfs) to a peak instantaneous discharge rate of approximately 4.5 cfs. This additional flow increase of 3.3 cfs would accommodate the anticipated expansion of Lactalis' cheese processing plant. Reclamation considers its review of, and action on, the Application to constitute a federal action subject to change a NEPA review to identify potential environmental consequences associated with this change in water use. In addition to the Reclamation's review of the Application, Lactalis is in the process of obtaining a renewed NPDES permit from the Environmental Protection Agency (EPA).

The Draft EA analyzes the effects of project alternatives. Impacts (direct, indirect, and cumulative environmental effects) of each alternative are evaluated for the following affected resource areas:

- Hydrology (i.e., drain carrying capacity)
- Water Quality
- Land Use and Drainage System
- Biological Resources
- Threatened and Endangered Species (TES)
- Cultural Resources
- Indian Sacred Sites and Indian Trust Assets (ITAs)
- Hazardous Materials and Waste
- Socioeconomics
- Environmental Justice
- Climate Change

Aesthetics and visual resources, aquatic biota, recreation, soils, geology, noise, transportation, and air quality were also evaluated, but are not included in this Draft EA as it was determined that no impacts to these resources would result from the alternatives.

The Draft EA is organized as follows:

- Chapter 1 – Introduction, Background, Purpose and Need for Action, and Regulatory Compliance Considerations

- Chapter 2 –Alternatives including No Action Alternative, Proposed Action, and other Alternative Actions
- Chapter 3 – Affected Environment and Environmental Consequences for Proposed Action and No Action Alternatives
- Chapter 4 – Agency and Tribal Consultations and Coordination and Public Involvement

1.2 Background

1.2.1 Project Location

The site of the Lactalis cheese processing plant is located northeast of the City of Nampa, Idaho as shown previously on Figure 1-1. The site includes the cheese processing plant, wastewater treatment plant, and fields used for land application of treated wastewater on a 140.5-acre site as shown on Figure 1-3. The site is currently surrounded by agricultural land and rural residential developments to the north, east, and south. To its west is the Idaho Center and City of Nampa.

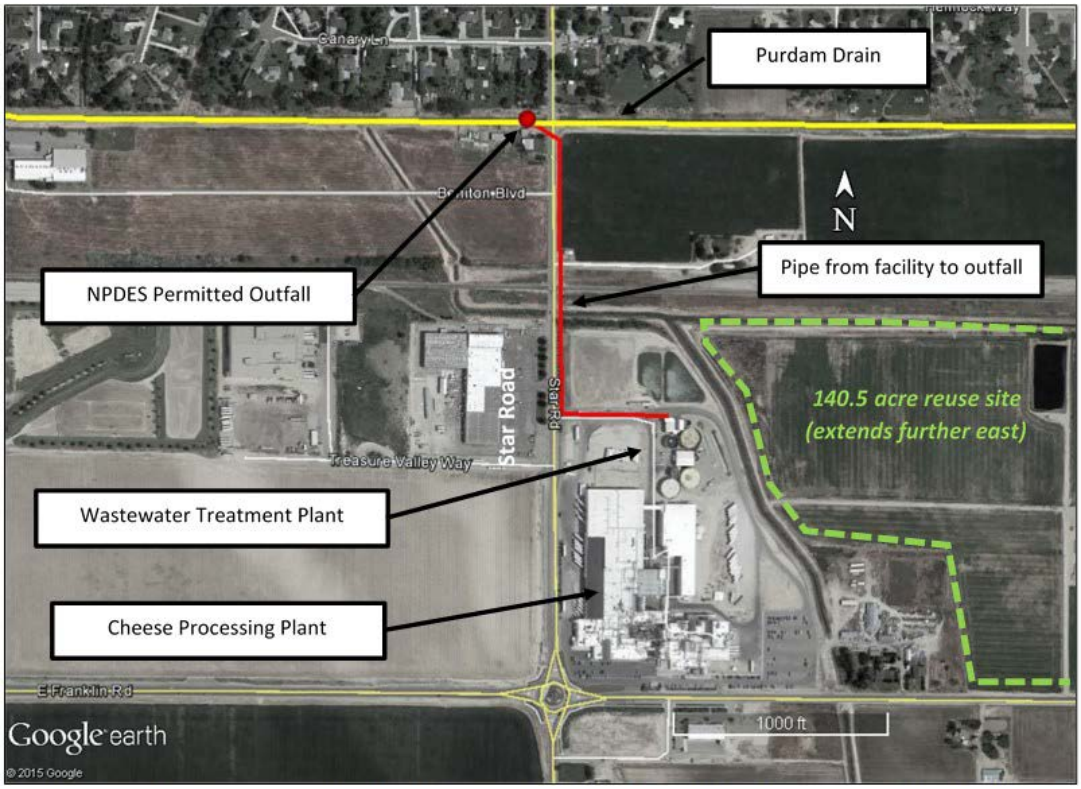

Figure 1-3. Aerial photo of Lactalis Cheese Processing Plant, Wastewater Treatment Plant, pipe, outfall, and Purdam Drain.

1.2.2 Facility History and Operations

In 1999, Sorrento Lactalis purchased a cheese processing plant from the J.R. Simplot Company in Nampa, Idaho. The cheese processing plant as purchased was considerably smaller than the current plant. Lactalis currently processes approximately 4.5 million pounds of milk daily received from local and regional dairies to produce natural cheese, dry whey, and cultured cream cheese. Lactalis may expand production capability processing up to approximately 5.0 million pounds of milk daily in the next 2 to 5 years, and up to 6.5 million pounds daily over the next 10 years.

1.2.3 Facility Wastewater Management

When acquired by Lactalis in 1999, the cheese processing plant discharged process wastewater to a series of open treatment lagoons and land-applied the remaining sludge. These treatment lagoons leached phosphorus to groundwater and produced odors. As a result, Lactalis began trucking its wastewater for offsite disposal. Trucking of wastewater was intended as a temporary solution while a more environmentally sound, permanent solution was developed.

To this end, Lactalis constructed a wastewater treatment plant onsite to treat the process wastewater from the cheese processing plant. This wastewater treatment plant came online in 2005. The wastewater treatment plant process consists of two sequencing batch reactors (i.e., activated sludge), a tertiary clarifier, sand filters, sludge dewatering belt filter, dissolved air flotation, and ultraviolet disinfection.

Lactalis obtained consents and authorizations from the EPA, U.S. Army Corps of Engineers (USACE), Reclamation, Idaho Department of Environmental Quality (IDEQ), NMID, Pioneer Irrigation District (PID), Nampa Highway District, Union Pacific Railroad, and Idaho Department of Water Resources (IDWR) to discharge wastewater effluent (effluent) from the treatment plant to the Purdam Drain. The treatment plant currently discharges treated effluent at an average daily rate of approximately 1.2 cfs and a maximum of 750,000 gallons per day (gpd) to the Purdam Drain pursuant to a license agreement with NMID. Effluent limitations and monitoring requirements are pursuant to a NPDES permit (Permit # ID-002083-7) issued by the EPA on November 1, 2005, and extended administratively on October 27, 2010.

Lactalis also land-applies effluent to a 140.5-acre site east and north of its wastewater treatment plant. Lactalis has an Industrial Wastewater Reuse Permit (Permit # I-091-03) that was issued by the IDEQ on June 19, 2003, and renewed June 19, 2013. Land application occurs during any wastewater treatment plant upsets, episodes of non-compliance with effluent limitations contained in its NPDES permit, or when effluent flows would exceed the current daily discharge limit of 750,000 gpd to the Purdam Drain contained in Lactalis'

agreement with NMID. Additionally, waste sludge is dewatered at the wastewater treatment plant, and then trucked offsite to be composted as a soil amendment.

Sanitary sewer discharges, such as from kitchen and bathroom facilities, do not flow into the wastewater treatment plant. These sanitary sewer discharges are handled onsite by a separate septic system.

Lactalis may increase the volume of treated effluent it discharges to the Purdam Drain over the next 10 years. Under this proposed increase, Lactalis would be authorized to discharge up to a maximum peak instantaneous rate of 4.5 cfs to accommodate variable discharge flows. This increase would coincide with Lactalis' production plans to increase its raw milk intake up to 6.5 million pounds per day. Lactalis would continue to treat its effluent to meet existing and future EPA NPDES permit requirements.

1.2.4 Reclamation Facilities

The Lactalis site is located within the Lower Boise River drainage basin. The basin has extensive irrigation canals and ditches that are fed by the Lower Boise River that crisscross the drainage basin. Excess water not used for irrigation and return flows from irrigation activities drain back into the river. Effluent from the Lactalis wastewater treatment plant enters the Purdam Drain and travels through it and into Mason Creek in route to the Lower Boise River. The portion of Mason Creek flowing northwest from approximately the intersection of 11th Avenue North and Garrity Road in Nampa, Idaho, is a Reclamation facility, while the portion of Mason Creek upstream from that location is within the boundaries of the NMID.

From the Lactalis site, the Purdam Drain continues for approximately 4.8 miles in a northwesterly direction and discharges to Mason Creek. Mason Creek flows northwest and discharges to the Lower Boise River, approximately 7.6 miles west of its confluence with the Purdam Drain. The Lower Boise River is the regulatory designated receiving stream for the Lactalis wastewater treatment plant effluent. The flow regimes for Purdam Drain and Mason Creek generally mimic irrigation seasons. Low flow conditions generally begin in mid-October when the irrigation season ends. The low flow periods extend through the winter until the irrigation season typically begins again in mid-April. Flows in these segments of the Purdam Drain and Mason Creek are highest during the irrigation season and significantly lower during the remainder of the year.

Lactalis currently discharges into a section of the Purdam Drain that is owned and operated by the NMID. Approximately 1,000 yards west of the Lactalis outfall the Purdam Drain enters the boundary of the PID. The Purdam Drain from the PID boundary downstream to Mason Creek is owned by Reclamation, and operated and maintained by PID pursuant to a contract with Reclamation.

1.3 Purpose and Need for Action

Reclamation's purpose is to respond to Lactalis' Application requesting water uses change within Reclamation drainage facilities. The Application requests Reclamation authorization to increase Lactalis' discharge of treated effluent to the Purdam Drain in Canyon County, Idaho, from its current daily rate of approximately 1.2 cfs to a future peak instantaneous rate of 4.5 cfs to accommodate anticipated expansion of Lactalis' Nampa cheese processing plant and related increases in wastewater treatment and disposal.

The project need is to increase discharge to a future peak instantaneous rate of 4.5 cfs safely through existing Reclamation drainage facilities. The increased discharge should not have no effect on the current ability of existing drainage facilities to convey a 100-year flood event and not cause harm to the existing facilities and the surrounding environment.

This Draft EA evaluates the current capacity of the Purdam Drain and Mason Creek to carry drainage and flood waters using Reclamation-approved methodologies. The Draft EA proposes to identify any existing or future constraints to acceptance of the proposed increase of treated effluent during a 100-year flood event.

1.4 Regulatory Compliance

Reclamation has the responsibility to ensure an action is in compliance with applicable regulations and other related environmental laws. The following section is an overview of these regulations and references the Draft EA chapter in which a compliance determination is made.

1.4.1 National Environmental Policy Act

The National Environmental Policy Act of 1969 (NEPA) requires that the action agency determine whether or not there are any environmental impacts associated with proposed federal actions. If there are no significant environmental impacts, a Finding of No Significant Impact (FONSI) can be signed to complete the NEPA compliance.

1.4.2 Endangered Species Act

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request a list of species from the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration Marine Fisheries Service (NOAA Fisheries) that identifies

threatened and endangered species within or near the action area. The agency then must evaluate impacts to those species. If the action may impact any listed species, the agency must consult with USFWS or NOAA Fisheries. Chapter 3.5 presents analysis of and conclusions regarding the potential for impact to listed species.

1.4.3 National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA) requires that, prior to authorizing an undertaking, Federal agencies must take into account the effect of the undertaking on any properties eligible for or listed on the National Register of Historic Places. The 36 CFR 800 regulations provide procedures that federal agencies must follow to comply with the NHPA. For any undertaking, federal agencies must determine if there are properties of National Register quality in the project area, the effects of the project on those properties, and the appropriate mitigation for adverse effects. In making these determinations, federal agencies are required to consult with the State Historic Preservation Office (SHPO), Native American Tribes with a traditional or culturally significant religious interest in the study area, the interested public, and the Advisory Council on Historic Preservation (ACHP) (in certain cases). Chapter 3.6 presents analysis and conclusions relevant to NHPA requirements.

1.4.4 Executive Order 13007: Indian Sacred Sites

Executive Order (EO) 13007, dated May 24, 1996, instructs federal agencies to promote accommodation of, access to, and protection of the physical integrity of American Indian sacred sites. A “sacred site” is a specific, discrete, narrowly delineated location on Federal land. An Indian Tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. However, this is provided that the tribe or authoritative representative has informed the agency of the existence of such a site. Analysis related to this requirement is presented in Chapter 3.7 and Chapter 4.

1.4.5 Executive Order 13175: Consultation and Coordination with Tribal Governments

EO 13175 instructs federal agencies to consult, to the greatest extent practicable and to the extent permitted by law, with Tribal governments prior to taking actions that affect federally-recognized tribes. Each agency shall assess the impact of federal government plans, projects, programs, and activities on tribal trust resources and assure that government rights and concerns are considered during the development of such plans, projects, programs, and activities. Analysis related to this requirement is presented in Chapter 3.7 and Chapter 4.

1.4.6 Secretarial Order 3175: Department Responsibilities for Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States (with the Secretary of the Interior acting as trustee) for Indian Tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. In many cases, ITAs are on-reservation; however, they are also found off-reservation. The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and EOs. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control. Details on potential impacts are described in Chapter 3.7 and Chapter 4.

1.4.7 Executive Order 12898: Environmental Justice

EO 12898, dated February 11, 1994, instructs federal agencies, to the greatest extent practicable and permitted by law, make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs. Analysis related to this requirement is presented in Chapter 3.10.

1.4.8 Executive Order 11988: Floodplain Development

EO 11988, dated May 24, 1977, instructs federal agencies prior to taking an action to the greatest extent practicable, to determine whether the proposed action will occur in a floodplain and if so, consider alternatives to avoid adverse effects. If the only feasible alternatives occur within a floodplain, the agency shall take action to design or modify its action in order to minimize potential harm to or within the floodplain consistent with regulations accompanying this Executive Order. Details on potential hydrologic impacts are described in Chapter 3.1.

1.4.9 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) provides for equal consideration of wildlife conservation in coordination with other features of water resource development programs.

The FWCA requires that any plans to impound, divert, control, or modify any stream or other body of water must be coordinated with the USFWS and State wildlife agency through consultation directed toward prevention of fish and wildlife losses and development or enhancement of these resources. Details regarding this coordination effort are found in Chapter 3.5.

1.4.10 Clean Water Act (33 U.S.C. 1251 et seq.)

Section 402 of the Clean Water Act (CWA) authorizes the NPDES permit program. All of the proposed alternatives would be permitted by the EPA NPDES permit program. Any necessary facility upgrades must be designed and operated in accordance with the NPDES permit requirements. NPDES requirements are designed to mitigate potential direct, indirect and/or cumulative effects on the environment. Details on potential impacts to water quality are described in Chapters 3.1 and 3.2.

1.4.11 Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.)

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) calls for direct action to stop or reverse the continued loss of fish habitats. As fish are not known to exist at the Purdam Drain outfall location, the total maximum daily load (TMDL) established for the Lower Boise River was considered when the EPA established discharge limits for the Lactalis NPDES permit to mitigate potential adverse environmental impacts on essential fish habitat that may be downstream from the discharge point.

1.4.12 Warren Act Contracts

Warren Act contracts are generally agreements entered into to allow the storage or conveyance of non-project water in Reclamation facilities. These contracts are entered into at times when Reclamation has excess conveyance or storage capacity in its facilities. Reclamation determines the direct and indirect impacts of entering into a Warren Act contract and then completes the appropriate level of NEPA compliance. As the existing discharge is already covered by a NPDES permit issued to Lactalis by EPA under the CWA, this Draft EA was not prepared under the Warren Act.

1.5 Decision to be Made

Reclamation's decision to be made pertaining to the Application submitted by Lactalis includes the following options:

1. Approve the Application with no modifications;
2. Approve the Application with commitments required to reduce the magnitude and extent of potential impacts resulting from the proposed activities to insignificant levels and meet relevant environmental protection objectives; or
3. Deny the Application.

Chapter 2 ALTERNATIVES

2.1 Introduction

This chapter describes the alternatives in this Draft EA: Alternative A – No Action and Alternative B – Proposed Action (Increased Discharge). As required by NEPA, the No Action Alternative (i.e., the future without the Proposed Action) forms the basis for analyzing the effects of the Proposed Action. Lactalis would fund any necessary facility upgrades resulting from any proposed alternative. Reclamation's decision will not involve expenditure of public funds on a local, state, or federal level.

Other alternatives to manage the increased wastewater flow were considered, but eliminated from detailed consideration for various reasons. These alternatives included:

- Discharging effluent directly to the Boise River;
- Sending effluent to the City of Nampa's Publicly Owned Treatment Works;
- Trucking treated or untreated effluent off-site;
- Increasing land application volumes and/or rates;
- Using evaporation ponds; and
- Implementing an aquifer storage and recovery program.

2.2 Alternative A – No Action

The No Action Alternative would allow Lactalis to continue existing operations of the wastewater treatment plant with no increase in discharge rates to the Purdam Drain. The wastewater treatment plant treats only process water from the cheese processing plant. After treatment, the wastewater effluent is gravity piped north and discharged to the Purdam Drain. As discussed in Chapter 1, the Purdam Drain is a tributary to Mason Creek, which discharges into the Lower Boise River.

Under the No Action Alternative, the average daily discharge rate to the Purdam drain would remain 1.2 cfs. The Lactalis wastewater treatment plant process would continue to treat effluent to meet constituent concentrations specified in Lactalis' NPDES permit. Lactalis' NPDES permit (Permit #ID-002803-7) was issued by the EPA on September 14, 2005,

became effective November 1, 2005, and was extended administratively on October 27, 2010.

Under its Industrial Wastewater Reuse Permit issued to Lactalis by IDEQ, Lactalis would continue to apply its effluent to its 104.5-acre reuse site (see Figure 1-3) during any wastewater treatment plant upset, episodes of non-compliance with effluent limitations contained in its NPDES permit requirements, or when flows exceed the current discharge limit of 750,000 gpd to the Purdam Drain contained in Lactalis' agreement with NMID. Sanitary sewer discharges would continue to be treated on-site by a separate septic system.

2.3 Alternative B – Proposed Action

The Proposed Action consists of authorizing an increase in the amount of treated wastewater effluent Lactalis may discharge to the Purdam Drain to a peak instantaneous flow of 4.5 cfs and subject to any average daily limits as may be contained in Lactalis' NPDES permit.

Under the Proposed Action, Lactalis would continue to discharge treated effluent to the Purdam Drain except at a higher instantaneous flow limit. The plant would continue to adhere to its EPA NPDES permit requirements. Lactalis applied to EPA in April 2010 to renew its NPDES permit. Permit renewal is anticipated in summer 2016. To meet anticipated updated NPDES limits for constituents such as ammonia, pH, and total suspended solids (TSS), alterations to existing wastewater treatment equipment, or installation of new equipment would be implemented as necessary. Under the authority of its IDEQ Reuse Permit, Lactalis would continue to apply effluent to its 140.5-acre site.

2.4 Alternatives Considered but Eliminated from Further Study

NEPA requires Reclamation to consider alternatives developed through public scoping. However, only those alternatives that are considered reasonable and meet the purpose and need of the Proposed Action must be analyzed. The following alternatives were identified during the scoping process, but were not considered as viable or reasonable alternatives due to anticipated adverse community effects, increased localized emissions, increased pollutant load, or other environmental or social considerations when compared with the No Action and Proposed Action Alternatives. The alternatives considered but eliminated from further study, as well as a brief evaluation and analysis of their related environmental impacts, are described below.

2.4.1 Discharging Effluent Directly to Boise River

This alternative would involve construction and operation of a new 12-inch forcemain pipeline along Star Road to convey any increased effluent discharge to the Lower Boise River directly from the Lactalis wastewater treatment plant as shown on Figure 2-1. The pipeline would run 5 miles under or adjacent to Star Road, which is the shortest route between the wastewater treatment plant and the Lower Boise River. A pump station sized to handle Lactalis' increased flow rate would be necessary due to the generally flat topography between the wastewater treatment plant and the river. The pipeline would traverse Canyon County and Ada County, cross multiple properties of diverse ownership, and cross under the Union Pacific Railroad, an irrigation canal (Phyllis Canal), and 14 irrigation drains. A new outfall would need to be constructed on the southern bank of the river.

The anticipated negative impacts of this alternative are: 1) the beneficial assimilative impact of additional discharge of generally higher quality water in the Purdam Drain and downstream, would not occur if the effluent were disposed of directly to the Lower Boise River by constructing a separate pipeline; 2) piping all of Lactalis' effluent to the river would decrease infiltration of the effluent which provides localized groundwater recharge into the Treasure Valley aquifer system in the Lower Boise River subbasin; 3) short and long-term surface disturbance and environmental impacts associated with pipeline construction would be greater than using existing infrastructure to convey the additional effluent; 4) impacts to residents, businesses, and traffic flow during construction and periods of subsequent facility maintenance, repair, and replacement; and 5) operation and maintenance of a pump necessary to convey the effluent across the flat topography would be required as long as the plant operates, resulting in continued operation, maintenance, and power.

Figure 2-1. Figure showing alternative not considered of discharging effluent directly to Boise River.

This alternative would involve multiple environmental review and permitting steps that are complex and expected to take multiple years to implement. Anticipated permits include an additional NEPA evaluation; a further modified NPDES permit authorizing a new point of discharge; Idaho DEQ 401 water quality certification; USFWS consultation on endangered species; an USACE 404 permit for discharge of fill material into navigable waters at the point of discharge, an IDWR stream alteration permit; a permit for floodplain work from Ada County; and in the event all Lactalis' effluent were to be piped to the Lower Boise River, an amendment of one of Lactalis' existing groundwater rights would be required.[1] In addition to regulatory permitting, and depending on the specific route chosen, the project would require contacting each of the individual property owners along Star Road (44 properties on the west side, 54 properties on the east) to negotiate easements or rights-of-way, construction phasing, and irrigation drain and rail crossings.

Although complex, the permitting, engineering, construction, and operation of a pipeline along Star Road to discharge effluent directly to the Boise River may be feasible. However, overall the potential negative environmental and social effects appear greater than the Proposed Action, which uses existing infrastructure. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse impacts, and because of the identified adverse impacts of implementing this alternative it does not meet the purpose and need for the action and has been eliminated from further evaluation.

2.4.2 Discharge Effluent to City of Nampa's Publicly Owned Treatment Works

This alternative would direct the Lactalis effluent to the city of Nampa wastewater collection system and Publicly Owned Treatment Works (POTW). The Lactalis facilities are not within the boundaries of the city of Nampa, so connection to the city's wastewater collection system would require annexation. Lactalis' preliminary discussions with the Nampa's Public Works Director and its POTW operator suggest that connection to Nampa's POTW would require construction of roughly 1 mile of forcemain, 5 miles of sewer line, and a new pump station. Although there is a sewer line adjacent to Franklin Road near the Lactalis plant, Nampa's Public Works Director believes the capacity of this line could not support Lactalis' effluent due to the sewer line's physical configuration (i.e., slope, depth, and diameter) as well as the city's commitments to other planned uses for capacity in the line.

[1] Lactalis Water Right No. 63-32103 is used for commercial purposes at the cheese processing facility. The water right, or license, includes a condition requiring discharge to the Purdam Drain of an amount of water equal to the amount of groundwater diverted and used under the water right.

Under this alternative, construction within the public rights of way would be required to connect Lactalis' wastewater treatment plant to Nampa's wastewater collection system. The proposed new pipelines would need to comply with Nampa's Sewer Master Plan and with local and state rules and regulations to minimize environmental effects. This alternative is dependent on a discretionary approval by the city of Nampa to annex the Lactalis property into the city limits. If obtained, this would likely impose a different set of zoning and building codes.

Under this alternative, the cheese production process wastewater would be treated twice: once at Lactalis' existing wastewater treatment plant and again at the POTW. This double treatment is inefficient, provides for no net environmental benefit, and results in otherwise unnecessary wear and tear on the city infrastructure. Treating Lactalis' effluent in a POTW consumes both electricity and chemical resources, requires additional human labor, and generates sludge, chemical waste, and an increased carbon footprint. The beneficial assimilative impact of additional discharges of generally higher-quality water in the Purdam Drain and downstream, would not occur if the effluent were directed to the POTW. Conveying all of the effluent to the POTW would decrease localized groundwater recharge into the local aquifer system as described in Section 2.4.1.

Although feasible, this alternative imposes adverse operations and other adverse impacts on the City of Nampa and the environment while eliminating the benefits of discharging treated effluent to the lower quality waters in the Purdam Drain. Overall, the potential negative environmental and social impacts of implementing this alternative are greater than those identified for the Proposed Action, which uses existing infrastructure. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse environmental impacts, and because of the identified adverse impacts of implementing this alternative, it does not meet the purpose and need for the action and has been eliminated from further evaluation.

2.4.3 Trucking Effluent Offsite for Disposal

An alternative to discharging effluent to the Purdam Drain is to truck treated or untreated effluent off-site, such as to a POTW or to a remote land application site.

Trucking the effluent offsite would increase the number of heavy trucks traveling to and from the Lactalis wastewater treatment plant. Based on an assumed tanker truck capacity of approximately 8,000 gallons, at current discharge rates, trucking the effluent offsite would require approximately 90 roundtrip truckloads per day. At the planned future maximum discharge rate, approximately 190 truckloads per day could be required. This increased heavy-truck traffic would be expected to increase congestion and travel times for other

vehicles on the roads, increase potential for accidents and spills, increase traffic noise, and increase wear on the roads.

The increased heavy-truck traffic would also increase the consumption of diesel fuel, emissions of greenhouse gases (such as carbon dioxide, methane, and nitrous oxide), and emissions of other air pollutants (such as particulate matter and sulfur dioxide) for an area that is already of concern for particulate matter.[2] Each of the 90 to 100 additional round-trip heavy truck trips required daily for effluent disposal would make two passes through the community: one going to the offsite disposal location and one returning. During regular business hours of 8:00 am through 5:00 pm, this would result in approximately 20 heavy trucks per hour of additional use on regional roadways. The vehicle emissions from these trips would increase airborne particulate matter in the immediate community, and the busier roads would likely produce increased traffic congestion and accidents. As with other non-discharge alternatives, the beneficial assimilative impact of additional discharges of generally higher-quality water in the Purdam Drain and downstream, would not occur if the effluent were trucked offsite for disposal. Trucking all of the effluent offsite would decrease localized groundwater recharge into the local aquifer system as described in Section 2.4.1.

Similar to the alternative to pipe effluent directly to the city of Nampa's POTW, this alternative would result in the effluent being treated twice: once at the Lactalis wastewater treatment plant and again at the receiving facility. This double treatment is inefficient and has associated negative environmental consequences as described in Section 2.4.2.

In addition to these concerns, no POTW has guaranteed Lactalis that it has the capacity to accept Lactalis' trucked effluent. To date, POTWs have only offered disposal that may be terminated at will, leaving Lactalis with no assured disposal site.

Although, potentially feasible, the negative environmental impacts from implementing this Alternative appear to be greater than the Proposed Action. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse environmental impacts, and because of the identified adverse impacts of implementing this alternative it does not meet the purpose and need for the action and has been eliminated from further evaluation.

[2] Canyon County, where the Nampa plant is located, is currently in an Idaho Department of Environment Quality ("DEQ") Area of Concern for particulate matter as well as ozone. (https://www.deq.idaho.gov/media/662796-nonattainment_map.pdf)

2.4.4 Increasing Land Application Volumes and/or Rates

This alternative would direct effluent by pipeline to be land applied under an IDEQ Reuse Permit[3] issued and regulated by IDEQ to properties that would be owned or leased by Lactalis. These properties could be leased to or from farmers, and the effluent would be used to provide a portion of the water supply needed to irrigate crops during the growing season from April to October as stipulated by IDEQ's rules. A storage reservoir would need to store excess effluent during winter months when allowable irrigation quantities are reduced. Additionally, a pumping system would be needed to deliver effluent via pipeline from the Lactalis water treatment plant to the application site. That infrastructure would need easements to cross lands not currently owned by Lactalis and would require additional energy to operate.

Lactalis would need to comply with IDEQ's Recycled Water Rules[4] for land application and apply for and obtain a new or increased IDEQ Reuse Permit. This option would require an area of land significantly larger than Lactalis currently possesses to accommodate increased effluent flows during the irrigation season. It is anticipated that Lactalis would need to substantially increase its current land base for the additional application. During the non-irrigation season, land application quantities are very limited, and one or more storage reservoirs would be necessary to hold winter volumes. The design, construction, and maintenance of a large storage reservoir would be anticipated to have engineering and regulatory hurdles, and associated environmental impacts to surrounding properties during construction, operation, and maintenance. The necessary acquisition and permanent dedication of lands for wastewater treatment purposes may be incompatible with future development and use of neighboring properties in an increasingly urbanizing area.

As with the other non-discharge alternatives, the beneficial assimilative impact of additional discharges of generally higher-quality water in the Purdam Drain and downstream, would not occur if the effluent were disposed of via increased land application treatment.

This alternative has potential environmental concerns from year-round land application and from construction of one or more storage reservoirs for winter months. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse environmental impacts, and because of the identified adverse impacts of implementing this alternative it does not meet the purpose and need for the action and has been eliminated from further evaluation.

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[3] Lactalis' permit title is "Idaho Department of Environmental Quality Reuse Permit I-091-03"
[4] Idaho Administrative Procedures Act (IDAPA) 58.01.17 – Rules for the Reclamation and Reuse of Municipal and Industrial Wastewater

2.4.5 Using Evaporation Ponds

The creation of evaporation ponds would allow Lactalis to utilize its existing wastewater treatment plant, but would require the creation of new ponds for evaporation. Ponds would be constructed per IDEQ regulations, and would be lined with high strength HDPE plastic or bentonite.

While Lactalis currently has several onsite ponds for stormwater management, using only evaporation ponds for the removal of the increased wastewater effluent would necessitate construction of several new ponds. These ponds would require lining and possibly covers to prevent animal entry. To minimize the land required, mechanical evaporators could be installed to speed the evaporation process. The pumps required for sending the effluent to the ponds would nominally increase energy demand on local power generation resources.

It is possible that effluent could accumulate, especially throughout the winter when evaporation occurs more slowly. Although the effluent would be treated, this alternative could result in increased odors in the immediate vicinity of the plant, which was a primary reason that Lactalis moved from use of ponds as a treatment and disposal method in 2005. Pond linings would prevent infiltration, which would have a slight negative effect on groundwater levels in the vicinity of the Purdam Drain near the Lactalis facility. As with the other non-discharge alternatives, the beneficial assimilative impact of additional discharges of generally higher-quality water in the Purdam Drain and downstream, would not occur if the effluent were disposed of using evaporation ponds. Treating all of the effluent via evaporation ponds would decrease localized groundwater recharge into the local aquifer system as described in Section 2.4.1.

Although potentially feasible if additional lands and related access are obtained, the identified negative environmental effects from implementing this alternative appear to be greater than those of the Proposed Action. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse environmental impacts, and because of the identified adverse impacts of implementing this alternative, it does not meet the purpose and need for the action and has been eliminated from further evaluation.

2.4.6 Implementing an Aquifer Storage and Recovery Program

This alternative considers discharging effluent to groundwater via deep injection wells. Although this method is used elsewhere in the United States, it would be the first aquifer storage and recovery system for an industrial wastewater treatment plant in Idaho. Baseline

groundwater conditions would need to be established and monitored over an extended period of time, and necessary upgrades and operational changes to the wastewater treatment plant would be needed to meet regulatory requirements for Idaho's Class A reuse standards.

This alternative presents many unknown engineering and regulatory constraints since a similar project has not been attempted with a municipal or industrial wastewater facility before in Idaho, and therefore the feasibility of this alternative is unknown. Lactalis would be required to coordinate with agencies including IDEQ and IDWR to meet regulatory-driven treatment levels, best management practices, facility upgrades, and construction of injection wells. It is anticipated a several year-long public outreach and/or education program along with background data collection would be required to study and mitigate potential environmental and public concerns before this alternative could be determined feasible. In addition, operating and maintaining aquifer storage and recovery systems has been shown to have ongoing challenges including the tendency of organic components, in combination with the dual-purpose, dual-direction flow, to cause bacterial growth in injection wells, which create continual well maintenance issues.

This alternative presents multiple potential environmental, regulatory, and technical challenges just to determine if this alternative is feasible, unlike the Proposed Action which is feasible. Since discharge to the Purdam Drain under the Proposed Action would not measurably affect the carrying capacity of the Purdam Drain or Mason Creek under the 100-year flood event, or result in any identified adverse environmental impacts, and because of the unknown feasibility of implementing this alternative, it does not meet the purpose and need for the action and has been eliminated from further evaluation.

2.5 Summary Comparison of the Environmental Impacts of the Alternatives

The environmental impacts of Alternative A – No Action and Alternative B – Proposed Action are compared in Table 2-1. Potential short- and long-term, direct and indirect impacts of the alternatives are summarized. The environmental consequences of the alternatives arranged by resource are described in detail in Chapter 3. The terms "environmental consequences" and "environmental impacts" are synonymous in this document.

Table 2-1. Summary of environmental effects of actions.

Resource	Alternative A – No Action	Alternative B – Proposed Action
Hydrology and Drain Capacity	Since no action will occur, there will be no direct, indirect, short-term, or long-term impacts on drain hydrology or drain capacity of the Purdam Drain, Mason Creek, and the Lower Boise River are anticipated. Under a 100-year flood event, the Purdam Drain and Mason Creek would continue to overtop the drain at most road crossing.	Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to drain hydrology from an instantaneous peak flow of 4.5 cfs. The increase in flow would be practicably immeasurable following USGS standard measurements methods.
Water Quality	**Surface water** – Since no action will occur, there will be no direct, indirect, short-term, or long-term impacts on water quality of the Purdam Drain, Mason Creek, and the Lower Boise River are anticipated. **Groundwater** – Since no action will occur, there will be no direct, indirect, short-term, or long-term impacts on water quality of localized groundwater are anticipated.	**Surface water** – Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to water quality from an instantaneous peak flow of 4.5 cfs. Short and long-term effects to water quality would be positive as the effluent water quality is better than the background level in the drain. **Groundwater** – Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to groundwater quality from an instantaneous peak flow of 4.5 cfs. Short and long-term effects to the groundwater levels would be negligible and continue to occur as they do under the No Action Alternative. The Proposed Action would not cause a noticeable change in existing groundwater elevations.
Land Use and Drainage System	Since no action will occur, no direct, indirect, short-term, or long-term impacts on land uses in the affected environment are anticipated.	Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to land uses from an instantaneous peak flow of 4.5 cfs.

Resource	Alternative A – No Action	Alternative B – Proposed Action
Biological Resources	Since no action will occur, no direct, indirect, short-term, or long-term impacts to biological resources in the affected environment are anticipated.	Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to biological resources from an instantaneous peak flow of 4.5 cfs.
Threatened and Endangered Species (TES)	Slickspot peppergrass is listed by the USFWS as Proposed Endangered. Its critical habitat is outside the affected environment of the Draft EA. Therefore, under the No Action Alternative, it is not anticipated slickspot peppergrass distribution, abundance, or local population viability would change.	As the existing habitat for the slickspot peppergrass is outside the affected environment of the Draft EA, slickspot peppergrass distribution, abundance, or local population viability would not be impacted from an instantaneous peak flow of 4.5 cfs.
Cultural Resources	There are no identified cultural sites within the proposed project area. Therefore, under the No Action Alternative, there would be no direct, indirect, short-term, or long-term impacts to cultural resources in the affected environment.	The Purdam Drain is eligible for listing on the NRHP and Idaho SHPO will be consulted on its listing status. As there are no identified cultural sites the proposed project area, no cultural sites would experience direct, indirect, short-term or long-term adverse impacts from an instantaneous peak flow of 4.5 cfs.
Indian Sacred Sites and Indian Trust Assets (ITAS)	There are no identified Indian Sacred Sites and ITAs within the affected environment of this Draft EA. Therefore, under the No Action Alternative, there would be no direct, indirect, short-term, or long-term impacts to Indian Sacred Sites or Indian Trust Assets.	As there are no identified Indian Sacred Sites or ITAs within the proposed project area, there would be no direct, indirect, short-term or long-term adverse impacts from an instantaneous peak flow of 4.5 cfs.
Hazardous Materials and Waste	There are no identified hazardous waste sites within the proposed project area and therefore, there would be no direct, indirect, short-term, or long-term impacts from hazardous waste sites.	As there are no identified hazardous waste sites, there would be no direct, indirect, short-term or long-term adverse impacts from hazardous waste sites would occur from an instantaneous peak flow of 4.5 cfs.

Resource	Alternative A – No Action	Alternative B – Proposed Action
Socioeconomics	Since no action will occur, no direct, indirect, short-term, or long-term impacts on socioeconomics conditions in the affected environment are anticipated.	Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to socioeconomics conditions from an instantaneous peak flow of 4.5 cfs. It is probable that the increase in production represented by the proposed project will have a beneficial effect in the form of increased economic activity.
Environmental Justice	There are no identified natural resource or socioeconomic impacts adversely affecting minority and low-income populations in the affected environment of the Draft EA. Therefore under the No Action Alternative, no direct, indirect, short-term, or long-term environmental justice impacts are anticipated.	Similar to the No Action Alternative, the Proposed Action Alternative is not expected to result in any disproportionately high and adverse effects on minority and low-income populations. The Proposed Action would be in compliance with all applicable NEPA regulations related to environmental justice protections.
Climate Change	Under the No Action Alternative, no direct, indirect, short-term, or long-term impacts on climate change or from climate change to the affected environment are anticipated.	Under the Proposed Action Alternative, there would be no discernible direct, indirect, short-term or long-term adverse impacts to climate change or from climate change from an instantaneous peak flow of 4.5 cfs

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Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The scope of this Draft EA is defined by the Proposed Action as compared with the No Action alternative. Analysis is focused on identifying and evaluating potential environmental impacts resulting specifically from the Proposed Action detailed in Chapter 2.

The affected environment (proposed action area) addressed in this EA includes the Purdam Drain and Mason Creek and the land that borders both drains from the Lactalis outfall to the confluence of the Mason Creek with the Lower Boise River.

NEPA requires analysis only of resource categories or issues in which there is or could be potential for adverse impact from the Proposed Action. This chapter does not contain comprehensive discussions of every resource, but focuses on issues that were identified during scoping or that might be affected by the alternatives being considered. The resources analyzed in this Draft EA include:

- Hydrology and Drain Capacity
- Water Quality
- Land Use and Drainage Systems
- Biological Resources
- TES
- Cultural Resources
- Indian Sacred Sites and ITAs
- Hazardous Materials and Waste
- Socioeconomics
- Environmental Justice
- Climate Change
- Cumulative Impacts

3.1 Hydrology and Drain Capacity

The purpose of the Capacity Analysis is to evaluate the potential effects of adding additional flow to a predetermined high water event in the Purdam Drain and Mason Creek. Therefore, this section discusses the existing conveyance capacity of the Purdam Drain and Mason Creek during a 100-year flood event, and the effects from an increase in effluent from the Lactalis wastewater treatment plant. The section uses hydrologic and hydraulic data to evaluate the impact of Lactalis proposed flow increase from a current average daily discharge rate of approximately 1.2 cfs to a peak instantaneous discharge rate of approximately 4.5 cfs. The evaluation of an approximately 3.3 cfs increase follows Reclamation preferred methodologies.

3.1.1 Affected Environment

Hydrology of Purdam Drain and Mason Creek

The affected environment includes the Purdam Drain and Mason Creek and the land that borders both drains from the Lactalis outfall to the confluence of the Mason Creek with the Lower Boise River. It also includes areas impacted by flooding when capacity in the drain and creek is exceeded and its conveyance facilities (i.e., road crossings, culverts, arches) cannot accommodate the full flow in the waterways.

The drain capacity analysis prepared for this Draft EA (Appendix A) analyzes the Mason Creek watershed and the drainage area of the Purdam Drain downstream of the Lactalis outfall (Figure 3-1).

The drainage area of the Purdam Drain covers 16.4 square miles of land. The area analyzed for this Draft EA includes the lower reach of the drain between its confluence with the Mason Creek to a point 4.8 miles upstream where Star Road crosses the drain and the existing Lactalis discharge occurs. The drainage area of this reach of the drain was delineated using the United States Geological Survey (USGS) StreamStats Program (USGS 2012).

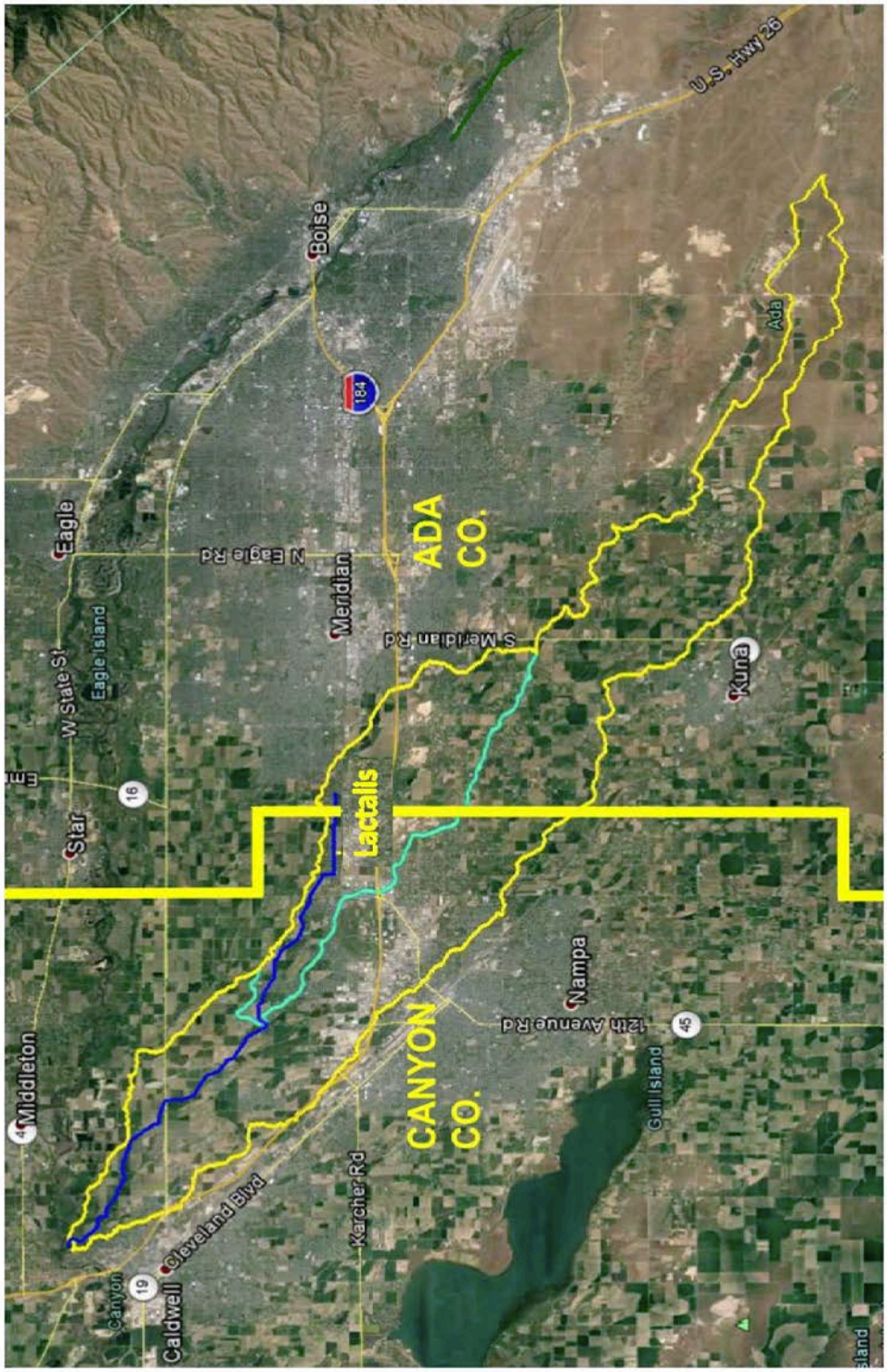

Figure 3-1. Project vicinity map. The Lactalis facility is located within the Purdam Drain watershed (partly outlined in cyan), which in turn is a subdrainage of the Mason Creek watershed (outlined in yellow). The route of the existing discharge through the Purdam Drain and Mason Creek to the Lower Boise River is depicted in dark blue.

The Mason Creek watershed covers 62-square-miles of land which encompasses the drainage area of the Purdam Drain. The segment of Mason Creek being analyzed is from its confluence with the Lower Boise River to a point 7.6 miles upstream near Northside Boulevard, where the Purdam Drain discharges into the creek. The Mason Creek watershed was identified in a Flood Insurance Study (FIS) prepared for Canyon County by the Federal Emergency Management Agency (FEMA), dated May 24, 2011 (FEMA 2011). The FIS of the watershed was conducted as a part of the process to modernize the flood insurance mapping for Canyon County.

The Canyon County FIS along with numerous other prior studies addressed and characterized the hydrology of Mason Creek and its drainage area. The FIS identified that a combination of rainstorms and melting snow in winter months and in early spring, possibly on frozen ground, is apt to cause flooding within the entire Mason Creek basin including the Purdam Drain. The typical, high intensity 24-hour storm associated with these runoff events in the project area can be expected to have a storm peak occurring within a 1-hour time span approximately during the midpoint of the storm (McCuen 1998). Depending on the storm location within the basin, the time of concentration and degree of basin attenuation will likely result in a flood peak that would be expressed within a few hours. The FIS also identified that another cause for flooding is debris lodging on the upstream side of some of the numerous bridges and culverts along Mason Creek. More information on methodology of the FIS is included in Appendix A.

FEMA quantified the effective 1 percent exceedance event or the 100-year flood event for the Purdam Drain and Mason Creek using the FEMA methodology contained in Appendix A. The Purdam Drain drainage area derived through the StreamStats program, in combination with the FEMA methodology was used to develop the 100-year flood event for the drain. Table 3-1 summarizes the 100-year flood event for the reaches of the Purdam Drain and Mason Creek analyzed. These values serve as the basis for the hydraulic analyses prepared for this Draft EA.

Table 3-1. Effective hydrology peak discharges of 100-year flood events for the proposed action area.

Reach Segment	100-year flood event
Purdam Drain from Mason Creek to Star Road	704 cfs
Mason Creek from Lower Boise River to Purdam Drain	1,266 cfs

The Purdam Drain is a constructed facility with bank slopes varying from steep to mild (i.e., 6:1 to 2:1 horizontal to vertical) through the reach studied. The bottom channel is non-vegetated, and flanked on both sides by banks vegetated with aquatic species. The upper ditch banks are generally covered by grasses. The bottom channel varies from 10 to 20 feet in width and 2 to 4 feet in depth. Top widths of the banks range from 40 to 60 feet. The Purdam

Drain normally conveys between 40 to 60 cfs during the irrigation season, while flows in the non-irrigation season drop into the 10 to 30 cfs range as described in Appendix A.

While Mason Creek shares similar characteristics with the Purdam Drain, it is not entirely a constructed facility. Irrigation practices for the past 100 years altered drainage patterns in Mason Creek, and in many cases, water no longer follows natural drainage paths. The natural drainage area has been deepened, lengthened, straightened, and diverted while drains, laterals, and canals have been constructed. Stream alterations and man-made waterways have created new drainage areas that are significantly different from the original natural watershed. Average flows in Mason Creek are identified as between 60 to 85 cfs in the non-irrigation season, and 160 to 190 cfs during the irrigation season (IDEQ 2001a).

Hydraulic Capacity and Crossings of Purdam Drain and Mason Creek

The hydraulic capacity of the Purdam Drain and Mason Creek and their respective crossings were evaluated separately. Purdam Drain was evaluated downstream of the existing Lactalis point of discharge near Star Road to the confluence of the drain with Mason Creek. Mason Creek was evaluated from its confluence with the Purdam Drain to the Lower Boise River. An overview of these two segments is provided in Figure 3-2, while the general location of the 47 individual crossings is provided in Figure 3-3 and listed in Table 3-2 and Table 3-3 in order from downstream to upstream.

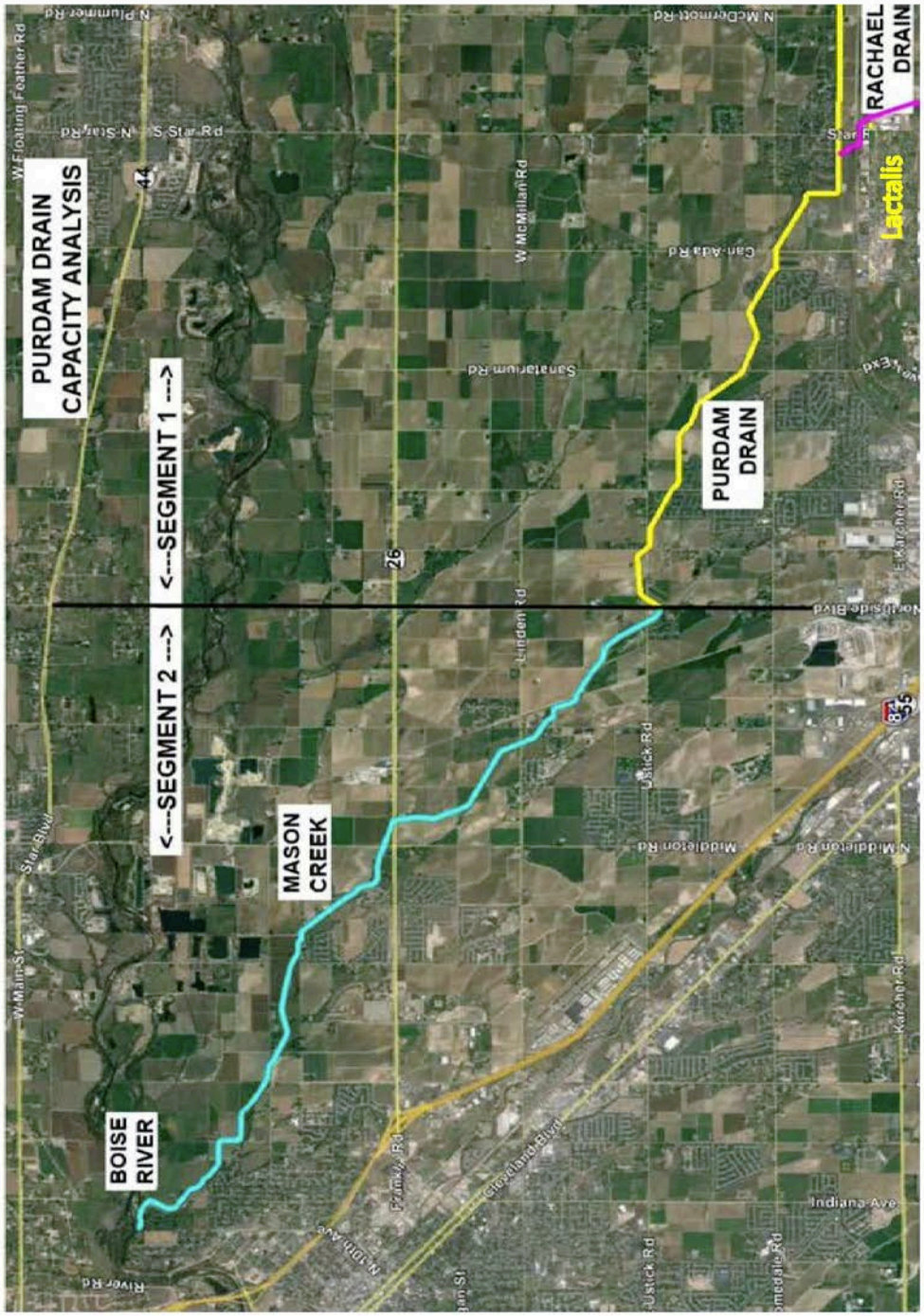

Figure 3-2. Segment reach map. Lactalis' point of discharge (pink) is at the bottom right. The drainage system is comprised of two segments, the upstream Segment 1 (Purdam Drain) and the downstream Segment 2 (Mason Creek). The Purdam Drain was hydraulically modeled using the FHWA HY-8 culvert analysis program (USDOT FHA 2015). The Mason Creek was modeled utilizing the USACE's HEC-RAS modeling program that was the basis of FEMA's 2011 Canyon County FIS.

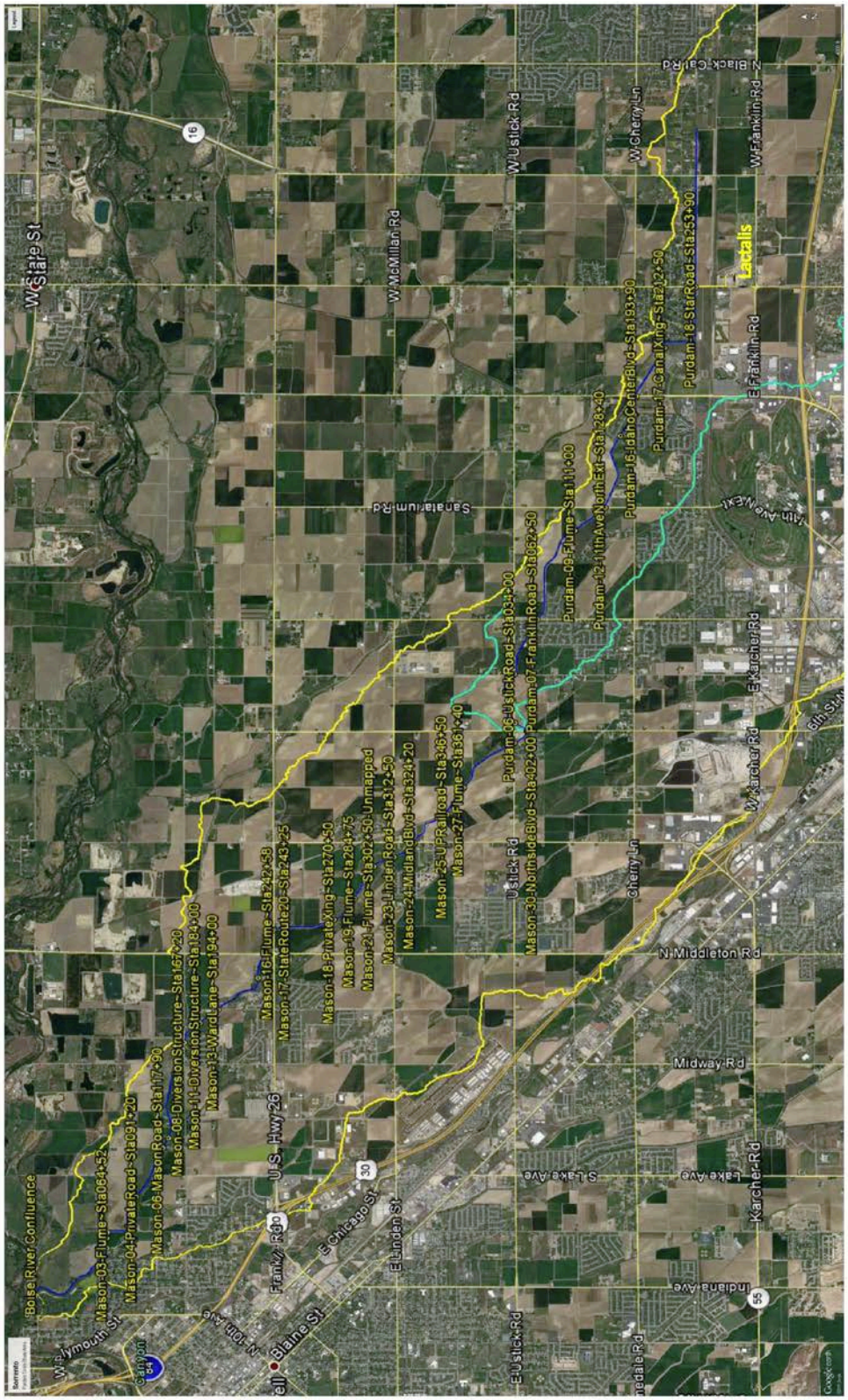

Figure 3-3. Inventory of Purdam Drain and Mason Creek major crossings.

Table 3-2. Mason Creek crossings and conveyance structures.

No.	Description
1	Mason-01-PolkRd~Sta057+00
2	Mason-02-Pipe~Sta061+70
3	Mason-03-Flume~Sta064+52
4	Mason-04-PrivateRoad~Sta091+20
5	Mason-05-LincolnRoad~Sta112+00
6	Mason-06-MasonRoad~Sta117+90
7	Mason-07-Flume~Sta123+80
8	Mason-08-DiversionStructure~Sta167+20
9	Mason-09-MarbleFrontRoad~Sta171+00
10	Mason-10-PrivateRoad~Sta182+00-NotMapped
11	Mason-11-DiversionStructure~Sta184+00
12	Mason-12-PipeCrossing~Sta191+50
13	Mason-13-WardLane~Sta194+00
14	Mason-14-PrivateXing~Sta219+00
15	Mason-15-MiddletonRoad~Sta230+60
16	Mason-16-Flume~Sta242+58
17	Mason-17-StateHighway20~Sta243+25
18	Mason-18-PrivateXing~Sta270+50
19	Mason-19-Flume~Sta284+75
20	Mason-20-Flume~Sta294+50-Unmapped
21	Mason-21-Flume~Sta302+50-Unmapped
22	Mason-22-Canal~Sta309+50
23	Mason-23-LindenRoad~Sta312+50
24	Mason-24-MidlandBlvd~Sta324+20
25	Mason-25-UPRailroad~Sta346+50
26	Mason-26-PrivateXing~Sta361+00
27	Mason-27-Flume~Sta361+40
28	Mason-28-DiversionStructure~Sta392+30
29	Mason-29-LoneTreeLane(Ustick Road)~Sta393+50

Table 3-3. Purdam Drain crossings and conveyance structures.

No.	Description
1	Purdam-01-NorthsideBlvd~Sta000+50
2	Purdam-02-Flume~Sta007+20
3	Purdam-03-UstickRoad~Sta007+50
4	Purdam-04-LocalDrive~Sta023+80
5	Purdam-05-MadisonRoad~Sta033+10
6	Purdam-06-UstickRoad~Sta034+00
7	Purdam-07-FranklinRoad~Sta062+50
8	Purdam-08-FarmAccess~Sta110+90
9	Purdam-09-Flume~Sta111+00
10	Purdam-10-FarmAccess~Sta123+50
11	Purdam-11-FarmAccess~Sta125+20
12	Purdam-12-11thAveNorthExt~Sta128+40
13	Purdam-13-LyonsdalePlace~Sta165+20
14	Purdam-14-Flume~Sta177+10
15	Purdam-15-CherryLane~Sta177+50
16	Purdam-16-IdahoCenterBlvd~Sta193+90
17	Purdam-17-CanalXing~Sta212+50
18	Purdam-18-StarRoad~Sta253+90

During scoping, Reclamation identified two separate methodologies to analyze the hydraulics of the existing conveyance structures. These are the USACE's hydraulic modeling program (HEC-RAS),[1] and the Federal Highway Administration's HY-8 Culvert Analysis Program (HY-8 Program)[2].

As Mason Creek was previously evaluated using HEC-RAS as a part of the recent 2011 Canyon County FIS prepared by FEMA, it was again evaluated using the existing HEC-RAS hydraulic model. The Canyon County FIS was subjected to wide public comment and review, prior to final acceptance by the local communities and FEMA.

Since the Purdam Drain is an unmapped basin under FEMA programs, no existing modeling was available for the Purdam Drain. Reclamation identified the HY-8 Program as the most efficient and appropriate program to model the drain for this type of analysis.

[1] http://www.hec.usace.army.mil/software/hec-ras/
[2] https://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/

Purdam Drain Hydraulic Analysis

For the Purdam Drain, data to support analysis with the HY-8 Program was collected in the field for 18 crossings. Data includes the type of conveyance (e.g., culvert, bridge, or flume), channel configuration, hydraulic characteristics, and digital images as future reference material.

Of the 18 conveyances crossing on the Purdam Drain, there are 13 culverts, 2 bridges (arches), and 3 flumes. Each type of crossing was evaluated slightly differently. Culverts were evaluated using the HY-8 Program. Bridges and flumes were evaluated using a simplified hydraulic analysis configured for individual crossings. In the case of the two makeshift bridges at Station 123 +50 and Station 125+20, they were analyzed as large culverts under the HY-8 Program. In the case of the three flumes, each was immediately adjacent to a culvert crossing, and was significantly higher in elevation than the adjacent crossing, and deemed to pose an insignificant high water impairment in comparison to the adjacent crossing. Therefore, while the adjacent culvert crossings were hydraulically analyzed, a separate analysis was not conducted on these three hydraulically insignificant flumes.

Crossing characteristics were evaluated for both culverts and bridges. For culverts the evaluation criteria included the type of culvert material, the diameter and length of the culvert, the bed slope of the waterway, and an evaluation of pipe inlet and outlet conditions. The criterial for evaluating bridges and flumes included evaluating the span length and the width of the bridge deck, determining the channel bed slope and evaluating embankment conditions. A visual assessment was conducted at each crossing to verify hydraulic roughness characteristics and to observe unusual hydraulic conditions that may occur in the field. The evaluation criteria for the Purdam Drain culverts formed the basis of the hydraulic analysis using the HY-8 Program.

Table 3-4 summarizes the results of the inventoried Purdam Drain crossings analyzed using the HY-8 Program. The analysis determined that none of the existing Purdam Drain facilities inventoried are anticipated to pass the 100-year flood event under the respective existing built condition. The analysis shows that under the 100-year flood event, the capacity of existing facilities will be exceeded. The analysis also shows that under minimum flow conditions, that is, flows of 10 to 60 cfs, the capacity of existing facilities are not exceeded unless there is a blockage.

Table 3-4. Purdam Drain crossings and conveyance structures.

Purdam Drain Conveyance Crossing[1]	Station	Material (CMP, RCP, Etc.)	Diameter (feet) or Other Shape (inches)	Crossing Overtops (cfs)[2]	Conveyance Passes the 100-year Flood Event (704 cfs) Y/N?
Northside Blvd	000+50	CMP	117 x 79 inches	497	**N**
Flume	007+20	-	-	-	
Ustick Road	007+50	CMP	117 x 79 inches	584	**N**
Local Drive	023+80	CMP	60 inches	197	**N**
Madison Road	033+10	CMP	60 inches	147	**N**
Ustick Road	034+00	CMP	60 inches	219	**N**
Franklin Road	062+50	CMP	54 inches	193	**N**
Farm Access (W)	110+90	RCP	54 inches	182	**N**
Farm Access (E)	110+90	RCP	54 inches	177	**N**
Flume	111+00	-	-	-	
Farm Access	123+50	CMP Arch	30.0 feet	251	**N**
Farm Access	125+20	CMP Arch	30.0 feet	211	**N**
11th Ave North Ext	128+40	CMP	84 inches	331	**N**
Lyonsdale Place	165+20	CMP	95 x 67 inches	261	**N**
Flume	177+10	-	-	-	
Cherry Lane	177+50	CMP	96 inches	339	**N**
Idaho Center Blvd	193+90	CMP	96 inches	482	**N**
Canal Crossing	212+50	RCP	66 inches	371	**N**
Star Road	253+90	CMP	78 inches	376	**N**

1 – Crossings listed in order from upstream to downstream.
2 – "Overtopping" is defined as the condition where the existing drainage conveyance structure can no longer convey the water in the ditch resulting in higher ditch water elevations, followed by eventual flooding of the embankment (road or canal bank).

Hydraulic Analysis for Mason Creek

The Mason Creek segment was studied in detail as a part of the 2011 Canyon County FIS using the FEMA-accepted, USACE's HEC-RAS hydraulic modeling program. The analysis provides an evaluation of existing Mason Creek facility capabilities to successfully pass potential high water events.

The HEC-RAS analysis primarily relied on the existing HEC-RAS hydraulic model. A total of 26 of the 29 crossings over Mason Creek were originally surveyed in support of the 2011 FIS. The 26 crossings included in the 2011 FIS were field verified in the summer of 2015, and their characteristics remain consistent with the original FIS survey. The structures include public and private bridges, culverts (both round and arch types), plus a number of flumes that convey irrigation water across Mason Creek, from one bank to the other. No changed conditions from those of the original survey were observed in the field. The three crossings not modeled in the 2011 FIS are minor crossings deemed hydraulically insignificant. Two of them are elevated flumes over Mason Creek, and the third is a temporary crossing used to access a farm via a private road.

According to the HEC-RAS hydraulic analysis, the overall majority of Mason Creek crossings are anticipated to be inundated during the 100-year flood event (base flood) condition. Of the 26 Mason Creek structures inventoried, only 2 are anticipated to be able to pass the 100-year flood event. During normal flow conditions, 60 to 190 cfs, no flooding impacts would occur.

Table 3-5 summarizes the conveyance capacity of the inventoried Mason Creek conveyance structures. The three crossings not mapped by the 2011 FIS study are identified in the right-most column in the table. These three crossings are considered inconsequential since they would be anticipated to be impacted the same as the surrounding crossings under the 100-year flood event. Figure 3-4 and Figure 3-5 are excerpts from the HEC-RAS model that depict the floodplain widths from the 100-year flood event.

Table 3-5. Mason Creek – existing conveyance crossings capacities (FEMA 2011).

Mason Creek Conveyance Crossing[1]	Station	Material (CMP, RCP, etc.)	Bridge Span (ft)	Diameter or Other Shape (feet)	Conveyance Passes the 100-yr Flood Event (1,266 cfs) Y/N?	Crossing Mapped in FIS Y/N?
Polk Road	057+00	CMP Arch	-	10 x 7.5	N	Y
Pipe	061+70	-	44	-	N	Y
Flume	064+52	-	37	-	N	Y
Private Road	091+20	-	15	-	N	Y
Lincoln Road	112+00	CMP	-	8	N	Y
Mason Road	117+90	CMP	-	8	N	Y
Flume	123+80	-	43	-	N	Y
Diversion Structure	167+20	-	-	-	N	Y
Marble Front Road	171+00	CMP Arch	-	14 x 7.5	N	Y
Private Road	182+00	-	-	-	-	N
Diversion Structure	184+00	-	-	-	N	Y
Pipe Crossing	191+50	-	58	-	N	Y
Ward Lane	194+00	CMP	-	8	N	Y
Private Crossing	219+00	-	25	-	N	Y
Middleton Road	230+60	CMP	-	8	N	Y
Flume	242+58	-	56	-	N	Y
State Highway20	243+25	-	26	-	Y	Y
Private Crossing	270+50	-	29	-	N	Y
Flume	284+75	-	59	-	N	Y
Flume	294+50	-	-	-	-	N
Flume	302+50	-	-	-	-	N
Caldwell Highline Canal	309+50	CMPs	-	4, 4 & 4	N	Y
Linden Road	312+50	-	28	-	N	Y
Midland Blvd	324+20	CMP	-	8	N	Y
UP Railroad	346+50	CMP	-	4	N	Y
Private Crossing	361+00	-	30	-	N	Y
Flume	361+40	-	24	-	N	Y
Diversion Structure	392+30	-	-	-	N	Y
Ustick Road	393+50	CMP	-	16	Y	Y

1 – Crossings listed in order from upstream to downstream.

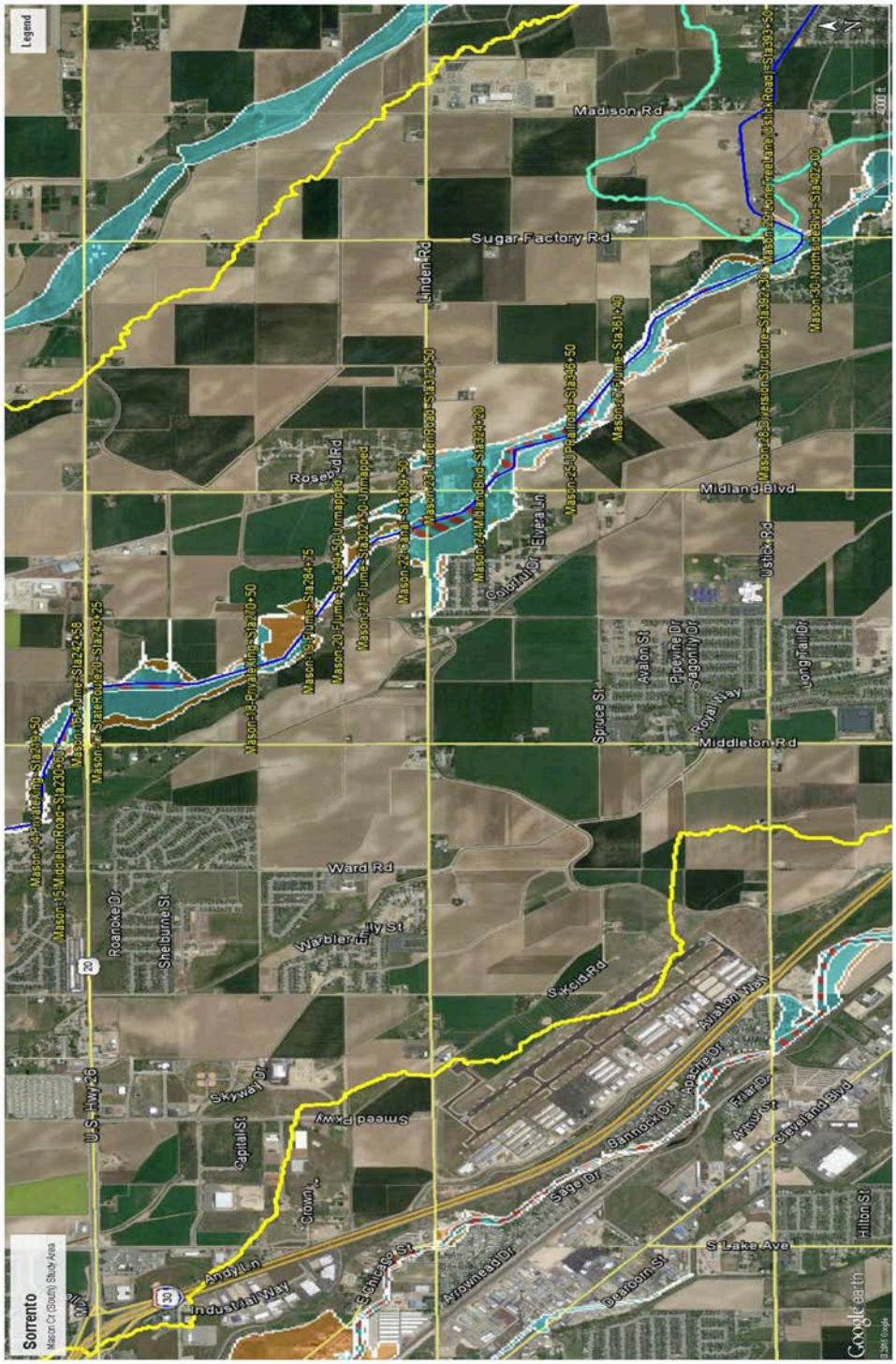

Figure 3-4. The 100-year floodplain. The north half of the Mason Creek drainage (yellow) and FEMA shallow flood hazard areas are shown on this figure. Mason Creek is delineated as a dark blue line traversing the image from the lower right to upper left. The red and blue striped areas represent the regulatory floodway, the light blue shading denotes the delineated 100-year floodplain, while the tan shading represents the 500-year floodplain.

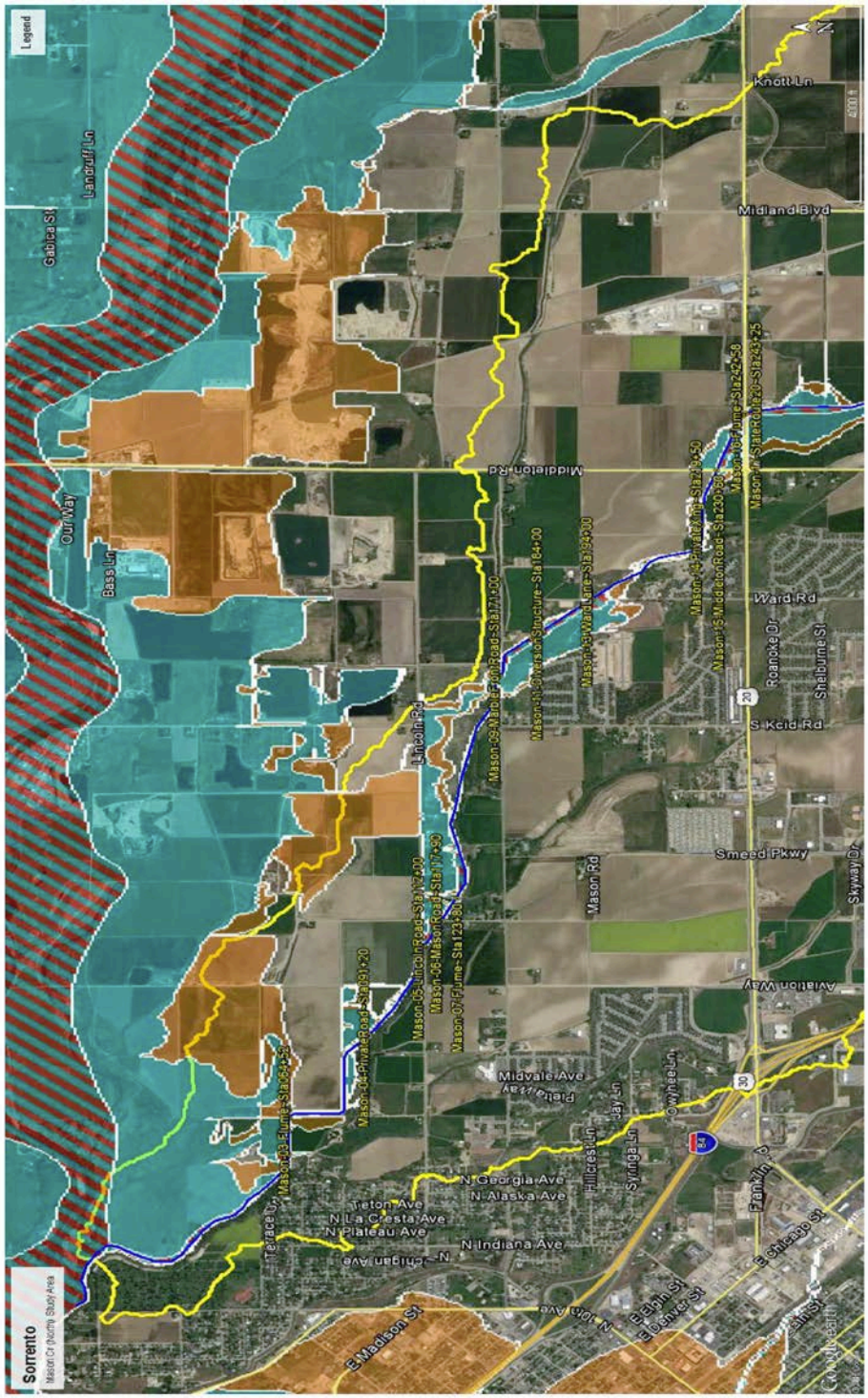

Figure 3-5. The 100-year floodplain. The south half of the Mason Creek drainage (yellow) and FEMA shallow flood hazard areas are shown on this figure. Mason Creek is delineated as a dark blue line traversing the image from lower right to upper left. The red and blue striped areas represent the regulatory floodway, the light blue shading denotes the delineated 100-year floodplain, while the tan shading represents the 500-year floodplain.

Irrigation District Facilities

NMID facilities that are within the affected environment include the Purdam Drain between Star Road and the Pioneer Irrigation District's Phyllis Canal, a reach of approximately 4,140 lineal feet (approximately 0.8 mile). No conveyance crossing structures are within this reach.

PID facilities that are within the affected environment are the Phyllis Canal at the Purdam Drain crossing and the Caldwell Highline Canal at the Mason Creek crossing. The hydraulic analyses for both structures indicate that presently under the 100-year flood event, floodwaters are anticipated to overtop both canal embankments by significant amounts.

3.1.2 Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the analyses show that under the 100-year flood event, the capacity of Purdam Drain and Mason Creek will be exceeded. Only two of the existing conveyance facilities are expected to be able to adequately convey the 100-year flood event. The two crossings that are adequately sized are the large culvert pipe that conveys Mason Creek under Ustick Road, and the 26-foot bridge under State Highway 20.

The hydraulic analyses for the Purdam Drain and Mason Creek indicate that presently under 100-year flood event, floodwaters are anticipated to overtop the Phyllis Canal at the Purdam Drain crossing, and the Caldwell Highline Canal at the Mason Creek crossing by significant amounts.

Alternative B – Proposed Action

Under the Proposed Action, Reclamation analyzed the potential effects of adding up to 3.3 cfs additional flow to a predetermined high water event. The range of high water events vary between 704 cfs (a 100-year flood event on Purdam Drain) to 1,266 cfs (a 100-year flood event on Mason Creek). A flow of up to 3.3 cfs ranges between 0.5 and 0.3-percent of the projected high water events. Table 3-6 illustrates the numerical impact that would be attributed to an increased discharge of up to 3.3 cfs.

Table 3-6. Proposed flow increase compared to project 100-year flood event.

Flood Event	Purdam Drain		Mason Creek	
	Discharge (cfs)	3.3 cfs as a percent of Discharge	Discharge (cfs)	3.3 cfs as a percent of Discharge
100-Year ("1 percent Annual Chance")	704	0.5 percent	1,266	0.3 percent

The narrow impact range (0.3 percent to 0.5 percent) identified in Table 3-6, while theoretically measurable, can only be considered measurable when produced under strictly controlled laboratory conditions. On a practical basis, this narrow range will be undetectable in the field when using present-day techniques and equipment. The USGS manual addressing techniques and standards for making discharge measurements describes conditions of being able to measure to within a 2 percent accuracy as “excellent,” while “good” conditions are accurate within plus or minus 5 percent (Turnipseed and Sauer 2010).

The quality of measurements are directly affected by a number of factors typically encountered in the field, including the uniformity of cross section, flow conditions, and weather, which results in the USGS statement “(a)s a general rule, the accuracy of most discharge measurements will be about 5 percent.” Conditions that materially affect measurements include the smoothness of the streambed, the presence of large rocks in the channel or flood plain, the uniformity of velocity, uniformity of approach conditions, the presence of in-channel obstructions (bridge piers, diversion structures, etc.), uniformity of flood plain vegetation, rapid stage changes, and adverse weather, including wind and ice. “Excellent” conditions (plus or minus 2 percent accuracy) can and will be quickly degraded to “good,” “fair” or “poor” conditions through the presence of any combination of these factors.

For instance, a measurement might be rated as excellent (2 percent) if (1) the cross section is smooth, firm, and uniform; (2) the velocity is smooth and evenly distributed; (3) the equipment is in good condition; (4) the two-point velocity measurement method was used; and (5) weather conditions are good (no wind or ice). On the other hand, several of these factors together will make it difficult to accurately measure depth and (or) velocity, and the measurement might be rated fair (8 percent), or even poor (more than 8 percent). The qualitative-accuracy evaluation is based on the hydrographer’s judgment, in this case, Reclamation’s. Table 3-7 summarizes the commonly accepted qualitative evaluation criteria for discharge measurements, as defined by the USGS. Therefore, while the impacts of 3.3 cfs is theoretically measurable, the hydrology of the Purdam Drain and Mason Creek make impacts in the range of 0.3 to 0.5 percent practicably immeasurable and unnoticeable to observers of the drain during a 100-year flood event.

Table 3-7. USGS qualitative evaluation criteria for flow measurement.

USGS Qualitative Description	Relative Accuracy of Measurements
Excellent	+/- 2 percent
Good	+/- 5 percent
Fair	+/- 8 percent
Poor	> 8 percent

Impacts to Purdam Drain

As stated in the No Action Alternative, according to the results of the HY-8 Program, not one of the existing Purdam Drain conveyance crossing inventoried is anticipated to pass the 100-year flood event under today's built conditions. The analysis shows that under the 100-year flood event, the capacity of the drain and its conveyance crossings would be far exceeded. As a result, when the flow in the drain is increased by up to 3.3 cfs the impacts would not have an observable effect on the affected environment. Output data from the HY-8 Program are provided in Appendix A.

Impacts to Mason Creek

According to the HEC-RAS analysis, only two of the existing Mason Creek conveyance crossings inventoried are anticipated to pass the 100-year flood event under current conditions. To analyze impacts from the proposed maximum increase of up to 3.3 cfs, the Mason Creek HEC-RAS model was modified by including additional flows in 0.5 cfs increments on top of the 100- year flood event. An upper limit of 3.5 cfs was used. While this is 0.2 cfs greater than the proposed maximum instantaneous discharge value, the nominal difference between the two flows, 3.3 and 3.5 cfs was considered a conservative method to evaluate impacts from increased flows.

The HEC-RAS model evaluated the modeled increase in water surface elevations or increase in the width of the flood plan inundated during the 100-year flood event. Table 3-8 summarizes the inventoried Mason Creek facilities by stating whether the conveyance crossings can pass the full 100-year flood event with an additional 3.5 cfs. The use of this slightly higher flow (6 percent) allowed for uniform incremental steps during the initial stages using the HEC-RAS model.

Table 3-8. Mason Creek – proposed conveyance crossings capacities (FEMA 2011).

Mason Creek Conveyance Crossing[1]	Station	Material (CMP, RCP, Etc.)	Bridge Span (feet)	Diameter or Other Shape (feet)	Conveyance Passes the 100-year Flood Event Plus 3.5 cfs Y/N?
Polk Road	057+00	CMP Arch	-	10 x 7.5	N
Pipe	061+70	-	44	-	N
Flume	064+52	-	37	-	N
Private Road	091+20	-	15	-	N
Lincoln Road	112+00	CMP	-	8	N
Mason Road	117+90	CMP	-	8	N
Flume	123+80	-	43	-	N
Diversion Structure	167+20	-	-	-	N
Marble Front Road	171+00	CMP Arch	-	14 x 7.5	N
Private Road	182+00	-	-	-	-
Diversion Structure	184+00	-	-	-	N
Pipe Crossing	191+50	-	58	-	N
Ward Lane	194+00	CMP	-	8	N
Private Crossing	219+00	-	25	-	N
Middleton Road	230+60	CMP	-	8	N
Flume	242+58	-	56	-	N
State Highway 20	243+25	-	26	-	**Y**
Private Crossing	270+50	-	29	-	N
Flume	284+75	-	59	-	N
Flume	294+50	-	-	-	-
Flume	302+50	-	-	-	-
Caldwell Highline Canal	309+50	CMPs	-	4, 4 & 4	N
Linden Road	312+50	-	28	-	N
Midland Blvd	324+20	CMP	-	8	N
UP Railroad	346+50	CMP	-	4	N
Private Crossing	361+00	-	30	-	N
Flume	361+40	-	24	-	N
Diversion Structure	392+30	-	-	-	N
Ustick Road	393+50	CMP	-	16	**Y**

1 – Crossings listed in order from upstream to downstream.

The HEC-RAS modeling demonstrates that maximum projected increases in water surface elevations would generally be between 0.01 to 0.03 feet (1/8 to 3/8 of an inch). When compared to projected flood elevations of 8 to 12 feet of maximum flood water depth, these changes are between 0.1 and 0.4 percent. Considering the inherent fluctuations in water surfaces during a high water event, these differences would be physically immeasurable.

As stated in the No Action Alternative, the crossing at Ustick Road and State Highway 20 are the only two crossings adequately sized to handle the 100-year flood event. These two crossings are also adequately sized to handle an additional 3.5 cfs of flow from the Proposed Action as shown in Table 3-8.

Figure 3-6, Figure 3-7, and Figure 3-8 provide a graphical representation that shows, in profile view road crossings at State Highway 20, Linden Road, and Ustick Road during the 100-year flood event with an additional 3.5 cfs. The figures show the 100-year flood event in blue and the additional 3.5 cfs of flow as a bright blue line. The Ustick Road and State Highway 20 crossings are not inundated, while the Linden Road crossing shows the 100-year flood event overtopping the road illustrated in grey. Output data from the HEC- RAS modeling for all Mason Creek conveyance crossings are provided in Appendix A.

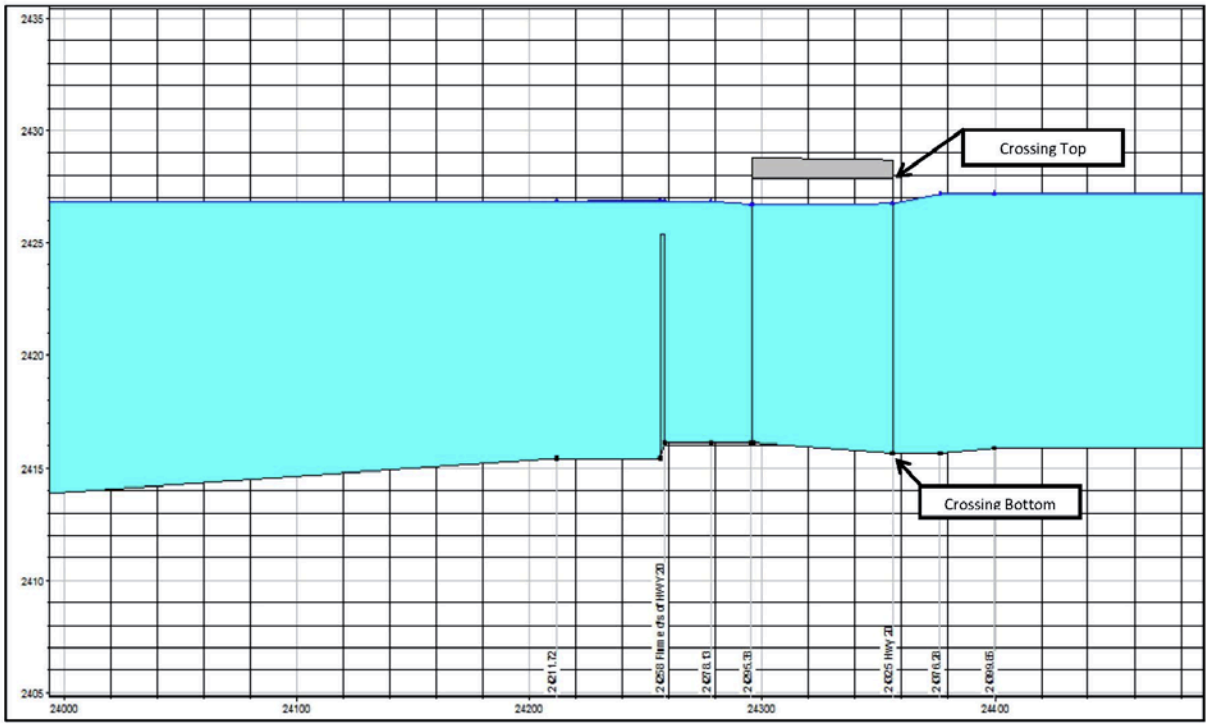

Figure 3-6. State Highway 20 – Mason Creek crossing HEC-RAS plot.

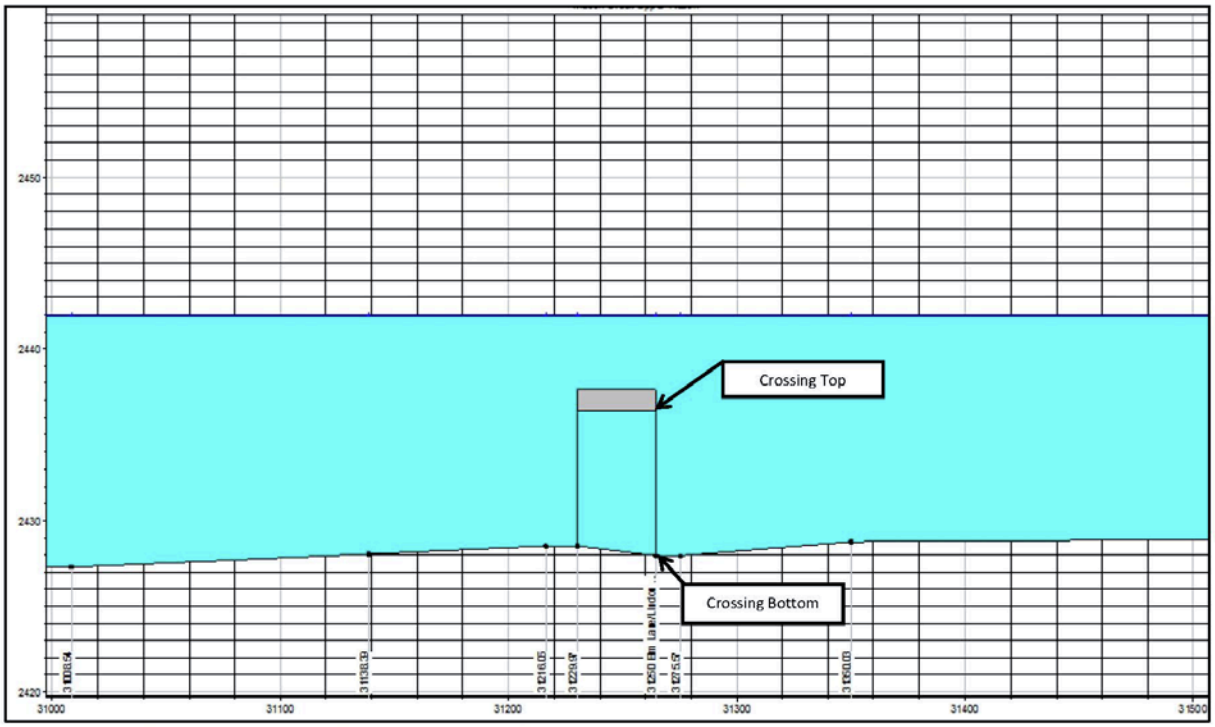

Figure 3-7. Linden Road – Mason Creek crossing HEC-RAS plot.

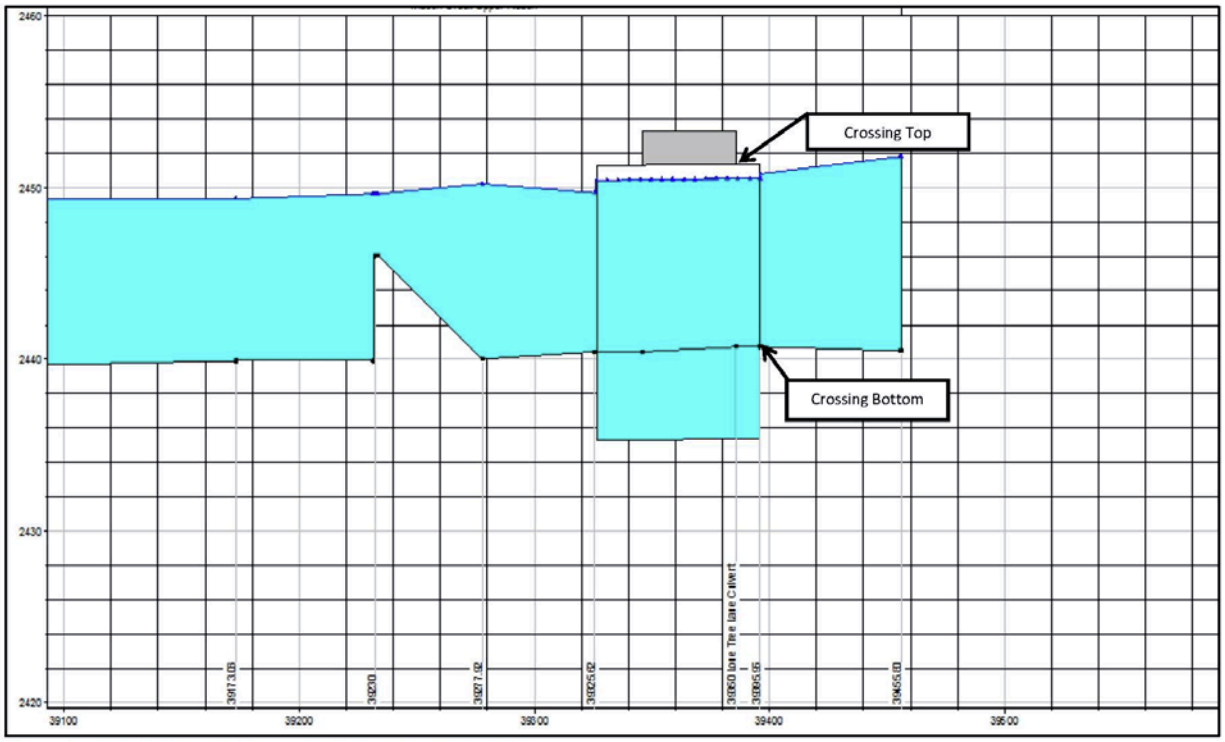

Figure 3-8. Ustick Road – Mason Creek crossing HEC-RAS plot.

Other Impacts

A review of lateral floodplain impacts indicate that the predicted median change in the width of the flooded area is less than one foot, or less than 2 percent of the floodplain width. Due to normal water surface elevation fluctuations during a high water event, any changes as a result of an increase up to an additional 3.3 cfs flow would be anticipated to be practicably immeasurable.

Since the increase in discharge would be relatively immeasurable, risks attributed to additional siltation deposits, bed, or structural scour are considered unquantifiable. Similarly, the risk of adverse impacts to the aquatic and terrestrial environments along both Purdam Drain and Mason Creek are also anticipated to be unquantifiable due to the low magnitude of change.

Impact on Irrigation District Facilities

The Purdam Drain between Star Road and the PID's Phyllis Canal is the only NMID facility within the affected environment. As there are no conveyance structures within this reach, impacts associated with an increase up to 3.3 cfs on NMID facilities are anticipated to be minimal and as described previously about the Purdam Drain.

The principal PID facilities within the affected environment are the Phyllis Canal and the Caldwell Highline Canal, which cross the Purdam Drain and Mason Creek, respectively. The hydraulic analyses for both structures indicate that under the 100-year flood event, floodwaters are anticipated to overtop both canal embankments by significant amounts. The addition of up to 3.3 cfs is not anticipated to materially affect the projected impacts associated with the 100-year flood event at either the Phyllis Canal or Caldwell Highline Canal. Therefore, existing irrigation facilities are not anticipated to experience additional hydraulic or environmental stress, due to an increase of flows up to 3.3 cfs. The Phyllis Canal and the Caldwell Highline Canal crossings have been demonstrated to be sized to adequately handle only events smaller than the 100-year flood event.

3.2 Water Quality

An important issue raised during the scoping process for this Draft EA is the desire by local highway and land use jurisdictions (i.e., Canyon County Highway District and city of Caldwell) to discuss potential water quality impacts to existing structures, and drain operations to the conveyance facilities. This section provides an overview of the existing water quality regulations that pertain to Lactalis' operations and the Proposed Action, a description of the hydrologic and hydrogeological conditions within the region and drain system subject to the additional proposed discharge, and a discussion of potential

environmental consequences resulting from the Proposed Action on both surface water and groundwater quality.

The constituents of concern related to the Proposed Action include Total Phosphorus (TP), Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), *E. coli*, and pH limits.

Regulatory Background

Federal Clean Water Act

The CWA regulates discharges of water (i.e., from pipes or other "point source" outlets) to "waters of the United States" (e.g., streams or wetlands) if those discharges contain pollutants. The regulated materials or chemical compounds and their respective threshold levels are defined by the EPA and State Water Quality Standards.

Section 305(b) of the CWA requires the State of Idaho to identify the quality of all waters in the state. Section 303(d) of the CWA requires the State to further identify those waters where required pollution controls are not sufficient to attain or maintain applicable water quality standards.

TMDLs, Point Sources, and Nonpoint Sources

The maximum amount of a pollutant a waterbody can receive and still meet water quality standards is a TMDL. A TMDL is an allocation of that load among various sources of that pollutant with the pollutant sources characterized as either point sources or nonpoint sources. A TMDL also accounts for seasonal variations in water quality, and include a margin of safety to account for uncertainty in predicting how well pollutant reductions will result in meeting State Water Quality Standards.

Point sources are sources subject to regulation under the NPDES permitting program, e.g., wastewater treatment facilities, some stormwater discharges, and concentrated animal feeding operations (CAFOs). Because Lactalis discharges treated wastewater to the Purdam Drain, which EPA deems to be Waters of the United States, Lactalis was required to seek and did obtain EPA approval via a NPDES permit to discharge effluent from its wastewater treatment plant in 2005. Lactalis' NPDES permit sets effluent limits for BOD, TSS, *E. coli*, pH, and Phosphorus and stream monitoring requirements for Ammonia (NH3), Nitrate + Nitrite (NO_3 + NO_2), Nitrite (NO_2), Total Kjeldahl Nitrogen (TKN), Ortho-Phosphate (OPO_4), and TP. A copy of Lactalis' NPDES Permit and the 2013 NPDES Permit Renewal Application including effluent and water quality monitoring are included in Appendix B.

Point sources receive a wasteload allocation (WLA) that defines the receiving water's loading capacity allocated to one of its existing or future point sources of pollution (e.g., permitted

wastewater treatment facilities). The loading or assimilative capacity is the ability of a body of water to receive pollutants without exceeding a specific concentration.

Nonpoint sources include all remaining sources of pollutants as well as anthropogenic and natural background sources. Nonpoint sources of pollution receive a load allocation (LA) that identifies the portion of the loading capacity attributed to (1) the existing or future nonpoint sources of pollution and (2) natural background sources.

Lower Boise River Subbasin Assessments and TMDL

Lower Boise River Subbasin Assessments

The Lower Boise River flows to the northwest through Ada and Canyon counties and the cities of Boise and Caldwell. It originates at Lucky Peak Dam and flows 64 miles to its confluence with the Lower Snake River near Parma, Idaho.

Beneficial uses of Lower Boise River water determined by IDEQ and EPA to have been affected by pollutants in its subbasin include: cold water aquatic life (CWAL), salmonid spawning, domestic and agricultural water supply, primary and secondary contact recreation (SCR). Of seven listed pollutants (flow alteration, sediment, dissolved oxygen, oil and grease, nutrients, bacteria, and temperature) in the subbasin, IDEQ has completed TMDLs for sediment and *E. coli*.

Since the Lower Boise River is a major tributary to the Lower Snake River, phosphorus (total and dissolved) are being examined by IDEQ and EPA for possible LAs and WLAs based on the downstream Snake River-Hells Canyon TMDL.

Lower Boise River TMDL

The Lower Boise River TMDL includes Mason Creek and its tributary, the Purdam Drain. The TMDL establishes targets and load capacities for specific pollutants of concern in the Lower Boise River, estimates existing pollutant loads, and allocates responsibility for pollutant load reductions needed to return listed waters to a condition meeting water quality standards. It also identifies implementation strategies, including reasonable time frames, approach, responsible parties, and monitoring strategies necessary to achieve pollutant load reductions and meet water quality standards in the future. The EPA approved the initial Lower Boise River TMDLs for Sediment and Bacteria on January 25, 2000. Addendums to Lower Boise Sediment and Bacteria TMDLs were approved by EPA on June 3, 2008. IDEQ is currently developing a TMDL for TP.

3.2.1 Affected Environment

In addition to the drain capacity analysis discussed in Section 3.1, water quality of this stretch is analyzed to determine potential adverse impacts of the Proposed Action. Surface water and groundwater quality data were gathered from multiple sources and summarized below.

Surface Water Quality

Lactalis discharges treated wastewater effluent to the Purdam Drain under a NPDES permit, which flows to Mason Creek in route to the Lower Boise River. The Lower Boise River is the receiving stream and its TMDL requires that phosphorus, sediment, and bacteria loadings be reduced in Mason Creek.

Irrigation activities, including irrigation return flows and stormwater discharges from agricultural lands, are nonpoint sources and exempt the requirement to operate under an NPDES permit. The irrigation districts that surround Purdam Drain and Mason Creek operate under this exemption.

Mason Creek

The Mason Creek subwatershed drains approximately 62 square miles of rangeland, agricultural land and urban areas (IDEQ 2015b). The creek largely flows through Canyon County with headwaters located in Ada County where the drain originates from a feeder canal off the New York Canal (ISDA 2002). Much of the creek is maintained as an agricultural drain by the Pioneer Irrigation District.

Mason Creek and five other stream segments within the Lower Boise River watershed are included in the 2012 Integrated Report (IDEQ 2014) as waters whose required pollution controls are not sufficient to attain or maintain appropriate State Water Quality Standards.

Mason Creek is listed as being impacted by dissolved oxygen (DO), sediment, and nutrients. (IDEQ 2001b). The report also identifies CWAL and SCR as beneficial uses for Mason Creek. While SCR is a designated use, CWAL is a presumed use. A subsequent assessment of Mason Creek conducted by IDEQ on March 30, 2012 found CWAL and SCR beneficial uses not to be supported (IDEQ 2014). Therefore, the Mason Creek is subject to load reduction requirements at its confluences with the Lower Boise River.

Table 3-9 is taken from the “Lower Boise River TMDL: 2015 Total Phosphorus Addendum” The table presents the E. coli and sediment concentrations and loads in the Mason Creek (IDEQ 2015b). Concentrations for E.coli are presented in colony forming units per 100 mL (cfu/100 mL), and sediment are presented in milligrams per liter (mg/L). Loads are presented in 10 trillion colony forming units per day (109 cfu/day) and kilograms (kg) and pounds (lbs)

per day for sediment. These concentrations and loads are similar to concentrations and loads found in other impaired streams that discharge to the Lower Boise River (IDEQ 2015b).

Table 3-9. Lower Boise River TMDL – Mason Creek *E. coli* and sediment concentrations.

Existing *E. coli* Concentration [a] (cfu/100 mL)	Existing *E. coli Load* (10^9 *cfu/day)*	Existing Sediment Concentration [a] (mg/L)	Existing Sediment Load	
			(kg/day)	(lb/day)
709[b]	1.521	80.4[c]	32,049	70,656

[a] Maximum concentration, collected per IDAPA 58.01.02.251.01
[b] Data from ISDA, July 1999
[c] Data from ISDA, 2008

Purdam Drain

Purdam Drain, also known as Purdum Drain and Purdam Gulch Drain, is a tributary to Mason Creek that drains 10,477 acres of land to the southeast of its confluence with Mason Creek. It was engineered to provide capacity for 20 to 28 cfs of discharge providing a base width of 5 feet, a water surface width of 8 to 10 feet, and a depth of 1 to 1.6 feet (IDEQ 2015b).

NPDES Purdam Drain Surface Water Monitoring

The previously discussed Lower Boise River TMDL did not collect stream specific data for the Purdam Drain. Data for the Purdam Drain was collected as a requirement of Lactalis' 2005 NPDES permit. Lactalis monitors flows and takes surface water samples monthly from two locations along the Purdam Drain. One location is upstream of the Lactalis discharge point and the other downstream. The upstream monitoring location is at the intersection of the Purdam Drain with Star Road, immediately upstream of the Lactalis outfall. The downstream monitoring location is at the confluence of the Purdam Drain with Mason Creek. These locations are shown in Figure 3-9.

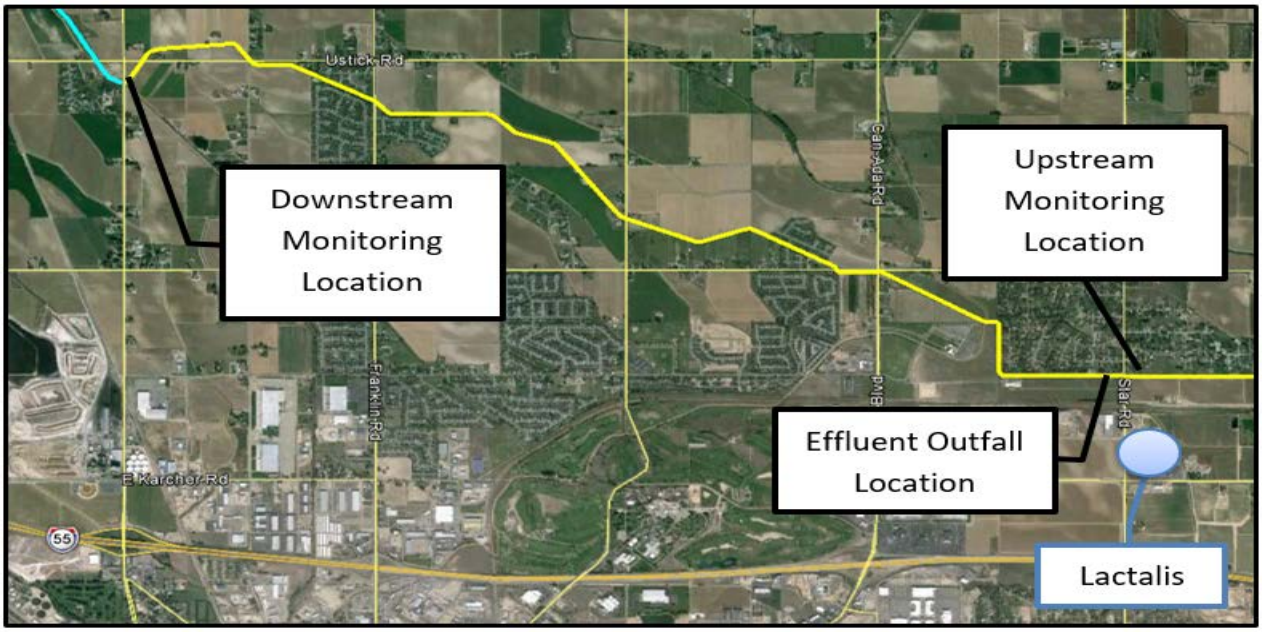

Figure 3-9. NPDES permit surface water monitoring locations.

Collection of water quality data for the Purdam Drain started in 2006, and collection of flow data started in December 2005. Parameters analyzed include Ammonia (NH_3), Nitrate + Nitrite (NO_3 + NO_2), Nitrite (NO_2), TKN, Ortho-Phosphate (OPO_4), and TP. These parameters and their sample frequencies are listed in Table 3-10.

Table 3-10. NPDES Permit # ID-002803-7 surface water monitoring requirements.

Parameter	Units	Sample Location		Sample Frequency	Sample Type
		Upstream	Downstream		
Flow	MGD[1]	•	•	Monthly	Measure
Nitrite	mg/L	•		Quarterly	Grab
Nitrate + Nitrite	mg/L	•		Quarterly	Grab
Total Kjeldahl Nitrogen	mg/L	•		Quarterly	Grab
Total Ammonia as N	mg/L	•	•	Quarterly	Grab
Total Phosphorus as P	mg/L	•	•	Quarterly	Grab
Orthophosphate as P	mg/L	•	•	Quarterly	Grab
pH	s.u.	•	•	Quarterly	Grab
Temperature	°C	•	•	Quarterly	Grab
[1] million gallons per day					

Flow Data from 2005 to 2013

The average monthly flow in the Purdam Drain from December 30 2005, through April 1 2013 was 13.09 million gallons per day (MGD) (20.25 cfs) at the upstream monitoring location. Measured flows ranged from a low of 1.11 MGD (1.72 cfs) to a high of 59.13 MGD

(91.49 cfs). As shown in Figure 3-10, the highest flows at the upstream monitoring location typically peak in early July and lowest flows generally occur in early spring between February and April.

The average monthly flow in the Purdam Drain from December 30, 2005, through April 1, 2013 was 30.23 MGD (46.77 cfs) at the downstream monitoring location. Measured flows ranged from a low of 5.75 MGD (8.89 cfs) to a high of 130.68 MGD (202.19 cfs). Figure 3-10 shows that the downstream flows increase in later years after lagging behind upstream flows in earlier years.

The difference between the upstream and downstream flows can be attributed to a combination of water discharged to the drain from various irrigation drains located along the Purdam Drain, effluent from the Lactalis facility, and other unknown variables. The downstream monitoring location therefore does not reflect actual or potential impacts of the Lactalis' effluent on the Purdam Drain. This analysis compares the water quality data from the monitoring locations to the permitted effluent limits and effluent water quality data.

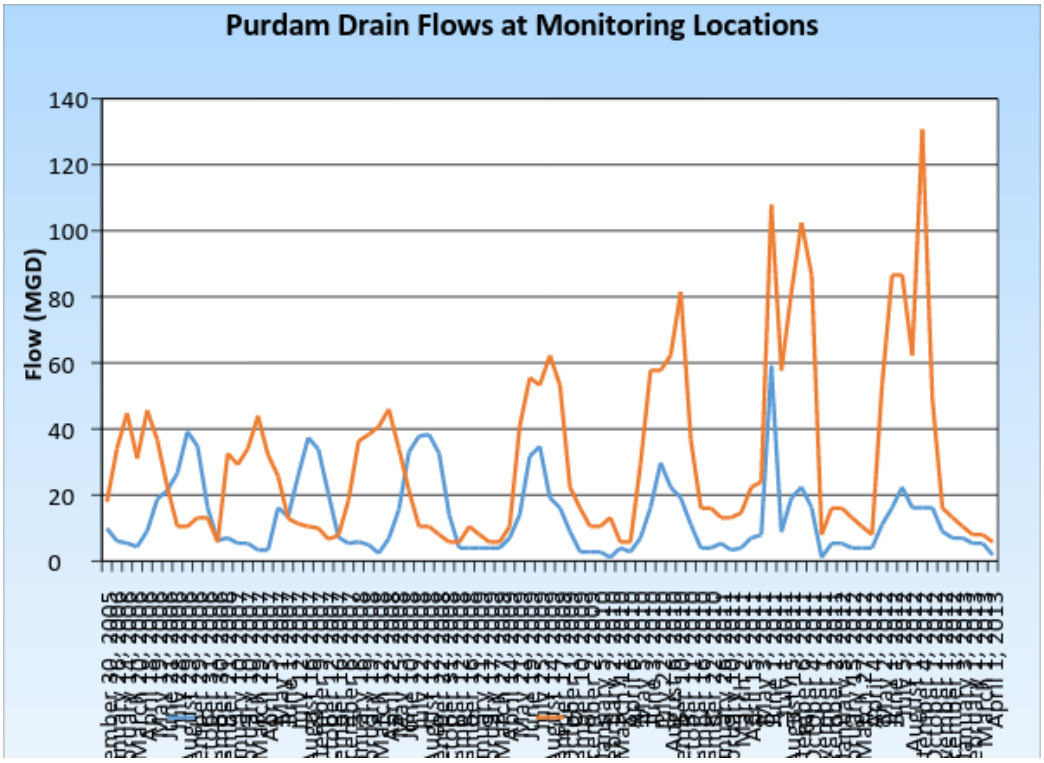

Figure 3-10. Purdam Drain upstream and downstream flows.

Water Quality Data from 2006 to 2015

Water quality data were collected monthly to identify the background conditions in the Purdam Drain to compare to the discharged effluent. Averages and medians of the monthly results from the upstream and downstream monitoring locations are discussed below and are listed in Table 3-11. Long-term averages of effluent water quality data collected from May 2008 to April 2013 are also discussed below, and provided in the NPDES Permit Renewal Application in Appendix B.

Table 3-11. Purdam Drain upstream and downstream surface water monitoring data from January 2006 to June 2015.

	Upstream Monitoring Location				Downstream Monitoring Location			
	NH_3	NO_3+ NO_2	NO_2	TKN	NH_3	NO_3+ NO_2[a]	NO_2[a]	TKN[a]
	(mg/L)				(mg/L)			
average	0.08	3.42	0.20	0.52	0.06	3.67	0.29	0.55
median	0.04	3.80	0.02	0.40	0.04	3.86	0.03	0.51

	Upstream Monitoring Location				Downstream Monitoring Location			
	OPO_4	TP	pH	Temp	OPO_4	TP	pH	Temp
	(mg/L)		(s.u.)	(°C)	(mg/L)		(s.u.)	(°C)
average	0.19	0.252	7.8	11.09	0.21	0.30	7.80	11.51
median	0.20	0.240	7.8	11.00	0.21	0.27	7.80	11.47

Ammonia (NH_3) concentrations in water samples collected from both upstream and downstream locations have typically been below detection limit (0.04 mg/L). Average concentrations of ammonia at the upstream and downstream monitoring locations during the monitoring period were 0.08 mg/L and 0.06 mg/L, respectively.

Effluent data collected as a NPDES permit requirement show long-term averages for ammonia of 0.40 mg/L and 2.10 lbs/day. While effluent concentrations are greater than the upstream and downstream levels, the effluent loading contribution is notably less as the average monthly upstream drain flow is nearly twenty times the effluent discharge (20.25 cfs compared to 1.2 cfs), and the downstream drain flow is nearly forty times the effluent discharge (46.77 cfs compared to 1.2 cfs). Based on these flow rates, the ammonia loading at the upstream monitoring location is approximately 7.27 lbs/day, greater than the effluent daily contribution of 2.10 lbs.

Nitrate + Nitrite (NO_3 + NO_2) concentrations were above the minimum detection limit (0.02 mg/L) in all samples collected from both upstream and downstream monitoring locations.

Average concentrations of nitrate + nitrite at the upstream and downstream monitoring locations over the monitoring period were 3.42 mg/L and 3.67 mg/L, respectively.

Effluent data collected as a NPDES permit requirement show long term averages for nitrate + nitrite of 2.35 mg/L and 12.95 lbs/day. The effluent concentration is lower than the upstream and downstream concentrations.

Nitrite (NO_2) concentrations are typically near the detection limit of 0.01 mg/L at both the upstream and downstream monitoring locations. However, three elevated quarterly average concentrations skew the average concentrations for the upstream and downstream monitoring locations upward to 0.20 mg/L and 0.29 mg/L, respectively. The median values for these two locations are therefore more representative at 0.02 mg/L and 0.03 mg/L for upstream and downstream respectively.

Effluent data collected as a NPDES permit requirement show long-term averages for nitrite of 0.05 mg/L and 0.27 lbs/day. While effluent concentrations are greater than the upstream and downstream levels, the effluent loading contribution is notably less as the average monthly upstream and downstream drain flows are nearly twenty and forty times the effluent discharge. Based on these flow rates, the nitrite loading at the upstream monitoring location is approximately 1.82 lbs/day, greater than the effluent daily contribution of 0.27 lbs.

Total Kjeldahl Nitrogen (TKN) concentrations for upstream and downstream monitoring locations vary from 0.2 mg to 1.1 mg/L. Average concentrations of TKN for the upstream and downstream monitoring locations are 0.52 mg/L and 0.55 mg/L respectively. Median values are 0.40 mg/L and 0.51 mg/L respectively.

Effluent data collected as a NPDES permit requirement show long term averages for TKN of 1.49 mg/L and 7.84 lbs/day. While effluent concentrations are greater than the upstream and downstream levels, the effluent loading contribution is notably less as the average monthly upstream and downstream drain flows are nearly twenty and forty times the effluent discharge. Based on these flow rates, and the TKN upstream TKN concentration of 0.52 mg/L, the TKN loading at the upstream monitoring location is approximately 47.27 lbs/day, greater than the effluent daily contribution of 7.84 lbs.

Ortho-Phosphate (OPO_4) concentrations for upstream and downstream monitoring locations vary from 0.08 mg/L to 0.38 mg/L. Average concentrations of ortho-phosphate for the upstream and downstream monitoring locations are 0.19 mg/L and 0.21 mg/L respectively.

Effluent data collected as a NPDES permit requirement show long term averages for ortho-phosphate of 0.006 mg/L and 0.033 lbs/day. The effluent concentration is lower than the upstream and downstream ortho-phosphate concentrations in the drain.

Total Phosphorus (TP) concentrations for upstream and downstream monitoring locations vary from 0.16 mg/L to 0.49 mg/L over the monitoring period. The average concentrations of total phosphorus for the upstream and downstream monitoring locations are 0.25 mg/L and 0.30 mg/L respectively. Effluent data collected as a NPDES permit requirement show long term averages for TP of 0.032 mg/L and 0.172 lbs/day, lower than the concentrations in the drain. These effluent values are also lower than the NPDES average monthly permit limits for Total Phosphorus, which are 0.07 mg/L and 0.29 lbs/day. NPDES permit limits and effluent water quality data are discussed later in this subchapter.

Permitted Point and Nonpoint Sources Discharges

There are six NPDES permitted point sources that discharge to Mason Creek or its tributaries (Table 3-12). Five are stormwater permits, and one is the Lactalis NPDES permit. The stormwater permits are based on implementation of best management practices and have no numeric permit limits, while the NPDES permit monitors and regulates five parameters. The NPDES limits for effluent discharge from Lactalis permit are listed in Table 3-13.

The five parameters monitored and regulated by Lactalis' 2005 NPDES permit are BOD, TSS, *E. coli*, pH, and phosphorus. The water quality concerns with these parameters are described below Table 3-13. Six other additional parameters are monitored, but not regulated in the NPDES permit: temperature, ortho-phosphate, TKN, nitrate + nitrite, nitrite, and ammonia.

Table 3-12. Point source discharges to Mason Creek (IDEQ 2015b).

Name	Permit Number	Receiving Water	Type
City of Caldwell	IDS-028118	Indian and Mason Creeks	Stormwater
Canyon Highway District #4	IDS-028134	Indian and Mason Creeks	Stormwater
ITD #3	IDS-028177	Fivemile, Tenmile, Indian, Mason Creeks	Stormwater
Nampa Highway District #1	IDS-028142	Mason and Indian Creeks	Stormwater
City of Nampa	IDS-028126	Mason and Indian Creeks	Stormwater
Lactalis	ID-002803-7	Mason Creek (via Purdam Drain)	Industrial

Table 3-13. NPDES permit #ID-002803-7 effluent limitations and monitoring requirements.

Parameter	Units	Avg. Month	Max. Daily	Inst. Max
BOD	mg/L	10	20	-
	lbs/day	42	84	-
TSS	mg/L	13	25	-
	lbs/day	53	106	-
E. Coli	#/100ml	126		406
pH	s.u.		6.0 - 9.0	
Phosphorus	mg/L	0.07	0.14	-
	lbs/day	0.29	0.58	-

Biochemical Oxygen Demand (BOD) is the amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period. Effluent monitoring data from May 2008 to April 2013 were analyzed and show long term averages of BOD at 2.8 mg/L and 15.4 lbs/day. These values are below the average monthly limits presented in Table 3-13.

The pH indicates the sample's acidity but is actually a measurement of the potential activity of hydrogen ions (H+) in the sample. The pH measurements run on a scale from 0 to 14, with 7.0 considered neutral. Solutions with a pH below 7.0 are considered acidic. Effluent monitoring data from May 2008 to April 2013 were analyzed and show maximum 30-day pH values ranging from 6.80 s.u. to 7.68 s.u. These values are within the permitted range presented in Table 3-13.

Phosphorus is an essential nutrient for plants, animals and humans. Under natural conditions phosphorus (P) is typically scarce in water. Human activities, however, have resulted in excessive loading of phosphorus into many freshwater systems. This can cause water pollution by promoting excessive algae growth, particularly in lakes. Water quality can be further impaired when bacteria consume dead algae and use up dissolved oxygen, suffocating fish and other aquatic life. As discussed earlier, effluent monitoring data for phosphorus from May 2008 to April 2013 were analyzed and show long-term averages of 0.032 mg/L and 0.172 lbs/day. These values are below the average monthly limits presented in Table 3-13.

Total Suspended Solids (TSS) are solids in water that can be trapped by a filter. TSS can include a wide variety of material, such as silt, decaying plant and animal matter, industrial wastes, and sewage. High concentrations of suspended solids can cause many problems for stream health and aquatic life. Effluent monitoring data for TSS from May 2008 to April

2013 were analyzed and show long-term averages of 4.1 mg/L and 22.31 lbs/day. These values are below the average monthly limits presented in Table 3-13.

E. coli is a type of fecal coliform bacteria commonly found in the intestines of animals and humans. *E. coli* is short for Escherichia coli. The presence of *E. coli* in water is a strong indication of recent sewage or animal waste contamination. Sewage may contain many types of disease-causing organisms. Effluent monitoring data for *E. coli* from May 2008 to April 2013 were analyzed and show a long term averages of 2.6 cfu/ 100 ml. This value is below the average monthly limit presented in Table 3-13.

Groundwater Quality

Regional Hydrogeology

The hydrogeology of the area can be broken into deep and shallow groundwater zones, separated by a blue clay layer. Besides these groundwater systems, there are potentially three to five deeper aquifers below the project area (Anderson and Wood 1981). The source of recharge for the deep system probably comes from the Owyhee Mountains to the south and/or the Idaho Batholith to the north (Anderson and Wood 1981).

The shallow groundwater zone occurs in older terrace gravels, basalts of the Snake River Group, younger terrace gravels, and Quaternary alluvium. Recharge to the shallow zone is mainly from leakage of irrigation canals and laterals, downward percolation of applied irrigation water and precipitation, and downward percolation of domestic wastewater from septic tanks (Dion 1972). Other minor recharge sources include small streams, upward leakage of water from the deep aquifer, and natural leakage of groundwater from outside the project area (Dion 1972). Most of the recharge occurs during April to October, which corresponds with the irrigation season (Dion 1972).

Local Hydrogeology

The Lactalis site is located in an area underlain by two major cold water (less than 85°F) aquifers (IDEQ 2015b):

1. The shallow, unconfined Lower Boise River gravel aquifer; and
2. The deep, semi-confined to confined Idaho Group aquifer.

While canal seepage and irrigation application are sources of recharge to the shallow aquifer, the primary water yielding strata are interbedded sand, silt, and claystone of the Idaho Group. Historically, these groundwater levels were lower than they are today. Extensive irrigation including surface flooding and furrow irrigation methods resulted in rising groundwater levels. However, groundwater levels have since stabilized since many drains and wells were dug back in the 1910s and 1920s.

Approximately 650,000 gpd are used annually at the cheese processing facility. This usage volume is expected to increase to 1 MGD (average daily flow) by 2023.

Groundwater quality testing includes approximately 75 constituents that are tested regularly in operating wells. Total coliform was detected in the distribution system in September 1994, and again in August and September 2004. Testing over the past 10 years measured trace elements of barium, fluoride, beryllium, and iron in both wells. Between 2004 and 2014, the maximum nitrate concentration was 1.8 mg/L, which is well below the maximum contaminant level (MCL) of 10 mg/L as set by the EPA. No VOC's or SOC's were tested.

3.2.2 Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, Lactalis would continue to discharge its effluent at the current average daily flow rate of 1.2 cfs and continue to comply with the limits of its existing NPDES permit.

Lactalis would monitor and analyze its effluent and the water in the Purdam Drain at both the upstream and downstream monitoring locations to verify that Lactalis' wastewater treatment plant is operating in accordance with its NPDES permit requirements. Its effluent would continue to have little to no effect on the water quality of surface and groundwater sources.

Alternative B – Proposed Action

The Proposed Action would permit an increase in the peak instantaneous discharge rate of Lactalis effluent to the Purdam Drain to 4.5 cfs. The decision to permit a peak instantaneous discharge rate of 4.5 cfs would increase the proposed flow in Mason Creek by up to 3.3 cfs.

Under the Proposed Action, the Lactalis wastewater treatment plant would be required to meet existing NPDES permit limits and the WLAs in the Lower Boise River TMDL. These compliance requirements include meeting the identified WLAs for sediment and *E. coli* in the Lower Boise River TMDL. Lactalis would be required to comply with any future NPDES permits and TMDLs, such as the Total Phosphorus TMDL currently being developed by IDEQ, and a new NPDES permit currently being prepared by EPA.

Lactalis would operate its wastewater treatment plant to meet the peak instantaneous proposed flow rate of 4.5 cfs and manage increased pollutant loading to the Purdam Drain under its new NPDES permit. The Proposed Action would be expected to have a nominal effect on surface water quality in the Purdam Drain as the effluent pollutant concentrations are lower than the background levels in the Purdam Drain and would not exceed either the WLAs included in the Lower Boise River TMDL or NPDES permit limits.

Under the Proposed Action, the increased flow to the Purdam Drain would come from increased water usage at the cheese production facility. The water source would be localized groundwater. The primary water yielding strata would be the deep Idaho Group aquifer; not the shallow Lower Boise River Gravel aquifer that is recharged by canal seepage or irrigation application. The gradient of groundwater flow is towards and into the Purdam Drain, therefore, under the Proposed Action, the effluent discharge would not be expected to affect localized or regional groundwater quality.

During necessary facility upgrades for increased growth, there is always potential for environmental issues to arise. Under its current and any future NPDES permit, Lactalis would be required to continue to monitor effluent such that any unexpected noncompliance issues would be addressed prior to discharge to the Purdam Drain by being retreated or used for land application purposes. Similar concerns to the No Action Alternative also exist regarding noncompliance and discharging effluent that has not been treated to acceptable levels.

By maintaining compliance with its NPDES permit and TMDLs, there are no anticipated water quality impacts to human health or plants and animals located within or adjacent to the affected environment. The nominal effect on water quality would not affect any existing drain infrastructure or the ability of the irrigation districts to operate the Purdam Drain or Mason Creek. The Proposed Action would therefore have little or no effect on the quality of surface water and groundwater.

3.3 Land Use and Drainage Systems

Land use classifications characterize the natural and/or human activities that occur at, or are planned for, a given location. Natural land uses include open grassland, open space, forest, open water, and other undeveloped uses. Developed land uses are generally classified as residential, commercial, industrial, airfield, and other types of human-made development. Comprehensive plans, policies, and zoning regulate the type and extent of land uses allowable in specific areas, and often protect environmentally sensitive resources. Land use impacts typically result from actions that negatively affect or displace an existing use, or the suitability of an area for its current, designated, or formally planned use.

3.3.1 Affected Environment

The affected environment is located within Canyon County and parts of the cities of Nampa and Caldwell and includes the Purdam Drain and Mason Creek and the land that borders both drains from the Lactalis outfall to the confluence of Mason Creek with the Lower Boise River. The topography of the proposed action area is near level to gently sloping northwest

towards the Lower Boise River. Much of the area was originally open grassland covered by sagebrush and native grasses reflecting the arid climate of the Snake River Plain. For the most part, this native vegetation has been cleared as land was developed for agriculture or urban uses. The dominant agricultural uses in Canyon County are crop cultivation and raising livestock. Private ownership accounts for about 94 percent of the land in the county, while public lands account for less than 6 percent. Reclamation has property interests such as easements northwest of the discharge site on that portion of Purdam Drain within the PID.

Land use issues in Canyon County are unique and diversified. Current land uses located within the affected environment are typical of an agricultural based community with most commercial and industrial uses being located closer to the city centers of Nampa and Caldwell. There have been recent development changes with agricultural areas being converted to residential uses along the Purdam Drain and Mason Creek. As agricultural land uses change, the county and cities must balance protecting agriculture, while allowing for the expansion of residential, commercial and industrial developments. This balancing act is captured in the following three separate comprehensive plans prepared by the cities of Nampa and Caldwell and Canyon County:

- Nampa 2035 Comprehensive Plan, January 2012 (http://www.cityofnampa.us/index.aspx?NID=516
- City of Caldwell 2030 Comprehensive Plan, Adopted May 17, 2010 http://www.cityofcaldwell.com/PlanningZoning
- Canyon County 2020 Comprehensive Plan http://www.canyonco.org/Elected-Officials/Commissioners/Departments/Development-Services/Ordinances.aspx

Figure 3-12 and Figure 3-13, respectively, are excerpts taken from the Nampa 2015 Proposed Future Land Use Map and the city of Caldwell Comprehensive Plan Map both parts of the first two plans identified above. Together they show future land uses in the proposed project area of medium and high density residential developments throughout areas where agricultural is the current dominant land use.

The Lactalis facility is zoned Light Industrial by Canyon County. The affected environment crosses through the cities of Nampa and Caldwell and unincorporated areas of Canyon County. The zoning of the affected environment includes: Agricultural (unincorporated Canyon County), Single Family Residential and Commercial (city of Nampa), and Low Density Residential (city of Caldwell).

Irrigation Drainage System

The affected environment lies within boundaries of four irrigation districts: PID, NMID, Mason Creek Ditch Company, and Franklin Ditch Company (Figure 3-11). These districts supply irrigation water from the Lower Boise River by a series of irrigation canals and laterals to agricultural lands that crisscross the area. Excess water not used for irrigation drains back into the river.

The PID and NMID are the main irrigation districts that operate the Purdam Drain and Mason Creek. PID irrigates over 20,000 acres, while NMID irrigates approximately 5,000 acres. PID also maintains approximately 250 Reclamation irrigation drains covering approximately 34,050 acres.

The Mason Creek Ditch Company and Franklin Ditch Company are irrigation companies smaller than PID and NMID that border the Mason Creek within the Lower Boise River floodplain.

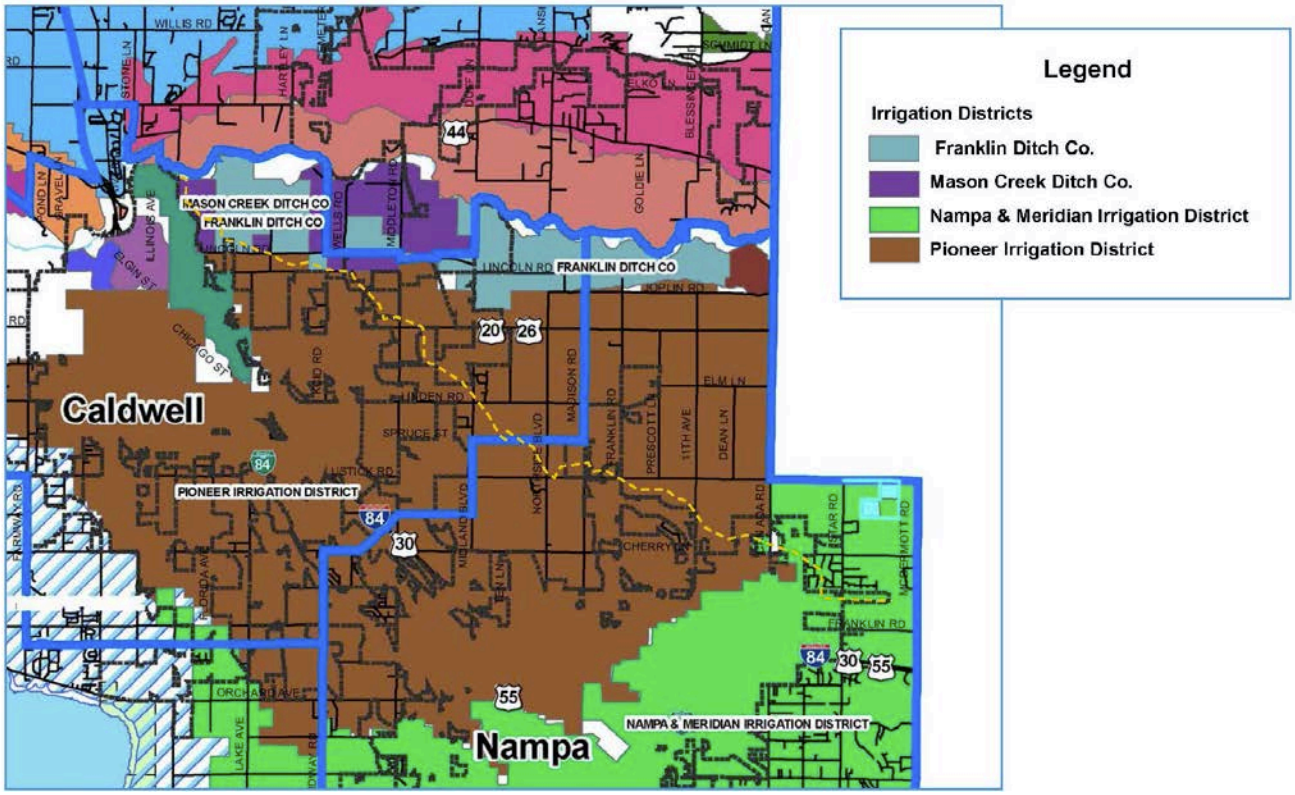

Figure 3-11. Portion of Canyon County, Idaho – Irrigation district map (1/12/2011). Update affected environment shown in the dashed yellow line. (Source: http://www.canyonco.org/Elected-Officials/Commissioners/Departments/Development-Services/Ordinances.aspx.

3.3.2 Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, the discharge from the Lactalis site would not increase and thereby continue to not have an impact on the land use of the surrounding area and the properties that are adjacent to the Purdam Drain and Mason Creek. Lactalis would continue to operate under its current discharge permit and agreements with NMID and PID. Land uses in the affected environment would continue piecemeal development from agricultural to residential, commercial and industrial uses depicted in Figure 3-12 and Figure 3-13 by the cities of Nampa and Caldwell, respectively. The ongoing operation of the Lactalis facility at its current capacity would not be responsible for this affecting or displacing an existing use.

As future residential, commercial, and industrial development occurs, increased stormwater runoff may occur; however, those developments would be responsible for onsite runoff control and individual stormwater management.

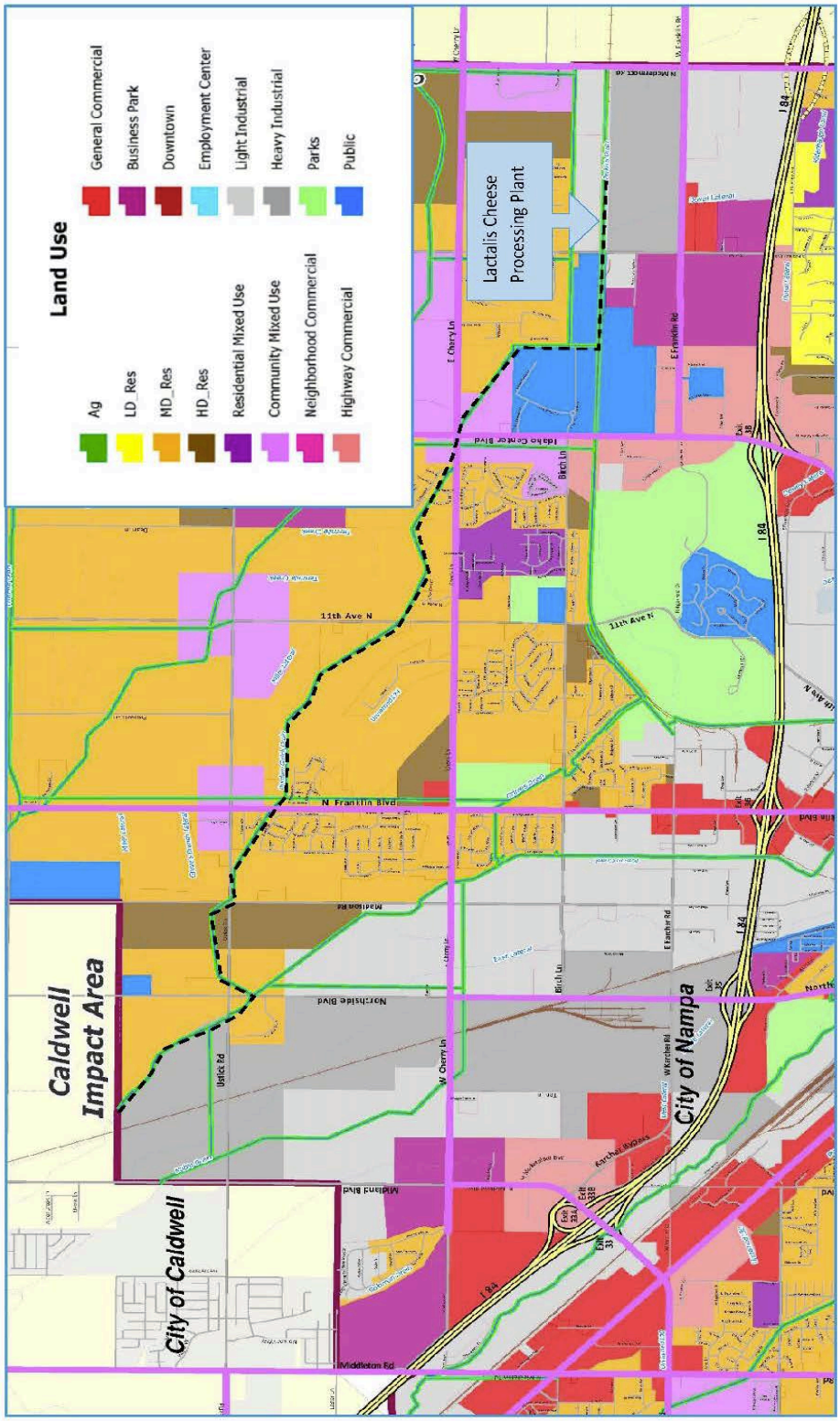

Figure 3-12. Portion of the City of Nampa's proposed future land use map – 2/2/2015 update. Affected environment in black dashed line. (http://www.cityofnampa.us/index.aspx?NID=516).

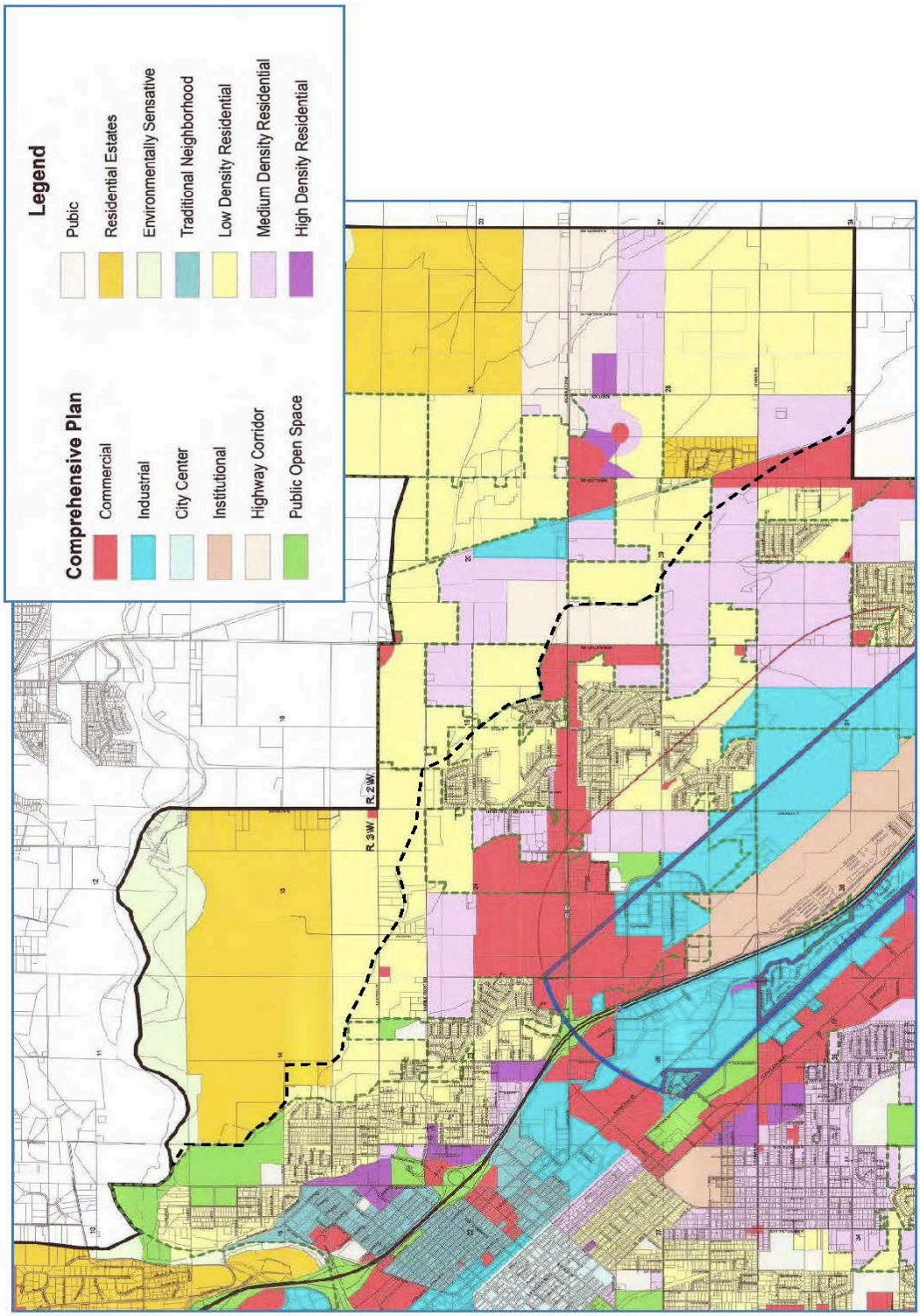

Figure 3-13. Portion of the City of Caldwell official comprehensive plan map – adopted 5/19/2014. Affected environment in black dashed line. (http://www.cityofcaldwell.com/PlanningZoning)

Alternative B – Proposed Action

Under the Proposed Action, the increased discharge would be anticipated to nominally raise surface water elevations in the Purdam Drain and Mason Creek. This increase would not affect the surrounding land uses along the Purdam Drain and Mason Creek. As future Lactalis facility expansions occur, they would not affect land use at the facility as it the site is zoned light industrial by Canyon County and the City of Nampa's proposed land use for the site is heavy industrial.

Future maintenance activities to the irrigation drainage system may temporarily disturb areas along the drain, but these activities would be for ongoing maintenance and necessary with the No Action or the Proposed Action. Therefore, the Proposed Action would have a similar effect on land use and the irrigation drainage system as the No Action Alternative.

3.4 Biological Resources

This section discusses the potential effects that the alternatives considered would have on biological resources in the proposed action area.

3.4.1 Affected Environment

The proposed action area is relatively uniform, and has limited habitat for plant and animal species. Information was collected on plant and animal species that occur within or adjacent to the affected environment in order to identify species that might be impacted. Based on the amount of area and total number of species present, only dominant well-known plant and wildlife species were discussed. Relevant information was obtained through reviews of previously prepared EAs, consultation with federal agencies, and prior experience with the habitat characteristics of the affected environment. This information was used to assess the potential, or probability of occurrence of dominant species within the proposed action area.

Vegetation

Vegetative communities surrounding the affected environment of the Purdam Drain and Mason Creek include native and non-native species. While most vegetation is irrigated farmland, there is an abundance of non-native vegetation due to historic construction, operation, maintenance, and management activities.

Introduced plant species within the affected environment are generally either non-native invasive species or Idaho-listed noxious weeds. These species have been historically introduced to the area and spread through contaminated crop seed, domestic livestock, landscaping and horticulture, recreation activities, and other human uses. Noxious weeds are

non-native plants that have been designated "noxious" by State law because of their potential harm to the Idaho economy. While there have been no comprehensive noxious weeds inventories conducted for the area, a general list of Idaho-designated noxious weed species can be found online at the Idaho State Department of Agricultural (ISDA 2015).

Table 3-14 lists the species likely to be found within or immediately adjacent to the proposed action area. This is a general list of the dominant species, and not a complete inventory of the area.

Table 3-14. Common vegetation communities and species found within the affected environment.

Communities	General Species Likely to be Present (Common Name)
Agricultural	Sugar beets, wheat, barley, potatoes, corn, dry beans, alfalfa hay, pasture grasses
Residential	Locust, oak, pine, maple, elm, Kentucky bluegrass, rye, fescue (lawn mix), as well as other species, generally non-native, associated with residential lawns and landscaping
Riparian species	Willow species, cottonwoods, Russian olive, various sedge, rush, and grass species, cattails, and other native, invasive, and noxious weed species associated with riparian areas in southwest Idaho
Invasive Species	Cheatgrass, medusahead wild rye, Reed canary grass, foxtail barley, witch grass, verbena, kochia, Russian thistle, bur butter-cup, halogeton, various mustard species
Noxious weeds	Purple loosestrife, Eurasian watermilfoil, Rush skeleton weed, white top, Canada thistle, field bind weed, puncture vine, Russian and Spotted knapweed.

The irrigation districts conduct periodic vegetation management along the channel corridors and mechanical removal of plants, sediments, and debris to maintain sufficient flow within the drains. Debris from drain maintenance is piled along the easements and leveled by heavy equipment. Current vegetation management requirements and methods along the Purdam Drain and Mason Creek include mechanical and biological control measures, while chemical controls are prohibited. These standard management methods are assumed to be still in use. Mechanical controls are generally restricted to mowing, but hand thinning and other mechanical measures may be implemented as well. Biological control measures are currently limited to the management of purple loosestrife (*Lythrum salicaria*). The two agents currently used to control the purple loosestrife are varieties of the *Galerucella calmariensis* and *Galerucella pusilla*, or more commonly, the Golden and Black Margined Loosestrife beetles.

Invasive and noxious weed control is the primary vegetation-related management concern. All landowners and managers are required by the State of Idaho to control noxious weeds on their property per Idaho Statutes, specifically Title 22 (Agriculture and Horticulture), Chapter 24 (Noxious Weeds). The primary terrestrial invasive and noxious weed species of concern within the affected area include, but are not limited to: puncture vine or goathead (*Tribulus terrestris*); white top (*Lepidium draba*, previously known as *Cardaria draba*); and Canada thistle (*Cirsium arvense*). Aquatic vegetation of concern includes, but is not limited to: Eurasian Watermilfoil (*Myriophyllum spicatum*); algae; emergent, submerged, and floating aquatic plants.

Fish

Purdam Drain

In 2005, the IDEQ studied the Purdam Drain as well as similar sized streams and determined that there are no existing cold water aquatic life uses, or fish habitat, in the drain. The seasonal operation of irrigation water prevents establishment of permanent fisheries in irrigation drainage systems.

Mason Creek

As stated in the *Mason Creek Subbasin Assessment* (IDEQ 2001a), Reclamation indicated that numerous game and non-game fish species were historically found in Mason Creek, although no quantitative estimates or observation dates were noted. No fish electrofishing surveys have been conducted in Mason Creek. The Idaho Fish and Game has stated that information exists on file that shows rainbow trout resided in Mason Creek prior to November 1975.

Species in Mason Creek could include rainbow trout, minnows such as the red-sided shiner and long-nosed dace, sculpins, and other general fish species found in local seasonal tributaries. Similar to the Purdam Drain, the seasonal operation of irrigation generally prevents establishment of a permanent fisheries in water delivery and drainage system.

Lower Boise River

As stated in the Lower Boise River TMDL (IDEQ 2015b), the Lower Boise River supports a natural and stocked fishery. The section of the Lower Boise River downstream of the Mason Creek is populated by cool and warm water species, with suckers, dace, carp, and large and small mouth bass being most abundant. The river below Mason Creek supports few if any trout species; however, mountain whitefish are seasonally abundant, especially in the fall-winter period.

Birds

Several species of waterfowl, shore birds, upland game birds, raptors, and passerines have been observed within the area surrounding the affected environment. Typical species are listed in Table 3-15.

Table 3-15. Common bird species found in the Proposed Action area.

Classification	General Species Likely to be Present (Common Name)
Waterfowl	Canada goose, mallard, chukar, grey partridge, blue winged teal, western grebe
Shore Birds	Blue heron, curlew, killdeer, California gull, and avocet
Upland Game Birds	Ring-necked pheasant, mourning dove, and California quail (habitat generally limited in urban areas)
Raptors	Northern harrier, Swainson's Hawk, Red-tailed Hawk, Ferruginous Hawk, Prairie Falcon, Bald Eagle, and American kestrel
Passerines	Red-winged blackbird, western meadowlark, American robin, horned lark, starlings, European and barn swallows, crow, raven, magpie

Mammals

Mammals potentially occurring in the affected environment are limited due to the amount of development on surrounding lands. Small mammals expected to be present include the western harvest mouse, pocket gopher, deer mouse, kangaroo rat, voles, Piute ground squirrel, and other rodents. Larger species potentially found in the area include striped skunk, coyote, red fox, badger, raccoon, and occasionally mule deer.

Reptiles and Amphibians

Reptile and amphibian species potentially occurring in the affected environment include the Pacific tree frog, boreal toad, spadefoot toad, western toad, racer, gopher snake, garter snake, rattlesnakes, whiptail and leopard lizards, fence lizards, horned lizards, side-botched lizards, and tiger salamander.

3.4.2 Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no change in vegetation communities or wildlife habit to the Purdam Drain and Mason Creek. It is assumed that current management activities and treatment methods would continue. No impacts are expected.

Alternative B – Proposed Action

Under the Proposed Action, there would be a nominal change in flows in the Purdam Drain and Mason Creek that would create no change in wildlife and vegetation habitat to the Purdam Drain and Mason Creek. The Proposed Action would result in no new surface disturbances to vegetation communities or wildlife habitat, and would not change fish habitat or waterfowl usage downstream. As described for the No Action Alternative, current management activities and treatment methods would continue. The Proposed Action would have no effect on biological resources present in the affected environment. Therefore, the Proposed Action would have a similar effect on biological resources as the No Action Alternative with a peak instantaneous discharge flow of 4.5 cfs.

3.5 Threatened and Endangered Species

This section discusses the potential occurrence of and impact to federally-designated TES associated with the proposed project. Information regarding species protected under the ESA that have the potential to occur in the project area and vicinity was obtained through correspondence with the USFWS (March 17, 2016). Correspondence with the USFWS is included as Appendix C. No formal field investigations were conducted.

3.5.1 Affected Environment

According to the USFWS there is one threatened or endangered species identified as occurring/potentially occurring within or near the affected area. The species is the slickspot peppergrass (*Lepidium papilliferum*), a small flowering plant in the mustard (*Brassicacea*e) family that is endemic to the sagebrush steppe environment of southwestern Idaho. This species was listed as threatened in 2009, a status which has since been vacation in litigation; it is currently listed as Proposed Endangered. Its nearest proposed critical habitat in Idaho is approximately 5 miles northeast of the proposed action area in the elevated foothills of the Boise Mountains (Figure 3-14).

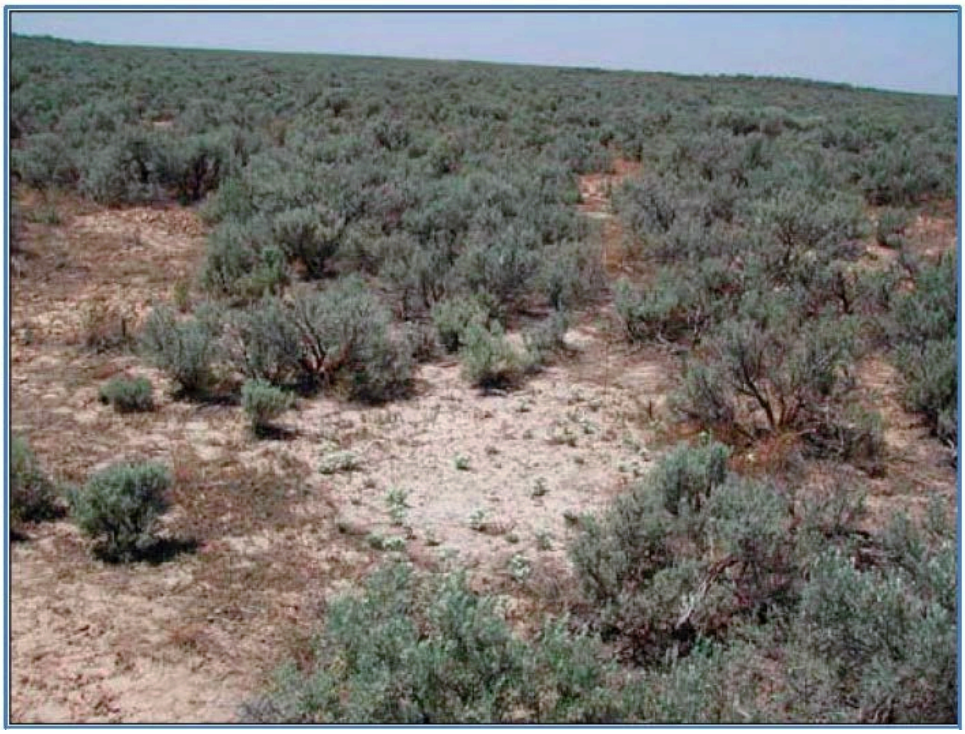

Figure 3-14. Photograph of a Slickspot area (USDA 2015).

Slickspot peppergrass is generally restricted to microhabitats known as slickspots, which are small-scale sites of water accumulation in the gently undulating landscape of the sagebrush steppe vegetation of the Snake River Plains of southwestern Idaho (USDA 2015). Slickspots are visually distinct small-scale (mostly between 10 to 20 square feet) depressions in the soil that collect water (Figure 3-15). Due to the species' dependence upon these spatially-scattered microsites, individual populations of slickspot peppergrass tend to be spatially isolated.

Figure 3-15. Slickspot peppergrass plant (USDA 2015).

Within the proposed action area, development, agriculture, and livestock grazing over the last century has significantly altered the landscape, and any historic slickspots that may have occurred have likely been degraded to such an extent that it is unlikely any slickspot peppergrass individuals are present. It is believed that slickspots take several thousand years to form, therefore once degraded they cannot be recreated. Livestock trampling simulation studies have found that trampling can cause local extirpation over time frames as short as 15 years, therefore it is unlikely that extant populations of slickspot peppergrass exist in the affected environment (Meyer, Quinney, and Weaver 2006).

Slickspot peppergrass is adapted to an environment characterized by high year-to-year variability in precipitation, existing as a short-lived ephemeral species with both annual and biennial, but not perennial, life history strategies. As such, slickspot peppergrass is likely dependent on a long-lived dormant seed bank for population persistence (Brown and Venable 1986). As seed bank and germination studies of slickspot peppergrass have indicated rapidly declining rates of seed viability beyond 12 years, it is possible but highly unlikely that a viable dormant seed bank of slickspot peppergrass exists in the affected environment.

Slickspot Peppergrass Critical Habitat

The USFWS states that there are no critical habitats for the slickspot peppergrass within the project area. Critical habitat is presented in Figure 3-16.

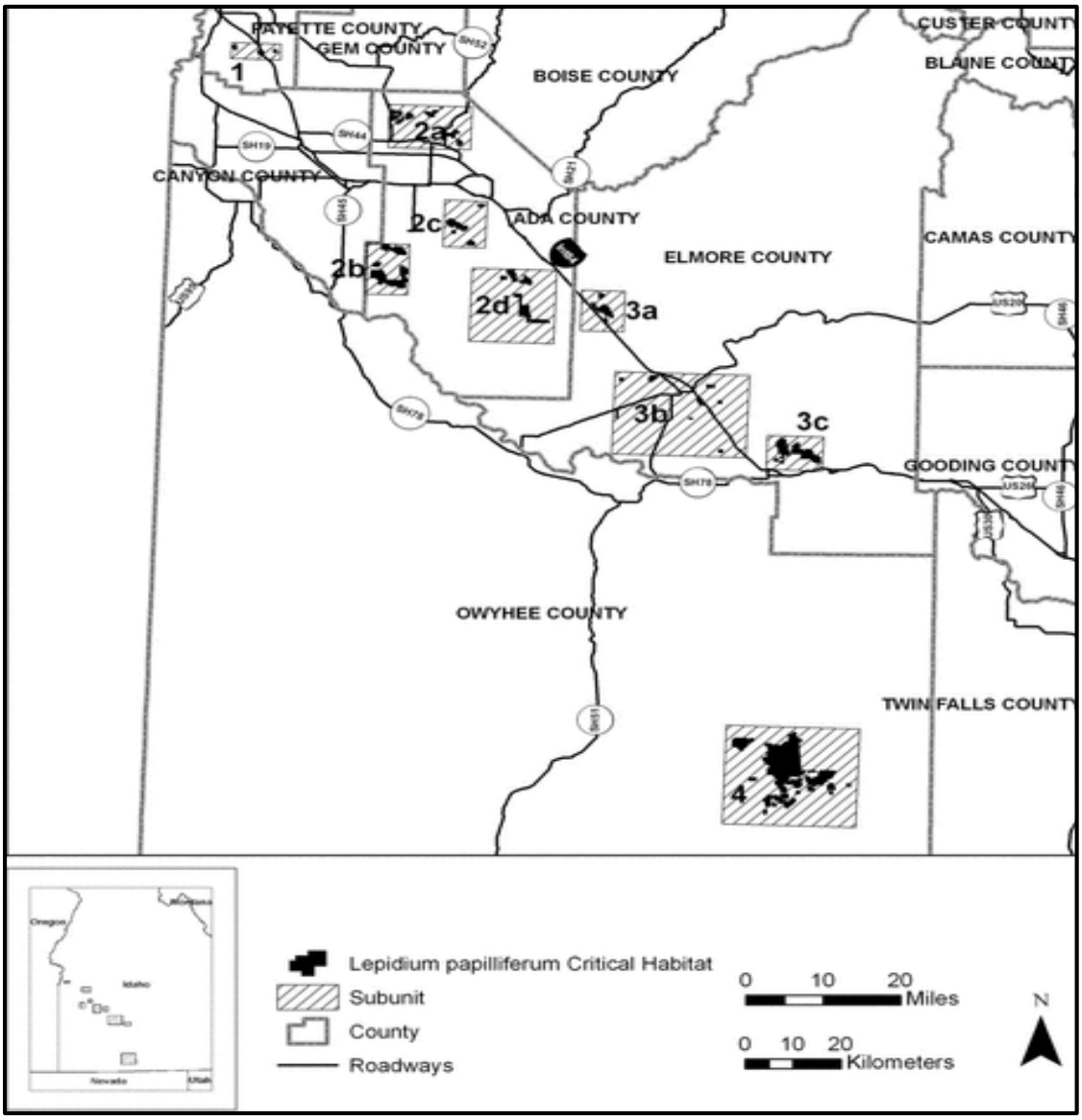

Figure 3-16. Critical habitat of the slickspot peppergrass (FR 2011).

3.5.2 Environmental Consequences

Alternative A – No Action

There are no records of threatened and endangered species within the project area. Therefore, as no disturbances are proposed under the No Action Alternative, there would be no anticipated direct or indirect environmental impacts on TES.

Alternative B – Proposed Action

The Proposed Action would not occur within the critical habitat of any federally-listed endangered or threatened plant or animal species. There would also not be any new surface disturbances associated with the Proposed Action. Potential impacts on current federally-listed or endangered species under the Proposed Action would be the same as those described above for No Action, that is, no impact. Therefore, the Proposed Action would have no anticipated direct or indirect environmental impacts on TES.

3.6 Cultural Resources

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. If these resources meet defined significance criteria, they are protected under several Federal Laws and executive orders. The Federal Laws include the NHPA of 1966 as amended, the Archaeological and Historic Preservation Act (AHPA) of 1974, the Archaeological Resources Protection Act (ARPA) of 1979, and the Native American Graves Protection and Reparation Act (NAGRPA) of 1990. Reclamation's cultural resources management policy is to preserve historic properties in place to the fullest extent possible and attempt to avoid adverse effects to them.

Only significant cultural resources, whether known or unknown, warrant consideration with regard to adverse impacts from a proposed action. Cultural resources addressed in this Draft EA include known resources that are determined or recommended eligible for inclusion in the National Register of Historic Places (NRHP) or that are unevaluated for NRHP inclusion. Cultural resources are eligible for the NRHP if they meet one or more of four significance criteria and retain historic integrity.

The significance criteria are:

- The resource is associated with events that have made a significant contribution to the broad pattern of history (Criterion A).
- The resource is associated with the lives of people significant in the past (Criterion B).
- The resource embodies distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic value; or represents a significant and distinguishable entity whose components may lack individual distinction (Criterion C).
- The resource has yielded, or may be likely to yield, information important in prehistory or history (Criterion D).

A significant cultural resource must also possess several, if not most of the aspects of integrity defined by the NRHP as location, design, setting, materials, workmanship, feeling, and association.

- Integrity – the authenticity of a property's historic identity, as evidenced by the survival of physical characteristics it possessed in the past, and its capacity to convey information about a culture or people, historic patterns, or architectural or engineering design or technology.
- Location – the place where an event occurred or a property was constructed.
- Design – elements such as the plan, form, and style of a property. Setting is the property's physical environment.
- Materials – the physical elements used to construct the property.
- Workmanship – the craftsmanship of the property's builders.
- Feeling – the property's ability to convey a sense of historical time and place.
- Association – the link between the property and a historic event, pattern of events, or person.

Because the Proposed Action occurs on lands with federal easements, Reclamation must consider the potential effects on cultural resources that are included in or eligible for inclusion in the NRHP. Pursuant to Section 106 of the NHPA and 36 CFR 800, Reclamation is conducting consultation with the Idaho State Historic Preservation Officer (SHPO). As required under the NHPA, Section 106, Reclamation identified historic properties within the Area of Potential Effects (APE), applied the National Register criteria (36 CFR 63) to properties that have not been previously evaluated for NRHP eligibility, and determined whether the Proposed Action would adversely affect such properties.

3.6.1 Affected Environment

The affected environment includes the Purdam Drain and Mason Creek and the land that borders both drains from the Lactalis outfall to the confluence of the Mason Creek with the Lower Boise River. To be conservative, Purdam Drain, Mason Creek, and lands within 100 feet of them are considered to be the affected environment for cultural resources or APE.

During efforts to transfer title to PID for all Reclamation conveyance facilities within the boundaries of the PID, an archaeological survey was conducted over a percentage of the involved facilities, including a portion of Purdam Gulch Drain. Information collected from a records search and the intensive archaeological survey identified the entire drainage system, including Purdam Drain and Mason Creek, as eligible to the NRHP as a part of the larger PID irrigation system under Criterion C for its association with the development of agriculture in the Treasure Valley. Although some features associated with the drains have been replaced

over the years, the system remains in the same location as it was when it was built in the early 1910s and retains its historic integrity. In a letter dated June 18, 2007, the Idaho SHPO concurred with the determination of eligibility for the PID drainage system.

3.6.2 Environmental Consequences

Alternative A – No Action

The No Action Alternative involves no change to existing conditions, and therefore would have no impact to any NRHP-eligible resources.

Alternative B – Proposed Action

Under the Proposed Action, there would be a nominal change in flows in the Purdam Drain and Mason Creek that would have no adverse direct or indirect effects on cultural resources. The additional flow would not impact water levels or the physical nature or historical connection to the development of agriculture in the Treasure Valley. No new surface disturbances are proposed, nor would the Purdam Drain or Mason Creek be modified in any way to degrade the drains' integrity from a cultural perspective. Reclamation is consulting with Idaho SHPO on potential effects that the Proposed Action may have on the historic properties involved. It is anticipated that a finding of "No Adverse Effect" to the eligible historic property would be recommended by SHPO.

3.7 Indian Sacred Sites and Indian Trust Assets

Indian Sacred Sites

EO 13007 identifies Indian sacred sites as specific, discrete, narrowly delineated locations on Federal land that are identified by an Indian Tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. The Tribe or appropriately authoritative representative of an Indian religion must inform a Federal Agency of the existence of such a site.

Executive Order 13007 grants tribal access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and avoids adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

Indian Trust Assets

ITAs are legal interests in property held in trust by the United States for Indian Tribes or individuals). The Secretary of the Interior, acting as trustee, holds many assets in trust for Indian Tribes and individuals. Examples of trust assets are lands, minerals, grazing, hunting, fishing, and water rights. Most ITAs are on-reservation; however, they may also be found off-reservation.

The United States has a responsibility to protect and maintain rights reserved by or granted to Indian Tribes and Indian individuals by treaties, statutes and executive orders. These are sometimes further interpreted through court decisions and regulations. Any anticipated impacts to ITAs from a proposed project or action must be explicitly addressed in a NEPA document.

3.7.1 Affected Environment

The Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho, a federally-recognized Tribe, have trust assets both on and off their Reservation. In the Treaty of Fort Bridger (1868), Article 4 states, "..they (the Shoshone and the Bannock) shall have the right to hunt on the unoccupied lands of the United States." This has been further interpreted to mean federally-managed lands. Reclamation (for the United States) must protect the hunting rights of the Shoshone-Bannock Tribes on lands it holds in fee title. Reclamation holds only easements, and no fee lands within the affected environment considered in this Draft EA.

Three other federally-recognized Tribes, the Shoshone-Paiute Tribes of the Duck Valley Reservation, the Northwestern Band of the Shoshone Nation, and the Burns Paiute Tribe of Burns Paiute Indian Colony of Oregon near Burns, Oregon have cultural and religious interests in the Boise Valley.

Indian Sacred Sites

Involved Indian tribes, including the Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho, the Shoshone-Paiute Tribes of the Duck Valley Reservation, the Northwestern Band of the Shoshone Nation, and the Burns Paiute Tribe of Burns Paiute Indian Colony of Oregon were informed of the Proposed Action through the NEPA scoping process and government-to-government consultation (see Chapter 4). No information indicating issues related to Indian Sacred Sites was offered by the Tribes.

Reclamation is not aware of any Indian sacred sites within the easements or rights-of-way on which the facilities are located or on the lands surrounding the proposed action. The facility corridor is narrow, has been physically altered over time, and surrounded by farm fields and residential developments. The existing landscape bears no resemblance to that present before

the Boise Valley was settled. Based on the extent of disturbance and present usage of the facility corridor and character of surrounding land uses, it anticipated that no Indian Sacred Sites are present.

However, because information about Indian Sacred Sites are not widely shared outside of traditional communities, the potential for their existence in any location exists and must be taken into consideration.

Indian Trust Assets

The Shoshone-Bannock Tribes, the Shoshone-Paiute Tribes, the Northwestern Band of the Shoshone Nation, and the Burns Paiute Tribe were notified of the Proposed Action through the NEPA scoping process and government-to-government consultation (see Chapter 4). The Tribes have not identified ITAs in the area that could be affected by the Proposed Action.

The land involved in the Proposed Action does not support a significant habitat for fisheries or wildlife also does not represent ITAs.

3.7.2 Environmental Consequences

Alternative A – No Action

As no Indian Sacred Sites or ITAs have been identified by the tribes in the project area and vicinity, the No Action Alternative would have no direct, indirect, short or long-term effects upon Indian Sacred Sites or ITAs.

Alternative B – Proposed Action

As no Indian Sacred Sites have been identified by the tribes in the project area and vicinity, the Proposed Action would have no direct, indirect, short or long term effects upon Indian Sacred Sites. As there are no ITAs identified in the project area or vicinity, the proposed increase in discharge flow from the Proposed Action would not have any direct, indirect, short or long term effects on ITAs of lands, minerals, grazing, hunting, fishing, and water rights. The Proposed Action would also not affect tribal hunting and fishing rights in the region. Consultation with the tribes is ongoing and will be completed following tribal review of the Draft EA.

3.8 Hazardous Materials and Waste

This section describes hazardous materials and waste surveys conducted for the affected environment and the potential for environmental and health impacts associated with the Proposed Action.

Hazardous materials are generally defined as a usable product or substance that may cause harm to humans, natural resources, or the environment when spilled, released, or contacted. Hazardous materials are used in everyday activities and may be in the form of a solid, liquid, or gas. Regardless of their physical state, hazardous materials may be toxic, flammable, combustible, reactive, and/or corrosive. When used and stored properly, associated risks are minimized or eliminated.

Hazardous waste is regulated under the Resource Conservation and Recovery Act of 1976 (RCRA). RCRA is the federal legislation that gives the EPA authority to control hazardous materials from production to its being discarded as waste. This authority includes hazardous materials generation, transportation, treatment, storage, and disposal.

For this analysis, hazardous wastes are described as discarded, abandoned, inherently waste-like, released, and/or spilled hazardous materials or substances. Federal and State databases were searched for RCRA hazardous material or waste sites.

3.8.1 Affected environment

There are no documented RCRA or Hazardous Waste sites with the affected environment of this Draft EA.

In May 2007, a Hazardous Materials and Wastes Survey that included the Purdam Drain and Mason Creek was completed in accordance with Reclamation policy (Reclamation 2007). That survey identified no issues of concern on Reclamation property.

Lactalis' existing NPDES permit also carries the condition that there is to be no discharge of hazardous materials in concentrations found to be of public health significance or with the potential to impair designated beneficial uses of surface water resources. The Lactalis' NPDES permit limits are set to meet this requirement.

In November 2015, a search for hazardous materials in the region of the Proposed Action's was conducted using the EPA's EnviroMapper website (see Figure 3-17) and the Idaho DEQ Waste Management & Remediation Division Facility Mapper website (see Figure 3-18). Both searches identify the location and details regarding remediation sites and facilities which generate or manage wastes or which have released wastes into the environment which require

remediation. The two searches did not identify any RCRA hazardous material or waste sites adjacent to the Purdam Drain or Mason Creek within the proposed action area.

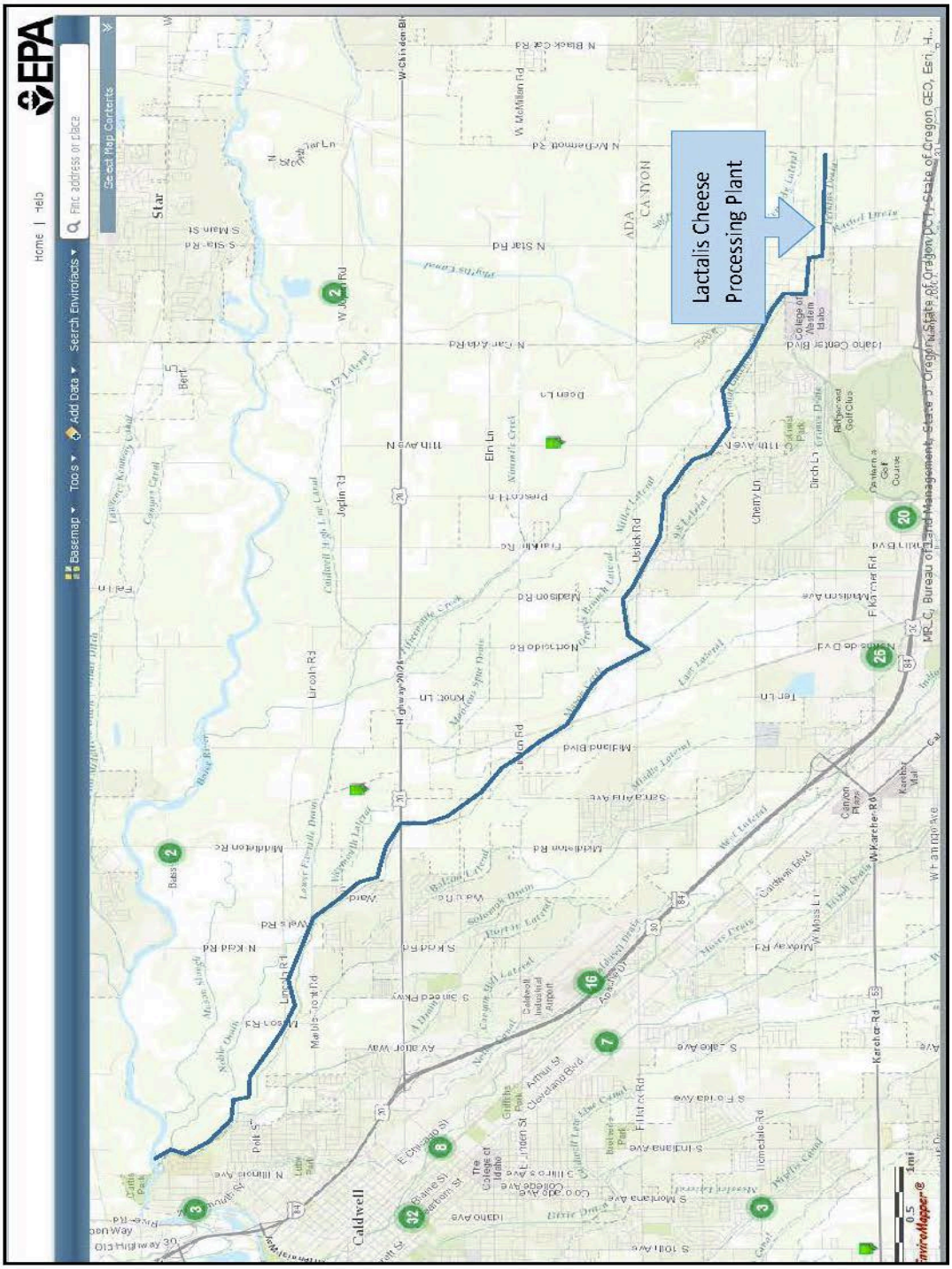

Figure 3-17. No hazardous materials or waste RCRA sites were identified within the proposed action area (blue line) (EPA 2015a).

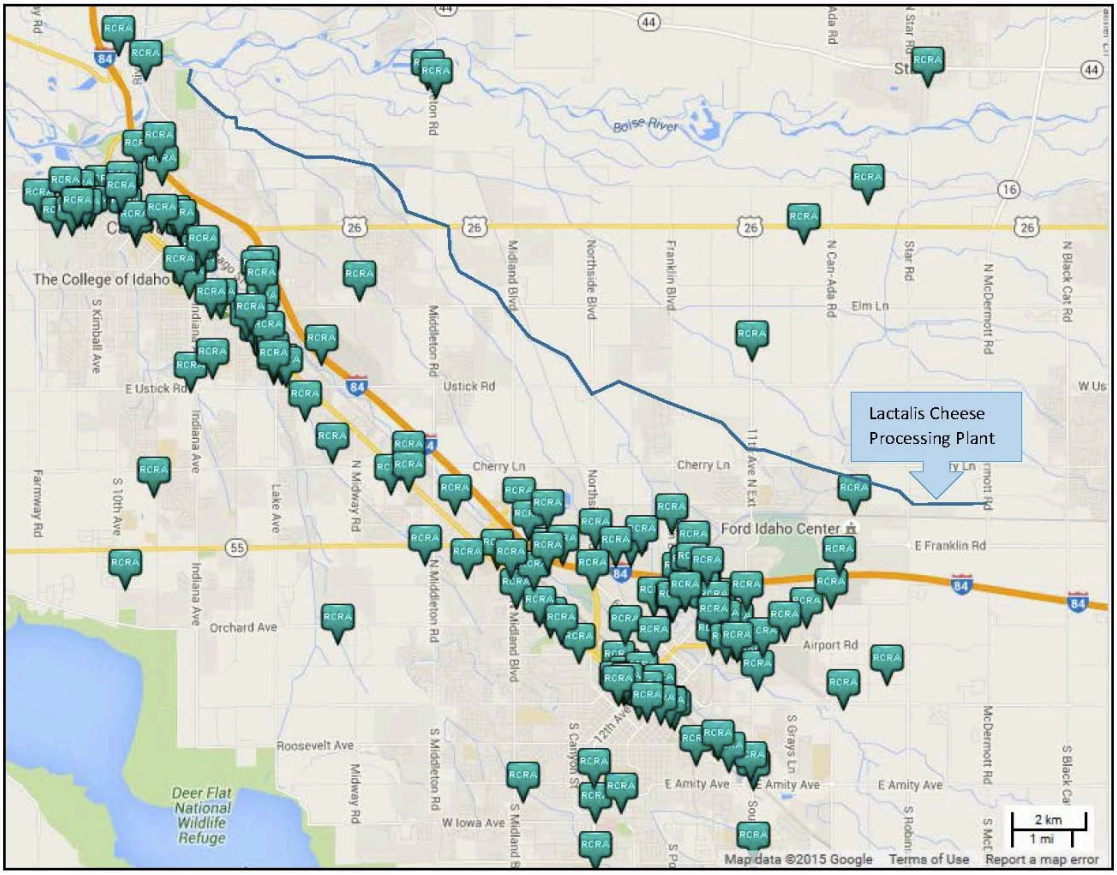

Figure 3-18. No hazardous materials or waste RCRA sites were identified within the proposed action area (blue line) (IDEQ 2015a).

3.8.2 Environmental Consequences

Alternative A – No Action

As the No Action Alternative involves no change to existing conditions, there would be no environmental consequences related to hazardous materials.

Alternative B – Proposed Action

Under the Proposed Action, the nominal change to the surface water level in the Purdam Drain and Mason Creek would involve no recognizable changes from the No Action Alternative, and would have no environmental consequences related to hazardous materials. The Proposed Action would also not affect or change hazardous material management practices for the Purdam Drain and Mason Creek. Lactalis would continue to comply with its

NPDES permit conditions by continuing to monitor its discharge to the drain to meet water quality standards and not impair designated beneficial uses of surface water resources.

3.9 Socioeconomic Conditions

The socioeconomic character of an area includes its population and economic activity. Socioeconomic changes may occur when a project directly or indirectly changes any of these elements. This sections discusses socioeconomic resources within the human environment, particularly population and economic activity that may be impacted. Population is described as the magnitude, characteristics, and distribution of people. Economic activity is described in terms of employment distribution, personal income, and business growth.

3.9.1 Affected environment

Population

Canyon County is Idaho's second most populous county with 188,923 residents in 2010. It is also the sixth smallest in geographic area. Caldwell and Nampa are Canyon County's largest cities and both rank in the top 10 in population. Nampa ranks second while Caldwell is sixth. Combined with Ada County and the city of Boise to the east, the combined population is over 580,000, the largest urban area in Idaho.

According to the U.S. Census Bureau (USCB), the population of Canyon County has more than doubled in the last 40 years. As shown in Table 3-16 below, the population the annual percent population increase from 1970 to 2010 was 5.2 percent, while the annual percent population increase from 2000 to 2010 was 4.4 percent.

Table 3-16. Canyon County population change, 1970 to 2010.*

Total Population					Annual Percent Change		Percent change	
1970	1980	1990	2000	2010	2000-2010	1970-2010	2000-2010	1970-2010
61,288	83,756	90,076	131,441	188,923	4.4	5.2	43.73	208.25

*Source: http://www.compassidaho.org/documents/prodserv/CIM2040/Official_2040_Increments_Demographic_Area percent20Formatted.pdf

The Community Planning Association of Southwest Idaho (COMPASS) is the metropolitan planning organization for Ada and Canyon Counties. One of the roles of COMPASS is to forecast future demographics for population, jobs, and housing for Ada and Canyon Counties for 25 to 30 years into the future. Current demographic forecasts look to the year 2040 and are provided in Table 3-17. The table shows that between 2010 and 2040, population in Canyon County is projected to increase by 158,933, an 84 percent increase. The average annual percent change over this 30 year period is anticipated to be 2.80 percent.

Table 3-17. Canyon County population projections, 2010 to 2040.*

Actual Population	Population Projections								
2010	2015	2020	2025	2030	235	2040	2010-2040 Projected Population Change	2010-2040 Projected Population Change (percent)	2010-2040 Projected Population Change (percent)
188,923	205,087	226,703	252,065	281,193	318,589	347,856	158,933	84.13	2.80

* Source: http://www.compassidaho.org/documents/prodserv/CIM2040/Official_2040_Increments_Demographic_Area percent20Formatted.pdf

Table 3-18 displays the USCB racial composition data for Canyon County for 2000 and 2010. Racial composition as compared to the rest of the state of Idaho is included in Chapter 3.10, Environmental Justice. Table 3-18 shows an increase in all races except for the classification, Other Race, which shows a 45 percent decrease.

Table 3-18. Canyon County racial composition, 2000 to 2010.*

Race	2000	2010	1990 to 2000 Percent Increase
White	109,225	156.750	44
Black or African American	421	1,077	156
American Indian and Alaska Native	1,120	2,028	81
Asian or Pacific Islander	1,232	1,921	56
Other Race	38,886	21,469	-45
Hispanic or Latino (of any race)	24,455	45,069	84

*Source: http://www.compassidaho.org/documents/prodserv/CIM2040/Official_2040_Increments_Demographic_Area percent20Formatted.pdf

Industry, Employment, and Wages

According to the Idaho Department of Labor (IDL), Canyon County ranked second to last of 44 counties in Idaho in per capita income at $25,606 in 2013, well below the state average of $36,146 and the national average of $44,765. Average wages range from $12,767 in the hospitality sector to $38,721 in information (Table 3-19 and Table 3-20). Manufacturing job, similar to the ones at Lactalis, had the second highest wage at $41,782, only lower than jobs in financial activities. The 2014 unemployment rate for Canyon County was 5.9 percent and an extension of a downward trend starting in 2009 of an increasing civilian labor force and reduction of unemployment following the Great Recession where the unemployment rate for the County in 2010 was 11.3 percent by comparison to 3.7 percent in 2007 (Table 3-21).

Table 3-19. Canyon County labor force.*

Covered Employment & Average Annual Wages Per Job for 2004, 2013, & 2014	2004		2013		2014	
	Average Employment	Average Wages	Average Employment	Average Wages	Average Employment	Average Wages
Total Covered Wages	48,204	$27,068	54,261	$31,770	56,325	$32,847
Agriculture	2,891	$21,278	2,850	$28,015	2,981	$29,871
Mining	50	$38,147	24	$32,863	26	$35,018
Construction	4,326	$27,607	3,738	$33,992	4,192	$34,302
Manufacturing	8,948	$32,478	7,974	$39,222	8,103	$41,782
Trade, Utilities & Transportation	9,554	$26,690	11,895	$33,268	12,066	$34,458
Information	554	$33,279	659	$39,427	705	$38,721
Financial Activities	1,626	$30,204	1,642	$43,279	1,623	$46,799
Professional and Business Services	2,891	$27,744	4,082	$30,191	4,396	$30,759
Educational and Health Services	6,003	$28,238	7,215	$29,567	7,372	$30,237
Leisure and Hospitality	3,331	$10,107	3,960	$12,695	4,413	$12,767
Other Services	922	$20,643	1,539	$27,145	1,606	$28,611
Government	7,108	$29,029	8,684	$32,481	8,843	$33,748

*Source: http://labor.idaho.gov/publications/lmi/pubs/CanyonProfile.pdf

Table 3-20. Canyon County per capita income.*

Per Capita Income	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Canyon County	$20,994	$21,842	$23,265	$24,023	$23,203	$22,698	$23,201	$24,159	25,019	$25,606
State of Idaho	$28,974	$29,989	$32,035	$33,057	$32,819	$31,688	$32,100	$33,677	$35,142	$36,146
United States	$34,300	$35,888	$38,127	$39,804	$40,873	$39,379	$40,144	$42,332	$44,200	$44,765

*Source: http://labor.idaho.gov/publications/lmi/pubs/CanyonProfile.pdf

Table 3-21. Canyon County unemployment.*

Labor Force	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Civilian Labor Force	75,041	78,790	82,571	83,264	84,096	85,237	84,728	85,427	86,886	87,640	88,595
Unemployment	4,261	3,504	3,220	3,084	5,459	9,595	9,540	8,961	7,851	6,518	5,191
percent of Labor Force Unemployed	5.7	4.4	3.9	3.7	6.5	11.3	11.3	10.5	9.0	7.4	5.9

*Source: http://labor.idaho.gov/publications/lmi/pubs/CanyonProfile.pdf

3.9.2 Environmental Consequences

Alternative A – No Action

No new construction or development activities are proposed under the No Action Alternative; therefore, no impacts or benefits to socioeconomic resources would occur.

Alternative B – Proposed Action

Under the Proposed Action, no noticeable adverse direct, indirect, or cumulative impacts on socioeconomic resources would occur. The operation of the Proposed Action would create a potential long-term indirect beneficial economic impact from potential creation of jobs at the Lactalis cheese processing plant from facility expansions associated with increased production. The jobs created would mostly fall under the manufacturing class with the second highest average salary as shown in Table 3-19. The increased milk cheese production at the

plant would be assumed to beneficially affect milk producers in the Treasure Valley (Nampa – Boise Area) and Magic Valley (Twin Falls, ID) regions by increasing demand for their products and in turn enhance stability and viability of local and regional farms and other businesses that directly and indirectly support the dairy industry with increased purchases in the community for goods and services. The increased wastewater discharge may enhance availability of water in the Purdam Drain and Mason Creek for beneficial uses under state law.

The increased wastewater discharge would not have adverse effects on the area population, on social or economic aspects, or on rural lifestyles. Therefore, the impacts from implementing the Proposed Action would be localized and are not anticipated to change the economics of the region, similar to the no effect assumed under the No Action Alternative.

3.10 Environmental Justice

3.10.1 Affected Environment

Environmental justice (EJ) relates to 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 policies. The identification of special protections for specific groups (e.g., low-income and minority populations) was brought forward in 1994 by EO 12898.

In most cases, analyzing census data related to community makeup and economic status can provide information to determine potential effects to protected groups, specifically, information on race and/or ethnic breakdowns and on median household incomes. If potentially disadvantaged communities exist within the project footprint or sphere of influence of the project actions, they should be identify and addressed. The affected environment or assessment area for the Proposed Action runs from the Lactalis facility location, northwest roughly parallel to Highway 84, until it meets the Lower Boise River within Canyon County.

Table 3-22 displays the census information for Canyon County, which encompasses the project in total, and compares this information to the state of Idaho as a whole.

Table 3-22. Racial populations in Canyon County and Idaho (USCB 2015).

U.S. Census Bureau 2013 Statistics*	Canyon	Idaho
2013 Total Population Estimate	188,923	1,612,843
White, percent	83.0	93.7
Black or African American, percent	0.6	0.8
American Indian and Alaska Native, percent	1.1	1.7
Asian, percent	0.8	1.4
Native Hawaiian or Pacific Islander, percent	0.2	0.2
Two or More Races, percent	3.0	2.2
Hispanic or Latino, percent	23.9	11.8
White alone, not Hispanic or Latino, percent	72.3	83.1

Based on this review, minority populations do not represent a substantial percentage of the project area population.

Table 3-23 shows data related to income and poverty rates within Canyon County, comparing those to the rest of the state. This data indicates that, for the county as a whole, income is slightly lower than state averages. This could be for a variety of reasons, but the resulting number is likely due to several pockets of poverty along Interstate 84 (Figure 3-19 and Figure 3-20). These populations, while inside Canyon County, are outside of the influence of the project actions, and thus would not be affected by the project or any of the alternatives.

Table 3-23. Income and poverty data for Canyon County and Idaho for years 2009 to 2013 (USCB 2015).

Geographic Area	Per Capita Income	Median Household Income	People Below Poverty
Idaho	$22,568	$46,767	15.5 percent
Canyon County	$17,755	$42,105	20.4 percent

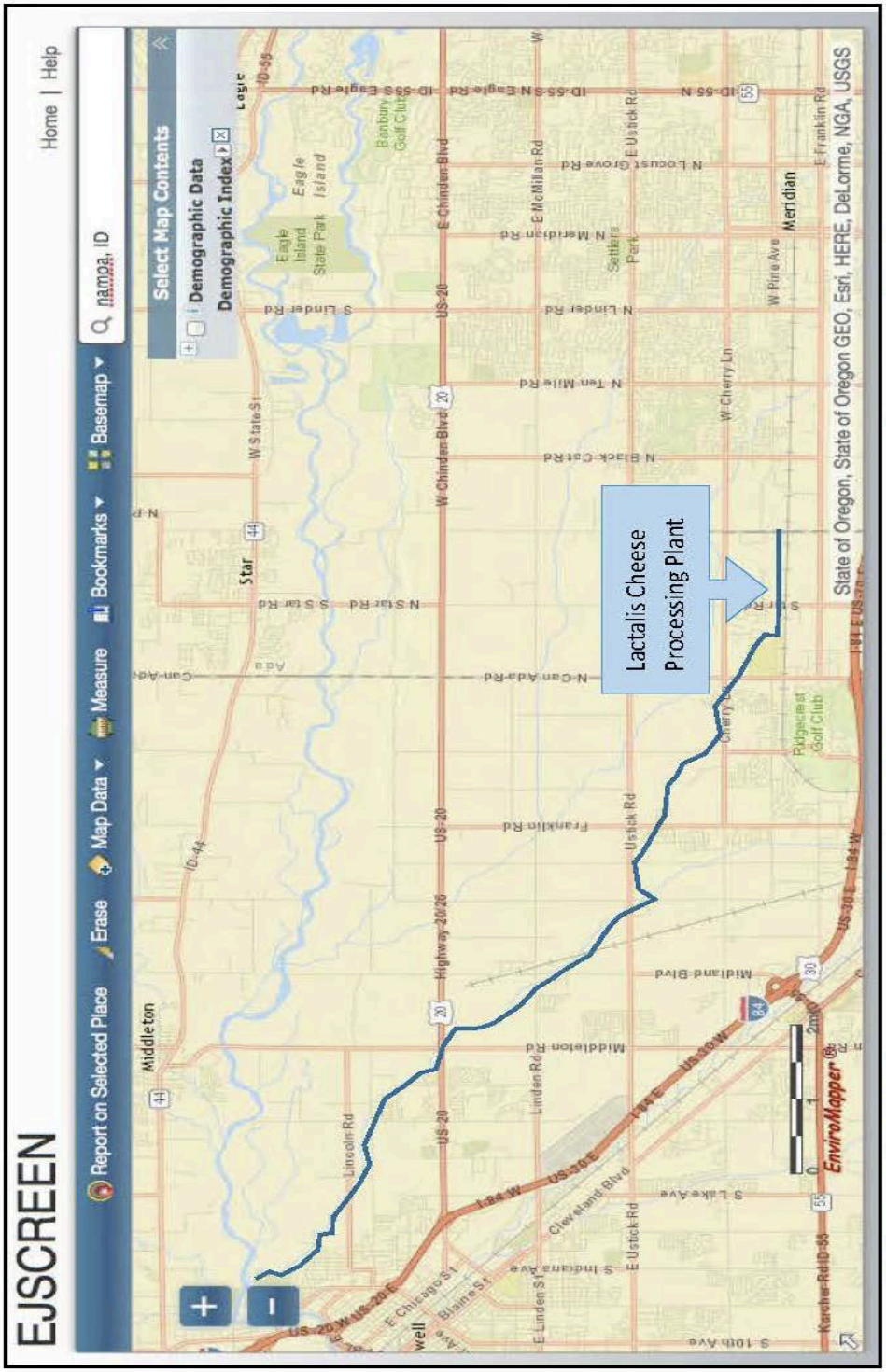

Figure 3-19. EJSCREEN screen shot for Lactalis' Nampa cheese processing plant, the proposed action area (blue line) and surrounding area with no demographic data overlay.

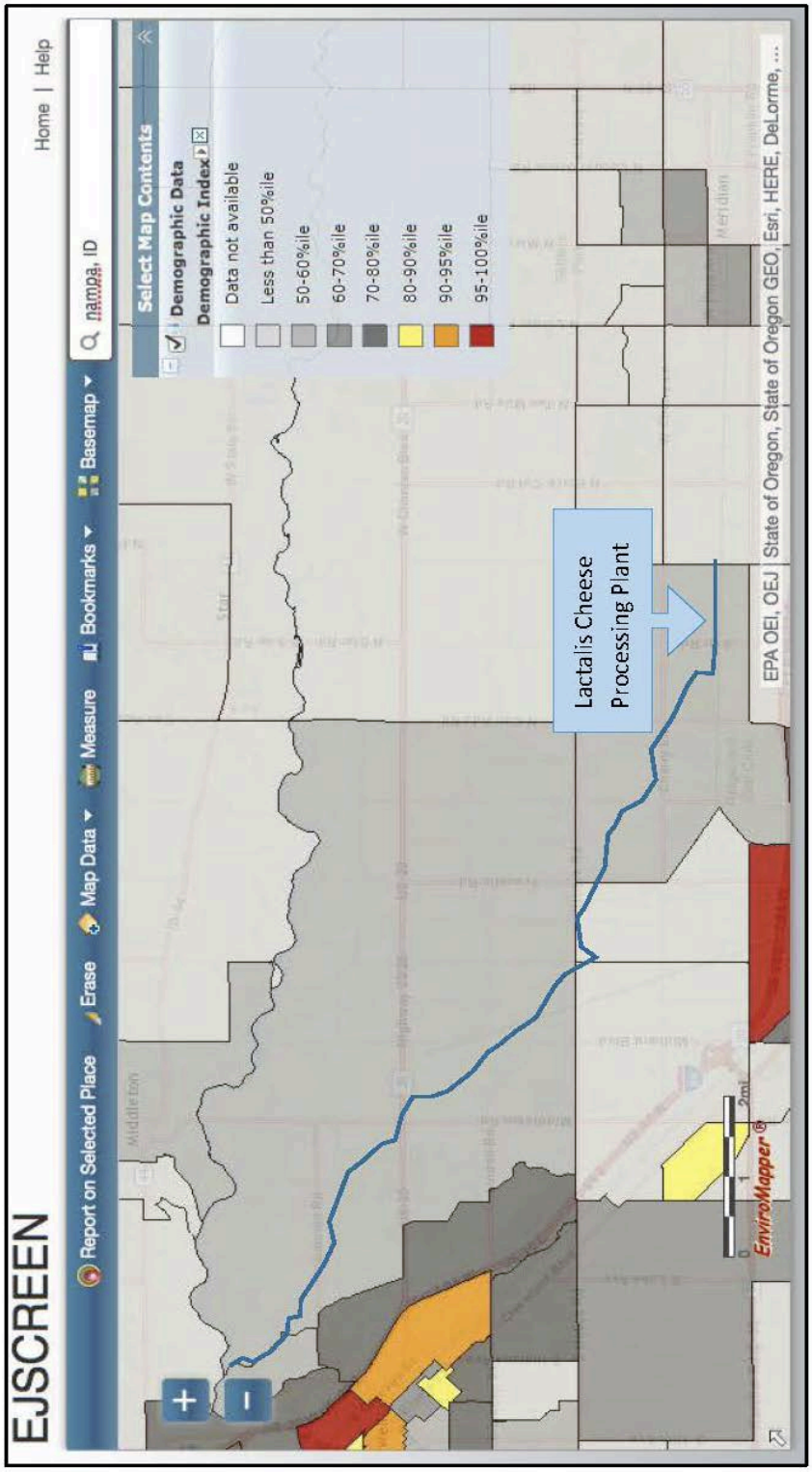

Figure 3-20. EJSCREEN screen shot for Lactalis' Nampa cheese processing plant, the proposed action area (blue) and surrounding area with overlay of demographic indicators of "percent low income" and "percent minority" combined.

The EPA has developed a tool to make this analysis consistent across the nation: EJSCREEN. This tool (version released in 2015) uses census information to indicate a community's general susceptibility to issues of environmental justice. In the words of the EPA: "EJ mapping and screening tools combine environmental and demographic indicators in maps and reports. This information can help to highlight geographic areas and the extent to which they may be candidates for further review, including additional consideration, analysis or outreach" (EPA 2015b).

Demographic indicators included in the mapping are as follows (all measures are on a block-group[3] level):

- Percent low-income (with low-income defined as less-than-or-equal-to twice the federal poverty rate);
- Percent minority (individuals that are other than white-alone or Latino);
- Less than high school education (individuals over 25 without a high school education);
- Linguistic isolation (households with members over age 14 that do not speak English at all, or "not well");
- Individuals under age 5; and
- Individuals over age 64.

EJSCREEN provides for two indexes:

1. A demographic index is based on two of the demographic indicators: "Percent Low-Income" and "Percent Minority"; and
2. A supplemental demographic index is based on the average of all six indicators.

In order to be consistent with EO 12898, Index 1 was used for the analysis that follows.

Figure 3-19 above represents the EJSCREEN tool's output for the assessment area (EPA 2015c). This figure shows just the assessment base map with no overlay of EJSCEEN output.

Based on the information presented in the above two figures generated from the EJSCREEN tool, there are no census blocks near or within the project boundary that might be considered low-income or predominantly minority.

[3] Census block groups are statistical areas bounded by visible features such as roads, streams, and railroad tracks, and by nonvisible boundaries such as property lines, city, township, school district, county limits and short line-of-sight extensions of roads; census blocks may be large, irregular, and bounded by a variety of features, such as roads, streams, and transmission lines. Though they are not delineated by population, and can have zero inhabitants in remote areas, they generally encompass between 600 and 3,000 people.

3.10.2 Environmental Consequences

Alternative A – No Action

The No Action Alternative would not alter the current regional environmental justice status, and thus has no effect.

Alternative B – Proposed Action

Based on the review of census data and application of the EJSCREEN tool, no minority or low-income groups, as defined by EO 12898, would be disproportionately affected by health or environmental effects as the results of the implementation of the Proposed Action. Therefore, the Proposed Action has no effect on environmental justice issues.

3.11 Climate Change

Climate represents the long-term statistical characterization of daily, seasonal, and annual weather conditions such as temperature, relative humidity, precipitation, cloud cover, solar radiation, and wind speed and direction. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. A region's climate is affected by latitude, terrain, and altitude, as well as nearby water bodies and their currents. Climate change has the potential to profoundly alter habitats through both direct and indirect effects.

Climate change effects are estimated based on projections rather than predictions. This is largely because future climatological phenomena cannot be predicted, as current atmospheric perturbation currently in motion has not been seen in historic accounts and does not act in accordance with historic patterns. It is only trends that can be identified, and these are based on 12 global circulation modules (gcms) projecting worldwide climatological effects. Regional downscaling of these models is completed by a variety of organizations (though with federal data only, in this analysis), and can be used to complement the higher-level information. The information below is presented within this framework of understanding, and data sources are cited where appropriate.

3.11.1 Affected Environment

In 2011, Reclamation completed the River Management Joint Operating Committee (RMJOC) Climate Change Study in collaboration with the Bonneville Power Administration (BPA) and the USACE, to adopt climate change and hydrology datasets for their longer-term planning activities in the Columbia-Snake River Basin (BPA 2011). These agencies

collaborated to develop climate change and hydrology datasets to be used in their longer-term planning activities in the Columbia-Snake River Basin.

The three partners are collaborating again to update the RMJOC Climate Change Study results and to generate new hydrology and climate change datasets for use. In the first RMJOC Climate Change Study, projections were selected based on the changes in temperature and precipitation averaged over the Columbia River Basin. When these same projections were used to evaluate the Snake River basin, they tended towards wetter conditions overall. In the update to the RMJOC Climate Change Study, projections would be selected based on temperature and precipitation changes over the Snake River basin, which would provide for a broader range of wet to dry in potential future climate. This work is ongoing and is anticipated to be completed by Fiscal Year 2017.

Future projections suggest that the Pacific Northwest may gradually become wetter than historical conditions. Warming trends may lead to a shift in cool season precipitation, resulting in more rain and less snow which would cause increased rainfall-runoff volume during the cool season accompanied by less snowpack accumulation. Future climate projections based on hydrologic analyses suggest that warming and associated loss of snowpack would persist over much of the western United States.

Warming is expected to diminish the accumulation of snow during the cool season (i.e., late autumn through early spring) and the availability of snowmelt to sustain runoff during the warm season (i.e., late spring through early autumn). Decreased snowpack volume also could result in decreased groundwater infiltration, runoff, and ultimately decreased contribution to summer base flow in rivers. It is also expected to lead to more rainfall-runoff during the cool season than snowpack accumulation, which would lead to increases in the December to March runoff and decrease the April to July runoff.

On a regional basis, climate science projects that precipitation will likely rise through the end of the century. Further detail suggests that these precipitation events will come with less frequency, but with greater intensity and duration. Data for the Idaho region project a significant increase in precipitation for winter months, and general decrease in summer month precipitation (EPA 2015d). From a practical perspective, the region should likely prepare for the possibility of:

1. Lower summer flows, and
2. More precipitation in the form of rain, and in more erratic patterns, in other times.

3.11.2 Environmental Consequences

Based on the available projections, both more intense and longer precipitation events could result in more intense impacts to the irrigation drain system, occurring more often, by increased flows. Based on analyses conducted as Section 3.1 (Hydrology), it is likely that the potential impacts of climate change could be greatest in terms of precipitation patterns of rain on snow events, potentially increasing the occurrence of overtopping at undersized culverts.

Alternative A – No Action

The No Action Alternative would have no effect on the occurrence and/or intensity of climate change or contribution to the effects of climate change: it would not contribute to more intense or serious effects of climate change on a local, regional, or global level.

Alternative B – Proposed Action

The Proposed Action would nominally increase flows in the irrigation drainage system periodically as compared with historic patterns. This slight increase would have no effect on the occurrence and/or intensity of climate change or contribution to the effects of climate change: it would not present mitigation opportunities nor would it contribute to more intense or serious effects of climate change on a local, regional, or global level.

Indirect impacts would be anticipated to and from climate change from the Proposed Action. These impacts would include increased emissions from transporting more milk and product to and from the facility along with emissions associated with a proposed increase of milk processing from 4.5 million pounds per day to 6.5 million pounds per day. These indirect impacts are not anticipated to be affected by future projections that show the Pacific Northwest may gradually become wetter than historic conditions. Increased cheese production and transportation needs could increase emissions up to 44 percent if facility emissions are proportional to milk processing amounts. This conservative emissions increase is comparable to recent population growth from 2000 to 2010 of 43.73 percent in Canyon County shown in Table 3-16.

Therefore, the Proposed Action would have a similar no effect on the occurrence and/or intensity of climate change or contribution to the effects of climate change as the No Action Alternative.

3.12 Cumulative Impacts of the Proposed Action

Cumulative Effect of Impact is defined as the "impact on the environment that results from the incremental impact of the [proposed] action when added to other past, present, and reasonably foreseeable future actions" (40 CFR 1508.7). The CEQ interprets this regulation as referring only to the cumulative impact of the direct and indirect effects of the Proposed Action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time.

3.12.1 Past, Present, and Reasonably Foreseeable Future Actions

Past, present, and reasonably foreseeable actions identified in the surrounding area (public or private) that would adversely affect the same resource areas evaluated in this Draft EA would be additive effects to the Proposed Action. As discussed in the Land use (Chapter 3.3) and Socioeconomic (Chapter 3.9), there have been recent development changes as agriculture areas in Canyon County are being converted to residential uses at increasing rates and the county and cities must balance multiple uses. The cities of Nampa and Caldwell and Canyon County have developed their own Comprehensive Plans to manage the changing environment.

Another action to be considered is the proposed transfer of title to PID of all interest in right/title of Reclamation's drainage facilities and associated land interests within PID's service area.

The principal effect from that Proposed Action would be to cultural resources. That effect would be mitigated by documenting the significance of the PID drainage system to the development of agriculture in the Treasure Valley. Mitigation requirements would be stipulated in a Memorandum of Agreement to be signed by the SHPO, Reclamation, and PID, prior to implementation of the title transfer.

Hydrology

Water gained in the drains from the potentially increased discharge is relatively minor in comparison to the systems' existing capacities. A flow increase of up to 3.3 cfs ranges between 0.5 and 0.3-percent of the 100-year flood event for the Purdam Drain and Mason Creek, respectively.

While the proposed increase in flow would appear to contribute positively to in-season irrigation demands, the increase would be still relative to the groundwater use by the cheese processing facility. As Lactalis' existing groundwater withdrawal permit requires discharge

back to the drain, any assumed benefit from the Proposed Action to irrigation flows would be minimal, and when combined with past and present effects, the incremental effect would also be minimal.

3.12.2 Environmental Consequences

No other incremental or cumulative environmental effects are expected to occur as a result of the Proposed Action. Urban and suburban growth are expected to continue in the surrounding areas, regardless of the Proposed Action. Land use conversion from agricultural to urban/suburban uses would be expected to continue around the proposed action area and additional needs for development-specific stormwater management facilities would be expected. As described in Chapter 3.3, it is anticipated that the Proposed Action would not affect land use or current stormwater management practices or policies.

Since many of the resources would experience little or no effects from the Proposed Action, no cumulative effects would occur as a result of the No Action or Proposed Action Alternatives.

Chapter 4 CONSULTATION AND COORDINATION

4.1 Public Involvement

In March of 2015, Reclamation mailed a scoping document to over 140 agencies, Indian Tribes, organizations, and individuals soliciting their help in identifying any issues and concerns related to the Proposed Action and its alternatives.

Appendix D contains a copy of the scoping letter, and Appendix E contains a copy of the distribution list.

Ten written responses to the scoping letter were received during a 30-day comment period; a listing of the entities and individuals who provided comments is provided below.

- Pioneer Irrigation District (PID)
- Nampa & Meridian Irrigation District (NMID)
- Canyon Highway District No. 4, District Engineer
- City of Caldwell, Public Works Director
- Project Neighbor Richard Bicandi
- Project Neighbors Charles and Norma Paynter
- Project Neighbor Derek Tanaka
- Project Neighbor Angela Jolley
- Project Neighbor Margaret Hill
- Project Neighbor Jerry Rose

Copies of the comment correspondence and Reclamation's responses are included as Appendix D. The main issues that were raised and addressed in the Draft EA consisted of:

- Water Quality Concerns (addressed in Chapter 3.2)
  - Impact to Facility Use/Drain Operations from Effluent
  - Impact to Human Health and Exposure to Animals
  - Impacts to Groundwater
- Water Quantity Concerns (addressed in Chapter 3.1)

  - Impact to Drain Capacity
  - Future Agreements
- Permit Requirements (Addressed in Chapter 3.2)
- Wastewater Discharge Alternatives (Addressed in Chapter 2)
  - Alternative Preference
  - Additional Suggested Alternatives
- Cumulative Impacts (Addressed in Chapter 3.12)

4.2 Agency Consultation and Coordination

Reclamation mailed scoping letters to the EPA, USFWS, Idaho Department of Fish and Game (IDFG), IDWR, and IDEQ on March 27, 2015.

Reclamation requested relevant species lists from the USFWS on August 11, 2015. Reclamation received an email response from USFWS on August 11, 2015 containing an updated species list covering the project area. Reclamation concludes that the Proposed Action would have no effect on USFWS listed species.

Since the proposed project involves no eligible historic properties or would cause no adverse effects to known eligible cultural resources, no formal consultation concerning cultural resources was necessary.

4.3 Tribal Consultation and Coordination

Reclamation mailed scoping letters to: the Shoshone-Bannock, Shoshone-Paiute, Northwestern Shoshone, and Burns Paiute tribes on March, 20 2015 to both inform and involve Native American tribes in order to determine if the tribes have issues or concerns related to the Proposed Action (Appendix F). No response or concerns from the tribes were brought forward during the scoping period.

Chapter 5 REFERENCES

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APPENDICES

APPENDIX A

Capacity Analysis for Portions of Purdam Drain and Mason Creek, Canyon County, Idaho

Capacity Analysis
For
Portions
Of
Purdam Drain
And
Mason Creek
Canyon County, Idaho

Prepared
By:

Quadrant Consulting, Inc.
1904 W. Overland Rd.
Boise, ID 83705
www.quadrant.cc

Quadrant
Consulting, Inc.

Quadrant Consulting, Inc.

CAPACITY ANALYSIS
PORTIONS OF PURDAM DRAIN AND MASON CREEK
CANYON COUNTY, IDAHO

The Purdam Drain and Mason Creek Capacity Analysis quantifies flow capacity and hydraulic constraints on portions of the Purdam Drain and Mason Creek in Canyon County, Idaho. The work described in this Analysis evaluates the effect of a proposed Sorrento Lactalis, Inc. ("Sorrento") discharge into the Purdam Drain. The Purdam Drain discharge eventually flows into Mason Creek that eventually flows to the Boise River, approximately 11 miles to the northwest.

The Capacity Analysis includes hydrologic and hydraulic data supporting the US Bureau of Reclamation's decision to approve or disapprove an increase of discharge to Purdam Drain from 1.2 to 4.5 cubic feet per second ("cfs"). Sorrento's Application requests authorization to increase Sorrento's discharge of treated wastewater from a current average daily rate of approximately 1.2 cfs to a maximum instantaneous discharge rate of 4.5 cfs.

STUDY AREA

The Sorrento study area is located in the western end and lower-elevation reach of the Purdam Drain watershed, a sub-drainage of the Mason Creek watershed (Figure 1).

Figure 1. Project Vicinity Map. The project site is contained within Canyon County. The Sorrento facility is located within the Purdam Drain watershed (outlined in cyan), which in turn is a sub-drainage of the Mason Cr watershed (outlined in yellow). The route of the existing discharge through lower Purdam Drain and lower Mason Creek to the Boise River is depicted in dark blue. (Base map imagery: Google Earth Pro; Mason and Purdam watershed delineations: StreamStats, http://water.usgs.gov/osw/streamstats/idaho.html)

The Canyon County Flood Insurance Study[1] (FIS) identifies the Mason Creek drainage area as being comprised of 52 square miles, in both Ada and Canyon Counties. The Mason Creek segment is on the lower end of the drain between the Boise River confluence to a point 7.6 miles upstream near the Northside Blvd. crossing. The Purdam Drain discharges into Mason Creek near the Northside Blvd. crossing.

Utilizing the USGS StreamStats program[2], the Purdam Drain sub-watershed was determined to cover 16.4 square miles of land, again in both Ada and Canyon Counties. (Appendix A) The segment of the Purdam Drain being analyzed is the lower reach between the Mason Creek confluence to a point 4.8 miles upstream where Star Rd. crosses the Drain.

Hydraulic capacity is evaluated in two segments. Segment 1 includes the evaluation of the Purdam Drain downstream of the existing Sorrento point of discharge near Star Road to the confluence of the Drain with Mason Creek. Segment 2 evaluates Mason Creek between the Purdam Drain confluences for the length of the Creek to the Boise River. A general overview of these two segments is provided in Figure 2. More specifically, Appendix B provides both an image depicting the general location of the 48 individual crossings and Appendix B, Table 1 provides coordinates for each crossing.

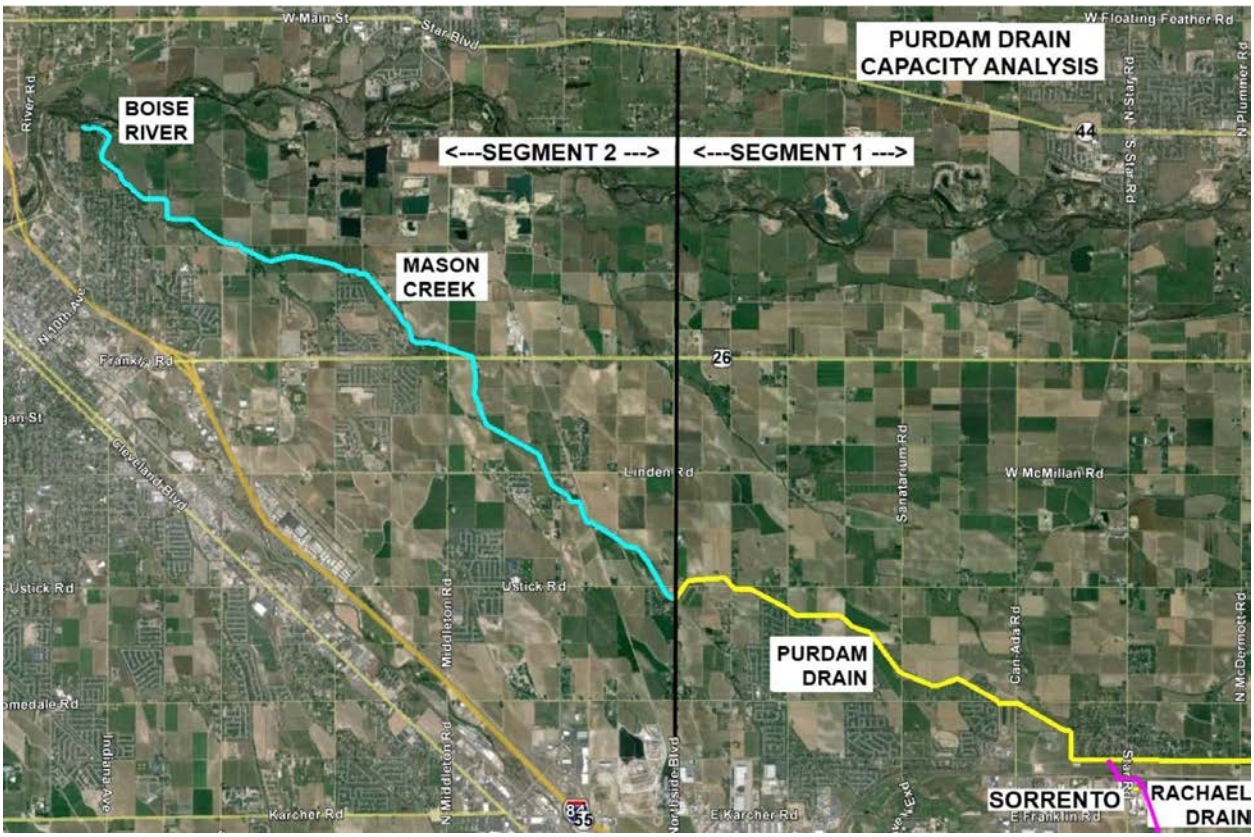

Figure 2. Segment Reach Map. Sorrento point of discharge (pink) is at the bottom right. The drainage system is comprised of two segments, the upstream Segment 1 (yellow) and the downstream Segment 2 (cyan). Segment 1 was hydraulically modeled using the FHWA HY-8 culvert analysis program. Segment 2 was modeled utilizing the US Army's HEC-RAS modeling program as a part of the effective Canyon County FIS. (Base map imagery: Google Earth Pro)

[1] FEMA, Flood Insurance Study, Canyon County, Idaho (and Incorporated Areas), 16027C000A, May 24, 2011.
[2] U.S. Geological Survey, 2012, The StreamStats program for Idaho, online at http://water.usgs.gov/osw/streamstats/idaho.html, last visited August 3, 2015.

HYDROLOGY/HYDRAULICS

Initial project scoping discussions at the Bureau of Reclamation Snake River Area Office resulted in an agreement that facilities in both lower Purdam Drain (Segment 1) and lower Mason Creek (Segment 2) would be evaluated with respect to impacts associated with the one percent annual exceedance chance, high water event (the “100-year Flood”). Potential methods and methodology for evaluating anticipated impacts were also discussed and generally agreed upon by the attending participants.

On October 6, 2014, QCI staff conducted a "windshield" field inventory of a majority of the existing crossings with Jesse M. Poletasio, PE, Hydraulic Engineer with the Bureau of Reclamation, Pacific Northwest Region. Observations were made concerning individual site configurations, accessibility, and available methodologies that would be appropriate to conduct the hydraulic analysis.

As a result of the site visit and upon review of existing information, two separate methodologies were agreed upon as being appropriate to provide a technically appropriate hydraulic analysis for the existing hydraulic conveyance structures. Due to the fact that no existing modeling was available for the Purdam Drain (Segment 1) structures, evaluation using the Federal Highway Administration's HY-8 Culvert Analysis Program[3] was selected as the optimum approach. Mason Creek (Segment 2) which was previously evaluated using the US Army's hydraulic modeling program HEC-RAS[4] as a part of the recent 2011 Canyon County FIS, was again evaluated using the existing HEC-RAS hydraulic model that was previously accepted following a rigorous review for the 2011 Canyon County FIS.

Hydrology

Hydrology of the subject area has been addressed through numerous prior studies, with the FEMA Canyon Co. FIS, May 24, 2011, being the most recent. The FIS studied Mason Creek in detail and effective discharges for Mason Creek were published in Table 2 of the FIS. An excerpt from the FIS discussion on the hydrologic methodology and the complete Canyon County Flood Insurance Study (May 24, 2011) is included in this analysis as Appendix C.

According to WEST Consultants[5], “For Indian and Mason Creeks, the primary cause of large floods is snowmelt and rain in winter months and in early spring.” (See Appendix D.) The typical, high intensity storm associated with runoff events in the project area is best described by the NRCS Type II synthetic rainfall distribution. For a 24-hour event, a Type II storm peak can be expected to occur within a one-hour time span[6] approximately during the midpoint of the storm. Depending on the storm location within the basin, the time of concentration and degree of basin attenuation will likely result in a flood peak that will be expressed within a few hours.

As a part of the Technical Support Data Notebook submitted with the updated FIS, the FEMA contractor prepared a Revised Hydrologic Analysis to quantify effective discharges (the 1-percent exceedance event or the 100-year Flood) for Mason Creek. The watershed study was

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[3] https://www.fhwa.dot.gov/engineering/hydraulics/software/hy8/
[4] http://www.hec.usace.army.mil/software/hec-ras/
[5] Revised Hydrologic Analysis for Indian Creek and Mason Creek, Flood Insurance Study, Canyon County, Idaho, WEST Consultants, Inc., November 15, 2005.
[6] McCuen, R.H. (1998), Hydraulic Analysis and Design, 2nd Ed., Prentice-Hall.

conducted as a part of the process to modernize the flood insurance mapping for Canyon County. A copy of the Revised Hydrologic Analysis is included within Appendix D.

Purdam Drain is a sub-basin of the Mason Creek watershed. The FEMA methodology contained in Appendix D, was used to define effective discharges (the 100-year Flood)[7]. The Purdam Drain Basin area derived through the StreamStats program(Appendix A), in combination with the FEMA methodology contained in the Revised Hydraulic Analysis, was used to develop the effective hydrology ("100-year Flood") for the Drain.

Table 1 summarizes FEMA's effective hydrology for the two study area reaches. These values serve as the basis for this hydraulic analysis.

Table 1
Effective Hydrology
Peak Discharge

Reach Segment	1% Annual Chance "100-year Flood"
Purdam Drain Mason Creek (Northside Blvd.) to Star Rd.	704 cfs
Mason Creek Boise River to Purdam Drain (Northside Blvd.)	1,266 cfs

Hydraulics – General

Sorrento's application requests authorization to increase Sorrento's discharge of treated wastewater from a current average daily rate of approximately 1.2 cubic feet per second ("cfs") to a maximum instantaneous discharge rate of 4.5, cfs resulting in a maximum increase under the current application of 3.3 cfs. Initial incremental project analysis was conducted in 0.5 cfs steps for Mason Creek, with an upper limit of 3.5 cfs, or six percent greater than the maximum instantaneous discharge value stated in the application. The consistent incremental steps allowed early analysis using HEC-RAS results. In an overview sense, the nominal difference between the two flows, 3.3 and 3.5 cfs, when compared to the base flood flows, which are on the order of 1,000 cfs, remains insignificant.

Purdam Drain by all appearances is a constructed facility. The Drain is composed of a composite channel, with a normal low-flow (10-60 cfs), non-vegetated channel flanked on either side by banks vegetated with aquatic species along the channel. Grasses generally cover the outer ditch banks. These banks are mildly sloped in isolated reaches to relatively steep throughout the majority of the study reach. Bank slopes varying between 6:1 to 2:1 (horizontal-to-vertical). In some locations the Drain is apparently subject to mechanical cleaning on a regular basis. The channel in the bottom varies in the range of 10-20 feet in width and two to four feet in depth. Top widths of the bank range from 40 to 60 feet.

By observation, Purdam Drain appears to normally convey between 40-60 cfs during the irrigation season. Flows in the non-irrigation season, while not measured as a part of this analysis appear to drop into the 10-30 cfs range.

[7] Appendix D, Formula (6): $Q_{100} = 169.91A^{0.5083}$

Mason Creek shares many similar characteristics with the Purdam Drain. Mason Creek has been described in as Subbasin Assessment as follows:

> Dating as far back as 1916 (Paul, 1916), irrigation practices have altered drainage patterns in Mason Creek. In many cases, water does not follow natural drainage paths. The natural drainage area in much of the lower portion of the subwatershed has been deepened, lengthened, straightened, and diverted while drains, laterals, and canals have been constructed. The stream alterations and man-made waterways have created new drainage areas that are significantly different from the natural subwatershed areas.[8]

The Subbasin Assessment identifies average flows in Mason Creek as between 60-85 cfs in the non-irrigation season and 160-190 cfs during the irrigation season.

Methods used in this analysis are the same as methods that would have been used by Bureau of Reclamation staff had they conducted the study. The methods were discussed with Bureau staff and management, originally during the October 6 “windshield” inventory and later at the June 5, 2015, project meeting at the Snake River Area Office. Both of these conversations were prior to beginning the analysis, and there was agreement that the methods used are appropriate for this type of analysis.

Hydraulics – Segment 1 (Purdam Drain)

For Segment 1, data to support analysis with the HY-8 software was collected in the field by QCI staff and includes the type of conveyance (e.g., culvert, bridge, or flume), channel configuration, and hydraulic characteristics. At the individual sites in Segment 1, horizontal and vertical control was established using differentially corrected global positioning system (GPS)[9] survey-grade equipment (Trimble R-8). Semi-permanent control markers (rebar pins and magnetic pavement nails) were left at each surveyed crossing site. At each site, digital images were collected as future reference material.

Field data collected on the Purdam Drain for crossings 1 -18, in support of the HY-8 analysis, is included as Appendix E. Processed data, including the digital images are included as Appendix F. A summary of pertinent data extracted from the processed field data is included as Appendix G, Purdam Drain, Summarized Data Sheet.

Culverts were evaluated with HY-8. Bridges and flumes in Segment 1 were evaluated using a simplified hydraulic analysis configured for each individual crossing. In the cases of both the “Purdam-10” and the “Purdam-11” crossings, these makeshift bridges were analyzed as large culverts under the HY-8 program. In the case of the flumes, “Purdam-02,” “Purdam-09” and “Purdam-14,” these crossings were evaluated in light of the capability to adversely affect high water. In the case of the three flumes, each was immediately adjacent to a culvert crossing, was significantly higher in elevation than the adjacent crossing and was deemed to pose an insignificant high water impairment in comparison to the adjacent crossing. While the adjacent culvert crossing was hydraulically analyzed, a separate analysis was not conducted on these three hydraulically insignificant flumes.

Crossing characteristics were evaluated for both culverts and bridges. For culverts the evaluation criteria included the type of culvert material, the diameter and length of the culvert,

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[8] Idaho Department of Environmental Quality. (2001). Mason Creek Subbasin Assessment, https://www.deq.idaho.gov/media/781365-sand-hollow-creek-mason-creek-2001-sba.pdf , last visited March 7, 2016.

[9] http://www.esri.com/news/arcuser/0103/differential1of2.html

the bed slope of the waterway, and an evaluation of pipe inlet and outlet conditions. The criteria for evaluating bridges and flumes included evaluating the span length and the width of the bridge deck, determining the channel bed slope and evaluating embankment conditions. Additionally, a visual assessment was conducted at each crossing to verify hydraulic roughness characteristics and to observe unusual hydraulic conditions that may occur in the field.

The evaluation criteria for the Purdam Drain culverts formed the basis of the hydraulic analysis using the HY-8 program. Data for each culvert was input and the analysis performed. The results of the HY-8 analysis are summarized in Appendix H and presented in the file entitled "HY8-Purdam-SummaryReport."

Hydraulics – Segment 2 (Mason Creek)

Segment 2 was studied in detail as a part of the Canyon County FIS, 2011. Utilizing survey-grade, differentially corrected GPS equipment (Trimble R-8) and total station survey instruments, Quadrant Consulting crews conducted the field survey for Mason Creek, as a subcontractor for WEST Consultants, Inc., FEMA's Canyon County FIS contractor.

WEST Consultants prepared the Canyon County 2011 FIS using the FEMA-accepted, U.S. Army Corps of Engineer's HEC-RAS hydraulic modeling program. The Draft FIS was subjected to wide public comment and review, prior to final acceptance by the local communities and FEMA. The project was thoroughly vetted through the community review process. As a part of the final FEMA submittal, WEST concluded the following:

> The results of the study were reviewed at an intermediate CCO (Consultation and Coordination Officer) meeting held on February 15, 2008, and attended by representatives of FEMA, WEST Consultants, the Idaho Department of Water Resources, the Bureau of Reclamation, Flood Control Districts 10 and 11, Quadrant Consulting, Senator Crapo, Congressman Sali and the cities of Greenleaf, Star, Middleton, Notus, Caldwell, Parma and Canyon County. All problems raised at that meeting have been addressed in this study.[10]

The analysis by Quadrant Consulting of Segment 2 primarily relied on the existing HEC-RAS hydraulic model. Twenty-six of the 29 crossings in Segment 2 were originally surveyed by QCI personnel in support of the FIS. Three minor crossings in Segment 2 were not modeled as a result of West's original field review. Two of the minor crossings were flumes, elevated over Mason Creek and the third was a farm crossing that was interpreted in the field to be a temporary structure. The 26 crossings included in the FIS were field verified in the summer of 2015, and we confirmed that their characteristics remain consistent with the original FIS survey. No changed conditions from those of the original survey were observed in the field.

[10] Section 1.3, Canyon County FIS, No. 16027C000A, effective May 24, 2011.

ANALYSIS

The purpose of the Capacity Analysis is to evaluate the potential effects of adding an additional flow to a pre-determined high water event. Before embarking on a review of the calculated flow numbers, a flow magnitude review is appropriate. The range of high water events vary between 704 cfs (a "100-yr Flood" on Purdam Drain) to 1,266 cfs (a "100-yr Flood" on Mason Creek.) A flow of up to 3.3 cfs will range between 0.5 and 0.3-percent of the projected high water event. Table 2 illustrates the relatively small numerical impact that would be attributed to an increased discharge of up to 3.3 cfs.

Table 2
Evaluation of Flow Impacts
3.3 cfs - As Compared to Projected Flood Events

Flood Event	Purdam Drain		Mason Creek	
	Discharge (cfs)	3.3 cfs As a % of Discharge	Discharge (cfs)	3.3 cfs As a % of Discharge
1% Annual Chance ("100-yr Flood")	704	0.5%	1,266	0.3%

The narrow impact range (0.3% - 0.5%) may only be considered practically measureable if under field conditions, the difference can be detected by available techniques and equipment. The USGS manual addressing techniques and standards for making discharge measurements[11] describes conditions of being able to measure to with a two percent accuracy as "excellent," while "good" conditions are accurate within plus or minus five percent. Appendix I, "USGS-TM3-A8-DischargeMeasurements, Excerpt" provides an extended discussion on the topic of flow measurement accuracy.

Table 3 summarizes commonly accepted qualitative evaluation criteria for discharge measurements, as defined by the US Geological Survey[11].

Table 3
USGS Qualitative Evaluation Criteria
Flow Measurements[11]

USGS Qualitative Description	**Relative Accuracy of Measurements**
Excellent	±2%
Good	±5%
Fair	±8%
Poor	≥8%

The quality of measurements are directly affected by a number of factors typically encountered in the field, including the uniformity of cross-section, flow conditions, and weather, which results in the USGS statement "(a)s a general rule, the accuracy of most discharge measurements will be about 5 percent." Conditions that materially affect measurements include the smoothness of

[11] Turnipseed, D.P., and Sauer, V.B., 2010, Discharge measurements at gaging stations: U.S. Geological Survey Techniques and Methods, Book 3, Chapter A8, 87 p. (Also available at http://pubs.usgs.gov/tm/tm3-a8/.)

the streambed, the presence of large rocks in the channel or flood plain, the uniformity of velocity, uniformity of approach conditions, the presence of in-channel obstructions (bridge piers, diversion structures, etc.), uniformity of flood plain vegetation, rapid stage changes, and adverse weather, including wind and ice. “Excellent” conditions (plus or minus 2 percent accuracy) can and will be quickly degraded to “good,” “fair” or “poor” conditions through the presence of any combination of these factors.

From a practical standpoint and for the ranges of impacts proposed, between 0.3 and 0.5 percent of measured flow, the impact of a discharge up to 3.3 cfs will be physically immeasurable in the field. Simply, one will be highly unlikely to experience “excellent measurement conditions” during a flood event, considering all the variables that one can encounter in the field.

Another factor considered in this analysis is the capacity of existing facilities (culverts, short bridges, etc.) to be able to successfully pass high water events under conditions that exist in the field today. The Purdam Drain HY-8 analysis provides an evaluation of the existing facility capacities to successfully pass the potential high water events identified by FEMA.

According to the results of the HY-8 analysis, not one of the existing Purdam Drain facilities inventoried is anticipated to pass the one percent event (100-yr Flood) under today’s built conditions. In effect, the analysis shows that under the 100-yr Flood scenario, the capacity of existing facilities will be far exceeded. As a result, the impact of the proposed action of increasing the flow in the Drain by up to 3.3 cfs will have no measurable effect on the affected environment.

Table 4 summarizes the results of the conveyance capacity analysis of the inventoried Purdam Drain facilities on the next page. In short, not one of the existing facilities in place today is expected to be able to adequately pass the 100-year Flood event.

In a similar manner, the Mason Creek HEC-RAS hydraulic analysis provides an evaluation of existing Mason Creek facility capabilities to successfully pass potential high water events that have been identified by FEMA. According to the HEC-RAS analysis, only one of the existing Mason Creek facilities inventoried is anticipated to pass the one percent event (100-yr Flood) under today’s conditions. The one facility that appears to be adequately sized in Segment 1 is the large culvert pipe under Ustick Road.

Table 5 summarizes the conveyance capacity of the inventoried Mason Creek facilities by including the modeled effects of up to an additional 3.5 cfs of flow in the waterway. Note that the 3.5 cfs modeled is a conservative and slightly higher flow than the proposed maximum increase of up to 3.3 cfs. The use of this slightly higher flow (six percent) allowed for uniform incremental steps during the initial stages using the HEC-RAS model.

Table 4
Existing Conveyance Capacities
Purdam Drain

PURDAM DRAIN							
No.	**Description**	**Purdam Stationing**	**Culvert Material (CMP, RCP, Etc.)**	**Culvert Dia (ft)**	**Culvert (Other Shape) (in)**	**Existing Facility Overtops[1] at: (cfs)**	**Conveyance Passes the 100-yr Flood Event (704 cfs) Y / N?**
1	Purdam-01-NorthsideBlvd	000+50	CMP	-	117x79	497	**N**
2	Purdam-02-Flume	007+20	-	-	-	-	
3	Purdam-03-UstickRoad	007+50	CMP	-	117x79	584	**N**
4	Purdam-04-LocalDrive	023+80	CMP	5.0	-	197	**N**
5	Purdam-05-MadisonRoad	033+10	CMP	5.0	-	147	**N**
6	Purdam-06-UStickRoad	034+00	CMP	5.0	-	219	**N**
7	Purdam-07-FranklinRoad	062+50	CMP	4.5	-	193	**N**
8a	Purdam-08-FarmAccess (W)	110+90	RCP	4.5	-	182	**N**
8b	Purdam-08-FarmAccess (E)	110+90	RCP	4.5	-	177	**N**
9	Purdam-09-Flume	111+00	-	-	-	-	
10	Purdam-10-FarmAccess	123+50	Arch	30.0	-	251	**N**
11	Purdam-11-FarmAccess	125+20	Arch	30.0	-	211	**N**
12	Purdam-12-11thAveNorthExt	128+40	CMP	7.0	-	331	**N**
13	Purdam-13-LyonsdalePlace	165+20	CMP	-	95x67	261	**N**
14	Purdam-14-Flume	177+10	-	-	-	-	
15	Purdam-15-CherryLane	177+50	CMP	8.0	-	339	**N**
16	Purdam-16-IdahoCenterBlvd	193+90	CMP	8.0	-	482	**N**
17	Purdam-17-CanalXing	212+50	RCP	5.5	-	371	**N**
18	Purdam-18-StarRoad	253+90	CMP	6.5	-	376	**N**

Note: 1. "Overtopping" is defined as the condition where the existing drainage conveyance structure can no longer convey the water in the ditch, resulting in higher ditch water elevations, followed by eventual flooding of the embankment (road or canal bank).

Similar to the situation on Purdam Drain, the overall majority of Mason Creek crossings are anticipated to be inundated during the base flood (100-year Flood) condition. Twenty-six structures over or within the creek were included in FEMA's 2011 Study. The structures included public and private bridges, culverts (both round and arch types), plus a number of flumes that convey irrigation water across Mason Creek, from one bank to the other. One culvert crossing of the Pioneer Irrigation District's Caldwell Highline Canal crossing, consisting of three 48-inch diameter corrugated metal pipes (CMPs), was included in the 2011 Study and is included in this analysis.

Of the 26 Mason Creek structures inventoried, only the Ustick Road (Lone Tree Lane) culvert at 16 feet in diameter and the 26-ft bridge on SH-20, are anticipated to be able to pass the base flood (100-year Flood) condition. Of particular interest, the Caldwell Highline Canal crossing currently appears to be at risk of flood waters inundating the canal during a base flood event. See Appendix K.4, page 19 for a HEC-RAS graphical depiction of the canal crossing under these modeled flood conditions.

A summary table (Table 5) summarizing the conveyance capacity of the inventoried Mason Creek facilities follows. Additional numeric and graphical information illustrating the HEC-RAS modeling results are included in Appendices J and K. The Mason Creek reach extends from the Boise River confluence to the Purdam Drain confluence, which is immediately downstream of Northside Blvd. The Northside Blvd. crossing, while outside of the effective FIS mapping, is included in Table 5 to serve as a geographic reference for the reader.

Table 5
Existing Conveyance Capabilities
Mason Creek

MASON CR STRUCTURES - (2011 CANYON CO FIS)									
No.	Description	Mason Cr. Stationing	Bridge Span (ft)	Culvert Material (CMP, RCP, Etc.)	Culvert Dia (ft)	Culvert (Other Shape) (ft)	Conveyance Passes the 100-yr Flood Event (1,266 cfs) Y / N?	Conveyance Passes the 100-yr Flood Event Plus 3.5 cfs Y / N?	Crossing Mapped in FIS Y/N?
1	Mason-01-PolkRd	057+00	-	CMP Arch	-	10x7.5	N	N	Y
2	Mason-02-Pipe	061+70	44	-	-	-	N	N	Y
3	Mason-03-Flume	064+52	37	-	-	-	N	N	Y
4	Mason-04-PrivateRoad	091+20	15	-	-	-	N	N	Y
5	Mason-05-LincolnRoad	112+00	-	CMP	8	-	N	N	Y
6	Mason-06-MasonRoad	117+90	-	CMP	8	-	N	N	Y
7	Mason-07-Flume	123+80	43	-	-	-	N	N	Y
8	Mason-08-DiversionStructure	167+20	-	-	-	-	N	N	Y
9	Mason-09-MarbleFrontRoad	171+00	-	CMP Arch	-	14x7.5	N	N	Y
10	Mason-10-PrivateRoad	182+00	-	-	-	-	-	-	N
11	Mason-11-DiversionStructure	184+00	-	-	-	-	N	N	Y
12	Mason-12-PipeCrossing	191+50	58	-	-	-	N	N	Y
13	Mason-13-WardLane	194+00	-	CMP	8	-	N	N	Y
14	Mason-14-PrivateXing	219+00	25	-	-	-	N	N	Y
15	Mason-15-MiddletonRoad	230+60	-	CMP	8	-	N	N	Y
16	Mason-16-Flume	242+58	56	-	-	-	N	N	Y
17	Mason-17-StateRoute20	243+25	26	-	-	-	Y	Y	Y
18	Mason-18-PrivateXing	270+50	29	-	-	-	N	N	Y
19	Mason-19-Flume	284+75	59	-	-	-	N	N	Y
20	Mason-20-Flume	294+50	-	-	-	-	-	-	N
21	Mason-21-Flume	302+50	-	-	-	-	-	-	N
22	Mason-22-Caldwell Highline Canal	309+50	-	CMPs	4, 4 & 4	-	N	N	Y
23	Mason-23-LindenRoad	312+50	28	-	-	-	N	N	Y
24	Mason-24-MidlandBlvd	324+20	-	CMP	8	-	N	N	Y
25	Mason-25-UPRailroad	346+50	-	CMP	4	-	N	N	Y
26	Mason-26-PrivateXing	361+00	30	-	-	-	N	N	Y
27	Mason-27-Flume	361+40	24	-	-	-	N	N	Y
28	Mason-28-DiversionStructure	392+30	-	-	-	-	N	N	Y
29	Mason-29-LoneTreeLn(UstickRd)	393+50	-	CMP	16	-	Y	Y	Y
30	Mason-30-NorthsideBlvd	402+00	-	-	-	-	-	-	N

Flow capacity for the crossings on Mason Creek downstream of the Purdam Drain confluence, Segment 2, is characterized at incremental design discharges matching those used in the 2011 FIS, which includes the one percent exceedance discharge (100-year Flood). FEMA's effective Mason Creek HEC-RAS model was modified by including additional flows in 0.5 cfs increments on top of the BFE (100-year Flood) and evaluating the modeled increase in water surface elevations or increase in the width of the 100-year flood plain. The output data from the HEC-RAS modeling are provided in Appendix J, "Mason Creek, HEC-RAS Output Results, Excerpted from Canyon Co Flood Insurance Study, 2011."

The HEC-RAS modeling demonstrates that maximum projected increases in water surface elevations are generally between 0.01-0.03 foot (1/8 – 3/8 of an inch). When compared to projected flood elevations of 8-12 feet of maximum flood water depth, these changes are

between 0.1 – 0.4 percent. Again, considering the inherent fluctuations in water surfaces during a high water event, these differences will be practically immeasurable.

In addition to evaluating the impact on flood depths, a review of lateral flood plain impacts indicates that the predicted median change in the top width of the flood plain is less than one foot or less than 2-percent of the flood plain width. Again, due to normal water surface elevation fluctuations during a flood event, any changes as a result of an increase up to an additional 3.3 cfs flow will be practically immeasurable.

Appendix K provides excerpts from the hydraulic model for the effective FIS that clearly depict flood plain widths being increased by existing road crossings (Appendices K.1 and K.2). Appendix K.3 supplies a graphical representation that shows, in profile view, a number of road crossings that are inundated during the base flood (100-year Flood) condition. Appendix K.4 provides a graphical interpretation of the numerical results derived from the HEC-RAS hydraulic model.

In light of a relatively insignificant increase in discharge that will result from an approved application for an increased discharge of up to 3.3 cfs, one should reasonably anticipate that risks attributed to additional siltation deposits, additional bed scour or structural scour should be considered as practically immeasurable. Similarly, the risk of adverse potential impacts to the aquatic and terrestrial environment along both Purdam Drain and Mason Creek is anticipated to be insignificant and unquantifiable due to the low magnitude of change.

IMPACT ON NAMPA & MERIDIAN IRRIGATION DISTRICT FACILITIES

Nampa & Meridian Irrigation District facilities that are within the study area primarily include the Purdam Drain between Star Road and the Pioneer Irrigation District's Phyllis Canal, a reach of approximately 4,140 lineal feet (approximately 0.8 mile). No conveyance structures are within this reach. Therefore, lacking structures in this portion of the analysis reach, impacts associated with an increase up to 3.3 cfs on NMID facilities are anticipated to be insignificant.

IMPACT ON PIONEER IRRIGATION DISTRICT FACILITIES

The principal Pioneer Irrigation District facilities that are within the study area are the Phyllis Canal at the Purdam Drain crossing and the Caldwell Highline Canal at the Mason Creek crossing. The hydraulic analyses for both structures indicate that presently under 100-year Flood scenarios, floodwaters are anticipated to overtop both canal embankments by significant amounts.

The Purdam Drain is piped under the Phyllis Canal through a 66-inch diameter reinforced concrete pipe, which can be observed in both the Drain and in the floor of the dewatered Canal. According to the analysis, flows of greater than 371 cfs, or slightly more than half of the One Percent Annual Chance event (704 cfs, the 100-year Flood), are projected to begin spilling out of bank and flooding the local surrounding area immediately upstream of the canal embankment. A detailed hydraulic analysis of potential flooding of the surrounding area was not included in this analysis. In any event, the addition of up to 3.3 cfs is not anticipated to materially affect the projected impacts associated with the 100-yr Flood at the Phyllis Canal.

The crossing of the Caldwell Highline Canal over Mason Creek is accomplished with the passage of Mason Creek through three 4-foot diameter corrugated metal pipes that exist today

under the canal embankment. The HEC-RAS hydraulic analysis predicts that under the 100-year Flood event (1,266 cfs), the canal should be anticipated to experience flood waters coming over the canal embankment at a depth of over one foot deep. Again, the addition of up to 3.3 cfs is not anticipated to materially affect the projected impacts associated with the conveyance of the 100-yr Flood at the Caldwell Highline Canal.

CONCLUSIONS

The impacts associated with a flow increase of up to 3.3 cfs into Purdam Drain and Mason Creek are on the order of significantly less than a one-half of a percent (0.5 percent) change during a 100-year Flood event. Under the best of conditions, including laboratory settings, one cannot expect to reliably detect such a small incremental change in flow.

Impacts due to the increase of up to 3.3 cfs are practically immeasurable due to the fact that even under “excellent” conditions (a measurement accuracy of two percent or less), any change caused by the additional flow contribution, including flood water heights and lateral flooding, is highly likely to remain undetected with present technology.

Analysis by commonly accepted hydraulic modeling tools (HY-8 and HEC-RAS) verifies that the vast majority of structures on both lower-Purdam Drain and lower-Mason Creek are presently undersized and incapable today of conveying the 100-year Flood event without overtopping. Bank overtopping during a flood event today caused by the existing inadequately sized facilities should be anticipated to result in minor flooding in areas immediately adjacent to these structures. The data supports that an additional 3.3 cfs discharge will not make current conditions worse.

Existing irrigation facilities are not anticipated to endure additional hydraulic or environmental stress, due to an increase of flows up to 3.3 cfs. The Phyllis Canal and the Caldwell Highline Canal crossings over Purdam Drain and Mason Creek, respectively, have been demonstrated to be sized to adequately handle only events smaller than the 100-year Flood event. However, in the case that a 100-year Flood event should occur, effects associated with an incremental increase of 3.3 cfs to the respective base flood flow, included raised flood heights, increased lateral flooding, increased siltation or scour, impacts on infrastructure or impacts on the aquatic and terrestrial environment have been demonstrated to be practically immeasurable.

Quadrant Consulting, Inc.

Appendix A
StreamStats – Purdam Drain

StreamStats Version 3 Beta

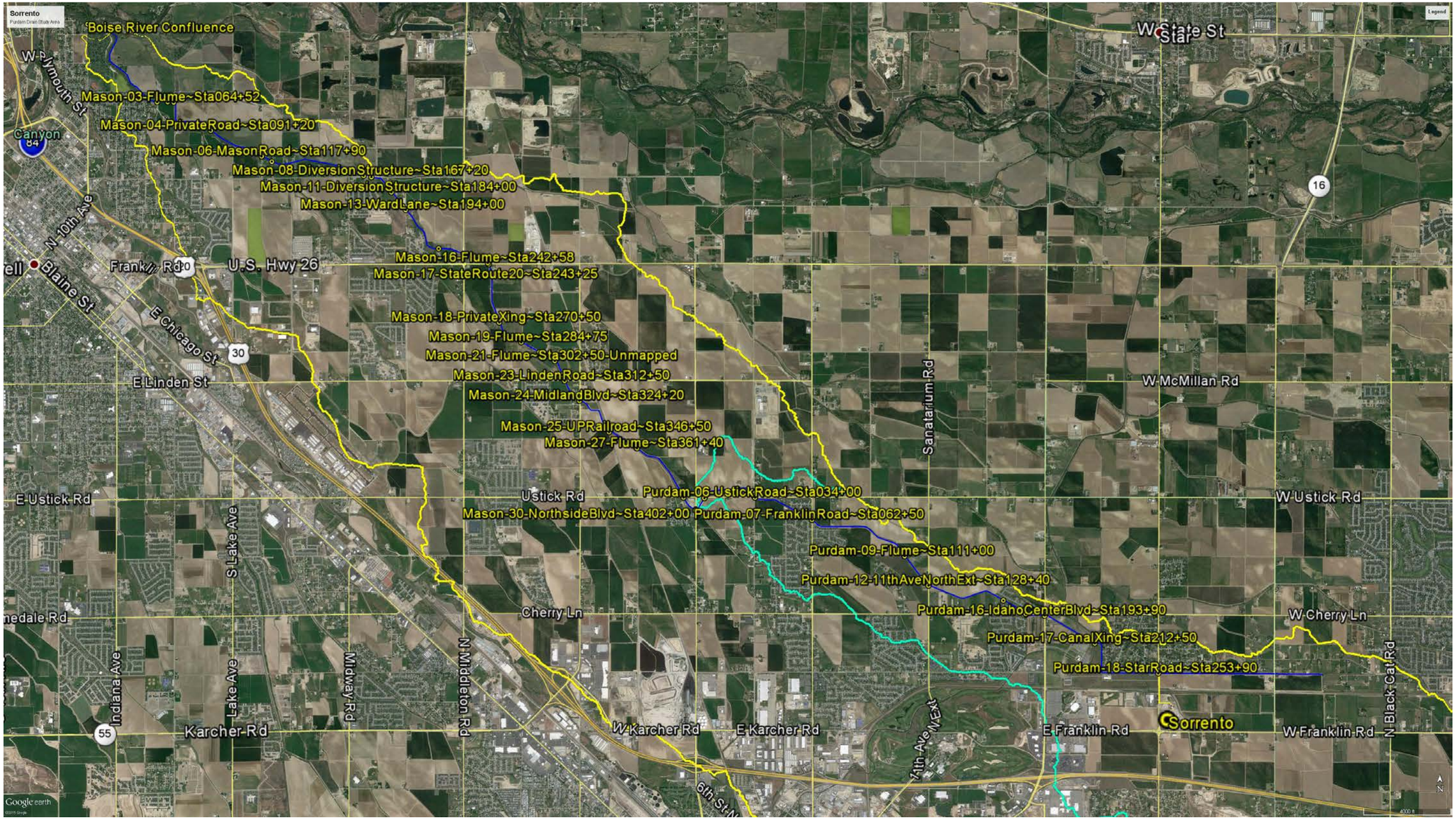
Basin Characteristics Ungaged Site Report

Date: Mon Aug 3, 2015 2:16:18 PM GMT-6
NAD 1983 Latitude: 43.6325 (43 37 57)
NAD 1983 Longitude: -116.573 (-116 34 23)

Label	Value	Units	Definition
DRNAREA	16.38	square miles	Area that drains to a point on a stream
RELIEF	305	feet	Maximum - minimum elevation
ELEVMAX	2750	feet	Maximum basin elevation
MINBELEV	2450	feet	Minimum basin elevation
ELEV	2590	feet	Mean Basin Elevation
FOREST	0	percent	Percentage of area covered by forest
PRECIP	10	inches	Mean Annual Precipitation
BSLDEM10M	2	percent	Mean basin slope computed from 10 m DEM
SLOP30_10M	0	percent	Percent area with slopes greater than 30 percent from 10-meter NED
NFSL30_10M	0	percent	Percent area with north-facing slopes greater than 30 percent from 10-meter NED.
CSL1085LFP	22.6	feet per mi	Change in elevation divided by length between points 10 and 85 percent of distance along the longest flow path to the basin divide, LFP from 2D grid
SLOP30_30M	0	percent	Percent area with slopes greater than 30 percent from 30-meter DEM.
BSLDEM30M	1.55	percent	Mean basin slope computed from 30 m DEM
CSL10_85	27.5	feet per mi	Change in elevation divided by length between points 10 and 85 percent of distance along main channel to basin divide - main channel method not known
NFSL30_30M	-1	percent	Percent area with north-facing slopes greater than 30 percent from 30-meter DEM.
AG_OF_DA	86.6	percent	Agricultural Land in Percentage of Drainage Area (Idaho Logistic Regression Equations SIR 2006-5035
DV_OF_DA	5.96	percent	Developed Land in Percentage of Drainage Area (Idaho Logistic Regression Equations SIR 2006-5035
LAKEAREA	0.054	percent	Percentage of Lakes and Ponds
SLOP50	0	percent	Slopes Greater Than 50 Percent as percent of drainage area
VOLCANIC	0	percent	Percent of drainage area as surficial volcanic rocks as defined in SIR 2006-5035
IMPNLCD01	2.2	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	27	percent	Percentage of land-use from NLCD 2001 classes 21-24

Quadrant Consulting, Inc.

Appendix B
Purdam Drain & Mason Creek Crossing Inventory



Appendix B. Purdam Drain & Mason Creek Crossing Inventory

TABLE 1

MASON CR STRUCTURES - (2011 CANYON CO FIS)

No.	Latitude	Longitude	Description
1	-116.66618312	43.68326716	Mason-01-PolkRd~Sta057+00
2	-116.66437141	43.68328230	Mason-02-Pipe~Sta061+70
3	-116.66333222	43.68323699	Mason-03-Flume~Sta064+52
4	-116.65694367	43.67971515	Mason-04-PrivateRoad~Sta091+20
5	-116.65004450	43.67732476	Mason-05-LincolnRoad~Sta112+00
6	-116.64814472	43.67652246	Mason-06-MasonRoad~Sta117+90
7	-116.64638891	43.67587099	Mason-07-Flume~Sta123+80
8	-116.63056699	43.67412883	Mason-08-DiversionStructure~Sta167+20
9	-116.62922298	43.67397606	Mason-09-MarbleFrontRoad~Sta171+00
10	-116.62630129	43.67257236	Mason-10-PrivateRoad~Sta182+00-NotMapped
11	-116.62577009	43.67208630	Mason-11-DiversionStructure~Sta184+00
12	-116.62384815	43.67035239	Mason-12-PipeCrossing~Sta191+50
13	-116.62330878	43.66989388	Mason-13-WardLane~Sta194+00
14	-116.61759699	43.66506715	Mason-14-PrivateXing~Sta219+00
15	-116.61334061	43.66442558	Mason-15-MiddletonRoad~Sta230+60
16	-116.60911618	43.66330303	Mason-16-Flume~Sta242+58
17	-116.60895552	43.66314652	Mason-17-StateRoute20~Sta064+52
18	-116.60713926	43.65588776	Mason-18-PrivateXing~Sta270+50
19	-116.60333522	43.65343733	Mason-19-Flume~Sta284+75
20	-116.60019991	43.65218676	Mason-20-Flume~Sta294+50-Unmapped
21	-116.59756044	43.65110932	Mason-21-Flume~Sta302+50-Unmapped
22	-116.59628547	43.64938910	Mason-22-Canal~Sta309+50
23	-116.59586007	43.64863343	Mason-23-LindenRoad~Sta312+50
24	-116.59329437	43.64615752	Mason-24-MidlandBlvd~Sta324+20
25	-116.58818703	43.64225897	Mason-25-UPRailroad~Sta346+50
26	-116.58349934	43.64029391	Mason-26-PrivateXing~Sta361+00
27	-116.58336030	43.64025030	Mason-27-Flume~Sta361+40
28	-116.57561562	43.63443211	Mason-28-DiversionStructure~Sta392+30
29	-116.57534358	43.63412350	Mason-29-LoneTreeLane(UstickRoad)~Sta393+50
30	-116.57323200	43.63252383	Mason-30-NorthsideBlvd~Sta402+00

PURDAM DRAIN STRUCTURES - (GOOGLE EARTH INVENTORY)

No.	Latitude	Longitude	Description
1	-116.57323381	43.63262594	Purdam-01-NorthsideBlvd~Sta000+50
2	-116.57175455	43.63404658	Purdam-02-Flume~Sta007+20
3	-116.57170774	43.63412323	Purdam-03-UstickRoad~Sta007+50
4	-116.56611641	43.63523958	Purdam-04-LocalDrive~Sta023+80
5	-116.56324455	43.63432376	Purdam-05-MadisonRoad~Sta033+10
6	-116.56303679	43.63413021	Purdam-06-UStickRoad~Sta034+00
7	-116.55321667	43.63136654	Purdam-07-FranklinRoad~Sta062+50
8	-116.53730279	43.62689444	Purdam-08-FarmAccess~Sta110+90
9	-116.53725537	43.62686004	Purdam-09-Flume~Sta111+00
10	-116.53442529	43.62411549	Purdam-10-FarmAccess~Sta123+50
11	-116.53405516	43.62373299	Purdam-11-FarmAccess~Sta125+20
12	-116.53315890	43.62319233	Purdam-12-11thAveNorthExt~Sta128+40
13	-116.52026194	43.62133863	Purdam-13-LyonsdalePlace~Sta165+20
14	-116.51638582	43.61968108	Purdam-14-Flume~Sta177+10
15	-116.51634428	43.61959230	Purdam-15-CherryLane~Sta177+50
16	-116.51314668	43.61945132	Purdam-16-IdahoCenterBlvd~Sta193+90
17	-116.50450640	43.61601033	Purdam-17-CanalXing~Sta212+50
18	-116.49357704	43.61227146	Purdam-18-StarRoad~Sta253+90

Quadrant Consulting, Inc.

Appendix C
Canyon County FIS (2011) Excerpt
Hydrology
And
Canyon County FIS 16027CV000A (2011)

The following information is a part of the Canyon County Effective Flood Insurance Study (2011) and summarizes the effective Hydrology development for both Mason and Purdam Drain.

Source: Flood Insurance Study. Canyon Co., Idaho, Effective May 24, 2011

2.1 AREA STUDIED, Scope of Study

Countywide Revision
The Boise River was restudied using detailed methods from Interstate 84 to the Canyon-Ada County boundary. Indian Creek was restudied using detailed methods from its confluence with the Boise River to the Canyon-Ada County boundary. Mason Creek was studied using detailed methods from its confluence with the Boise River to Lone Tree Lane in the City of Nampa.

2.3 Principal Flood Problems
City of Nampa
A combination of a rainstorm and melting snow, possibly on frozen ground, is apt to cause flooding on Indian and Mason Creeks. Flooding has occurred many times in the past where debris has lodged on the upstream side of some of the numerous bridges and culverts, causing backwater.

3.1 Hydrologic Analyses
The flood frequency curve for Mason Creek upstream of Lone Tree Lane was based on the 1-percent-annual-chance flood discharge determined by the USACE for an FIS in Ada County (Reference 12). This discharge, developed for snow and rainfall runoff conditions, was increased slightly to account for an increase in drainage area at the Canyon-Ada County line.

Curves developed using USGS and USACE methods (Reference 7, 8, and 9) were then used to determine the shape of the curve through the 1-percent-annual-chance discharge. Discharge was not increased with drainage area downstream from the county line into and through Nampa because it was thought that the large number of culverts and bridges would tend to attenuate peaks and moderate flows.

The estimation of flood frequency discharges for Mason Creek from its confluence with the Boise River upstream to Lone Tree Lane was based on a regional regression analysis (WEST Consultants, Inc., Revised Hydrologic Analysis for Indian Creek and Mason Creek, Flood Insurance Study, Canyon County, Idaho, November 15, 2005.).

Countywide Revision
WSELs for Mason Creek for this revision from its confluence with the Boise River to Lone Tree Lane were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Quadrant Consulting, Inc. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data were developed from surveys conducted by Quadrant Consulting, Inc. The starting WSEL was specified as normal depth based on the ground slope near the confluence with the Boise River.

Manning's "n" values used in this revision were based on field inspections and aerial photos.

Channel and overbank roughness coefficients (Manning's "n" values), used in the hydraulic computations, were chosen by engineering judgment based on field observation of stream and floodplain areas. The roughness coefficients for all studied flooding sources are listed in Table 3 below.

Table 3. Manning's "n" Values

Flooding Source	Channel Value	Overbank Value
Mason Creek	0.03-0.06	0.025-0.1

The 1-percent-annual-chance flood elevations for streams studied by approximate methods were developed using normal-depth calculations and topographic maps (References 25, 26, and 27).

Locations of selected cross-sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

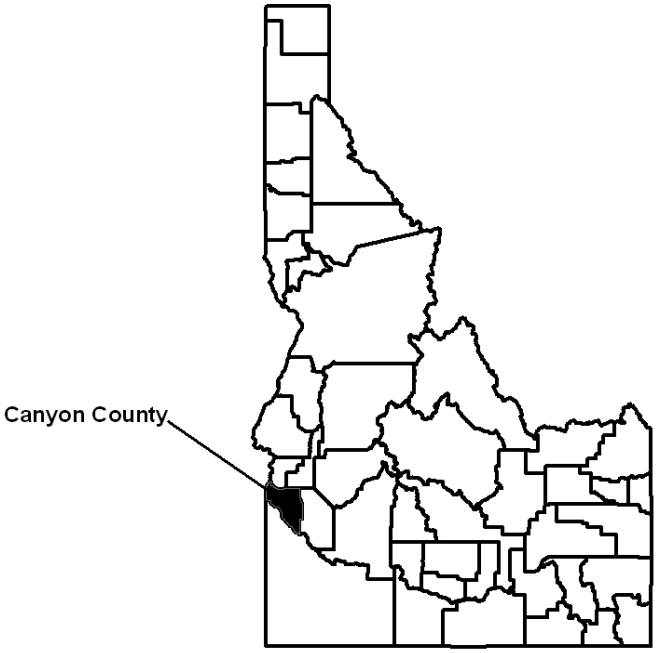
The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

FLOOD INSURANCE STUDY

CANYON COUNTY, IDAHO
AND INCORPORATED AREAS

Community Name	Community Number
CALDWELL, CITY OF	160036
GREENLEAF, CITY OF	160235
*MELBA, CITY OF	160020
MIDDLETON, CITY OF	160037
NAMPA, CITY OF	160038
NOTUS, CITY OF	160147
PARMA, CITY OF	160039
STAR, CITY OF	160236
*WILDER CITY, CITY OF	160196
CANYON COUNTY (UNINCORPORATED AREAS)	160208

*NO SPECIAL FLOOD HAZARD AREAS



Effective:
May 24, 2011

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
16027C000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

Selected Flood Insurance Rate Map panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X
C	X

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

Countywide Effective: May 24, 2011

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Exhibit 1 - Flood Profiles

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Indian Creek	Panels 17P – 31P
Mason Creek	Panels 32P – 53P
Mason Creek Overflow to Boise River	Panel 54P
Mill Creek (Mill Slough)	Panels 55P – 57P
North Split Flow from Mason Creek	Panel 58P
Renshaw Canal	Panels 59P – 60P
Renshaw Canal Overflow	Panels 61P – 62P
Tenmile Creek	Panel 63P
Willow Creek (Lower)	Panels 64P – 65P
Willow Creek (Upper)	Panel 66P

PUBLISHED SEPARATELY:

Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
CANYON COUNTY, IDAHO AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Canyon County, Idaho, including the Cities of Caldwell, Greenleaf, Melba, Middleton, Nampa, Notus, Parma, Star and Wilder City and the unincorporated areas of Canyon County (referred to collectively herein as Canyon County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Cities of Melba and Wilder City are non-floodprone. Additionally, the City of Star is located in both Canyon County and Ada County. This FIS contains only the information for the City of Star in Canyon County. Please consult the Ada County FIS for information regarding Star in Ada County.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Pre-Countywide

The original hydrologic and hydraulic analyses for the Boise River, Indian Creek, Mason Creek, Mill Creek (Mill Slough), Renshaw Canal, and Renshaw Canal Overflow were performed by the United States Geological Survey (USGS) for the Federal Emergency Management Agency (FEMA) under Interagency Agreement No. IAA-H-8-76, Project Order No. 24 (8-12-76) and Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 2. This work was completed in August 1979.

Revised hydrologic and hydraulic analyses for a reach of the Boise River near Caldwell were performed by Toothman-Orton Engineering Company, Boise, Idaho, for FEMA under Contract EMW-86C-224l. That study was completed in November 1987.

The hydrologic and hydraulic analyses for a restudy of the Boise River, from its confluence with the Snake River upstream to the Canyon-Ada County line with the exception of the reach near Caldwell, were performed by the United States Army Corps of Engineers (USACE)-Walla Walla District, under Interagency Agreement EMW-90-E-3286, Project Order No.7. That work was completed in 1991.

Hydrologic and hydraulic analyses for Mill Creek (Mill Slough) were reviewed by the USACE-Walla Walla District, in 1981, to include new bridges at Boise Street and State Highway 44.

Willow Creek was originally studied by the USGS in 1979. The hydrologic and hydraulic analyses for a restudy of the flooding on Willow Creek were performed by the USACE-Walla Walla District, for FEMA under Interagency Agreement No. EMW-87-E-1137, Project Order No. 37, and Interagency Agreement No. EMW-87-E-2529, Project Order No.9. That study was completed in July 1988.

The work done by Fox Water Engineering, LLC for the July 27, 2006, Willow Creek Letter of Map Revision (LOMR) contained detailed study data from just downstream of Duff Lane to just upstream of Lansing Lane.

The work done by Kunz Engineering for the August 28, 2007, Boise River LOMR contained detailed study data from approximately 9,400 feet to approximately 3,800 feet downstream of Notus Greenleaf Road.

The work done by Kunz Engineering and Holiday Engineering for the July 3, 2003, Boise River LOMR contained detailed study data in the area approximately 2,100 feet downstream of Middleton Road.

The work done by the City of Nampa Engineering Department for the October 24, 1997, Mason Creek LOMR contained detailed study data in the area just upstream of the abandoned Union Pacific Railroad (UPRR) right-of-way to just downstream of the Franklin Road South culvert.

The work done for the April 30, 2009 Tenmile Creek LOMR contained detailed study data in the area from approximately 2,600 feet downstream of Canada Road to just upstream.

The work done for the December 28, 2009 Mason Creek LOMR contained detailed study data in the area from just downstream of South Americana Drive to just upstream of Kings Road.

Countywide Revision

The hydrologic and hydraulic analyses for a restudy of Indian Creek, Mason Creek, and the Boise River were performed by WEST Consultants, Inc. for FEMA under contract number EMS-2001-CO-0068. This preliminary study was completed in October 2007. Base mapping was compiled by Horizons, Inc. from LiDAR coverage at a scale of one inch equals 500 feet.

The preliminary hydraulic modeling for Indian Creek was subsequently modified by CH2M Hill, under contract to the City of Caldwell, to account for recent channel and floodplain modifications. The modeling revisions were completed in July 2008. The preliminary hydrologic analysis for Indian Creek was modified after discussions regarding the contributing drainage area, the joint probability of flows in the New York Canal and Indian Creek and the capacity of the New York Canal. This revised analysis was completed in November 2009. The modified hydrologic analysis results and the modified hydraulic model were used to determine the final water surface elevations, floodplain extents and floodway delineation. This work was completed by Michael Baker Jr., Inc., for FEMA.

1.3 Coordination

Pre-Countywide

Canyon County (Unincorporated Areas)
The initial Consultation and Coordination Officer (CCO) meeting was held on March 4, 1976, and attended by representatives of Canyon County, the City of Caldwell, FEMA, and the study contractor. During that meeting the streams to be studied by detailed or approximate methods, the limit of detailed and approximate study, and the selection of data on local flooding were discussed.

An intermediate coordination meeting was held on February 8, 1979, and was attended by representatives of the study contractor, FEMA, and Canyon County to discuss the results of the study. No major problems were encountered, and the study was acceptable to the county.

The results of the initial study were reviewed at a final community coordination meeting held on September 13, 1979, and attended by representatives of Canyon County, the City of Caldwell, the Federal Insurance Administration (FIA), and the study contractor. No problems were raised at the meeting.

On October 24, 1983, a final CCO meeting was held for Canyon County. In attendance were representatives of the study contractor, FEMA, and the county. No problems were raised at the meeting.

The 1979 FIS was revised in 1988 to add flooding from Willow Creek that affects the unincorporated areas of Canyon County. Willow Creek was studied by detailed methods as part of the FIS for the City of Middleton, Canyon County, Idaho.

A restudy of the Boise River was initiated by FEMA following completion of the new Interstate Highway 84 Bridge over the Boise River and construction of the new frontage roads. Limits of the restudy were determined by the FIA following a meeting with the community and the study contractor held in January 1986.

An intermediate and final CCO meeting concerning the restudy was held on February 2, 1988. Attending the meeting were representatives of the county, FEMA, and the study contractor.

The final CCO meeting was held on January 12, 1993, and was attended by representatives of FEMA, the USACE, and Canyon County. The study was acceptable to the county.

City of Caldwell
The initial CCO meeting was held on March 4, 1976, and attended by representatives of Canyon County, the City of Caldwell, FEMA, and the study contractor. During that meeting the streams to be studied by detailed or approximate methods, the limit of detailed and approximate study, and the selection of data on local flooding were discussed.

The results of the initial study were reviewed at a final community coordination meeting held on September 13, 1979, and attended by representatives of Canyon County, the City of Caldwell, the FIA, and the study contractor. No problems were raised at the meeting.

A restudy of the Boise River was initiated by FEMA following completion of the new Interstate Highway 84 Bridge over the Boise River and construction of the new frontage roads. Limits of the restudy were determined by the FIA following a meeting with the community and the study contractor held in January 1986.

An intermediate and final CCO meeting concerning the restudy was held on February 2, 1988. Attending the meeting were representatives of the county, FEMA, and the study contractor.

City of Middleton

For the original studies for the City of Middleton, the Mayor and members of the Middleton City Council, the Middleton City Engineer, and citizens of Middleton met with representatives of FEMA and the study contractor on March 5, 1976, to determine which streams were to be studied. Coordination was maintained with the USACE.

The results of the original study were reviewed at a final community coordination meeting held on September 13, 1979. Attending the meeting were representatives of FEMA, the study contractor, and the city. No problems were raised at the meeting.

On December 15, 1989, a final community coordination meeting was held to review the results of the restudy of Willow Creek. Attending this meeting were representatives of FEMA, the study contractor, and the City of Middleton.

City of Nampa

For the original studies for the City of Nampa, local officials and citizens of Nampa met with representatives of FEMA and the study contractor on December 12, 1975, to determine which streams were to be studied. City officials furnished general information on flooding within the study area.

The study was reviewed at the intermediate coordination meeting on May 1, 1979. The meeting was attended by representatives of FEMA, the study contractor, and the city. No major problems were encountered and the study was acceptable to the community.

The final community coordination meeting was held on October 24, 1983, and was attended by representatives of FEMA, the study contractor, and the city. All problems with the study have been resolved.

City of Notus

For the original studies for the City of Notus, the initial CCO meeting was held on March 5, 1976, and attended by representatives of the City of Notus, FEMA, and the USGS. During the meeting the streams to be studied by detailed or approximate methods were discussed. City officials furnished general information on flooding within the study area.

The results of the initial study were reviewed at a final community coordination meeting held on February 9, 1979. Attending the meeting were representatives of the FIA, the study contractor, and the city. No problems were raised at the meeting.

The results of the restudy were reviewed at the final CCO meeting held on January 12, 1993, and attended by representatives of FEMA, the City of Notus, and the USACE. All problems raised at that meeting have been addressed.

City of Parma

For the original studies for the City of Parma, the CCO meeting was held on March 3, 1976, and attended by representatives of the Parma City Council, the mayor, the city attorney, FEMA, and the USACE. Three lifelong residents of the city were also present. The streams to be studied by detailed or approximate methods were discussed. Lifelong residents of the area furnished recollections of flooding of the Boise River in 1937.

The results of this study were reviewed at a final community coordination meeting held on September 13, 1979. Attending the meeting were representatives of the FIA, the study contractor, and the city. No problems were raised at the meeting.
The results of the restudy were reviewed at the final CCO meeting held on January 12, 1993, and attended by representatives of FEMA, the City of Parma, and the USACE. All problems raised at that meeting have been addressed.

Countywide Revision

The initial CCO meeting was held on November 5, 2003, and was attended by representatives of FEMA, the State of Idaho, Canyon County, the City of Nampa, the City of Caldwell, and the study contractor.

An intermediate CCO meeting was held on February 15, 2008, and was attended by representatives of FEMA, WEST Consultants, the State of Idaho, the Cities of Nampa, Caldwell, Star, Middleton, Greenleaf, Parma and Greenleaf, Senator Crapo's office, Congressman Sali's office and Quadrant Consulting. Two main issues raised at the meeting include the new channel configuration for Indian Creek and the flow capacity of the New York Canal.

The preliminary analyses for Indian Creek were appealed on January 15, 2009 by the Cities of Caldwell and Nampa. The appeal from the City of Caldwell involved a request to update the channel configuration for Indian Creek to account for the work done by the city to realign and regrade the stream banks of Indian Creek between 5th and 10th Avenues. Both cities appealed the hydrologic analysis conducted on Indian Creek and the New York Canal. The appeal involved a review and changes to the contributing drainage area of Indian Creek, the joint probability of flows in the New York Canal and Indian Creek and the capacity of the New York Canal. The appeal was resolved on December 31, 2009.

The results of the study were reviewed at an intermediate CCO meeting held on February 15, 2008, and attended by representatives of representatives of FEMA, WEST Consultants, the Idaho Department of Water Resources, the Bureau of Reclamation Flood Control Districts 10 and 11, Quadrant Consulting, Senator Crapo, Congressman Sali and the cities of Greeleaf, Star, Middleston, Notus, Caldwell, Parma and Canyon County. All problems raised at that meeting have been addressed in this study.

Once the appeal was resolved it was determined in conversations with FEMA and the communities that no further CCO meetings were necessary so a second CCO meeting was not held.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Canyon County, Idaho, including the incorporated communities listed in Section 1.1.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development.

Pre-Countywide

The August 1979 study performed by USGS provided a detailed study along Boise River from its confluence with Snake River upstream to the Canyon-Ada County line. The November 1987 study performed by Toothman-Orton Engineering Company, Boise, Idaho, provided new detailed study data of the reach of Boise River near Caldwell after construction of the interstate Highway 84 Bridge and new frontage roads. The Boise River (excluding the reach near the City of Caldwell) was then restudied in 1991 by USACE-Walla Walla District.

Indian Creek was studied by detailed method from its confluence with Boise River to the eastern county limits.

Willow Creek was studied by detailed methods from its confluence with Boise River to the northern corporate limits of the City of Middleton. The 1988 hydrologic and hydraulic analyses for the restudy of the flooding on Willow Creek, that were performed by the USACE, provided detailed data along Willow Creek from its confluence with Boise River to the northern corporate limits of the City of Middleton, to include changes in channel geometry and sedimentation built up within the floodplain. The work done by Fox Water Engineering, LLC for the July 27, 2006, Willow Creek LOMR contained detailed study data from just downstream of Duff Lane to just upstream of Lansing Lane.

Renshaw Canal was studied by detailed method from its confluence with Riverside Canal approximately 1.5 miles to Lower Ridge Road. Renshaw Canal Overflow was studied by detailed methods from the overflow back to its confluence with Renshaw Canal.

Mason Creek was studied by approximate methods from its confluence with Boise River upstream to Lone Tree Lane and then by detailed methods from Lone Tree Lane to the eastern county limits. The work done by City of Nampa for the October 24, 1997, Mason Creek LOMR contained detailed study data from the abandoned UPRR right-of-way located approximately 450 feet downstream of Third Avenue North along Mason Creek to just downstream of Franklin Road South Culvert.

The 1981 USACE hydrologic and hydraulic analyses for Mill Creek (Mill Slough) used in the original report constituted a detailed study to include new bridges at Boise Street and State Highway 44.

USGS also provided approximate studies along 12th Avenue Drain, Dixie Drain, Elijah Drain, Mill Creek (downstream of Boise Street), Parma Drain, First Drain west of Parma Drain (flowing southerly through Parma), Second Drain west of Parma Drain, Willow Creek (upstream of the UPRR), and Wilson Drain.

Snake River, Willow Creek upstream of the UPRR, Mill Creek downstream of Boise Street, 12th Avenue Drain, Wilson Drain, Elijah Drain (southeast of Caldwell), Parma Drain, and the First Drain west of Parma Drain (flowing southerly through Parma).

Floods caused by overflow from Conway Drain within the corporate limits of Notus were studied using approximate methods. Approximate analyses revealed that Conway Drain has no known history of flooding in Notus and that only extremely heavy rainstorms and/or debris in the channel would cause flooding.

Approximated analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Canyon County (including the Cities of Caldwell, Greenleaf, Melba, Middleton, Nampa, Notus, Parma, and Wilder City).

Countywide Revision

The Boise River was restudied using detailed methods from Interstate 84 to the Canyon-Ada County boundary. Indian Creek was restudied using detailed methods from its confluence with the Boise River to the Canyon-Ada County boundary. Mason Creek was studied using detailed methods from its confluence with the Boise River to Lone Tree Lane in the City of Nampa.

2.2 Community Description

Canyon County is located in southwestern Idaho. It is bordered by Payette and Gem Counties to the north, Ada County to the east, Owyhee County to the south (all in Idaho), and Malheur County, Oregon, to the west.

The population of Canyon County was 131,441 in 2000, an increase of approximately 46 percent from 1990 census population of 90,076 (Reference 1). Table 1 below shows the population of the county and incorporated cities.

Table 1. Populations in Canyon County, Idaho

Community	Population
City of Caldwell	25,967
City of Greenleaf	862
City of Melba	439
City of Middleton	2,978
City of Nampa	51,867
City of Notus	458
City of Parma	1,771
City of Star	1,795
City of Wilder City	1,462
Canyon County (Unincorporated Areas)	45,637
Total	133,236

Agriculture is the major industry of the county and is supported heavily by irrigation. About 85 percent of the area is used for irrigated crops or improved pasture. The majority of the surface water diverted for irrigation in Canyon County is from Boise River and its reservoirs. The New York Canal supplies water to Lake Lowell, an irrigation water storage reservoir formed in 1908 by construction of two earth-filled dams. Water from the Payette River Valley is transferred to Canyon County to irrigate land north of Boise River. High-lift pumping from Snake River irrigates land in southern Canyon County. Additional scattered areas are irrigated by groundwater pumping. Broad areas are nearly level and gently sloping sandy loams and silt loams are well suited to intensive cultivation. The soils cannot be cultivated without irrigation, but water of excellent quality is available in adequate amounts.

All streams studied, except for Snake River, are in the Boise River basin. Boise River drains a total area of approximately 4,130 square miles.

The Boise River flows from east to west through the northern half of Canyon County and joins the Snake River in the northwestern corner of the county, a few miles northwest of Parma. The Snake River, flowing northwesterly, forms the southern part of the western boundaries of Canyon County, as well as part of the Idaho-Oregon border. These two rivers are characterized by large, flat valleys with rolling hills along the fringes of old river terraces or benches. Elevations range from 2,200 to 2,800 feet. The Owyhee Mountains, with peaks over 8,000 feet, slope down to the left bank of the Snake River to the south and west of Canyon County. Lake Lowell, covering approximately 13 square miles, is located in the southern half of the county.

Indian Creek originates on Three Point Mountain, east of Boise, Idaho. It flows through rangeland and some farmland to its convergence with the New York Canal approximately 1,200 feet downstream of Stroebel Road near the City of Kuna, Idaho. The New York Canal and Indian Creek continue as one stream until about 2,100 feet upstream of Columbia Road where there is a Callopy gate across the stream channel which controls water diverted through New York Canal west to Lake Lowell. Indian Creek continues to the northwest through the Cities of Nampa and Caldwell to the Boise River.

At its mouth, Indian Creek drains an area of approximately 264 square miles. Indian Creek enters the City of Nampa from the east, flows northwesterly through the northern part of the city, and exits near the northwest corner. Within the Indian Creek floodplain, development consists mostly of residential areas with a few commercial and light industrial areas.

Mason Creek, also a tributary of the Boise River, enters the City of Nampa near the northeast corner, flows northwesterly through the northern part of the city, and exits along the northern boundary. Approximately 25 percent of the Mason Creek floodplain, within the Nampa City limits, lies within Lakeview Park.

Conway Drain enters the City of Notus from the northeast and flows into the Boise River just west of Notus. Conway Drain carries natural flow from Conway Gulch and upstream irrigation-return flow.

Wilson Drain enters the City of Caldwell near the southeastern corner and flows northwesterly, south of the UPRR embankment, until it enters Indian Creek upstream of the commercial, light-industrial center of Caldwell. The drainage area of Wilson Drain at its mouth is approximately 30 square miles.

Dixie Drain enters the City of Caldwell near the southwestern corner and flows northerly to the western edge of the commercial industrial center of Caldwell, where it enters a network of covered drains. The drainage area of Dixie Drain at the point it becomes covered is approximately seven square miles.

Willow Creek enters the City of Middleton from the north and joins the Boise River just outside the southwest corner of the corporate limits of Middleton. Mill Slough enters Middleton in three branches at the eastern corporate limits, and flows southwest. At the UPRR Bridge, Mill Slough becomes one stream and is known as Mill Creek. Vegetation in Middleton consists of common trees, such as willow and cottonwood. Shrubs include sagebrush, rabbit brush, and wild raspberries. Grasses and forbs are representative of desert habitats and include cheatgrass, fescue, and shepherd's purse. Areas adjacent to Willow Creek are mostly open pasture and agricultural land.

The Boise River Valley has a semi-arid to arid continental climate that is characterized by cool, wet winters and warm, dry summers. At Caldwell, for the period 1904 to 2003, the average maximum monthly temperature of 92.4°F occurs in July and the mean minimum monthly temperature of 37.1°F occurs in January. The average total precipitation is equal to 10.6 inches and the average total snowfall is 16.5 inches. Snow cover in the area is usually light and seldom remains on the ground for long periods. The greatest monthly average snowfall of 6.8 inches occurs in January. The average freeze-free growing season is 159 days (Reference 2).

Most precipitation occurs in the cooler months. General rainstorms may last for several days, but precipitation intensities are not great. Summer thunderstorms occasionally produce intense rainfall over parts of the drainage area. Major floods in the study areas would be expected from rainfall or a combination of rainfall and snowmelt, possibly with frozen ground conditions.

The northeastern and south-central parts of the county have dark colored, medium-textured surface soils with loamy and clayey subsoils that range from calcareous to noncalcareous. These deep to moderately deep soils are combinations of fine, silty subsoils with clay and lime accumulations above a calcium silica hardpan; fine, noncalcareous, loamy subsoils with moderate clay accumulations; and fine, montomorillonitic subsoils rich in clay and lime accumulations. These thin, loess-covered lake sediments range from moderately well-drained to well-drained and are nearly level. Wide strips along both banks of Boise River have dark to light-colored surface soils with medium to moderately coarse texture. These soils are deep to moderately deep, with combinations of noncalcareous, coarse, loamy covered, sandy subsoils with poor clay accumulations overlying a rich lime zone. These soils are gently sloping stream bottoms and are somewhat poorly drained. The surface soils north and south of the Boise River fringe and in the western part of the county are medium textured and dark-colored. These soils are deep and consist of fine, silty subsoils with small amounts of clay overlying a rich lime zone, and lake sediments overlain by thin loess. West of Lake Lowell and north of the Snake River, soils are light-colored with coarse to moderately coarse textures. The subsoi1s are calcareous to noncalcareous loams, poor in lime, overlying a sandy soil. These soils are deep to moderately deep and are well to extremely well-drained. In the southeastern part of Canyon County, soils are dark-colored with a medium to very coarse texture. These lake sediments are overlain by thin loess and are developing on lake terraces and lava plains. The coarse, silty subsoils, rich in lime, overlie a thin, calcium silica hardpan, which overlies bedrock. The surface soils north, south, and east of Lake Lowell range from dark to light-colored and are moderately coarse in texture. These lake sediments

are overlain by thin loess and are developing on lake terraces, lava plains, and alluvial fans. The subsoils include clay and fine, lime-poor silt overlying a calcium lime hardpan, and a lime-rich and clay-poor silt overlying a calcium-poor, sandy material. These soils are nearly level to sloping and are well-drained. In the northwestern part of the county, soils range from dark-to-light colored and are moderately coarse in texture. The subsoils include a coarse, lime-poor loam and silt with clay and lime. These soils are developing on well-drained lake deposits overlain by thin loess (Reference 3).

Canyon County lies in a semiarid zone, and the natural vegetation reflects that condition. Natural vegetation away from the perennial streams is of the sagebrush-grass type, characterized by large sagebrush, blue bunch wheatgrass, and Idaho fescue. Stream bank vegetation includes cottonwood and willow trees. Most of the native vegetation has been replaced by agricultural and urban species.

City of Caldwell

The City of Caldwell is located in central Canyon County. It is situated in the Boise River valley, approximately 16 miles east of the Idaho-Oregon State line and approximately 20 miles west of the City of Boise. Neighboring cities include Payette, approximately 40 miles northwest, and Homedale, approximately 10 miles southwest.

Approximately 90 percent of the City of Caldwell has been developed, of which 40 percent is light industrial and commercial areas. Development along the Boise River floodplain within Caldwell is limited to a few light industries, commercial businesses, and scattered single family residences. Indian Creek flows northeasterly from a primarily residential area through downtown Caldwell. Indian Creek has been channelized and is covered through most of downtown.

Terrain in the Caldwell area is generally very level to gently sloping, except for Canyon Hill in the northeastern corner of the city. Caldwell is built on low stream terraces of the Boise River. There are two major soils groups it the area. The soils in northern and western Caldwell are of one major grouping and range from moderately deep to deep, and poorly drained to moderately well-drained. The surface and subsoils are fine, sandy loam and loamy sand, a silt loam and loam, and a strong to moderately calcareous silt loam or loam. The substratum consists of stratified sand and gravel and stratified, fine, sandy loam and coarse sand (which is calcareous in the upper part and noncalcareous in the lower part), or loam and stratified sand and gravel, which is moderately calcareous and strongly alkaline.

The soil group in southern and eastern Caldwell has two types of soils. Both are well-drained and range from deep to moderately deep. The surface and upper subsoils are slightly calcareous to noncalcareous, heavy silt or light, silty, clay loams. The lower subsoils are strong to moderately calcareous silt loam or loams. The substratum ranges from sandy loam and loamy sand and gravel to stratified sand and gravel with some silica calcium carbonate hardpan located in the upper stratum (Reference 3).

Vegetation in the areas adjacent to streams within Caldwell is mostly open pasture and agricultural land. Common trees are willow and cottonwood. Shrubs include sagebrush, rabbit brush, and wild raspberries. Grasses and forbs are representative of dessert habitats and include cheat grass, fescue, and shepherd's purse. Irrigated areas are used to grow a variety of crops.

City of Greenleaf

The City of Greenleaf is located in central Canyon County. It is situated in the Boise River Valley approximately seven miles west of the City of Caldwell and approximately 10 miles east of the Idaho-Oregon state line.

City of Melba

The City of Melba is located in southeastern Canyon County. It is situated approximately 11 miles southeast of the City of Nampa and approximately one mile west of the Canyon-Ada County boundary.

City of Middleton

The City of Middleton is located in northeastern Canyon County. It is situated in the Boise River Valley approximately 20 miles east of the Idaho-Oregon state line and approximately 22 miles northeast of the City of Caldwell.

Terrain in Middleton ranges from fairly level to gently sloping hills. The city is built mostly on low stream terraces of the Boise River. The three major soils types in the area range from moderately deep (20 to 40 inches) and poorly drained, to deep (over 40 inches) and well-drained. Surface and subsoil layers are a fine, sandy loam, a silty loam, or a moderately calcareous silty loam and loam. The substrata are a stratified sand and gravel, a stratified, fine sandy loam and coarse sand (which is calcareous in the upper part and noncalcareous in the lower part), or a loam and stratified sand and gravel, which is moderately calcareous and strongly alkaline (Reference 3).

Development through the City of Middleton is primarily residential. Along the Willow Creek floodplain, most of the land is devoted to agriculture.

City of Nampa

The City of Nampa is located in eastern Canyon County. It is situated approximately 20 miles west of the City of Boise and approximately seven miles southeast of the City of Caldwell. The economy of Nampa is oriented toward agriculture and light industry. Residential communities occupy 65 percent of Nampa's corporate limits.

Terrain in the Nampa area is generally level to gently sloping. Most of the soils in the Nampa area are thin, loess covered stream terraces ranging from deep to moderately deep and from noncalcareous to slightly calcareous. The surface and subsoil area a heavy silt loam or light, silty, clay loam. The substratum is a sandy loam or loamy sand and calcium-silicate hardpan over stratified sand and gravel. In addition, there is a mixed alluvial, dark color, loamy subsoil associated with Indian Creek.

City of Notus

The City of Notus is located in central Canyon County. It is located in the Boise River Valley, approximately six miles northwest of the City of Caldwell and 22 miles southeast of the City of Ontario, Oregon. There is no residential, commercial, or industrial development along the Boise River in Notus, but the land is platted and could be developed in the future. Several homes are located near, but well above, the 1-percent-annual-chance floodplain.

Topography in the Notus area is generally level, with some rolling hills to the northeast. Residential and business areas of Notus are built on an old terrace of the Boise River. The soils are generally deep and well-drained. The surface and subsoil layers consist of silt loams. Below the subsoil layer, in the substratum, there is a series of laminated calcareous lacustrine

silt. These layers slightly restrict the movement of water and roots. At the south edge of Notus, topsoils and subsoils range from fine, sandy loam to silt loam. The substratums consist of stratified sand and gravel, fine, sandy loam and coarse sand, which is calcareous in the upper part and less calcareous in the lower part, and a loam and stratified sand and gravel, which is moderately to slightly calcareous and highly alkaline. All these soils are less well-drained than the other soils in Notus.

City of Parma

The City of Parma is located in northwestern Canyon County. It is situated approximately 14 miles northwest of the City of Caldwell and approximately four miles east of the Idaho-Oregon State boundary at the lower end of the Boise River Valley. There is considerable residential, commercial, and industrial development within the 1-percent-annual-chance floodplain.

In the Parma area, the terrain is generally level, with some rolling hills to the north and east. Residential areas north of the downstream part of Parma lie on an old terrace of the Boise River. The downstream part of Parma and residential areas to the south and west of Parma are built on the floodplain fringe of the Boise River. Average depth of soil is more than 40 inches. Surface and subsoil layers are both silt loams and are well-drained. The substratum is comprised of calcareous laminated lacustrine silt. The laminates layers slightly restrict movement of water and roots.

City of Star

The City of Star is located in eastern Canyon County and has part of its corporate limits located in Ada County. It is approximately 4 miles east of the City of Middleton.

City of Wilder City

The City of Wilder City is located in western Canyon County. It is situated approximately 11 miles west of the City of Caldwell and approximately six miles east of the Idaho-Oregon State line.

2.3 Principal Flood Problems

Canyon County (Unincorporated Areas)

Flooding from the Boise River results primarily from spring snowmelt in the 2,650 square-mile upper watershed. A combination of rainfall and snowmelt could cause large releases from the upstream reservoirs (Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Reservoir) during the winter. Significant flooding from tributaries draining the Boise River Valley could be caused by a combination of a winter rainstorm associated with a warm air-mass, melting snow, and possibly frozen ground. Flooding from the Snake River could occur during late winter or early spring when higher-than-normal releases from reservoirs would be necessary. Ice jams during the winter could also cause some localized flood problems.

In 1896, flooding occurred on the Boise River, near Boise. This flood, the maximum on record, was equal to a 47-year event on the natural curve. However, on the regulated floodflow frequency curve developed for this study, it would have a recurrence interval of 500 years (Reference 4).

Flooding also occurred on the Boise River in 1943. Discharge for this flood at Notus was estimated at 20,500 cfs with a recurrence interval of 23 years. This flood occurred before the

Lucky Peak and Anderson Ranch Dams were built on Boise River However, the same discharge would now be greater than the 1-percent-annual-chance flood because of regulated flows.

On February 13, 1979, a peak discharge of approximately 1,160 cfs was measured on Willow Creek just above the railroad bridge at the northeastern edge of Middleton (Reference 4). This discharge approximated the calculated discharge for the 10-year flood event. Willow Creek overflowed its banks almost continuously downstream to its mouth after entering the Boise River Valley, causing shallow to moderate flooding.

On February 13 and 14, 1979, Mill Slough flooded for the first time in more than 33 years. The peak discharge in Mill Slough was approximately 625 cfs at a location just upstream of the railroad tracks at Middleton (Reference 4). This exceeds the 1-percent-annual-chance flood discharge of 317 cfs calculated for this study by a significant amount.

On February 14, 1979, the Governor of Idaho declared Canyon County a disaster area because of the extreme flooding conditions. Widespread flooding occurred throughout Canyon County, mostly from small drains within the Boise River Valley that had rapid snowmelt over frozen ground.

The largest flood in the Boise River since construction of Lucky Peak Dam in 1955 occurred in June 1983 with a discharge of 9,240 cfs, as recorded at the USGS gaging station near Parma.

As reported by the USGS, with the decrease in peak flows below Lucky Peak, aggradation (deposition of materials in the streambed) has caused increased flood elevations over time for the same flow. As an example, a flow of 8,000 cfs flowed in 1972 at Notus, at the same stage as 11,800 cfs flowed in 1938. It is estimated that a flow of approximately 21,000 cfs, which occurred in April 1943, would now flow at approximately 2.5 feet higher than in 1943 (Reference 2).

City of Caldwell

Three bridges span the Boise River near Caldwell. Debris accumulation during high flow at any of these bridge sites could cause flooding due to backwater. Only slight over-bank flooding is known to have occurred.

The largest flood on the Boise River since construction of Lucky Peak Dam in 1955 occurred in June 1983 and had a discharge of 9,240 cfs, as recorded at the USGS gaging station near Parma.

Flooding on Indian Creek would be caused by the runoff from a combination of a rainstorm and melting snow, possibly over frozen ground. There are numerous crossings over Indian Creek, and reaches of the channel, up to approximately 1,200 feet in length, are covered. The banks of Indian Creek have been overtopped.

The channel for Wilson Drain is cleaned periodically, minimizing its over-bank flooding in Caldwell. Dixie Drain has been channelized, which limits over-bank flooding to a low area at the southern end of the Municipal Park Golf Course.

Elijah Drain has no known history of flooding in Caldwell. Flooding could occur only after extremely heavy rainstorms or from lesser runoff if the drain is obstructed by debris. Its flood potential is considered negligible.

City of Middleton

On February 13, 1979, Willow Creek flooded within the City of Middleton. It is estimated that approximately 1,160 cfs. (Reference 4) entered the city limits from above the UPRR Bridge at the northeastern edge of town. This discharge approximated the calculated discharge for the 10-year flood event and showed close agreement with the computed 10-year flood profiles. Willow Creek overflowed its banks almost continuously downstream to its mouth, causing shallow to moderate flooding in most of western Middleton. Flood depths along the left bank ranged from 1.7 feet along the north side of Concord Street to 1.2 feet at the entrance to the Middleton High School football field south of State Highway 44. Flood depths along the right bank ranged from 0.8 feet on the north side of Concord Street to 2.5 feet at the northwest corner of State Highway 44 and Cemetery Road. Shallow flooding occurred as far as 1,000 feet out from the main channel.

On February 13 and 14, 1979, Mill Slough also flooded within the City of Middleton. The estimated peak discharge in Mill Slough was approximately 625 cfs above the railroad tracks and approximately 325 cfs below. The difference is approximately 300 cfs (Reference 4) that flowed over State Highway 44 east of the railroad tracks. The flood in February 1979 was the first flood on Mill Slough in more than 33 years. Flood depths ranged from 3.0 feet along State Highway 44 just east of the railroad tracks to 0.5 foot at Second Street South and Duncan Avenue. South of State Highway 44, most flooding was shallow with depths to 0.5 foot.

City of Nampa

A combination of a rainstorm and melting snow, possibly on frozen ground, is apt to cause flooding on Indian and Mason Creeks. Flooding has occurred many times in the past where debris has lodged on the upstream side of some of the numerous bridges and culverts, causing backwater.

History indicates that Indian Creek overflowed its banks in February 1952, flooding several basements in Nampa and causing road closures due to mud and debris left by the high water.

Elijah, Wilson, and 12th Avenue Drains have no known history of flooding in Nampa. Flooding could occur only after extremely heavy rainstorms, or from lesser runoff if the drain were obstructed by debris.

Cities of Notus and Parma

The maximum discharge of record at the Boise River at Notus gage was 20,500 cfs, recurrence interval of 23 years, on April 20, 1943, before Lucky Peak and Anderson Ranch Dams were built. Since construction of the Lucky Peak and Anderson Ranch Dams, the 1-percent-annual-chance flood of the Boise River at Notus has been determined by the USACE to be 16,600 cfs (Reference 5). The most recent flood having a recurrence interval of approximately 10 years was recorded in 1972 with a discharge of 7,850 cfs.

The 1-percent-annual-chance flood of the Boise River at Parma was determined by the USACE to be 16,600 cfs. Flood discharge at Parma is considered essentially the same as that through the entire Lower Boise River.

In 1937, floodwaters from the Boise River are reported to have reached northward in Parma to the UPRR tracks. This flooding was the result of a 1-percent-annual-chance flood (1,530 cfs), as recorded at the gaging station in Notus, Idaho. However, no flooding in the city from this source has been reported since then.

2.4 Flood Protection Measures

The Boise River flow is regulated, upstream of the City of Boise, by storage in Anderson Ranch Reservoir, Arrowrock Reservoir, and Lucky Peak Lake. These storage areas have a combined active capacity of 988,800 acre-feet. The effect of these reservoirs is to lower the expected discharge for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods. The natural 10-percent-annual-chance flood peak would be approximately 25,000 cfs, as opposed to 7,200 cfs for regulated flow. The natural 0.2-percent-annual-chance flood peak would be approximately 54,000 cfs as opposed to 34,800 cfs for regulated flow.

Flood magnitudes along Lower Indian Creek are affected by operation of the New York Canal. The New York Canal is an irrigation canal that starts from the Boise River just below the Lucky Peak Project. To the south of Eager Road and Kuna Road (in Ada County), the canal splits to the Mora Canal and the New York Canal.

Approximately 1,200 feet downstream of Stroebel Road in the City of Kuna, Idaho, the New York Canal converges with Indian Creek. The New York Canal and Indian Creek continue as one stream until about 2,100 feet upstream of Columbia Road where there is a Callopy gate across the stream channel. Indian Creek splits from the combined channel and flows to the northwest through the Cities of Nampa and Caldwell to the Boise River. The New York Canal continues west to Lake Lowell. The Callopy gate controls how much water is allowed to flow through the New York Canal. The gate currently maintains the design flow of 1,500 cfs in the New York Canal. The flood flow in excess of 1,500 cfs is diverted to Indian Creek over a broad crested weir.

During the flood season (December 1 to March 31) it is assumed that 1,000 cfs is maintained in the joint New York Canal/Indian Creek channel 20% of the time. The percentage of time the canal was in use was determined by analyzing observed records. So during a flood event in the Indian Creek basin, the natural discharges from the Indian Creek basin are increased by the flow diverted to the New York Canal.

Willow Creek was included in the United States Bureau of Reclamation Black Canyon Irrigation Project. Watershed rehabilitation, levee work, channelization, and construction of vertical drops to control velocity were done as part of the project during 1946 through 1950.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of

completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

Pre-Countywide Analyses

A flood frequency curve for the Lower Boise River basin, developed in 1976 by the USACE-Walla Walla District, was used for the original Boise River study (Reference 5). Since 1955, when storage in Lucky Peak Lake began, the lower part of the frequency curve has been defined by regulated floodflows as measured at the USGS gaging station at Boise, Idaho. The upper part of the regulated frequency curve was developed by routing the 0.2-percent-annual-chance peak flood through the upstream reservoirs. Values for the 10-, 2-, 1-, and 0.2-percent-annual-chance peak discharges were obtained from a log-Pearson Type III distribution of annual peak flow data (Reference 6).

During the 1987 restudy of the Boise River near Caldwell, it was determined that the 1- and 0.2-percent-annual-chance floods would overtop a portion of the adjacent northerly floodplain between the Interstate Highway 84 Bridge and the UPRR Bridge near Caldwell. This overtopping results in floodflows separating from the main channel and flowing northwesterly in the general area between the UPRR and U.S. Highway 20-26 toward the City of Notus. Therefore, peak discharges in the Boise River and the adjacent floodplains downstream of the railroad bridge are reduced by the amount of lost, or overtopping, split flows. All the split flow returns to the river at or before a point that is approximately 1.25 miles upstream of Notus.

Flood frequency curves for Wilson Drain, Dixie Drain, and Renshaw Canal were developed using the 50-year flood discharges from a regression equation using basin characteristics as presented in A Proposed Streamflow-Data Program for Idaho (Reference 7). Then, a frequency curve was drawn through this value with a shape similar to curves derived from techniques found in Magnitude and Frequency of Floods in Small Drainage Basins in Idaho (Reference 8), and United States Department of Interior Water-Supply Paper 1688, Magnitude and Frequency of Floods in the United States. Part 13: Snake River Basin (Reference 9).

The 1-percent-annual-chance peak flood for Willow Creek was derived as part of a special flood hazard survey by the USACE-Walla Walla District (Reference 10). A value of 2,700 cfs was used as the 1-percent-annual-chance flood. The shape of the frequency curve was determined from curves developed using techniques outlined in the USGS Open-File Report, A Proposed Streamflow-Data Program for Idaho, and USGS Water Resources Investigations 7-73, Magnitude and Frequency of Floods in Small Drainage Basins in Idaho (References 7 and 8).

Peak discharges for Mill Creek (Mill Slough) were taken from the 1981 USACE-Walla Walla District, Mill Slough Flood Study (Reference 11).

The flood frequency curve for Mason Creek upstream of Lone Tree Lane was based on the 1-percent-annual-chance flood discharge determined by the USACE for an FIS in Ada County (Reference 12). This discharge, developed for snow and rainfall runoff conditions, was increased slightly to account for an increase in drainage area at the Canyon-Ada County line.

Curves developed using USGS and USACE methods (Reference 7, 8, and 9) were then used to determine the shape of the curve through the 1-percent-annual-chance discharge. Discharge was not increased with drainage area downstream from the county line into and through Nampa because it was thought that the large number of culverts and bridges would tend to attenuate peaks and moderate flows.

Countywide Analyses

This restudy of the Boise River from Interstate 84 to the Canyon-Ada County boundary used the effective flood frequency discharges estimates from the regulated discharge curve for Lucky Peak Dam (Reference 13).

The estimation of flood frequency discharges for Indian Creek upstream of the Callopy gate was based on a regional regression analysis (Reference 14) and a joint probability approach to reflect the historical use of the New York Canal for the December 1 to March 31 time period (the historical flood season) (Reference 15). The canal was determined to be in use 20% of the time between December 1 and March 31 with an assumed flow of 1,000 cfs. For Indian Creek downstream of the Callopy gate, the discharges were equal to flow in excess of 1,500 cfs (the amount diverted to the New York Canal by the Callopy gate) plus the flows due to the local drainage area.

The estimation of flood frequency discharges for Mason Creek from its confluence with the Boise River upstream to Lone Tree Lane was based on a regional regression analysis (Reference 14).

Peak discharge drainage area relationships studied by detailed methods are shown in Table 2, Summary of Discharges.

Table 2. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharge (cfs) 10-percent-annual-chance	2-percent-annual-chance	1-percent-annual-chance	0.2-percent-annual-chance
Boise River					
At Mouth	4,130	7,200[1]	11,000[1]	16,600[1]	34,800[1]
South of Union Pacific Railroad Bridge (split flow location)	3,220	7,200	11,000	14,200	22,300
North of Union Pacific Railroad Bridge	3,220	7,200[1]	11,000[1]	16,600[1]	34,800[1]
Indian Creek[2]					
At Mouth	264	88	983	1,725	3,900
Between Wilson Drain and New York Canal	234	23	860	1,560	3,630
Willow Creek (Lower)					
Upstream of Middleton	82	1,170	2,160	2,700	4,220
Willow Creek (Upper)					
At Duff Lane	*	*	*	2,700	*
Renshaw Canal					
Above Confluence with West End Drain	9	160	305	385	615
At Downstream End of Study Area	*	300	565	715	1,135
Renshaw Canal Overflow					
At Divergence From Renshaw Canal	*	21	129	200	408
Mason Creek					
At Mouth	52	424	951	1,266	2,255
Upstream of Purdam Gulch Drain	30	326	723	957	1,691
At Kings Road	27	310	686	907	1,595
Mill Slough					
At Union Pacific Railroad	*	345	*	810	1,180

[1]Regulated Discharges from Lucky Peak Dam

[2]Flow partly diverted to New York Canal

* Not Available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Pre-Countywide

Water Surface Elevations (WSELs) for the Boise River (excluding the reach near Caldwell) were computed using the USACE 1990 HEC-2 step-backwater computer program (Reference 16). The WSELs for the Boise River near the City of Caldwell, which was restudied by Toothman-Orton, were computed using the USACE 1982 HEC-2 step-backwater computer program (Reference 17). Starting WSELs for the Boise River at its confluence with the Snake River were developed by the slope-area method. Starting WSELs upstream of Caldwell were those computed in the 1987 restudy at Canyon County.

Cross-sections for the reach of Boise River near Caldwell were field surveyed by Toothman-Orton Engineering Company in 1986 and 1987. Cross-section data for the two reaches upstream and downstream of the reach near Caldwell were those utilized to perform the Boise River Floodplain Management Report studies (Reference 18). The 1987 Boise River restudy indicated that a flow split would occur on the right bank of the Boise River, extending from the Interstate 84 interchange at Caldwell downstream to a point approximately 1.25 miles upstream from Notus. Detailed backwater analyses were performed for the 1- and 0.2-percent-annual-chance floods in this area using data obtained from USGS 7.5 minute topographic maps. The split flow analysis for the 1-percent-annual-chance flow indicated that a flow of 2,400 cfs will separate from the channel and adjacent floodplains, and flow northwesterly between the UPRR embankment and U.S. Highway 20-26.

Lesser magnitude floods do not split and flow in this area. It was assumed that the majority of the flow would return as weir flow over the UPRR tracks. For the 0.2-percent-annual-chance flood, two split flow analyses were performed. One on the right overbank area, upstream of the UPRR, with a total of 12,600 cfs involved, and one on the left bank area between West Plymouth and West Kearney Streets, in which 5,800 cfs was computed to overtop the bank area and flow through portions of Caldwell before reentering the river area between West Freeport and West Chicago Streets. A separate flood profile for this portion of the 0.2-percent-annual-chance flood through Caldwell was computed.

Some of the separated flow for the 1-percent-annual-chance flood, as well as the 0.2-percent-annual-chance flood, may return to the river at existing bridges under the railroad, such as the bridge for the Seidenberd Canal. However, due to the approximate nature of the analysis, any intermediate return flow was ignored.

WSELs for floods of the selected recurrence intervals on Mill Creek (Mill Slough) were computed using the USACE March 1977 HEC-2 computer program (Reference 19). Cross-section data for Mill Creek (Mill Slough) were digitized from aerial photography flown on September 17, 1981 (Reference 20). Starting elevations for Mill Creek (Mill Slough) were

taken from the Boise River flood profiles.

WSELs for floods of the selected recurrence intervals on Willow Creek were computed using the USACE March 1977 HEC-2 computer program (Reference 19). Cross-sectional data were obtained from field surveys. Starting elevations for Willow Creek were developed by the critical-depth method and compared with the Boise River profiles at the confluence.

WSELs for floods of the selected recurrence intervals on Renshaw Canal and the Renshaw Canal Overflow were computed using the USGS computer programs E431 and J635 (References 21 and 22). Starting elevations for Renshaw Canal were developed by the slope-area method. The overflow area for Renshaw Canal used starting elevations determined by a WSEL discharge rating curve.

WSELs for floods of the selected recurrence intervals on Mason Creek upstream of Lone Tree Lane were computed using the USGS computer programs E431 and J635 (References 21 and 22). Cross-section data for backwater analyses of the flooding on Mason Creek were obtained by photogrammetric methods from aerial photographs. Below-water sections were obtained by field measurements. Starting elevations for Mason Creek were developed by the slope-area method.

Roughness coefficient factors (Manning's "n" values) used in the hydraulic computations were taken from calibration backwater analyses using high water elevations measured during the June 1983 flood. The 1983 flood is the largest flood on the Boise River since construction of Lucky Peak Dam in 1955 with a discharge recorded at the USGS gaging station near Parma of 9,240 cfs. The roughness coefficients for each flooding source are listed in Table 3.

Countywide Revision

WSELs for the Boise River for this revision from Interstate 84 to the Ada County boundary were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Minister & Glaeser Surveying, Inc. for the Boise River. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data was developed from surveys conducted by Minister & Glaeser Surveying, Inc. The starting WSELs were taken from the flood profiles in the effective FIS report (Reference 24).

WSELs for Indian Creek for this revision were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Quadrant Consulting, Inc. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data were developed from surveys conducted by Quadrant Consulting, Inc. The starting WSEL was specified as normal depth based on the ground slope near the confluence with the Boise River.

The preliminary channel geometry for some sections of Indian Creek was changed to account for the relocation of the stream channel, the removal of buildings and road pavement to allow access to the stream channel and the regrading of the channel banks. The revised sections were located between the following streets:

1. Between 10th Avenue and 9th Avenue
2. Between 9th Avenue and Kimball Boulevard
3. Between Kimball Boulevard and 5th Avenue

Additionally, two new pedestrian bridges were added to the preliminary model and the bridge at Kimball Boulevard was revised to reflect the new downstream stream channel configuration.

The new cross sections and bridges were surveyed by Quadrant Consulting, Inc.

WSELs for Mason Creek for this revision from its confluence with the Boise River to Lone Tree Lane were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Quadrant Consulting, Inc. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data were developed from surveys conducted by Quadrant Consulting, Inc. The starting WSEL was specified as normal depth based on the ground slope near the confluence with the Boise River.

Manning's "n" values used in this revision were based on field inspections and aerial photos.

Channel and overbank roughness coefficients (Manning's "n" values), used in the hydraulic computations, were chosen by engineering judgment based on field observation of stream and floodplain areas. The roughness coefficients for all studied flooding sources are listed in Table 3 below.

Table 3. Manning's "n" Values

Flooding Source	Channel Value	Overbank Value
Boise River	0.030-0.055	0.030-0.085
Indian Creek	0.03-0.055	0.040-0.01
Mason Creek	0.03-0.06	0.025-0.1
Mill Slough	0.050-0.070	0.060-0.100
Renshaw Canal*	0.028-0.060	0.028-0.080
Willow Creek	0.03	0.04

*At Arana Valley Road concrete-lined values are as low as 0.014

The 1-percent-annual-chance flood elevations for streams studied by approximate methods were developed using normal-depth calculations and topographic maps (References 25, 26, and 27).

Locations of selected cross-sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations across the corporate limits between communities. The conversion factor for streams studied by detailed methods in Canyon County is 3.12 feet. To convert from NGVD29 to NAVD88 use the following:

NVGD29 elevation + 3.12 feet = NAVD88 elevation

For more information on NAVD88, see the FEMA publication entitled Converting the National Flood Insurance Program to the North American Vertical Datum of 1988 (Reference 28), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address http://www.ngs.noaa.gov).

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross-section. Between cross-sections, the boundaries were

interpolated using topographic maps at differing scales and contour intervals. Table 4 below lists the topographic scale and contour interval used for each flooding source.

Table 4. Topographic Data Scales and Contour Intervals

Flooding Source	Scale	Contour Interval	Reference
Boise River	1:4,800	2 feet	Reference 29
	1:24,000	10 feet	Reference 30
Indian Creek	1:4,800	2 feet	Reference 29
	1:24,000	10 feet	Reference 30
Mason Creek	1:4,800	2 feet	Reference 29
	1:24,000	10 feet	Reference 31
Renshaw Canal	1:4,800	2 feet	Reference 29
Renshaw Canal Overflow	1:4,800	2 feet	Reference 29
Mill Creek	1:4,800	2 feet	Reference 29
Willow Creek	1:24,000	10 feet	Reference 32

For this countywide revision topographic maps were generated from aerial photography by Horizons, Inc. The contour interval for these maps was 2 feet (Reference 32).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazard Zones A, AE, X, and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM.

Approximate flood boundaries for the Snake River, Willow Creek, and Mill Slough were delineated using topographic maps at a scale of 1:24,000, with contour intervals of 10, 20, and 40 feet (References 25, 26, and 27) in conjunction with their computed elevations.

Approximate 1-percent-annual-chance floodplain boundaries in some portions of the study area were taken directly from the Flood Hazard Boundary Map for Canyon County (Reference 34).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance

floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross-sections. Between cross-sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross-sections (see Table 5, Floodway Data). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the Floodway boundary is shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the WSEL of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

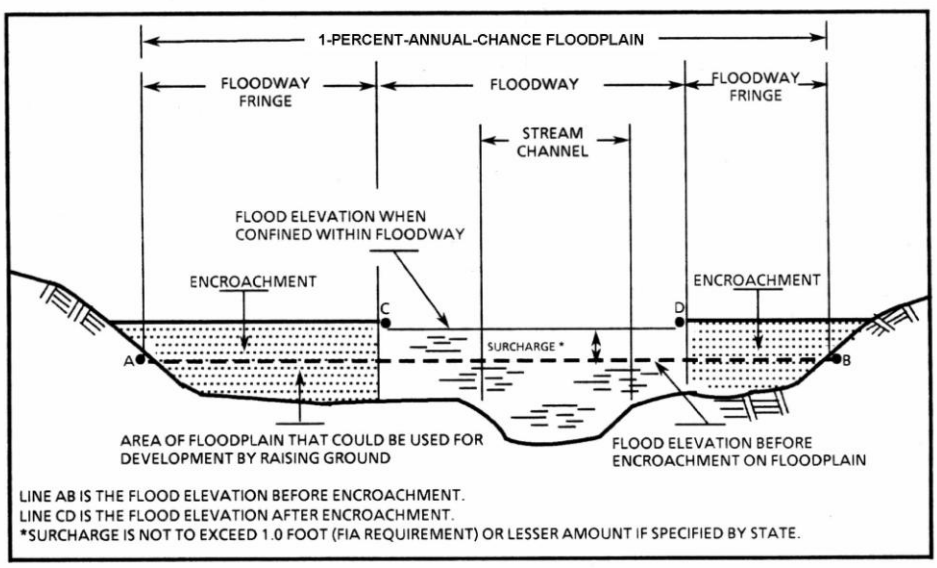

Figure 1. Floodway Schematic

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	NAVD) INCREASE
						Feet (NAVD)		
Boise River								
A	1.000	1,733	7,859	2.1	2,190.5	2190.52	2,191.5	1.0
B	1.675	1,812	7,819	2.1	2,191.3	2191.32	2,192.0	0.7
C	2.155	1,389	5,948	2.8	2,191.6	2191.62	2192.1	0.5
D	2.415	1,252	5,191	3.2	2,191.9	2191.9	2192.3	0.4
E	2.785	1,242	5,750	2.9	2,192.3	2192.3	2192.7	0.4
F	3.850	1,032	3,531	4.7	2,193.1	2193.1	2193.3	0.2
G	4.260	923	3,229	5.1	2,194.0	2194.0	2194.1	0.1
H	5.400	800	4,062	4.1	2,195.6	2195.6	2195.9	0.3
I	6.420	575	3,129	5.3	2,196.6	2,196.6	2,197.2	0.6
J	7.495	1,055	4,966	3.3	2,198.1	2,198.1	2,198.7	0.6
K	9.310	907	4,896	3.4	2,199.4	2,199.4	2,200.0	0.6
L	9.815	1,199	5,428	3.1	2,199.6	2,199.6	2,200.3	0.7
M	11.210	900	3,667	4.5	2,200.5	2,200.5	2,201.5	1.0
N	12.430	918	4,815	3.4	2,202.3	2,202.3	2,203.1	0.8
O	13.540	702	4,016	4.1	2,203.1	2,203.1	2,203.9	0.8
p	14.503	500	2,182	7.6	2,204.6	2,204.6	2,204.8	0.2
Q	15.235	863	2,438	6.8	2,206.2	2,206.2	2,206.9	0.7
R	15.895	917	4,421	3.8	2,207.8	2,207.8	2,208.6	0.8
S	17.125	1,252	6,988	2.4	2,208.5	2,208.5	2,209.5	1.0
T	18.320	1,450	6,650	2.5	2,209.0	2,209.0	2,209.8	0.8
U	19.300	1750	8,383	2.0	2,209.4	2,209.4	2,210.2	0.8
V	20.230	1,623	8,337	2.0	2,209.7	2,209.7	2,210.5	0.8
W	21.115	656	3,676	4.5	2,210.0	2,210.0	2,210.8	0.8
X	22.120	1,180	3,857	4.3	2,212.1	2,212.1	2,212.4	0.3
Y	24.905	2,298	5,431	3.1	2,218.7	2,218.7	2,219.4	0.7
Z	25.895	1,970	7,398	2.2	2,219.8	2,219.8	2,220.3	0.5

[1] Thousands of Feet above mouth

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Boise River								
AA	26.755	1,836	5,166	3.2	2,220.8	2,220.8	2,221.3	0.5
AB	27.660	2,000	4,982	3.3	2,221.7	2,221.7	2,222.7	1.0
AC	28.655	2,000	4,744	3.5	2,223.9	2,223.9	2,224.2	0.3
AD	29.600	2,000	4,241	3.9	2,224.6	2,224.6	2,225.4	0.8
AE	33.565	1,964	4,558	3.6	2,227.8	2,227.8	2,228.6	0.8
AF	34.430	1,678	5,834	2.8	2,228.8	2,228.8	2,229.7	0.9
AG	35.455	1,483	4,608	3.6	2,230.1	2,230.1	2,230.6	0.5
AH	36.210	1,224	3,745	4.4	2,231.6	2,231.6	2,232.0	0.4
AI	37.400	1,317	5,544	3.0	2,233.2	2,233.2	2,233.6	0.4
AJ	38.215	1,550	3,883	4.3	2,234.0	2,234.0	2,234.4	0.4
AK	39.175	1,636	6,431	2.6	2,235.5	2,235.5	2,236.0	0.5
AL	40.185	1,137	2,948	5.6	2,236.0	2,236.0	2,236.7	0.7
AM	40.935	1,744	6,505	2.6	2,237.7	2,237.7	2,238.5	0.8
AN	42.115	1,326	3,373	4.9	2,238.9	2,238.9	2,239.5	0.6
AO	42.950	852	2,489	6.7	2,241.4	2,241.4	2,241.9	0.5
AP	43.990	1,395	4,273	3.9	2,244.3	2,244.3	2,244.8	0.5
AQ	45.075	2,118	11 ,664	1.4	2,244.8	2,244.8	2,245.6	0.8
AR	45.945	1,880	6,621	2.5	2,245.1	2,245.1	2,245.7	0.6
AS	46.685	1,500	5,674	2.9	2,245.8	2,245.8	2,246.2	0.4
AT	48.680	1,495	4,984	3.3	2,247.6	2,247.6	2,248.2	0.6
AU	51.060	1,256	5,670	2.9	2,250.0	2,250.0	2,250.7	0.7
AV	51.450	2,250	11 ,338	1.5	2,250.2	2,250.2	2,251.0	0.8
AW	52.125	2,751	10,330	1.6	2,250.3	2,250.3	2,251.1	0.8
AX	52.780	2,847	6,420	2.6	2,250.6	2,250.6	2,251.3	0.7
AY	53.395	2,688	3,985	4.2	2,251.2	2,251.2	2,251.9	0.7
AZ	54.150	2,202	3,116	5.3	2,253.1	2,253.1	2,253.6	0.5

[1] Thousands of Feet above mouth

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Boise River								
BA	56.045	2,403	5,898	2.8	2,254.9	2,254.9	2,255.6	0.7
BB	56.775	2,104	5,211	3.2	2,256.0	2,256.0	2,256.5	0.5
BC	57.420	2,154	5,391	3.1	2,257.1	2,257.1	2,257.4	0.3
BD	58.360	1,429	4,587	3.6	2,258.4	2,258.4	2,258.6	0.2
BE	59.090	1,499	4,509	3.7	2,259.3	2,259.3	2,259.6	0.3
BF	59.820	1,136	2,748	6.0	2,260.2	2,260.2	2,260.7	0.5
BG	60.750	1,368	3,447	4.8	2,262.8	2,262.8	2,262.8	0.0
BH	61.310	2,400	5,957	2.8	2,263.3	2,263.3	2,264.1	0.8
BI	61.760	2,839	8,218	2.0	2,263.5	2,263.5	2,264.5	1.0
BJ	62.570	2,488	4,778	3.5	2,264.5	2264.5	2265.0	0.5
BK	65.225	1,391	3,941	4.2	2,267.3	2267.3	2267.8	0.5
BL	68.305	1,840	5,276	3.1	2,273.5	2273.5	2274.1	0.6
BM	69.935	1,487	6,022	2.8	2,275.3	2275.3	2275.5	0.2
BN	70.855	1,238	3,249	5.1	2,276.1	2276.1	2276.3	0.2
BO	71.625	1,361	5,847	2.8	2,277.3	2277.3	2277.8	0.5
BP	72.465	2,256	4,918	3.4	2,277.7	2277.7	2278.3	0.6
BQ	73.500	2,404	5,195	3.2	2,279.3	2279.3	2279.7	0.4
BR	74.455	1,789	5,081	3.3	2,280.4	2280.4	2280.9	0.5
BS	75.550	1,902	4,040	4.1	2,281.7	2281.7	2282.0	0.3
BT	76.700	2,225	3,572	4.6	2,284.9	2284.9	2285.1	0.2
BU	77.805	1,776	6,831	2.4	2,286.4	2286.4	2286.6	0.2
BV	78.525	1,398	5,610	3.0	2,286.7	2286.7	2287.0	0.3
BW	79.380	1,900	6,176	2.7	2,287.4	2287.4	2287.8	0.4
BX	80.205	2,200	3,521	4.7	2,288.2	2288.2	2288.5	0.3
BY	81.300	2,985	5,190	3.2	2,289.9	2289.9	2290.9	1.0
BZ	82.300	2,400	7,030	2.4	2,292.0	2292.0	2292.2	0.2

[1] Thousands of Feet above mouth

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Boise River								
CA	83.115	2,400	5,198	3.2	2,292.7	2,292.7	2,292.9	0.2
CB	84.105	1,900	2,881	5.8	2,295.5	2,295.5	2,295.9	0.4
CC	84.890	1,800	6,850	2.4	2,297.1	2,297.1	2,297.7	0.6
CD	86.000	1,702	5,418	3.1	2,297.9	2,297.9	2,298.3	0.4
CE	86.940	2,100	6,214	2.7	2,298.5	2,298.5	2,299.0	0.5
CF	89.080	2,200	7,192	2.3	2,302.8	2,302.8	2,303.3	0.5
CG	90.445	2,495	7,814	2.1	2,303.6	2,303.6	2,304.2	0.6
CH	91.295	2,550	8,045	2.1	2,304.1	2,304.1	2,304.7	0.6
CI	92.100	2,100	5,549	3.0	2,304.7	2,304.7	2,305.3	0.6
CJ	92.950	1,994	5,155	3.2	2,305.5	2305.5	2306.3	0.8
CK	94.000	1,710	3,746	4.4	2,306.7	2306.7	2307.1	0.4
CL	95.000	1,820	5,839	2.8	2,308.0	2308.0	2308.7	0.7
CM	95.920	1,840	5,115	3.2	2,308.7	2308.7	2309.6	0.9
CN	96.710	1,660	3,086	5.4	2,309.8	2309.8	2310.5	0.7
CO	97.540	1,030	3,989	4.2	2,311.6	2311.6	2312.6	1.0
CP	98.740	1,500	4,291	3.9	2,313.7	2313.7	2314.4	0.7
CQ	100.000	1,410	5,726	2.9	2,315.2	2315.2	2315.9	0.7
CR	100.950	1,620	2,960	5.6	2,316.1	2316.1	2316.7	0.6
CS	101.675	1,700	4,664	3.6	2,318.5	2318.5	2319.0	0.5
CT	102.960	1,130	4,081	4.1	2,320.0	2320.0	2320.6	0.6
CU	103.460	1,150	4,107	4.0	2,320.5	2320.5	2321.2	0.7
CV	106.440	1,600	4,892	3.4	2,323.5	2323.5	2324.5	1.0
CW	106.890	1,700	5,014	3.3	2,324.1	2324.1	2325.1	1.0
CX	107.380	1,911	4,717	3.5	2,324.8	2324.8	2325.6	0.8
CY	108.030	2,826	4,426	3.8	2,326.1	2326.1	2326.6	0.5
CZ	108.840	2,586	5,077	3.3	2,327.2	2327.2	2328.2	1.0

[1] Thousands of Feet above mouth

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Boise River								
DA	109.690	1,800	4,623	3.6	2,328.5	2,328.5	2,329.3	0.8
DB	110.110	989	3,096	5.4	2,329.3	2,329.3	2,330.0	0.7
DC	110.920	1,446	5,255	3.2	2,331.0	2,331.0	2,331.6	0.6
DD	111.500	1,400	4,364	3.8	2,331.8	2,331.8	2,332.5	0.7
DE	112.170	1,232	2,991	5.6	2,333.5	2,333.5	2,333.8	0.3
DF	112.880	1,500	4,581	3.6	2,335.2	2,335.2	2,336.0	0.8
DG	113.560	1,559	4,191	4.0	2,336.8	2,336.8	2,337.3	0.5
DH	114.240	1,719	4,809	3.5	2,337.5	2,337.5	2,338.5	1.0
DI	114.800	1,748	5,369	3.1	2,338.4	2,338.4	2,339.4	1.0
DJ	115.500	1,500	5,137	3.2	2,339.8	2339.8	2340.2	0.4
DK	116.180	1,697	6,538	2.5	2,340.0	2340.0	2340.8	0.8
DL	116.795	1,522	4,268	3.9	2,340.1	2340.1	2341.1	1.0
DM	117.295	1,434	5,715	2.9	2,340.7	2340.7	2341.7	1.0
DN	119.515	1,636	3,076	5.4	2,344.4	2344.4	2345.0	0.6
DO	121.615	1,830	5,518	3.0	2,347.3	2347.3	2348.3	1.0
DP	122.695	676	2,488	6.7	2,348.8	2348.8	2349.6	0.8
DQ	123.305	737	3,265	5.1	2,349.9	2349.9	2350.9	1.0
DR	124.105	681	4, 140	4.0	2,351.0	2351.0	2352.0	1.0
DS	124.605	387	2,097	7.9	2,352.4	2352.4	2353.3	0.9
DT	124.955	618	3,561	4.7	2,353.8	2353.8	2354.8	1.0
DU	125.605	1,316	6,314	2.6	2,354.7	2354.7	2355.4	0.7
DV	126.565	1,301	4,473	3.7	2,355.4	2355.4	2356.4	1.0
DW	127.569	556	2,643	6.3	2,356.7	2356.7	2357.3	0.6
DX	129.806	570	4,024	4.3	2,359.3	2359.3	2360.2	0.9
DY	134.662	293	2,047	8.1	2,360.7	2360.7	2361.3	0.6
DZ	140.350	684	4,545	3.7	2,364.3	2364.3	2364.9	0.6

[1] Thousands of Feet above mouth

Table 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

(AND INCORPORATED AREAS)

FLOODWAY DATA

BOISE RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
						Feet (NAVD)		T (NAVD)
Boise River								
EA	146.673	318	2,113	7.9	2,364.6	2,364.6	2,365.0	0.4
EB	154.115	540	3,279	5.1	2,367.3	2,367.3	2,367.7	0.4
EC	162.633	536	3,413	4.9	2,368.5	2,368.5	2,369.0	0.5
ED	173.127	1,909	10,201	1.6	2,369.4	2,369.4	2,370.4	1.0
EE	184.985	963	4,149	4.1	2,369.9	2,369.9	2,370.7	0.8
EF	197.858	659	3,158	5.4	2,371.9	2,371.9	2,372.1	0.2
EG	212.535	1,905	5,720	3.0	2,374.2	2,374.2	2,375.0	0.8
EH	229.356	1,645	4,469	3.7	2,376.2	2,376.2	2,377.0	0.8
EI	248.718	2,121	7,670	2.8	2,381.2	2,381.2	2,381.6	0.4
EJ	269.927	2,123	2,411	6.9	2,383.3	2383.3	2383.4	0.1
EK	292.064	1,544	6,577	3.1	2,386.1	2386.1	2386.1	0.0
EL	315.583	1,870	3,202	7.4	2,387.0	2387.0	2387.0	0.0
EM	339.803	1,799	4,927	6.9	2,389.1	2389.1	2389.1	0.0
EN	366.283	1,546	6,692	2.7	2,392.9	2392.9	2393.0	0.1
EO	393.863	1,089	3,072	6.0	2,393.3	2393.3	2393.3	0.0
EP	423.945	1,283	4,063	4.6	2,396.2	2396.2	2396.9	0.7
EQ	454.806	1,424	5,817	5.2	2,398.2	2398.2	2398.5	0.3
ER	486.266	1,294	4,589	3.6	2,399.2	2399.2	2399.4	0.2
ES	519.941	1,919	6,904	4.9	2,403.4	2403.4	2403.4	0.0
ET	556.416	1,901	4,799	3.7	2,406.2	2406.2	2407.0	0.8
EU	594.427	1,986	4,865	3.7	2,409.9	2409.9	2409.9	0.0
EV	633.821	1,987	5,300	4.8	2,412.2	2412.2	2412.2	0.0
EW	675.490	2,309	8,291	3.4	2,416.7	2416.7	2416.7	0.0
EX	720.138	3,218	5,574	3.0	2,420.0	2420.0	2420.6	0.6
EY	766.171	3,265	6,167	2.7	2,422.5	2422.5	2423.3	0.8
EZ	813.300	2,803	4,551	3.7	2,423.7	2423.7	2424.4	0.7

[1] Thousands of Feet above mouth

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Boise River								
FA	863.057	2,144	3,164	5.6	2,427.4	2,427.4	2,427.5	0.1
FB	914.208	1,800	5,398	3.1	2,431.7	2,431.7	2,432.1	0.4
FC	966.504	1,799	3,296	5.0	2,433.5	2,433.5	2,433.6	0.1
FD	1,019.779	2,631	4,829	5.5	2,436.1	2,436.1	2,436.1	0.0
FE	1,075.954	1,645	5,000	5.1	2,442.4	2,442.4	2,442.4	0.0
FF	1,135.081	1,682	4,782	3.6	2,446.9	2,446.9	2,446.9	0.0
FG	1,195.528	2,100	5,049	3.3	2,448.5	2,448.5	2,448.6	0.1
FH	1,256.920	2,158	5,095	3.3	2,449.3	2,449.3	2,449.4	0.1
FI	1,320.498	1,589	5,307	3.8	2,454.4	2,454.4	2,455.4	1.0
FJ	1,384.947	1,357	5,506	3.1	2,455.7	2455.7	2456.4	[illegible]
FK	1,450.236	1,036	3,421	4.9	2,456.6	2456.6	2457.2	0.6

[1] Thousands of Feet above mouth

Table 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

(AND INCORPORATED AREAS)

FLOODWAY DATA

BOISE RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Mason Creek								
A	631	69	215	5.9	2,363.0	2,363.0	2,363.9	0.9
B	1,010	44	209	6.1	2,364.2	2,364.2	2,365.1	0.9
C	2,074	77	198	6.4	2,367.2	2367.17	2367.8	0.6
D	2,779	94	315	4.0	2,368.8	2368.8	2369.6	0.7
E	3,964	82	365	3.5	2,370.1	2370.1	2371.1	1.0
F	5,110	44	242	5.2	2,370.9	2370.9	2371.8	0.9
G	5,660	59	232	5.5	2,371.9	2371.9	2372.7	0.8
H	5,809	128	502	2.5	2,375.1	2375.1	2376.0	0.9
I	6,498	48	303	4.2	2,376.7	2,376.7	2,377.3	0.6
J	8,700	70	320	4.0	2,380.3	2,380.3	2,380.8	0.5
K	9,072	65	352	3.6	2,380.7	2,380.7	2,381.1	0.4
L	9,165	72	259	4.9	2,381.3	2,381.3	2,382.1	0.8
M	9,201	54	350	3.6	2,381.6	2,381.6	2,382.6	0.9
N	9,800	44	286	4.4	2,381.9	2,381.9	2,382.9	1.0
O	11,360	194	732	1.7	2,388.6	2,388.6	2,389.5	0.8
P	11,812	91	336	3.8	2,388.7	2,388.7	2,389.5	0.8
Q	11,855	236	821	1.5	2,389.8	2,389.8	2,390.8	1.0
R	12,324	48	344	3.7	2,390.1	2,390.1	2,391.1	1.0
S	12,367	45	322	3.9	2,390.2	2,390.2	2,391.1	0.9
T	13,219	152	523	2.4	2,390.6	2,390.6	2,391.6	1.0
U	16,517	29.41	172	7.4	2,397.0	2,397.0	2,397.6	0.6
V	16,683	48	405	3.1	2,398.1	2,398.1	2,398.7	0.7
W	16,825	32	181	7.0	2,399.8	2,399.8	2,400.3	0.5
X	16,220	34	226	5.6	2,396.8	2,396.8	2,397.4	0.6
Y	16,517	29	172	7.4	2,397.0	2,397.0	2,397.6	0.6
Z	16,683	48	405	3.1	2,398.1	2,398.1	2,398.7	0.7

[1]Feet above confluence with Boise River

Table 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

(AND INCORPORATED AREAS)

FLOODWAY DATA

MASON CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Mason Creek								
AA	16,825	32	181	7.0	2,399.8	2,399.8	2,400.3	0.5
AB	17,044	31	192	6.6	2,400.6	2,400.6	2,400.9	0.3
AC	17,272	95	778	1.8	2,403.8	2,403.8	2,404.4	0.6
AD	18,093	100	350	3.6	2,403.8	2,403.8	2,404.6	0.7
AE	18,456	101	250	5.1	2,404.3	2,404.3	2,405.3	1.0
AF	19,134	98	263	4.8	2,406.5	2,406.5	2,407.0	0.5
AG	19,343	131	262	4.8	2,407.4	2,407.4	2,407.8	0.4
AH	19,524	230	517	2.5	2,408.6	2,408.6	2,409.4	0.8
AI	19,854	44	172	7.4	2,408.5	2,408.5	2,409.5	1.0
AJ	20,433	37	173	7.3	2,411.9	2,411.9	2,411.6	-0.3
AK	21,834	57	170	7.5	2,416.0	2,416.0	2,416.1	0.1
AL	22,007	57	282	4.5	2,417.3	2,417.3	2,418.2	1.0
AM	22,489	68	247	5.1	2,418.1	2,418.1	2,418.9	0.9
AN	22,975	56	177	7.1	2,420.0	2,420.0	2,420.0	0.0
AO	23,224	154	1,091	1.2	2,426.8	2,426.8	2,427.7	0.9
AP	24,442	59	493	2.6	2,427.2	2,427.2	2,428.0	0.8
AQ	26,141	46	325	3.9	2,427.3	2,427.3	2,428.2	1.0
AR	26,607	49	320	4.0	2,427.5	2,427.5	2,428.5	1.0
AS	27,137	82	598	2.1	2,428.1	2,428.1	2,429.0	0.9
AT	27,837	59	349	3.6	2,428.2	2,428.2	2,429.1	0.9
AU	28,466	47	234	5.4	2,428.8	2,428.8	2,429.5	0.7
AV	30,305	42	209	6.1	2,433.6	2,433.6	2,433.7	0.0
AW	30,878	78	324	3.9	2,434.7	2,434.7	2,434.7	0.0
AX	31,181	413	3,333	0.4	2,441.9	2,441.9	2,442.6	0.6
AY	32,568	101	686	1.8	2,442.0	2,442.0	2,442.8	0.9
AZ	33,127	270	1,146	1.1	2,442.0	2,442.0	2,442.9	1.0

[1]Feet above confluence with Boise River

Table 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

(AND INCORPORATED AREAS)

FLOODWAY DATA

MASON CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Mason Creek								
BA	34,599	957	1,788	0.7	2,442.3	2,442.3	2,443.3	1.0
BB	34,774	283	1,212	1.0	2,445.0	2,445.0	2,445.8	0.8
BC	35,830	38	271	4.7	2,445.1	2,445.1	2,446.0	0.9
BD	36,252	73	287	4.4	2,446.6	2,446.6	2,447.5	0.9
BE	36,781	46	318	4.0	2,447.0	2,447.0	2,448.0	1.0
BF	38,021	78	379	3.3	2,448.4	2,448.4	2,449.0	0.6
BG	39,216	44	283	4.5	2,449.4	2,449.4	2,450.0	0.6
BH	39,498	53	433	2.9	2,451.8	2,451.8	2,452.4	0.6
BI	40,825	35	321	5.8	2,452.4	2,452.4	2,453.3	0.9
BJ	40,900	37	366	5.1	2,453.3	2453.3	2453.4	0.1
BK	40,945	57	365	4.1	2,453.3	2453.3	2453.6	0.3
BL	41,975	60	306	4.9	2,453.3	2453.3	2454.3	1.0
BM	42,050	60	383	3.9	2,453.7	2453.7	2454.5	0.8
BN	42,870	42	280	5.4	2,454.2	2454.2	2455.1	0.9
BO	43,630	50	337	4.5	2,455.1	2455.1	2456.0	0.9
BP	43,685	50	277	5.4	2,455.1	2455.1	2456.0	0.9
BQ	44,440	48	281	5.3	2,456.6	2456.6	2457.0	0.4
BR	45,110	45	283	5.3	2,457.6	2457.6	2457.8	0.2
BS	45,180	61	329	4.6	2,457.8	2457.8	2458.0	0.2
BT	45,450	50	274	5.5	2,458.2	2458.2	2458.2	0.0
BU	45,525	50	294	5.1	2,458.2	2458.2	2458.3	0.1
BV	45,805	27	222	6.8	2,458.2	2458.2	2458.3	0.1
BW	45,830	16	141	6.4	2,458.2	2458.2	2458.3	0.1
BX	45,885	80	362	2.5	2,459.3	2459.3	2459.3	0.0
BY	46,765	351	638	2.4	2,459.4	2459.4	2459.7	0.3
BZ	46,880	40	332	4.5	2,460.0	2460.0	2461.0	1.0

[1]Feet above confluence with Boise River

Table 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

(AND INCORPORATED AREAS)

FLOODWAY DATA

MASON CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Mason Creek								
CA	47,380	44	485	3.1	2,460.5	2,460.5	2,461.5	1.0
CB	47,865	32	274	5.5	2,460.7	2,460.7	2,461.6	0.9
CC	48,875	28	278	5.4	2,461.7	2,461.7	2,462.7	1.0
CD	48,930	25	255	5.9	2,461.9	2,461.9	2,462.7	0.8
CE	49,540	29	289	5.2	2,462.5	2,462.5	2,463.5	1.0
CF	50,395	29	272	5.5	2,463.3	2,463.3	2,464.3	1.0
CG	51,445	28	274	5.5	2,464.4	2,464.4	2,465.4	1.0
CH	52,315	33	318	4.7	2,465.3	2,465.3	2,466.3	1.0
CI	52,370	126	758	2.0	2,469.7	2,469.7	2,470.7	1.0
CJ	53,360	30	378	4.0	2,469.9	2469.9	2470.9	1.0
CK	54,270	40	501	3.0	2,470.3	2470.3	2471.3	1.0
CL[2]								
CM	55,075	150	724	2.1	2,477.2	2477.2	2478.2	1.0
CN	55,910	60	373	4.0	2,477.5	2477.5	2418.5	1.0
CO - CX[2]								
CY	59,540	50	318	4.7	2,487.5	2487.5	2488.4	0.9
CZ	59,575	46	302	5.0	2,487.5	2487.5	2488.5	1.0
DA	59,720	373	2,508	0.6	2,488.8	2488.8	2489.8	1.0
DB	60,430	65	379	3.9	2,488.8	2488.8	2489.8	1.0
DC	60,640	67	204	5.2	2,489.5	2489.5	2490.2	0.7
DD	61,045	115	287	3.7	2,493.2	2493.2	2494.0	0.8
DE	61,125	130	896	1.6	2,493.4	2493.4	2494.3	0.9
DF	61,425	214	1,268	1.1	2,493.4	2493.4	2494.3	0.9
DG	61,535	101	589	2.4	2,493.4	2493.4	2494.3	0.9

[1]Feet above confluence with Boise River

[2]No floodway computed for these cross sections

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			
Mason Creek								
DH	61,970	78	285	5.3	2,493.4	2,493.4	2,494.4	1.0
DI	62,010	83	394	3.5	2,494.1	2,494.1	2,494.9	0.8
DJ	62,240	57	360	3.9	2,494.3	2,494.3	2,495.0	0.7
DK	62,315	60	276	5.0	2,494.3	2,494.3	2,495.0	0.7
DL	62,640	116	454	3.1	2,495.1	2,495.1	2,495.6	0.5
DM	62,655	53	167	8.3	2,495.1	2,495.1	2,495.6	0.5
DN	62,700	745	166	6.3	2,496.2	2,496.2	2,496.5	0.3
DO	63,075	752	2,306	0.8	2,497.1	2,497.1	2,497.3	0.2
DP	63,184	406	1,790	0.9	2,499.0	2,499.0	2,499.3	0.3
DQ	63,379	436	1,385	1.1	2,499.0	2499.0	2499.3	0.3
DR	63,469	511	1,291	1.1	2,499.0	2499.0	2499.3	0.3
DS	63,819	486	159	6.0	2,498.7	2498.7	2499.1	0.4
DT	63,919	102	388	2.1	2,502.8	2502.8	2503.3	0.5
DU	64,001	120	1,014	1.2	2,502.9	2502.9	2503.3	0.4
DV	64,168	138	1,339	0.9	2,502.9	2502.9	2503.4	0.5
DW	64,231	171	1,317	1.0	2,502.9	2502.9	2503.4	0.5
DX	65,261	122	846	1.4	2,503.0	2503.0	2503.4	0.4
DY	66,241	185	1,314	1.0	2,503.0	2503.0	2503.5	0.5
DZ	67,181	104	94	9.7	2,503.0	2503.0	2503.5	0.5
EA	67,246	136	1,043	2.1	2,506.4	2506.5	2507.4	0.9
EB - EG[2]								
EH	70,455	27	242	5.7	2,506.2	2506.2	2507.2	1.0
EI	71,185	29	266	5.2	2,507.1	2507.1	2508.0	0.9
EJ	72,150	11	97	14.3	2,509.6	2509.6	2510.5	0.9

[1]Feet above confluence with Boise River

[2]No floodway computed for these cross sections

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE-FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					Feet (NAVD)			D)
Mason Creek								
EK	72,255	27	178	7.8	2,512.9	2,512.9	2,512.9	0.0
EL	73,020	41	358	3.9	2,514.0	2,514.0	2,514.5	0.5
EM	73,845	61	300	4.6	2,514.5	2,514.5	2,515.0	0.5
EN	73,900	190	806	1.7	2,516.6	2,516.6	2,516.6	0.0
EO	74,790	163	437	3.2	2,516.7	2,516.7	2,516.8	0.1
EP	75,610	38	291	4.8	2,517.2	2,517.2	2,517.6	0.4
EQ	76,425	37	267	5.2	2,517.9	2,517.9	2,518.4	0.5
ER	76,470	48	302	4.1	2,517.9	2,517.9	2,518.6	0.7
ES	77 ,425	96	151	8.3	2,521.4	2,521.4	2,521.4	0.0
ET	78,270	44	176	7.1	2,528.1	2528.1	2528.1	0.0
EU	79,165	82	169	7.4	2,533.3	2533.3	2533.3	0.0
EV	80,050	100	178	7.0	2,547.0	2547.0	2547.0	0.0
EW	80,135	110	806	1.6	2,551.7	2551.7	2552.7	1.0
EX	80,415	100	606	2.1	2,551.8	2551.8	2552.8	1.0
EY	80,485	110	507	2.5	2,551.8	2551.8	2552.8	1.0
EZ	81,045	50	210	6.0	2,552.2	2552.2	2553.2	1.0
FA	81,950	40	165	7.6	2,555.4	2555.4	2555.9	0.5
FB	82,795	45	255	4.9	2,557.6	2557.6	2558.5	0.9
FC	83,865	55	210	6.0	2,559.4	2559.4	2560.3	0.9
FD	83,905	60	194	6.5	2,559.7	2559.7	2560.3	0.6
FE	83,930	50	204	6.1	2,560.5	2560.5	2560.7	0.2
FF	84,125	50	239	5.2	2,560.6	2560.6	2561.4	0.8
FG	84,200	50	291	4.3	2,565.6	2565.6	2565.6	0.0
FH	84,765	60	493	2.5	2,565.6	2565.6	2566.0	0.4
FI	84,815	65	305	4.1	2,565.6	2565.6	2566.0	0.4
FJ	85,735	80	608	2.1	2,565.7	2565.7	2566.5	0.8

[1]Feet above confluence with Boise River

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance zone that corresponds to the 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analysis are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance zone that corresponds to the 1-percent-annual-chance shallow flooding (usually areas of sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analysis are shown within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

Table 6. Flood Insurance Zones within Each Community

Community	Zone(s)
City of Caldwell	A, AE, X
City of Greenleaf	AE, X
City of Middleton	A, AE, X
City of Nampa	AE, X
City of Notus	AE, X
City of Parma	AE, X
City of Star	A, AE, X
Canyon County (Unincorporated Areas)	A, AE, X

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross-sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Canyon County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 7, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Canyon County (Unincorporated Areas)	May 24, 1977	N/A	September 28, 1984	December 3, 1993
Caldwell, City of	November 19, 1976	N/A	September 3, 1980	September 30, 1988
Greenleaf, City of	May 24, 2011	N/A	May 24, 2011	N/A
[1]Melba, City of	N/A	N/A	N/A	N/A
Middleton, City of	November 2, 1973	July 30, 1976	September 3, 1980	June 17, 1976 September 28, 1980 December 3, 1993
Nampa, City of	May 31, 1974	August 13, 1976 July 19, 1977	September 28, 1984	N/A
Notus, City of	September 26, 1975	N/A	March 18, 1980	December 3, 1993
Parma, City of	May 17, 1974	June 4, 1976	September 30, 1980	December 3, 1993
[2]Star, City of	June 28, 1977 (Ada County)	N/A	December 18, 1984 (Ada County)	December 17, 1991 August 2, 1996 (Ada County)
[1]Wilder City, City of	N/A	N/A	N/A	N/A

[1] No Special Flood Hazard Areas
[2] Map dates for this community were taken from Ada County, Idaho

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, IDAHO AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

FIS reports were published for the City of Nampa on March 28, 1984, for the City of Caldwell on September 30, 1988, and for Canyon County (Unincorporated Areas) and the Cities of Middleton, Notus, and Parma on December 3, 1993 (References 35, 36, 24, 37, 38, and 39).

No previous studies have been prepared for the Cities of Greenleaf, Melba, and Wilder City.

This FIS report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Federal Insurance and Mitigation Directorate, FEMA Region X, Federal Regional Center, 130 228th Street, Southwest, Bothell, Washington 98021-9796.

9.0 BIBLIOGRAPHY AND REFERENCES

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17. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles Users Manual, Davis, California, September 1982

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38. Federal Emergency Management Agency, Flood Insurance Study, City of Notus, Idaho, December 3, 1993

39. Federal Emergency Management Agency, Flood Insurance Study, City of Parma, Idaho, December 3, 1993

10.0 REVISION DESCRIPTIONS

This section has been added to provide information regarding significant revisions made since the original FIS report was printed. Future revisions may be made that do not result in the republishing of the FIS report. To assure that user is aware of all revisions, it is advisable to contact your community's flood hazard data repository.

10.1 First Revision (May 24, 2011)

a. Acknowledgments

The hydrologic and hydraulic analyses for a restudy of Indian Creek, Mason Creek, and the Boise River were performed by WEST Consultants, Inc. for FEMA under contract number EMS-2001-CO-0068. This preliminary study was completed in October 2007. Base mapping was compiled by Horizons, Inc. from LiDAR coverage at a scale of one inch equals 500 feet.

The preliminary hydraulic modeling for Indian Creek was subsequently modified by CH2M Hill, under contract to the City of Caldwell, to account for recent channel and floodplain modifications. The modeling revisions were completed in July 2008. The preliminary hydrologic analysis for Indian Creek was modified after discussions regarding the contributing drainage area, the joint probability of flows in the New York Canal and Indian Creek and the capacity of the New York Canal. This revised analysis was completed in November 2009. The modified hydrologic analysis results and the modified hydraulic model were used to determine the final water surface elevations, floodplain extents and floodway delineation. This work was completed by Michael Baker Jr., Inc., for FEMA.

b. Coordination

The initial CCO meeting was held on November 5, 2003, and was attended by representatives of FEMA, the State of Idaho, Canyon County, the City of Nampa, the City of Caldwell, and the study contractor.

An intermediate CCO meeting was held on February 15, 2008, and was attended by representatives of FEMA, WEST Consultants, the State of Idaho, the Cities of Nampa, Caldwell, Star, Middleton, Greenleaf, Parma and Greenleaf, Senator Crapo's office, Congressman Sali's office and Quadrant Consulting. Two main issues raised at the meeting include the new channel configuration for Indian Creek and the flow capacity of the New York Canal.

The preliminary analyses for Indian Creek were appealed on January 15, 2009 by the Cities of Caldwell and Nampa. The appeal from the City of Caldwell involved a request to update the channel configuration for Indian Creek to account for the work done by the city to realign and regrade the stream banks of Indian Creek between 5th and 10th Avenues. Both cities appealed the hydrologic analysis conducted on Indian Creek and the New York Canal. The appeal involved a review and changes to the contributing drainage area of Indian Creek, the joint probability of flows in the New York Canal and Indian Creek and the capacity of the New York Canal. The appeal was resolved on December 31, 2009.

Once the appeal was resolved it was determined in conversations with FEMA and the communities that no further CCO meetings were necessary so a second CCO meeting was not held.

c. Scope

The Boise River was restudied using detailed methods from Interstate 84 to the Canyon-Ada County boundary. Indian Creek was restudied using detailed methods from its confluence with the Boise River to the Canyon-Ada County boundary. Mason Creek was studied using detailed methods from its confluence with the Boise River to Lone Tree Lane in the City of Nampa.

d. Flood Protection Measures

Flood magnitudes along Lower Indian Creek are affected by operation of the New York Canal. The New York Canal is an irrigation canal that starts from the Boise River just below the Lucky Peak Project. To the south of Eager Road and Kuna Road (in Ada County), the canal splits to the Mora Canal and the New York Canal.

Approximately 1,200 feet downstream of Stroebel Road in the City of Kuna, Idaho, the New York Canal converges with Indian Creek. The New York Canal and Indian Creek continue as one stream until about 2,100 feet upstream of Columbia Road where there is a Callopy gate across the stream channel. Indian Creek splits from the combined channel and flows to the northwest through the Cities of Nampa and Caldwell to the Boise River. The New York Canal continues west to Lake Lowell. The Callopy gate controls how much water is allowed to flow through the New York Canal. The gate currently maintains the design flow of 1,500 cfs in the New York Canal. The flood flow in excess of 1,500 cfs is diverted to Indian Creek over a broad crested weir.

During the flood season (December 1 to March 31) it is assumed that 1,000 cfs is maintained in the joint New York Canal/Indian Creek channel 20% of the time. The percentage of time the canal was in use was determined by analyzing observed records. So during a flood event in the Indian Creek basin, the natural discharges from the Indian Creek basin are increased by the flow diverted to the New York Canal.

e. Hydrologic Analysis

This restudy of the Boise River from Interstate 84 to the Canyon-Ada County boundary used the effective flood frequency discharges estimates from the regulated discharge curve for Lucky Peak Dam (Reference 13).

The estimation of flood frequency discharges for Indian Creek upstream of the Callopy gate was based on a regional regression analysis (Reference 14) and a joint probability approach to reflect the historical use of the New York Canal for the December 1 to March 31 time period (the historical flood season) (Reference 15). The canal was determined to be in use 20% of the time between December 1 and March 31 with an assumed flow of 1,000 cfs. For Indian Creek downstream of the Callopy gate, the discharges were equal to flow in excess of 1,500 cfs (the amount diverted to the New York Canal by the Callopy gate) plus the flows due to the local drainage area.

The estimation of flood frequency discharges for Mason Creek from its confluence with the Boise River upstream to Lone Tree Lane was based on a regional regression analysis (Reference 14).

Peak discharge drainage area relationships studied by detailed methods are shown in Table 2, Summary of Discharges.

f. Hydraulic Analysis

WSELs for the Boise River for this revision from Interstate 84 to the Ada County boundary were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Minister & Glaeser Surveying, Inc. for the Boise River. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data was developed from surveys conducted by Minister & Glaeser Surveying, Inc. The starting WSELs were taken from the flood profiles in the effective FIS report (Reference 24).

WSELs for Indian Creek for this revision were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Quadrant Consulting, Inc. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data were developed from surveys conducted by Quadrant Consulting, Inc. The starting WSEL was specified as normal depth based on the ground slope near the confluence with the Boise River.

The preliminary channel geometry for some sections of Indian Creek was changed to account for the relocation of the stream channel, the removal of buildings and road pavement to allow access to the stream channel and the regrading of the channel banks. The revised sections were located between the following streets:

1. Between 10th Avenue and 9th Avenue
2. Between 9th Avenue and Kimball Boulevard
3. Between Kimball Boulevard and 5th Avenue

Additionally, two new pedestrian bridges were added to the preliminary model and the bridge at Kimball Boulevard was revised to reflect the new downstream stream channel configuration.

The new cross sections and bridges were surveyed by Quadrant Consulting, Inc.

WSELs for Mason Creek for this revision from its confluence with the Boise River to Lone Tree Lane were computed using HEC-RAS version 3.1.3 (Reference 23). The channel geometry was developed from channel surveys conducted by Quadrant Consulting, Inc. Overbank geometry was developed from LiDAR data acquired by Horizons, Inc. Bridge and culvert data were developed from surveys conducted by Quadrant Consulting, Inc. The starting WSEL was specified as normal depth based on the ground slope near the confluence with the Boise River.

Manning's "n" values used in this revision were based on field inspections and aerial photos.

Channel and overbank roughness coefficients (Manning's "n" values), used in the hydraulic computations, were chosen by engineering judgment based on field observation of stream and

floodplain areas. The roughness coefficients for all studied flooding sources are listed in Table 3.

g. Vertical Datum

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations across the corporate limits between communities. The conversion factor for streams studied by detailed methods in Canyon County is 3.12 feet. To convert from NGVD29 to NAVD88 use the following:

NVGD29 elevation + 3.12 feet = NAVD88 elevation

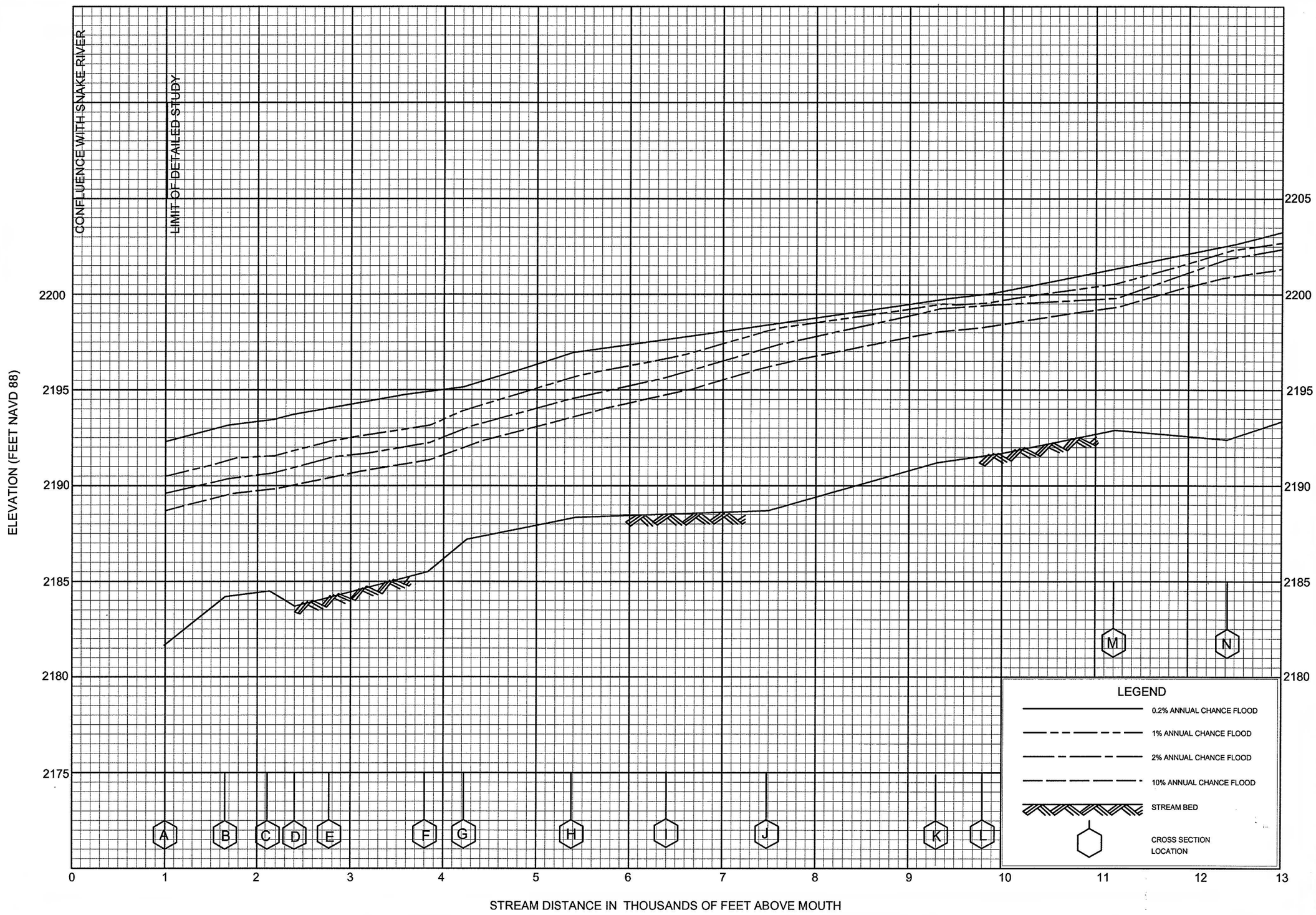
h. Floodplain Boundaries

For this revision topographic maps were generated from aerial photography by Horizons, Inc., at a scale of one inch equals 500 feet with a contour interval of 2 feet (Reference 33).

In addition to the above study the following LOMRs were incorporated as part of the countywide study.

Table 8. Letters of Map Revision Incorporated

Case Number	Final Letter Date	Flooding Source	Segment Studied
05-10-0594P	July 27, 2006	Willow Creek	from just downstream of Duff Lane to just upstream of Lansing Lane
07-10-0530P	August 28, 2007	Boise River	from approximately 9,400 feet to approximately 3,800 feet downstream of Notus Greenleaf Road
02-10-391P	July 3, 2003	Boise River	the area approximately 2,100 feet downstream of Middleton Road
97-10-177P	October 24, 1997	Mason Creek	just upstream of the abandoned Union Pacific Railroad (UPRR) right-of-way to just downstream of the Franklin Road South culvert
08-10-0685P	April 30, 2009	Tenmile Creek	from approximately 2,600 feet downstream of Canada Road to just upstream
09-10-0166P	December 28, 2009	Mason Creek	from just downstream of South Americana Drive to just upstream of Kings Road

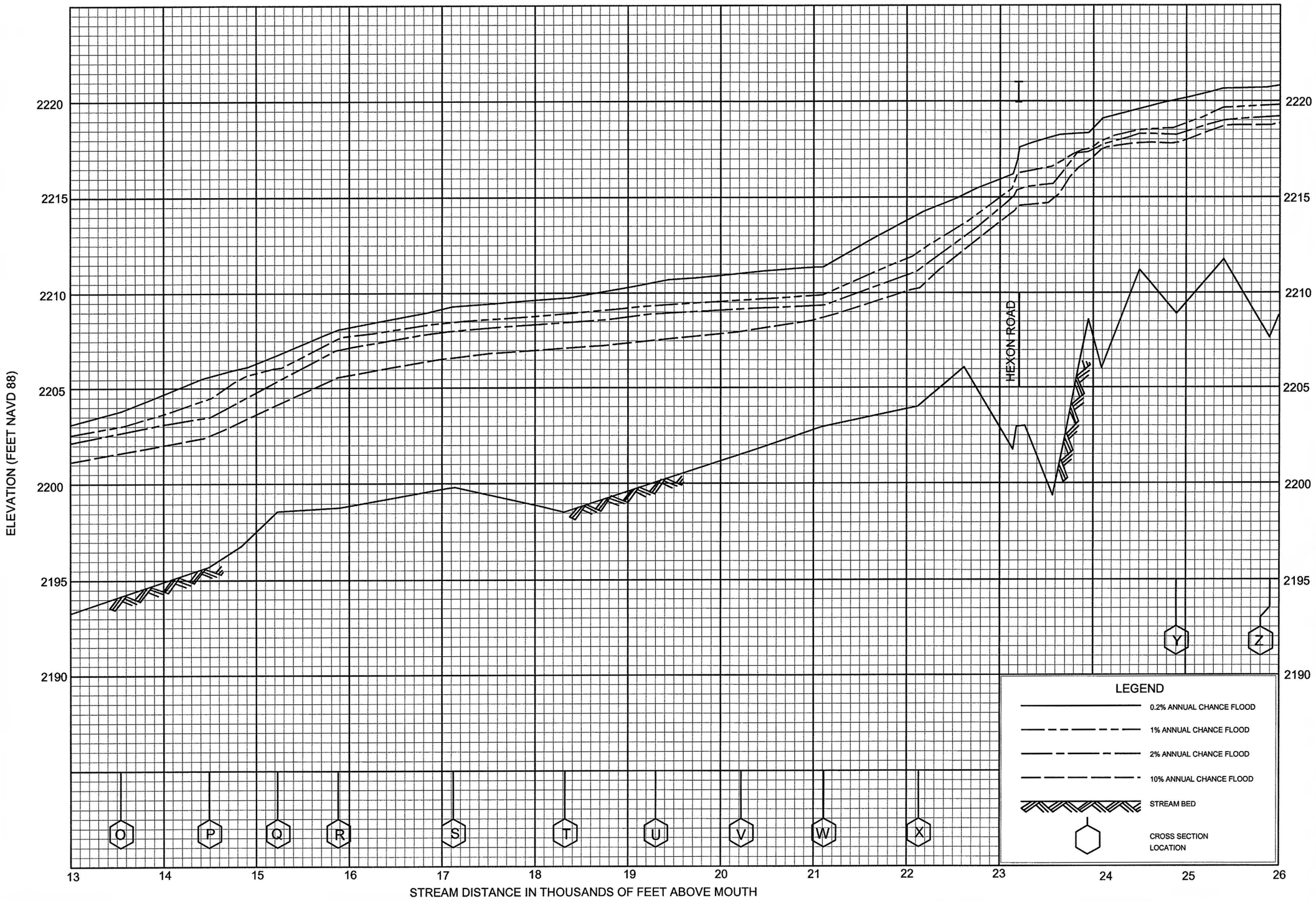


FLOOD PROFILES

BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID
AND INCORPORATED AREAS



FLOOD PROFILES

BOISE RIVER

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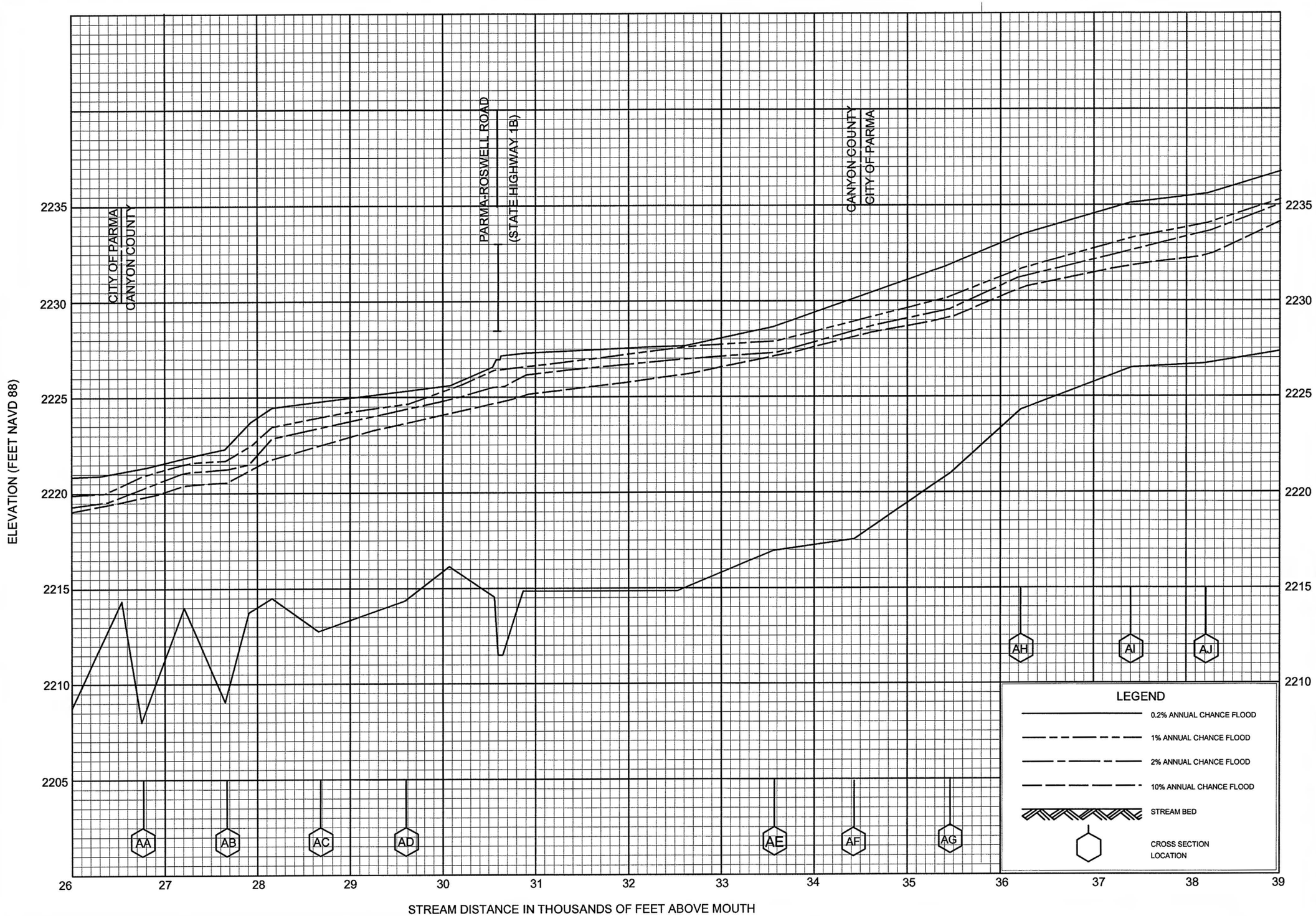
CANYON COUNTY, ID
AND INCORPORATED AREAS



FLOOD PROFILES

BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID
AND INCORPORATED AREAS

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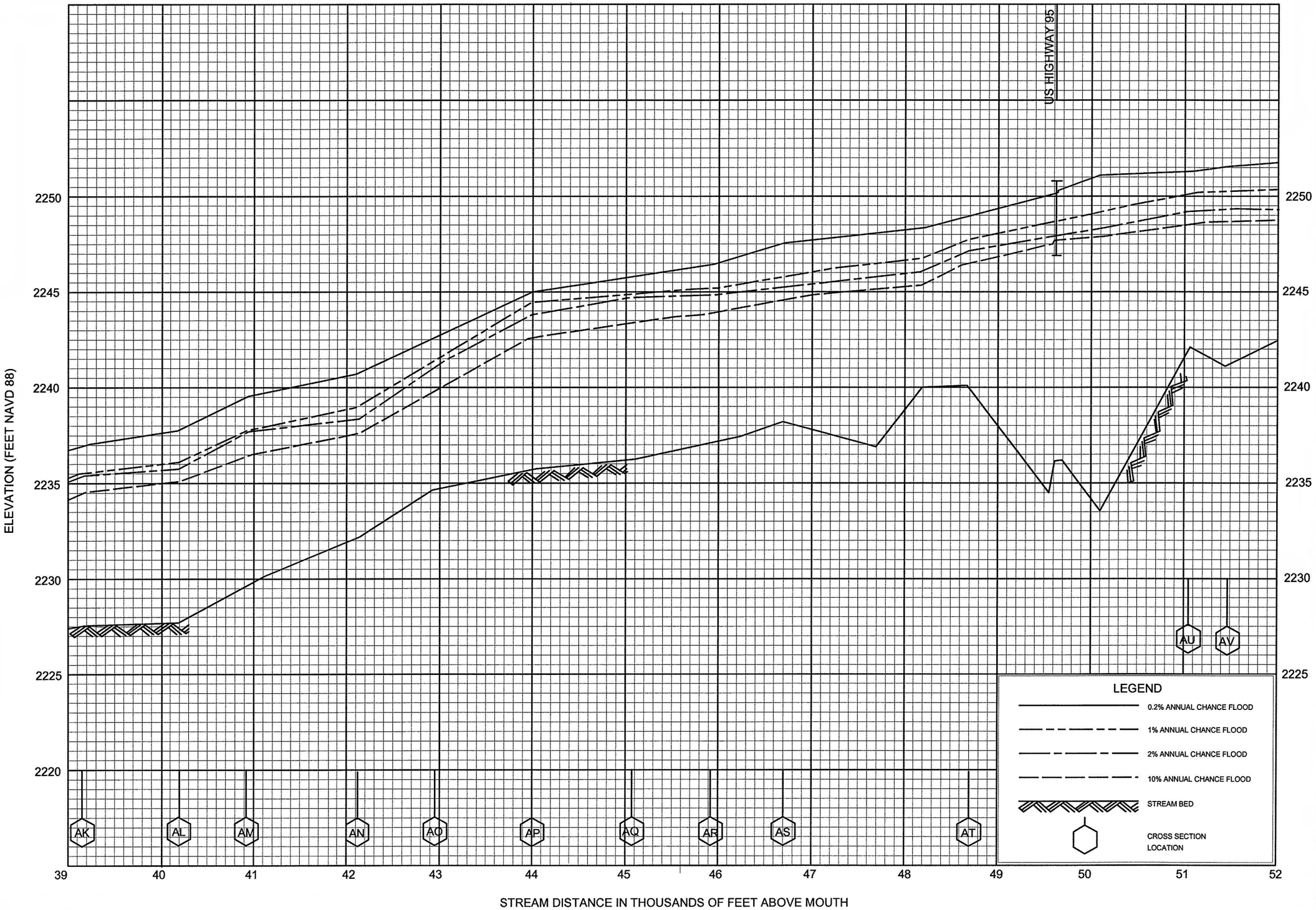

FLOOD PROFILES

BOISE RIVER

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CANYON COUNTY, ID
AND INCORPORATED AREAS

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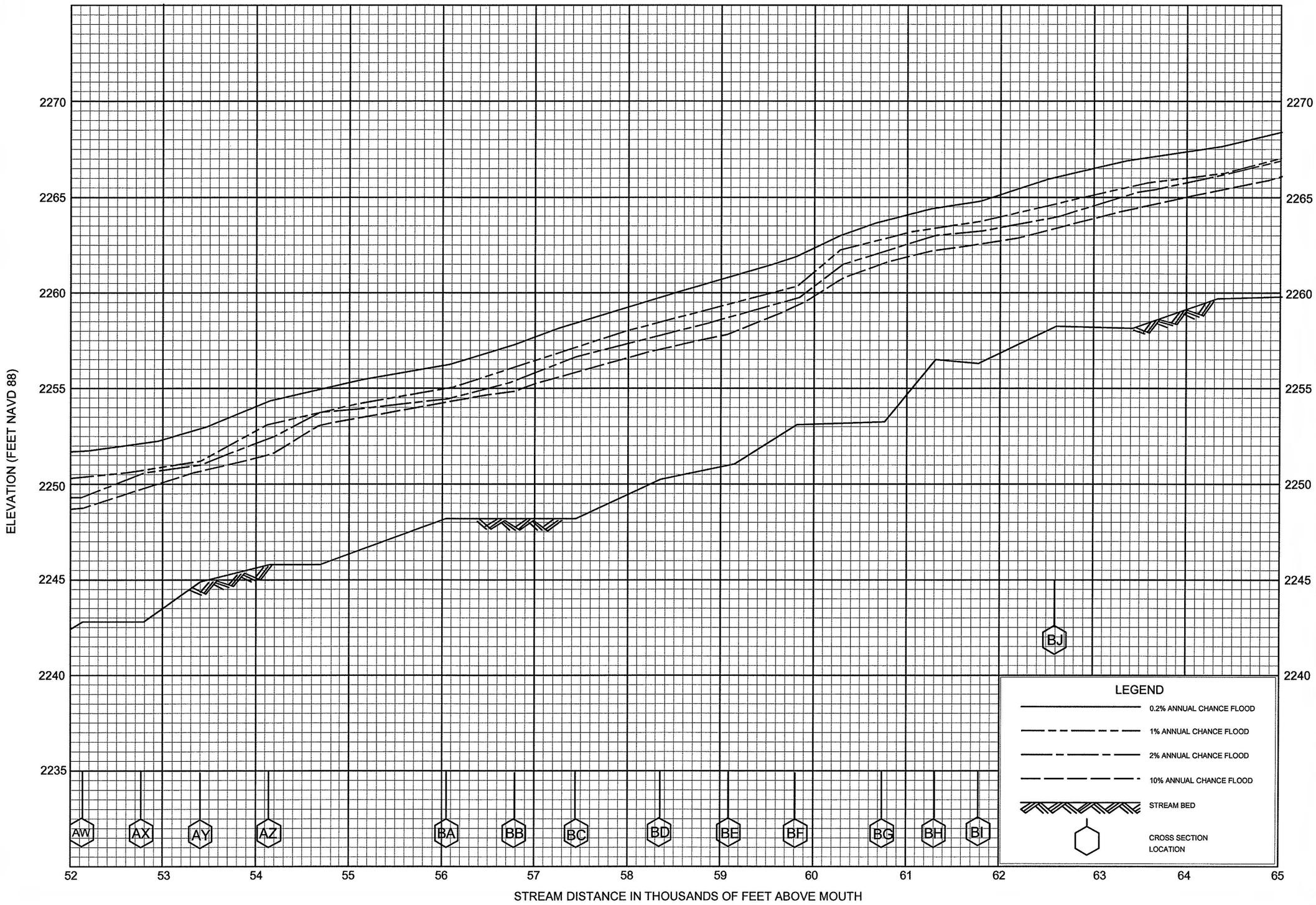

FLOOD PROFILES

BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID
AND INCORPORATED AREAS

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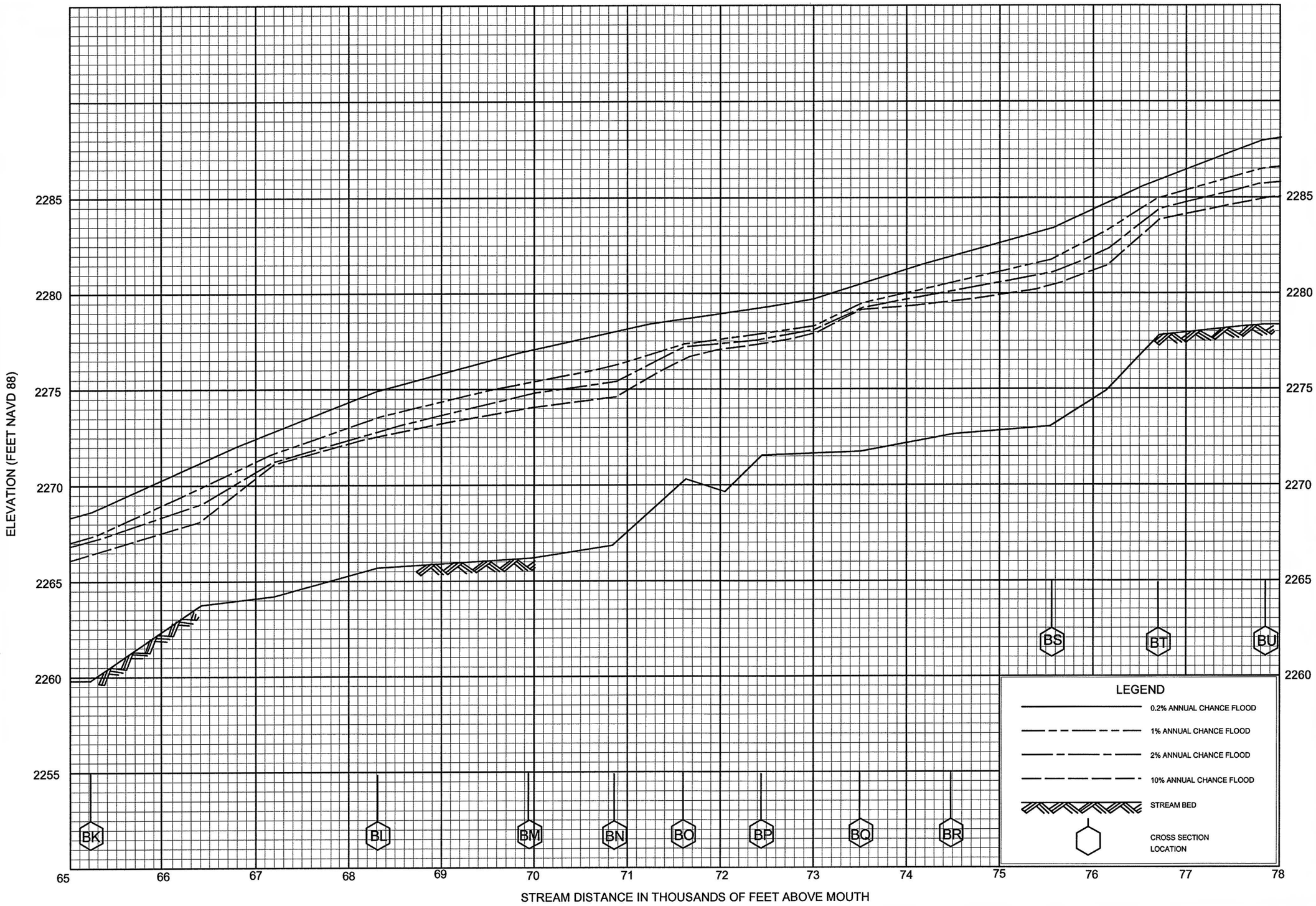

FLOOD PROFILES

BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID
AND INCORPORATED AREAS

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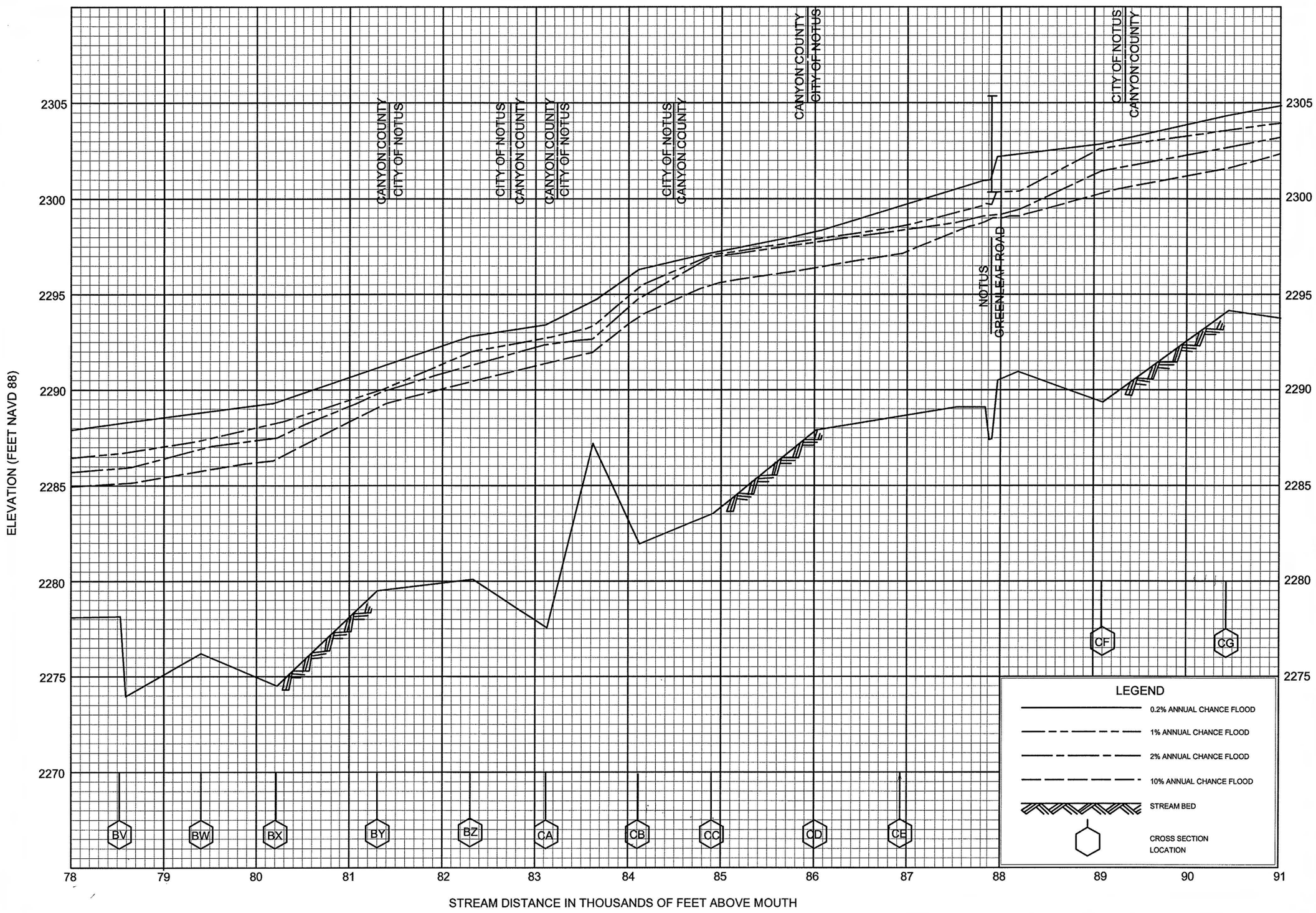

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BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID
AND INCORPORATED AREAS

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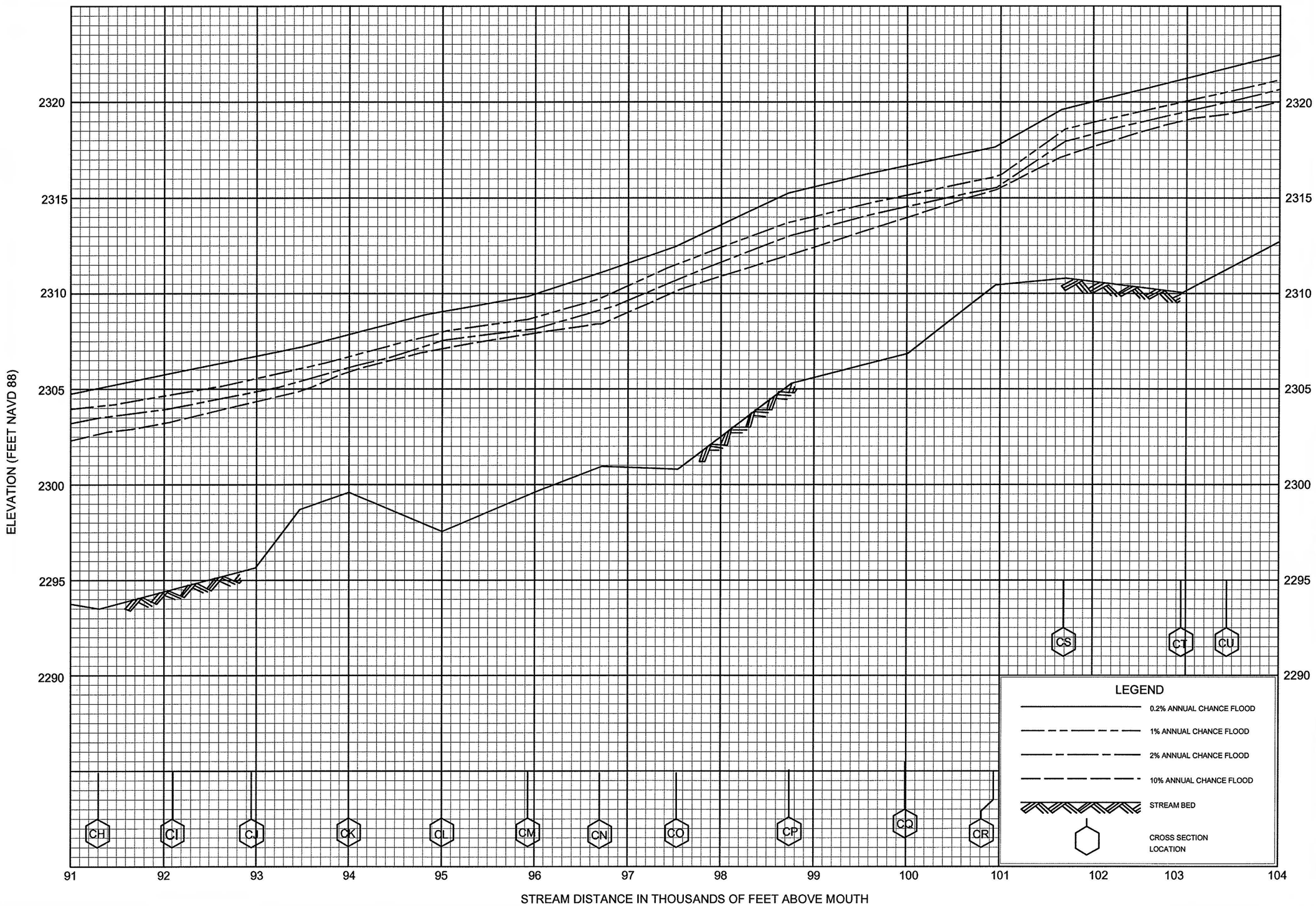

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BOISE RIVER

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CANYON COUNTY, ID
AND INCORPORATED AREAS

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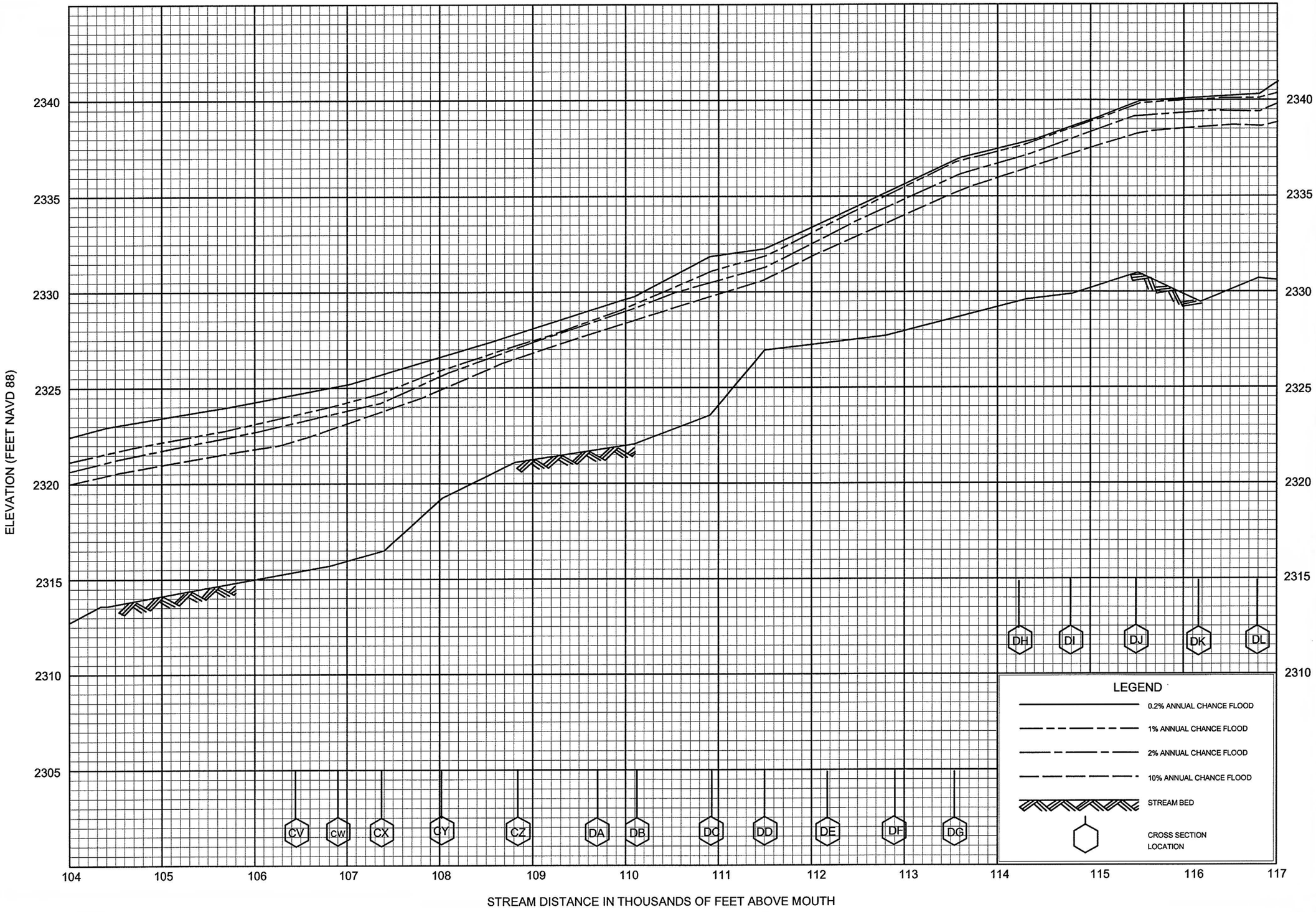

FLOOD PROFILES

BOISE RIVER

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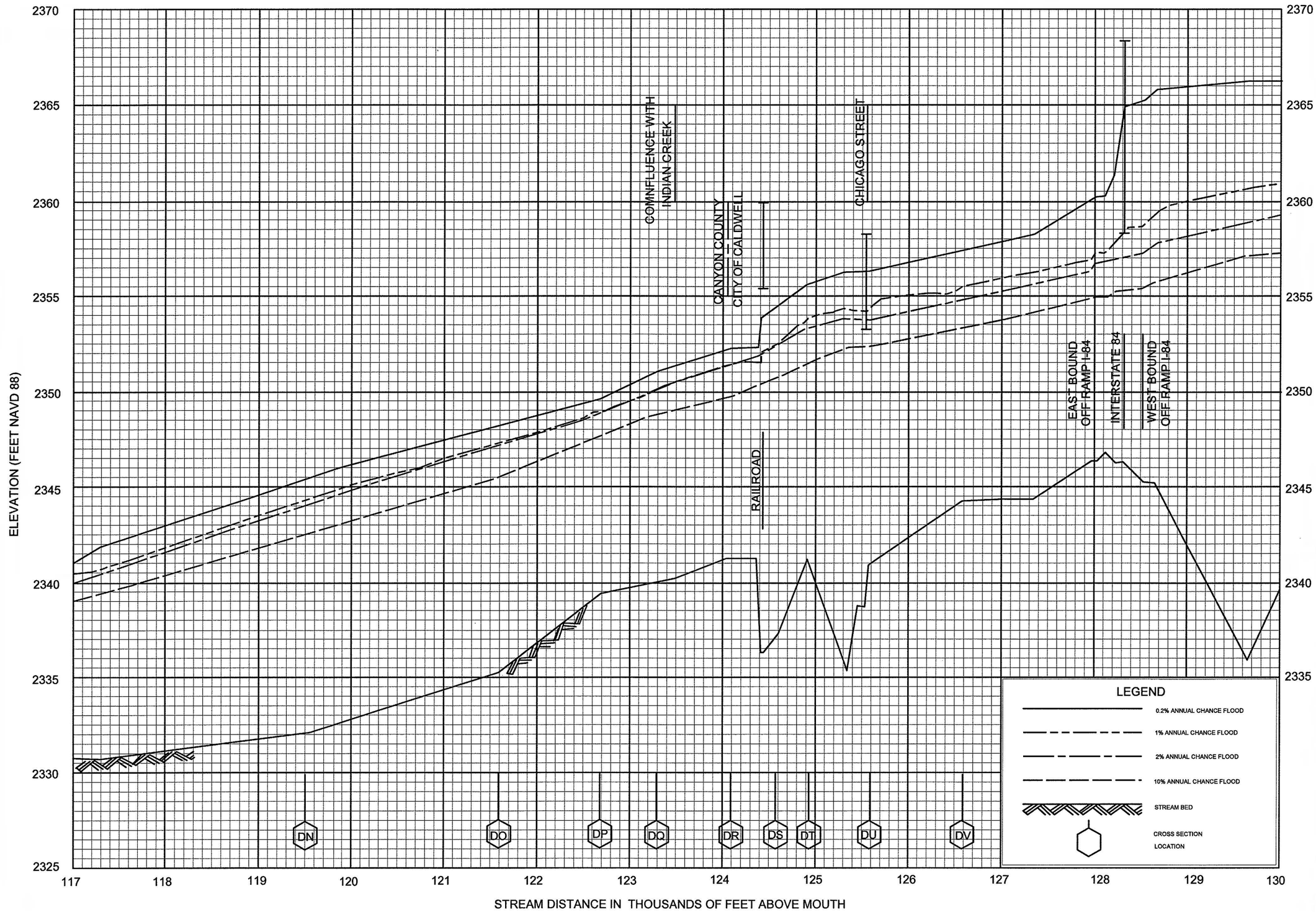
CANYON COUNTY, ID
AND INCORPORATED AREAS



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BOISE RIVER

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CANYON COUNTY, ID
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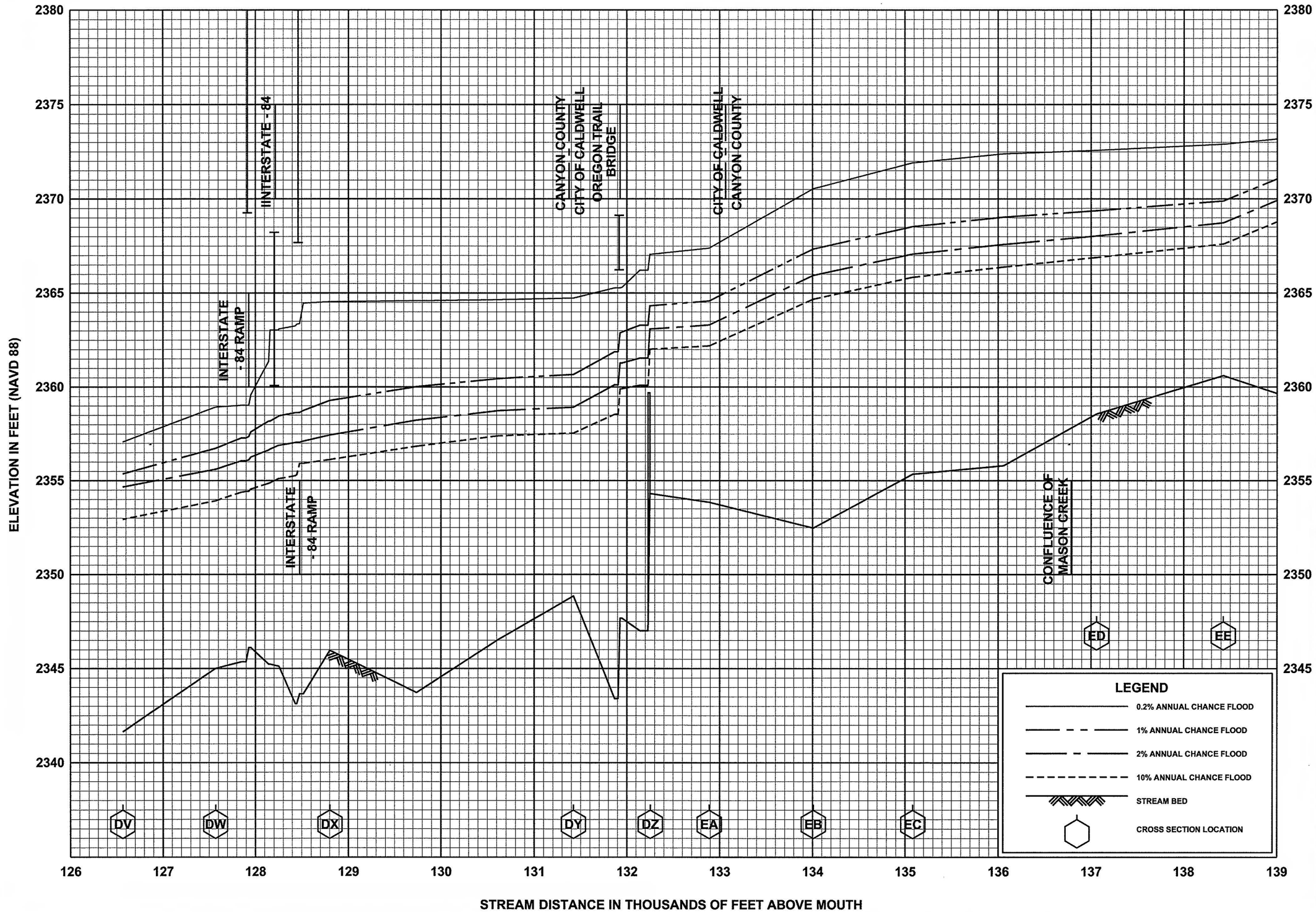

FLOOD PROFILES

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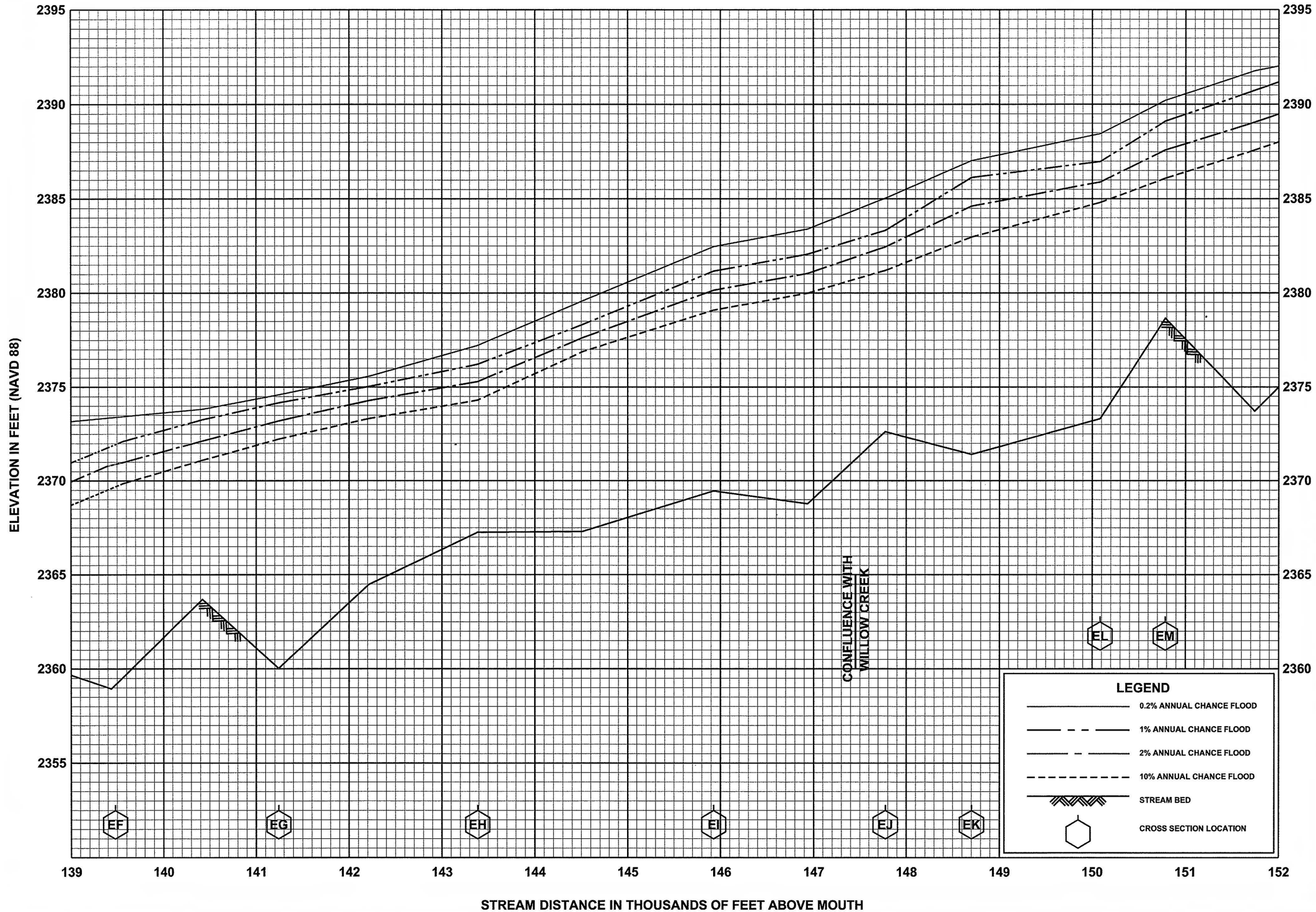

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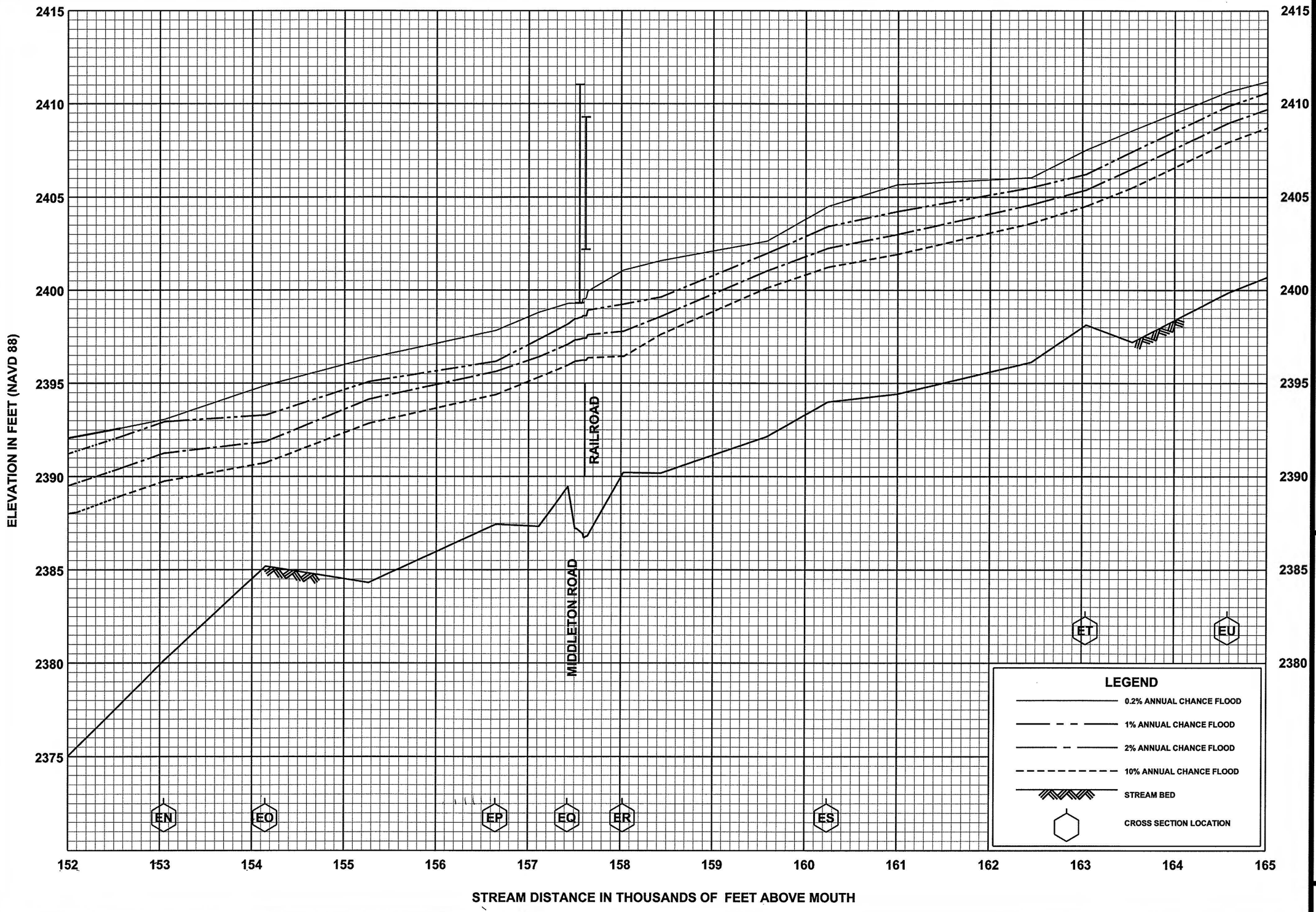

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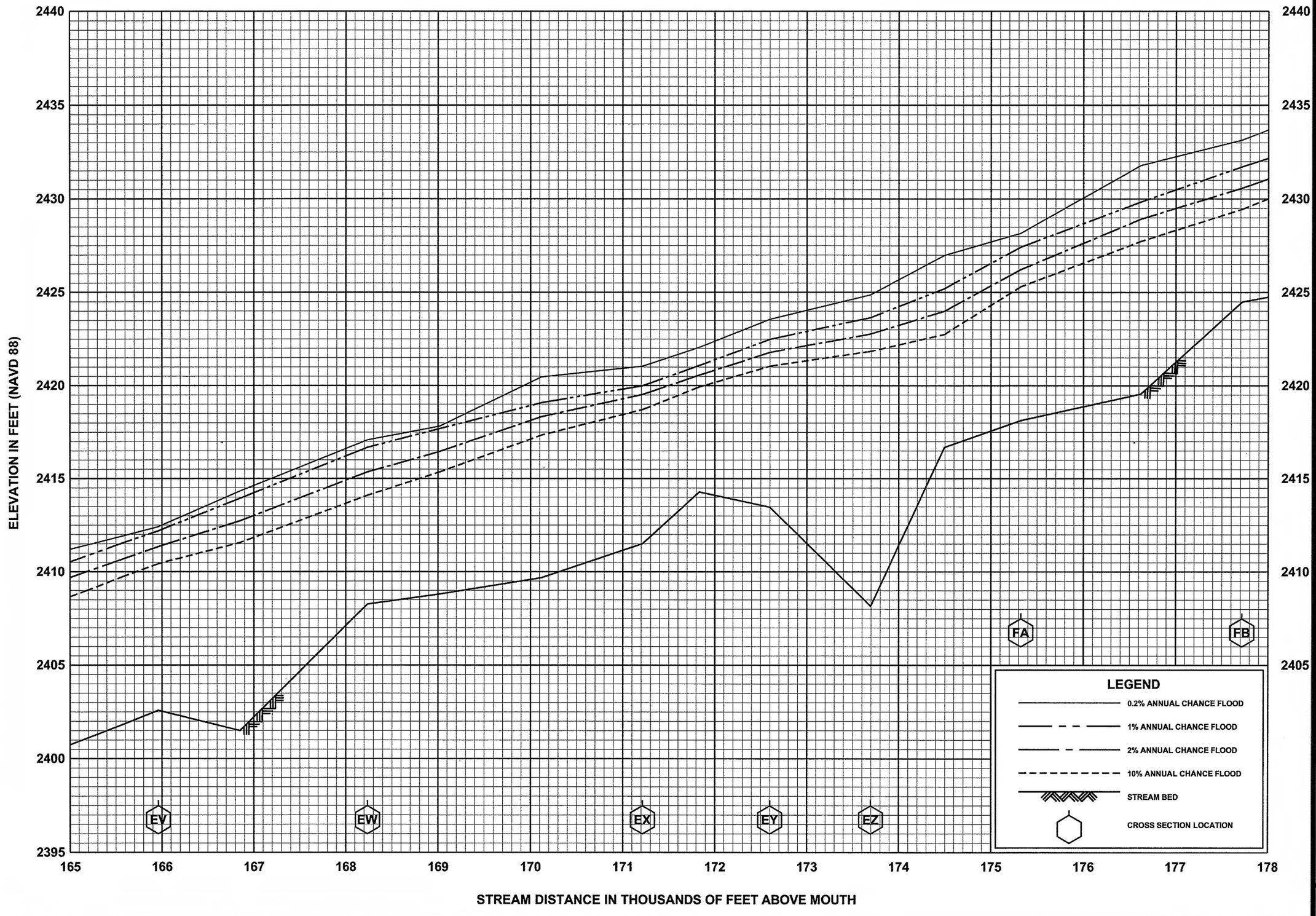

FLOOD PROFILES

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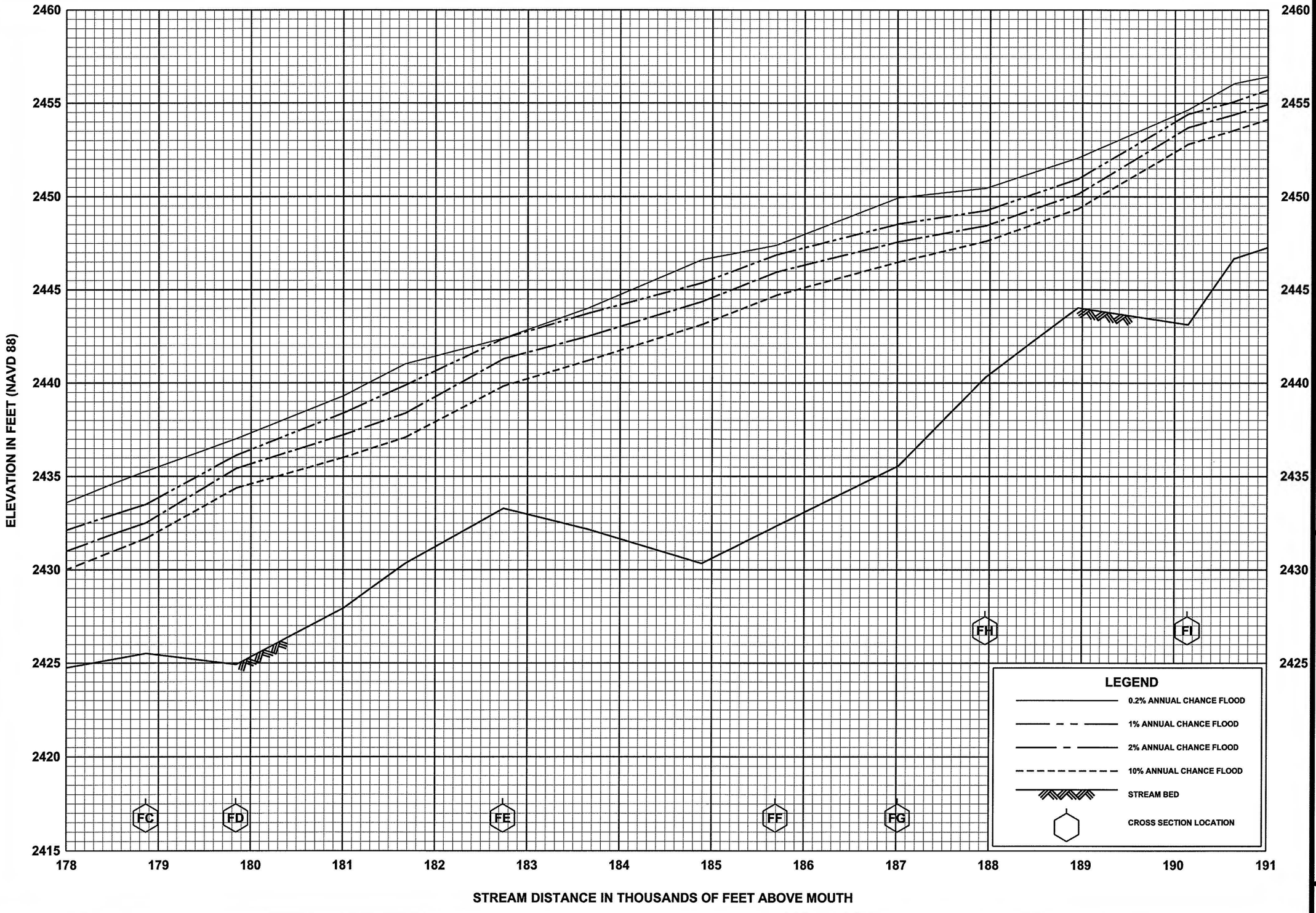

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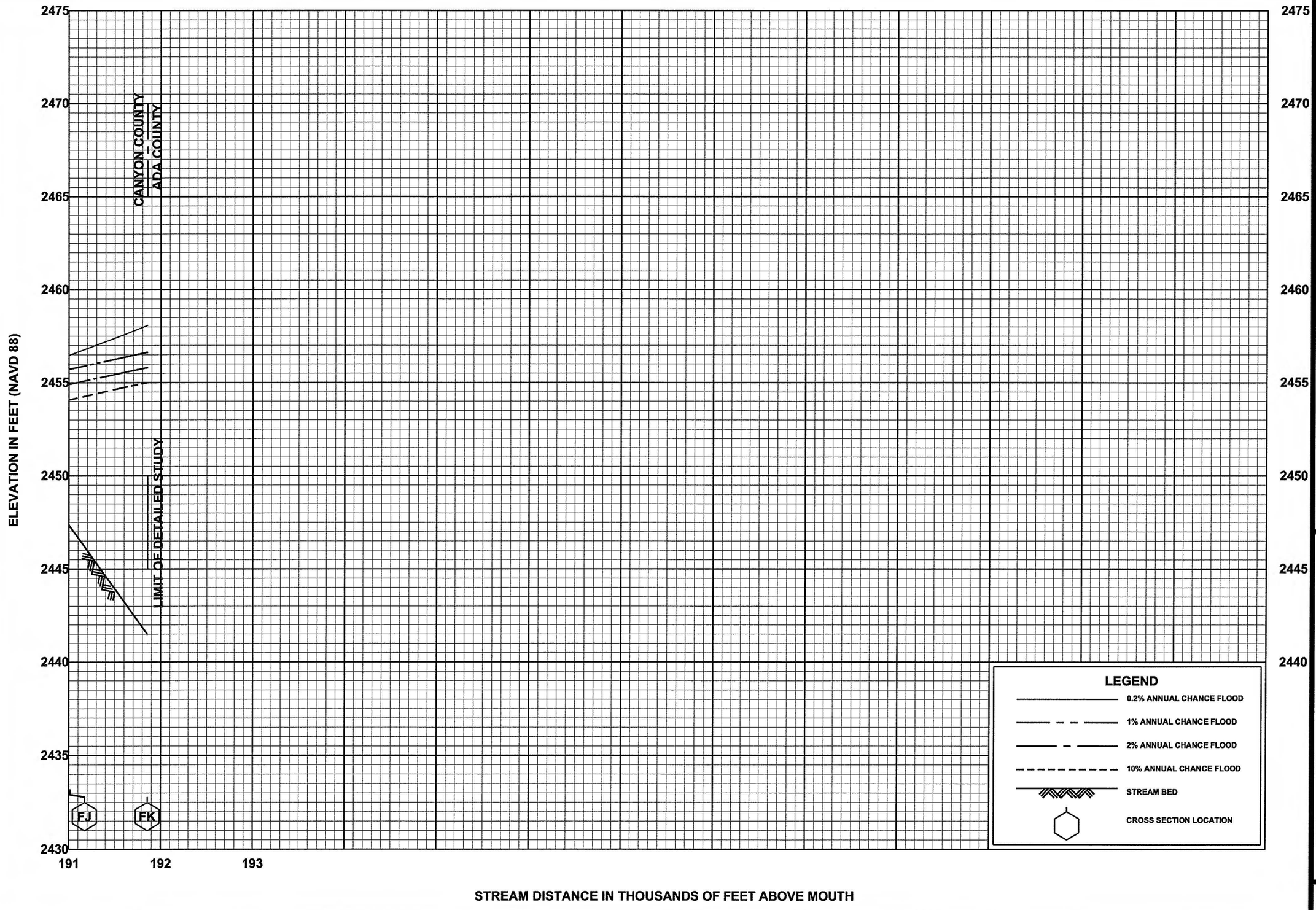

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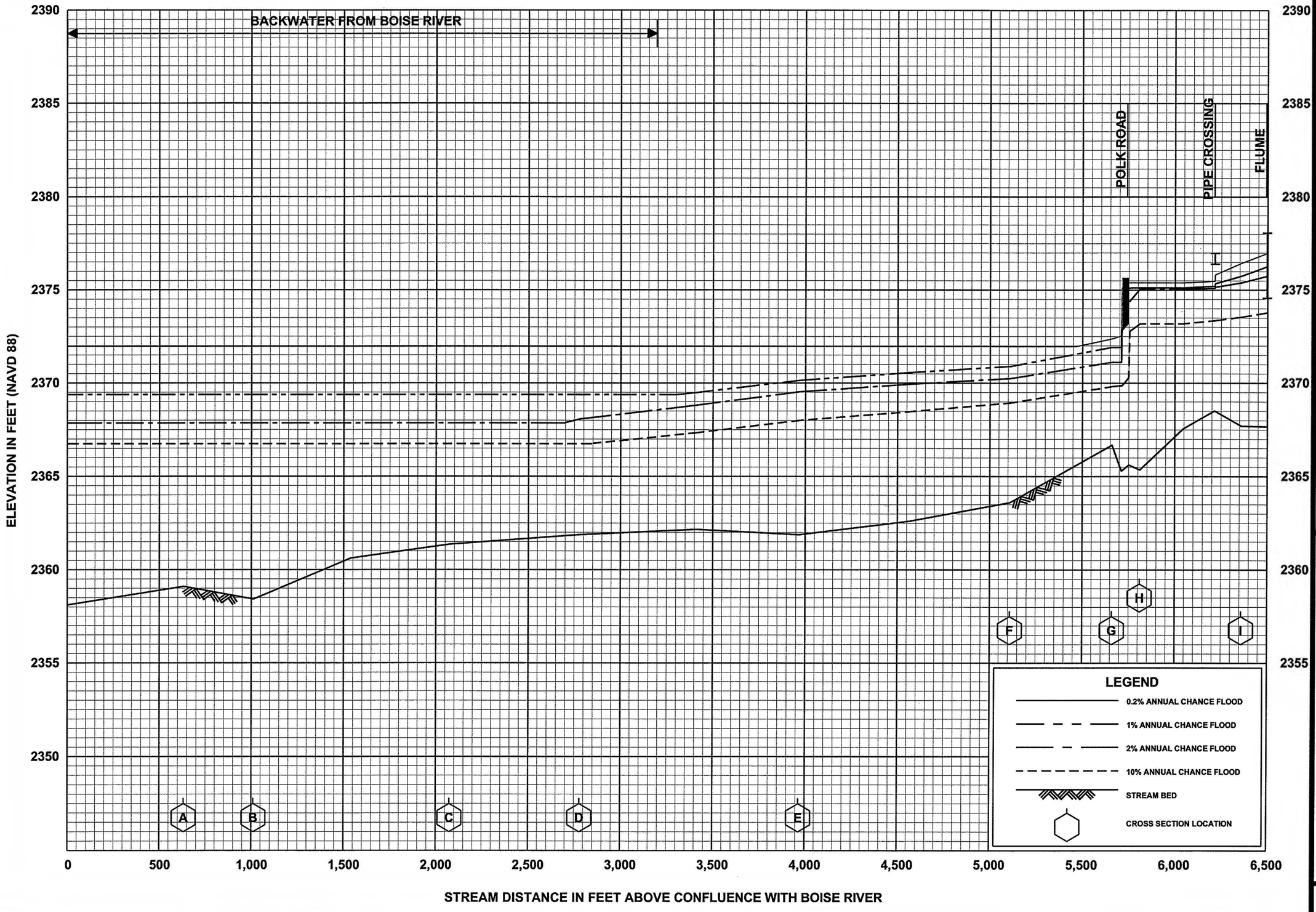

FLOOD PROFILES

MASON CREEK

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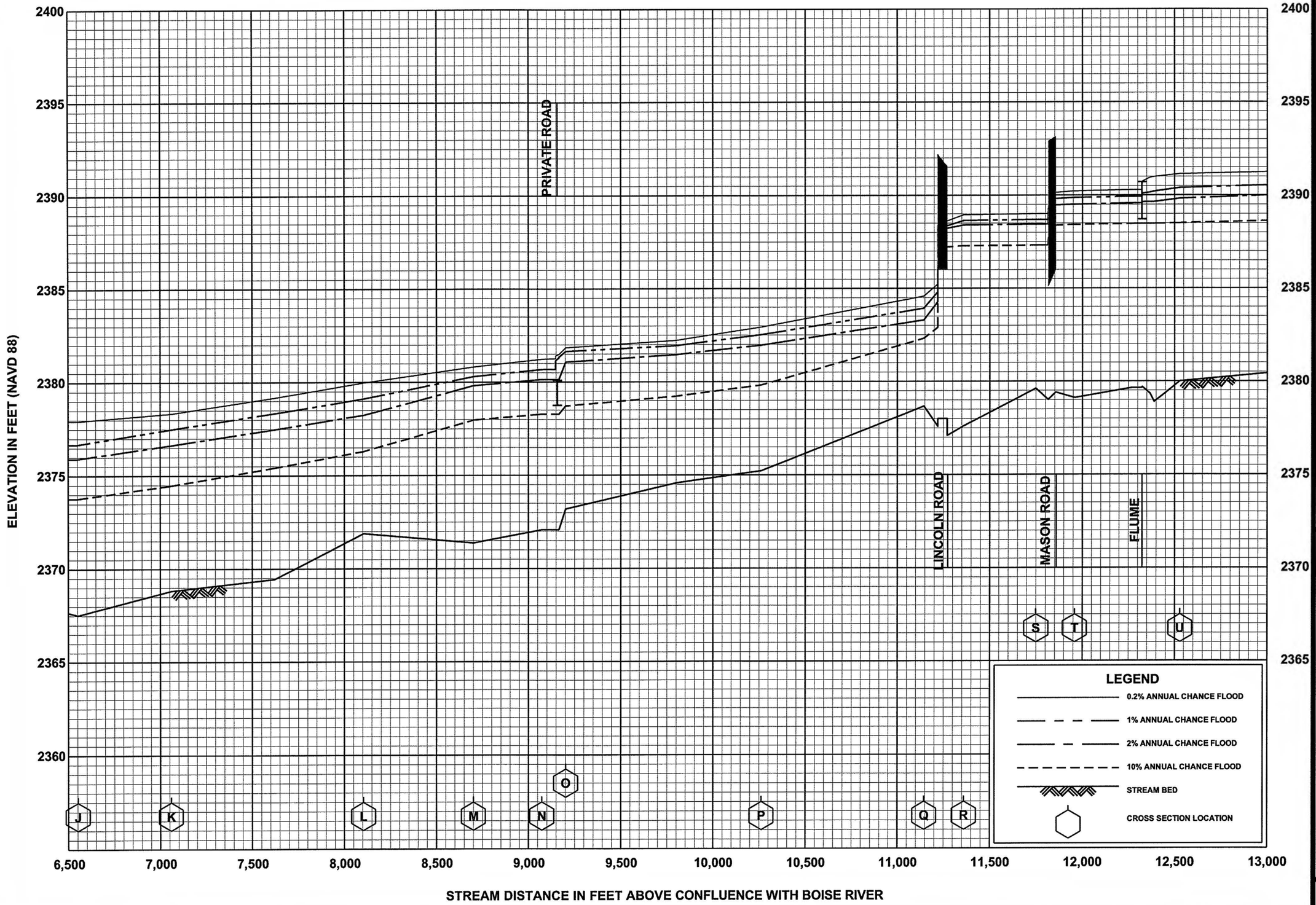

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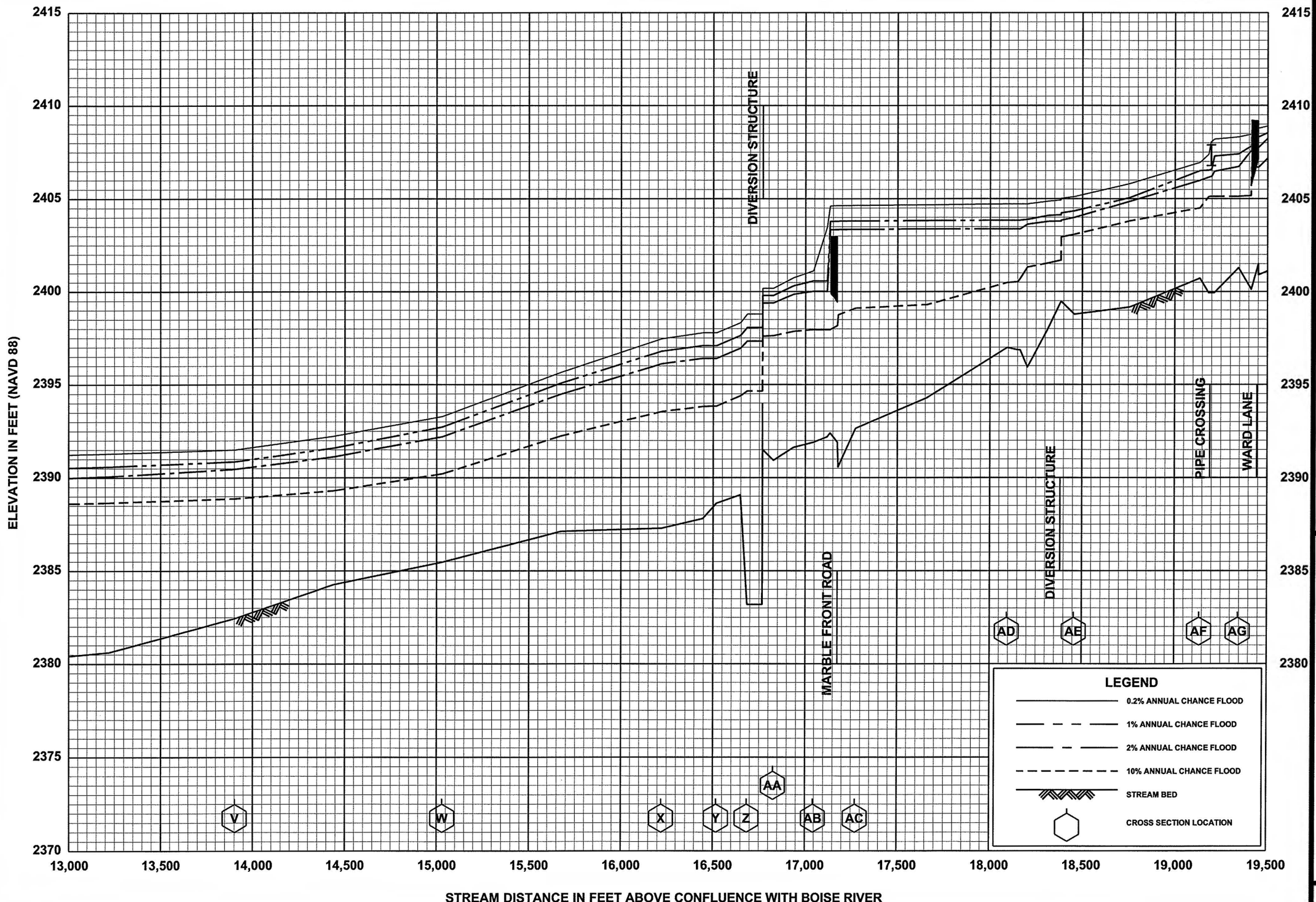

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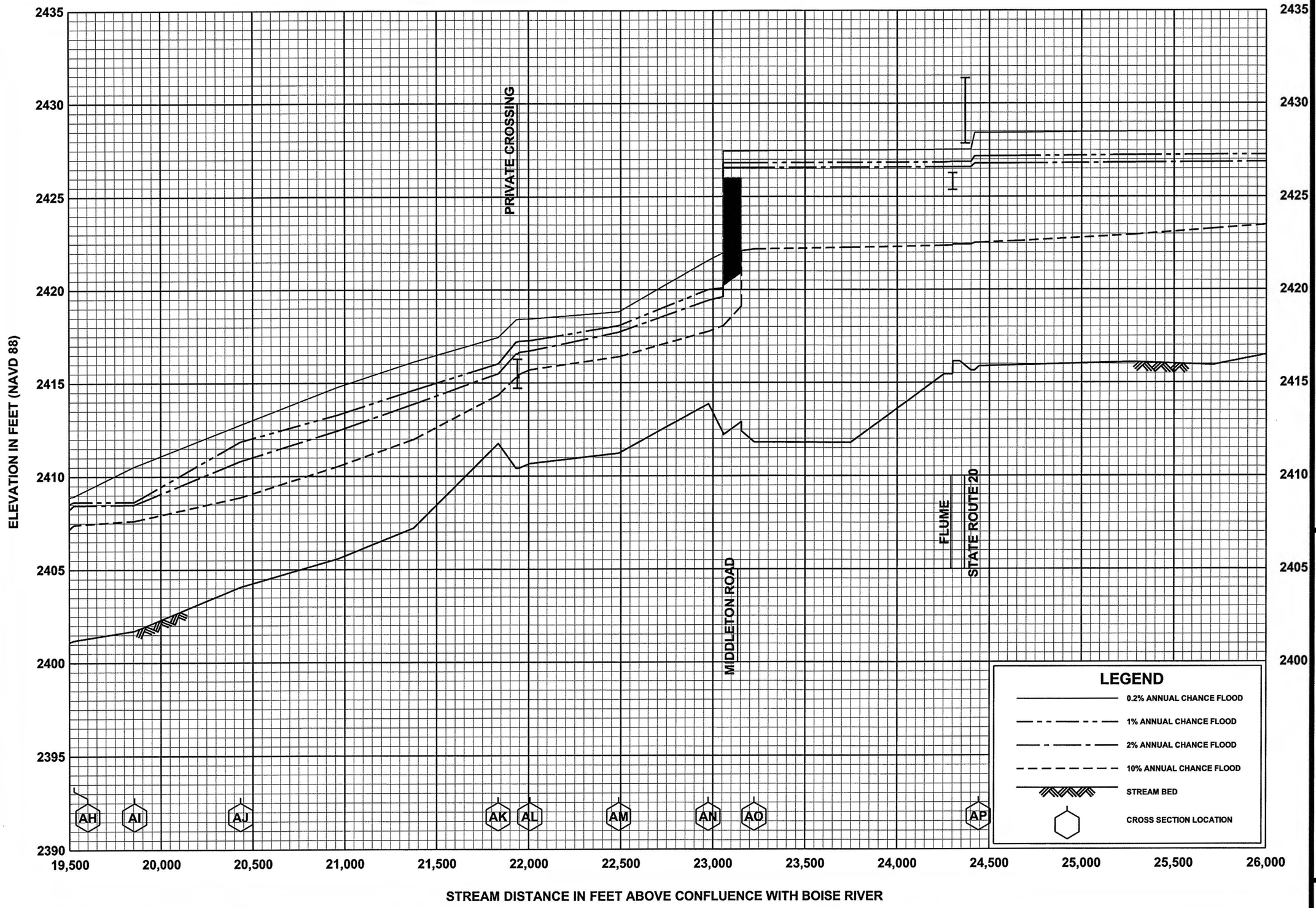

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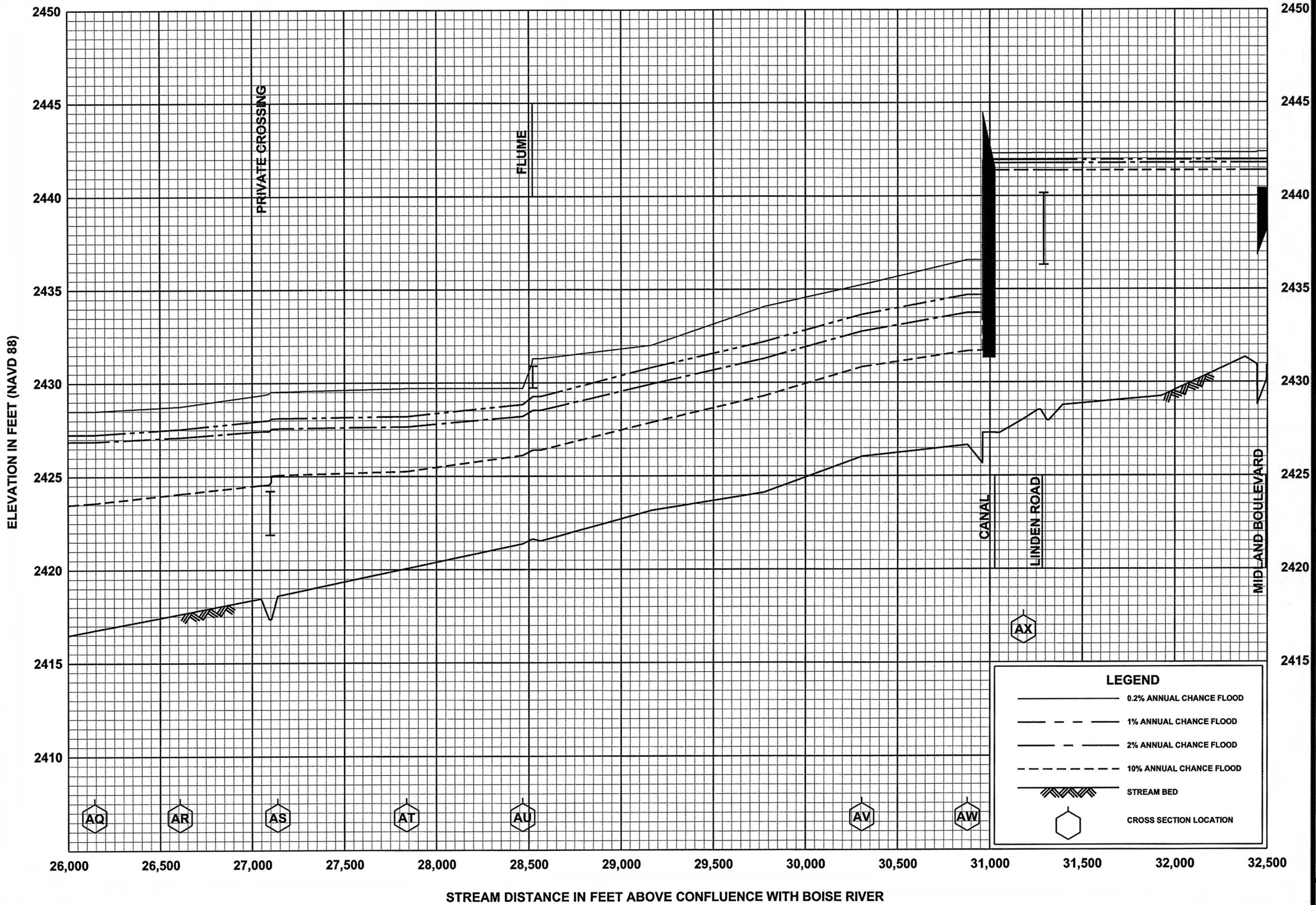

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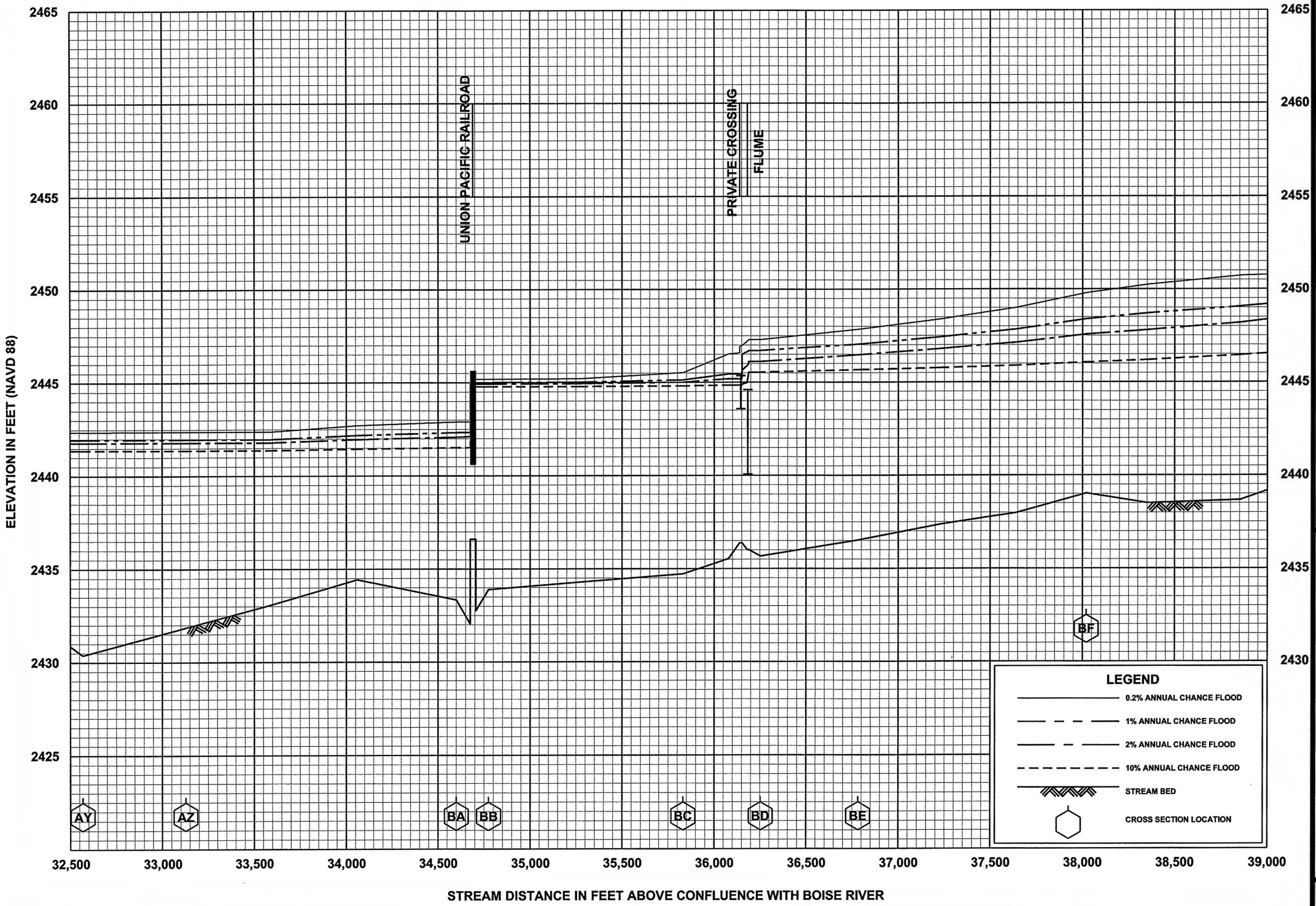

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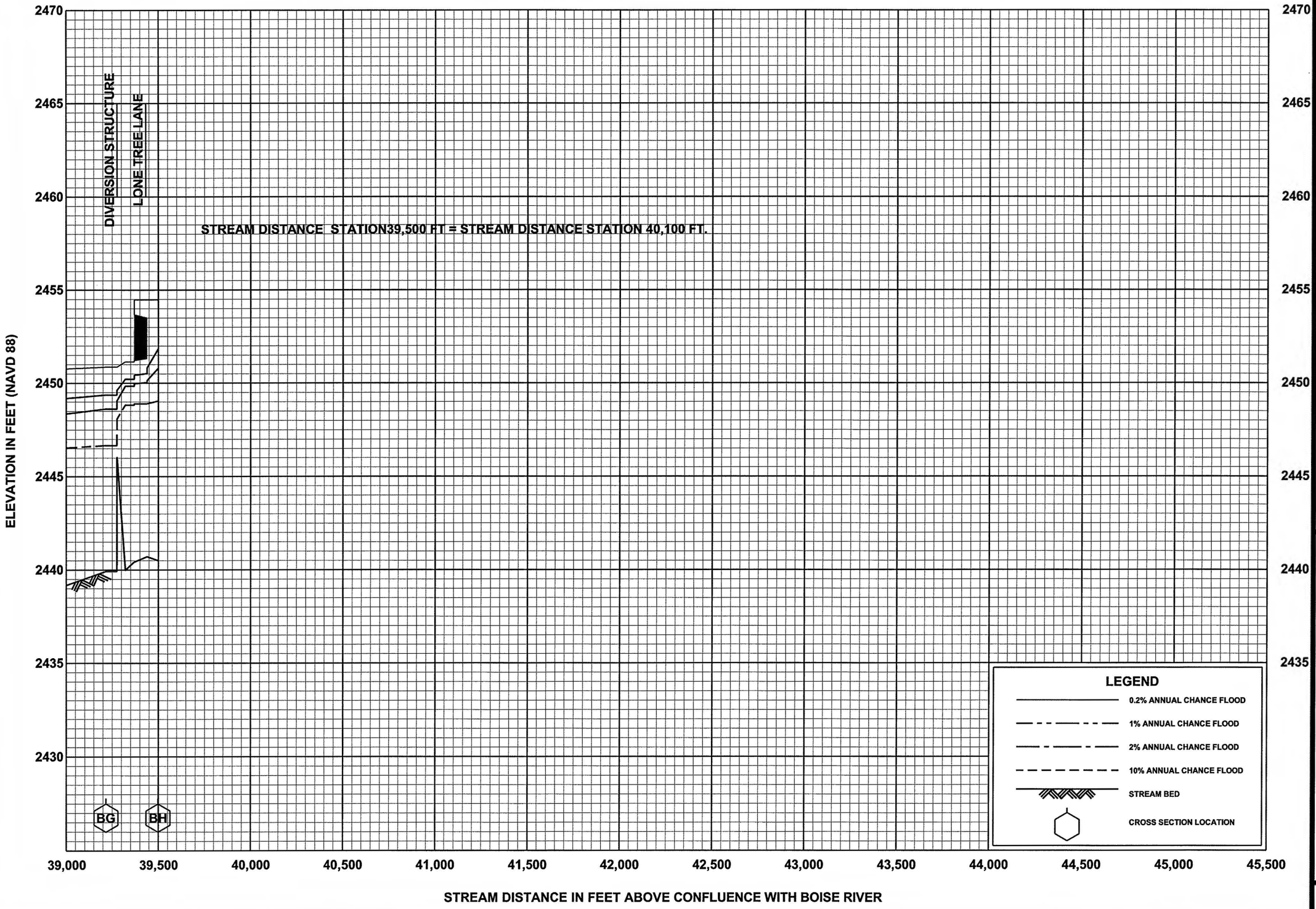

FLOOD PROFILES

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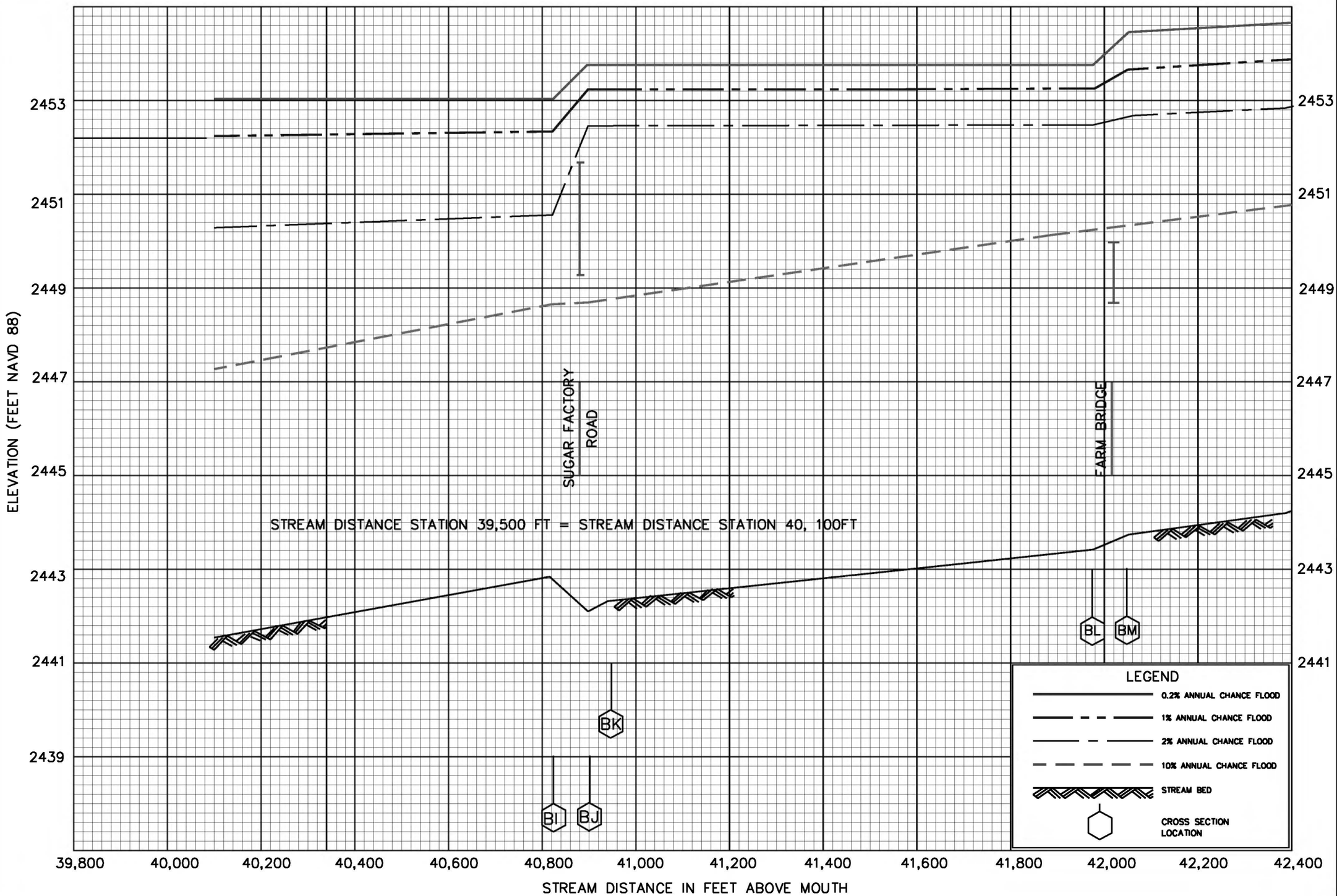

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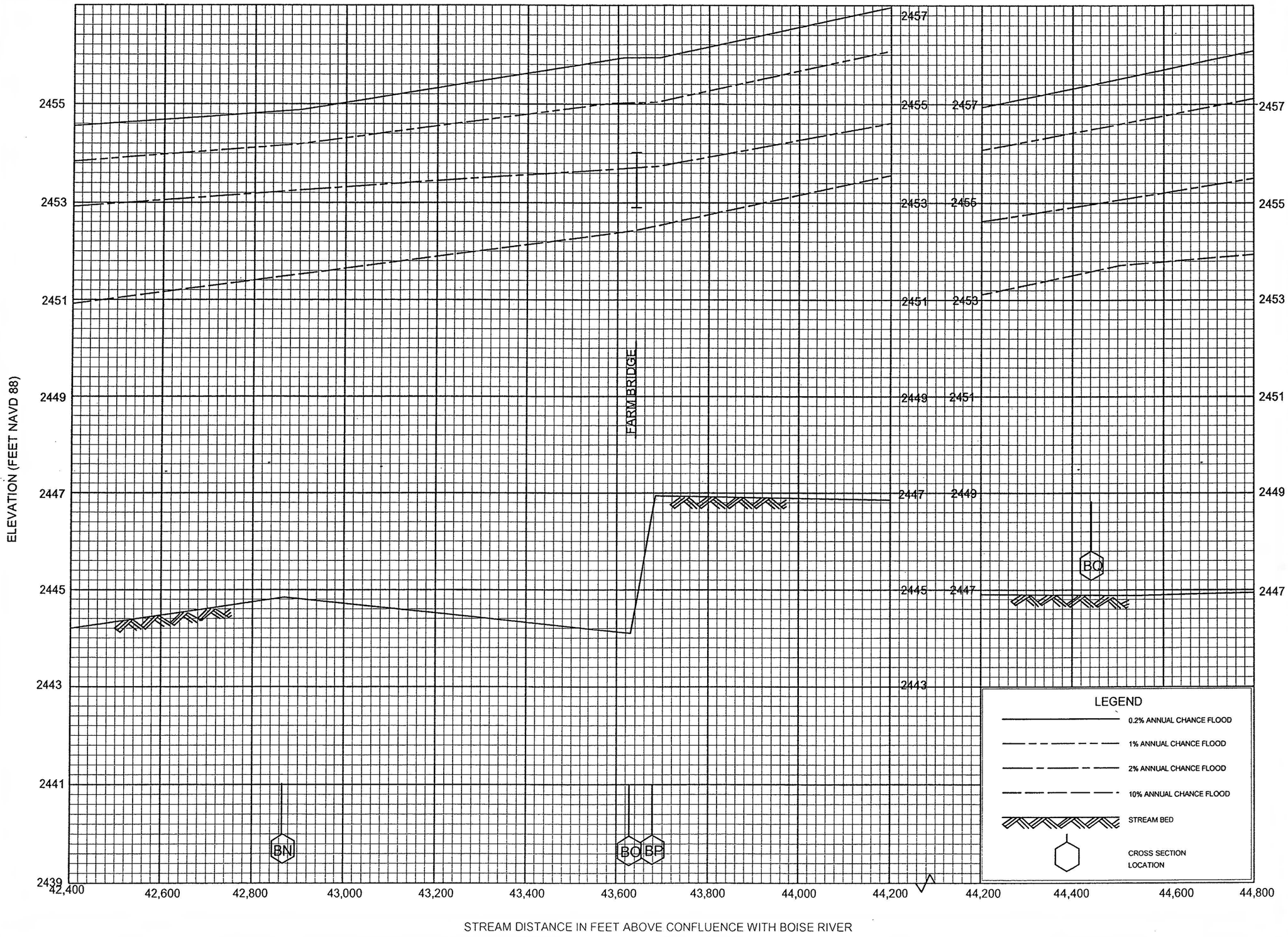

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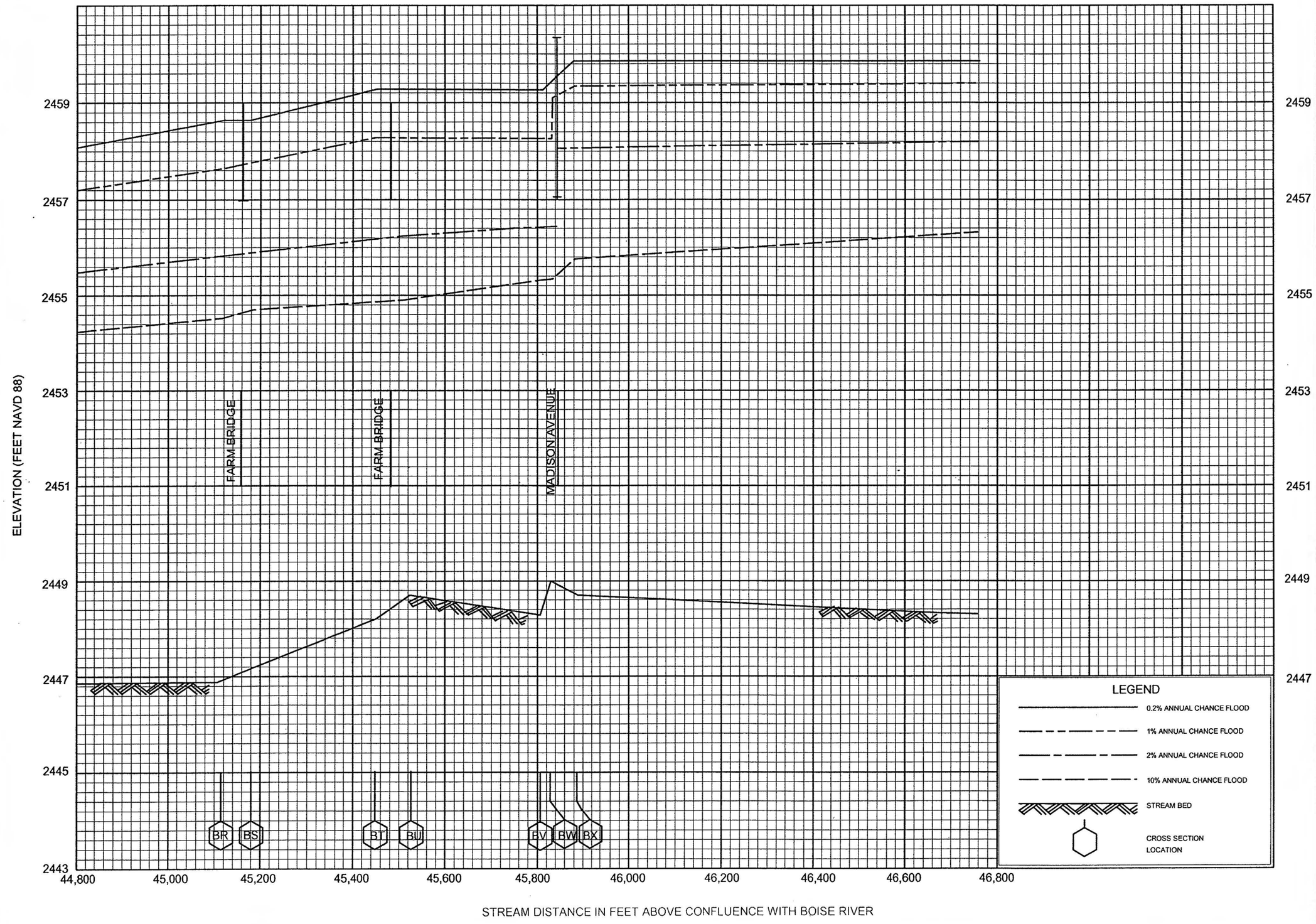
AND INCORPORATED AREAS



FLOOD PROFILES

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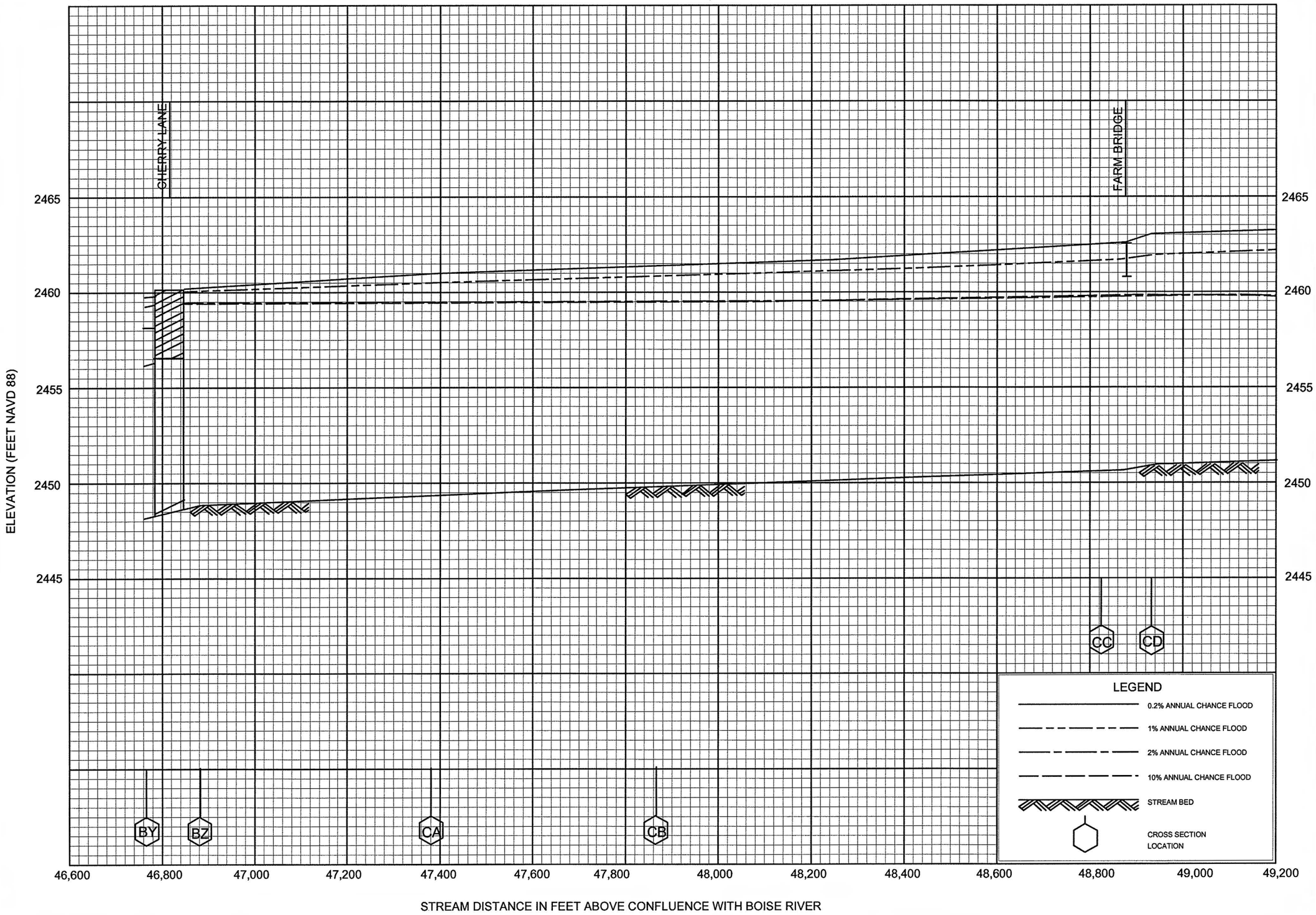

FLOOD PROFILES

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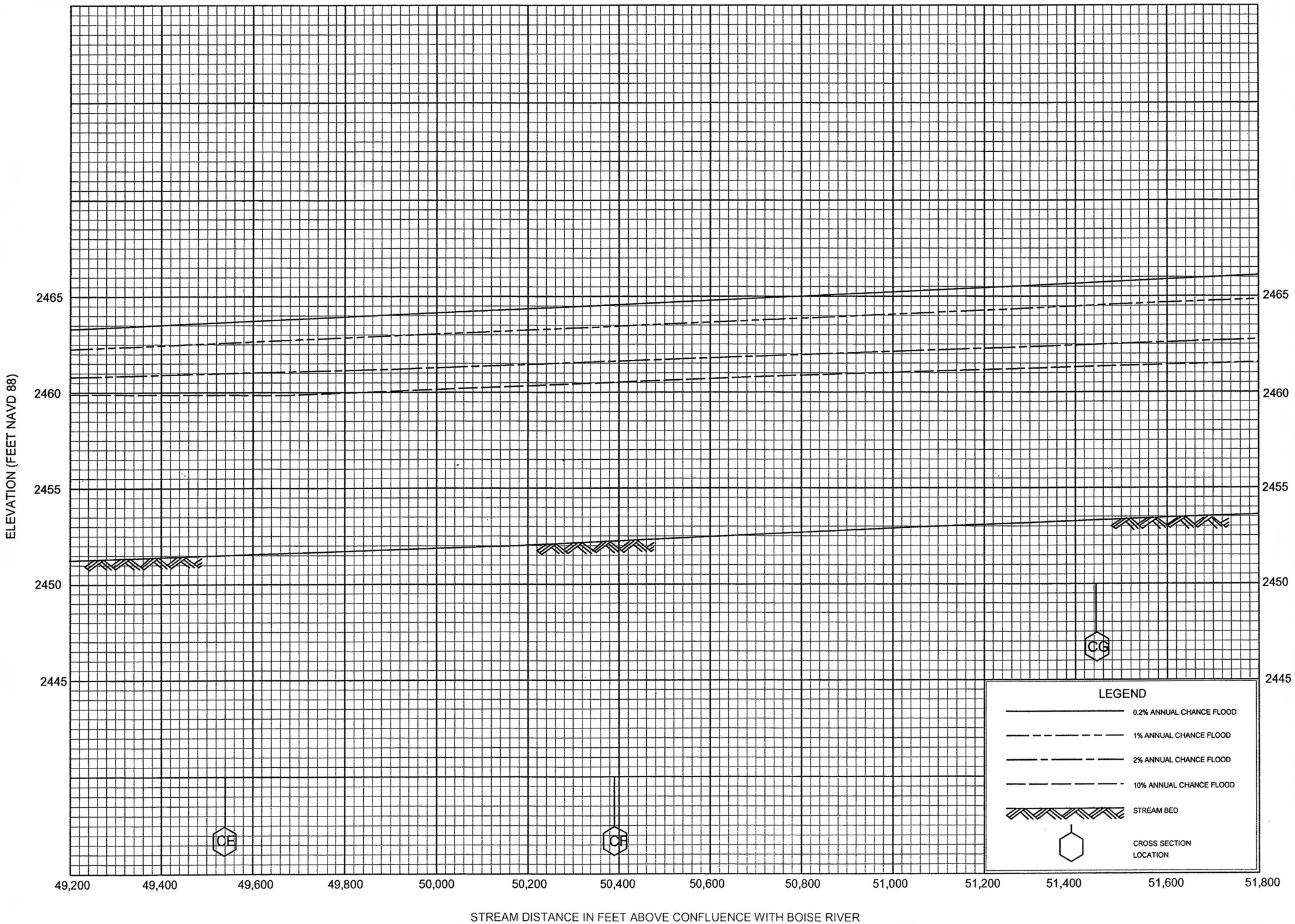

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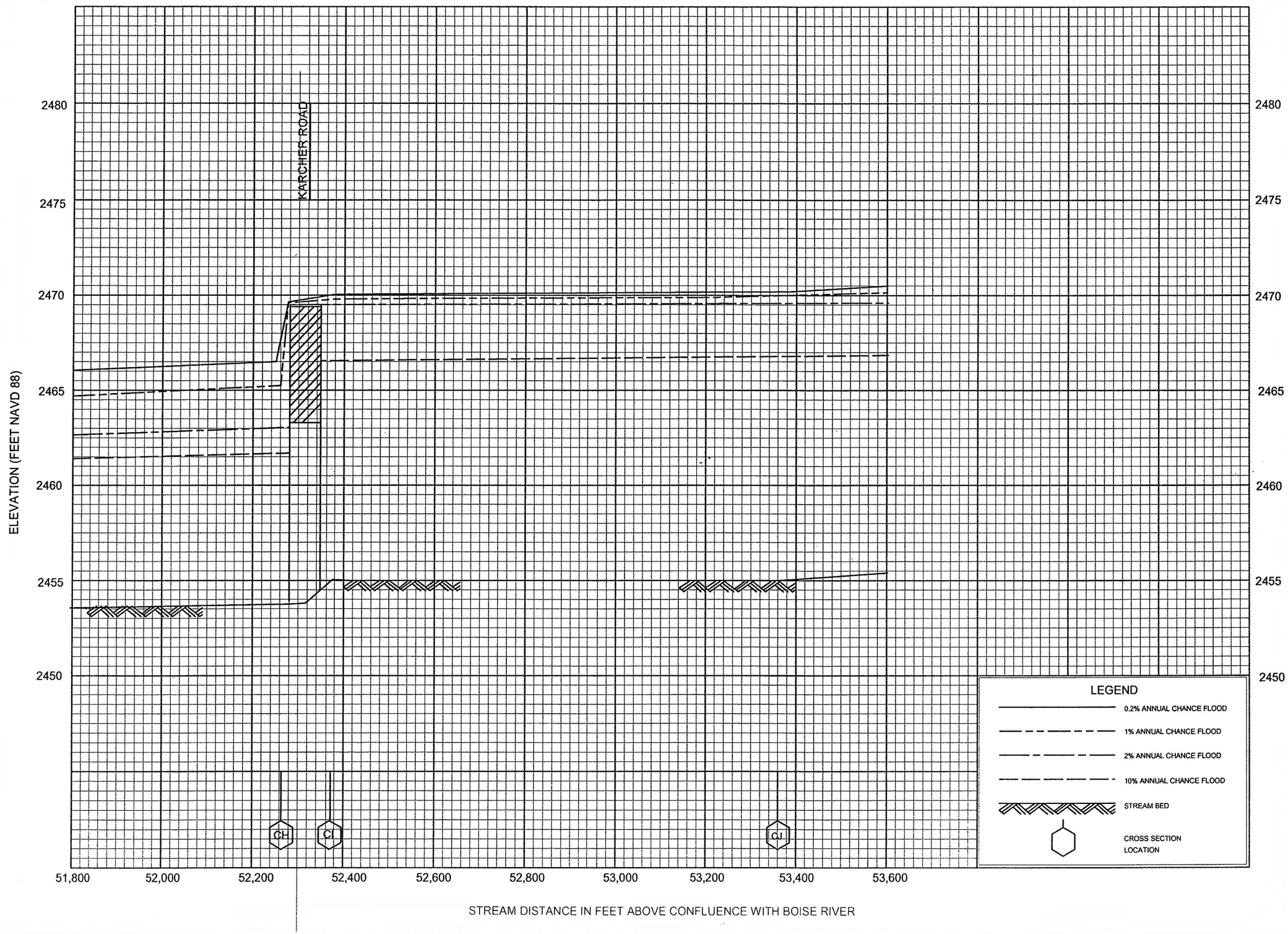

FLOOD PROFILES

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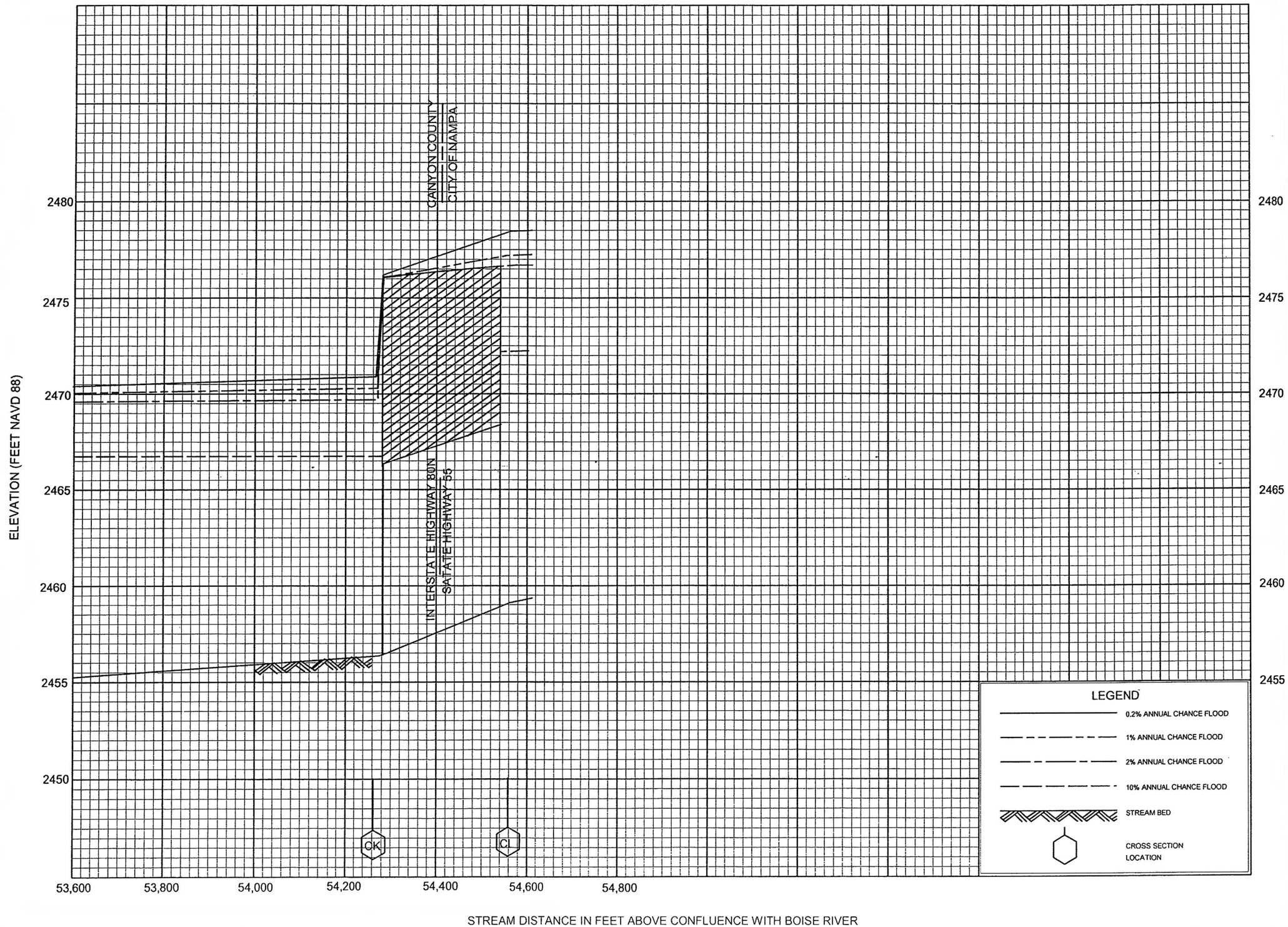

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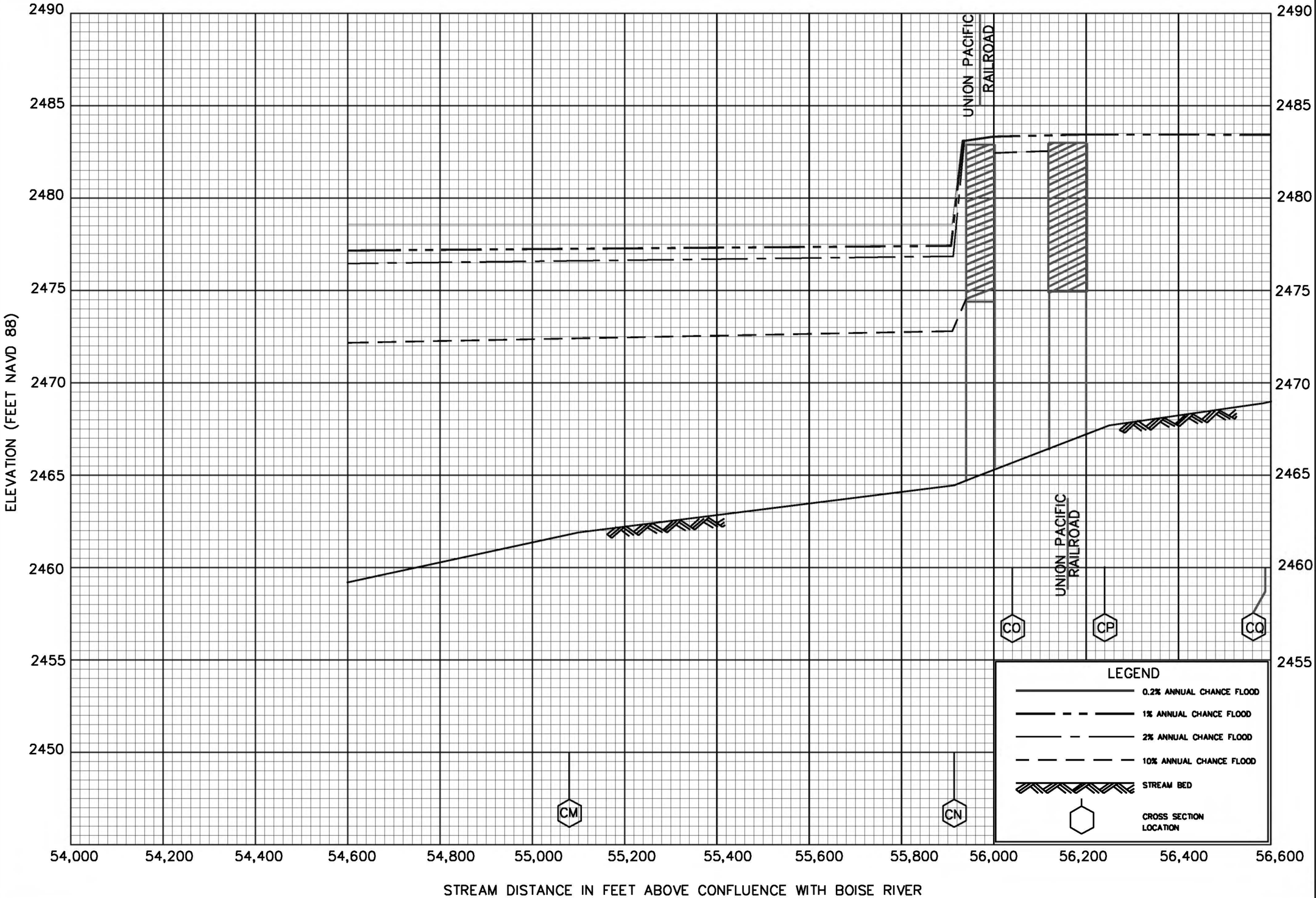

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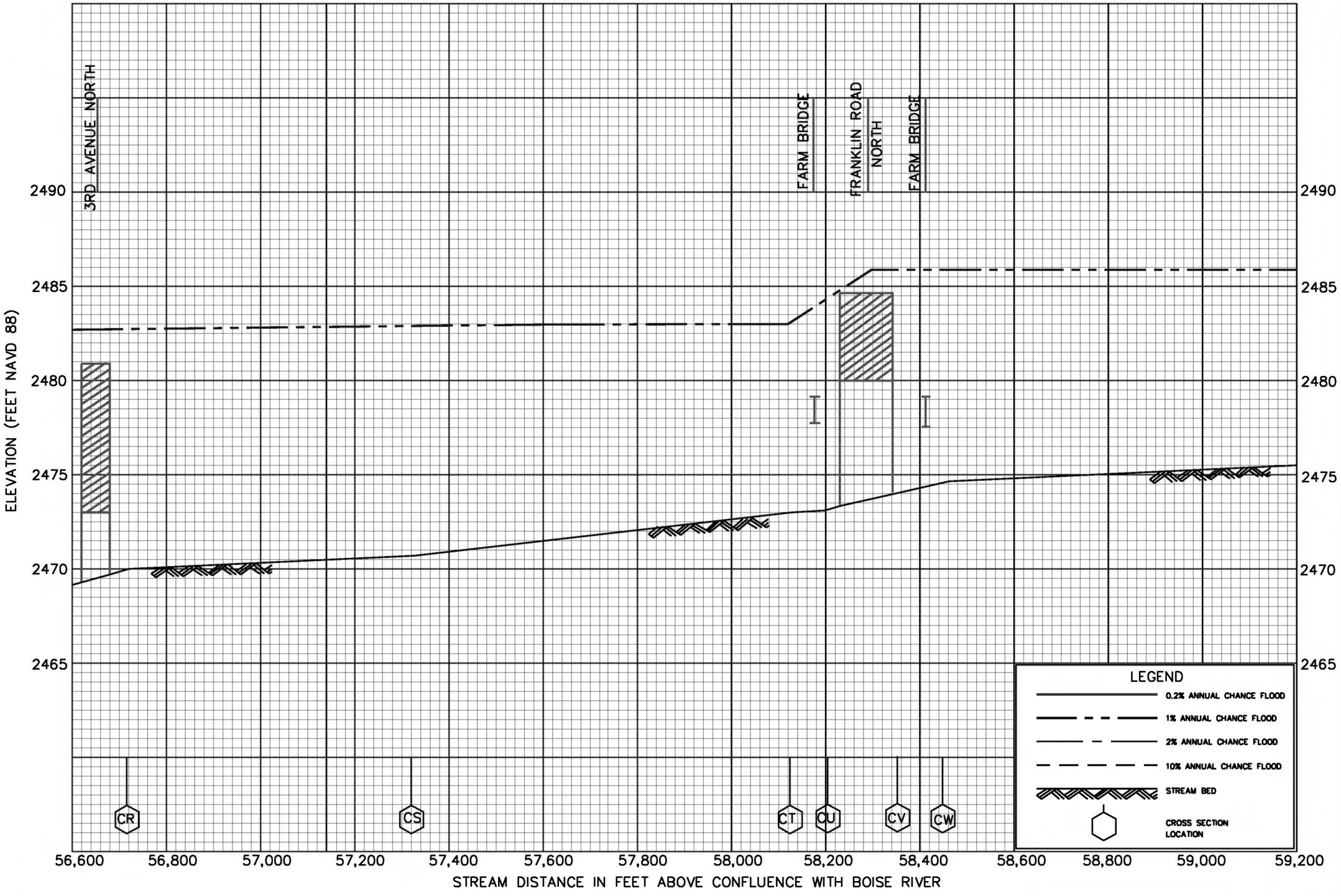

FLOOD PROFILES

MASON CREEK

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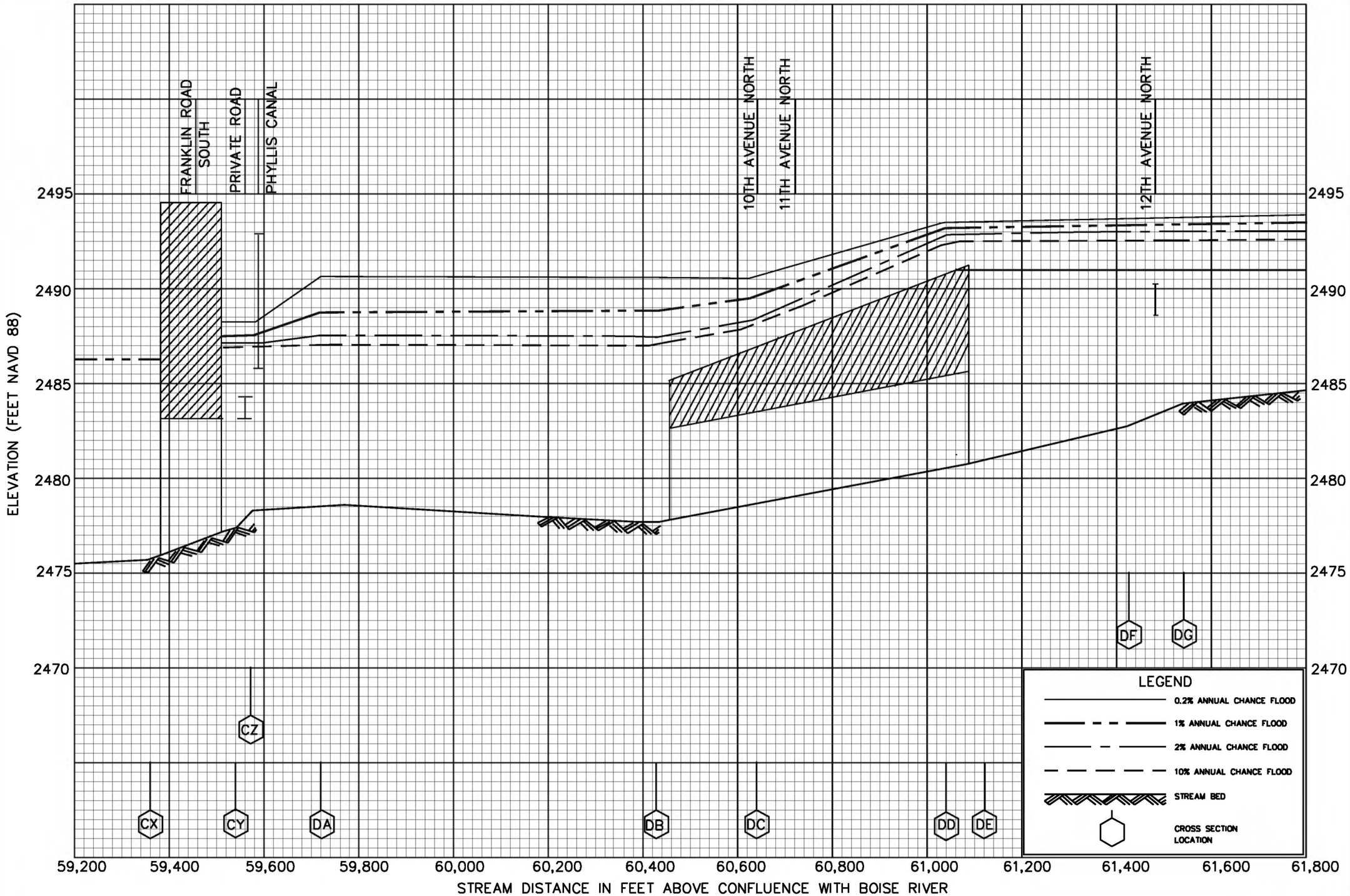

FLOOD PROFILES

MASON CREEK

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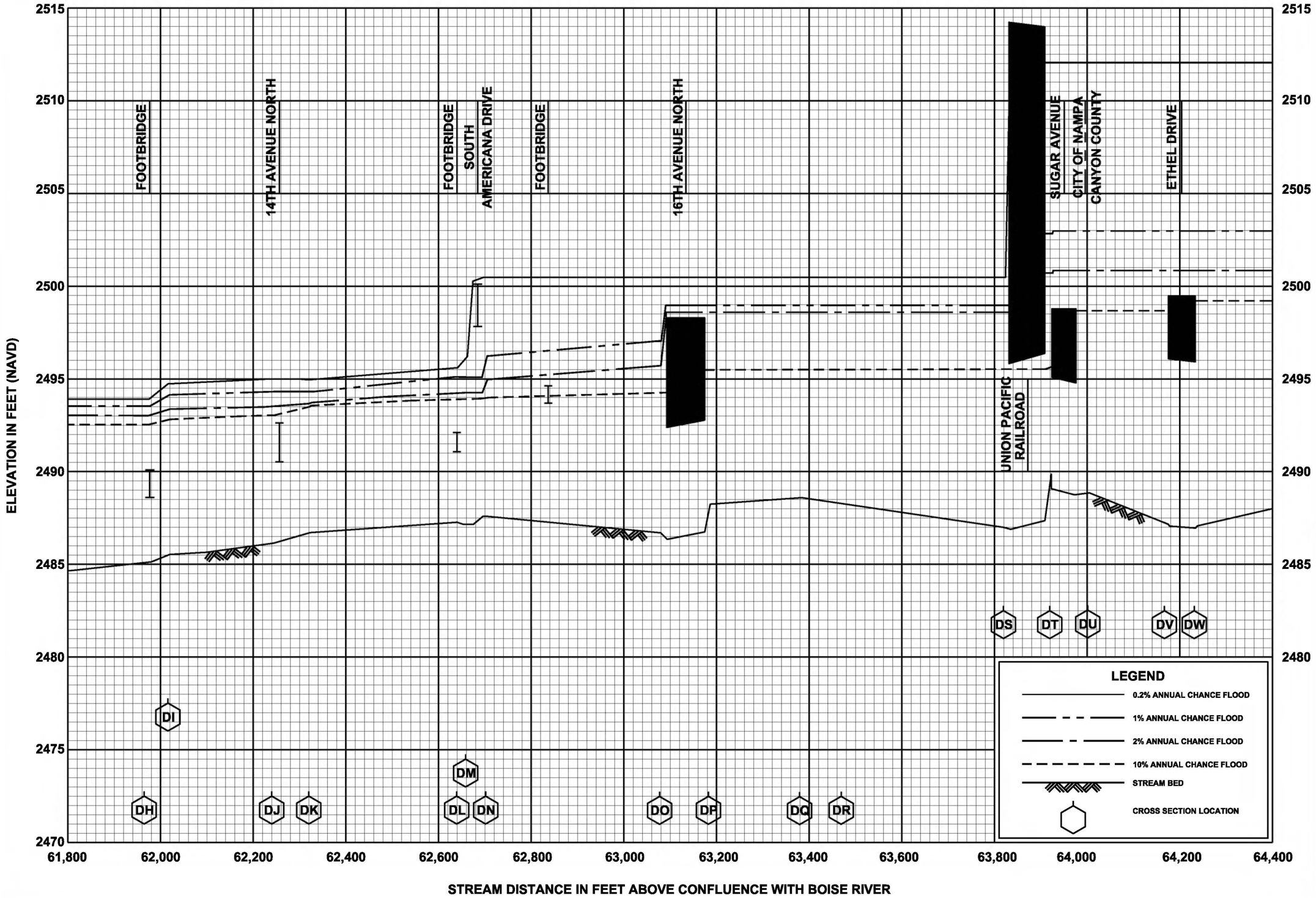
AND INCORPORATED AREAS



FLOOD PROFILES

MASON CREEK

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CANYON COUNTY, ID

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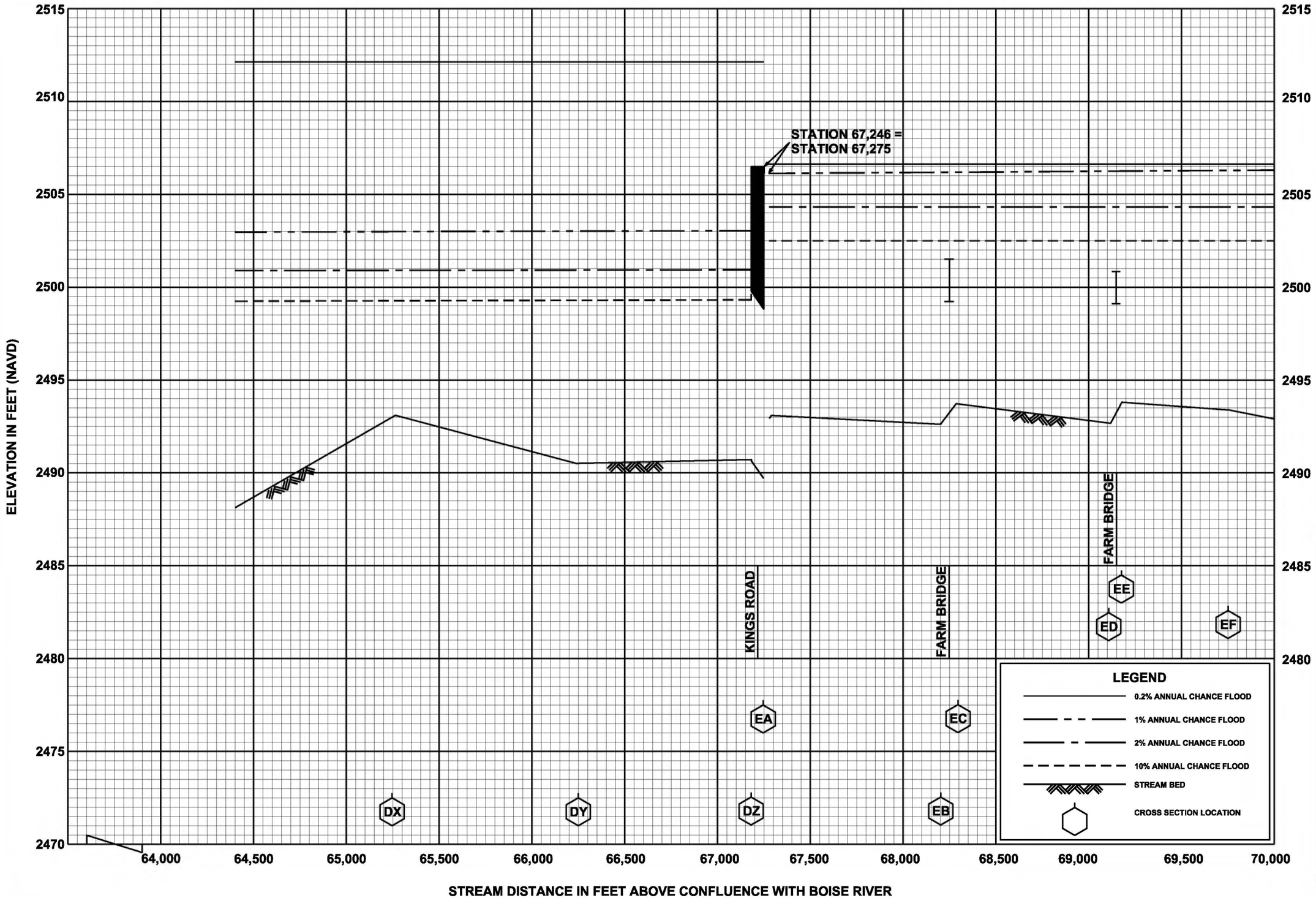

FLOOD PROFILES

MASON CREEK

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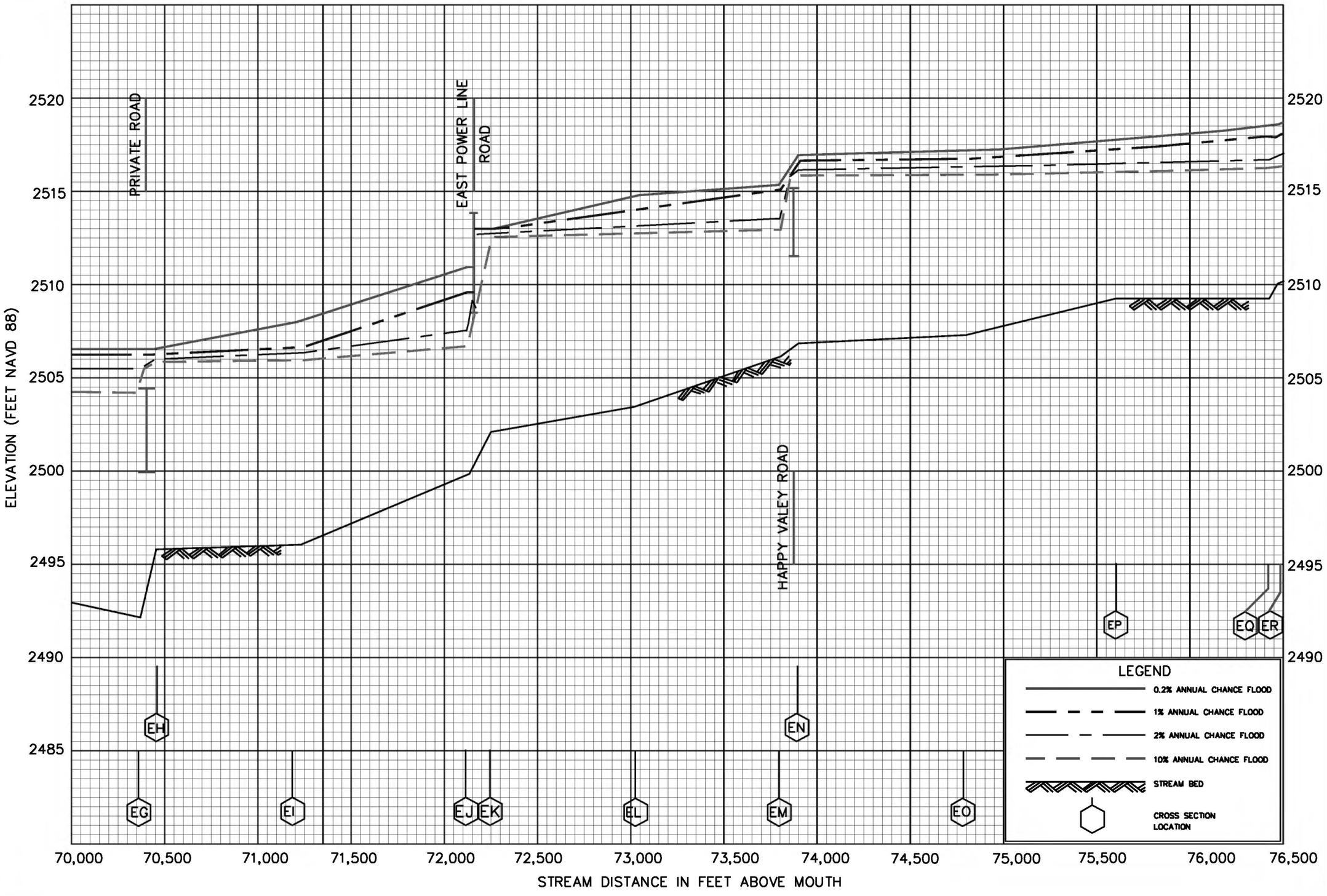

FLOOD PROFILES

MASON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

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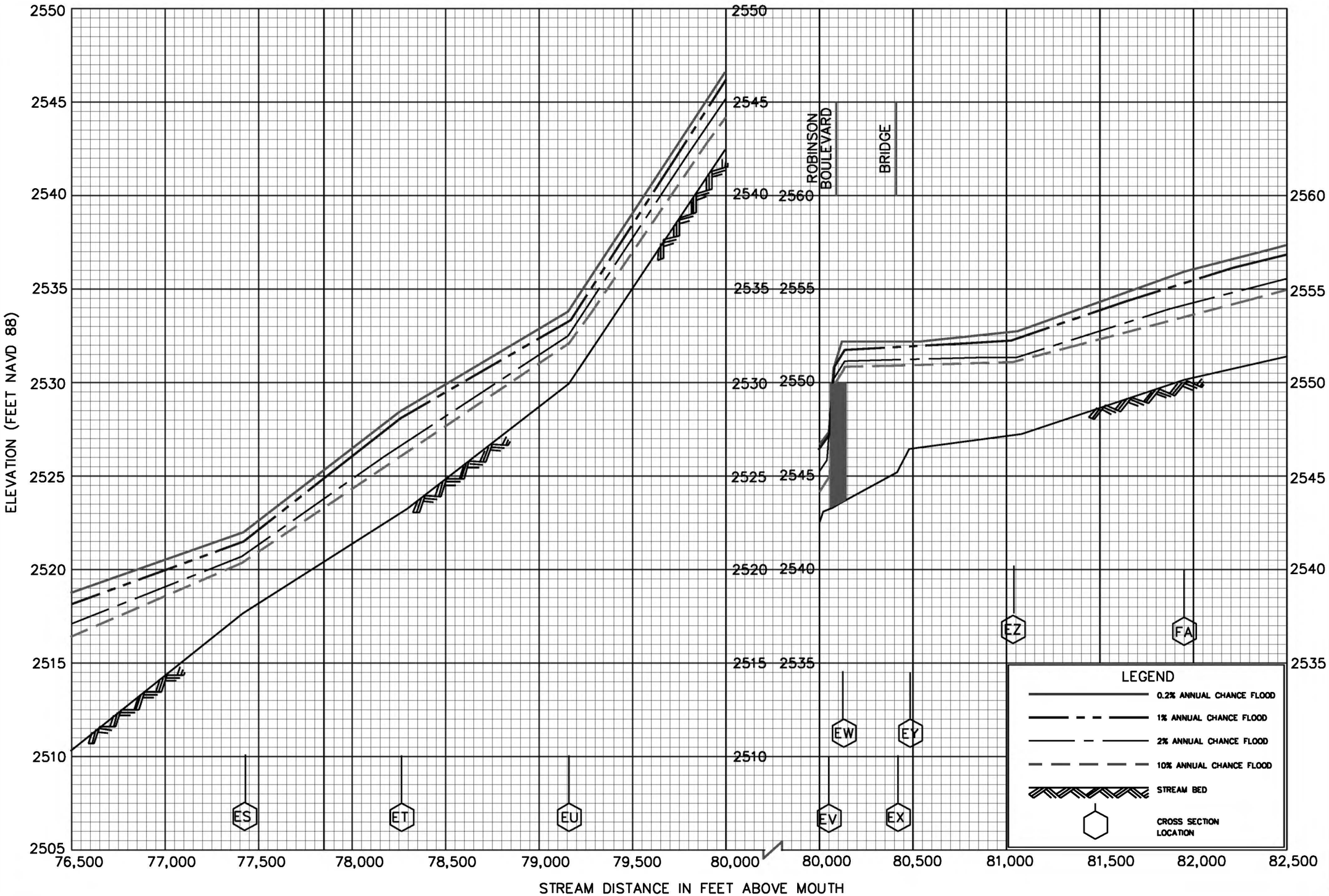

FLOOD PROFILES

MASON CREEK

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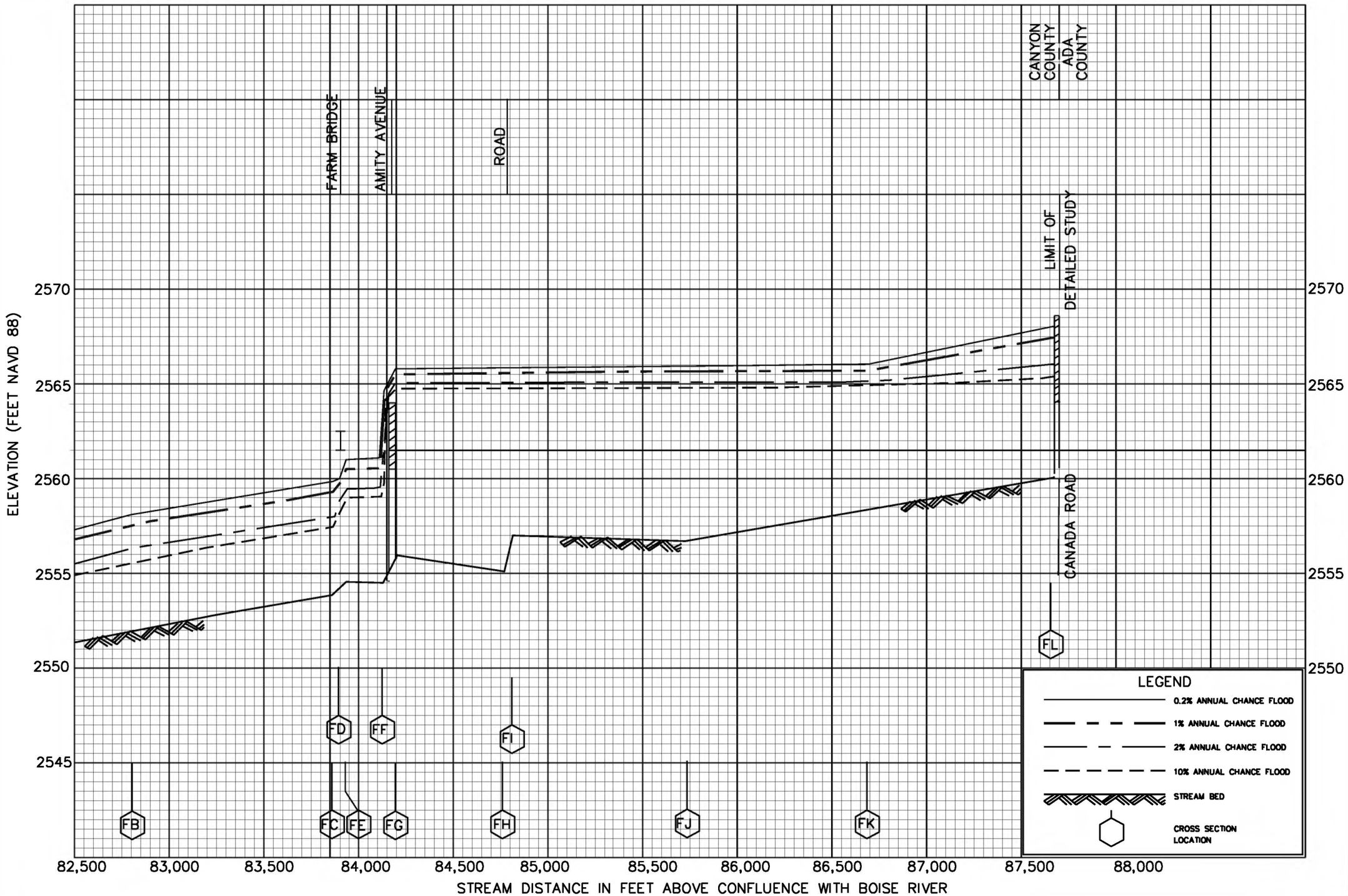

FLOOD PROFILES

MASON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

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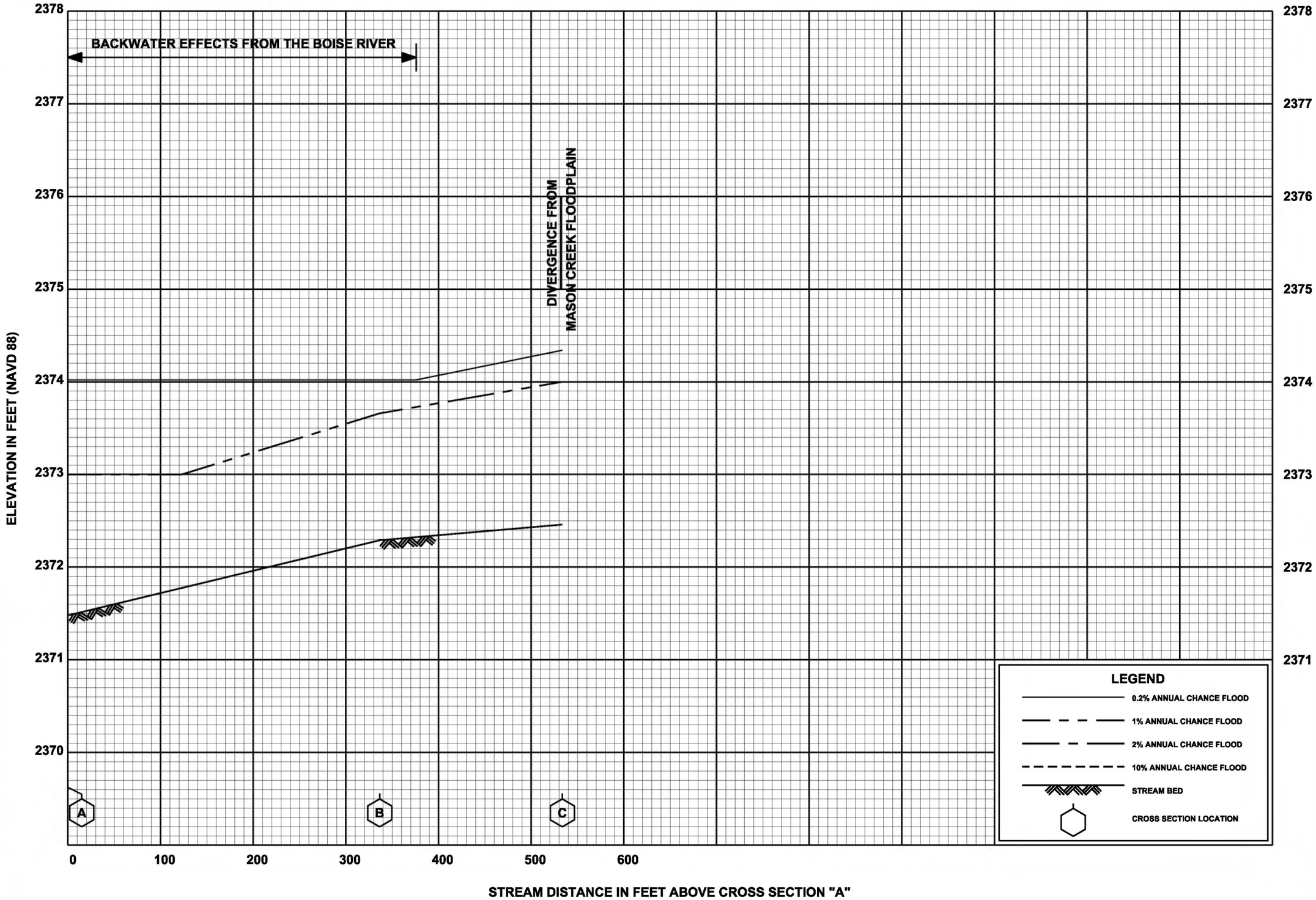

FLOOD PROFILES

MASON CREEK OVERFLOW TO BOISE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CANYON COUNTY, ID

AND INCORPORATED AREAS

Quadrant Consulting, Inc.

Appendix D

Revised Hydrologic Analysis
For Indian Creek and Mason Creek Flood Insurance Study
Canyon County, Idaho
WEST Consultants, Inc.
November 15, 2005

Appendix D
Revised Hydrologic Analysis for Indian Creek and Mason Creek
Flood Insurance Study, Canyon County, Idaho
WEST Consultants, Inc.
November 15, 2005

Below is a brief summary of the revised hydrologic analysis since the September 9, 2005 conference call. The revised analysis addresses the following three questions:

- Does the Indian Creek Reservoir have significant effects on flood discharges?
- What are the more reasonable regression equations to use?
- What is the flow capacity of the New York Canal (NYC) below the Indian Creek Diversion?

ORCHARD DAM/INDIAN CREEK RESERVOIR

Orchard Dam is located in Section 30, Township 1 North, Range 4 East, about 22 miles east of the City of Kuna, Idaho on Indian Creek. The contributing drainage area to Indian Creek Reservoir is about 51 square miles. The basins are at high elevations on the hilly east-west ridge at the source of Indian Creek. In our and COE's previous hydrology analyses for frequency flows for lower Indian Creek, the reservoir's storage was ignored. However, the Idaho Department of Water Resources (IDWR) pointed out that the Indian Creek reservoir's storage capacity would have a considerable attenuation effect on the peak flow from the upper Indian Creek drainage (Steve Burrell 2005). The Boise Project Board of Control (Paul DeVeau, project manager, personal communication on September 19, 2005) also mentioned that Indian Creek Reservoir might have some effects on flood flow through the reservoir. In this revised hydrology analysis, background information and data on the reservoir's storage were collected to evaluate whether or not Indian Creek Reservoir can significantly attenuate the flood discharges. The following people were contacted and they are extremely helpful in providing relevant information on Orchard Dam:

Jerry Deal, Wildlife Habitat Manager, Idaho Department of Fish and Game
Phil Jeppson, Engineering Bureau Chief, Idaho Department of Fish and Game
Mike Stubblefield, Idaho Department of Water Resources

Orchard Dam is owned by the Idaho Department of Fish and Game. There is not much information and documentation on the dam since it was originally built between 1892 and 1902. The Idaho Department of Water Resources inspected the dam in the early 1980's and produced a detailed inspection report (IDWR 1983). In their evaluation, some routings of major floods (the probable maximum flood (PMF), the half-PMF, and the 100-year) were conducted based on information taken off USGS quadrangle maps.

The flood routings indicated that little attenuation would occur during major runoff events. Figure 1 shows the inflow and outflow hydrographs for the 100-year flood. The peak inflow is 1,080 cfs and the peak discharge through the emergency spillway is 966 cfs. The peak inflow is only reduced by about 10%.

The dam has a low level outlet. It is a gated 24-inch steel pipe with an estimated flow capacity of approximately 25 cfs. The outlet has had limited use over the past 100 years because the Department of Fish and Game maintains the reservoir at the highest level possible for fish propagation, wildlife habitat, and recreation. Under normal conditions, because Indian Creek is an intermittent stream and because of leakage through the dam and reservoir, the reservoir normally draws down naturally over the course of the summer months. During a flood event, typically in winter, the reservoir may provide some attenuation to the flood. However, in very wet years, it is possible that the reservoir may be full to the emergency spillway crest at the time a flood occurs. Under this condition, what flows into the reservoir essentially flows out through the spillway. For this reason, the IDWR 1983 flood studies assumed a full reservoir to the spillway crest storage as the initial condition in the flood routing.

Based on the typical dam operation and IDWR's flood routing results, it appears that Indian Creek Reservoir does not have a significant effect on flow attenuation of flood discharges. Neglecting the reservoir's capacity in the hydrology analysis for lower Indian Creek seems reasonable.

REGRESSION ANALYSIS

During the September 9, 2005 conference call, a recommendation was made to identify stations with the mean annual precipitation (MAP) between 10 to 12 inches from all stations in USGS Water Supply Paper (WSP) 2433 (Thomas et al. 1995) and to evaluate if there is any trend such that the WSP 2433 Region 2 regression equations can be refined to fit the stations with 10-12 inches of MAP. Figure 2 shows the relationship between the drainage area and the 100-year discharges, which were taken from WSP 2433. All stations for which a flood relation was undefined in WSP 2433 are not included. There are a total of 23 stations with the mean annual precipitation between 10 and 12 inches. Unfortunately, the stations with 10-12 inches precipitation are as scattered as the entire stations, and no clear band or trend can be identified. In addition, the majority of these stations with 10-12 MAP are located on basins higher than 5,500 feet, which is not representative of conditions for Indian and Mason Creeks.

In this revised analysis, a second approach was used to select stations. From all stations within WSP 2433 Region 2 for which a flood relation was defined, only stations with the mean basin elevations lower than 5,500 feet and mean annual precipitation less than 15 inches were selected. There are a total of 9 stations that meet the two selection criteria. Table 1 lists the details for these stations. Figure 3 shows their geographic locations. All stations except for station 10353500 are close to the Mason Creek and Indian Creek basins.

Station 13172200 was not included in the regression analysis because all major flood peaks at this station occurred in summer months likely due to thunderstorms. For Indian and Mason Creeks, the primary cause of large floods is snowmelt and rain in winter months and in early spring. All major floods at the other 8 stations occurred between January and early April. Station 10353500 was also not included in the analysis since the USGS peak streamflow record indicates that the discharge at this station is affected to an unknown degree by regulation or diversion. In addition, this station seems too far away from the study basins.

Figure 4 shows the flood relationship for the selected 7 stations and other stations in Region 2. Apparently, the WSP Region 2 equation does not reasonably fit the subset of 7 stations. A new set of regional regression equations needs to be developed. The regression equations for the 10-, 50-, and 100-year discharges using the drainage area and mean annual precipitation as two independent variables are as follows:

$$Q_{10} = 183484.8 A^{0.5269} P^{-3.2241} \quad (1)$$

$$Q_{50} = 104881.8 A^{0.5420} P^{-2.7070} \quad (2)$$

$$Q_{100} = 90907.6 A^{0.5487} P^{-2.5477} \quad (3)$$

where A is the drainage area in square miles and P is the mean annual precipitation in inches.

Equations (1)-(3) do seem not reasonable. The coefficients are large because of the large negative exponent of the mean annual precipitation. Therefore, the final regression equations only use the drainage area as the independent variable. The regression equations become:

$$Q_{10} = 64.72 A^{0.4758} \quad (4)$$

$$Q_{50} = 132.37 A^{0.4991} \quad (5)$$

$$Q_{100} = 169.91 A^{0.5083} \quad (6)$$

APPLICATION TO MASON AND INDIAN CREEKS

Mason Creek

For Mason Creek, the estimation of flood discharges using Equations (4) to (6) is straightforward. The proposed and effective discharges are shown in Table 2. The proposed 100-year discharge for Mason Creek above Purdam Gulch is about 49% smaller than the effective discharge.

Indian Creek

For Indian Creek, the discharges for the area upstream of the New York Canal are calculated using Equations (4) to (6) (Table 3). However, the determination of the flood discharges for lower Indian Creek (the studied reach) must consider the interaction between Indian Creek and the New York Canal.

General Description of New York Canal

The New York Canal is a Bureau of Reclamation project, operated by the Boise Project Board of Control. It starts from the Boise River just below the Lucky Peak Project. To the south of Eager Road and Kuna Road (Figure 5), the NYC splits to Mora Canal and New York Canal. About ¼ mile west of Eager Road, North Indian Creek and the New York Canal join together to become one single channel. About 2 miles downstream, Indian Creek has a confluence with the New York Canal. The NYC/Indian Creek run through the City of Kuna along a railroad track. Near Columbia Road, the New York Canal and Indian Creek split. Indian Creek goes north and the New York Canal runs west. There are Calopy gates in the canal that can be used to control the

flow in the canal (Figure 6). Flow through lower Indian Creek is controlled by gates and spillway.

Flood Control Benefit

If the canal is in use, the amount of flow in the canal at the location where North Indian Creek and the New York Canal join together is maintained at 1,000 cfs or less. In the event of a flood in the upper Indian Creek basin, which is typically in January, February, and March, there may already be a significant amount of water (up to 1,000 cfs) in the canal, transferred from the upper end of the canal. The full capacity of the canal may be not available. For this reason, a conclusion was made during the September 9, 2005 conference call that the New York Canal **at the Indian Creek/NYC confluence area** would not provide a flood control benefit and it would be reasonable to assume that the flow in the canal from the upper New York Canal is 1,000 cfs in the event of a flood in upper Indian Creek. The flood discharges for the joint portion of the New York Canal and Indian Creek near Kuna are combined flow from upper Indian Creek and from the upper canal (which is 1,000 cfs) (Table 3).

NYC/Indian Creek Diversion

In the vicinity of the NYC/Indian Creek Diversion (Figure 6), the amount of flow split into lower Indian Creek and flow remaining in the canal and further traveling downstream towards Lake Lowell is controlled by the configuration of the channel and structures and the operation of the gates. Under the normal operation, the Calopy gates are fully open and the lateral gates to lower Indian Creek are closed. The Boise Project Board of Control has indicated that they will not change their current operations during a flood of upper Indian Creek (personal communication with Paul DeVeau of the Boise Project Board of Control on September 19, 2005). The HEC-RAS model developed by Tracy Schwarz of USACE for modeling split flow in the vicinity of the NYC/Indian Creek Diversion area shows that the New York Canal at this location can accommodate large flow under the normal operations of gates. The flow starts to split to lower Indian Creek only when the upstream inflow reaches at approximately 3,600 cfs. Because the 10- and 50-year discharges for the combined channel of Indian Creek and the New York Canal are all less than 3,600 cfs, there is no flow entering lower Indian Creek. For the 100-year discharge, the HEC-RAS model shows that only 83 cfs splits into lower Indian Creek. The remaining key question is the flow capacity of the New York Canal downstream of the NYC/Indian Creek Diversion. Can it carry the remaining discharge of 3,875 cfs (for the 100-year flood) throughout this lower end of the canal to Lake Lowell?

New York Canal below Indian Creek

The Boise Project Board of Control indicates that the canal has one restriction near State Highway 45 (labeled as Point A in Figure 7). At this location, if the flow in the canal is 1,200 cfs, the water almost reaches the top of the canal bank (personal communication with Paul DeVeau of the Boise Project Board of Control on September 19, 2005). For the reach of the canal between the New York Canal/Indian Creek Diversion and Highway 45, at 1,200 cfs, the canal generally has a freeboard of 2-2.5 feet and, therefore, it probably can carry more than 1,200 cfs before flow overtops the bank. However, the design discharge for this section is 1,200 cfs. If the discharge is larger than 1,200 cfs, there is no guarantee that the canal will withstand the flow due to lack of sufficient freeboard or structural/geotechnical integrity or other activities since the canal in this reach is generally elevated. On the average, the top of canal is about 3 ft above the

ground. If there is breakout flow or overtopping flow between the New York Canal/Indian Creek Diversion and South Power Line Road (labeled as Point B in Figure 7), the water will generally flow northwesterly and join Indian Creek. Although the exact locations of potential breakout/overtopping cannot be readily determined without a detailed canal hydraulic analysis and risk assessment, it is possible that the breakout/overtopping flow may occur just downstream of the New York Canal/Indian Creek Diversion, creating a worst scenario for Indian Creek just downstream of the New York Canal Diversion.

In this revised hydrology analysis, it is assumed that the canal downstream of the New York Canal/Indian Creek Diversion can only carry 1,200 cfs towards Lake Lowell. Any flow in the canal in excess of 1,200 cfs will overtop and/or breakout to the left overbank of Indian Creek and flow along Indian Creek. Therefore, the flood discharges for lower Indian Creek just downstream of the New York Canal/Indian Creek Diversion is the combined flow in the joint channel of Indian Creek and the New York Canal minus 1,200 cfs (see Table 4).

For Indian Creek above and below Wilson Drain, which joins Indian Creek within the City of Caldwell, the discharges are calculated using Equations (4) to (6) and the combined equivalent drainage area for Indian Creek above the New York Canal and the local drainage area below the New York Canal/Indian Creek Diversion (Table 4). The equivalent area for the upstream Indian Creek basin was calculated using Equations (4) to (6) and the discharges for Indian Creek just below the New York Canal/Indian Creek Diversion (the first row in Table 4).

500-YEAR DISCHARGES

Because the 500-year discharges are not available in USGS WSP 2433, the proposed 500-year discharges for Mason and Indian Creeks were estimated by extrapolating the proposed 10-, 50-, and 100-year discharges. Extrapolation was done by plotting frequency flows on log-probability paper, fitting a straight line to the points plotted, and extrapolating the line to the 500-year discharge. A linear fitting is considered acceptable as the discharge and probability is closely correlated with R-square values close to 1.0. Table 5 shows the proposed 500-year discharges for Mason and Indian Creeks.

REFERENCES

Burrell, Steve (2005). “Comments on WEST Consultant’s Indian Creek FIS hydrology summary.” *Memorandum*, Idaho Department of Water Resources.

Idaho Department of Fish and Game (1983). *Detailed Inspection, Safety Evaluation Report, Orchard (Indian Creek) Dam, Inventory No. D63-4338*. Boise, ID.

Thomas, B.E., Hjalmarson, H.W., and Waltemeyer, S.D. (1995). *Methods for Estimating Magnitude and Frequency of Floods in the Southwestern United States*. U.S. Geological Survey Water-Supply Paper 2433, Denver, CO.

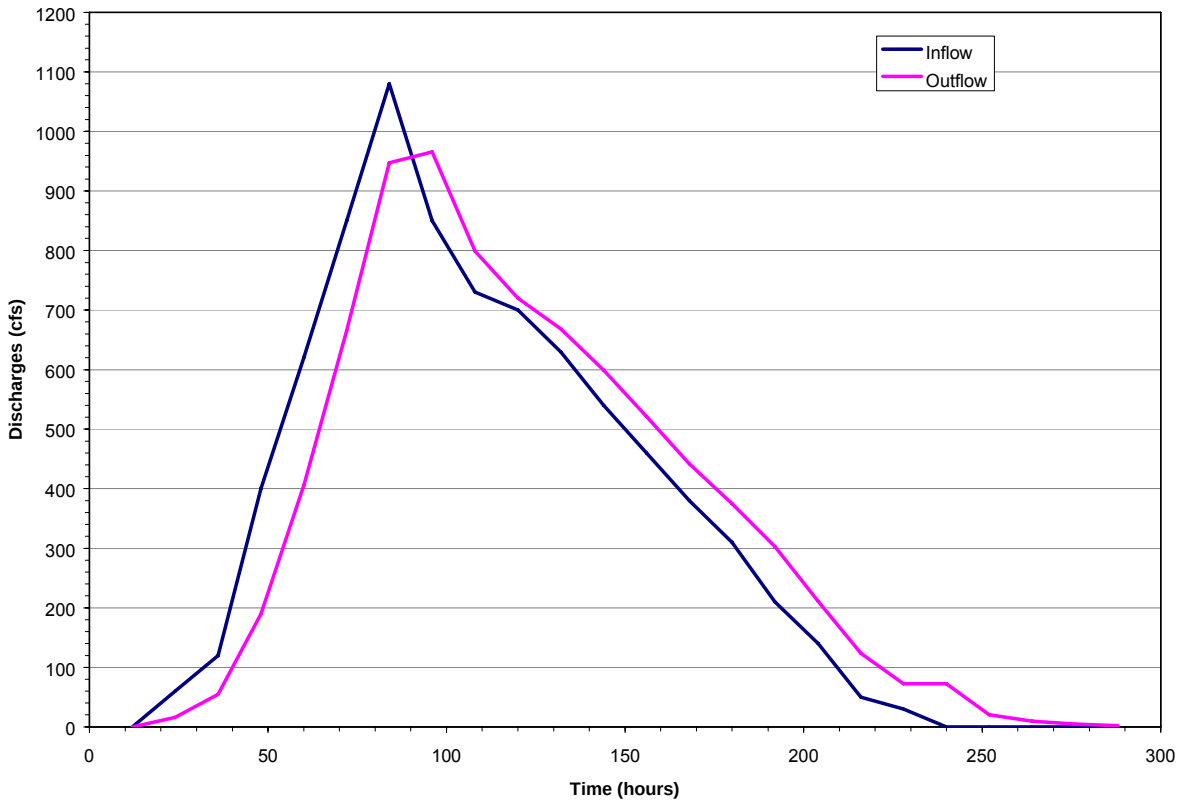

Figure 1. Indian Creek Reservoir inflow and outflow hydrographs for the 100-year flood.

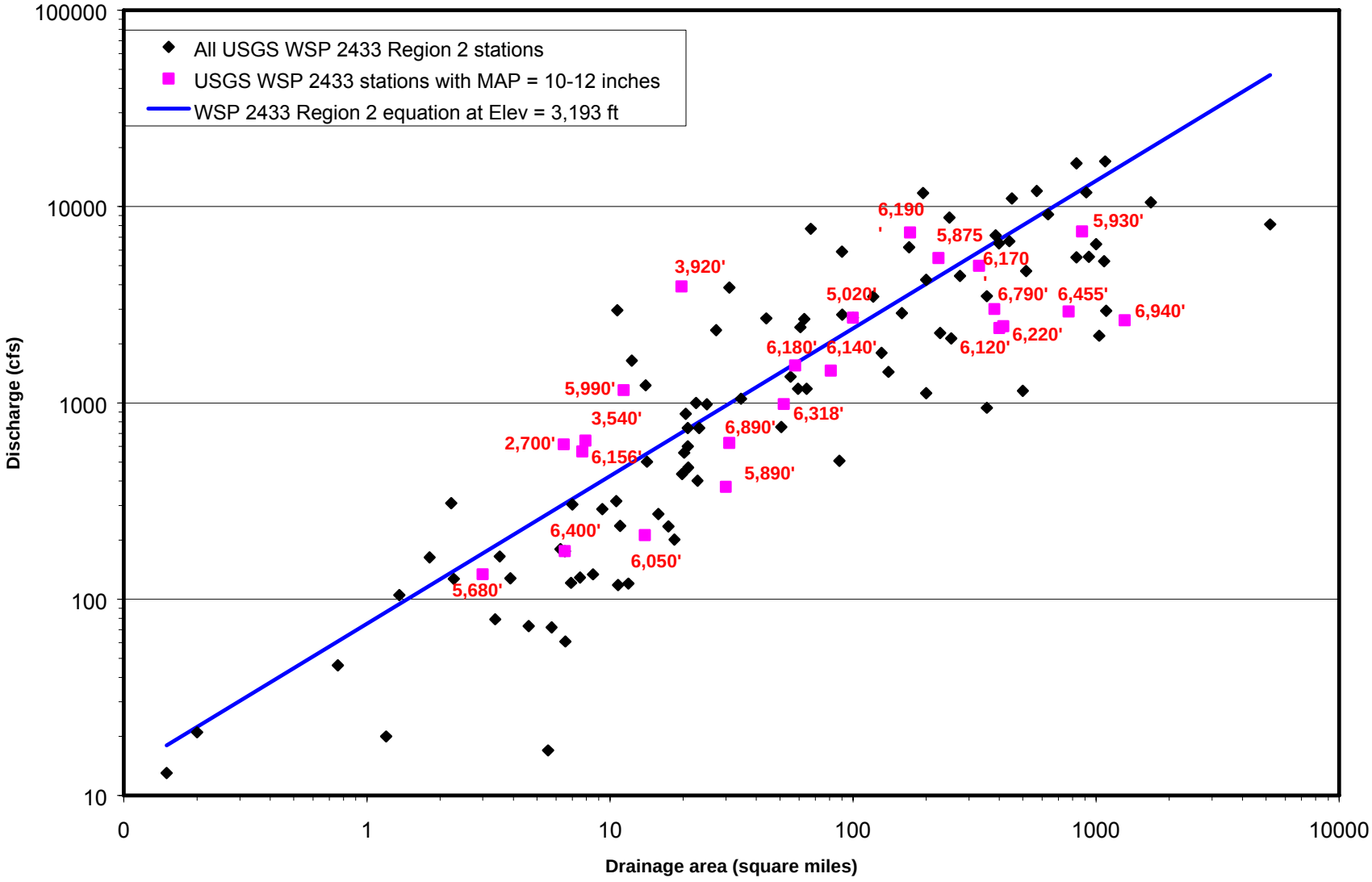

Figure 2. Relationship between drainage area and 100-year discharges for stations in USGS WSP 2433 Region 2.

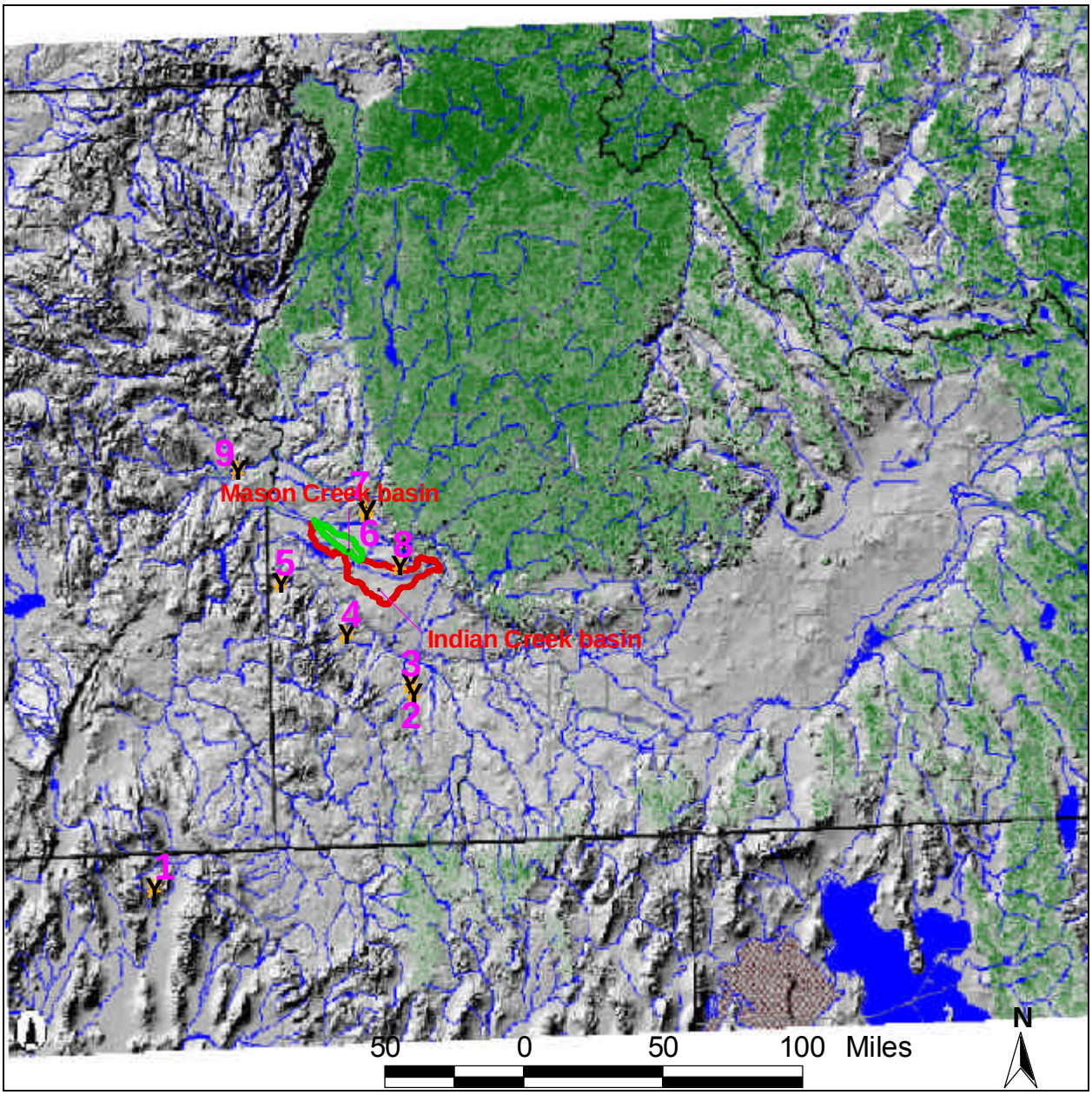

Figure 3. Locations of selected stations.

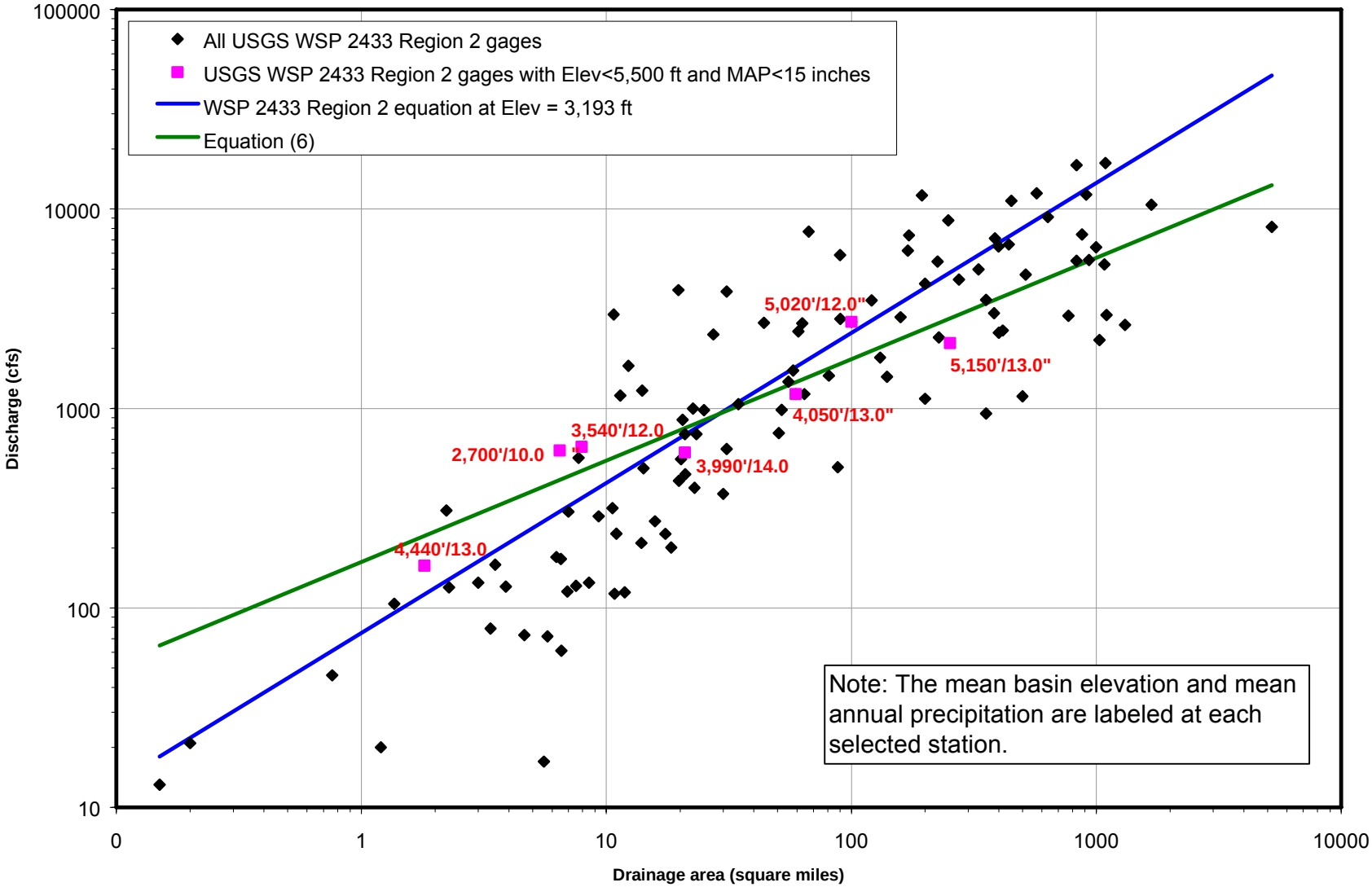

Figure 4. Relationship between drainage area and 100-year discharges for selected stations.

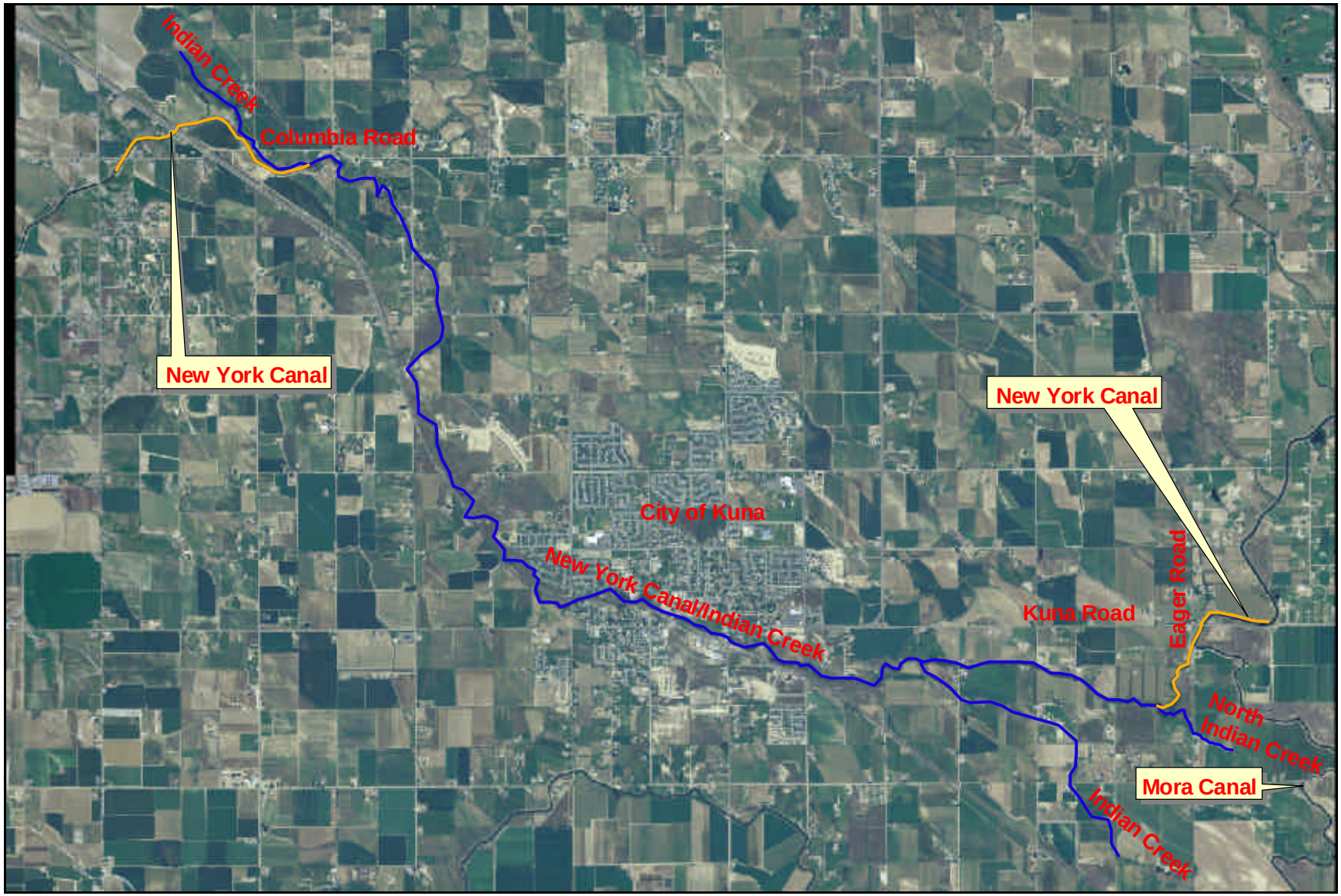

Figure 5. New York Canal and Indian Creek in the vicinity of Kuna.

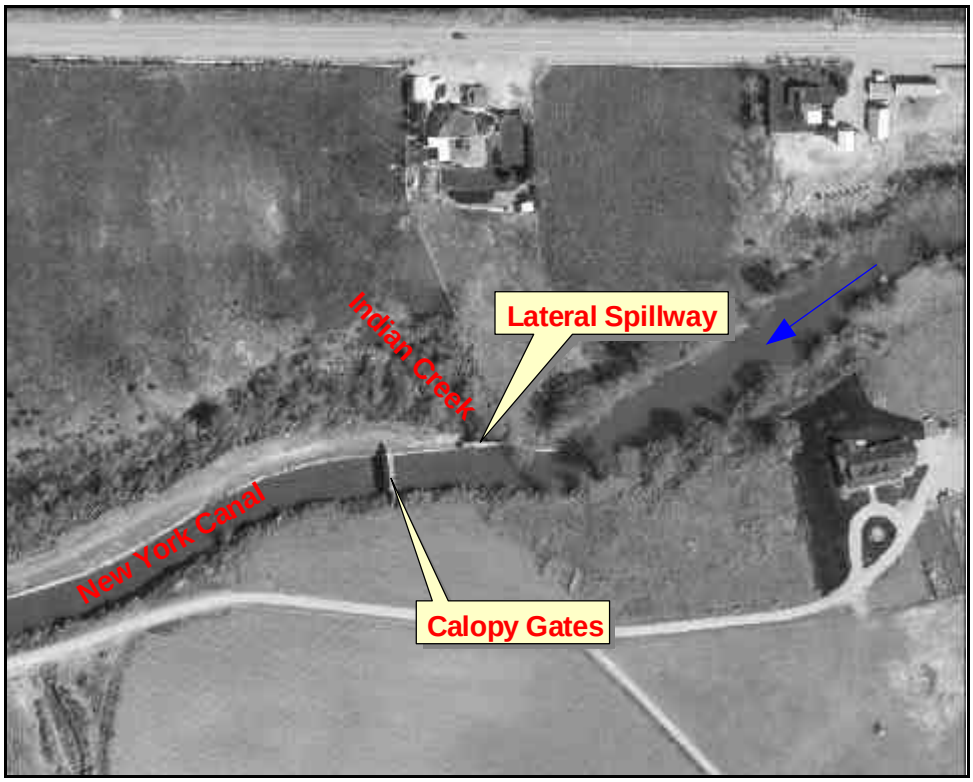

Figure 6. New York Canal and Indian Creek Diversion.

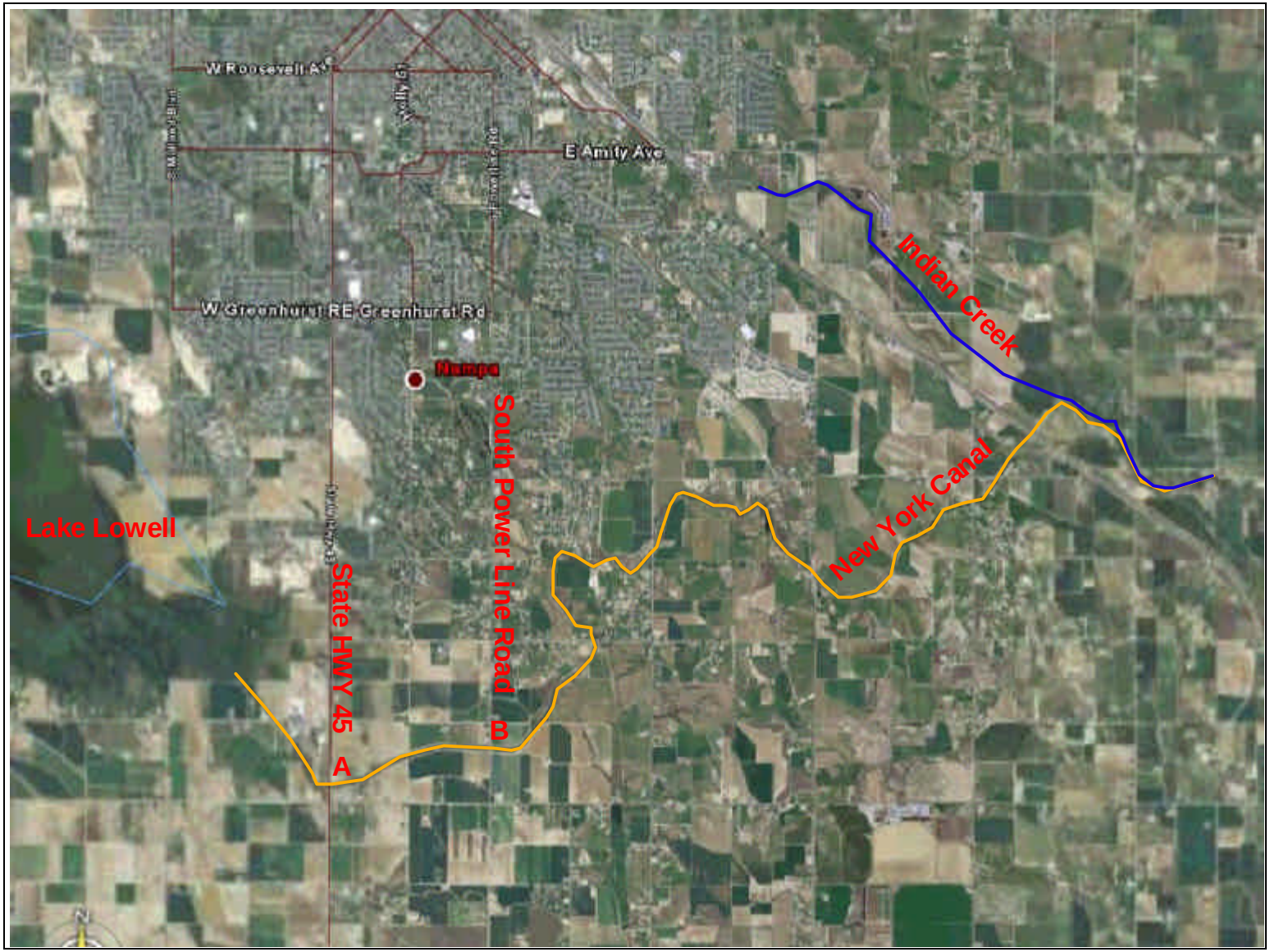

Figure 7. New York Canal below Indian Creek .

Table 1. Basin characteristics for selected stations in USGS WSP 2433 Region 2.

Map No.	Gaging station No.	Gaging station name	Drainage area (mi^2)	Elevation (ft)	Mean annual precipitation	Peak beginning	Peak end	Number of unregulated peaks
1	10353500(*)	QUINN R NR MC DERMITT NV	1,100.0	5.498	9.3	5/20/1949	4/9/1985	35
2	13169500	BIG JACKS CREEK NR BRUNEAU ID	253.0	5150	13	3/20/1939	3/20/2004	51
3	13170000	LITTLE JACKS CREEK NR BRUNEAU ID	100.0	5020	12	3/18/1939	5/16/1949	11
4	13172200(*)	FOSSIL CREEK NR OREANA ID	19.7	3920	12	2/2/1961	1/12/1980	17
5	13172800	LITTLE SQUAW CREEK TRIB NR MARSING ID	1.8	4440	13	1961-00-00	1/12/1980	19
6	13207000	SPRING VALLEY CREEK NR EAGLE ID	20.9	3990	14	4/22/1955	2/16/1982	18
7	13207500	DRY CREEK NR EAGLE ID	59.4	4050	13	4/22/1955	2/16/1982	16
8	13210300	BRYANS RUN NR BOISE ID	7.9	3540	12	1961-00-00	2/21/1980	19
9	13228300	LYTLE CREEK NEAR VALE OREG.	6.5	2700	10	3/31/1969	4/19/1981	13

Notes:

(*) The station was not included in the regression analysis.

Table 2. Proposed discharges for Mason Creek.

Location	A (mi^2)	Elev (ft)	MAP (in)		Q10 (cfs)	Q50 (cfs)	Q100 (cfs)
Mason Creek above Purdam Gulch	30	2625	11.7	Proposed	326	723	957
				Effective	762	1,165	1,870
Mason Creek below Purdam Gulch	52	2620	11.7	Proposed	424	951	1,266
				Effective	N.A.	N.A.	N.A.

Table 3. Discharges for Indian Creek using new regression equations.

Location	A (mi^2)	Elev (ft)	MAP (in)	Q10 (cfs)	Q50 (cfs)	Q100 (cfs)
Indian Creek above New York Canal	276	3193	11.8	938	2,188	2,958
Indian Creek/New York Canal near Kuna	276	3193	11.8	1,938	3,188	3,958

Table 4. Proposed discharges for Indian Creek below New York Canal.

Location		Q10	Q50	Q100
Indian Creek just below New York Canal	Discharge (cfs)	738	1,988	2,758
	Equvalient drainage area (mi^2)	167	228	240
Indian Creek between Wilson Drain and NYC Diversion	Local drainage area (mi^2)	14	14	14
	Total effective drainage area (mi^2)	181	242	254
	Proposed discharge (cfs)	**767**	**2,048**	**2,838**
	Effective discharge (cfs)	115	280	660
Indian Creek below Wilson Drain	Local drainage area (mi^2)	30	30	30
	Total effective drainage area (mi^2)	211	272	284
	Proposed discharge (cfs)	**826**	**2,171**	**3,003**
	Effective discharge (cfs)	390	750	1,230

Table 5. Proposed 500-year discharges for Indian and Mason Creeks.

Flooding source		**Q500** (cfs)
Indian Creek between Wilson Drain and NYC Diversion	Proposed	5,717
	Effective	1,690
Indian Creek below Wilson Drain	Proposed	5,983
	Effective	2,530
Mason Creek above Purdam Gulch	Proposed	1,691
	Effective	2,560
Mason Creek below Purdam Gulch	Proposed	2,255
	Effective	N.A.

Quadrant Consulting, Inc.

Appendix E
P1-18, FieldData

PURDAM 1-STA 0+50

PD 1-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
97	717605.334	2406994.701	2447.508	SETX*IRR-BOX*se-COR
98	717654.94	2407106.175	2450.349	SET12*QCI
1250	717603.486	2407005.475	2445.769	TOE
1251	717605.417	2407006.73	2445.087	TBD
1252	717606.194	2407007.152	2443.482	TOD
1267	717592.544	2407000.941	2449.141	TOP
1273	717614.127	2407011.731	2449.194	PIPE*TOP-10FT-CMP
1274	717614.629	2407010.586	2445.959	WSR
1275	717614.1	2407010.816	2442	FLD
1278	717621.437	2407013.104	2443.929	TOD
1279	717626.941	2407011.709	2443.347	TOD
1283	717622.82	2407012.964	2445.789	TBD
1284	717625.372	2407012.363	2446.244	TBD
1287	717632.593	2407011.793	2449.556	PIPE*TOP-10FT-CMP
1288	717632.948	2407010.646	2446.028	WSR
1289	717632.848	2407011.105	2442.751	FLD
1293	717640.883	2407011.081	2446.168	TBD
1294	717639.625	2407011.223	2444.212	TOD
1295	717650.194	2407012.426	2450.853	TOP
1296	717641.881	2407002.889	2446.523	HWM

PD 1-RD DS

1035	717682.004	2407033.937	2451.841	EG
1050	717608.55	2407033.408	2451.806	EG
1051	717569.491	2407030.686	2451.386	EG

PD 1-RD US

1033	717684.216	2407057.763	2452.245	EG
1048	717605.71	2407054.136	2451.779	EG
1053	717567.05	2407055.401	2451.566	EG

PD 1-B US

1066	717620.393	2407083.291	2451.262	TOP*RIPRAP*END
1072	717647.959	2407079.237	2450.259	TOP*RIPRAP
1079	717633.899	2407076.608	2450.023	PIPE*TOP*10FT-CMP
1084	717627.636	2407078.44	2446.424	TBD
1085	717629.677	2407077.644	2443.473	TOD
1086	717631.411	2407077.693	2445.895	WSR
1087	717634.086	2407076.928	2442.966	FLD
1088	717637.956	2407077.157	2443.489	TOD
1089	717639.027	2407077.623	2445.824	TBD
1090	717641.944	2407077.876	2446.834	TOE*RIPRAP
1134	717625.109	2407084.193	2447.289	TOE*RIPRAP
1316	717637.707	2407077.155	2446.565	HWM

PD 1-C US

1094	717649.244	2407101.904	2449.978	TOP*RIPRAP-END
1095	717646.842	2407106.098	2447.7	HWM
1096	717642.586	2407104.756	2446.105	TBD
1097	717640.828	2407105.092	2443.575	TOD
1098	717638.017	2407106.636	2443.172	FLD
1099	717638.083	2407106.619	2445.946	WSR
1100	717634.389	2407107.956	2443.014	TOD
1101	717633.219	2407108.681	2445.66	TBD
1131	717625.863	2407114.039	2451.267	TOP*RIPRAP
1132	717631.362	2407113.187	2446.623	TOE*RIPRAP

PD 1-D US

1094	717649.244	2407101.904	2449.978	TOP*RIPRAP-END
1095	717646.842	2407106.098	2447.7	HWM
1096	717642.586	2407104.756	2446.105	TBD
1097	717640.828	2407105.092	2443.575	TOD
1098	717638.017	2407106.636	2443.172	FLD
1099	717638.083	2407106.619	2445.946	WSR
1100	717634.389	2407107.956	2443.014	TOD
1101	717633.219	2407108.681	2445.66	TBD
1131	717625.863	2407114.039	2451.267	TOP*RIPRAP
1132	717631.362	2407113.187	2446.623	TOE*RIPRAP

PD 1-E US

1102	717647.532	2407129.903	2445.757	TBD
1103	717648.124	2407129.302	2443.374	TOD
1104	717651.09	2407124.85	2443.129	FLD
1105	717652.62	2407123.535	2443.309	TOD
1106	717657.237	2407119.133	2446.919	TBD
1107	717658.43	2407118.483	2447.612	HWM
1108	717661.542	2407113.02	2450.073	TOP
1126	717639.33	2407134.39	2450.729	TOP*RIPRAP
1127	717643.21	2407130.694	2445.819	TOE*RIPRAP

PURDAM 2-3 STA 7+20 - 7+50

PD 2/3-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
94	718161.581	2407657.145	2457.862	SETMAG*FOGLINE
95	718164.548	2407259.488	2454.334	SETMAG*FOGLINE
96	718190.227	2407464.348	2454.834	FND58*SKINNER*PLS-3627
1324	717986.172	2407362.196	2453.243	TOP
1328	717991.732	2407353.573	2447.636	TOE
1329	717993.93	2407349.918	2447.237	TBD
1330	717994.633	2407347.931	2444.658	TOD
1331	717997.389	2407343.647	2444.414	FLD
1332	717997.233	2407343.762	2446.934	WSR
1333	718001.304	2407339.33	2445.215	TOD
1334	718001.718	2407338.862	2447.464	TBD
1335	718002.913	2407337.935	2448.035	HWM
1336	718005.472	2407333.639	2450.931	TOP
1566	718198.475	2407346.027	2451.991	FND12*JUB-11334

PD 2/3-B DS

1323	718066.711	2407415.828	2453.786	TOP
1343	718088.065	2407384.375	2451.158	TOP
1344	718082.968	2407390.097	2447.573	TOE
1345	718080.03	2407394.962	2447.219	TBD
1346	718079.015	2407395.503	2444.775	TOD
1347	718077.788	2407398.451	2444.603	FLD
1348	718077.398	2407397.969	2447.238	WSR
1349	718073.853	2407401.059	2444.905	TOD
1350	718073.412	2407402.057	2447.054	TBD
1351	718072.346	2407406.903	2448.022	TOE

PD 2/3-C DS

1356	718138.149	2407455.297	2454.286	TOP
1358	718142.649	2407448.48	2448.713	TOE
1361	718149.676	2407448.936	2448.615	TBD
1362	718149.966	2407448.316	2446.604	TOD
1363	718152.28	2407444.511	2445.052	FLD
1364	718152.281	2407443.956	2447.699	WSR
1365	718153.541	2407440.917	2448.13	HWM
1366	718149.302	2407435.694	2446.29	TOD
1367	718149.27	2407434.707	2447.382	TBD
1372	718144.874	2407418.79	2452.753	TOP
1409	718152.45	2407444.782	2452.083	PIPE*TOP-10FT-CMP
1412	718152.14	2407438.124	2447.618	GAUGE*2.6+/-

PD 2/3-RD DS

1508	718160.665	2407563.181	2455.888	EP
1538	718161.556	2407463.169	2455.079	EP
1560	718162.497	2407371.921	2454.42	EP

PD 2/3-RD US

1504	718185.266	2407564.253	2455.871	EP
1534	718185.895	2407463.738	2454.883	EP
1564	718186.645	2407372.119	2454.422	EP

PD 2/3-D DS

1404	718202.402	2407454.231	2452.186	TOP
1467	718200.179	2407460.496	2448.246	TBD
1468	718200.283	2407461.198	2446.411	TOD
1469	718197.159	2407467.692	2445.364	FLD
1470	718197.163	2407467.321	2447.606	WSR
1471	718195.781	2407471.045	2446.166	TOD
1472	718195.844	2407472.22	2447.288	TBD
1473	718198.002	2407481.636	2448.504	TOE
1474	718192.247	2407497.531	2454.247	TOP
1481	718196.132	2407467.378	2451.879	PIPE*TOP-10FT-CMP

PD 2/3-E DS

1413	718279.35	2407505.171	2448.401	TOE
1414	718279.471	2407504.319	2449.035	HWM
1415	718282.534	2407500.652	2451.667	TOP
1458	718262.404	2407532.219	2453.277	TOP*HOTFENCE
1459	718267.155	2407524.517	2448.441	TOE
1460	718266.208	2407527.135	2449.905	HWM
1461	718269.984	2407519.313	2447.834	TBD
1462	718271.654	2407517.898	2445.642	TOD
1463	718274.445	2407514.041	2445.693	FLD
1464	718275.788	2407510.401	2446.072	TOD
1465	718276.028	2407509.446	2448.025	TBD
1466	718272.455	2407512.72	2447.938	WSR

PD 2/3-F DS

1446	718361.459	2407550.927	2451.094	TOP
1447	718361.036	2407552.941	2449.01	TOE
1448	718363.301	2407554.375	2449.228	HWM
1449	718360.892	2407553.714	2448.798	TBD
1450	718360.076	2407554.16	2447.299	TOD
1451	718356.969	2407557.923	2446.199	FLD
1452	718356.895	2407558.169	2448.195	WSR
1453	718353.867	2407563.416	2446.719	TOD
1454	718352.917	2407564.872	2448.541	TBD
1455	718344.873	2407573.404	2448.423	TOE
1456	718337.806	2407580.916	2453.377	TOP*HOTFENCE

PURDAM 4 - STA 23+80

PD 4-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
89	718151.528	2408712.706	2461.728	SETMAG*FOGLINE
90	718148.231	2409112.608	2463.569	SETMAG*FOGLINE
91	718182.764	2409003.236	2460.83	FND58*CAP-BLOWN*JUB
92	718185.391	2408963.474	2461.22	FND58*ENGINEERING-NW*CTRL*TLG
1735	718578.01	2408831.97	2458.829	TOP
1736	718555.522	2408836.605	2452.674	TOE
1737	718551.579	2408836.876	2452.529	TBD
1739	718550.647	2408837.139	2450.477	TOD
1740	718544.732	2408839.209	2450.25	FLD
1741	718544.764	2408839.167	2452.327	WSR
1742	718542.046	2408841.49	2450.9	TOD
1743	718541.356	2408842.169	2452.701	TBD
1744	718540.02	2408844.728	2453.223	HWM
1745	718533.303	2408844.711	2457.672	TOP

PD 4-B DS

1724	718543.694	2408902.586	2456.904	TOP
1725	718548.995	2408907.47	2454.43	HWM
1726	718550.429	2408901.331	2452.601	TBD
1727	718553.781	2408901.597	2450.166	TOD
1728	718562.743	2408896.655	2449.401	FLD
1729	718569.936	2408893.777	2450.257	TOD
1730	718571.661	2408891.698	2452.784	TBD
1731	718579.722	2408888.087	2453.257	TOE
1732	718590.263	2408883.839	2458.449	TOP

PD 4-C DS

1656	718549.611	2408927.652	2458.391	EG*TOP
1668	718588.033	2408918.277	2458.039	TOP
1673	718563.821	2408921.142	2454.335	PIPE*TOP-54IN-CMP
1677	718557.058	2408923.417	2454.47	TBD
1678	718560.226	2408921.825	2451.577	TOD
1679	718563.648	2408920.592	2449.657	FLD
1680	718563.445	2408920.405	2452.789	WSR
1681	718567.214	2408920.616	2451.155	TOD
1682	718571.115	2408919.674	2453.385	TBD
1683	718575.372	2408917.126	2453.903	HWM?

PD 4-RD DS

1654	718506.682	2408929.367	2458.755	EG
1656	718549.611	2408927.652	2458.391	EG*TOP
1667	718637.881	2408928.043	2459.055	EG

PD 4-RD US

1657	718541.197	2408944.991	2458.343	EG
1659	718564.256	2408944.334	2458.484	EG
1661	718575.254	2408946.75	2458.214	EG*TOP
1662	718606.302	2408948.194	2458.454	EG*TOP

PD 4-D US

1638	718575.25	2408953.296	2454.198	TBD
1639	718573.122	2408953.84	2452.747	TOD
1643	718567.185	2408954.715	2454.854	PIPE*TOP-54IN-CMP
1644	718567.209	2408955.28	2449.882	FLD
1645	718567.352	2408955.646	2453.163	WSR
1647	718561.493	2408954.46	2452.567	TOD
1648	718559.147	2408953.673	2454.352	TBD
1649	718550.648	2408962.549	2454.146	TOE
1650	718539.705	2408963.322	2456.94	TOP
1663	718614.223	2408957.262	2457.638	TOP
1664	718601.421	2408955.456	2457.314	TOE*TOP
1684	718550.71	2408958.11	2454.607	HWM?

PD 4-E US

1687	718597.6	2409051.352	2454.331	TOE
1688	718611.952	2409050.104	2456.035	TOP
1689	718577.511	2409050.909	2453.204	TBD
1690	718576.122	2409051.151	2450.811	TOD
1691	718571.413	2409052.167	2450.916	FLD
1692	718567.544	2409051.412	2451.129	TOD
1693	718566.574	2409051.492	2453.263	TBD
1694	718571.404	2409052.063	2453.508	WSR
1695	718556.342	2409051.584	2453.805	TOE
1696	718544.933	2409050.034	2456.883	TOP

PD 4-F US

1699	718548.69	2409153.586	2457.972	TOP
1700	718569.36	2409153.035	2454.233	TOE
1704	718574.78	2409149.179	2453.594	TBD
1705	718575.736	2409149.207	2451.036	TOD
1706	718581.022	2409151.14	2450.645	FLD
1707	718581.521	2409152.909	2453.877	WSR
1708	718585.125	2409152.685	2450.963	TOD
1709	718587.709	2409153.478	2453.751	TBD
1710	718600.576	2409153.377	2454.651	HWM?
1711	718604.111	2409152.569	2454.906	TOE
1712	718612.898	2409152.84	2457.056	TOP

PURDAM 5-STA 33+10

PD 5-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
59	718141.375	2409939.515	2462.988	SETMAG*FOGLINE
60	718165.332	2409743.387	2462.88	SETMAG*FOGLINE
5109	718298.774	2409629.539	2456.211	TOP
5110	718298.487	2409630.773	2455.446	TOE
5111	718299.047	2409632.416	2455.003	TBD
5112	718299.573	2409633.843	2453.967	TOD
5113	718302.51	2409638.698	2452.696	FLD
5114	718301.721	2409638.684	2454.65	WSR*11-2-15
5115	718305.317	2409645.157	2453.62	TOD
5116	718305.972	2409646.867	2454.958	TBD
5117	718307.01	2409649.082	2455.887	TOE
5118	718308.326	2409651.357	2456.86	TOP
5270	718097.661	2409743.65	2460.514	FND58*ISG-CTRL

PD 5-B DS

5121	718272.748	2409673.734	2459.686	TOP
5122	718271.491	2409672.22	2458.953	TOE*TOP
5123	718264.953	2409667.328	2454.663	TBD
5124	718264.034	2409665.865	2453.163	TOD
5125	718262.311	2409664.263	2452.197	PIPE*5FT-INV
5126	718262.288	2409663.913	2452.506	FLD
5127	718262.471	2409663.27	2454.681	WSR*11-2-15
5128	718260.496	2409660.876	2452.571	TOD
5129	718256.966	2409658.369	2455.076	TBD
5130	718256.302	2409656.016	2455.427	TOE
5132	718250.64	2409653.021	2459.108	TOP

PD 5-RD DS

5121	718272.748	2409673.734	2459.686	TOP
5132	718250.64	2409653.021	2459.108	TOP
5133	718250.921	2409668.432	2459.607	TOP
5134	718257.168	2409669.715	2458.955	TOP

PURDAM 6-STA 34+0

PD 6-RD US

5188	718141.652	2409743.003	2462.697	EP
5221	718141.535	2409760.942	2462.728	EP
5224	718140.466	2409835.587	2462.782	EP

PD 6-A US

5272	718123.79	2409744.74	2460.032	TOP
5275	718126.913	2409750.604	2458.624	TOE
5277	718127.47	2409760.177	2457.611	TBD*TO-TOE
5278	718124.017	2409761.747	2456.597	HWM
5279	718127.482	2409763.807	2453.83	TOD
5280	718128.908	2409766.39	2453.201	FLD
5281	718129.169	2409771.82	2453.673	TOD
5282	718128.712	2409773.184	2456.124	TBD
5283	718126.676	2409770.392	2455.451	WSR*11-2-15
5284	718129.244	2409766.051	2452.876	PIPE*5FT-INV
5287	718135.682	2409797.939	2462.186	TOP

PD 6-B US

5254	2409833.303	718051.382	2460.76	TOP
5256	2409835.655	718056.925	2458.17	HWM
5255	2409835.343	718058.453	2457.59	TOE
5257	2409837.07	718063.033	2456.65	TBD
5303	2409837.597	718064.432	2454.33	TOD
5258	2409839.253	718068.081	2454	FLD
5304	2409842.859	718070.753	2454.41	TOD
5259	2409843.386	718072.209	2456.54	TBD
5260	2409847.584	718086.647	2457.35	TOE
5261	2409850.59	718092.139	2459.55	TOP

PD 6-C US

5250	2409914.919	718027.638	2459.5	TOP*EG
5248	2409915.52	718032.764	2458.24	HWM
5249	2409916.48	718036.18	2457.36	TOE
5307	2409917.736	718039.468	2656.72	TBD
5306	2409918.155	718040.835	2453.68	TOD
5247	2409919.665	718044.673	2455.72	WSR*11-2-15
5305	2409919.395	718044.99	2453.51	FLD
5246	2409920.773	718049.157	2453.78	TOD
5245	2409921.173	718050.673	2456.64	TBD
5244	2409923.24	718057.879	2457.09	TOE
5243	2409924.27	718063.788	2458.95	TOP

PURDAM 7 - STA 62+50

PD 7-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
86	716910.998	2412348.107	2470.278	SETMAG*FOGLINE
87	717322.016	2412350.58	2469.631	SETMAG*FOGLINE
88	717127.145	2412323.515	2469.064	SETMAG*FOGLINE
1777	717261.402	2412114.637	2465.966	TOP
1778	717254.086	2412110.262	2461.988	TOE
1779	717255.257	2412112.036	2463.262	HWM
1781	717244.514	2412104.796	2458.805	TOD
1782	717244.295	2412104.57	2461.785	WSR
1783	717245.776	2412105.001	2461.555	TBD
1796	717229.096	2412096.594	2465.828	TOP
1797	717233.833	2412100.856	2461.924	TBD
1798	717235.192	2412101.755	2459.004	TOD
1834	717053.205	2412385.436	2467.064	FND58*ISG-4431

PD 7-B DS

1767	717209.347	2412198.073	2465.34	TOP
1769	717204.278	2412196.726	2463.016	HWM?
1770	717203.118	2412194.014	2462.001	TOE
1771	717199.82	2412192.68	2461.837	TBD
1772	717197.865	2412192	2458.561	TOD
1774	717195.163	2412192.82	2462.069	WSR
1791	717181.54	2412179.312	2466.597	TOP
1792	717188.349	2412184.922	2462.281	TBD
1793	717190.463	2412185.188	2459.202	TOD

PD 7-C DS

1750	717136.568	2412258.984	2467.62	TOP
1754	717169.994	2412274.942	2468.134	TOP
1759	717145.911	2412259.24	2463.76	TBD
1760	717149.617	2412259.137	2460.504	TOD
1761	717157.095	2412259.102	2457.916	TOD
1762	717157.114	2412260.505	2461.78	TBD
1763	717164.612	2412265.058	2462.385	TBD
1764	717162.862	2412263.816	2460.008	TOD
1765	717163.707	2412263.392	2462.126	WSR

PD 7-RD DS

1911	717087.79	2412313.25	2468.944	LIP
1923	717158.362	2412313.749	2468.822	LIP

PD 7-RD US

1915	717084.567	2412350.061	2469.041	EP
1919	717155.436	2412351.057	2468.929	EP

PD 7-D US

1800	717089.354	2412355.057	2468.582	TOP
1802	717142.676	2412355.784	2468.486	TOP
1813	717110.244	2412366.147	2463.102	TBD
1814	717108.417	2412366.316	2461.088	TOD
1817	717104.343	2412361.471	2463.296	PIPE*TOP-54IN-CMP
1819	717103.437	2412363.275	2462.61	WSR
1820	717096.046	2412362.988	2460.147	TOD
1821	717095.663	2412362.037	2462.902	TBD
1822	717093.817	2412360.403	2464.263	TOE
1833	717075.29	2412370.946	2464.403	HWM?

PD 7-E US

1838	717012.046	2412429.082	2467.434	TOP
1839	717016.582	2412436.018	2463.453	TOE*END
1840	717017.753	2412437.583	2463.282	TBD
1841	717018.672	2412438.271	2461.105	TOD
1843	717018.832	2412439.955	2462.723	WSR
1859	717033.39	2412456.2	2465.727	TOP
1860	717030.209	2412452.58	2463.321	TOE
1861	717030.919	2412453.349	2464.096	HWM?
1862	717028.506	2412448.254	2462.805	TBD
1863	717026.878	2412447.73	2460.84	TOD

PD 7-F US

1847	716934.55	2412494.39	2466.671	TOP
1848	716939.764	2412499.46	2463.528	TBD
1849	716941.107	2412500.263	2461.156	TOD
1851	716943.576	2412504.941	2462.798	WSR
1852	716946.268	2412510.119	2460.544	TOD
1853	716949.151	2412512.928	2462.539	TBD
1854	716953.049	2412515.152	2463.39	TOE
1855	716951.938	2412517.632	2463.936	HWM?
1856	716955.956	2412521.575	2465.898	TOP

PURDAM 8 - STA 110+90

PD 8-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
3538	715657.33	2416410.965	2479.735	TOP
3539	715649.171	2416401.649	2473.955	TOE
3540	715645.6	2416394.371	2473.267	TBD
3541	715650.791	2416405.197	2475.093	HWM
3542	715644.159	2416393.745	2471.099	TOD
3543	715639.953	2416387.401	2471.116	FLD
3544	715640.236	2416387.483	2473.544	WSR
3545	715635.559	2416383.987	2471.834	TOD
3546	715634.992	2416383.822	2473.961	TBD
3547	715633.798	2416382.661	2474.155	TOE
3548	715630.171	2416375.505	2478.519	TOP

PD 8-B DS

3523	715545.187	2416436.616	2478.642	TOP
3524	715549.678	2416441.719	2475.085	HWM
3525	715550.628	2416444.286	2473.887	TOE
3526	715555.784	2416447.624	2473.927	TBD
3527	715558.292	2416449.689	2471.343	TOD
3528	715563.418	2416452.494	2471.692	FLD
3529	715561.751	2416454.603	2473.737	WSR
3530	715563.747	2416458.863	2471.406	TOD
3531	715565.593	2416460.242	2473.321	TBD
3532	715569.624	2416465.562	2474.691	TOE
3533	715576.354	2416475.327	2480.496	TOP

PD 8-C DS

3519	715462.905	2416504.156	2478.974	TOP
3588	715476.273	2416544.307	2480.8	TOP
3601	715474.329	2416534.309	2474.337	TOE
3602	715471.8374	2416533.087	2473.708	TBD*TOE
3603	715472.469	2416532.123	2472.311	TOD
3604	715467.042	2416529.914	2472.059	FLD
3607	715467.596	2416525.903	2472.553	TOD
3610	715467.195	2416523.964	2473.272	TBD
3611	715468.352	2416523.202	2472.511	TOD
3612	715466.721	2416520.533	2471.829	FLD
3614	715466.597	2416517.77	2472.328	TOD
3615	715465.727	2416518.024	2473.863	TBD

PD 8-RD DS

3579	715461.223	2416503.216	2479.117	EG
3581	715457.081	2416529.695	2479.89	EG
3586	715459.285	2416547.691	2480.456	EG
3589	715480.198	2416550.363	2481.338	EG

PD 8-RD US

3578	715447.828	2416497.133	2480.036	EG
3582	715447.221	2416532.289	2480.146	EG
3585	715448.522	2416552.938	2480.61	EG

PD 8-D US

3575	715433.703	2416518.602	2478.603	FNC*TOP
3584	715447.042	2416552.994	2480.685	TOP
3630	715433.252	2416528.553	2475.365	TOE
3631	715437	2416533.718	2474.865	TBD*TOE
3632	715437.401	2416535.252	2473.103	TOD
3634	715440.58	2416538.916	2471.931	FLD
3654	715440.379	2416552.528	2474.138	TBD
3655	715440.625	2416551.588	2472.675	TOD
3656	715438.855	2416548.011	2471.349	FLD

PD 8-E US

3662	715345.19	2416647.162	2480.142	TOP
3663	715333.638	2416637.785	2474.984	TOE
3664	715328.305	2416630.86	2474.49	TBD
3665	715336.79	2416638.501	2476.058	HWM?
3666	715327.958	2416629.381	2472.533	TOD
3667	715326.982	2416625.999	2471.983	FLD
3668	715326.541	2416626.221	2474.504	WSR
3669	715322.346	2416624.546	2472.118	TOD
3670	715322.123	2416623.915	2474.206	TBD
3671	715317.175	2416616.6	2475.061	TOE
3672	715312.092	2416609.862	2478.553	TOP

PD 8-E US (NEXT PAGE)

PD 8-E US

3677	715252.086	2416654.757	2478.086	TOP
3678	715257.707	2416659.867	2474.803	TOE
3679	715260.159	2416663.118	2474.518	TBD
3680	715261.111	2416664.764	2472.42	TOD
3681	715264.218	2416669.227	2471.86	FLD
3682	715263.859	2416669.402	2474.98	WSR
3683	715265.986	2416671.172	2471.668	TOD
3685	715272.126	2416679.168	2474.955	TOE
3686	715272.714	2416681.615	2475.822	HWM
3687	715279.635	2416692.114	2480.947	TOP

PURDAM 10 - STA 123+50

PD 10-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
3502	714585.965	2417136.023	2480.61	TOP
3504	714593.311	2417141.36	2476.667	TOE
3505	714598.12	2417146.369	2476.704	TBD
3506	714598.749	2417146.774	2475.056	TOD
3507	714600.045	2417147.194	2477.383	WSR
3508	714601.432	2417151.041	2475.028	FLD
3509	714605.569	2417155.131	2475.199	TOD
3510	714606.016	2417155.936	2476.47	TBD
3511	714610.867	2417166.806	2477.033	TOE
3512	714611.601	2417169.34	2477.888	HWM
3513	714619.17	2417174.782	2480.997	TOP

PD 10-B DS

3489	714533.399	2417239.152	2480.771	TOP
3490	714528.132	2417231.641	2477.214	TOE
3491	714521.455	2417222.127	2477.037	TBD
3492	714519.784	2417220.809	2475.341	TOD
3493	714517.802	2417217.292	2475.273	FLD
3494	714516.224	2417217.449	2477.776	WSR
3495	714511.244	2417214.808	2475.246	TOD
3496	714510.753	2417213.89	2476.719	TBD
3497	714504.91	2417208.114	2477.083	TOE
3498	714504.563	2417207.09	2478.098	HWM?
3499	714498.874	2417201.166	2480.993	TOP*FNC

PD 10-C DS

3469	714425.315	2417255.637	2480.763	FNC*AP*TOP
3471	714429.827	2417267.282	2478.163	TOE
3472	714431.197	2417273.526	2477.583	TBD*TOE
3473	714432.119	2417275.654	2475.928	TOD
3477	714434.719	2417281.991	2478.826	PIPE*TOP-12FT-ARCH
3478	714435.588	2417281.471	2477.986	WSR
3479	714435.488	2417281.324	2475.302	FLD
3480	714437.869	2417285.034	2475.575	TOD
3481	714438.312	2417286.56	2476.699	TBD*TOE
3483	714444.113	2417294.612	2479.833	TOP*FNC

PD 10-RD DS

3474	714427.355	2417276.592	2479.368	TOP
3476	714433.826	2417282.985	2479.4	TOP
3482	714435.843	2417288.95	2479.352	TOP

PD 10-RD US

3449	714430.755	2417293.956	2479.37	TOP
3455	714423.047	2417288.44	2479.318	PIPE*TOP-12FT-ARCH
3461	714419.489	2417282.226	2479.169	TOP

PD 10-D US

3447	714433.583	2417314.706	2481.07	TOP
3450	714427.753	2417295.794	2477.888	TOE
3452	714426.719	2417295.318	2477.744	TBD*TOE-END
3454	714425.799	2417294.223	2476.171	TOD
3455	714423.047	2417288.44	2479.318	PIPE*TOP-12FT-ARCH
3456	714422.546	2417288.744	2475.281	FLD
3458	714417.665	2417285.763	2475.916	TOD
3459	714416.511	2417284.14	2477.716	TBD*FNC
3460	714420.991	2417288.806	2478.058	WSR
3462	714405.591	2417277.273	2480.55	TOP*FNC-END
3463	714407.443	2417275.153	2480.851	FND58*ISG*PLS-4431
3475	714416.372	2417283.869	2478.071	HWM?

PD 10-E US

3430	714342.344	2417313.312	2481.266	TOP
3431	714346.953	2417319.273	2478.031	TBD*TOE-END
3432	714355.067	2417326.713	2476.607	TOD
3433	714362.456	2417333.747	2476.399	FLD
3434	714362.387	2417332.621	2478.323	WSR
3435	714374.729	2417343.399	2476.572	TOD
3436	714376.458	2417345.223	2477.56	TBD
3437	714385.481	2417352.163	2477.491	TOE
3438	714385.886	2417353.037	2479.037	HWM?
3442	714386.203	2417357.575	2480.267	TOP*FNC

PURDAM 11 - STA 125+20

PD 11-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
3394	714293.541	2417382.715	2480.018	PIPE*TOP-13.5FT*STEEL-ARCH
3415	714301.912	2417396.718	2479.403	TOP
3417	714300.48	2417390.484	2478.415	TOE*END
3418	714298.973	2417388.412	2477.867	TBD
3419	714298.465	2417388.134	2476.906	TOD
3420	714294.17	2417382.519	2476.163	FLD
3421	714294.206	2417382.295	2478.504	WSR
3422	714290.206	2417376.668	2477.043	TOD
3424	714289.709	2417376.108	2477.874	TBD
3425	714289.196	2417373.902	2478.093	TOE
3426	714286.594	2417371.671	2480.136	TOP

PD 11-RD DS

3394	714293.541	2417382.715	2480.018	PIPE*TOP-13.5FT*STEEL-ARCH
3416	714299.516	2417391.05	2479.645	TOP
3423	714288.468	2417377.651	2479.817	TOP

PD 11-RD US

3389	714277.874	2417377.27	2480.146	TOP
3390	714285.265	2417382.685	2479.784	TOP
3406	714295.219	2417396.329	2479.453	TOP

PD 11-B US

3389	714277.874	2417377.27	2480.146	TOP
3391	714286.425	2417388.379	2479.814	PIPE*TOP-13.5FT*STEEL-ARCH
3399	714281.86	2417383.373	2478.066	TBD
3400	714283.351	2417385.031	2476.595	TOD
3401	714286.214	2417388.716	2476.034	FLD
3402	714286.032	2417388.68	2478.48	WSR
3403	714290.153	2417394.953	2476.994	TOD
3404	714290.55	2417396.067	2477.672	TBD
3405	714292.867	2417397.864	2478.258	TOE*END
5000	714294.9401	2417399.472	2479.61	TOP

PD 11-C US (NEXT PAGE)

PD 11-C US

3373	714251.947	2417454.448	2483.045	TOP
3374	714244.823	2417446.789	2478.261	TOE
3375	714238.689	2417441.24	2478.069	TBD
3376	714238.406	2417440.081	2476.797	TOD
3377	714236.787	2417439.655	2478.751	WSR
3378	714228.707	2417432.01	2476.05	FLD
3379	714223.162	2417424.963	2476.731	TOD
3380	714222.779	2417424.171	2478.121	TBD
3381	714218.16	2417419.671	2478.479	TOE
3382	714216.956	2417417.494	2479.799	HWM
3383	714211.829	2417413.915	2481.992	TOP

PD 11-D US

72	714169.177	2417525.413	2480.327	SET12*QCI-CTRL
73	714137.685	2417506.315	2480.77	SET12*QCI-CTRL
3352	714139.617	2417490.802	2481.895	TOP
3359	714145.465	2417493.975	2478.896	TOE
3360	714149.712	2417497.966	2478.372	TBD
3361	714151.166	2417498.882	2476.438	TOD
3362	714157.46	2417501.903	2476.152	FLD
3363	714157.539	2417501.854	2478.919	WSR
3364	714164.285	2417506.927	2476.799	TOD
3365	714165.69	2417507.626	2478.503	TBD
3366	714169.791	2417510.645	2478.507	TOE
3367	714171.779	2417511.905	2479.645	GB*END
3368	714180.314	2417513.583	2481.047	TOP

PURDAM 12 - STA 128+40

PD 12-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
83	714097.804	2417608.944	2484.826	SETMAG*FOGLINE
1997	714104.625	2417595.66	2481.923	PIPE*TOP-84IN-CMP
1998	714104.701	2417594.796	2479.566	WSR
1999	714104.863	2417595.189	2476.031	FLD
3335	714155.278	2417593.267	2483.312	TOP*FNC
3337	714130.788	2417588.004	2478.909	TOE*FNC
3339	714111.592	2417596.492	2478.516	TBD
3340	714110.611	2417596.085	2477.079	TOD
3343	714101.305	2417593.085	2476.764	TOD
3344	714100.143	2417592.792	2478.324	TBD
3346	714089.644	2417591.094	2479.159	TOE
3347	714074.266	2417594.523	2482.55	TOP*FNC

PD 12-RD DS

1976	714062.435	2417607.143	2484.866	EP
1985	714114.239	2417608.188	2484.582	EP

PD 12-RD US

1972	714061.057	2417630.882	2485.04	EP
1981	714112.141	2417631.676	2485.005	EP
2103	714085.586	2417631.565	2484.999	EP

PD 12-B US

81	713864.292	2417628.44	2485.055	SETMAG*FOGLINE
82	714314.737	2417633.799	2485.016	SETMAG*FOGLINE
2105	714060.953	2417632.859	2485.032	TOP*END
2106	714061.004	2417637.346	2484.592	TOE*END
2108	714071.192	2417642.111	2484.19	TBD*TOP
2111	714091.118	2417655.248	2483.992	TOP
2114	714085.086	2417655.838	2480.45	HWM
2162	714072.775	2417648.463	2479.033	TBD
2163	714073.393	2417649.219	2476.923	TOD
2164	714077.939	2417650.954	2476.042	FLD
2165	714076.18	2417650.452	2479.57	WSR
2166	714082.46	2417652.386	2476.75	TOD
2167	714083.443	2417652.885	2479.204	TBD

PD 12-C US

2147	714019.892	2417740.554	2481.422	TOP
2148	714024.942	2417741.169	2479.608	TOE
2149	714024.292	2417740.396	2480.308	HWM
2150	714030.794	2417742.72	2479.452	TBD
2169	714065.91	2417745.912	2481.335	TOP
2170	714060.476	2417746.607	2480.223	HWM
2171	714058.614	2417746.018	2479.764	TOE
2172	714043.883	2417745.216	2479.183	TBD
2173	714042.936	2417745.434	2476.865	TOD
3331	714032.065	2417742.579	2476.992	TOD
3332	714038.986	2417744.882	2476.15	FLD

PD 12-D US

2152	713973.208	2417833.007	2481.858	TOP
2153	713979.65	2417835.929	2479.958	TOE
2154	713984.732	2417838.081	2480.006	TBD
2155	713985.843	2417838.37	2477.286	TOD
2156	713989.869	2417840.588	2477.157	FLD
2157	713989.107	2417840.194	2480.398	WSR
2158	713993.767	2417842.087	2476.729	TOD
2159	713994.544	2417842.818	2479.638	TBD
2175	714019.793	2417847.808	2482.467	TOP
2176	714017.302	2417845.257	2479.511	TOE
2177	714018.018	2417845.651	2480.653	HWM?

PURDAM 13 - STA 165+20

PD 13-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
74	713392.043	2421013.72	2491.247	SETMAG*ABOVE-PIPE
2027	713538.585	2421116.036	2490.048	FND58*NOCAP
2068	713383.232	2421029.109	2491.465	FND58*NOCAP
2298	713476.436	2420787.871	2495.593	TOP
2299	713485.605	2420796.229	2490.21	TOE
2300	713490.255	2420800.914	2489.838	TOP
2301	713493.539	2420806.424	2485.774	TOE
2302	713497.758	2420809.222	2485.663	TBD
2303	713498.653	2420809.952	2483.108	TOD
2304	713497.66	2420808.852	2486.965	WSR
2313	713518.938	2420824.387	2488.709	TOP
2314	713516.148	2420820.906	2486.297	TOE
2315	713507.327	2420818.388	2486.238	TBD
2316	713505.594	2420817.36	2483.379	TOD
2317	713519.899	2420819.32	2487.629	HWM?

PD 13-B DS

2277	713436.543	2420890.89	2486.72	TOE
2278	713435.662	2420888.694	2487.801	HWM
2279	713437.005	2420891.565	2487.152	WSR
2280	713448.13	2420899.228	2486.309	TBD
2282	713452.82	2420903.337	2482.912	FLD
2283	713429.811	2420886.238	2490.147	TOP
2307	713476.33	2420911.712	2488.967	TOP
2308	713471.448	2420909.056	2486.012	TOE
2309	713460.375	2420905.532	2486.363	TBD
2310	713459.103	2420904.754	2482.818	TOD

PD 13-C DS

2237	713400.952	2420998.003	2489.889	PIPE*TOP-96IN-CMP
2242	713418.759	2420998.943	2488.149	HWM
2247	713404.5733	2421000.967	2486.862	TOE*TBD
2248	713405.28	2420999.972	2485.141	TOD
2249	713414.215	2421008.664	2490.172	TOP
2254	713385.525	2420983.128	2490.012	TOP
2262	713392.685	2420989.471	2487.018	TOE
2264	713396.251	2420995.659	2487.016	TBD
2265	713397.4	2420994.543	2484.949	TOD
2268	713398.536	2420989.065	2487.324	WSR
2269	713405.47	2420991.93	2484.263	FLD

PD 13-RD DS

2062	713405.865	2421022.637	2491.191	LIP
2067	713394.203	2421016.187	2491.362	LIP
2076	713345.778	2420997.132	2490.794	LIP

PD 13-RD US

2060	713389.577	2421052.003	2491.124	LIP
2069	713375.592	2421044.232	2491.273	LIP*PT
2074	713338.489	2421030.416	2490.757	LIP

PD 13-D US

2183	713386.574	2421068.442	2490.552	TOP
2187	713347.694	2421044.8	2490.937	TOP*EG
2190	713349.296	2421057.895	2487.862	HWM
2193	713366.403	2421059.736	2483.912	FLD
2194	713362.923	2421056.815	2484.495	TOD
2195	713363.176	2421055.593	2486.45	TBD
2197	713355.823	2421054.76	2486.851	TOE
2200	713371.544	2421062.251	2485.516	TOD
2201	713371.748	2421062.152	2486.671	TBD
2204	713374.162	2421060.271	2487.145	TOE
2236	713367.066	2421058.559	2489.987	PIPE*TOP-96IN-CMP

PD 13-E US

2208	713325.191	2421167.201	2489.555	TOP
2209	713318.28	2421163.68	2486.804	TOE
2210	713309.713	2421157.459	2486.725	TBD
2211	713309.137	2421157.119	2484.031	TOD
2229	713288.73	2421148.781	2490.632	TOP
2230	713295.507	2421153.837	2487.043	TBD
2231	713296.769	2421154.331	2484.301	TOD
2232	713300.3438	2421156.174	2483.58	FLD
2233	713296.862	2421155.074	2487.557	WSR
2234	713294.248	2421152.508	2487.885	HWM

PD 13-F US (NEXT PAGE)

PD 13-F US

2213	713288.904	2421240.772	2489.304	TOP
2214	713282.419	2421237.209	2487.045	TOE
2215	713273.181	2421231.275	2487.159	TBD
2216	713272.266	2421230.845	2484.517	TOD
2217	713265.387	2421229.076	2484.315	FLD
2218	713265.791	2421228.977	2487.921	WSR
2219	713261.58	2421226.38	2484.508	TOD
2220	713260.857	2421226.185	2486.832	TBD
2221	713256.067	2421222.743	2487.395	TOE
2222	713255.874	2421219.659	2488.711	HWM
2223	713251.597	2421217.493	2490.856	TOP

PURDAM 14-STA 117+10

PD 14-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
75	712725.433	2421829.813	2494.198	SETMAG*3s-FOGLINE
76	712724.264	2422259.713	2494.813	SETMAG*FOGLINE
77	712748.219	2422056.309	2494.578	SETMAG*FOGLINE
4181	712882.224	2421877.281	2494.622	TOP
4182	712891.111	2421881.685	2489.361	HWM?
4183	712892.95	2421882.834	2488.051	TOE
4184	712896.017	2421884.946	2486.96	TBD
4185	712897.021	2421885.528	2485.19	TOD
4186	712897.091	2421885.469	2488.415	WSR
4187	712899.835	2421885.375	2484.942	FLD
4188	712905.1	2421889.16	2485.077	TOD
4189	712907.175	2421891.094	2488.16	TBD
4190	712910.942	2421892.86	2488.295	TOE
4191	712916.458	2421898.41	2491.375	TOP

PD 14-B DS

4166	712868.479	2421981.942	2491.467	TOP*FNC
4167	712863.003	2421973.701	2488.194	TOE
4168	712859.425	2421970.764	2487.848	TBD
4169	712858.256	2421970.254	2488.688	WSR
4170	712857.944	2421970.122	2485.058	TOD
4171	712855.73	2421966.417	2485.053	FLD
4172	712852.924	2421966.193	2485.211	TOD
4173	712851.255	2421965.472	2487.387	TBD
4174	712847.758	2421962.225	2487.956	TOE
4175	712836.335	2421955.532	2495.123	TOP
4176	712844.943	2421959.752	2490.144	HWM?

PD 14-C DS

4156	712813.166	2421981.502	2495.243	TOP
4157	712824.541	2421990.065	2488.057	TOE
4159	712830.144	2421996.56	2487.585	TBD
4160	712832.611	2421995.301	2488.723	WSR
4161	712831.477	2421997.046	2485.661	TOD
4162	712835.275	2421999.274	2485.391	FLD
4163	712838.108	2422002.83	2485.518	TOD
4164	712839.85	2422004.171	2488.085	TBD*TOE
4165	712843.556	2422009.504	2491.634	TOP*FNC

PD 14-D DS

3739	712756.027	2422031.603	2493.942	TOP
3783	712767.216	2422065.146	2493.124	TOP
4098	712763.121	2422049.382	2492.113	PIPE*TOP-7FT-CMP
4101	712761.65	2422042.868	2489.662	TBD
4102	712762.508	2422044.678	2486.912	TOD
4103	712761.807	2422046.318	2490.285	HWM
4104	712763.777	2422048.442	2489.084	WSR
4105	712763.659	2422049.083	2485.606	FLD
4106	712764.736	2422052.256	2485.721	TOD
4107	712764.892	2422054.191	2488.591	TBD

PD 14-RD

3715	712748.754	2422155.913	2494.466	EP
3722	712749.294	2422066.397	2494.477	EP
3743	712750.779	2421959.994	2494.192	EP

PURDAM 15-STA 177+50

PD 15-RD

3718	712725.219	2422156.336	2494.508	EP
3719	712725.303	2422066.945	2494.57	EP
3747	712726.206	2421959.713	2494.397	EP

PD 15-A US

3776	712701.533	2422058.702	2492.873	TOP
3780	712715.045	2422083.332	2493.683	TOP
4074	712707.62	2422071.071	2491.919	PIPE*TOP-7FT-CMP*RND
4077	712703.932	2422065.751	2488.721	TBD
4078	712705.194	2422068.221	2486.255	TOD
4080	712707.205	2422071.445	2485.752	FLD
4081	712709.22	2422075.119	2489.981	HWM
4082	712709.088	2422076.154	2488.173	TBD*TOE-END
4083	712708.522	2422075.521	2486.367	TOD

PD 15-B US

4061	712673.926	2422101.088	2488.689	TBD
4062	712676.139	2422101.45	2486.068	TOD
4063	712679.7062	2422104.28	2485.28	FLD
4065	712667.413	2422099.632	2492.301	TOP
4084	712684.684	2422110.196	2485.731	TOD
4086	712686.983	2422110.735	2488.248	TBD
4087	712694.242	2422113.705	2489.03	TOE
4089	712710.002	2422117.043	2493.656	TOP

PD 15-C US

4051	712652.22	2422157.308	2493.593	TOP
4054	712661.645	2422160.64	2489.198	TOE
4055	712659.22	2422159.54	2490.031	HWM
4056	712672.57	2422164.535	2488.557	TBD
4057	712673.756	2422164.478	2489.164	WSR
4058	712673.897	2422164.396	2486.384	TOD
4059	712676.608	2422164.263	2486.03	FLD
4092	712684.41	2422169.962	2486.161	TOD
4093	712685.604	2422169.956	2488.296	TBD
4094	712691.727	2422168.994	2489.069	TOE
4095	712709.404	2422169.296	2493.972	TOP

PD 15-D US

3788	712698.396	2422262.914	2492.626	TOP
4034	712692.689	2422264.971	2489.308	TOE
4035	712694.755	2422265.018	2490.49	HWM
4036	712685.92	2422264.623	2488.818	TBD
4037	712685.165	2422264.709	2485.974	TOD
4039	712679.472	2422264.39	2486.016	FLD
4040	712674.359	2422265.748	2485.933	TOD
4041	712673.375	2422265.636	2488.754	TBD
4042	712673.76	2422265.874	2489.301	WSR
4043	712666.656	2422266.107	2489.221	TOE
4045	712655.459	2422264.221	2494.97	TOP

PURDAM 16-STA 193+90

PD 16-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
78	712875.619	2422922.906	2498.72	SETMAG*FOGLINE
79	712474.183	2422916.854	2495.983	SETMAG*FOGLINE
80	712677.896	2422894.541	2495.863	SETMAG*EP*CL-PIPE
2026	712678.241	2422935.961	2493.887	FNDX*TOP-CMP
3925	712698.499	2422675.836	2493.989	TOP
4020	712654.33	2422673.559	2494.29	TOP
4021	712660.164	2422673.314	2493.171	GB
4022	712667.149	2422673.408	2489.653	TOE
4023	712664.941	2422673.784	2490.699	HWM
4024	712670.143	2422675.276	2489.837	TBD
4025	712671.423	2422675.643	2489.822	WSR
4026	712671.128	2422675.316	2486.361	TOD
4027	712675.828	2422674.87	2485.651	FLD
4028	712681.314	2422675.596	2486.309	TOD
4029	712684.72	2422675.834	2489.06	TBD
4030	712691.183	2422675.567	2490.044	TOE

PD 16-B DS

3921	712701.454	2422785.437	2494.568	TOP
4005	712689.627	2422783.401	2490.038	TOE
4006	712681.592	2422783.428	2489.727	TBD
4007	712679.797	2422781.911	2489.966	WSR
4008	712679.849	2422783.231	2486.645	TOD
4009	712673.917	2422783.472	2486.729	FLD
4010	712668.951	2422781.868	2486.864	TOD
4011	712668.258	2422781.485	2489.969	TBD
4012	712664.007	2422785.796	2490.651	HWM
4013	712660.123	2422780.038	2492.414	TOP

PD 16-C DS

3895	712704.34	2422876.357	2495.68	TOP
3981	712658.173	2422877.976	2494.271	TOP
3983	712665.868	2422875.739	2490.457	TOE
3990	712677.243	2422877.485	2492.73	PIPE*TOP-8FT-CMP*ROUND
3995	712689.859	2422873.617	2492.238	GB
3998	712685.415	2422873.97	2490.565	TOE*END
3999	712683.757	2422873.686	2490.24	TBD
4000	712682.112	2422873.015	2487.612	TOD
4002	712677.097	2422877.198	2487.102	FLD
4003	712671.253	2422876.026	2488.06	TOD
4004	712670.955	2422875.605	2490.489	TBD

PD 16-RD DS

3864	712582.565	2422895.438	2495.655	EP
3891	712677.917	2422894.164	2495.849	EP
3899	712700.664	2422886.615	2495.743	EP

PD 16-RD US

3850	712702.276	2422925.519	2496.114	EP
3851	712683.712	2422919.307	2496.083	EP
3861	712582.122	2422918.02	2495.829	EP

PD 16-D US

3848	712702.81	2422949.962	2495.473	TOP
3855	712661.406	2422932.918	2495.25	TOP
3939	712678.227	2422937.532	2493.899	PIPE*TOP-8FT-CMP
3940	712669.536	2422937.59	2490.394	TOE*END
3941	712673.987	2422938.076	2489.637	TBD
3942	712674.797	2422938.166	2487.779	TOD
3946	712678.794	2422937.81	2487.076	FLD
3947	712678.535	2422938.287	2490.033	WSR
3948	712683.355	2422938.056	2486.945	TOD
3949	712685.277	2422938.744	2489.343	TBD*TOE-END
3951	712695.296	2422950.77	2490.748	TOE
3980	712673.771	2422937.387	2491.165	HWM

PD 16-E US

3952	712678.34	2423038.157	2493.712	TOP
3954	712670.768	2423032.864	2490.504	TOE
3955	712663.852	2423029.263	2489.864	TBD
3956	712662.874	2423029.115	2487.554	TOD
3957	712661.507	2423029.411	2490.379	WSR
3958	712657.47	2423028.858	2487.299	FLD
3959	712653.05	2423025.992	2487.948	TOD
3960	712652.35	2423025.707	2490.26	TBD
3961	712646.857	2423023.185	2491.302	TOE
3962	712637.505	2423020.917	2497.291	TOP

PD 13-F US (NEXT PAGE)

PD 16-F US

3966	712598.101	2423082.867	2495.835	TOP
3968	712604.928	2423088.782	2491.322	TOE
3970	712605.847	2423104.79	2489.687	TBD
3971	712606.556	2423104.935	2487.861	TOD
3972	712612.809	2423108.697	2487.21	FLD
3973	712618.388	2423112.228	2487.432	TOD
3974	712619.406	2423112.602	2489.658	TBD
3975	712626.279	2423115.103	2490.652	TOE
3976	712617.081	2423113.707	2490.518	WSR
3977	712627.947	2423115.571	2491.497	HWM
3978	712639.586	2423120.471	2493.771	TOP

PURDAM 17-STA 212+50

PD 17-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
70	711355.111'	2425463.326'	2498.20'	SET12*QCI
71	711383.591'	2425212.262'	2503.04'	SET12*QCI
4306	711376.830'	2425203.940'	2502.58'	FNDAC*FLSI-WC30
5293	711349.022'	2425438.659'	2499.27'	FND12*QCI-CTRL
4393	711487.9387	2424939.57	2498.18	TOP
4392	711496.669	2424943.12	2494.77	TOE
4391	711499.595	2424947.91	2493.72	TBD
4390	711500.814	2424947.77	2493.72	WSR
4389	711501.713	2424949.643	2490.21	TOD
4388	711505.036	2424952.7	2489.79	FLD
4387	711510.503	2424956.188	2489.8	TOD
4386	711514.051	2424957.324	2493.11	TBD
4385	711514.013	2424957.678	2492.49	TOE
4384	711516.903	2424958.352	2495.08	HWM
4383	711526.134	2424963.878	2501.02	TOP

PD 17-B DS

4366	711394.537	2425121.817	2500.81	TOP
4370	711408.667	2425127.014	2495.89	HWM
4369	711409.27	2425125.728	2492.75	TBD
4371	711412.01	2425126.891	2490.4	TOD
4374	711415.134	2425128.283	2493.83	WSR
4372	711415.27	2425127.402	2490.23	FLD
4373	711415.489	2425128	2495.15	PIPE*TOP*5.5FT*CONC
4375	711416.864	2425127.745	2490.25	TOD
4376	711419.685	2425129.038	2492.76	TBD
4377	711424.326	2425128.35	2493.75	TOE
4378	711440.646	2425135.875	2501.49	TOP

PD 17-RD DS

4365	711398.959	2425131.814	2501.36	TOP
4364	711415.023	2425141.371	2501.75	TOP
4363	711436.61	2425140.717	2501.96	TOP

PD 17-RD US

4353	711352.238	2425217.402	2501.74	TOP
4349	711402.058	2425226.997	2502.06	TOP
4346	711449.477	2425230.866	2502.34	TOP

PD 17-C US

4315	711390.536	2425234.733	2497.54	TOP
4316	711393.409	2425236.07	2495.66	HWM
4317	711395.45	2425236.615	2492.98	TBD
4318	711396.73	2425236.833	2491.55	TOD
4324	711400.734	2425236.919	2491.05	FLD
4320	711401.226	2425235.797	2496.38	PIPE*TOP*6.5FT*CONC-BELL
4327	711405.379	2425238.915	2491.35	TOD
4328	711408.845	2425238.113	2494.58	TBD
4329	711413.633	2425242.978	2495.63	TOP

PD 17-D US

4309	711375.321	2425368.33	2501.16	TOP
500	711385.986	2425368.964	2595.36	TBD
4345	711386.933	2425369.039	2492.19	TOD
4344	711390.505	2425370.779	2490.3	FLD
4343	711397.002	2425376.54	2491.13	TOD
4342	711400.109	2425375.912	2494.54	WSR
4341	711401.333	2425374.924	2495.25	TBD
4339	711403.684	2425375.201	2495.56	TOE
4340	711404.562	2425374.7	2496.04	HWM
4337	711417.913	2425369.91	2500.83	TOP

PURDAM 18-STA 253+90

PD 18-A DS

PT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
102	709812.095	2428075.531	2511.17	SETMAG
282	709997.641	2427813.467	2506.54	TOP
283	710005.169	2427813.216	2502.43	GS
284	710007.885	2427812.983	2500.95	TBD
285	710009.599	2427813.326	2498.7	TOD
287	710015.082'	2427812.742'	2499.78'	WSR
286	710015.096	2427812.943	2498.3	FLD
288	710018.431	2427812.43	2498.34	TOD
289	710021.976	2427811.885	2500.59	TBD*HWL
290	710025.106	2427811.558	2502.26	GS
304	710036.158	2427813.765	2508.89	TOP
303	710042.719	2427816.011	2508.34	TOE
101	710208.556	2428077.265	2511.29	SETMAG

PD 18-B DS

279	709999.374	2427909.05	2506.67	TOP
293	710007.342	2427910.532	2501.4	TBD
291	710012.416	2427910.537	2499.02	TOD
295	710015.525	2427909.155	2500.06	WSR*4-15-15
294	710015.701	2427908.833	2498.72	FLD
296	710020.518	2427909.744	2499.1	TOD
297	710022.653	2427911.531	2501.48	TBD
299	710034.868	2427912.109	2509.36	TOP

PD 18-C DS

248	709997.072	2428032.617	2508.48	TOP*TOE
267	710006.771	2428033.601	2501.65	TBD
266	710009.96	2428034.109	2499.58	TOD
275	710014.42	2428034.413	2500.46	WSR*4-15-15
264	710014.749	2428034.58	2499.27	FLD
265	2428034.373'	710014.517'	2500.00'	PIPE*10H-6.5V*INV
263	710019.209	2428033.323	2499.17	TOD
262	710021.056	2428034.166	2500.9	TBD
244	710039.4	2428029.759	2509.07	TOP

PD 18-RD DS

138	709992.9735	2428049.309	2511.178	EP
142	710030.981	2428048.591	2511.161	EP

PD 18-RD US

134	709991.7651	2428078.5	2511.271	EP
146	710032.8861	2428079.256	2511.203	EP

PD 18-D US

218	2428108.16	709993.324	2510.22	TOP
187	2428095.088	710020.058	2502.8	TBD
186	2428094.681	710017.441	2500.84	TOD
185	2428094.563	710013.106	2501.44	WSR*4-15-15
184	2428094.659	710012.947	2500.17	PIPE*10H-6.5V*INV
183	2428094.726	710012.886	2500.24	FLD
182	2428094.598	710008.717	2500.75	TOD
181	2428094.762	710007.376	2502.09	TBD
172	2428108.028	710033.172	2507.49	TOP

PD 18-E US

216	2428206.327	709992.471	2509.1	TOP
198	2428206.387	710002.43	2501.92	TBD
197	2428206.481	710002.674	2500.91	TOD
195	2428205.899	710008.118	2500.07	FLD
196	2428205.876	710008.248	2501.62	WSR*4-15-15
194	2428206.148	710012.559	2500.1	TOD
193	2428205.867	710013.939	2501.44	TBD
191	2428206.392	710026.973	2507.64	TOP

PD 18-F US

211	2428315.386	709991.182	2508.71	TOP
209	2428316.035	710000.074	2502.54	TBD
208	2428316.048	710002.379	2500.62	TOD
206	2428316.173	710006.437	2501.76	WSR*4-15-15
207	2428315.921	710006.517	2500.22	FLD
205	2428315.848	710010.331	2500.37	TOD
204	2428316.389	710013.463	2502.6	TBD
202	2428315.389	710024.726	2507.6	TOP

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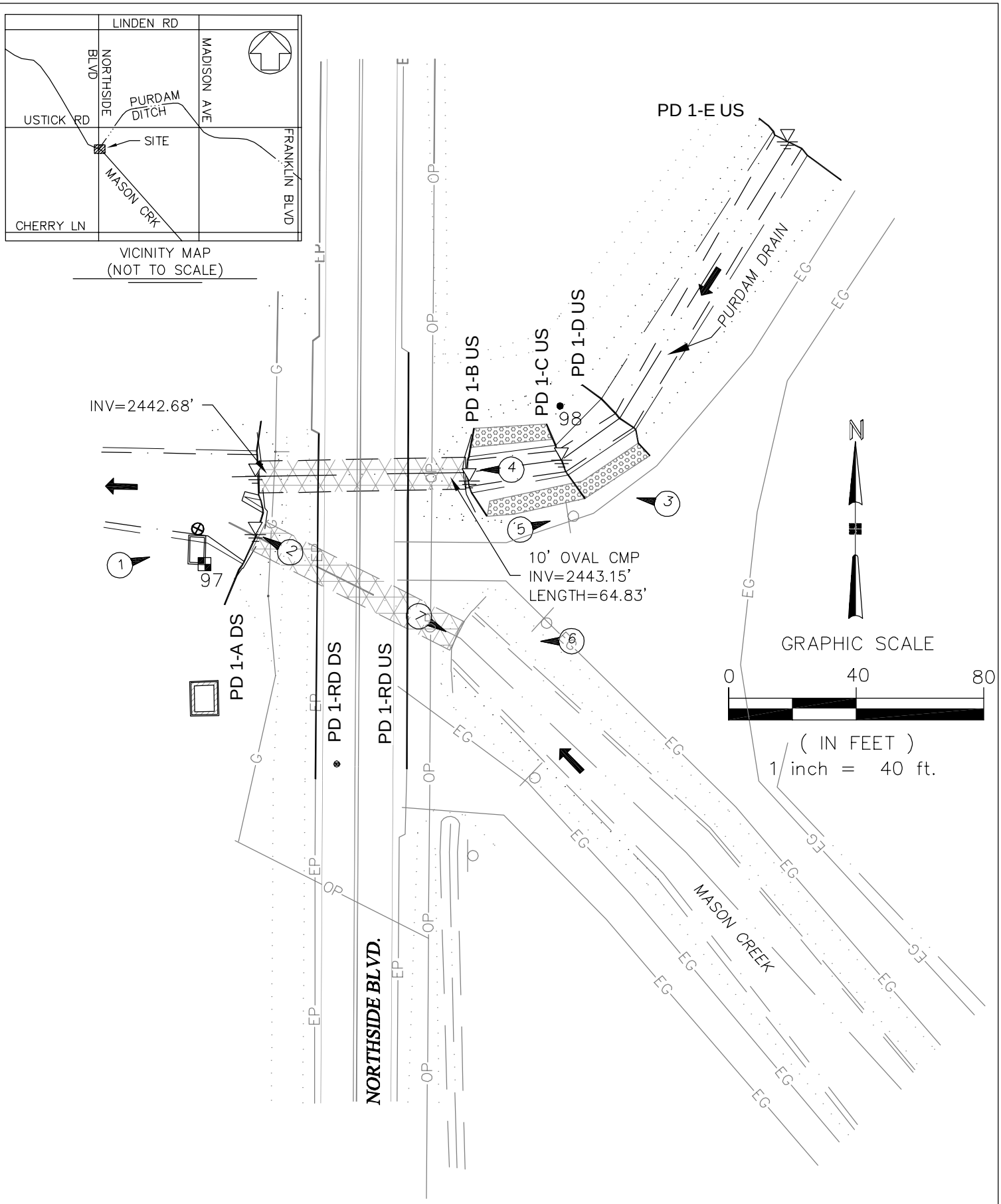
Appendix F

P1-18-SitePlans&Images



PURDAM 1 STA 0+50
DITCH SURVEY

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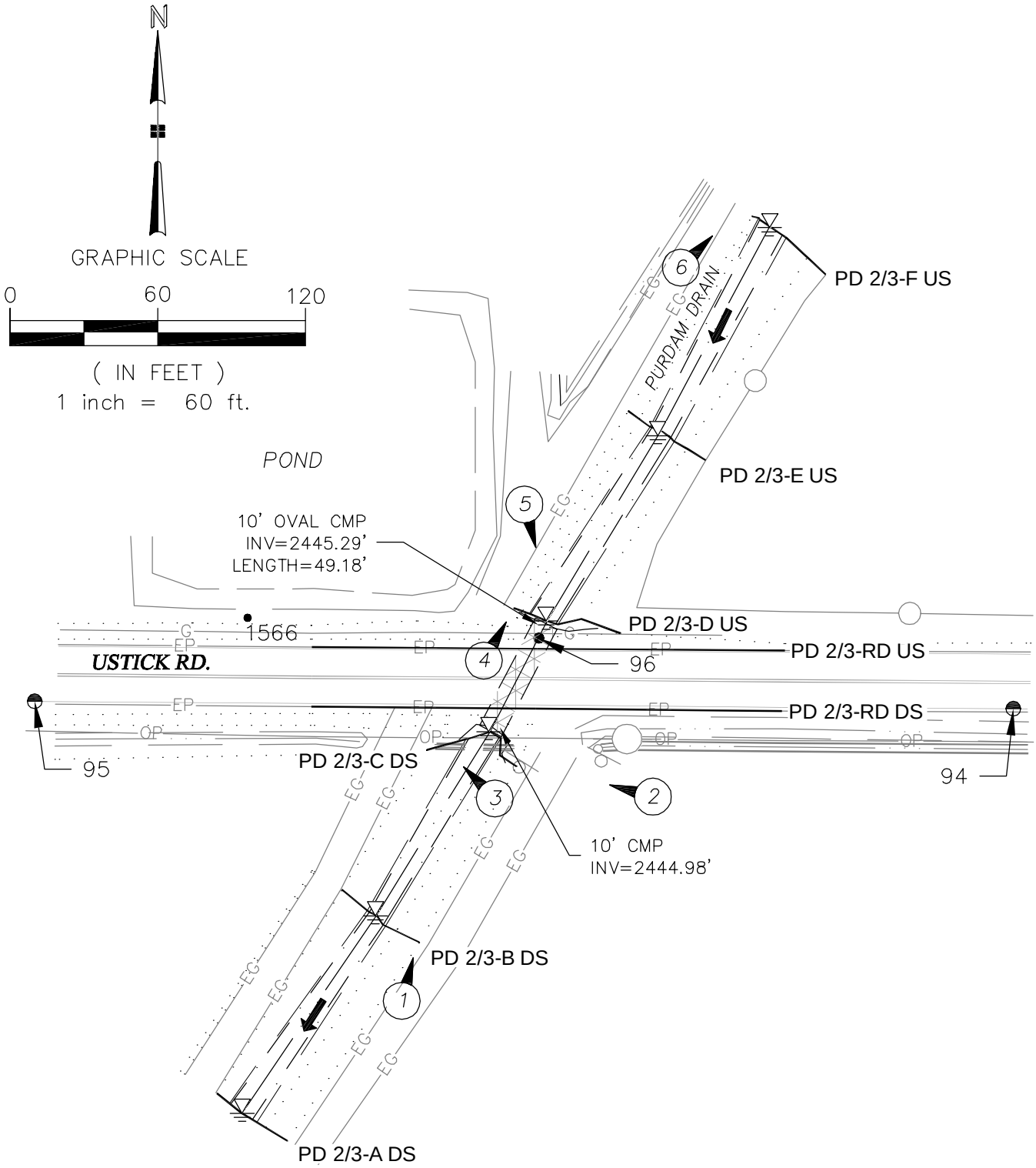

PURDAM 2-3 STA 7+20-7+50
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PURDAM 2-3 STA 7+20-7+50
PICTURES

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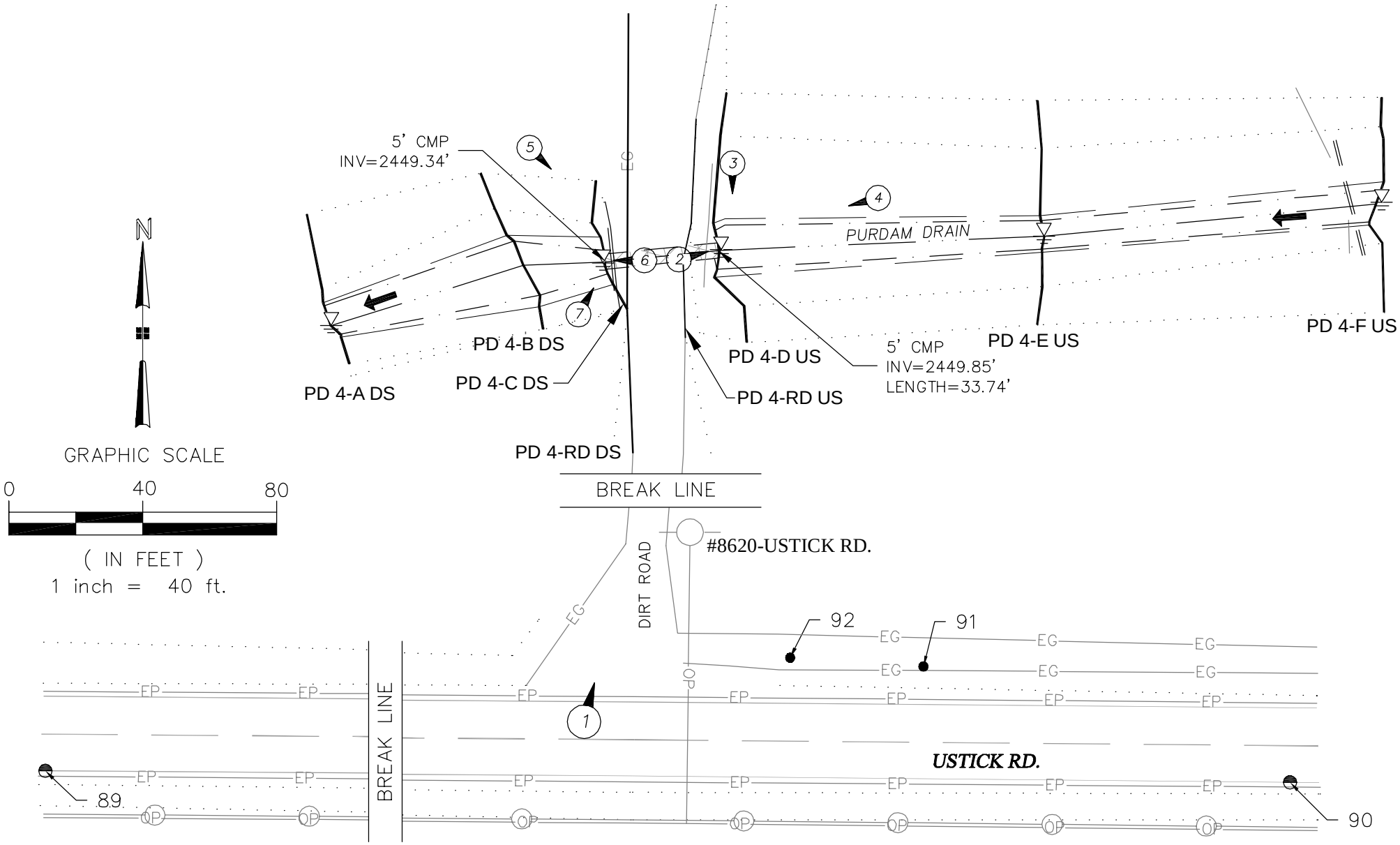

PURDAM 4 STA 23+80
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PURDAM 4 STA 23+80
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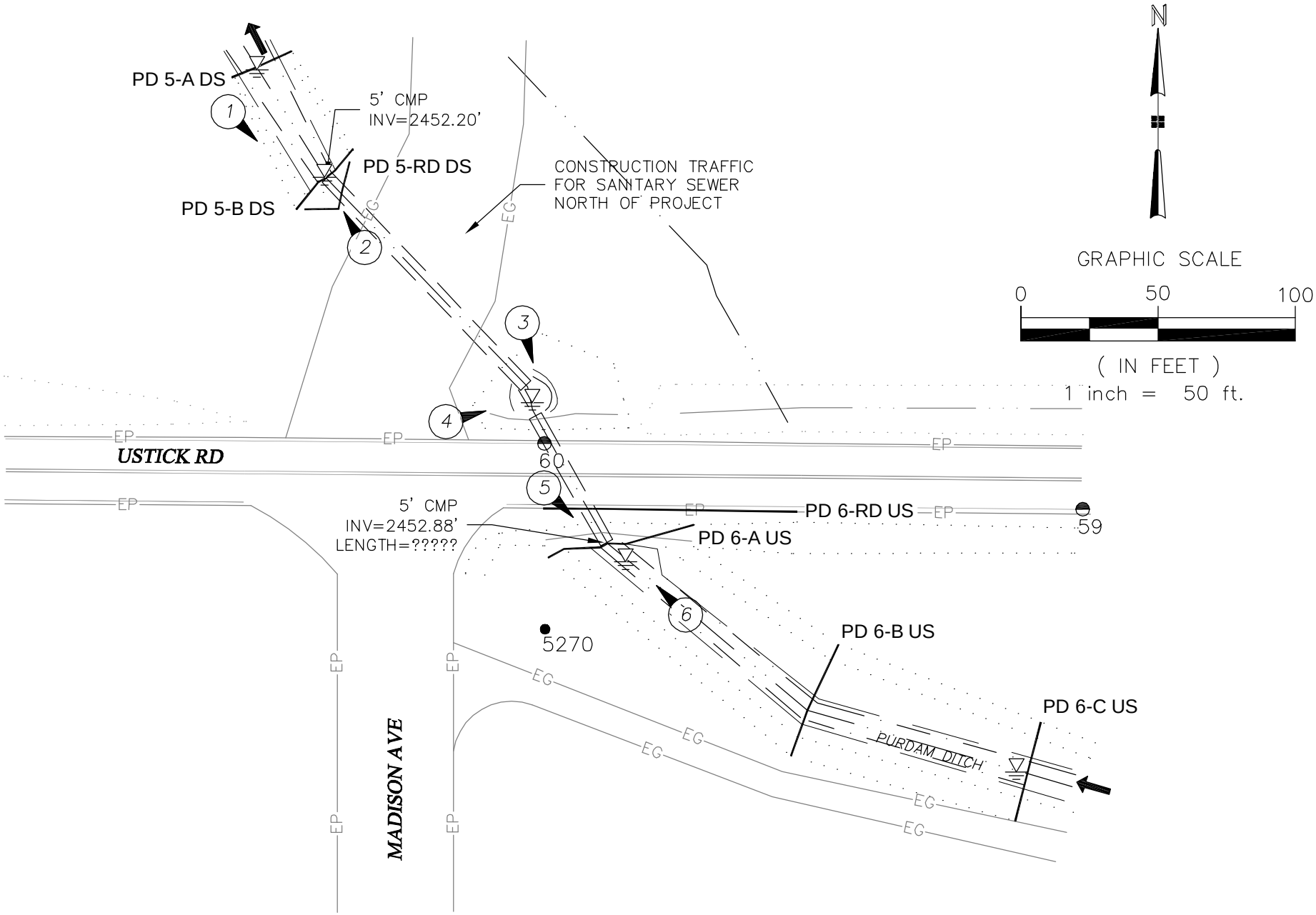

PURDAM 5-6 STA 33+10-34+00
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PURDAM 5-6 STA 33+10-34+00
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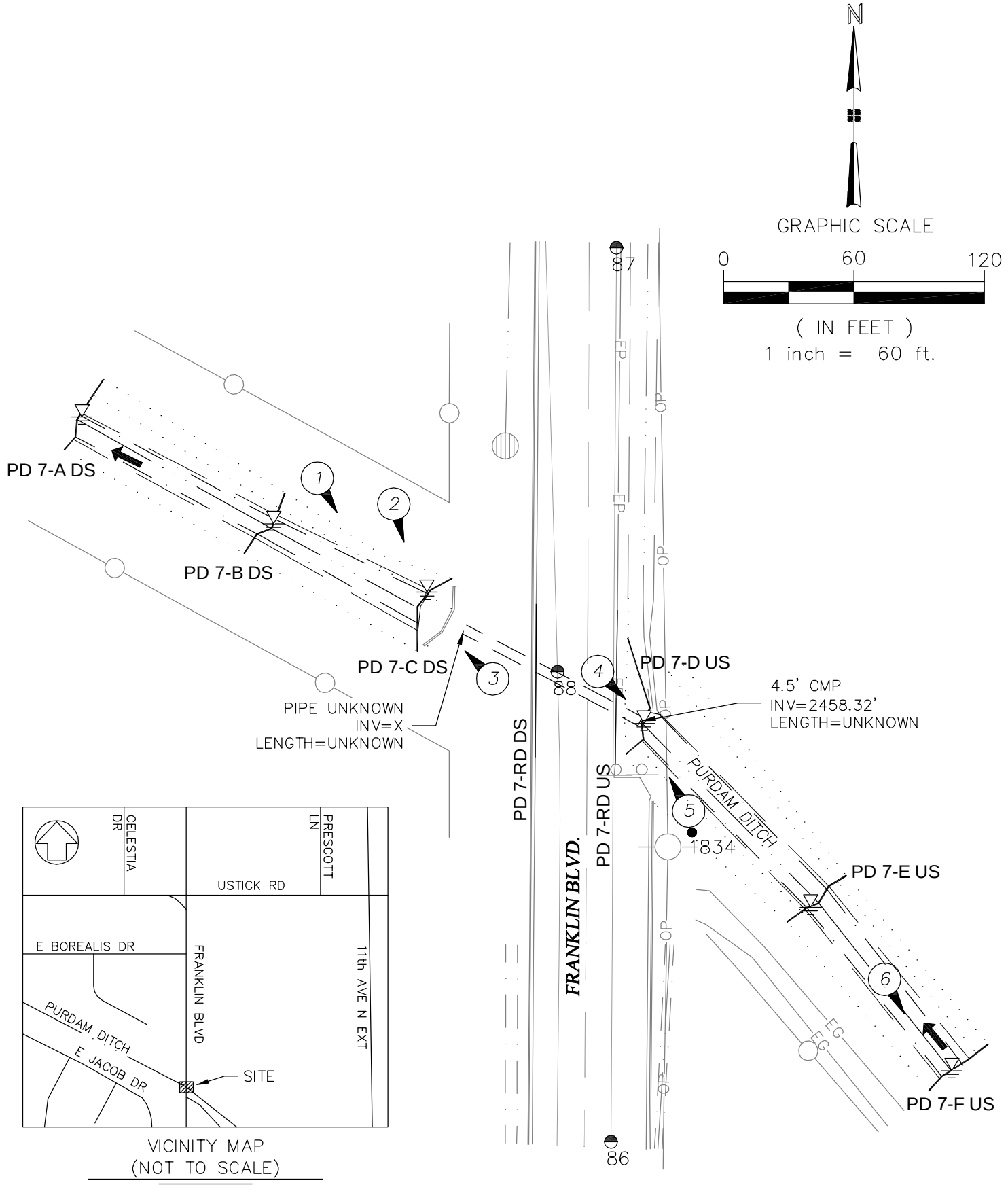

PURDAM 7 STA 62+50
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PURDAM 7 STA 62+50
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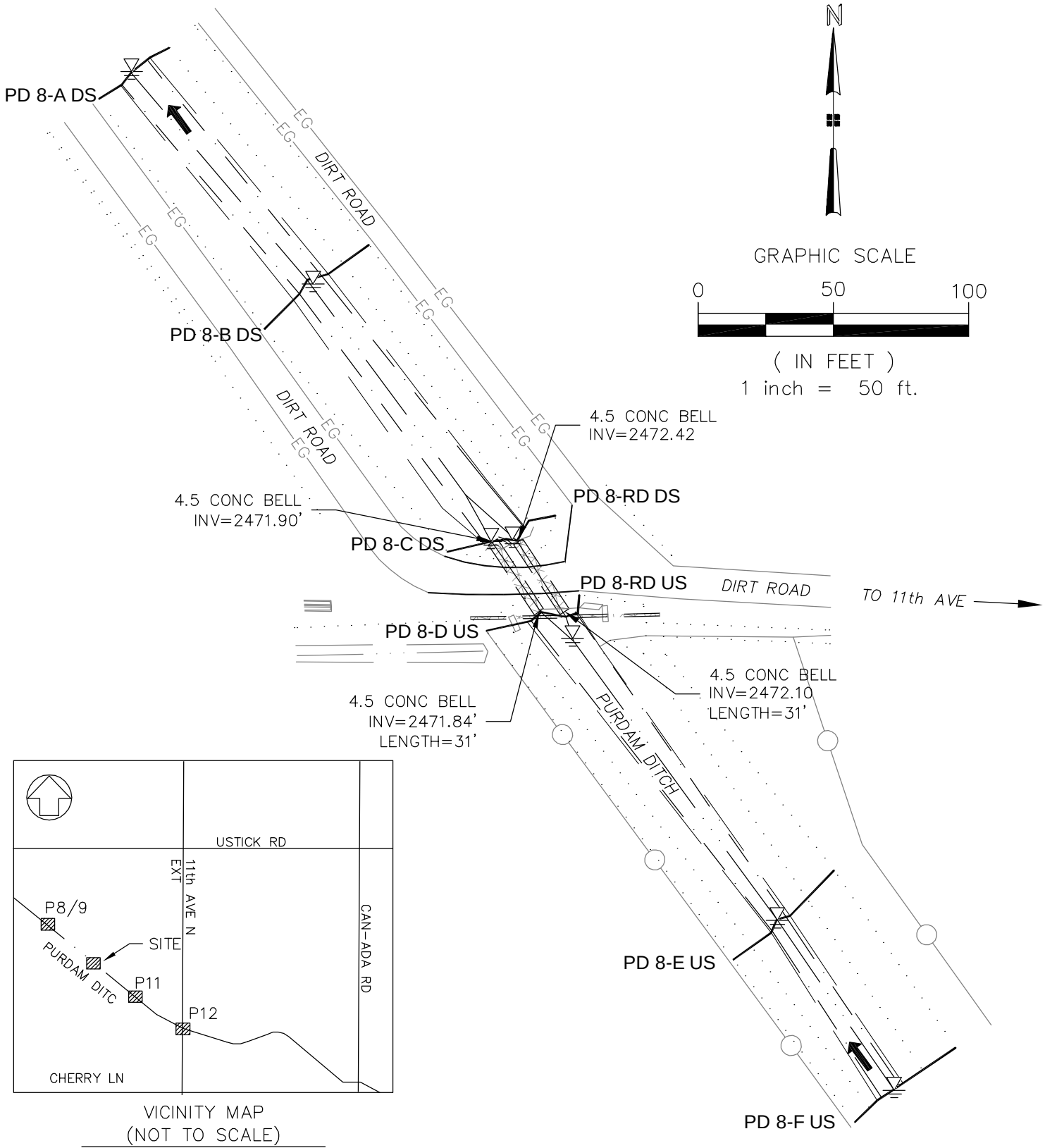

VICINITY MAP
(NOT TO SCALE)

PURDAM 8 STA 110+90
DITCH SURVEY

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PURDAM 8 STA 110+90
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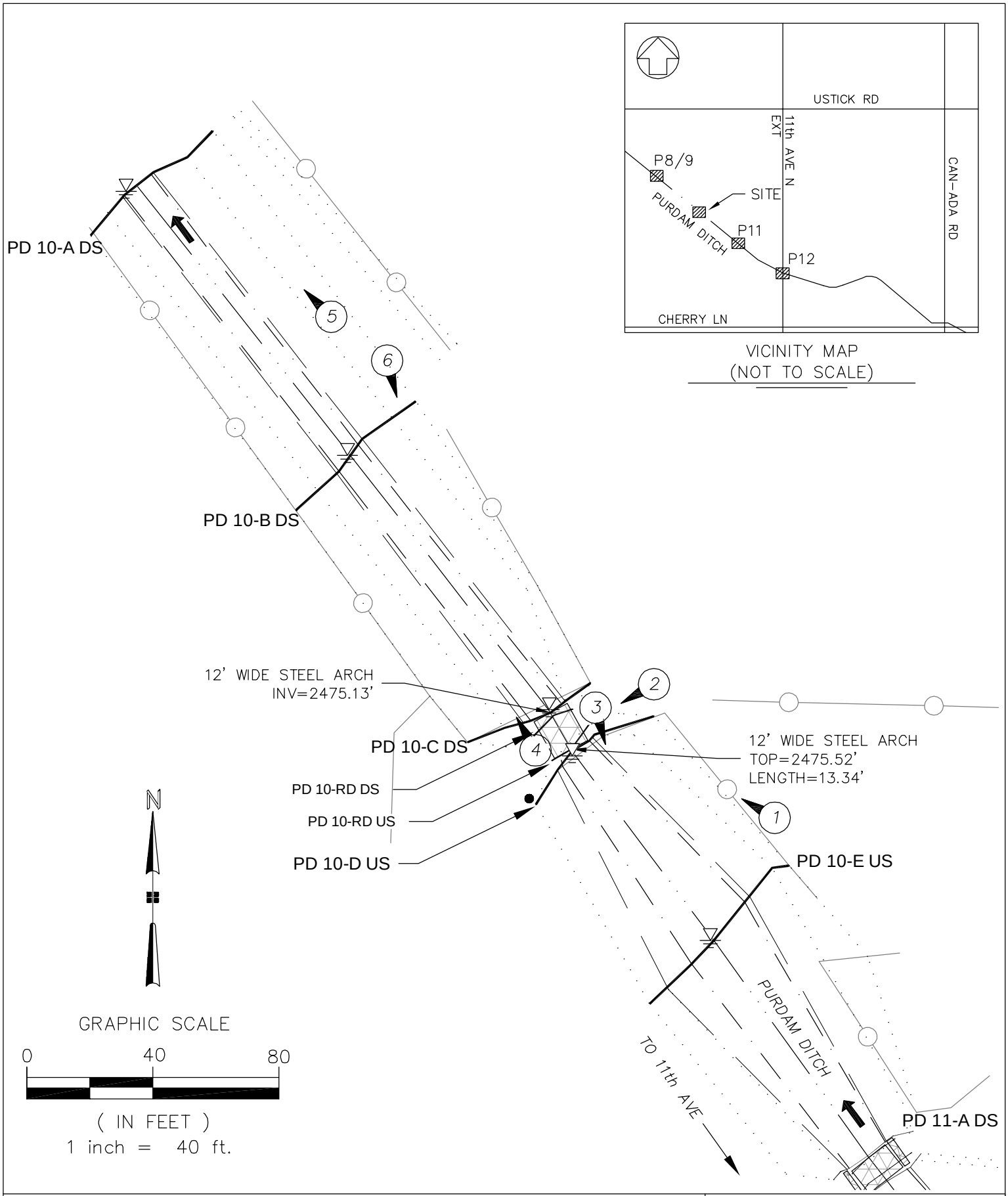

PURDAM 10 STA 123+50
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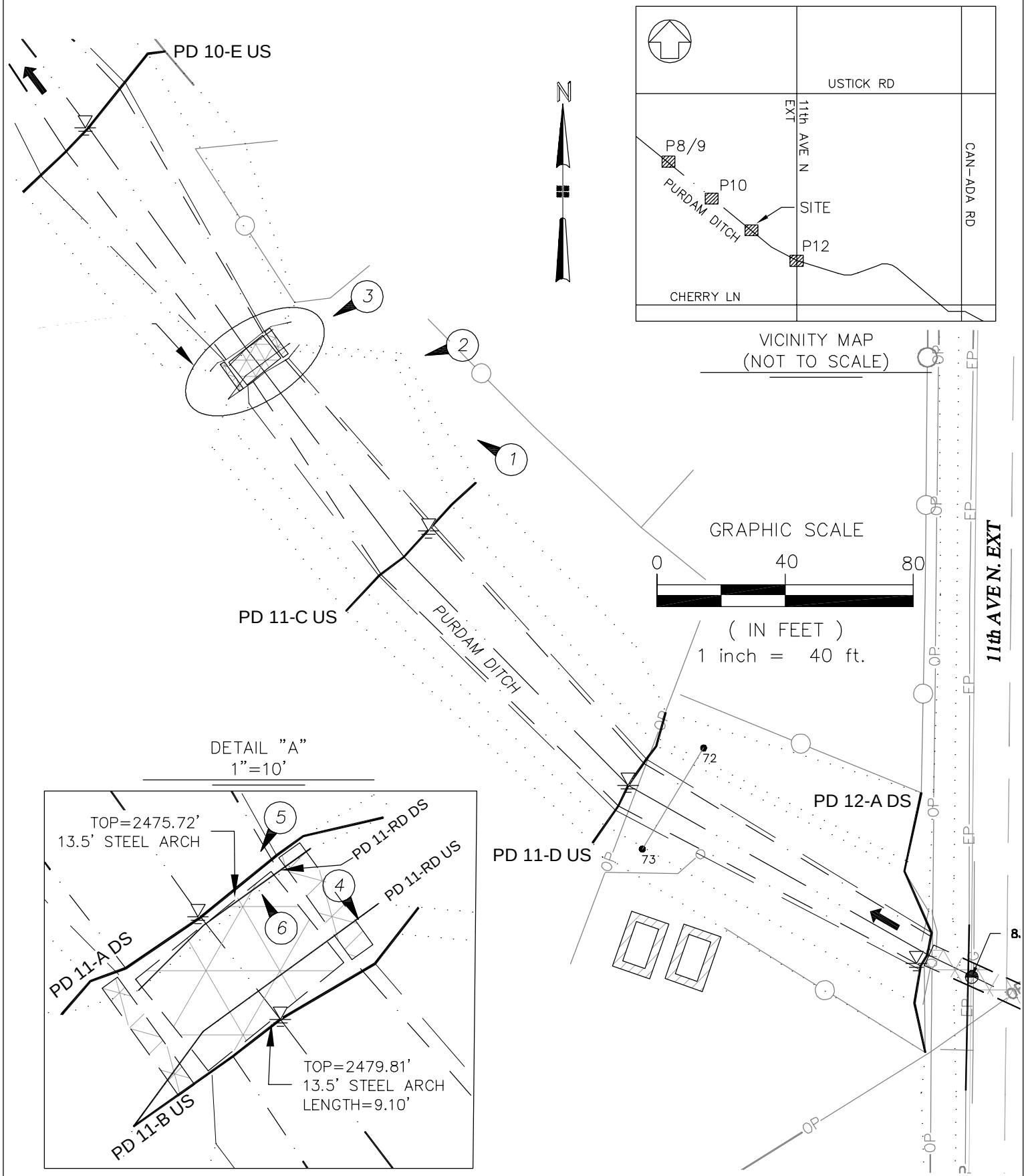

PURDAM 11 STA 125+20
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PURDAM 11 STA 125+20
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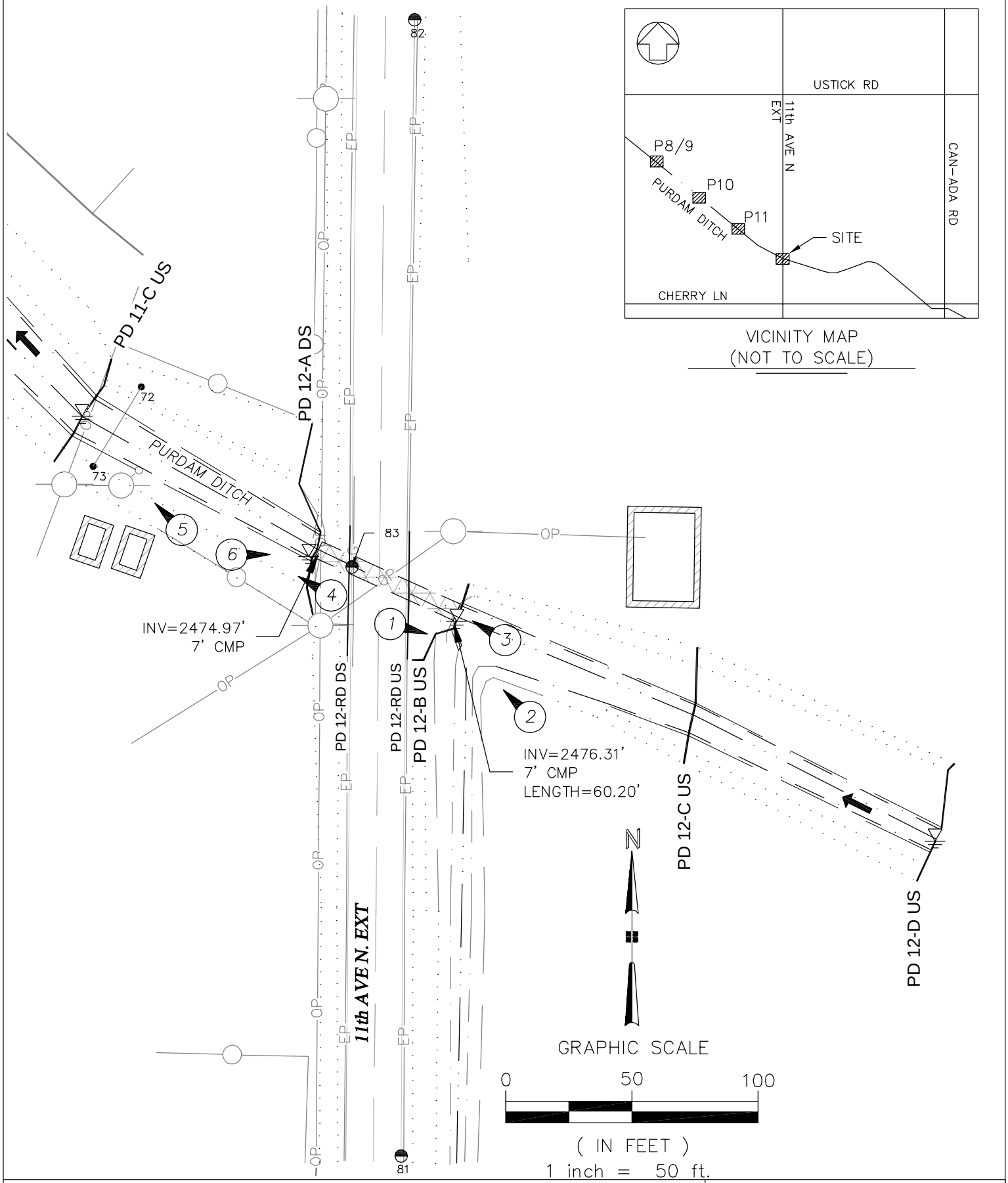

PURDAM 12 STA 128+40
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PURDAM 12 STA 128+40
DITCH SURVEY

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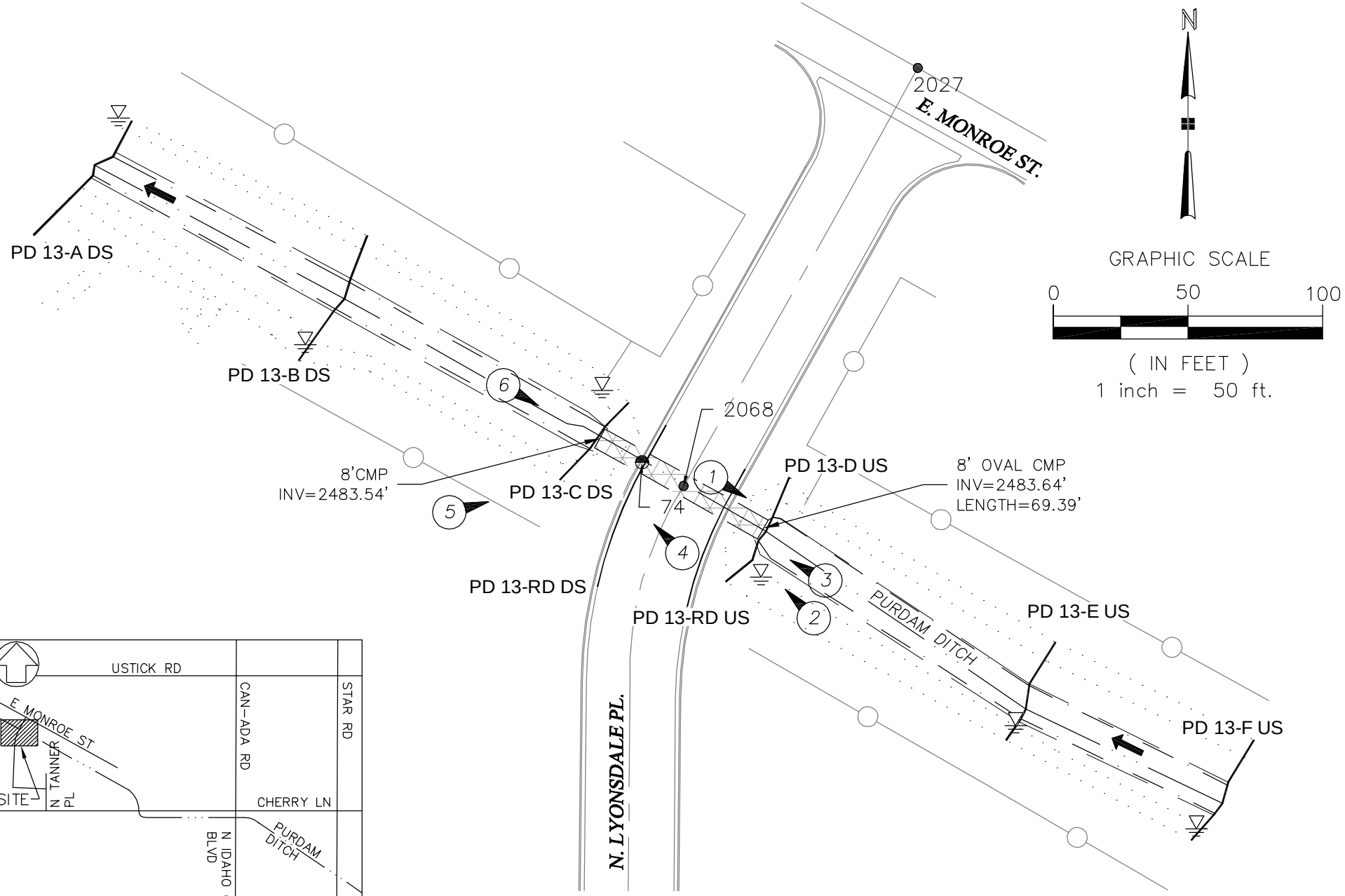

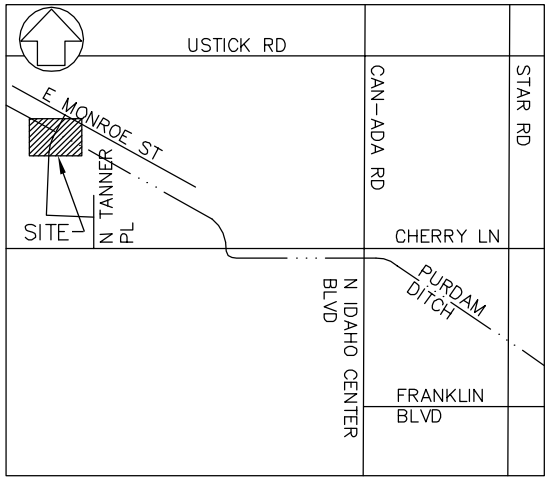

VICINITY MAP
(NOT TO SCALE)

PURDAM 13 STA 165+20
DITCH SURVEY

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PURDAM 13 STA 165+20
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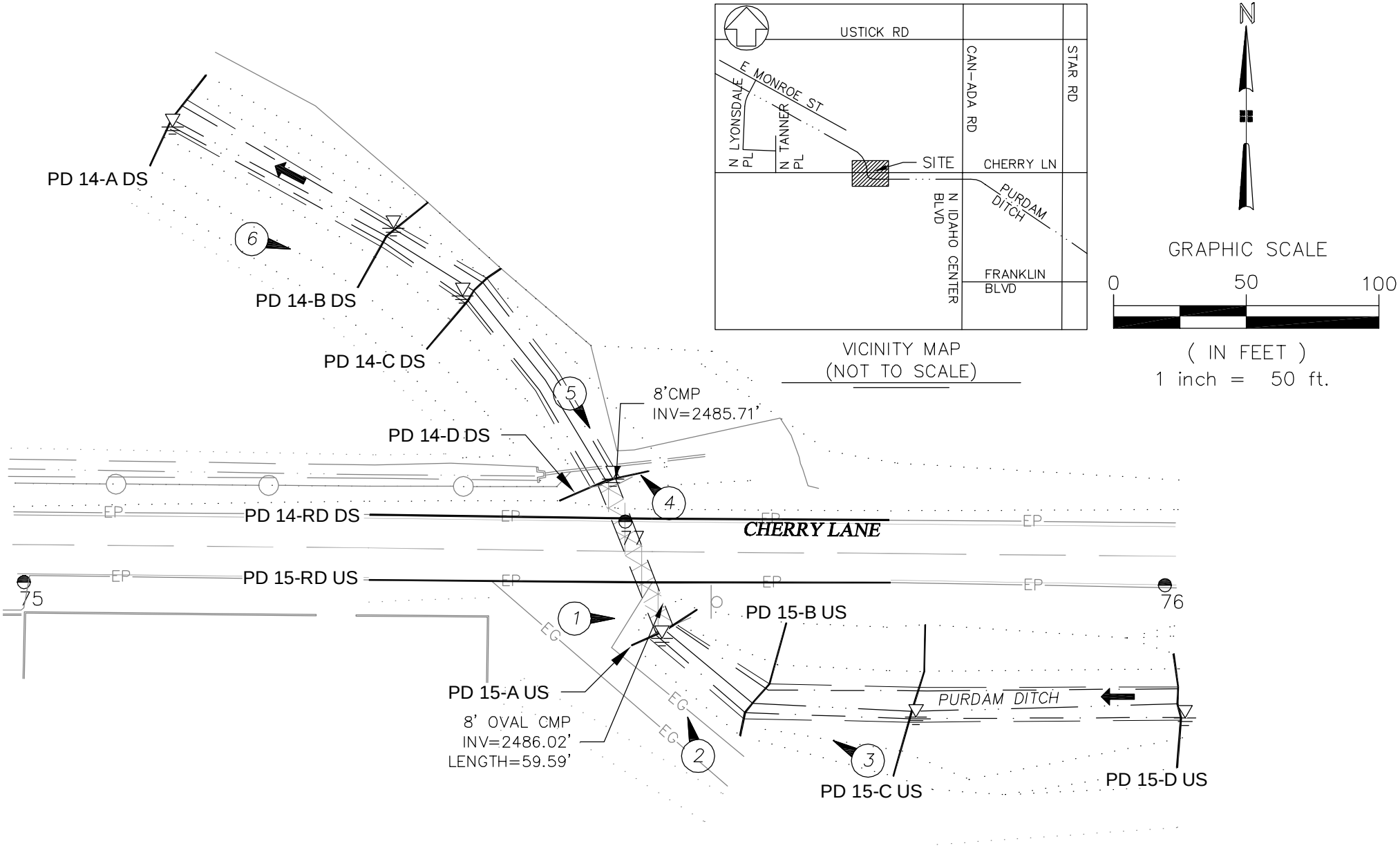

PURDAM 14-15 STA 117+10-117+50
DITCH SURVEY

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PURDAM 14-15 STA 117+10-117+50
DITCH SURVEY

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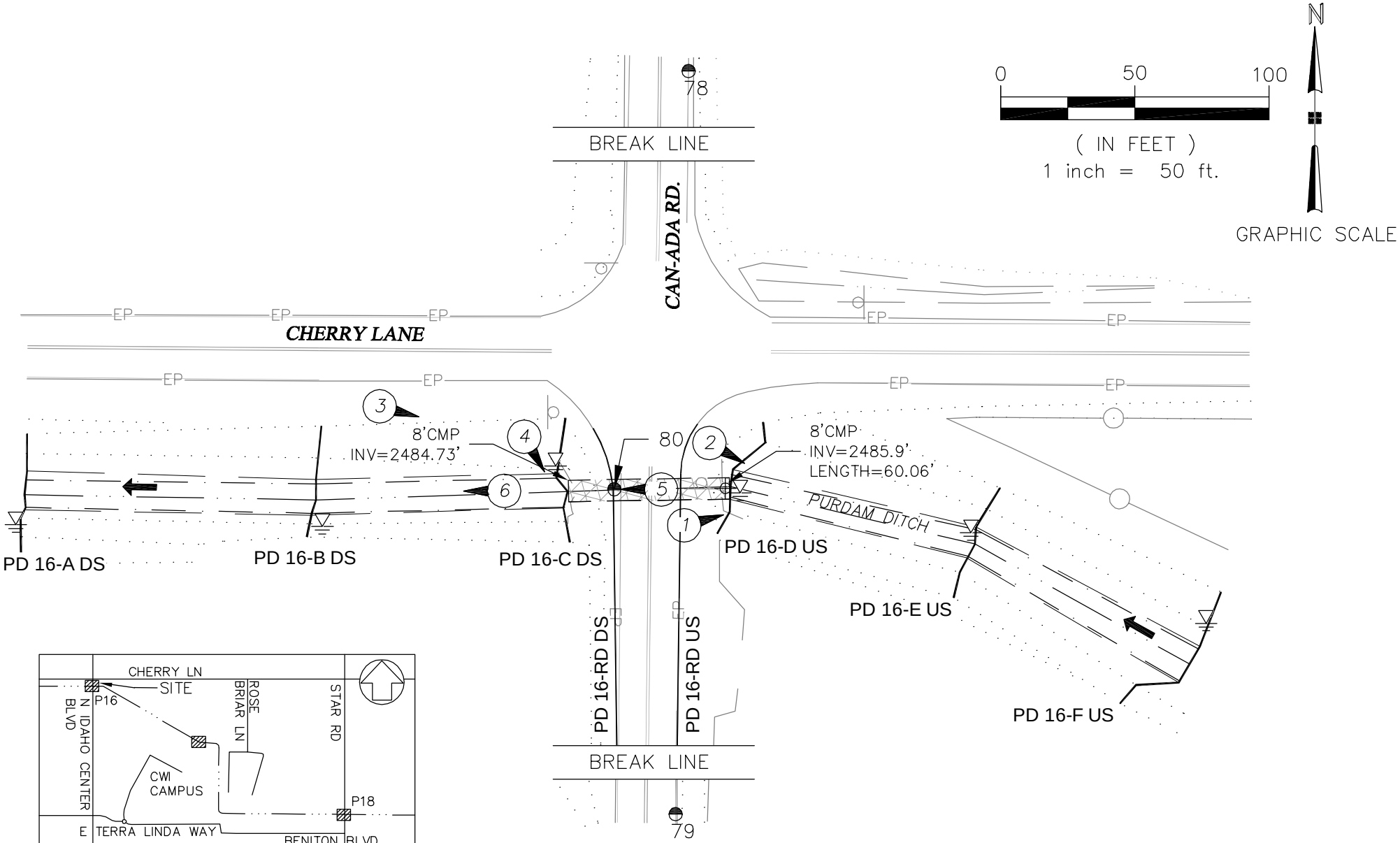

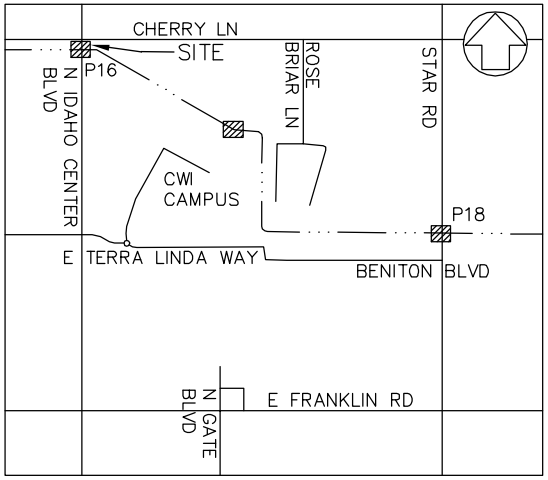

VICINITY MAP
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PURDAM 16 STA 193+90
DITCH SURVEY

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PURDAM 16 STA 193+90
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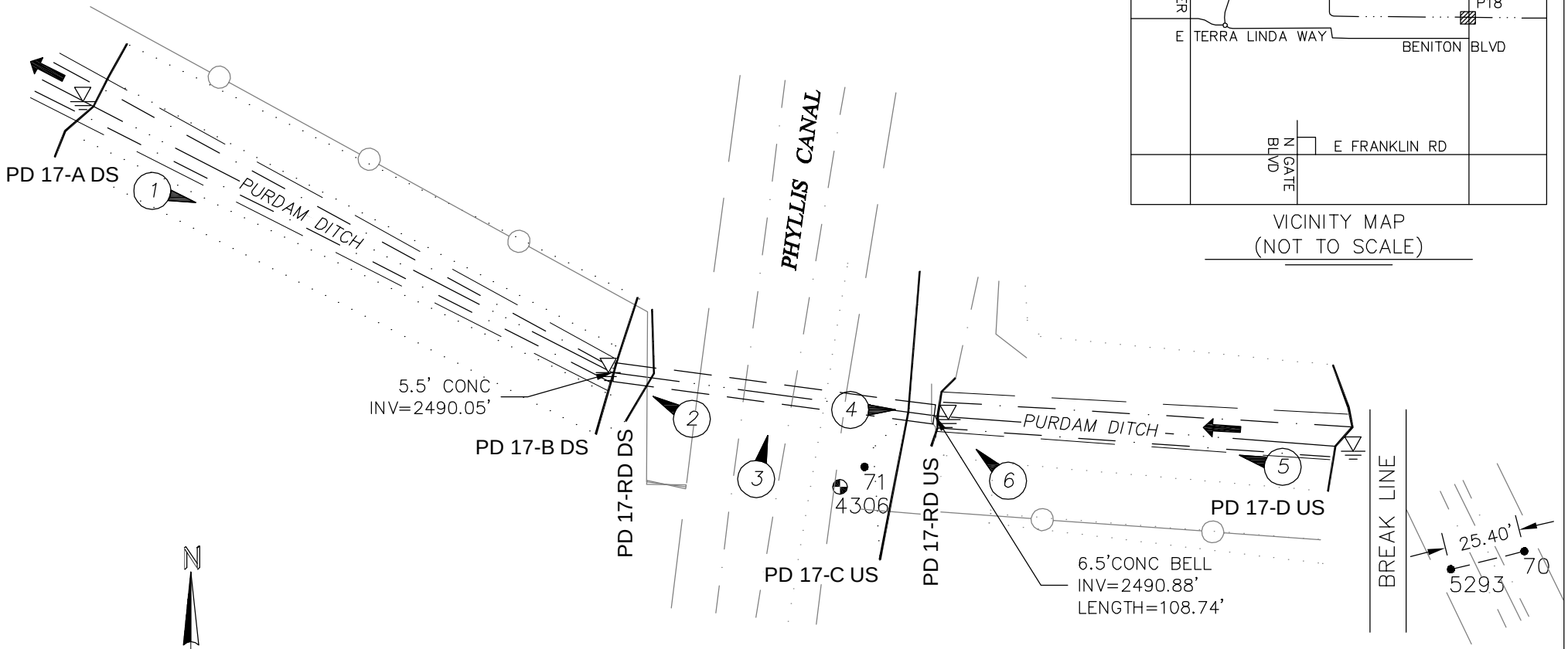

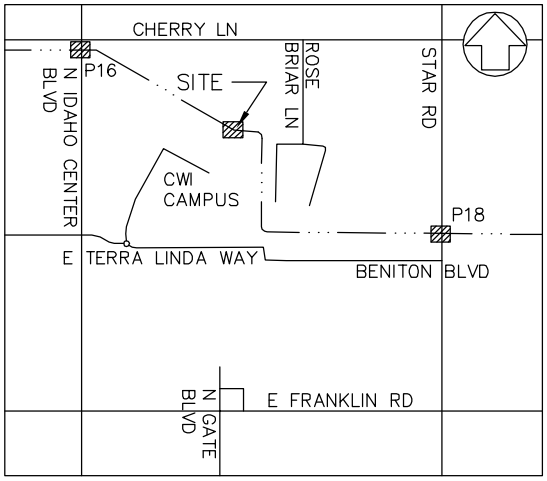

VICINITY MAP
(NOT TO SCALE)

N

GRAPHIC SCALE

0 50 100

(IN FEET)
1 inch = 50 ft.

PURDAM 17 STA 212+50
DITCH SURVEY

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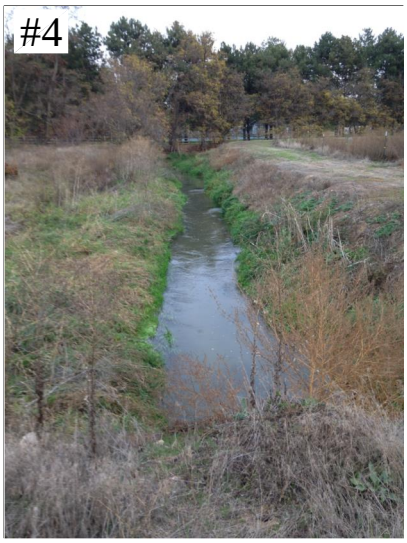
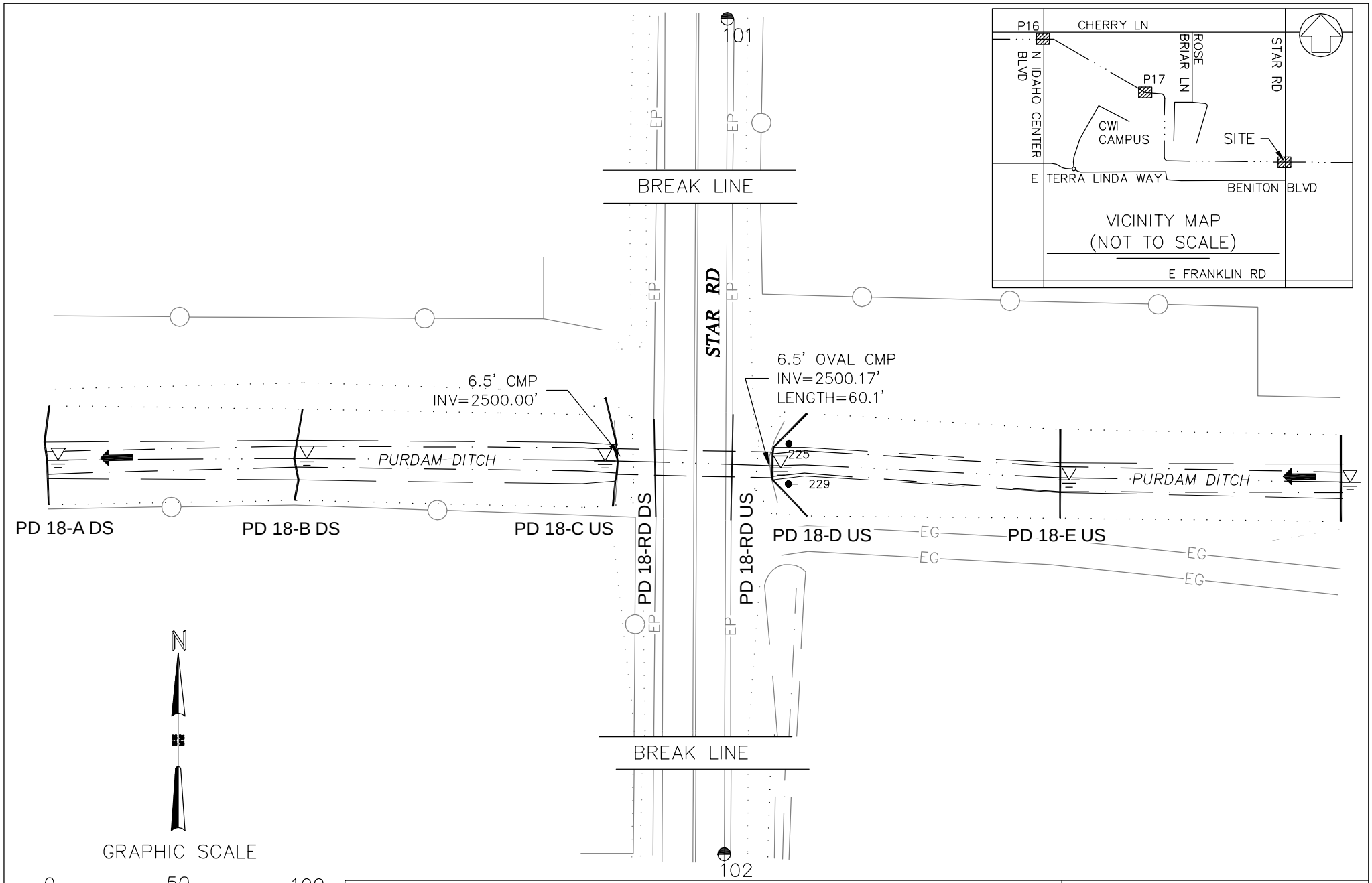


PURDAM 17 STA 212+50
DITCH SURVEY

Quadrant
Consulting, Inc.
1904 West Overland Road
Boise, Idaho 83705
(208) 342-0091 PHONE (208) 342-0092 FAX
CIVIL ENGINEERING-SURVEYING



N

GRAPHIC SCALE

0 50 100

(IN FEET)
1 inch = 50 ft.

PURDAM 18 STA 253+90
DITCH SURVEY

Quadrant
Consulting, Inc.
1904 West Overland Road
Boise, Idaho 83705
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PURDAM 18 STA 253+90
DITCH SURVEY

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Consulting, Inc.
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Boise, Idaho 83705
(208) 342-0091 PHONE (208) 342-0092 FAX
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Appendix G
Purdam Drain, Summarized Data Sheet

PURDAM DRAIN
HY-8 INPUT
SUMMARY DATA
DERIVED FROM FIELD DATA

No.	Description	Purdam Stationing	Culvert Fill Height (ft)	Culvert Material (CMP, RCP, Etc.)	Culvert Dia (ft)	Culvert (Other Shape) (in)	Culvert Slope (ft/ft)	Culvert Length (ft)	Inlet Invert Elev (ft)	Outlet Invert Elev (ft)	Inlet Bed Slope (ft/ft)	Outlet Bed Slope (ft/ft)	Manning's n	Crest Length (ft)	Crest Width (ft)	Crest Elev (ft)
1	Purdam-01-NorthsideBlvd	000+50	1.8	CMP	-	117x79	0.00725	64.80	2443.15	2442.68	0.00136	0.00136	0.03	59.5	28.2	2451.8
2	Purdam-02-Flume	007+20	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Purdam-03-UstickRoad	007+50	3.1	CMP	-	117x79	0.00630	49.20	2445.29	2444.98	0.00455	0.00346	0.03	72.0	27.3	2455.0
4	Purdam-04-LocalDrive	023+80	3.6	CMP	5.0	-	0.01512	33.74	2449.85	2449.34	0.00392	0.01086	0.03	59.5	16.6	2458.4
5	Purdam-05-MadisonRoad	033+10	3.2	CMP	5.0	-	0.00248	104.84	2452.46	2452.20	0.01586	0.00063	0.03	30.3	51.2	2459.6
6	Purdam-06-UStickRoad	034+00	5.7	CMP	5.0	-	0.01586	52.96	2452.88	2452.04	0.00174	0.00248	0.03	24.8	38.3	2462.7
7	Purdam-07-FranklinRoad	062+50	5.6	CMP	4.5	-	0.00402	99.55	2458.32	2457.92	0.00863	0.00344	0.03	47.0	37.0	2468.9
8a	Purdam-08-FarmAccess (W)	110+90	3.4	RCP	4.5	-	-0.00194	31.00	2471.84	2471.90	0.00307	0.00352	0.03	33.5	14.0	2480.0
8b	Purdam-08-FarmAccess (E)	110+90	3.2	RCP	4.5	-	-0.01032	31.00	2472.10	2472.42	0.00283	0.00586	0.03	33.5	14.0	2480.0
9	Purdam-09-Flume	111+00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Purdam-10-FarmAccess	123+50	0.5	Arch	30.0	-	0.00000	13.34	2475.30	2475.30	0.00505	0.00128	0.04	15.1	13.3	2480.2
11	Purdam-11-FarmAccess	125+20	0.8	Arch	30.0	-	0.00000	9.10	2476.10	2476.10	0.00028	0.00505	0.04	18.3	9.5	2480.4
12	Purdam-12-11thAveNorthExt	128+40	1.5	CMP	7.0	-	0.02226	60.20	2476.31	2474.97	0.00532	0.00000	0.03	34.0	21.7	2484.8
13	Purdam-13-LyonsdalePlace	165+20	4.4	CMP	-	95x67	0.00144	69.39	2483.64	2483.54	0.00207	0.00817	0.03	46.2	37.8	2490.6
14	Purdam-14-Flume	177+10	-	-	-	-	-	-	-	-	-	-	-	-		-
15	Purdam-15-CherryLane	177+50	2.5	CMP	8.0	-	0.00520	59.59	2486.02	2485.71	0.00128	0.00307	0.03	28.0	24.0	2494.8
16	Purdam-16-IdahoCenterBlvd	193+90	2.1	CMP	8.0	-	0.01948	60.06	2485.90	2484.73	0.00070	0.00716	0.03	46.0	22.2	2496.0
17	Purdam-17-CanalXing	212+50	6.0	RCP	5.5	-	0.00763	108.74	2490.88	2490.05	0.00214	0.00223	0.03	43.7	28.1	2502.4
18	Purdam-18-StarRoad	253+90	4.5	CMP	6.5	-	0.00283	60.10	2500.17	2500.00	0.00287	0.00499	0.03	39.6	30	2511.2

Quadrant Consulting, Inc.

Appendix H
HY8-Purdam-SummaryReport

HY-8 Culvert Analysis Report
Purdam Drain
Canyon County, Idaho

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 1 - Summary of Culvert Flows at Crossing: Purdam-01-NorthsideBlvd~Sta000+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-01-NorthsideBlvd~Sta000+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2448.63	245.00	245.00	0.00	1
2449.20	291.25	291.25	0.00	1
2449.76	337.50	337.50	0.00	1
2450.34	383.75	383.75	0.00	1
2450.92	430.00	430.00	0.00	1
2451.52	476.25	476.25	0.00	1
2451.98	522.50	509.00	13.28	6
2452.21	568.75	522.50	46.48	5
2452.40	615.00	530.84	84.10	5
2452.58	661.25	535.89	125.29	4
2452.76	704.00	534.47	169.29	5
2451.80	496.93	496.93	0.00	Overtopping

Table 2 - Culvert Summary Table: Purdam-01-NorthsideBlvd~Sta000+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2448.63	4.798	5.186	3-M1t	3.267	3.176	3.692	3.692	7.927	3.423
291.25	291.25	2449.20	5.366	5.756	3-M1t	3.664	3.490	4.039	4.039	8.564	3.591
337.50	337.50	2449.76	5.930	6.322	3-M1t	4.085	3.787	4.357	4.357	9.197	3.740
383.75	383.75	2450.34	6.508	6.895	7-M1t	4.548	4.042	4.651	4.651	9.822	3.873
430.00	430.00	2450.92	7.115	7.478	3-M2t	5.093	4.303	4.927	4.927	10.444	3.994
476.25	476.25	2451.52	7.763	8.081	3-M2t	6.583	4.553	5.186	5.186	11.070	4.105
522.50	509.00	2451.98	8.253	8.539	3-M2t	6.583	4.719	5.431	5.431	11.401	4.208
568.75	522.50	2452.21	8.464	8.771	3-M2t	6.583	4.785	5.664	5.664	11.344	4.304
615.00	530.84	2452.40	8.596	8.963	3-M2t	6.583	4.825	5.886	5.886	11.232	4.395
661.25	535.89	2452.58	8.677	9.145	3-M2t	6.583	4.850	6.100	6.100	11.104	4.480
704.00	534.47	2452.76	8.654	9.284	7-M2t	6.583	4.843	6.289	6.289	10.910	4.554

Outlet Elevation: 2442.68 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-01-NorthsideBlvd~Sta000+50

Barrel Shape: Pipe Arch

Barrel Span: 117.00 in

Barrel Rise: 79.00 in

Barrel Material: Steel or Aluminum

Embedment: 0.00 in

Barrel Manning's n: 0.0280

Culvert Type: Straight

Inlet Configuration: Headwall

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2443.44 ft, Outlet Elevation (invert): 2442.68 ft

Culvert Length: 65.00 ft, Culvert Slope: 0.0117

****

Site Data - Purdam-01-NorthsideBlvd~Sta000+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2443.44 ft

Outlet Station: 65.00 ft

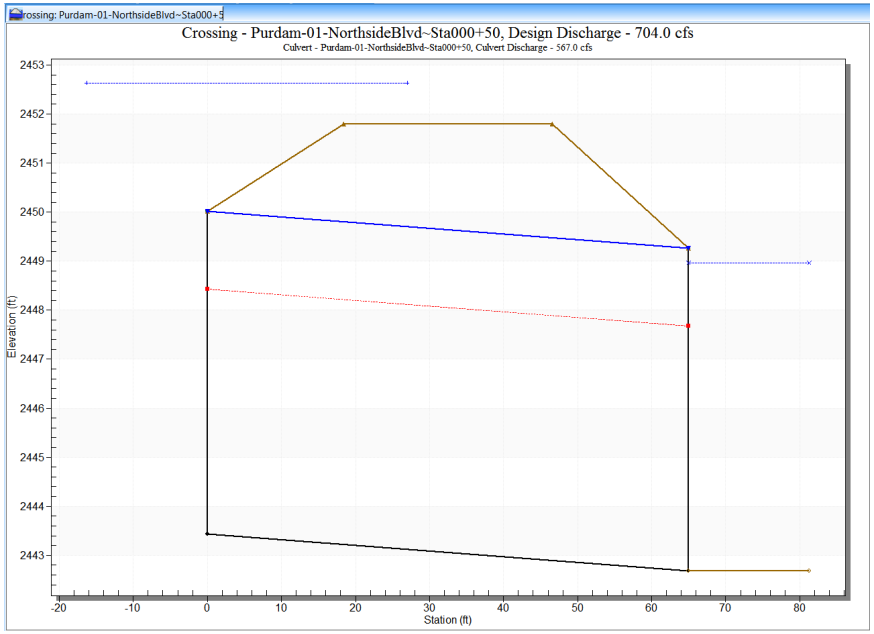


Table 3 - Downstream Channel Rating Curve (Crossing: Purdam-01-NorthsideBlvd~Sta000+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2446.37	3.69	3.42	0.32	0.37
291.25	2446.72	4.04	3.59	0.35	0.37
337.50	2447.04	4.36	3.74	0.38	0.38
383.75	2447.33	4.65	3.87	0.41	0.38
430.00	2447.61	4.93	3.99	0.43	0.38
476.25	2447.87	5.19	4.11	0.45	0.38
522.50	2448.11	5.43	4.21	0.47	0.39
568.75	2448.34	5.66	4.30	0.49	0.39
615.00	2448.57	5.89	4.39	0.51	0.39
661.25	2448.78	6.10	4.48	0.53	0.39
704.00	2448.97	6.29	4.55	0.55	0.39

Tailwater Channel Data - Purdam-01-NorthsideBlvd~Sta000+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0014

Channel Manning's n: 0.0300

Channel Invert Elevation: 2442.68 ft

Roadway Data for Crossing: Purdam-01-NorthsideBlvd~Sta000+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 59.50 ft

Crest Elevation: 2451.80 ft

Roadway Surface: Paved

Roadway Top Width: 28.20 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 4 - Summary of Culvert Flows at Crossing: Purdam-03-UstickRoad-Sta007+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-03-UstickRoad -Sta007+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2450.45	245.00	245.00	0.00	1
2451.05	291.25	291.25	0.00	1
2451.65	337.50	337.50	0.00	1
2452.23	383.75	383.75	0.00	1
2452.83	430.00	430.00	0.00	1
2453.44	476.25	476.25	0.00	1
2454.07	522.50	522.50	0.00	1
2454.76	568.75	568.75	0.00	1
2455.20	615.00	595.99	18.91	6
2455.42	661.25	601.41	59.56	6
2455.60	704.00	603.07	100.77	5
2455.00	584.04	584.04	0.00	Overtopping

Table 5 - Culvert Summary Table: Purdam-03-UstickRoad-Sta007+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2450.45	4.816	5.161	2-M2c	4.051	3.176	3.176	2.897	9.394	4.753
291.25	291.25	2451.05	5.384	5.763	2-M2c	4.682	3.490	3.490	3.177	10.033	4.994
337.50	337.50	2451.65	5.948	6.355	2-M2c	5.579	3.787	3.787	3.435	10.623	5.208
383.75	383.75	2452.23	6.525	6.944	7-M2c	6.583	4.042	4.042	3.674	11.276	5.398
430.00	430.00	2452.83	7.132	7.539	7-M2c	6.583	4.303	4.303	3.898	11.863	5.572
476.25	476.25	2453.44	7.781	8.148	7-M2c	6.583	4.553	4.553	4.110	12.437	5.732
522.50	522.50	2454.07	8.481	8.784	7-M2c	6.583	4.785	4.785	4.310	13.027	5.879
568.75	568.75	2454.76	9.241	9.467	7-M2c	6.583	5.002	5.002	4.501	13.631	6.017
615.00	595.99	2455.20	9.718	9.908	7-M2c	6.583	5.123	5.123	4.683	13.995	6.146
661.25	601.41	2455.42	9.815	10.004	7-M2c	6.583	5.146	5.146	4.858	14.069	6.268
704.00	603.07	2455.60	9.845	10.308	7-M2c	6.583	5.153	5.153	5.014	14.091	6.374

****

Straight Culvert

Inlet Elevation (invert): 2445.29 ft, Outlet Elevation (invert): 2444.98 ft

Culvert Length: 49.20 ft, Culvert Slope: 0.0063

****

Site Data - Purdam-03-UstickRoad-Sta007+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2445.29 ft

Outlet Station: 49.20 ft

Outlet Elevation: 2444.98 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-03-UstickRoad-Sta007+50

Barrel Shape: Pipe Arch

Barrel Span: 117.00 in

Barrel Rise: 79.00 in

Barrel Material: Steel or Aluminum

Embedment: 0.00 in

Barrel Manning's n: 0.0280

Culvert Type: Straight

Inlet Configuration: Headwall

Inlet Depression: NONE

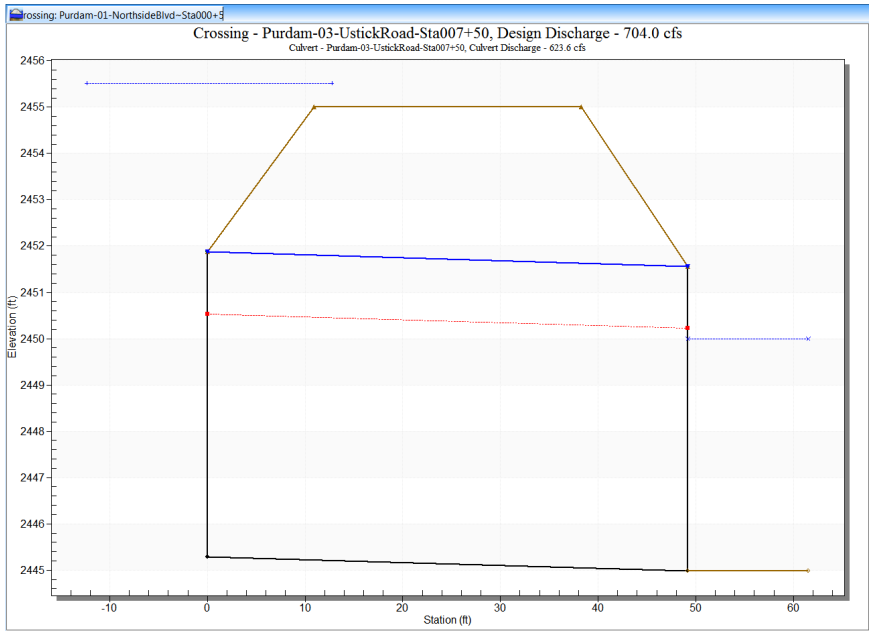


Table 6 - Downstream Channel Rating Curve (Crossing: Purdam-03-UstickRoad-Sta007+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2447.88	2.90	4.75	0.63	0.57
291.25	2448.16	3.18	4.99	0.69	0.57
337.50	2448.41	3.43	5.21	0.75	0.58
383.75	2448.65	3.67	5.40	0.80	0.58
430.00	2448.88	3.90	5.57	0.85	0.59
476.25	2449.09	4.11	5.73	0.90	0.59
522.50	2449.29	4.31	5.88	0.94	0.59
568.75	2449.48	4.50	6.02	0.98	0.60
615.00	2449.66	4.68	6.15	1.02	0.60
661.25	2449.84	4.86	6.27	1.06	0.60
704.00	2449.99	5.01	6.37	1.10	0.61

Tailwater Channel Data - Purdam-03-UstickRoad-Sta007+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0035

Channel Manning's n: 0.0300

Channel Invert Elevation: 2444.98 ft

Roadway Data for Crossing: Purdam-03-UstickRoad-Sta007+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 72.00 ft

Crest Elevation: 2455.00 ft

Roadway Surface: Paved

Roadway Top Width: 27.30 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 7 - Summary of Culvert Flows at Crossing: Purdam-04-LocalDrive~Sta023+80

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-04-LocalDrive ~Sta023+80 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2458.78	245.00	203.74	41.18	13
2459.00	291.25	207.70	83.45	5
2459.19	337.50	210.99	126.23	4
2459.36	383.75	213.93	169.63	4
2459.52	430.00	216.59	213.27	4
2459.67	476.25	219.05	257.09	4
2459.81	522.50	221.35	301.07	4
2459.94	568.75	223.52	345.16	4
2460.07	615.00	225.58	389.38	4
2460.19	661.25	227.53	433.42	3
2460.30	704.00	229.28	474.53	3
2458.40	196.84	196.84	0.00	Overtopping

Table 8 - Culvert Summary Table: Purdam-04-LocalDrive~Sta023+80

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	203.74	2458.78	8.926	8.032	7-M2c	5.000	4.069	4.069	2.126	11.905	7.093
291.25	207.70	2459.00	9.149	8.167	7-M2c	5.000	4.105	4.105	2.338	12.041	7.470
337.50	210.99	2459.19	9.338	8.283	7-M2c	5.000	4.131	4.131	2.534	12.162	7.804
383.75	213.93	2459.36	9.509	8.390	7-M2c	5.000	4.156	4.156	2.717	12.264	8.103
430.00	216.59	2459.52	9.668	8.490	7-M2c	5.000	4.178	4.178	2.888	12.358	8.375
476.25	219.05	2459.67	9.816	8.585	7-M2c	5.000	4.198	4.198	3.051	12.446	8.624
522.50	221.35	2459.81	9.957	8.676	7-M2c	5.000	4.217	4.217	3.205	12.528	8.855
568.75	223.52	2459.94	10.091	8.765	7-M2c	5.000	4.234	4.234	3.352	12.606	9.071
615.00	225.58	2460.07	10.220	8.852	7-M2c	5.000	4.250	4.250	3.493	12.681	9.273
661.25	227.53	2460.19	10.343	8.938	7-M2c	5.000	4.265	4.265	3.628	12.752	9.464
704.00	229.28	2460.30	10.455	9.036	7-M2c	5.000	4.279	4.279	3.749	12.816	9.630

****

Straight Culvert

Inlet Elevation (invert): 2449.85 ft, Outlet Elevation (invert): 2449.34 ft

Culvert Length: 33.74 ft, Culvert Slope: 0.0151

****

Site Data - Purdam-04-LocalDrive~Sta023+80

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2449.85 ft

Outlet Station: 33.74 ft

Outlet Elevation: 2449.34 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-04-LocalDrive~Sta023+80

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

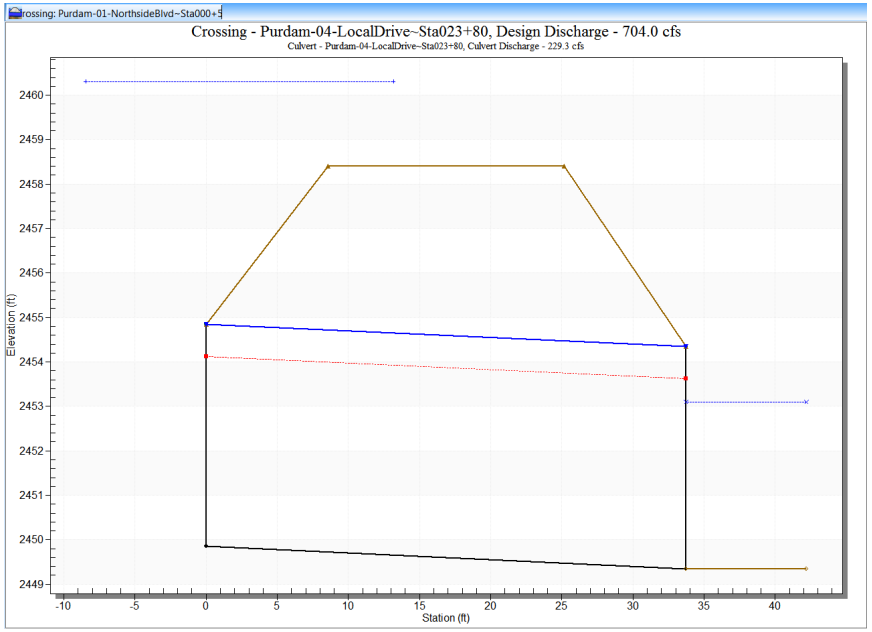


Table 9 - Downstream Channel Rating Curve (Crossing: Purdam-04-LocalDrive~Sta023+80)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2451.47	2.13	7.09	1.45	0.96
291.25	2451.68	2.34	7.47	1.59	0.97
337.50	2451.87	2.53	7.80	1.72	0.98
383.75	2452.06	2.72	8.10	1.85	0.99
430.00	2452.23	2.89	8.37	1.96	1.00
476.25	2452.39	3.05	8.62	2.07	1.01
522.50	2452.55	3.21	8.86	2.18	1.01
568.75	2452.69	3.35	9.07	2.28	1.02
615.00	2452.83	3.49	9.27	2.38	1.02
661.25	2452.97	3.63	9.46	2.47	1.03
704.00	2453.09	3.75	9.63	2.55	1.03

Tailwater Channel Data - Purdam-04-LocalDrive~Sta023+80

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0109

Channel Manning's n: 0.0300

Channel Invert Elevation: 2449.34 ft

Roadway Data for Crossing: Purdam-04-LocalDrive~Sta023+80

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 59.50 ft

Crest Elevation: 2458.40 ft

Roadway Surface: Paved

Roadway Top Width: 16.60 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 10 - Summary of Culvert Flows at Crossing: Purdam-05-MadisonRoad~Sta033+10

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-05-MadisonRoad~Sta033+10 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2460.49	245.00	168.08	76.88	7
2460.82	291.25	167.30	123.84	4
2461.12	337.50	165.34	172.08	4
2461.39	383.75	163.42	220.27	4
2461.64	430.00	161.52	268.43	4
2461.88	476.25	159.73	316.48	4
2462.10	522.50	158.05	364.42	4
2462.32	568.75	156.45	412.28	4
2462.52	615.00	154.94	460.04	4
2462.72	661.25	153.51	507.72	4
2462.90	704.00	152.28	551.51	3
2459.60	146.94	146.94	0.00	Overtopping

Table 11 - Culvert Summary Table: Purdam-05-MadisonRoad~Sta033+10

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	168.08	2460.49	7.171	8.028	7-M2t	5.000	3.712	4.593	4.593	8.903	2.518
291.25	167.30	2460.82	7.136	8.359	4-FFf	5.000	3.703	5.000	5.012	8.520	2.639
337.50	165.34	2461.12	7.049	8.659	4-FFf	5.000	3.682	5.000	5.395	8.421	2.745
383.75	163.42	2461.39	6.965	8.932	4-FFf	5.000	3.661	5.000	5.749	8.323	2.841
430.00	161.52	2461.64	6.882	9.183	4-FFf	5.000	3.640	5.000	6.080	8.226	2.928
476.25	159.73	2461.88	6.806	9.419	4-FFf	5.000	3.619	5.000	6.390	8.135	3.007
522.50	158.05	2462.10	6.734	9.644	4-FFf	5.000	3.600	5.000	6.684	8.049	3.082
568.75	156.45	2462.32	6.667	9.858	4-FFf	5.000	3.582	5.000	6.963	7.968	3.151
615.00	154.94	2462.52	6.604	10.063	4-FFf	5.000	3.565	5.000	7.229	7.891	3.216
661.25	153.51	2462.72	6.545	10.261	4-FFf	5.000	3.548	5.000	7.483	7.818	3.277
704.00	152.28	2462.90	6.494	10.439	4-FFf	5.000	3.534	5.000	7.709	7.756	3.331

Outlet Elevation: 2452.20 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-05-MadisonRoad~Sta033+10

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2452.46 ft, Outlet Elevation (invert): 2452.20 ft

Culvert Length: 104.84 ft, Culvert Slope: 0.0025

****

Site Data - Purdam-05-MadisonRoad~Sta033+10

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2452.46 ft

Outlet Station: 104.84 ft

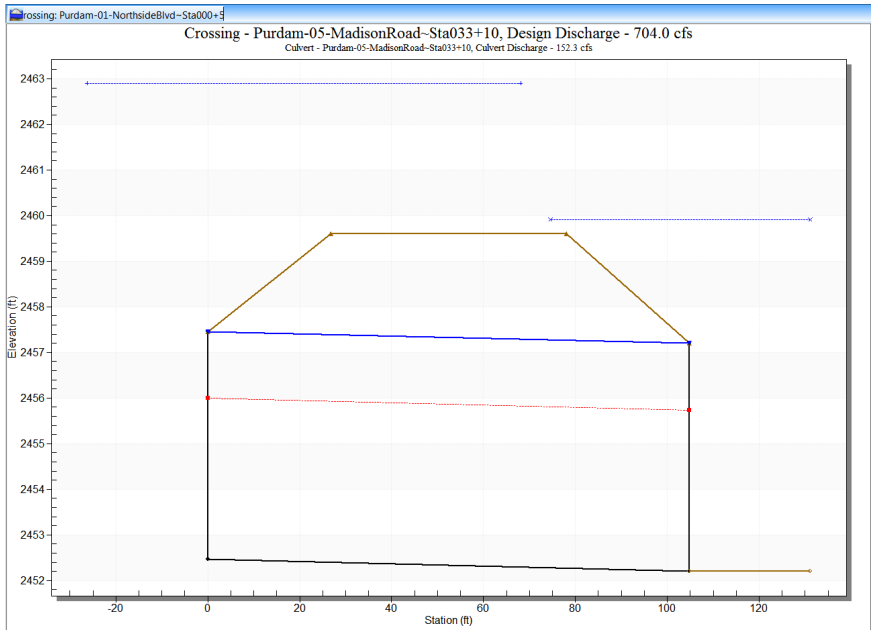


Table 12 - Downstream Channel Rating Curve (Crossing: Purdam-05-MadisonRoad~Sta033+10)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2456.79	4.59	2.52	0.17	0.25
291.25	2457.21	5.01	2.64	0.19	0.25
337.50	2457.59	5.39	2.75	0.20	0.25
383.75	2457.95	5.75	2.84	0.22	0.25
430.00	2458.28	6.08	2.93	0.23	0.26
476.25	2458.59	6.39	3.01	0.24	0.26
522.50	2458.88	6.68	3.08	0.25	0.26
568.75	2459.16	6.96	3.15	0.26	0.26
615.00	2459.43	7.23	3.22	0.27	0.26
661.25	2459.68	7.48	3.28	0.28	0.26
704.00	2459.91	7.71	3.33	0.29	0.26

Tailwater Channel Data - Purdam-05-MadisonRoad~Sta033+10

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0006

Channel Manning's n: 0.0300

Channel Invert Elevation: 2452.20 ft

Roadway Data for Crossing: Purdam-05-MadisonRoad~Sta033+10

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 30.30 ft

Crest Elevation: 2459.60 ft

Roadway Surface: Paved

Roadway Top Width: 51.20 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 13 - Summary of Culvert Flows at Crossing: Purdam-06-UstickRoad~Sta034+00

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-06-UstickRoad ~Sta034+00 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2463.11	245.00	225.70	19.28	11
2463.55	291.25	232.57	58.59	4
2463.91	337.50	237.98	99.47	4
2464.22	383.75	242.61	141.11	4
2464.51	430.00	246.76	183.21	4
2464.78	476.25	250.55	225.68	4
2465.03	522.50	254.07	268.42	4
2465.28	568.75	257.35	311.22	3
2465.51	615.00	260.46	354.37	3
2465.73	661.25	263.42	397.68	3
2465.93	704.00	266.03	437.84	3
2462.70	219.14	219.14	0.00	Overtopping

Table 14 - Culvert Summary Table: Purdam-06-UstickRoad~Sta034+00

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	225.70	2463.11	10.225	8.987	7-M2c	5.000	4.251	4.251	3.169	12.685	4.215
291.25	232.57	2463.55	10.666	9.361	7-M2c	5.000	4.303	4.303	3.473	12.938	4.427
337.50	237.98	2463.91	11.025	9.662	7-M2c	5.000	4.342	4.342	3.751	13.141	4.613
383.75	242.61	2464.22	11.340	9.909	7-M2c	5.000	4.374	4.374	4.010	13.318	4.781
430.00	246.76	2464.51	11.630	10.139	7-M2c	5.000	4.402	4.402	4.252	13.480	4.933
476.25	250.55	2464.78	11.899	10.371	7-M2t	5.000	4.426	4.480	4.480	13.506	5.072
522.50	254.07	2465.03	12.154	10.606	7-M2t	5.000	4.448	4.696	4.696	13.272	5.202
568.75	257.35	2465.28	12.395	10.897	7-M2t	5.000	4.467	4.901	4.901	13.169	5.322
615.00	260.46	2465.51	12.628	11.244	4-FFf	5.000	4.485	5.000	5.098	13.265	5.436
661.25	263.42	2465.73	12.852	11.592	4-FFf	5.000	4.502	5.000	5.286	13.416	5.542
704.00	266.03	2465.93	13.052	11.902	4-FFf	5.000	4.516	5.000	5.453	13.549	5.636

****

Straight Culvert

Inlet Elevation (invert): 2452.88 ft, Outlet Elevation (invert): 2452.04 ft

Culvert Length: 52.97 ft, Culvert Slope: 0.0159

****

Site Data - Purdam-06-UstickRoad~Sta034+00

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2452.88 ft

Outlet Station: 52.96 ft

Outlet Elevation: 2452.04 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-06-UstickRoad~Sta034+00

Barrel Shape: Circular

Barrel Diameter: 5.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

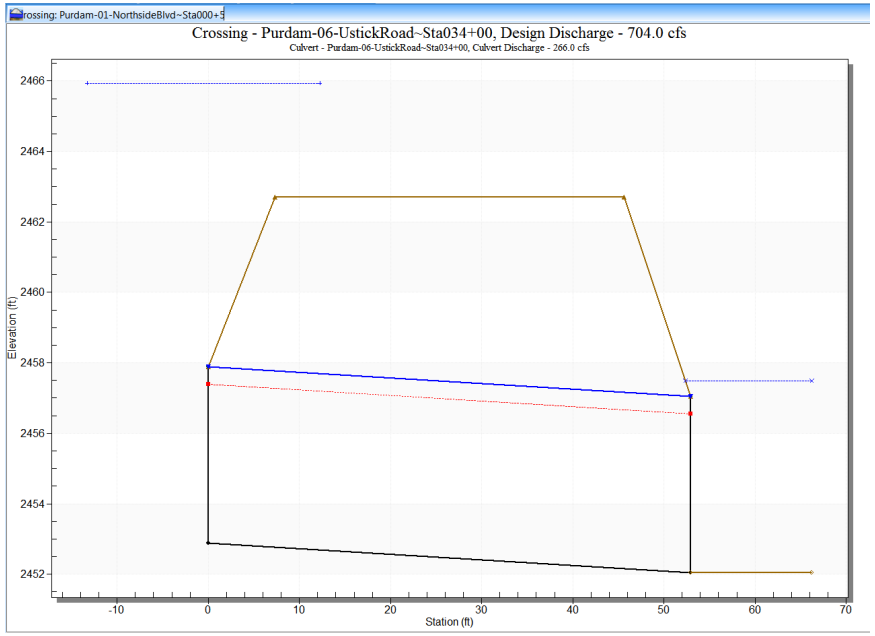


Table 15 - Downstream Channel Rating Curve (Crossing: Purdam-06-UstickRoad~Sta034+00)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2455.21	3.17	4.22	0.49	0.48
291.25	2455.51	3.47	4.43	0.54	0.49
337.50	2455.79	3.75	4.61	0.59	0.49
383.75	2456.05	4.01	4.78	0.63	0.50
430.00	2456.29	4.25	4.93	0.66	0.50
476.25	2456.52	4.48	5.07	0.70	0.50
522.50	2456.74	4.70	5.20	0.73	0.51
568.75	2456.94	4.90	5.32	0.76	0.51
615.00	2457.14	5.10	5.44	0.80	0.51
661.25	2457.33	5.29	5.54	0.82	0.51
704.00	2457.49	5.45	5.64	0.85	0.52

Tailwater Channel Data - Purdam-06-UstickRoad~Sta034+00

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0025

Channel Manning's n: 0.0300

Channel Invert Elevation: 2452.04 ft

Roadway Data for Crossing: Purdam-06-UstickRoad~Sta034+00

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 24.80 ft

Crest Elevation: 2462.70 ft

Roadway Surface: Paved

Roadway Top Width: 38.30 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 16 - Summary of Culvert Flows at Crossing: Purdam-07-FranklinRoad~Sta062+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-07-FranklinRoad~Sta062+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2469.37	245.00	199.37	45.49	13
2469.63	291.25	203.01	88.19	5
2469.85	337.50	205.90	131.43	4
2470.05	383.75	208.37	175.27	4
2470.23	430.00	210.85	219.07	4
2470.40	476.25	213.05	263.14	4
2470.57	522.50	214.50	307.95	4
2470.73	568.75	214.85	353.85	4
2470.89	615.00	214.51	400.44	4
2471.04	661.25	214.20	447.02	4
2471.18	704.00	213.91	489.83	3
2468.90	193.12	193.12	0.00	Overtopping

Table 17 - Culvert Summary Table: Purdam-07-FranklinRoad~Sta062+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	199.37	2469.37	9.070	11.048	7-M2c	4.500	4.032	4.032	2.919	13.268	4.704
291.25	203.01	2469.63	9.291	11.306	7-M2c	4.500	4.055	4.055	3.202	13.452	4.943
337.50	205.90	2469.85	9.470	11.527	7-M2c	4.500	4.074	4.074	3.461	13.600	5.153
383.75	208.37	2470.05	9.625	11.728	7-M2c	4.500	4.089	4.089	3.702	13.728	5.342
430.00	210.85	2470.23	9.783	11.911	7-M2c	4.500	4.103	4.103	3.928	13.857	5.514
476.25	213.05	2470.40	9.925	12.084	7-M2t	4.500	4.117	4.141	4.141	13.916	5.671
522.50	214.50	2470.57	10.019	12.251	7-M2t	4.500	4.124	4.342	4.342	13.637	5.817
568.75	214.85	2470.73	10.042	12.412	4-FFf	4.500	4.126	4.500	4.534	13.509	5.954
615.00	214.51	2470.89	10.020	12.570	4-FFf	4.500	4.125	4.500	4.718	13.488	6.081
661.25	214.20	2471.04	10.000	12.722	4-FFf	4.500	4.123	4.500	4.894	13.468	6.202
704.00	213.91	2471.18	9.981	12.856	4-FFf	4.500	4.121	4.500	5.050	13.450	6.308

****

Straight Culvert

Inlet Elevation (invert): 2458.32 ft, Outlet Elevation (invert): 2457.92 ft

Culvert Length: 99.55 ft, Culvert Slope: 0.0040

****

Site Data - Purdam-07-FranklinRoad~Sta062+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2458.32 ft

Outlet Station: 99.55 ft

Outlet Elevation: 2457.92 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-07-FranklinRoad~Sta062+50

Barrel Shape: Circular

Barrel Diameter: 4.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

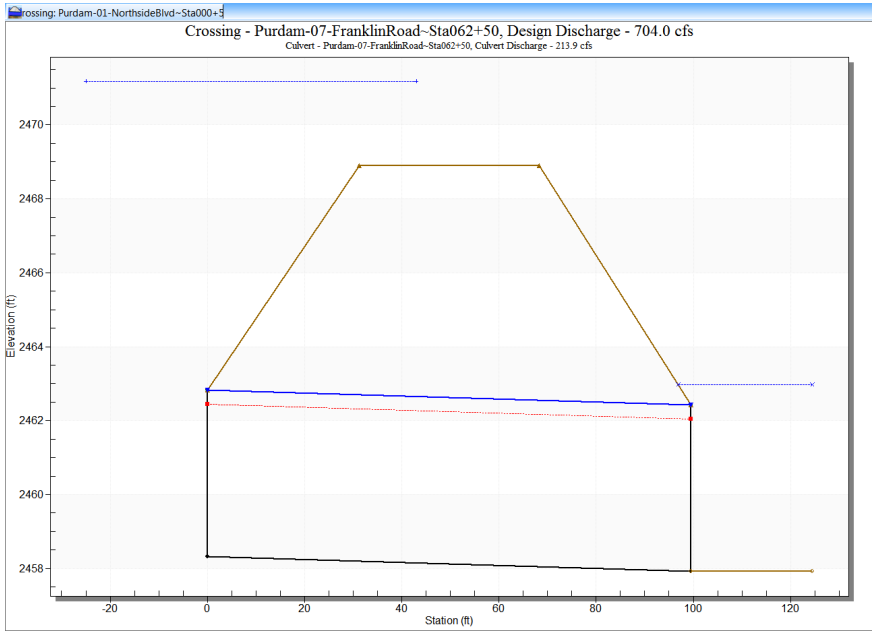


Table 18 - Downstream Channel Rating Curve (Crossing: Purdam-07-FranklinRoad~Sta062+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2460.84	2.92	4.70	0.62	0.56
291.25	2461.12	3.20	4.94	0.68	0.57
337.50	2461.38	3.46	5.15	0.73	0.57
383.75	2461.62	3.70	5.34	0.79	0.58
430.00	2461.85	3.93	5.51	0.83	0.58
476.25	2462.06	4.14	5.67	0.88	0.58
522.50	2462.26	4.34	5.82	0.92	0.59
568.75	2462.45	4.53	5.95	0.96	0.59
615.00	2462.64	4.72	6.08	1.00	0.59
661.25	2462.81	4.89	6.20	1.04	0.59
704.00	2462.97	5.05	6.31	1.07	0.60

Tailwater Channel Data - Purdam-07-FranklinRoad~Sta062+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0034

Channel Manning's n: 0.0300

Channel Invert Elevation: 2457.92 ft

Roadway Data for Crossing: Purdam-07-FranklinRoad~Sta062+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 47.00 ft

Crest Elevation: 2468.90 ft

Roadway Surface: Paved

Roadway Top Width: 37.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 19 - Summary of Culvert Flows at Crossing: Purdam-08-FarmAccess~Sta110+90

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-08-FarmAccess~Sta110+90 (W) Discharge (cfs)	Purdam-08-FarmAccess~Sta110+90 (E) Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2477.57	245.00	129.40	115.64	0.00	4
2478.40	291.25	150.45	140.83	0.00	3
2479.44	337.50	171.40	166.07	0.00	6
2480.29	383.75	186.59	181.75	15.39	5
2480.62	430.00	192.26	187.60	50.12	5
2480.90	476.25	196.80	192.24	87.10	4
2481.15	522.50	200.75	196.30	125.38	4
2481.38	568.75	204.31	199.95	164.44	4
2481.59	615.00	207.58	203.29	204.08	4
2481.79	661.25	210.61	206.41	244.18	4
2481.97	704.00	213.27	209.12	281.56	4
2480.00	358.22	181.61	176.61	0.00	Overtopping

Table 20 - Culvert Summary Table: Purdam-08-FarmAccess~Sta110+90 (W)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	129.40	2477.57	5.666	5.732	9-A2c	-1.000	3.344	3.344	2.704	10.211	4.669
291.25	150.45	2478.40	6.562	6.421	9-JA2c	-1.000	3.594	3.594	2.972	11.063	4.914
337.50	171.40	2479.44	7.599	7.167	9-A2t	-1.000	3.807	3.807	3.219	11.974	5.131
383.75	186.59	2480.29	8.447	7.709	9-A2t	-1.000	3.938	3.938	3.449	12.680	5.325
430.00	192.26	2480.62	8.784	7.906	9-A2t	-1.000	3.981	3.981	3.665	12.948	5.501
476.25	196.80	2480.90	9.062	8.069	9-A2t	-1.000	4.014	4.014	3.869	13.165	5.663
522.50	200.75	2481.15	9.311	8.214	9-A2t	-1.000	4.041	4.062	4.062	13.297	5.813
568.75	204.31	2481.38	9.539	8.347	9-A2t	-1.000	4.064	4.247	4.247	13.455	5.953
615.00	207.58	2481.59	9.752	8.471	9-A2t	-1.000	4.084	4.424	4.424	13.670	6.085
661.25	210.61	2481.79	9.953	9.039	4-FFf	-1.000	4.102	4.500	4.594	13.870	6.208
704.00	213.27	2481.97	10.132	9.302	4-FFf	-1.000	4.118	4.500	4.745	14.045	6.316

Outlet Elevation: 2471.90 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-08-FarmAccess~Sta110+90 (W)

Barrel Shape: Circular

Barrel Diameter: 4.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2471.84 ft, Outlet Elevation (invert): 2471.90 ft

Culvert Length: 31.00 ft, Culvert Slope: -0.0019

****

Site Data - Purdam-08-FarmAccess~Sta110+90 (W)

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2471.84 ft

Outlet Station: 31.00 ft

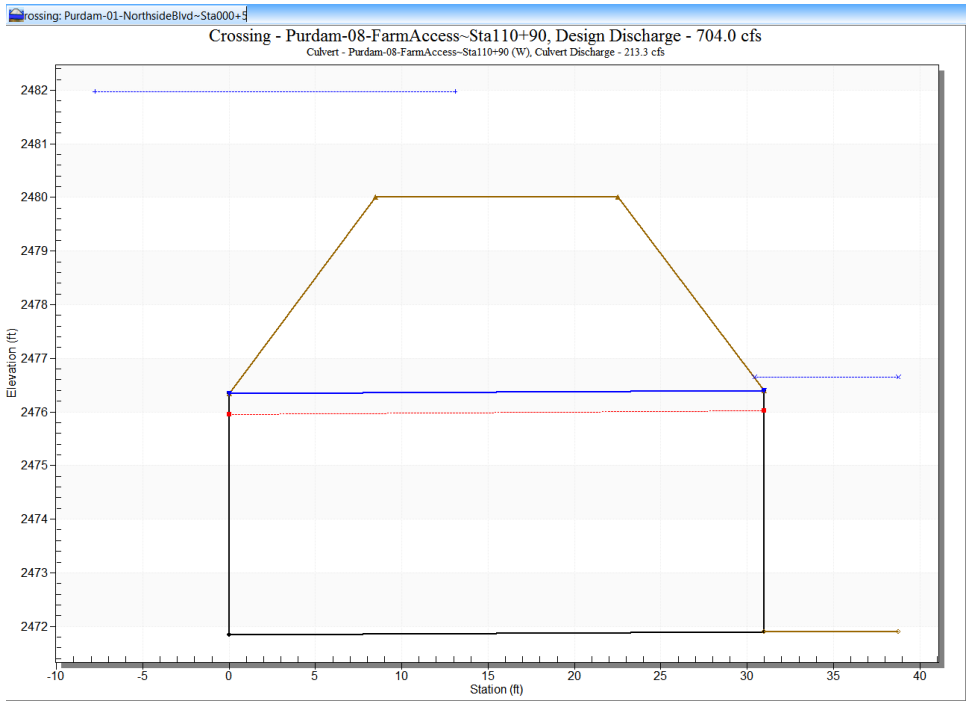


Table 21 - Culvert Summary Table: Purdam-08-FarmAccess~Sta110+90 (E)

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	115.64	2477.57	5.167	5.472	9-A2c	-1.000	3.161	3.161	2.704	9.686	4.669
291.25	140.83	2478.40	6.154	6.302	9-A2c	-1.000	3.484	3.484	2.972	10.659	4.914
337.50	166.07	2479.44	7.339	7.042	9-JA2c	-1.000	3.757	3.757	3.219	11.729	5.131
383.75	181.75	2480.29	8.187	7.544	9-JA2t	-1.000	3.899	3.899	3.449	12.453	5.325
430.00	187.60	2480.62	8.525	7.743	9-JA2t	-1.000	3.946	3.946	3.665	12.727	5.501
476.25	192.24	2480.90	8.802	7.906	9-A2t	-1.000	3.981	3.981	3.869	12.947	5.663
522.50	196.30	2481.15	9.050	8.051	9-A2t	-1.000	4.010	4.010	4.062	13.141	5.813
568.75	199.95	2481.38	9.278	8.184	9-A2t	-1.000	4.035	4.035	4.247	13.317	5.953
615.00	203.29	2481.59	9.492	8.309	9-A2t	-1.000	4.057	4.057	4.424	13.480	6.085
661.25	206.41	2481.79	9.694	8.426	9-A2t	-1.000	4.077	4.077	4.594	13.632	6.208
704.00	209.12	2481.97	9.872	8.530	9-A2t	-1.000	4.093	4.225	4.745	13.772	6.316

Number of Barrels: 1

Culvert Data Summary - Purdam-08-FarmAccess~Sta110+90 (E)

Barrel Shape: Circular

Barrel Diameter: 4.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2472.10 ft, Outlet Elevation (invert): 2472.42 ft

Culvert Length: 31.00 ft, Culvert Slope: -0.0103

****

Site Data - Purdam-08-FarmAccess~Sta110+90 (E)

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2472.10 ft

Outlet Station: 31.00 ft

Outlet Elevation: 2472.42 ft

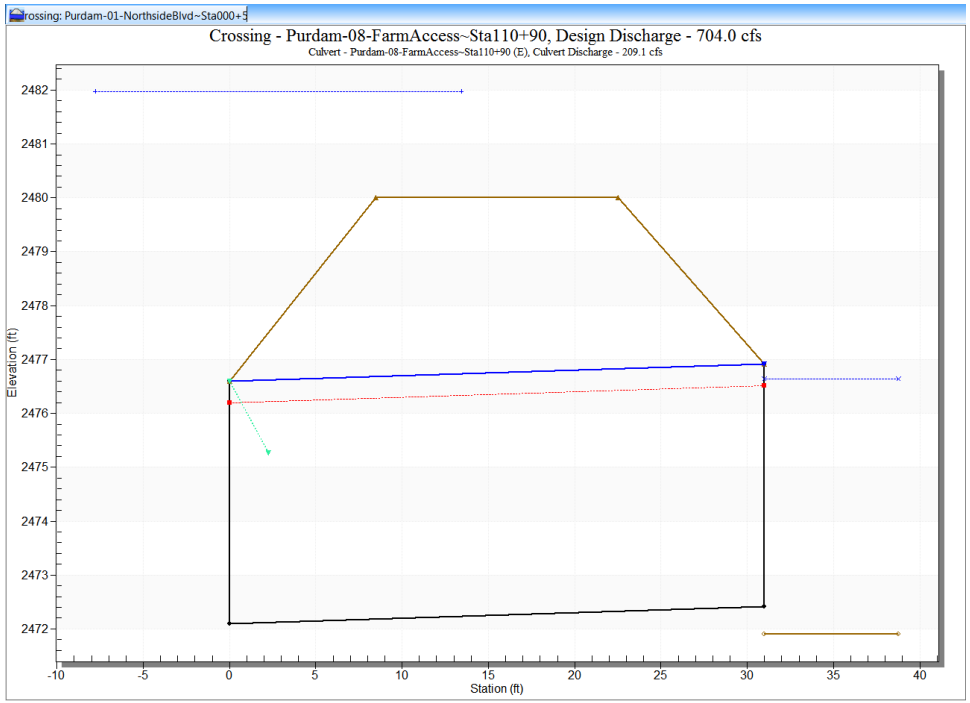


Table 22 - Downstream Channel Rating Curve (Crossing: Purdam-08-FarmAccess~Sta110+90)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2474.60	2.70	4.67	0.59	0.57
291.25	2474.87	2.97	4.91	0.65	0.57
337.50	2475.12	3.22	5.13	0.70	0.58
383.75	2475.35	3.45	5.32	0.75	0.58
430.00	2475.56	3.66	5.50	0.80	0.59
476.25	2475.77	3.87	5.66	0.84	0.59
522.50	2475.96	4.06	5.81	0.89	0.59
568.75	2476.15	4.25	5.95	0.93	0.60
615.00	2476.32	4.42	6.08	0.97	0.60
661.25	2476.49	4.59	6.21	1.00	0.60
704.00	2476.64	4.74	6.32	1.04	0.61

Tailwater Channel Data - Purdam-08-FarmAccess~Sta110+90

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 14.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0035

Channel Manning's n: 0.0300

Channel Invert Elevation: 2471.90 ft

Roadway Data for Crossing: Purdam-08-FarmAccess~Sta110+90

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 33.50 ft

Crest Elevation: 2480.00 ft

Roadway Surface: Paved

Roadway Top Width: 14.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 23 - Summary of Culvert Flows at Crossing: Purdam-10-FarmAccess~Sta123+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-10-FarmAccess~123+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2480.13	245.00	245.00	0.00	1
2480.77	291.25	273.47	17.74	4
2481.27	337.50	290.35	47.15	4
2481.70	383.75	302.91	80.84	4
2482.10	430.00	313.30	116.69	4
2482.47	476.25	322.77	153.47	4
2482.82	522.50	330.95	191.54	4
2483.13	568.75	337.56	229.56	8
2483.44	615.00	346.90	268.07	5
2483.74	661.25	352.32	308.87	4
2484.01	704.00	357.44	346.55	4
2480.20	251.16	251.16	0.00	Overtopping

Table 24 - Culvert Summary Table: Purdam-10-FarmAccess~123+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2480.13	4.399	4.831	8-H2t	-1.000	2.341	3.764	3.764	5.810	3.333
291.25	273.47	2480.77	4.822	5.473	4-FFf	-1.000	2.521	4.040	4.117	6.572	3.496
337.50	290.35	2481.27	5.075	5.969	4-FFf	-1.000	2.622	4.040	4.440	6.978	3.640
383.75	302.91	2481.70	5.263	6.403	4-FFf	-1.000	2.696	4.040	4.740	7.279	3.770
430.00	313.30	2482.10	5.419	6.799	4-FFf	-1.000	2.761	4.040	5.019	7.529	3.887
476.25	322.77	2482.47	5.560	7.172	4-FFf	-1.000	2.808	4.040	5.282	7.757	3.995
522.50	330.95	2482.82	5.683	7.518	4-FFf	-1.000	2.842	4.040	5.532	7.953	4.096
568.75	337.56	2483.13	5.798	7.835	4-FFf	-1.000	2.867	4.040	5.768	8.112	4.189
615.00	346.90	2483.44	5.987	8.177	4-FFf	-1.000	2.903	4.040	5.995	8.336	4.277
661.25	352.32	2483.74	6.097	8.462	4-FFf	-1.000	2.921	4.040	6.211	8.467	4.359
704.00	357.44	2484.01	6.201	8.720	4-FFf	-1.000	2.940	4.040	6.403	8.590	4.432

Outlet Elevation: 2475.30 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-10-FarmAccess~123+50

Barrel Shape: User Defined

Barrel Span: 12.00 ft

Barrel Rise: 4.04 ft

Barrel Material: Corrugated Metal Riveted or Welded

Embedment: 0.00 in

Barrel Manning's n: 0.0140 (top and sides)

Manning's n: 0.0400 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2475.30 ft, Outlet Elevation (invert): 2475.30 ft

Culvert Length: 13.34 ft, Culvert Slope: 0.0000

****

Site Data - Purdam-10-FarmAccess~123+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2475.30 ft

Outlet Station: 13.34 ft

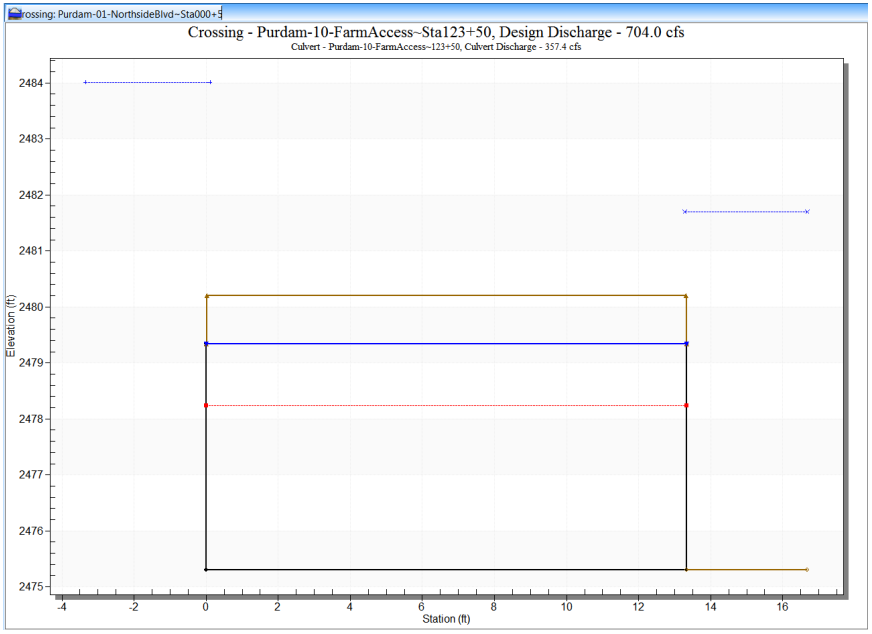


Table 25 - Downstream Channel Rating Curve (Crossing: Purdam-10-FarmAccess~Sta123+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2479.06	3.76	3.33	0.31	0.36
291.25	2479.42	4.12	3.50	0.33	0.36
337.50	2479.74	4.44	3.64	0.36	0.36
383.75	2480.04	4.74	3.77	0.38	0.37
430.00	2480.32	5.02	3.89	0.41	0.37
476.25	2480.58	5.28	4.00	0.43	0.37
522.50	2480.83	5.53	4.10	0.45	0.37
568.75	2481.07	5.77	4.19	0.47	0.38
615.00	2481.29	5.99	4.28	0.49	0.38
661.25	2481.51	6.21	4.36	0.50	0.38
704.00	2481.70	6.40	4.43	0.52	0.38

Tailwater Channel Data - Purdam-10-FarmAccess~Sta123+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0013

Channel Manning's n: 0.0300

Channel Invert Elevation: 2475.30 ft

Roadway Data for Crossing: Purdam-10-FarmAccess~Sta123+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 15.10 ft

Crest Elevation: 2480.20 ft

Roadway Surface: Gravel

Roadway Top Width: 13.30 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 26 - Summary of Culvert Flows at Crossing: Purdam-11-FarmAccess~Sta125+20

Headwater Elevation (ft)	Total Discharge (cfs)	Purdan-11-FarmAccess~Sta125+20 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2480.63	245.00	244.47	5.11	21
2480.63	291.25	518.06	5.12	4
2480.63	337.50	518.30	0.00	4
2480.63	383.75	518.22	0.00	5
2481.64	430.00	264.89	32.71	11
2482.05	476.25	-438.10	1.05	51
2482.47	522.50	-1107.37	1.55	28
2482.88	568.75	-335.86	1.98	50
2484.39	615.00	20313.35	441.27	100
2484.39	661.25	20313.35	429.07	3
2484.39	704.00	20313.35	362.19	3
2480.40	210.60	210.60	0.00	Overtopping

Table 27 - Culvert Summary Table: Purdan-11-FarmAccess~Sta125+20

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	244.47	2480.63	3.155	4.642	1-S1f	0.054	2.162	3.780	3.697	5.667	4.734
291.25	518.06	2480.63	4.526	0.0*	5-JS1f	0.115	3.201	3.780	4.173	12.009	4.985
337.50	518.30	2480.63	4.527	0.0*	5-JS1f	0.115	3.202	3.780	4.633	12.014	5.203
383.75	518.22	2480.63	4.526	0.0*	5-JS1f	0.115	3.201	3.780	5.080	12.013	5.396
430.00	264.89	2481.64	3.317	0.0*	1-JS1f	0.059	2.278	3.780	5.517	6.140	5.567
476.25	-438.10	2482.05	0.000	5.945	0-NF	0.000	0.000	3.780	5.945	6.140	5.722
522.50	-1107.37	2482.47	0.000	6.366	0-NF	0.000	0.000	3.780	6.366	6.140	5.863
568.75	-335.86	2482.88	0.000	6.781	0-NF	0.000	0.000	3.780	6.781	6.140	5.991
615.00	20313.35	2484.39	8.292	0.0*	5-S2n	1.635	3.780	2.582	7.190	585.259	6.110
661.25	20313.35	2484.39	8.292	0.0*	5-S2n	1.635	3.780	2.582	7.595	585.259	6.219
704.00	20313.35	2484.39	8.292	0.0*	5-S2n	1.635	3.780	2.582	7.965	585.259	6.313

* Full Flow Headwater elevation is below inlet invert.

****

Straight Culvert

Inlet Elevation (invert): 2476.10 ft, Outlet Elevation (invert): 0.00 ft

Culvert Length: 2476.12 ft, Culvert Slope: 260.6421

****

Site Data - Purdan-11-FarmAccess~Sta125+20

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2476.10 ft

Outlet Station: 9.50 ft

Outlet Elevation: 0.00 ft

Number of Barrels: 1

Culvert Data Summary - Purdan-11-FarmAccess~Sta125+20

Barrel Shape: User Defined

Barrel Span: 13.50 ft

Barrel Rise: 3.78 ft

Barrel Material: Corrugated Metal Riveted or Welded

Embedment: 0.00 in

Barrel Manning's n: 0.0140 (top and sides)

Manning's n: 0.0350 (bottom)

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 28 - Downstream Channel Rating Curve (Crossing: Purdam-11-FarmAccess~Sta125+20)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2479.80	3.70	4.73	1.15	0.43
291.25	2480.27	4.17	4.99	1.30	0.43
337.50	2480.73	4.63	5.20	1.45	0.43
383.75	2481.18	5.08	5.40	1.58	0.42
430.00	2481.62	5.52	5.57	1.72	0.42
476.25	2482.05	5.95	5.72	1.85	0.41
522.50	2482.47	6.37	5.86	1.99	0.41
568.75	2482.88	6.78	5.99	2.12	0.41
615.00	2483.29	7.19	6.11	2.24	0.40
661.25	2483.69	7.59	6.22	2.37	0.40
704.00	2484.07	7.97	6.31	2.49	0.39

Tailwater Channel Data - Purdam-11-FarmAccess~Sta125+20

Tailwater Channel Option: Rectangular Channel

Bottom Width: 14.00 ft

Channel Slope: 0.0050

Channel Manning's n: 0.0400

Channel Invert Elevation: 2476.10 ft

Roadway Data for Crossing: Purdam-11-FarmAccess~Sta125+20

Roadway Profile Shape: Constant Roadway

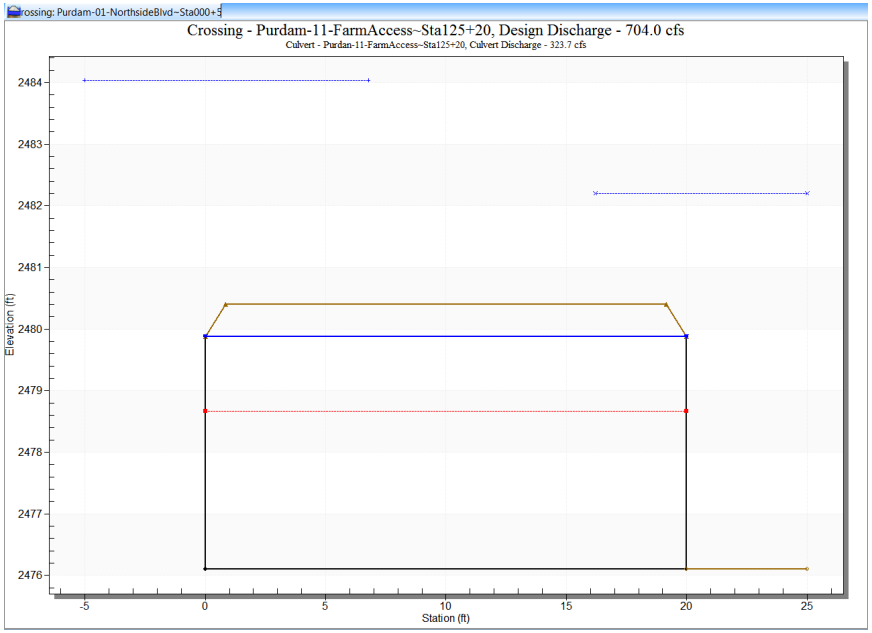
Elevation

Crest Length: 18.30 ft

Crest Elevation: 2480.40 ft

Roadway Surface: Gravel

Roadway Top Width: 18.30 ft



Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 29 - Summary of Culvert Flows at Crossing: Purdam-12-11thAveNorthExt~Sta128+40

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-12-11thAveNorthExt~Sta128+40 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2482.96	245.00	245.00	0.00	1
2483.91	291.25	291.25	0.00	1
2484.89	337.50	334.78	2.66	3
2485.27	383.75	350.59	33.11	5
2485.56	430.00	362.10	67.77	4
2485.81	476.25	371.94	104.23	4
2486.04	522.50	380.70	141.75	4
2486.25	568.75	388.67	180.04	4
2486.45	615.00	396.06	218.92	4
2486.64	661.25	402.97	258.26	4
2486.81	704.00	408.98	294.78	3
2484.80	330.97	330.97	0.00	Overtopping

Table 30 - Culvert Summary Table: Purdam-12-11thAveNorthExt~Sta128+40

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2482.96	6.650	4.253	1-S2n	3.387	4.097	3.477	3.019	12.837	4.499
291.25	291.25	2483.91	7.602	5.258	5-S2n	3.757	4.484	3.854	3.310	13.413	4.726
337.50	334.78	2484.89	8.580	6.269	5-S2n	4.101	4.815	4.199	3.577	13.902	4.927
383.75	350.59	2485.27	8.960	6.652	5-S2n	4.226	4.929	4.322	3.825	14.065	5.106
430.00	362.10	2485.56	9.246	6.941	5-S2n	4.317	5.013	4.410	4.057	14.179	5.270
476.25	371.94	2485.81	9.497	7.189	5-S2n	4.395	5.081	4.488	4.276	14.268	5.420
522.50	380.70	2486.04	9.727	7.412	5-S2n	4.465	5.140	4.558	4.483	14.357	5.559
568.75	388.67	2486.25	9.940	7.618	5-S2n	4.532	5.193	4.622	4.681	14.433	5.688
615.00	396.06	2486.45	10.141	7.811	5-S2n	4.595	5.242	4.680	4.869	14.504	5.810
661.25	402.97	2486.64	10.333	8.850	5-S2n	4.653	5.286	4.733	5.050	14.574	5.925
704.00	408.98	2486.81	10.503	8.991	5-S2n	4.704	5.324	4.780	5.211	14.629	6.025

****

Straight Culvert

Inlet Elevation (invert): 2476.31 ft, Outlet Elevation (invert): 2474.97 ft

Culvert Length: 60.21 ft, Culvert Slope: 0.0223

****

Site Data - Purdam-12-11thAveNorthExt~Sta128+40

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2476.31 ft

Outlet Station: 60.20 ft

Outlet Elevation: 2474.97 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-12-11thAveNorthExt~Sta128+40

Barrel Shape: Circular

Barrel Diameter: 7.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

Table 31 - Downstream Channel Rating Curve (Crossing: Purdam-12-11thAveNorthExt~Sta128+40)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2477.99	3.02	4.50	0.57	0.53
291.25	2478.28	3.31	4.73	0.62	0.53
337.50	2478.55	3.58	4.93	0.67	0.54
383.75	2478.79	3.82	5.11	0.72	0.54
430.00	2479.03	4.06	5.27	0.76	0.55
476.25	2479.25	4.28	5.42	0.80	0.55
522.50	2479.45	4.48	5.56	0.84	0.55
568.75	2479.65	4.68	5.69	0.88	0.56
615.00	2479.84	4.87	5.81	0.91	0.56
661.25	2480.02	5.05	5.92	0.95	0.56
704.00	2480.18	5.21	6.03	0.98	0.56

Tailwater Channel Data - Purdam-12-11thAveNorthExt~Sta128+40

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0030

Channel Manning's n: 0.0300

Channel Invert Elevation: 2474.97 ft

Roadway Data for Crossing: Purdam-12-11thAveNorthExt~Sta128+40

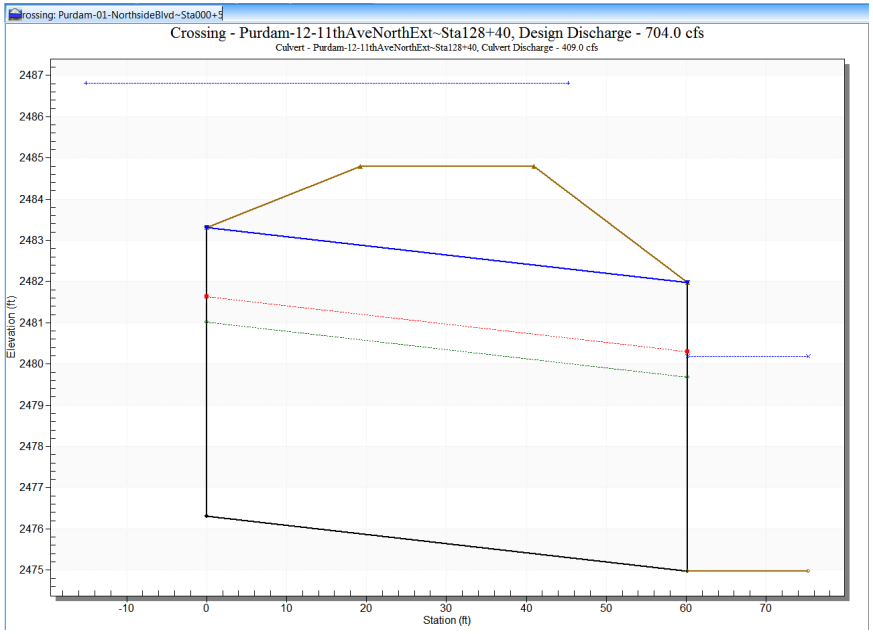
Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 34.00 ft

Crest Elevation: 2484.80 ft

Roadway Surface: Paved

Roadway Top Width: 21.70 ft



Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 32 - Summary of Culvert Flows at Crossing: Purdam-13-LyonsdalePlace~Sta165+20

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-13-Lyonsdale Place~Sta165+20 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2490.26	245.00	245.00	0.00	1
2490.86	291.25	273.08	18.12	6
2491.12	337.50	284.72	52.61	4
2491.34	383.75	293.99	89.66	4
2491.54	430.00	301.84	128.09	4
2491.75	476.25	303.20	172.92	5
2491.92	522.50	308.82	213.61	4
2492.09	568.75	314.60	254.12	4
2492.24	615.00	319.72	295.26	4
2492.39	661.25	325.40	335.82	4
2492.52	704.00	330.00	373.69	3
2490.60	261.13	261.13	0.00	Overtopping

Table 33 - Culvert Summary Table: Purdam-13-LyonsdalePlace~Sta165+20

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2490.26	5.979	6.622	7-M2c	5.583	3.470	3.470	2.299	10.442	6.421
291.25	273.08	2490.86	6.579	7.218	7-M2c	5.583	3.683	3.683	2.527	10.959	6.758
337.50	284.72	2491.12	6.845	7.481	7-M2c	5.583	3.768	3.768	2.737	11.173	7.056
383.75	293.99	2491.34	7.064	7.702	7-M2c	5.583	3.838	3.838	2.933	11.333	7.323
430.00	301.84	2491.54	7.256	7.902	7-M2c	5.583	3.893	3.893	3.117	11.477	7.566
476.25	303.20	2491.75	7.290	8.131	7-M2c	5.583	3.902	3.902	3.291	11.502	7.789
522.50	308.82	2491.92	7.431	8.285	7-M2c	5.583	3.941	3.941	3.455	11.606	7.996
568.75	314.60	2492.09	7.579	8.448	7-M2c	5.583	3.980	3.980	3.613	11.713	8.189
615.00	319.72	2492.24	7.713	8.604	7-M2c	5.583	4.015	4.015	3.763	11.809	8.369
661.25	325.40	2492.39	7.864	8.750	7-M2c	5.583	4.053	4.053	3.908	11.915	8.540
704.00	330.00	2492.52	7.989	8.883	7-M2t	5.583	4.083	4.137	4.037	11.859	8.689

****

Straight Culvert

Inlet Elevation (invert): 2483.64 ft, Outlet Elevation (invert): 2483.54 ft

Culvert Length: 69.40 ft, Culvert Slope: 0.0014

****

Site Data - Purdam-13-LyonsdalePlace~Sta165+20

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2483.64 ft

Outlet Station: 69.40 ft

Outlet Elevation: 2483.54 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-13-LyonsdalePlace~Sta165+20

Barrel Shape: Pipe Arch

Barrel Span: 95.00 in

Barrel Rise: 67.00 in

Barrel Material: Steel or Aluminum

Embedment: 0.00 in

Barrel Manning's n: 0.0280

Culvert Type: Straight

Inlet Configuration: Projecting

Inlet Depression: NONE

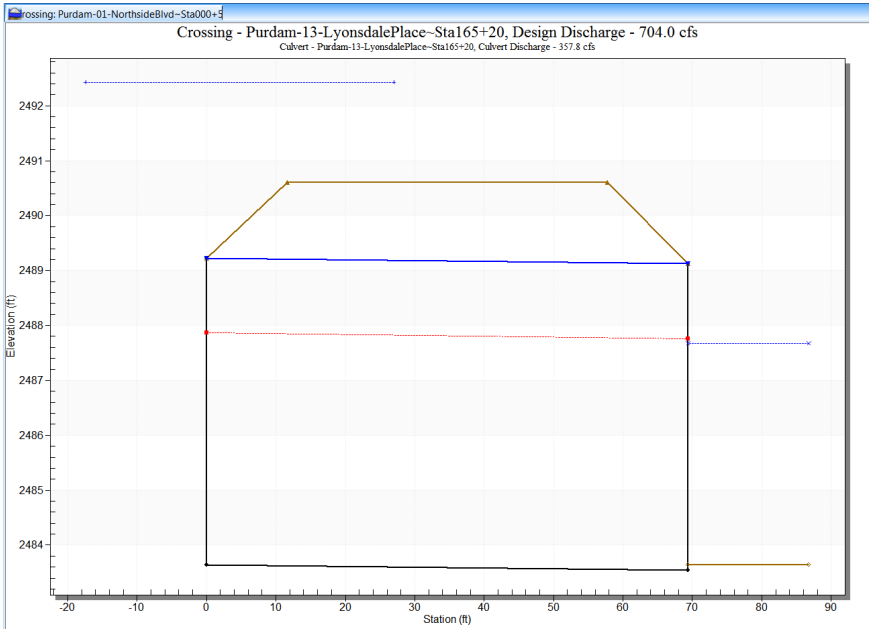


Table 34 - Downstream Channel Rating Curve (Crossing: Purdam-13-LyonsdalePlace~Sta165+20)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2485.94	2.30	6.42	1.18	0.84
291.25	2486.17	2.53	6.76	1.29	0.85
337.50	2486.38	2.74	7.06	1.40	0.86
383.75	2486.57	2.93	7.32	1.50	0.87
430.00	2486.76	3.12	7.57	1.59	0.87
476.25	2486.93	3.29	7.79	1.68	0.88
522.50	2487.10	3.46	8.00	1.77	0.89
568.75	2487.25	3.61	8.19	1.85	0.89
615.00	2487.40	3.76	8.37	1.93	0.89
661.25	2487.55	3.91	8.54	2.00	0.90
704.00	2487.68	4.04	8.69	2.07	0.90

Tailwater Channel Data - Purdam-13-LyonsdalePlace~Sta165+20

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0082

Channel Manning's n: 0.0300

Channel Invert Elevation: 2483.64 ft

Roadway Data for Crossing: Purdam-13-LyonsdalePlace~Sta165+20

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 46.20 ft

Crest Elevation: 2490.60 ft

Roadway Surface: Paved

Roadway Top Width: 46.20 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 35 - Summary of Culvert Flows at Crossing: Purdam-15-CherryLane~Sta177+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-15-CherryLane~Sta177+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2492.50	245.00	245.00	0.00	1
2493.43	291.25	291.25	0.00	1
2494.76	337.50	337.50	0.00	1
2495.28	383.75	355.57	28.15	5
2495.62	430.00	366.56	63.27	4
2495.91	476.25	376.44	99.78	4
2496.18	522.50	385.34	137.12	4
2496.42	568.75	392.92	175.80	4
2496.66	615.00	399.37	215.61	4
2496.89	661.25	404.50	256.72	4
2497.09	704.00	409.14	294.84	4
2494.80	338.83	338.83	0.00	Overtopping

Table 36 - Culvert Summary Table: Purdam-15-CherryLane~Sta177+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2492.50	5.969	6.475	7-M2c	5.583	3.470	3.470	2.993	10.442	4.552
291.25	291.25	2493.43	6.988	7.412	7-M2c	5.583	3.818	3.818	3.281	11.282	4.782
337.50	337.50	2494.76	8.186	8.744	7-M2c	5.583	4.131	4.131	3.546	12.142	4.985
383.75	355.57	2495.28	8.710	9.260	7-M2c	5.583	4.245	4.245	3.792	12.487	5.167
430.00	366.56	2495.62	9.044	9.602	7-M2c	5.583	4.311	4.311	4.023	12.700	5.333
476.25	376.44	2495.91	9.355	9.894	7-M2c	5.583	4.369	4.369	4.240	12.894	5.485
522.50	385.34	2496.18	9.644	10.156	7-M2t	5.583	4.420	4.446	4.446	13.008	5.625
568.75	392.92	2496.42	9.896	10.404	7-M2t	5.583	4.463	4.642	4.642	12.813	5.757
615.00	399.37	2496.66	10.115	10.641	7-M2t	5.583	4.498	4.829	4.829	12.648	5.880
661.25	404.50	2496.89	10.293	10.870	7-M2t	5.583	4.525	5.009	5.009	12.500	5.996
704.00	409.14	2497.09	10.456	11.073	7-M2t	5.583	4.550	5.168	5.168	12.410	6.098

****

Straight Culvert

Inlet Elevation (invert): 2486.02 ft, Outlet Elevation (invert): 2485.71 ft

Culvert Length: 59.60 ft, Culvert Slope: 0.0052

****

Site Data - Purdam-15-CherryLane~Sta177+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2486.02 ft

Outlet Station: 59.60 ft

Outlet Elevation: 2485.71 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-15-CherryLane~Sta177+50

Barrel Shape: Pipe Arch

Barrel Span: 95.00 in

Barrel Rise: 67.00 in

Barrel Material: Steel or Aluminum

Embedment: 0.00 in

Barrel Manning's n: 0.0280

Culvert Type: Straight

Inlet Configuration: Projecting

Inlet Depression: NONE

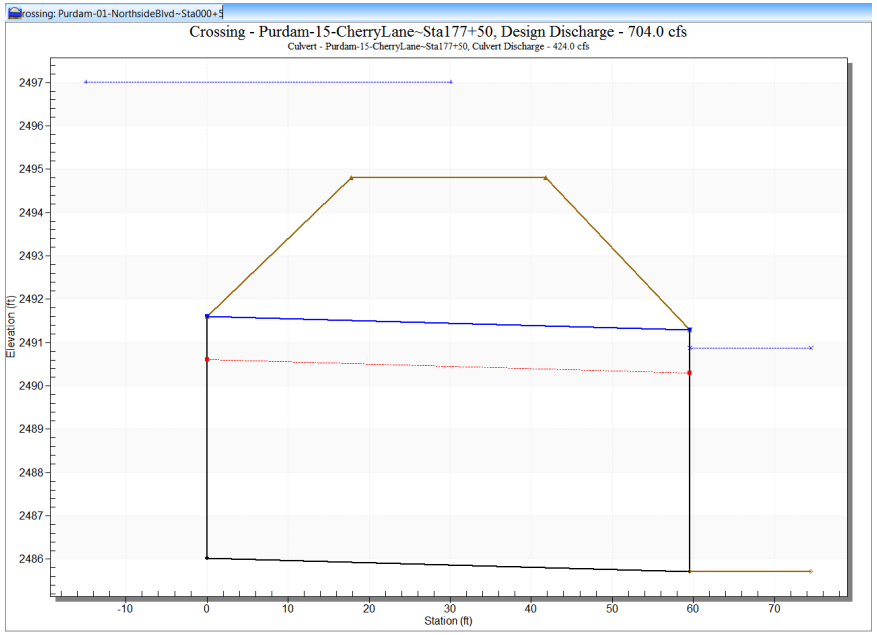


Table 37 - Downstream Channel Rating Curve (Crossing: Purdam-15-CherryLane~Sta177+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2488.70	2.99	4.55	0.58	0.54
291.25	2488.99	3.28	4.78	0.63	0.54
337.50	2489.26	3.55	4.99	0.69	0.55
383.75	2489.50	3.79	5.17	0.73	0.55
430.00	2489.73	4.02	5.33	0.78	0.55
476.25	2489.95	4.24	5.48	0.82	0.56
522.50	2490.16	4.45	5.63	0.86	0.56
568.75	2490.35	4.64	5.76	0.90	0.56
615.00	2490.54	4.83	5.88	0.93	0.57
661.25	2490.72	5.01	6.00	0.97	0.57
704.00	2490.88	5.17	6.10	1.00	0.57

Tailwater Channel Data - Purdam-15-CherryLane~Sta177+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0031

Channel Manning's n: 0.0300

Channel Invert Elevation: 2485.71 ft

Roadway Data for Crossing: Purdam-15-CherryLane~Sta177+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 28.00 ft

Crest Elevation: 2494.80 ft

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 38 - Summary of Culvert Flows at Crossing: Purdam-16-IdahoCenterBlvd~Sta193+90

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-16-IdahoCenterBlvd~Sta193+90 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2491.97	245.00	245.00	0.00	1
2492.70	291.25	291.25	0.00	1
2493.44	337.50	337.50	0.00	1
2494.20	383.75	383.75	0.00	1
2495.02	430.00	430.00	0.00	1
2495.89	476.25	476.25	0.00	1
2496.32	522.50	497.74	24.71	6
2496.56	568.75	509.70	59.00	5
2496.77	615.00	519.74	95.10	4
2496.97	661.25	528.69	132.45	4
2497.13	704.00	536.26	167.66	4
2496.00	481.89	481.89	0.00	Overtopping

Table 39 - Culvert Summary Table: Purdam-16-IdahoCenterBlvd~Sta193+90

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2491.97	6.073	3.634	1-S2n	3.296	3.936	3.379	2.382	12.126	6.134
291.25	291.25	2492.70	6.801	4.353	1-S2n	3.643	4.305	3.728	2.618	12.685	6.455
337.50	337.50	2493.44	7.538	5.109	1-S2n	3.962	4.650	4.058	2.835	13.184	6.738
383.75	383.75	2494.20	8.305	5.903	5-S2n	4.281	4.973	4.379	3.037	13.626	6.992
430.00	430.00	2495.02	9.117	6.735	5-S2n	4.597	5.274	4.695	3.226	14.032	7.223
476.25	476.25	2495.89	9.989	7.613	5-S2n	4.913	5.559	5.004	3.405	14.402	7.435
522.50	497.74	2496.32	10.418	8.034	5-S2n	5.059	5.685	5.149	3.575	14.562	7.631
568.75	509.70	2496.56	10.664	8.273	5-S2n	5.145	5.753	5.231	3.738	14.651	7.814
615.00	519.74	2496.77	10.875	8.475	5-S2n	5.218	5.809	5.298	3.893	14.728	7.986
661.25	528.69	2496.97	11.066	8.657	5-S2n	5.283	5.859	5.356	4.041	14.800	8.147
704.00	536.26	2497.13	11.230	8.813	5-S2n	5.339	5.900	5.407	4.174	14.853	8.289

Culvert Data Summary - Purdam-16-IdahoCenterBlvd~Sta193+90

Barrel Shape: Circular

Barrel Diameter: 8.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

****

Straight Culvert

Inlet Elevation (invert): 2485.90 ft, Outlet Elevation (invert): 2484.75 ft

Culvert Length: 60.11 ft, Culvert Slope: 0.0191

****

Site Data - Purdam-16-IdahoCenterBlvd~Sta193+90

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2485.90 ft

Outlet Station: 60.10 ft

Outlet Elevation: 2484.75 ft

Number of Barrels: 1

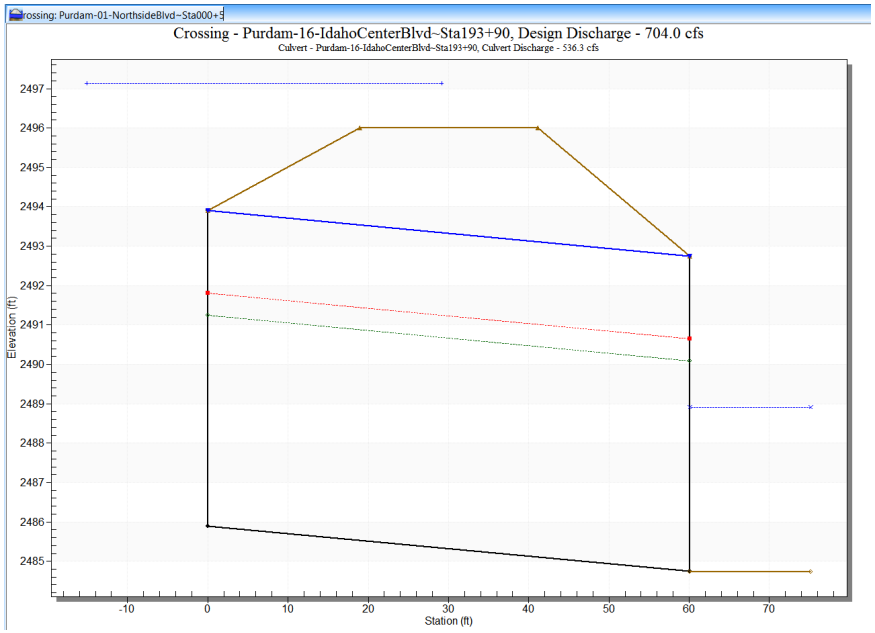


Table 40 - Downstream Channel Rating Curve (Crossing: Purdam-16-IdahoCenterBlvd~Sta193+90)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2487.11	2.38	6.13	1.07	0.79
291.25	2487.35	2.62	6.45	1.18	0.80
337.50	2487.56	2.83	6.74	1.27	0.81
383.75	2487.77	3.04	6.99	1.36	0.82
430.00	2487.96	3.23	7.22	1.45	0.82
476.25	2488.14	3.41	7.43	1.53	0.83
522.50	2488.31	3.58	7.63	1.61	0.83
568.75	2488.47	3.74	7.81	1.68	0.84
615.00	2488.62	3.89	7.99	1.75	0.84
661.25	2488.77	4.04	8.15	1.82	0.85
704.00	2488.90	4.17	8.29	1.88	0.85

Tailwater Channel Data - Purdam-16-IdahoCenterBlvd~Sta193+90

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0072

Channel Manning's n: 0.0300

Channel Invert Elevation: 2484.73 ft

Roadway Data for Crossing: Purdam-16-IdahoCenterBlvd~Sta193+90

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 46.00 ft

Crest Elevation: 2496.00 ft

Roadway Surface: Paved

Roadway Top Width: 22.20 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 41 - Summary of Culvert Flows at Crossing: Purdam-17-CanalXing~Sta212+50

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-17-CanalXing ~Sta212+50 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2498.02	245.00	245.00	0.00	1
2499.40	291.25	291.25	0.00	1
2501.04	337.50	337.50	0.00	1
2502.58	383.75	375.28	8.43	9
2502.94	430.00	383.53	46.34	5
2503.20	476.25	389.50	86.70	5
2503.42	522.50	394.50	127.80	4
2503.63	568.75	398.95	169.66	4
2503.81	615.00	402.99	211.92	4
2503.98	661.25	406.75	254.44	4
2504.14	704.00	410.01	293.95	4
2502.40	371.13	371.13	0.00	Overtopping

Table 42 - Culvert Summary Table: Purdam-17-CanalXing~Sta212+50

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2498.02	7.141	6.576	5-S2n	3.623	4.367	3.828	3.278	13.897	4.027
291.25	291.25	2499.40	8.517	7.768	5-S2n	4.149	4.708	4.299	3.591	14.649	4.228
337.50	337.50	2501.04	10.159	9.094	5-S2n	4.930	4.967	4.930	3.878	15.054	4.405
383.75	375.28	2502.58	11.697	10.268	7-M2c	5.500	5.121	5.121	4.144	16.286	4.564
430.00	383.53	2502.94	12.055	10.560	7-M2c	5.500	5.143	5.143	4.393	16.600	4.709
476.25	389.50	2503.20	12.319	10.765	7-M2c	5.500	5.166	5.166	4.628	16.814	4.842
522.50	394.50	2503.42	12.543	10.929	7-M2c	5.500	5.176	5.176	4.850	17.011	4.965
568.75	398.95	2503.63	12.745	11.091	7-M2c	5.500	5.193	5.193	5.061	17.171	5.080
615.00	402.99	2503.81	12.930	11.235	7-M2t	5.500	5.198	5.263	5.263	17.220	5.187
661.25	406.75	2503.98	13.104	11.447	7-M2t	5.500	5.214	5.457	5.457	17.141	5.289
704.00	410.01	2504.14	13.256	11.722	4-FFf	5.500	5.215	5.500	5.629	17.257	5.378

****

Straight Culvert

Inlet Elevation (invert): 2490.88 ft, Outlet Elevation (invert): 2490.05 ft

Culvert Length: 108.74 ft, Culvert Slope: 0.0076

****

Site Data - Purdam-17-CanalXing~Sta212+50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2490.88 ft

Outlet Station: 108.74 ft

Outlet Elevation: 2490.05 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-17-CanalXing~Sta212+50

Barrel Shape: Circular

Barrel Diameter: 5.50 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Grooved End Projecting

Inlet Depression: NONE

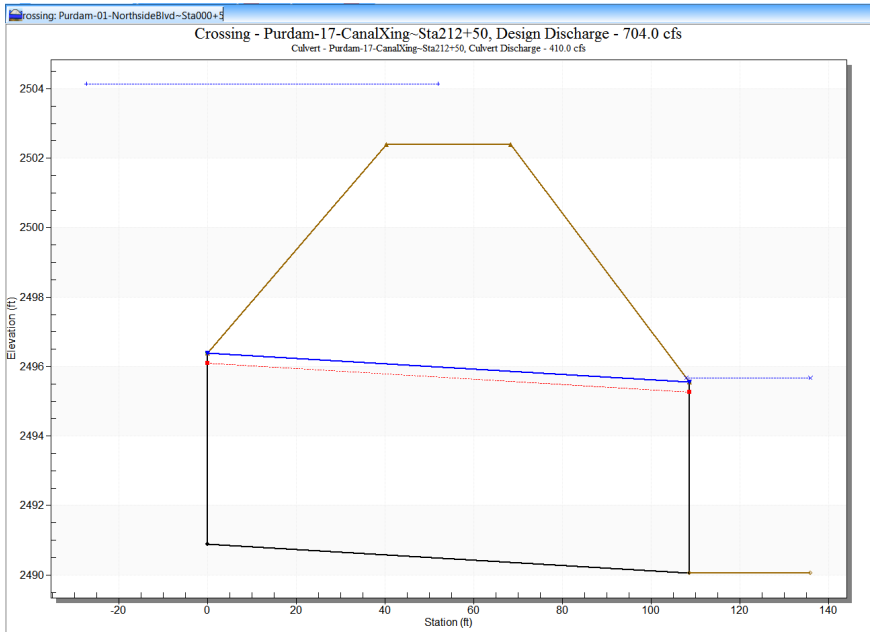


Table 43 - Downstream Channel Rating Curve (Crossing: Purdam-17-CanalXing~Sta212+50)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2493.33	3.28	4.03	0.45	0.46
291.25	2493.64	3.59	4.23	0.49	0.46
337.50	2493.93	3.88	4.41	0.53	0.47
383.75	2494.19	4.14	4.56	0.57	0.47
430.00	2494.44	4.39	4.71	0.60	0.47
476.25	2494.68	4.63	4.84	0.64	0.48
522.50	2494.90	4.85	4.96	0.67	0.48
568.75	2495.11	5.06	5.08	0.69	0.48
615.00	2495.31	5.26	5.19	0.72	0.48
661.25	2495.51	5.46	5.29	0.75	0.48
704.00	2495.68	5.63	5.38	0.77	0.49

Tailwater Channel Data - Purdam-17-CanalXing~Sta212+50

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0022

Channel Manning's n: 0.0300

Channel Invert Elevation: 2490.05 ft

Roadway Data for Crossing: Purdam-17-CanalXing~Sta212+50

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 43.70 ft

Crest Elevation: 2502.40 ft

Roadway Surface: Gravel

Roadway Top Width: 28.10 ft

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 245 cfs

Design Flow: 704 cfs

Maximum Flow: 707.5 cfs

Table 44 - Summary of Culvert Flows at Crossing: Purdam-18-StarRoad~Sta253+90

Headwater Elevation (ft)	Total Discharge (cfs)	Purdam-18-StarRoad~ Sta253+90 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
2507.57	245.00	245.00	0.00	1
2508.55	291.25	291.25	0.00	1
2509.91	337.50	337.50	0.00	1
2511.32	383.75	379.07	4.62	10
2511.69	430.00	389.20	40.72	5
2511.96	476.25	396.49	79.57	4
2512.20	522.50	402.69	119.70	4
2512.41	568.75	408.19	160.48	4
2512.61	615.00	413.23	201.71	4
2512.80	661.25	417.91	243.30	4
2512.97	704.00	421.98	281.99	4
2511.20	375.82	375.82	0.00	Overtopping

Table 45 - Culvert Summary Table: Purdam-18-StarRoad~Sta253+90

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
245.00	245.00	2507.57	7.194	7.399	7-M2c	6.500	4.190	4.190	2.631	10.833	5.394
291.25	291.25	2508.55	8.381	8.364	7-M2c	6.500	4.577	4.577	2.889	11.664	5.672
337.50	337.50	2509.91	9.743	9.424	7-M2c	6.500	4.928	4.928	3.125	12.504	5.917
383.75	379.07	2511.32	11.146	10.598	7-M2c	6.500	5.207	5.207	3.346	13.304	6.137
430.00	389.20	2511.69	11.517	10.905	7-M2c	6.500	5.270	5.270	3.552	13.506	6.337
476.25	396.49	2511.96	11.790	11.130	7-M2c	6.500	5.314	5.314	3.747	13.653	6.520
522.50	402.69	2512.20	12.028	11.323	7-M2c	6.500	5.350	5.350	3.932	13.780	6.690
568.75	408.19	2512.41	12.243	11.512	7-M2c	6.500	5.382	5.382	4.108	13.893	6.849
615.00	413.23	2512.61	12.442	11.655	7-M2c	6.500	5.411	5.411	4.276	13.998	6.997
661.25	417.91	2512.80	12.631	11.816	7-M2c	6.500	5.437	5.437	4.438	14.096	7.138
704.00	421.98	2512.97	12.796	11.935	7-M2c	6.500	5.460	5.460	4.582	14.182	7.261

****

Straight Culvert

Inlet Elevation (invert): 2500.17 ft, Outlet Elevation (invert): 2500.00 ft

Culvert Length: 60.10 ft, Culvert Slope: 0.0028

****

Site Data - Purdam-18-StarRoad~Sta253+90

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 2500.17 ft

Outlet Station: 60.10 ft

Outlet Elevation: 2500.00 ft

Number of Barrels: 1

Culvert Data Summary - Purdam-18-StarRoad~Sta253+90

Barrel Shape: Circular

Barrel Diameter: 6.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0240

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: NONE

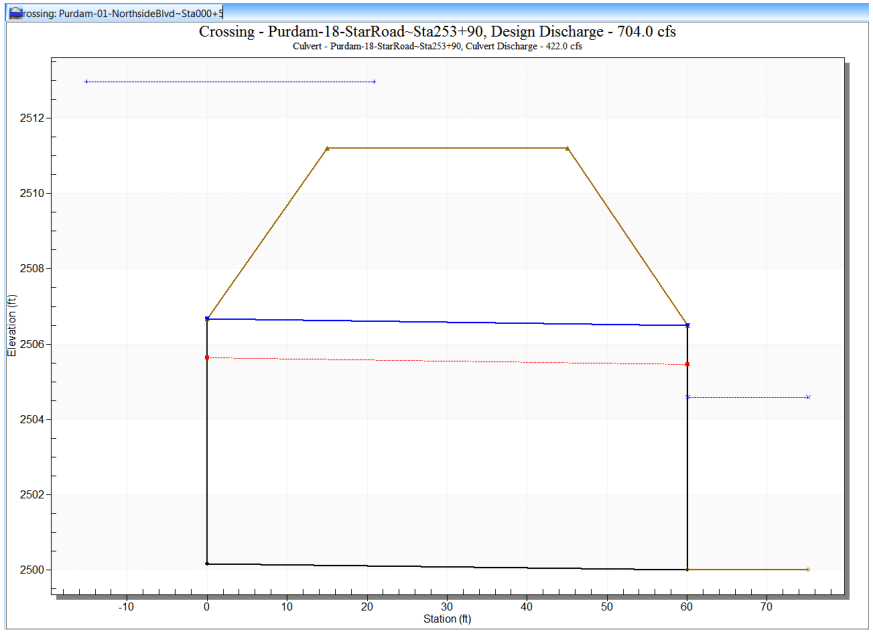


Table 46 - Downstream Channel Rating Curve (Crossing: Purdam-18-StarRoad~Sta253+90)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
245.00	2502.63	2.63	5.39	0.82	0.67
291.25	2502.89	2.89	5.67	0.90	0.68
337.50	2503.13	3.13	5.92	0.98	0.68
383.75	2503.35	3.35	6.14	1.04	0.69
430.00	2503.55	3.55	6.34	1.11	0.69
476.25	2503.75	3.75	6.52	1.17	0.70
522.50	2503.93	3.93	6.69	1.23	0.70
568.75	2504.11	4.11	6.85	1.28	0.71
615.00	2504.28	4.28	7.00	1.33	0.71
661.25	2504.44	4.44	7.14	1.38	0.71
704.00	2504.58	4.58	7.26	1.43	0.72

Tailwater Channel Data - Purdam-18-StarRoad~Sta253+90

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 12.00 ft

Side Slope (H:V): 2.00 (_:1)

Channel Slope: 0.0050

Channel Manning's n: 0.0300

Channel Invert Elevation: 2500.00 ft

Roadway Data for Crossing: Purdam-18-StarRoad~Sta253+90

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 39.60 ft

Crest Elevation: 2511.20 ft

Roadway Surface: Paved

Roadway Top Width: 30.00 ft

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Appendix I

USGS-TM3-A8-DischargeMeasurements
Accuracy of Current-Meter Discharge Measurements
Turnipseed & Sauer-Excerpt

Discharge Measurements at Gaging Stations

Chapter 8 of Book 3, Section A

Techniques and Methods 3–A8

U.S. Department of the Interior
U.S. Geological Survey

Accuracy of Current-Meter Discharge Measurements

The accuracy of a discharge measurement is dependent on many factors, including the equipment used, the location and characteristics of the measuring section, the number and spacing of verticals, the rate of change in stage, the measurement of depth and velocity, presence of ice and (or) debris in the measuring section, wind, experience of the hydrographer, carefulness (or carelessness) of the hydrographer, and various conditions that can occur during the process of making the measurement. The evaluation of the accuracy of a measurement has long been a qualitative assessment that takes some or all of these factors into account. A quantitative measure of the accuracy for some discharge measurements can also be made. The following two sections of this chapter describe these methods.

Qualitative Evaluation

Every discharge measurement should be evaluated for accuracy using the qualitative method. Historically, this has been the preferred method, and the hydrographer should make this evaluation immediately after making the measurement. The evaluation should be based on the hydrographer's opinion of the accuracy of the measurement—not on how well, or how poorly, the measurement plots on the stage-discharge relation. It is difficult to provide written guidelines for making a qualitative evaluation of accuracy. A good qualitative evaluation depends mostly on the experience and training of the hydrographer. Several of the factors that should be considered by the hydrographer are as follows:

Measuring section.—Consider factors such as the uniformity of depths, the smoothness of the streambed, the streambed material (that is, smooth sand; small, firm gravel; large rocks; soft muck; and so forth), the ability to accurately measure the depth, the approach conditions, presence of bridge piers, and other conditions that would affect measurement accuracy.

Velocity conditions.—Consider smoothness of velocity, uniformity of velocity, very slow velocity, very high velocity, turbulence, obstructions that may affect the vertical velocity distribution, use of one-point or two-point method, length of counting (40 or more seconds versus half-counts), and other factors that affect accuracy of velocity measurements.

Equipment.—Consider the type of current meter used (Price AA, Price pygmy, acoustic, or electromagnetic), the type of depth-sounding equipment, and the condition of the equipment.

Spacing of observation verticals.—Use about 25 to 30 verticals for a discharge measurement, spaced so that no more than 5 percent of the total discharge is contained in each subsection. Although this is frequently difficult to attain, except in unusual cases, no more than 10 percent of the total discharge should be in a subsection. Otherwise, the accuracy will be negatively affected.

Rapidly changing stage.—Although discussed in previous sections of this chapter, this condition should also be considered when assessing the accuracy of the measurement. Using the shortcut methods previously described will result in less accurate measurements of discharge.

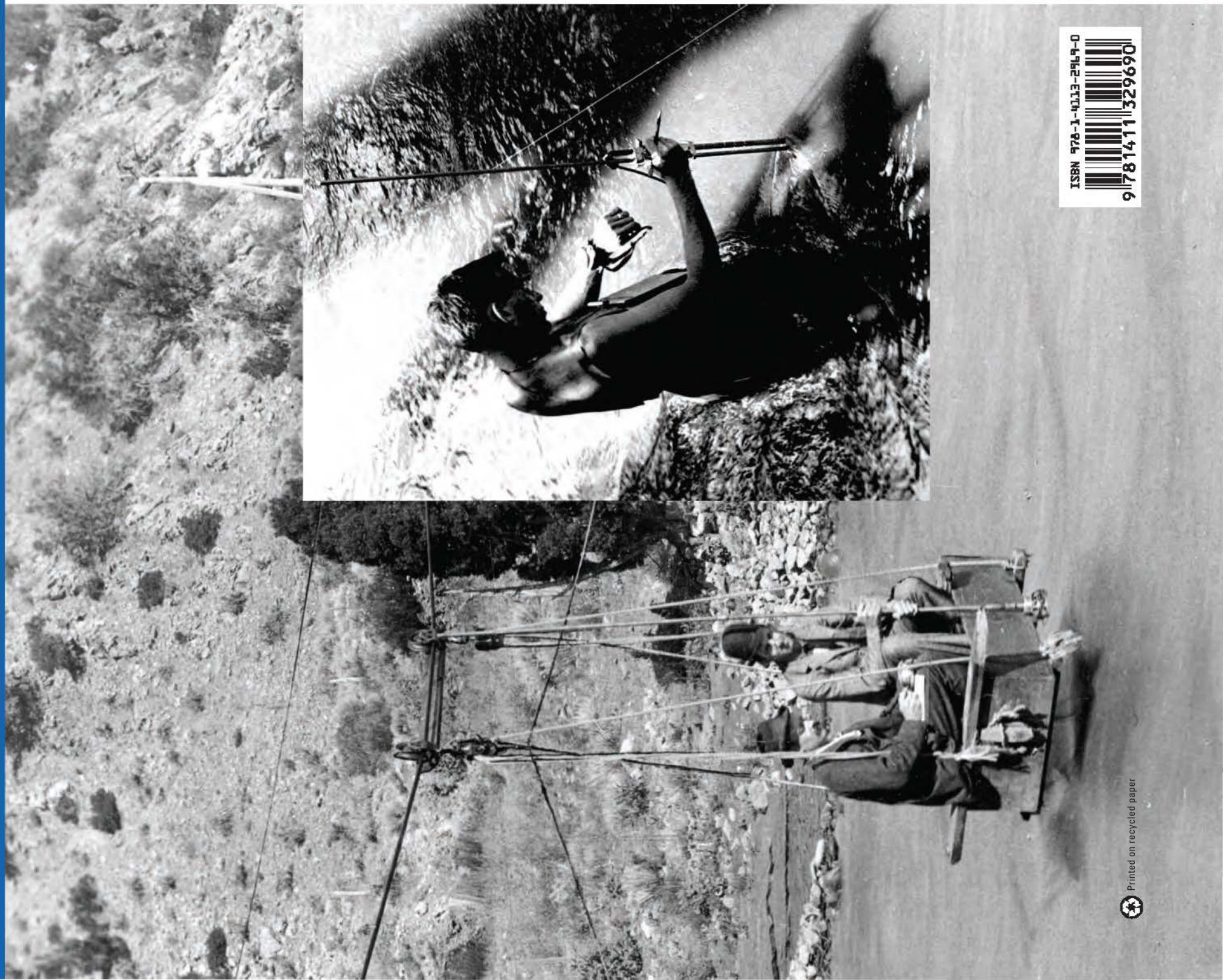
Ice measurements.—Making discharge measurements under ice cover is usually more difficult, and sometimes less accurate, than making open-water discharge measurements. Presence of slush ice, layered ice, and anchor ice will have adverse affects on accurate measurement of depth and velocity. Velocity distribution will be affected if the water surface is in contact with the ice. Freezing of water in the meter cups and pivot chamber may affect performance of the equipment.

Wind.—Wind can affect the accuracy of a discharge measurement by obscuring the angle of the current, or by creating waves that make it difficult to sense the water surface prior to making depth soundings. Wind can also affect the vertical-velocity distribution, particularly near the surface, and can cause vertical and (or) horizontal movement of the current meter while making a boat measurement, introducing possible error in velocity measurements.

The qualitative method of assessing the accuracy of a discharge measurement requires that the hydrographer consider all of the above items and their cumulative effect on the measurement accuracy. The front page of the discharge measurement note sheet (see figure 2) has space for describing (1) the cross section, (2) the flow, (3) the weather, and (4) any other flow conditions that relate to the accuracy. These descriptions, along with the type of equipment, number of verticals, velocity measurement method, and other measurement conditions, should provide the basis for rating the measurement as excellent (2 percent), good (5 percent), fair (8 percent), or poor (more than 8 percent).

For instance, a measurement might be rated as excellent (2 percent) if (1) the cross section is smooth, firm, and uniform; (2) the velocity is smooth and evenly distributed; (3) the equipment is in good condition; (4) the two-point velocity measurement method was used; and (5) weather conditions are good (no wind or ice). On the other hand, if several of these factors make it difficult to accurately measure depth and (or) velocity, the measurement might be rated fair (8 percent), or even poor (more than 8 percent).

As stated previously, it is not possible to provide absolute guidelines for making the qualitative evaluation of accuracy. As a general rule, the accuracy of most discharge measurements will be about 5 percent, or qualitatively a "good" measurement. This is sometimes used as the base-line accuracy, with accuracy upgraded to "excellent" when measuring conditions are substantially better than average, and accuracy downgraded to "fair" or "poor" when conditions are substantially worse than average. The qualitative-accuracy evaluation is based on the hydrographer's judgment. For more detailed qualitative-evaluation information on discharge measurements using ADCPs, see Oberg and others (2005) and Mueller and Wagner (2009).



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Appendix J
Mason Creek
HEC-RAS Output Results
Excerpted From
Canyon Co Flood Insurance Study, 2011

MASON CR
HEC-RAS OUTPUT RESULTS
EXCERPTED FROM
CANYON CO FLOOD INSURANCE STUDY, 2011

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Lower Reach	12281.89	100-yr base	1266.0	2390.10	212.23	
Lower Reach	12281.89	100-yr+0.5	1266.5	2390.09	207.89	-0.01
Lower Reach	12281.89	100-yr+1.0	1267.0	2390.09	207.93	-0.01
Lower Reach	12281.89	100-yr+1.5	1267.5	2390.10	211.58	0.00
Lower Reach	12281.89	100-yr+2.0	1268.0	2390.09	207.95	-0.01
Lower Reach	12281.89	100-yr+2.5	1268.5	2390.09	207.86	-0.01
Lower Reach	12281.89	100-yr+3.0	1269.0	2390.09	209.29	-0.01
Lower Reach	12281.89	100-yr+3.5	1269.5	2390.10	212.50	0.00
Lower Reach	12280	Flume	Bridge			
Lower Reach	12227.1	100-yr base	1266.0	2389.94	51.07	
Lower Reach	12227.1	100-yr+0.5	1266.5	2389.93	51.03	-0.01
Lower Reach	12227.1	100-yr+1.0	1267.0	2389.93	51.03	-0.01
Lower Reach	12227.1	100-yr+1.5	1267.5	2389.94	51.07	0.00
Lower Reach	12227.1	100-yr+2.0	1268.0	2389.93	51.04	-0.01
Lower Reach	12227.1	100-yr+2.5	1268.5	2389.93	51.03	-0.01
Lower Reach	12227.1	100-yr+3.0	1269.0	2389.94	51.05	0.00
Lower Reach	12227.1	100-yr+3.5	1269.5	2389.94	51.07	0.00
Lower Reach	11812.99	100-yr base	1266.0	2389.82	361.92	
Lower Reach	11812.99	100-yr+0.5	1266.5	2389.80	361.80	-0.02
Lower Reach	11812.99	100-yr+1.0	1267.0	2389.80	361.80	-0.02
Lower Reach	11812.99	100-yr+1.5	1267.5	2389.82	361.91	0.00
Lower Reach	11812.99	100-yr+2.0	1268.0	2389.80	361.80	-0.02
Lower Reach	11812.99	100-yr+2.5	1268.5	2389.80	361.78	-0.02
Lower Reach	11812.99	100-yr+3.0	1269.0	2389.81	361.85	-0.01
Lower Reach	11812.99	100-yr+3.5	1269.5	2389.82	361.92	0.00
Lower Reach	11790	Mason Rd.	Culvert			
Lower Reach	11769.71	100-yr base	1266.0	2388.71	121.90	
Lower Reach	11769.71	100-yr+0.5	1266.5	2388.69	105.49	-0.02
Lower Reach	11769.71	100-yr+1.0	1267.0	2388.70	105.90	-0.01
Lower Reach	11769.71	100-yr+1.5	1267.5	2388.71	115.70	0.00
Lower Reach	11769.71	100-yr+2.0	1268.0	2388.73	129.32	0.02
Lower Reach	11769.71	100-yr+2.5	1268.5	2388.70	112.85	-0.01
Lower Reach	11769.71	100-yr+3.0	1269.0	2388.69	104.90	-0.02

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Lower Reach	11769.71	100-yr+3.5	1269.5	2388.68	103.94	-0.03
Lower Reach	11227.84	100-yr base	1266.0	2388.43	453.92	
Lower Reach	11227.84	100-yr+0.5	1266.5	2388.40	441.28	-0.03
Lower Reach	11227.84	100-yr+1.0	1267.0	2388.40	443.59	-0.03
Lower Reach	11227.84	100-yr+1.5	1267.5	2388.42	451.27	-0.01
Lower Reach	11227.84	100-yr+2.0	1268.0	2388.47	459.21	0.04
Lower Reach	11227.84	100-yr+2.5	1268.5	2388.42	449.72	-0.01
Lower Reach	11227.84	100-yr+3.0	1269.0	2388.39	436.01	-0.04
Lower Reach	11227.84	100-yr+3.5	1269.5	2388.38	428.93	-0.05
Lower Reach	11200	Lincoln Rd.	Culvert			
Lower Reach	11176.73	100-yr base	1266.0	2384.80	29.65	
Lower Reach	11176.73	100-yr+0.5	1266.5	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+1.0	1267.0	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+1.5	1267.5	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+2.0	1268.0	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+2.5	1268.5	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+3.0	1269.0	2384.80	29.65	0.00
Lower Reach	11176.73	100-yr+3.5	1269.5	2384.80	29.65	0.00
Lower Reach	9122.347	100-yr base	1266.0	2381.32	545.30	
Lower Reach	9122.347	100-yr+0.5	1266.5	2381.30	545.12	-0.02
Lower Reach	9122.347	100-yr+1.0	1267.0	2381.30	545.13	-0.02
Lower Reach	9122.347	100-yr+1.5	1267.5	2381.30	545.13	-0.02
Lower Reach	9122.347	100-yr+2.0	1268.0	2381.30	545.16	-0.02
Lower Reach	9122.347	100-yr+2.5	1268.5	2381.30	545.16	-0.02
Lower Reach	9122.347	100-yr+3.0	1269.0	2381.30	545.14	-0.02
Lower Reach	9122.347	100-yr+3.5	1269.5	2381.30	545.18	-0.02
Lower Reach	9120	Private Rd	Bridge			
Lower Reach	9104.979	100-yr base	1266.0	2380.67	271.05	
Lower Reach	9104.979	100-yr+0.5	1266.5	2380.67	270.84	0.00
Lower Reach	9104.979	100-yr+1.0	1267.0	2380.67	271.15	0.00
Lower Reach	9104.979	100-yr+1.5	1267.5	2380.67	271.47	0.00
Lower Reach	9104.979	100-yr+2.0	1268.0	2380.67	272.00	0.00
Lower Reach	9104.979	100-yr+2.5	1268.5	2380.67	272.11	0.00
Lower Reach	9104.979	100-yr+3.0	1269.0	2380.67	272.43	0.00
Lower Reach	9104.979	100-yr+3.5	1269.5	2380.67	273.01	0.00
Lower Reach	6455.974	100-yr base	1266.0	2376.67	474.89	
Lower Reach	6455.974	100-yr+0.5	1266.5	2376.88	555.41	0.21

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Lower Reach	6455.974	100-yr+1.0	1267.0	2376.89	558.03	0.22
Lower Reach	6455.974	100-yr+1.5	1267.5	2376.88	555.60	0.21
Lower Reach	6455.974	100-yr+2.0	1268.0	2376.89	558.97	0.22
Lower Reach	6455.974	100-yr+2.5	1268.5	2376.89	562.34	0.22
Lower Reach	6455.974	100-yr+3.0	1269.0	2376.90	567.97	0.23
Lower Reach	6455.974	100-yr+3.5	1269.5	2376.90	570.22	0.23
Lower Reach	6452	Flume	Bridge			
Lower Reach	6450.131	100-yr base	1266.0	2376.23	419.21	
Lower Reach	6450.131	100-yr+0.5	1266.5	2376.41	514.46	0.18
Lower Reach	6450.131	100-yr+1.0	1267.0	2376.41	515.09	0.18
Lower Reach	6450.131	100-yr+1.5	1267.5	2376.41	514.27	0.18
Lower Reach	6450.131	100-yr+2.0	1268.0	2376.41	515.09	0.18
Lower Reach	6450.131	100-yr+2.5	1268.5	2376.41	515.92	0.18
Lower Reach	6450.131	100-yr+3.0	1269.0	2376.42	517.44	0.19
Lower Reach	6450.131	100-yr+3.5	1269.5	2376.42	517.88	0.19
Lower Reach	6173.318	100-yr base	1266.0	2375.33	422.10	
Lower Reach	6173.318	100-yr+0.5	1266.5	2375.68	448.47	0.35
Lower Reach	6173.318	100-yr+1.0	1267.0	2375.68	448.83	0.35
Lower Reach	6173.318	100-yr+1.5	1267.5	2375.68	448.13	0.35
Lower Reach	6173.318	100-yr+2.0	1268.0	2375.68	448.58	0.35
Lower Reach	6173.318	100-yr+2.5	1268.5	2375.69	449.06	0.36
Lower Reach	6173.318	100-yr+3.0	1269.0	2375.70	449.97	0.37
Lower Reach	6173.318	100-yr+3.5	1269.5	2375.70	450.11	0.37
Lower Reach	6170	Pipe	Bridge	Irrigation Pipe over the Mason Cr Within backwaters of Boise River Floodplain		
Lower Reach	6167.674	100-yr base	1266.0	2375.19	416.98	
Lower Reach	6167.674	100-yr+0.5	1266.5	2375.56	437.52	0.37
Lower Reach	6167.674	100-yr+1.0	1267.0	2375.56	437.78	0.37
Lower Reach	6167.674	100-yr+1.5	1267.5	2375.56	437.22	0.37
Lower Reach	6167.674	100-yr+2.0	1268.0	2375.56	437.58	0.37
Lower Reach	6167.674	100-yr+2.5	1268.5	2375.57	437.98	0.38
Lower Reach	6167.674	100-yr+3.0	1269.0	2375.58	438.89	0.39
Lower Reach	6167.674	100-yr+3.5	1269.5	2375.58	439.00	0.39
Lower Reach	5710.64	100-yr floodway	1266.0	2376.00	221.33	
Lower Reach	5710.64	100-yr+0.5	1266.5	2375.41	633.27	-0.59
Lower Reach	5710.64	100-yr+1.0	1267.0	2375.41	633.71	-0.59
Lower Reach	5710.64	100-yr+1.5	1267.5	2375.40	632.59	-0.60
Lower Reach	5710.64	100-yr+2.0	1268.0	2375.41	633.24	-0.59
Lower Reach	5710.64	100-yr+2.5	1268.5	2375.41	634.06	-0.59

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Lower Reach	5710.64	100-yr+3.0	1269.0	2375.43	635.81	-0.57
Lower Reach	5710.64	100-yr+3.5	1269.5	2375.43	635.94	-0.57
Lower Reach	5700	Polk Rd	Culvert	Culvert Pipe under Polk St Within backwaters of Boise River Floodplain		
Lower Reach	5666.086	100-yr floodway	1266.0	2372.59	30.36	
Lower Reach	5666.086	100-yr+0.5	1266.5	2372.58	30.32	-0.01
Lower Reach	5666.086	100-yr+1.0	1267.0	2372.60	30.43	0.01
Lower Reach	5666.086	100-yr+1.5	1267.5	2372.61	30.44	0.02
Lower Reach	5666.086	100-yr+2.0	1268.0	2372.61	30.44	0.02
Lower Reach	5666.086	100-yr+2.5	1268.5	2372.60	30.41	0.01
Lower Reach	5666.086	100-yr+3.0	1269.0	2372.60	30.43	0.01
Lower Reach	5666.086	100-yr+3.5	1269.5	2372.60	30.41	0.01

MASON CR
HEC-RAS OUTPUT RESULTS
EXCERPTED FROM
CANYON CO FLOOD INSURANCE STUDY, 2011

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	39395.95	100-yr base	1266.0	2450.80	454.53	
Upper Reach	39395.95	100-yr+0.5	1266.5	2450.80	454.59	0.00
Upper Reach	39395.95	100-yr+1.0	1267.0	2450.80	454.66	0.00
Upper Reach	39395.95	100-yr+1.5	1267.5	2450.81	454.72	0.01
Upper Reach	39395.95	100-yr+2.0	1268.0	2450.81	454.84	0.01
Upper Reach	39395.95	100-yr+2.5	1268.5	2450.81	454.92	0.01
Upper Reach	39395.95	100-yr+3.0	1269.0	2450.81	454.96	0.01
Upper Reach	39395.95	100-yr+3.5	1269.5	2450.81	454.87	0.01
Upper Reach	39350	Lone Tree Ln (Ustick)	Culvert			
Upper Reach	39325.62	100-yr base	1266.0	2449.68	117.67	
Upper Reach	39325.62	100-yr+0.5	1266.5	2449.68	117.69	0.00
Upper Reach	39325.62	100-yr+1.0	1267.0	2449.68	117.67	0.00
Upper Reach	39325.62	100-yr+1.5	1267.5	2449.68	117.70	0.00
Upper Reach	39325.62	100-yr+2.0	1268.0	2449.68	117.75	0.00
Upper Reach	39325.62	100-yr+2.5	1268.5	2449.68	117.76	0.00
Upper Reach	39325.62	100-yr+3.0	1269.0	2449.68	117.75	0.00
Upper Reach	39325.62	100-yr+3.5	1269.5	2449.68	117.58	0.00
Upper Reach	39233.4	100-yr base	1266.0	2449.62	197.35	
Upper Reach	39233.4	100-yr+0.5	1266.5	2449.62	197.37	0.00
Upper Reach	39233.4	100-yr+1.0	1267.0	2449.62	197.33	0.00
Upper Reach	39233.4	100-yr+1.5	1267.5	2449.62	197.46	0.00
Upper Reach	39233.4	100-yr+2.0	1268.0	2449.62	197.42	0.00
Upper Reach	39233.4	100-yr+2.5	1268.5	2449.62	197.44	0.00
Upper Reach	39233.4	100-yr+3.0	1269.0	2449.62	197.46	0.00
Upper Reach	39233.4	100-yr+3.5	1269.5	2449.62	197.52	0.00
Upper Reach	39230	Diversion	Inl Struct			
Upper Reach	39173.06	100-yr base	1266.0	2449.37	196.65	
Upper Reach	39173.06	100-yr+0.5	1266.5	2449.37	196.74	0.00
Upper Reach	39173.06	100-yr+1.0	1267.0	2449.37	196.87	0.00
Upper Reach	39173.06	100-yr+1.5	1267.5	2449.37	197.00	0.00
Upper Reach	39173.06	100-yr+2.0	1268.0	2449.37	197.13	0.00
Upper Reach	39173.06	100-yr+2.5	1268.5	2449.37	197.23	0.00
Upper Reach	39173.06	100-yr+3.0	1269.0	2449.37	197.36	0.00
Upper Reach	39173.06	100-yr+3.5	1269.5	2449.37	197.48	0.00

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	36145.02	100-yr base	1266.0	2446.70	422.65	
Upper Reach	36145.02	100-yr+0.5	1266.5	2446.70	422.85	0.00
Upper Reach	36145.02	100-yr+1.0	1267.0	2446.70	423.09	0.00
Upper Reach	36145.02	100-yr+1.5	1267.5	2446.70	423.21	0.00
Upper Reach	36145.02	100-yr+2.0	1268.0	2446.70	423.48	0.00
Upper Reach	36145.02	100-yr+2.5	1268.5	2446.71	423.68	0.01
Upper Reach	36145.02	100-yr+3.0	1269.0	2446.71	423.76	0.01
Upper Reach	36145.02	100-yr+3.5	1269.5	2446.71	424.04	0.01
Upper Reach	36140		Bridge			
Upper Reach	36136.56	100-yr base	1266.0	2446.63	401.77	
Upper Reach	36136.56	100-yr+0.5	1266.5	2446.63	401.97	0.00
Upper Reach	36136.56	100-yr+1.0	1267.0	2446.63	402.32	0.00
Upper Reach	36136.56	100-yr+1.5	1267.5	2446.63	402.46	0.00
Upper Reach	36136.56	100-yr+2.0	1268.0	2446.63	402.84	0.00
Upper Reach	36136.56	100-yr+2.5	1268.5	2446.63	403.13	0.00
Upper Reach	36136.56	100-yr+3.0	1269.0	2446.64	403.27	0.01
Upper Reach	36136.56	100-yr+3.5	1269.5	2446.64	403.51	0.01
Upper Reach	36108.84	100-yr base	1266.0	2446.49	370.69	
Upper Reach	36108.84	100-yr+0.5	1266.5	2446.49	370.92	0.00
Upper Reach	36108.84	100-yr+1.0	1267.0	2446.50	371.38	0.01
Upper Reach	36108.84	100-yr+1.5	1267.5	2446.50	371.56	0.01
Upper Reach	36108.84	100-yr+2.0	1268.0	2446.50	371.96	0.01
Upper Reach	36108.84	100-yr+2.5	1268.5	2446.50	372.37	0.01
Upper Reach	36108.84	100-yr+3.0	1269.0	2446.50	372.49	0.01
Upper Reach	36108.84	100-yr+3.5	1269.5	2446.50	373.08	0.01
Upper Reach	36100	Flume	Bridge			
Upper Reach	36095.43	100-yr base	1266.0	2445.42	232.42	
Upper Reach	36095.43	100-yr+0.5	1266.5	2445.42	232.02	0.00
Upper Reach	36095.43	100-yr+1.0	1267.0	2445.42	232.46	0.00
Upper Reach	36095.43	100-yr+1.5	1267.5	2445.42	232.09	0.00
Upper Reach	36095.43	100-yr+2.0	1268.0	2445.42	232.42	0.00
Upper Reach	36095.43	100-yr+2.5	1268.5	2445.42	232.53	0.00
Upper Reach	36095.43	100-yr+3.0	1269.0	2445.42	232.46	0.00
Upper Reach	36095.43	100-yr+3.5	1269.5	2445.43	232.83	0.01
Upper Reach	34662.34	100-yr base	1266.0	2445.00	3041.06	
Upper Reach	34662.34	100-yr+0.5	1266.5	2444.99	3039.81	-0.01
Upper Reach	34662.34	100-yr+1.0	1267.0	2445.00	3040.99	0.00
Upper Reach	34662.34	100-yr+1.5	1267.5	2444.99	3039.81	-0.01

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	34662.34	100-yr+2.0	1268.0	2444.99	3040.65	-0.01
Upper Reach	34662.34	100-yr+2.5	1268.5	2444.99	3040.51	-0.01
Upper Reach	34662.34	100-yr+3.0	1269.0	2444.99	3040.30	-0.01
Upper Reach	34662.34	100-yr+3.5	1269.5	2445.00	3041.13	0.00
Upper Reach	34650	UP Railroad	Culvert			
Upper Reach	34633.64	100-yr base	1266.0	2442.33	906.98	
Upper Reach	34633.64	100-yr+0.5	1266.5	2442.36	940.50	0.03
Upper Reach	34633.64	100-yr+1.0	1267.0	2442.33	909.33	0.00
Upper Reach	34633.64	100-yr+1.5	1267.5	2442.33	908.80	0.00
Upper Reach	34633.64	100-yr+2.0	1268.0	2442.33	908.80	0.00
Upper Reach	34633.64	100-yr+2.5	1268.5	2442.33	909.33	0.00
Upper Reach	34633.64	100-yr+3.0	1269.0	2442.33	909.33	0.00
Upper Reach	34633.64	100-yr+3.5	1269.5	2442.33	909.33	0.00
Upper Reach	32453.05	100-yr base	1266.0	2441.95	1214.48	
Upper Reach	32453.05	100-yr+0.5	1266.5	2441.95	1214.67	0.00
Upper Reach	32453.05	100-yr+1.0	1267.0	2441.95	1214.63	0.00
Upper Reach	32453.05	100-yr+1.5	1267.5	2441.95	1214.67	0.00
Upper Reach	32453.05	100-yr+2.0	1268.0	2441.95	1214.71	0.00
Upper Reach	32453.05	100-yr+2.5	1268.5	2441.95	1214.78	0.00
Upper Reach	32453.05	100-yr+3.0	1269.0	2441.95	1214.78	0.00
Upper Reach	32453.05	100-yr+3.5	1269.5	2441.95	1214.79	0.00
Upper Reach	32420	Midland Blvd.	Culvert			
Upper Reach	32400.15	100-yr base	1266.0	2441.92	1352.19	
Upper Reach	32400.15	100-yr+0.5	1266.5	2441.94	1354.79	0.02
Upper Reach	32400.15	100-yr+1.0	1267.0	2441.94	1354.60	0.02
Upper Reach	32400.15	100-yr+1.5	1267.5	2441.94	1354.70	0.02
Upper Reach	32400.15	100-yr+2.0	1268.0	2441.94	1354.79	0.02
Upper Reach	32400.15	100-yr+2.5	1268.5	2441.95	1354.95	0.03
Upper Reach	32400.15	100-yr+3.0	1269.0	2441.95	1354.95	0.03
Upper Reach	32400.15	100-yr+3.5	1269.5	2441.95	1354.91	0.03
Upper Reach	31264.37	100-yr base	1266.0	2441.91	2279.20	
Upper Reach	31264.37	100-yr+0.5	1266.5	2441.94	2292.63	0.03
Upper Reach	31264.37	100-yr+1.0	1267.0	2441.93	2291.34	0.02
Upper Reach	31264.37	100-yr+1.5	1267.5	2441.93	2291.94	0.02
Upper Reach	31264.37	100-yr+2.0	1268.0	2441.94	2292.54	0.03
Upper Reach	31264.37	100-yr+2.5	1268.5	2441.94	2293.58	0.03
Upper Reach	31264.37	100-yr+3.0	1269.0	2441.94	2293.49	0.03
Upper Reach	31264.37	100-yr+3.5	1269.5	2441.94	2293.23	0.03

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	31250	Linden Rd.	Bridge			
Upper Reach	31229.97	100-yr base	1266.0	2441.91	1902.73	
Upper Reach	31229.97	100-yr+0.5	1266.5	2441.93	1915.00	0.02
Upper Reach	31229.97	100-yr+1.0	1267.0	2441.93	1912.70	0.02
Upper Reach	31229.97	100-yr+1.5	1267.5	2441.93	1913.85	0.02
Upper Reach	31229.97	100-yr+2.0	1268.0	2441.93	1915.00	0.02
Upper Reach	31229.97	100-yr+2.5	1268.5	2441.94	1916.81	0.03
Upper Reach	31229.97	100-yr+3.0	1269.0	2441.94	1916.81	0.03
Upper Reach	31229.97	100-yr+3.5	1269.5	2441.94	1916.32	0.03
Upper Reach	30985.85	100-yr base	1266.0	2441.90	1950.37	
Upper Reach	30985.85	100-yr+0.5	1266.5	2441.93	1973.56	0.03
Upper Reach	30985.85	100-yr+1.0	1267.0	2441.93	1969.90	0.03
Upper Reach	30985.85	100-yr+1.5	1267.5	2441.93	1971.73	0.03
Upper Reach	30985.85	100-yr+2.0	1268.0	2441.93	1973.56	0.03
Upper Reach	30985.85	100-yr+2.5	1268.5	2441.93	1975.56	0.03
Upper Reach	30985.85	100-yr+3.0	1269.0	2441.93	1975.38	0.03
Upper Reach	30985.85	100-yr+3.5	1269.5	2441.93	1974.83	0.03
Upper Reach	30950	Pioneer Canal	Culvert			
Upper Reach	30916.19	100-yr base	1266.0	2434.62	85.49	
Upper Reach	30916.19	100-yr+0.5	1266.5	2434.62	85.59	0.00
Upper Reach	30916.19	100-yr+1.0	1267.0	2434.62	85.66	0.00
Upper Reach	30916.19	100-yr+1.5	1267.5	2434.62	85.73	0.00
Upper Reach	30916.19	100-yr+2.0	1268.0	2434.63	85.80	0.01
Upper Reach	30916.19	100-yr+2.5	1268.5	2434.63	85.89	0.01
Upper Reach	30916.19	100-yr+3.0	1269.0	2434.63	85.97	0.01
Upper Reach	30916.19	100-yr+3.5	1269.5	2434.63	86.03	0.01
Upper Reach	28479.69	100-yr base	1266.0	2429.26	135.21	
Upper Reach	28479.69	100-yr+0.5	1266.5	2429.26	135.23	0.00
Upper Reach	28479.69	100-yr+1.0	1267.0	2429.27	135.55	0.01
Upper Reach	28479.69	100-yr+1.5	1267.5	2429.26	135.49	0.00
Upper Reach	28479.69	100-yr+2.0	1268.0	2429.27	135.66	0.01
Upper Reach	28479.69	100-yr+2.5	1268.5	2429.26	135.31	0.00
Upper Reach	28479.69	100-yr+3.0	1269.0	2429.27	135.60	0.01
Upper Reach	28479.69	100-yr+3.5	1269.5	2429.27	135.74	0.01
Upper Reach	28475	Flume	Bridge			
Upper Reach	28474.52	100-yr base	1266.0	2429.24	114.82	
Upper Reach	28474.52	100-yr+0.5	1266.5	2429.24	114.84	0.00
Upper Reach	28474.52	100-yr+1.0	1267.0	2429.24	115.20	0.00

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	28474.52	100-yr+1.5	1267.5	2429.24	115.13	0.00
Upper Reach	28474.52	100-yr+2.0	1268.0	2429.24	115.30	0.00
Upper Reach	28474.52	100-yr+2.5	1268.5	2429.24	114.94	0.00
Upper Reach	28474.52	100-yr+3.0	1269.0	2429.24	115.23	0.00
Upper Reach	28474.52	100-yr+3.5	1269.5	2429.24	115.40	0.00
Upper Reach	27060.19	100-yr base	1266.0	2428.09	306.01	
Upper Reach	27060.19	100-yr+0.5	1266.5	2428.09	305.96	0.00
Upper Reach	27060.19	100-yr+1.0	1267.0	2428.10	306.34	0.01
Upper Reach	27060.19	100-yr+1.5	1267.5	2428.09	306.19	0.00
Upper Reach	27060.19	100-yr+2.0	1268.0	2428.10	306.32	0.01
Upper Reach	27060.19	100-yr+2.5	1268.5	2428.08	305.85	-0.01
Upper Reach	27060.19	100-yr+3.0	1269.0	2428.09	306.11	0.00
Upper Reach	27060.19	100-yr+3.5	1269.5	2428.10	306.24	0.01
Upper Reach	27050	Private Xing	Bridge			
Upper Reach	27047.64	100-yr base	1266.0	2428.01	269.96	
Upper Reach	27047.64	100-yr+0.5	1266.5	2428.01	269.88	0.00
Upper Reach	27047.64	100-yr+1.0	1267.0	2428.02	270.37	0.01
Upper Reach	27047.64	100-yr+1.5	1267.5	2428.02	270.18	0.01
Upper Reach	27047.64	100-yr+2.0	1268.0	2428.02	270.33	0.01
Upper Reach	27047.64	100-yr+2.5	1268.5	2428.00	269.72	-0.01
Upper Reach	27047.64	100-yr+3.0	1269.0	2428.01	270.07	0.00
Upper Reach	27047.64	100-yr+3.5	1269.5	2428.02	270.22	0.01
Upper Reach	24356.23	100-yr base	1266.0	2426.74	25.87	
Upper Reach	24356.23	100-yr+0.5	1266.5	2426.74	25.87	0.00
Upper Reach	24356.23	100-yr+1.0	1267.0	2426.77	25.87	0.03
Upper Reach	24356.23	100-yr+1.5	1267.5	2426.76	25.87	0.02
Upper Reach	24356.23	100-yr+2.0	1268.0	2426.77	25.87	0.03
Upper Reach	24356.23	100-yr+2.5	1268.5	2426.72	25.87	-0.02
Upper Reach	24356.23	100-yr+3.0	1269.0	2426.74	25.87	0.00
Upper Reach	24356.23	100-yr+3.5	1269.5	2426.75	25.87	0.01
Upper Reach	24325	State Route 20	Bridge			
Upper Reach	24295.38	100-yr base	1266.0	2426.72	27.06	
Upper Reach	24295.38	100-yr+0.5	1266.5	2426.71	27.06	-0.01
Upper Reach	24295.38	100-yr+1.0	1267.0	2426.75	27.07	0.03
Upper Reach	24295.38	100-yr+1.5	1267.5	2426.73	27.06	0.01
Upper Reach	24295.38	100-yr+2.0	1268.0	2426.74	27.07	0.02
Upper Reach	24295.38	100-yr+2.5	1268.5	2426.69	27.06	-0.03
Upper Reach	24295.38	100-yr+3.0	1269.0	2426.72	27.06	0.00
Upper Reach	24295.38	100-yr+3.5	1269.5	2426.73	27.06	0.01

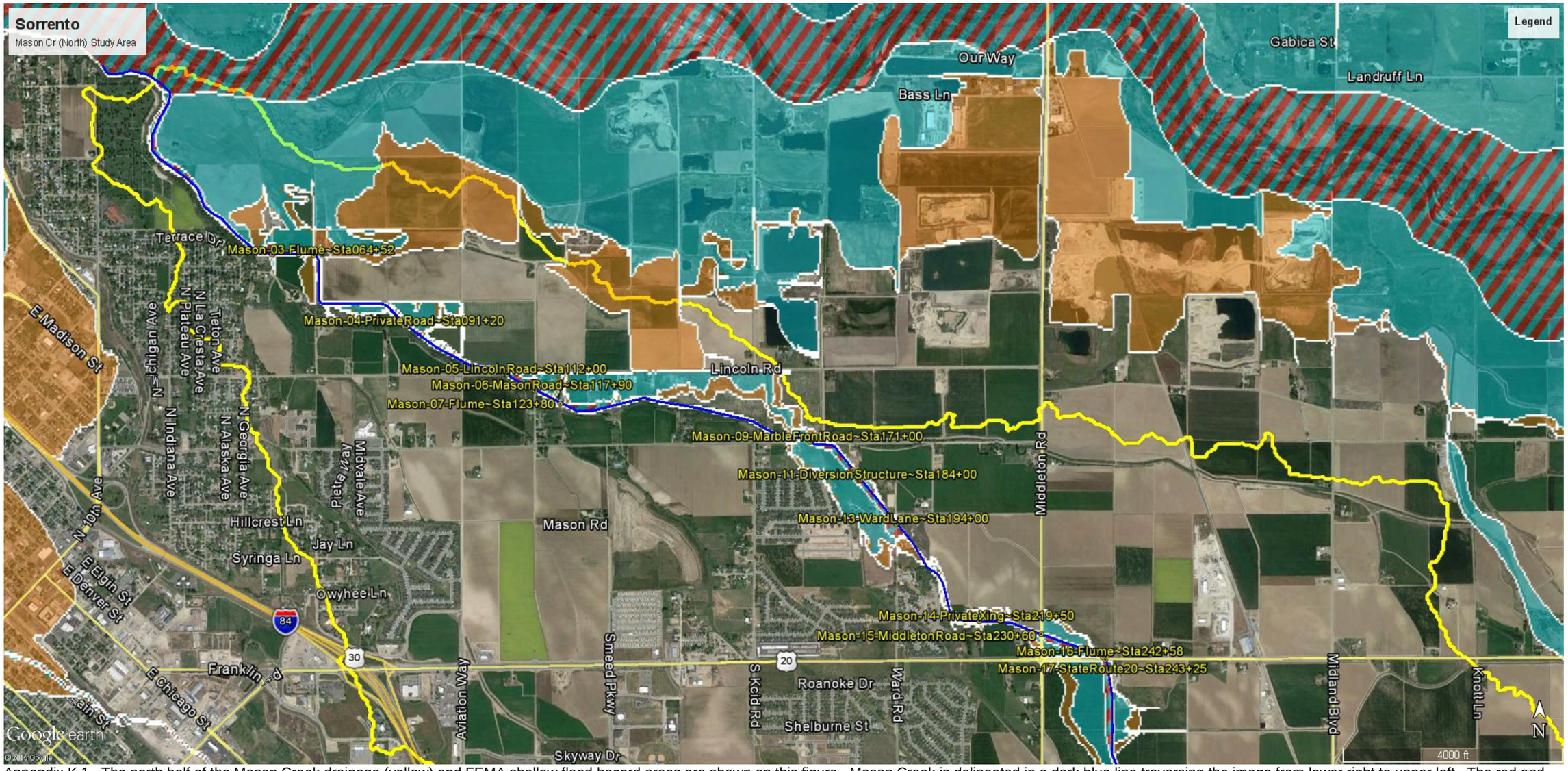
Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	24278.13	100-yr base	1266.0	2426.86	988.36	
Upper Reach	24278.13	100-yr+0.5	1266.5	2426.85	987.35	-0.01
Upper Reach	24278.13	100-yr+1.0	1267.0	2426.89	991.48	0.03
Upper Reach	24278.13	100-yr+1.5	1267.5	2426.87	989.87	0.01
Upper Reach	24278.13	100-yr+2.0	1268.0	2426.89	991.04	0.03
Upper Reach	24278.13	100-yr+2.5	1268.5	2426.84	973.81	-0.02
Upper Reach	24278.13	100-yr+3.0	1269.0	2426.86	988.12	0.00
Upper Reach	24278.13	100-yr+3.5	1269.5	2426.87	989.50	0.01
Upper Reach	24258	Flume	Bridge			
Upper Reach	24211.72	100-yr base	1266.0	2426.86	1057.69	
Upper Reach	24211.72	100-yr+0.5	1266.5	2426.85	1057.62	-0.01
Upper Reach	24211.72	100-yr+1.0	1267.0	2426.89	1057.94	0.03
Upper Reach	24211.72	100-yr+1.5	1267.5	2426.87	1057.80	0.01
Upper Reach	24211.72	100-yr+2.0	1268.0	2426.88	1057.89	0.02
Upper Reach	24211.72	100-yr+2.5	1268.5	2426.83	1057.45	-0.03
Upper Reach	24211.72	100-yr+3.0	1269.0	2426.86	1057.67	0.00
Upper Reach	24211.72	100-yr+3.5	1269.5	2426.87	1057.78	0.01
Upper Reach	23110.69	100-yr base	1266.0	2426.82	764.96	
Upper Reach	23110.69	100-yr+0.5	1266.5	2426.82	764.32	0.00
Upper Reach	23110.69	100-yr+1.0	1267.0	2426.85	766.96	0.03
Upper Reach	23110.69	100-yr+1.5	1267.5	2426.84	765.83	0.02
Upper Reach	23110.69	100-yr+2.0	1268.0	2426.85	766.58	0.03
Upper Reach	23110.69	100-yr+2.5	1268.5	2426.80	762.84	-0.02
Upper Reach	23110.69	100-yr+3.0	1269.0	2426.82	764.77	0.00
Upper Reach	23110.69	100-yr+3.5	1269.5	2426.83	765.64	0.01
Upper Reach	23060	Middleton Rd.	Culvert			
Upper Reach	23012.96	100-yr base	1266.0	2420.09	40.12	
Upper Reach	23012.96	100-yr+0.5	1266.5	2420.09	40.12	0.00
Upper Reach	23012.96	100-yr+1.0	1267.0	2420.09	40.13	0.00
Upper Reach	23012.96	100-yr+1.5	1267.5	2420.09	40.13	0.00
Upper Reach	23012.96	100-yr+2.0	1268.0	2420.09	40.13	0.00
Upper Reach	23012.96	100-yr+2.5	1268.5	2420.10	40.18	0.01
Upper Reach	23012.96	100-yr+3.0	1269.0	2420.10	40.16	0.01
Upper Reach	23012.96	100-yr+3.5	1269.5	2420.09	40.14	0.00
Upper Reach	21904.76	100-yr base	1266.0	2417.21	251.25	
Upper Reach	21904.76	100-yr+0.5	1266.5	2417.21	251.26	0.00
Upper Reach	21904.76	100-yr+1.0	1267.0	2417.21	251.28	0.00
Upper Reach	21904.76	100-yr+1.5	1267.5	2417.21	251.29	0.00

Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	21904.76	100-yr+2.0	1268.0	2417.21	251.30	0.00
Upper Reach	21904.76	100-yr+2.5	1268.5	2417.22	251.32	0.01
Upper Reach	21904.76	100-yr+3.0	1269.0	2417.22	251.33	0.01
Upper Reach	21904.76	100-yr+3.5	1269.5	2417.22	251.34	0.01
Upper Reach	21900	Private Xing	Bridge			
Upper Reach	21887.03	100-yr base	1266.0	2417.17	233.94	
Upper Reach	21887.03	100-yr+0.5	1266.5	2417.17	233.98	0.00
Upper Reach	21887.03	100-yr+1.0	1267.0	2417.17	234.02	0.00
Upper Reach	21887.03	100-yr+1.5	1267.5	2417.17	234.04	0.00
Upper Reach	21887.03	100-yr+2.0	1268.0	2417.17	234.09	0.00
Upper Reach	21887.03	100-yr+2.5	1268.5	2417.18	234.13	0.01
Upper Reach	21887.03	100-yr+3.0	1269.0	2417.18	234.16	0.01
Upper Reach	21887.03	100-yr+3.5	1269.5	2417.18	234.19	0.01
Upper Reach	19407.24	100-yr base	1266.0	2408.30	586.77	
Upper Reach	19407.24	100-yr+0.5	1266.5	2408.30	586.77	0.00
Upper Reach	19407.24	100-yr+1.0	1267.0	2408.30	586.77	0.00
Upper Reach	19407.24	100-yr+1.5	1267.5	2408.30	586.77	0.00
Upper Reach	19407.24	100-yr+2.0	1268.0	2408.29	572.01	-0.01
Upper Reach	19407.24	100-yr+2.5	1268.5	2408.29	576.73	-0.01
Upper Reach	19407.24	100-yr+3.0	1269.0	2408.31	591.48	0.01
Upper Reach	19407.24	100-yr+3.5	1269.5	2408.30	586.77	0.00
Upper Reach	19400	Ward Ln.	Culvert			
Upper Reach	19368.02	100-yr base	1266.0	2407.81	302.93	
Upper Reach	19368.02	100-yr+0.5	1266.5	2407.81	302.93	0.00
Upper Reach	19368.02	100-yr+1.0	1267.0	2407.81	302.39	0.00
Upper Reach	19368.02	100-yr+1.5	1267.5	2407.83	306.55	0.02
Upper Reach	19368.02	100-yr+2.0	1268.0	2407.81	303.14	0.00
Upper Reach	19368.02	100-yr+2.5	1268.5	2407.82	304.28	0.01
Upper Reach	19368.02	100-yr+3.0	1269.0	2407.83	306.17	0.02
Upper Reach	19368.02	100-yr+3.5	1269.5	2407.83	307.61	0.02
Upper Reach	19154.35	100-yr base	1266.0	2406.40	149.24	
Upper Reach	19154.35	100-yr+0.5	1266.5	2406.40	149.24	0.00
Upper Reach	19154.35	100-yr+1.0	1267.0	2406.41	150.69	0.01
Upper Reach	19154.35	100-yr+1.5	1267.5	2406.41	149.63	0.01
Upper Reach	19154.35	100-yr+2.0	1268.0	2406.41	154.13	0.01
Upper Reach	19154.35	100-yr+2.5	1268.5	2406.41	154.40	0.01
Upper Reach	19154.35	100-yr+3.0	1269.0	2406.41	154.13	0.01
Upper Reach	19154.35	100-yr+3.5	1269.5	2406.41	154.40	0.01

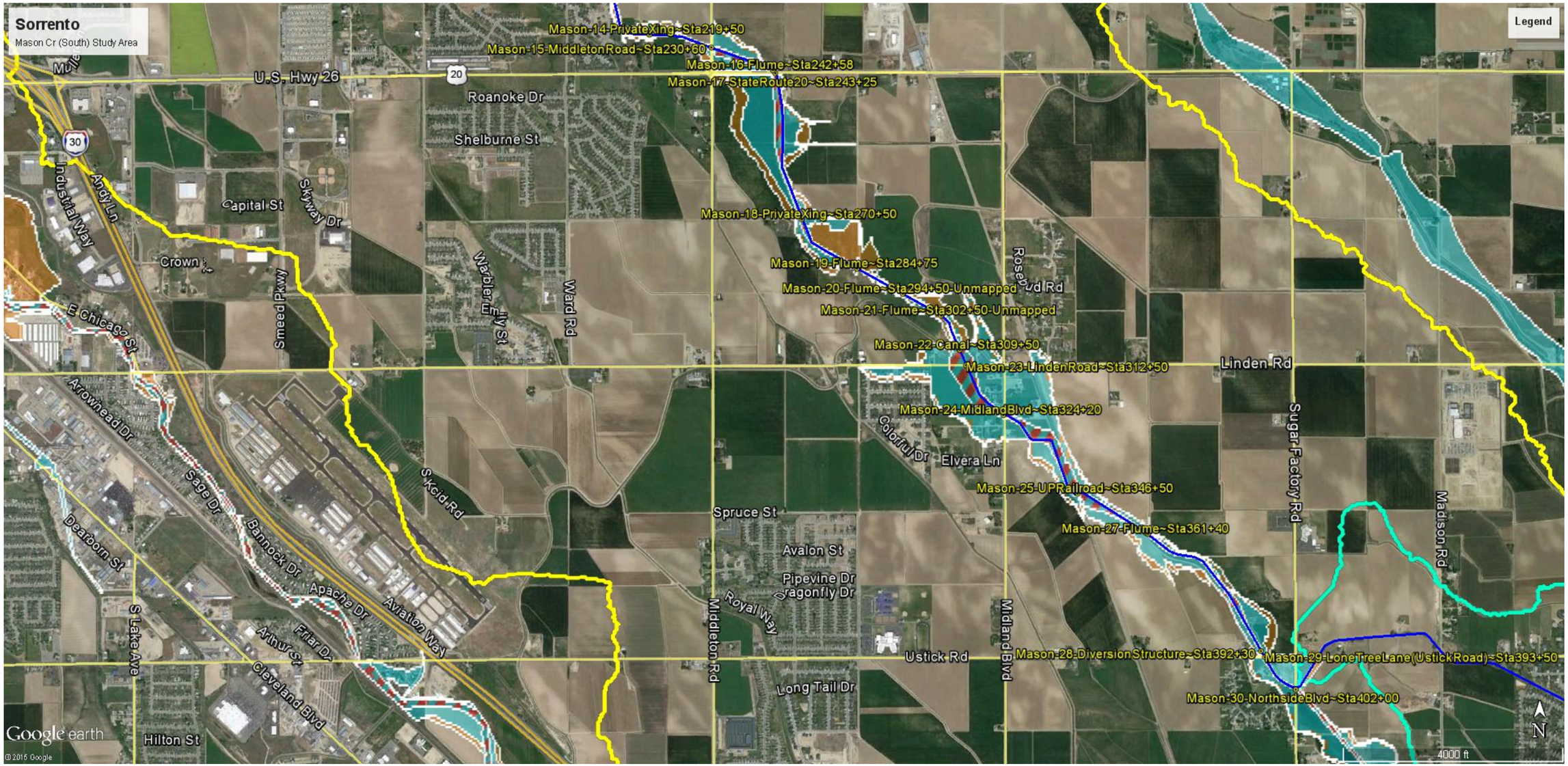
Reach	River Sta	Profile	Q Total (cfs)	W.S. Elev (ft)	Top Width (ft)	Delta-WSE (ft)
Upper Reach	19150	Pipe Crossing	Bridge			
Upper Reach	19138.67	100-yr base	1266.0	2406.52	222.35	
Upper Reach	19138.67	100-yr+0.5	1266.5	2406.52	222.56	0.00
Upper Reach	19138.67	100-yr+1.0	1267.0	2406.53	223.74	0.01
Upper Reach	19138.67	100-yr+1.5	1267.5	2406.53	223.10	0.01
Upper Reach	19138.67	100-yr+2.0	1268.0	2406.53	224.27	0.01
Upper Reach	19138.67	100-yr+2.5	1268.5	2406.53	224.48	0.01
Upper Reach	19138.67	100-yr+3.0	1269.0	2406.53	224.59	0.01
Upper Reach	19138.67	100-yr+3.5	1269.5	2406.53	224.80	0.01
Upper Reach	17134.78	100-yr base	1266.0	2403.80	734.47	
Upper Reach	17134.78	100-yr+0.5	1266.5	2403.82	737.75	0.02
Upper Reach	17134.78	100-yr+1.0	1267.0	2403.83	739.00	0.03
Upper Reach	17134.78	100-yr+1.5	1267.5	2403.83	738.35	0.03
Upper Reach	17134.78	100-yr+2.0	1268.0	2403.83	738.71	0.03
Upper Reach	17134.78	100-yr+2.5	1268.5	2403.84	739.27	0.04
Upper Reach	17134.78	100-yr+3.0	1269.0	2403.83	738.97	0.03
Upper Reach	17134.78	100-yr+3.5	1269.5	2403.83	738.71	0.03
Upper Reach	17100	Marble Front Rd.	Culvert	The flood plain in the vicinity of Sta17074.84 is 18 feet wide and in a split flow area. The transition of 1266 cfs through this tansition requires more detailed modeling		
Upper Reach	17074.84	100-yr base	1266.0	2399.76	18.09	
Upper Reach	17074.84	100-yr+0.5	1266.5	2400.28	19.26	0.52
Upper Reach	17074.84	100-yr+1.0	1267.0	2400.28	19.26	0.52
Upper Reach	17074.84	100-yr+1.5	1267.5	2400.28	19.26	0.52
Upper Reach	17074.84	100-yr+2.0	1268.0	2400.28	19.26	0.52
Upper Reach	17074.84	100-yr+2.5	1268.5	2400.28	19.26	0.52
Upper Reach	17074.84	100-yr+3.0	1269.0	2400.29	19.26	0.53
Upper Reach	17074.84	100-yr+3.5	1269.5	2400.29	19.27	0.53

Quadrant Consulting, Inc.

<u>Appendix K</u>
Mason Creek
Flood Hazard Areas
Canyon Co FIS 2011



Appendix K.1. The north half of the Mason Creek drainage (yellow) and FEMA shallow flood hazard areas are shown on this figure. Mason Creek is delineated in a dark blue line traversing the image from lower right to upper left. The red and blue striped areas represent the regulatory floodway, the light blue shading denotes the delineated 100-yr flood plain, while the tan shading represents the 500-yr flood plain. Upon inspection in the vicinity of major roads, one easily observes that the 100-yr flood plain expands due to system constrictions.



Appendix K.2. The south half of the Mason Creek drainage (yellow) and FEMA shallow flood hazard areas are shown on this figure. Mason Creek is delineated in a dark blue line traversing the image from lower right to upper center. The red and blue striped areas represent the regulatory floodway, the light blue shading denotes the delineated 100-yr flood plain, while the tan shading represents the 500-yr flood plain. Upon inspection in the vicinity of major roads, one easily observes that the 100-yr flood plain expands due to system constrictions.

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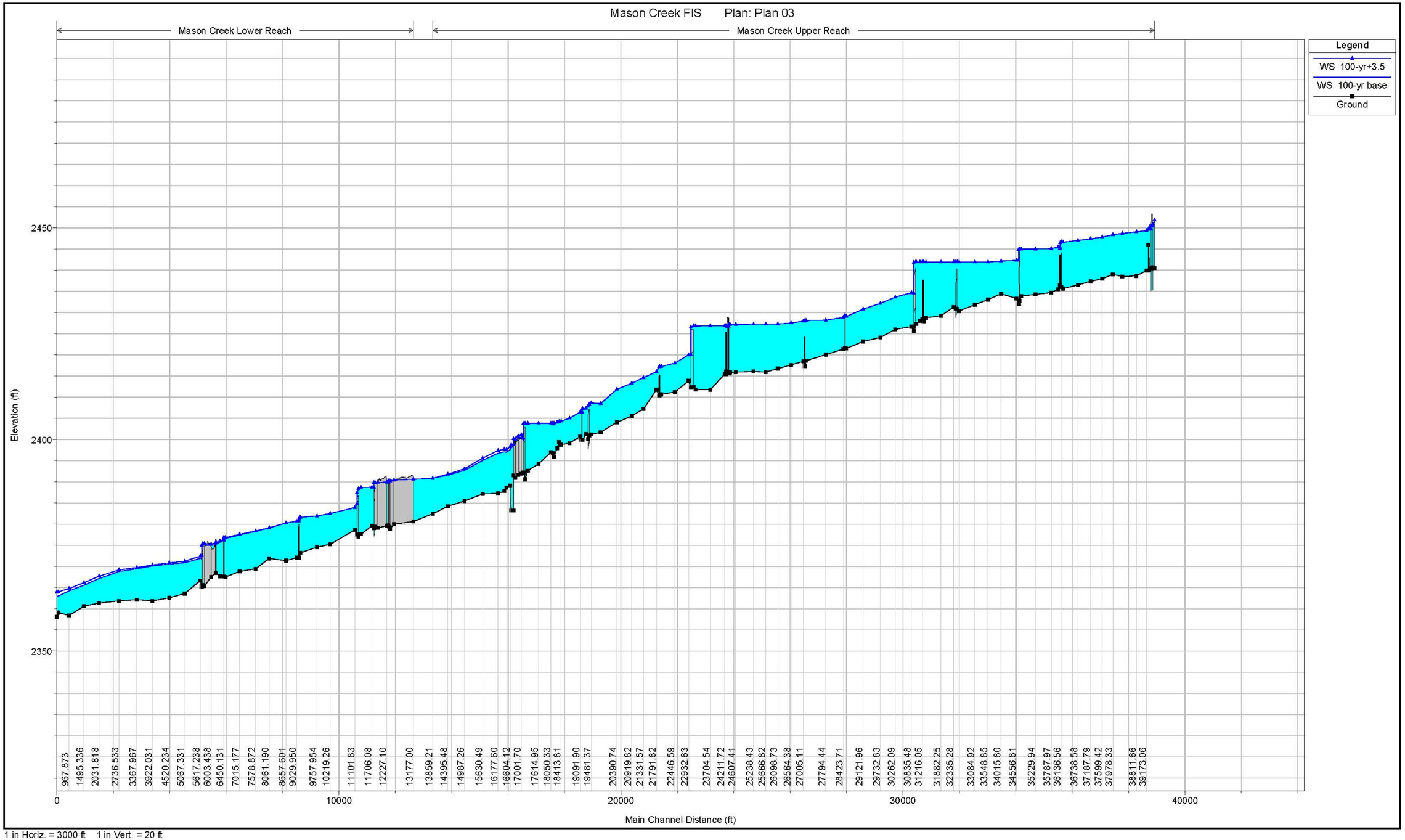
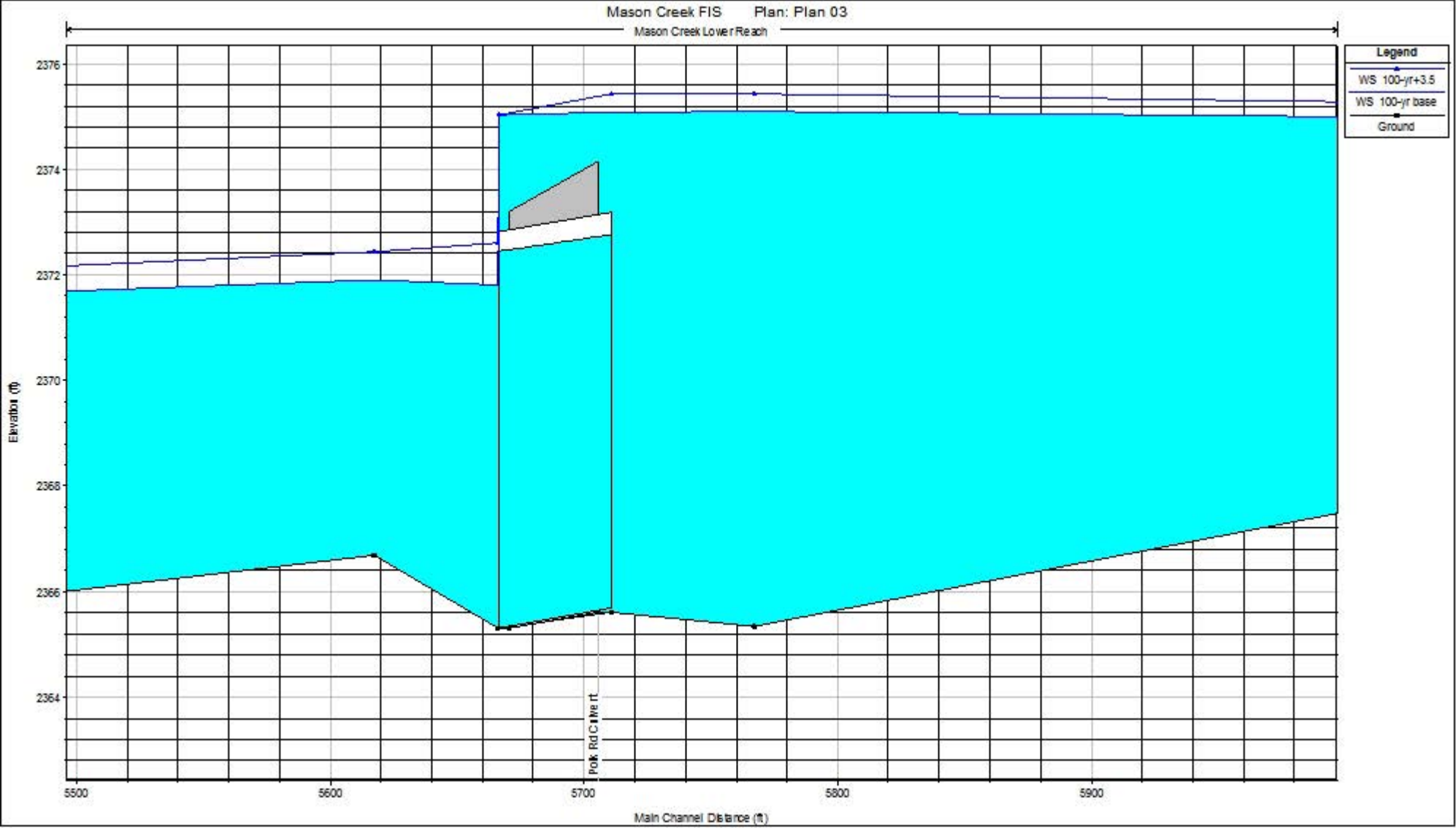
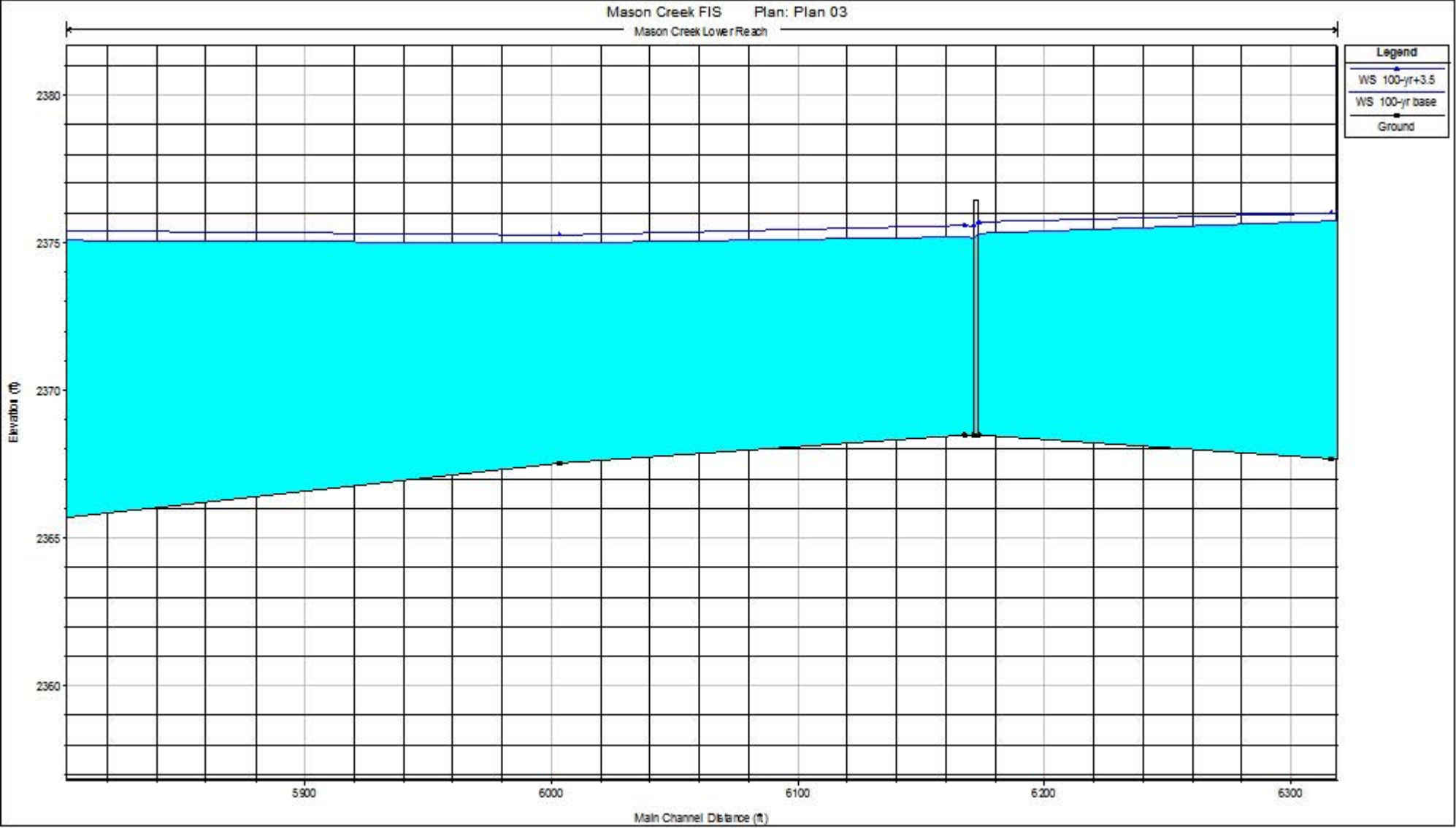
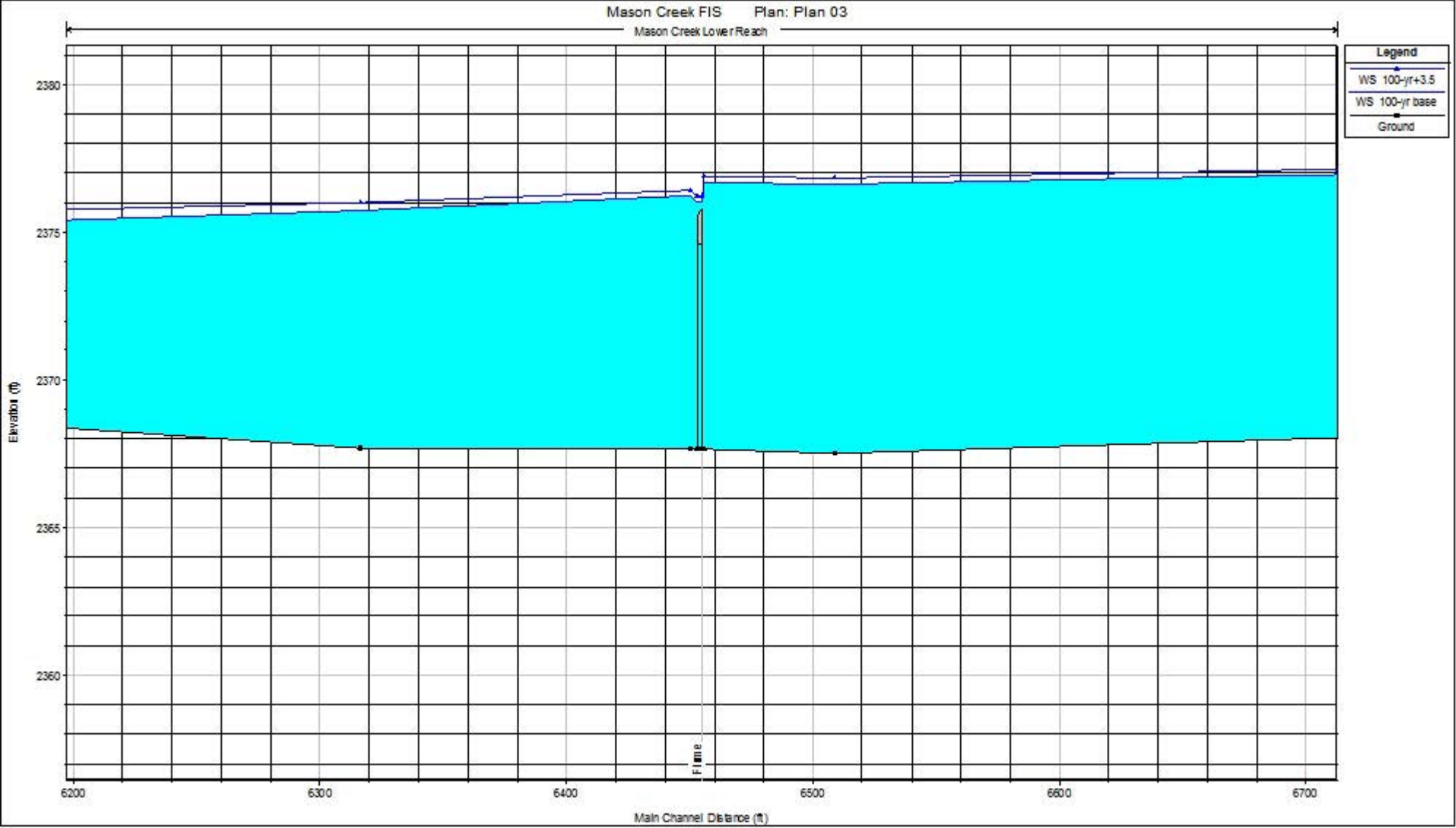


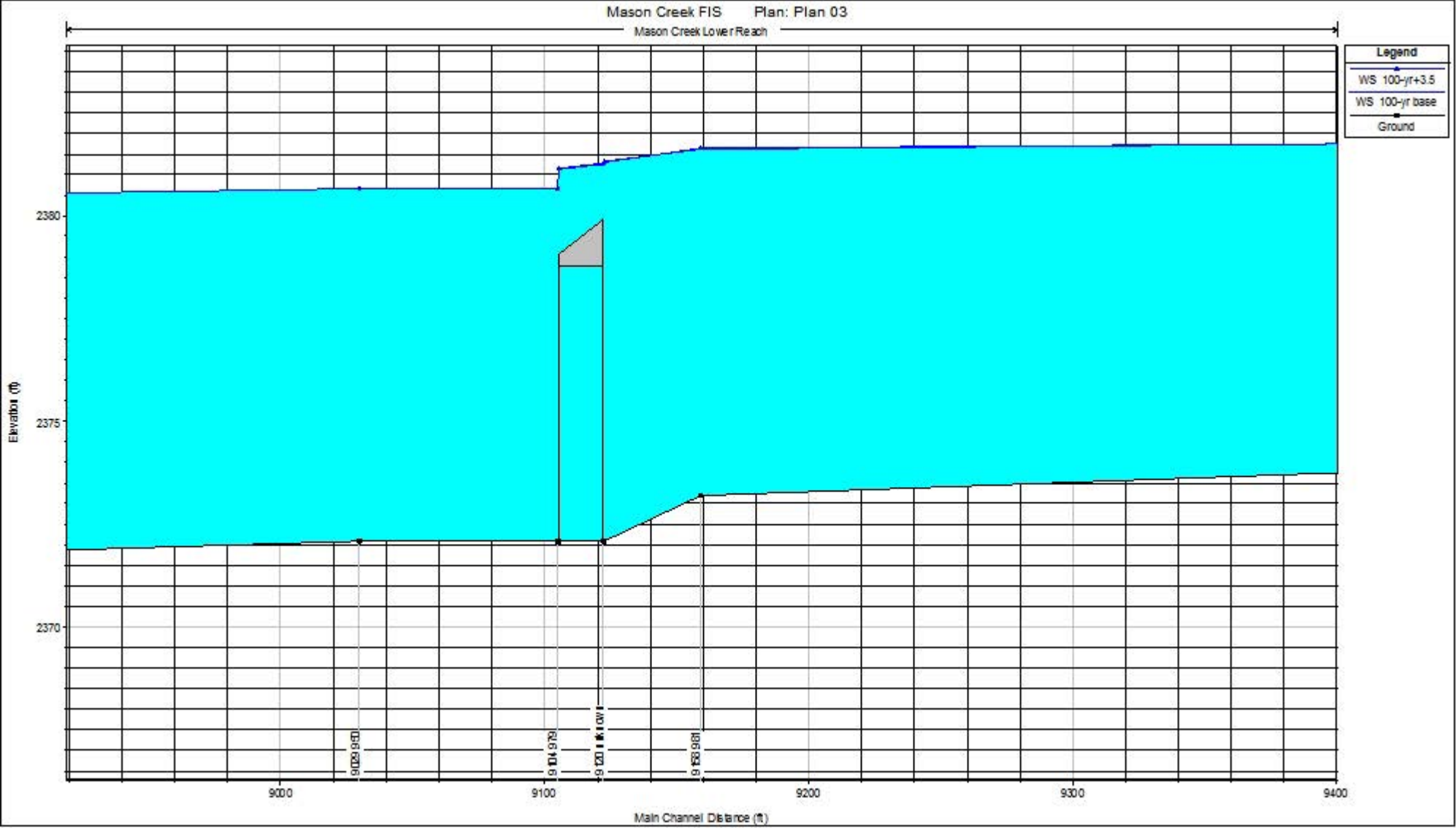
1 in Horiz. = 3000 ft 1 in Vert. = 20 ft

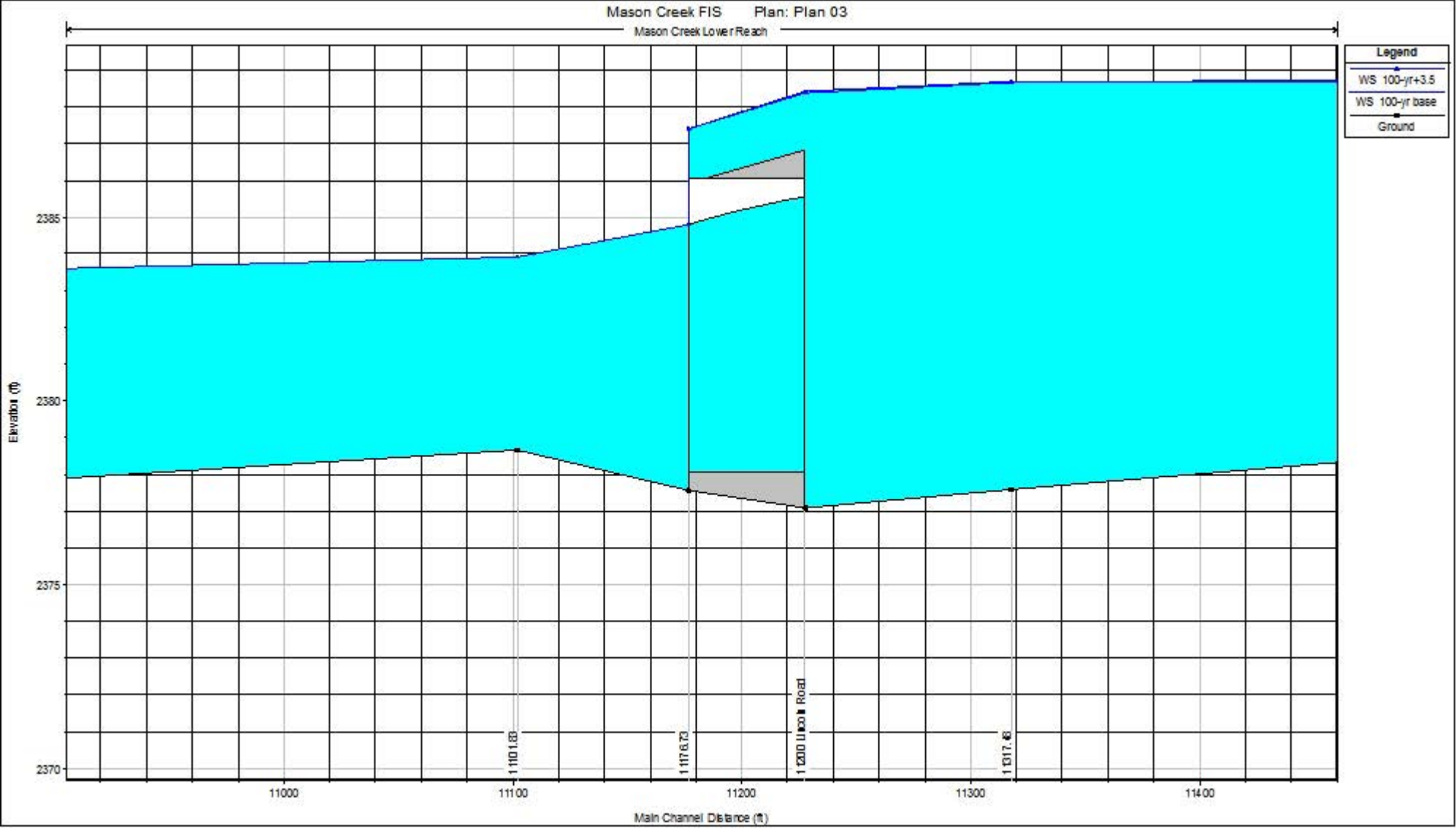
Appendix K.3. This plot, from the effective FIS HEC-RAS hydraulic model, clearly illustrates that along this mapped reach of Mason Creek, numerous channel crossings are inundated during the Base Flood (100-year) event. The segment of Mason Creek illustrated on this page extends from the Mason Creek-Boise River confluence in the viewers lower left to the Mason Creek-Purdam Drain confluence in the upper right.

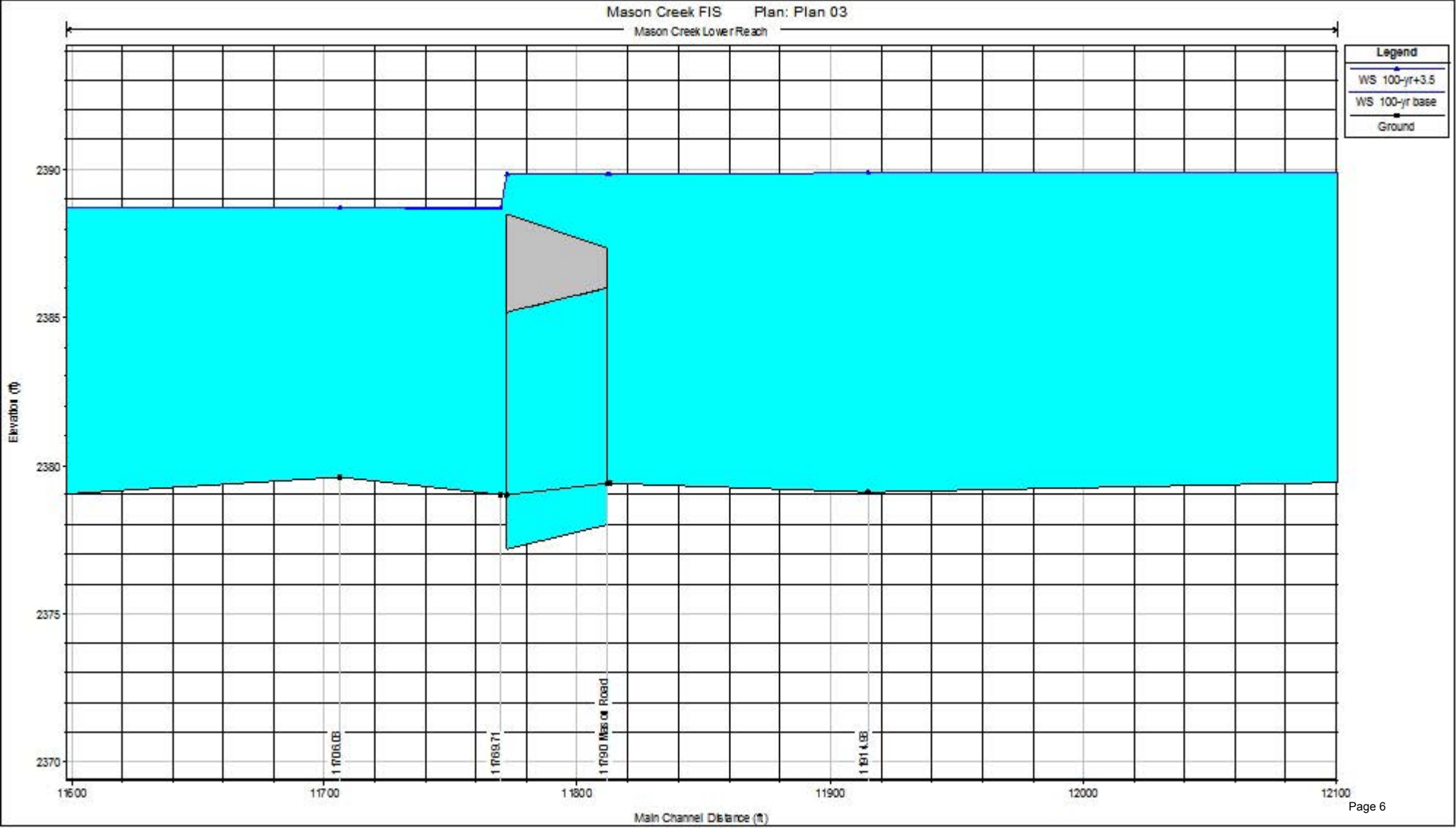

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2376
2374
2372
2370
2368
2366
2364
Polk Rd Culvert
5500
5600
5700
5800
5900
Main Channel Distance (ft)

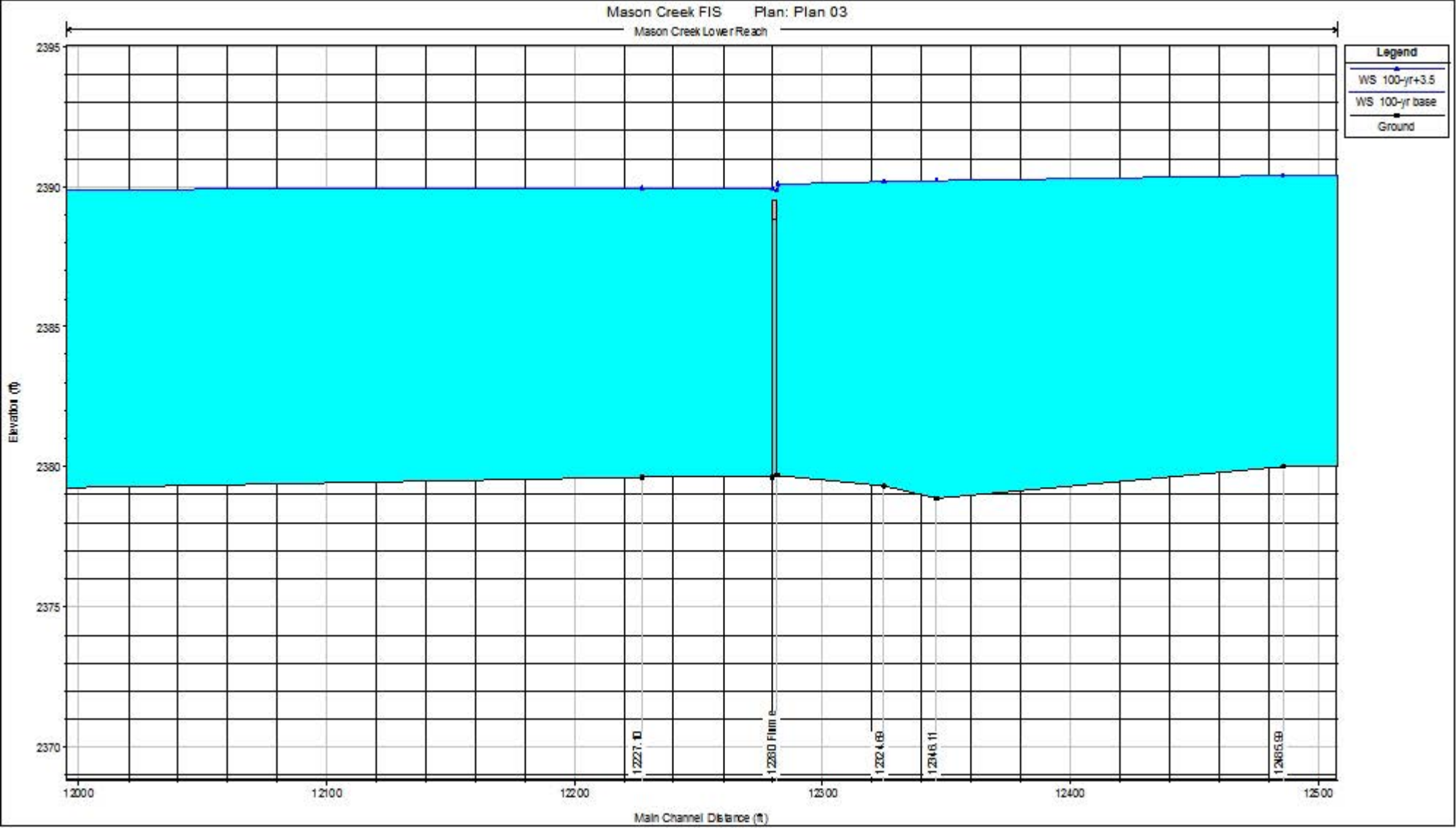

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
2380
2375
2370
2365
2360
Elevation (ft)
5900
6000
6100
6200
6300
Main Channel Distance (ft)

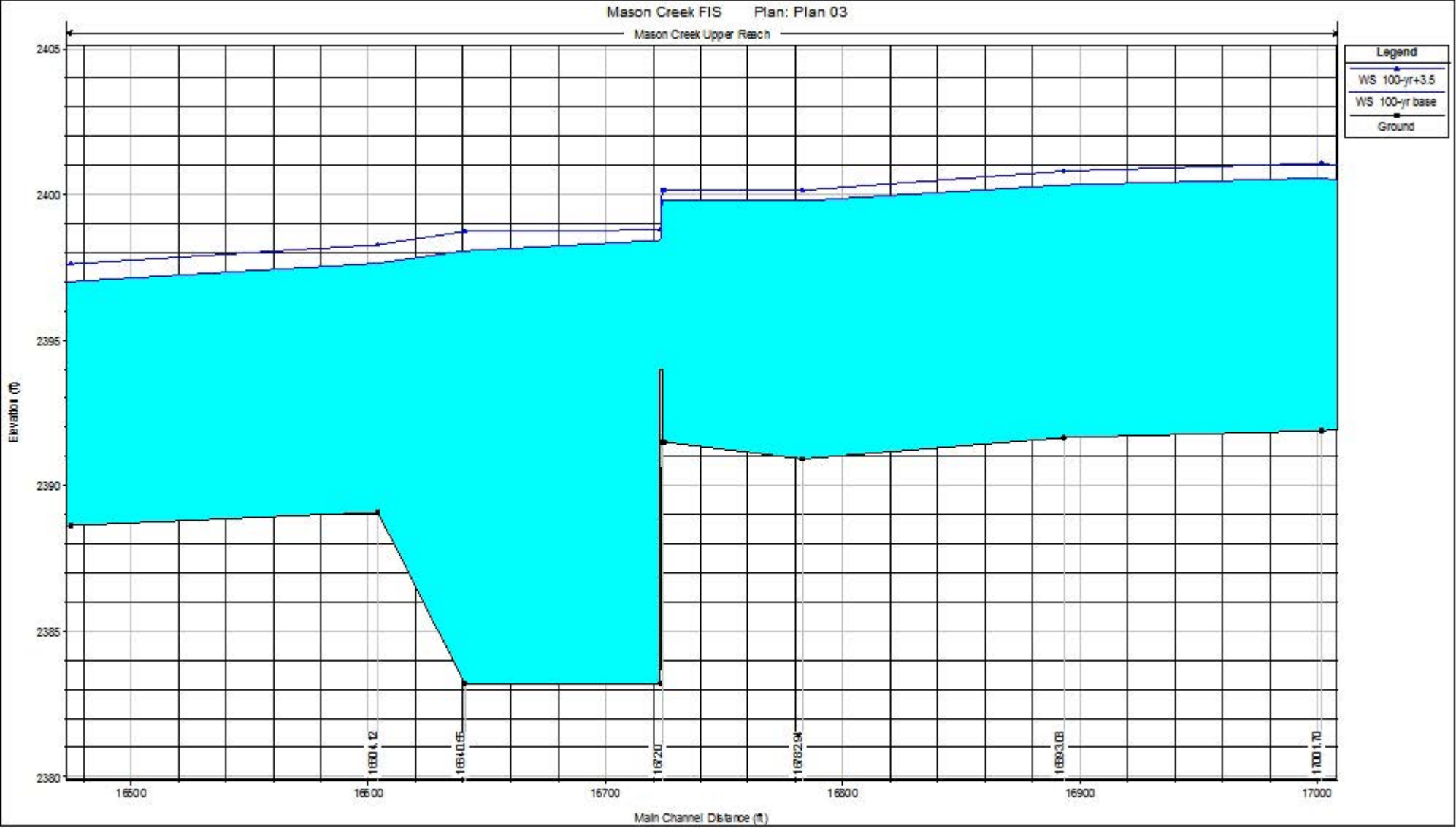

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
2380
2375
2370
2365
2360
Elevation (ft)
Flume
6200
6300
6400
6500
6600
6700
Main Channel Distance (ft)

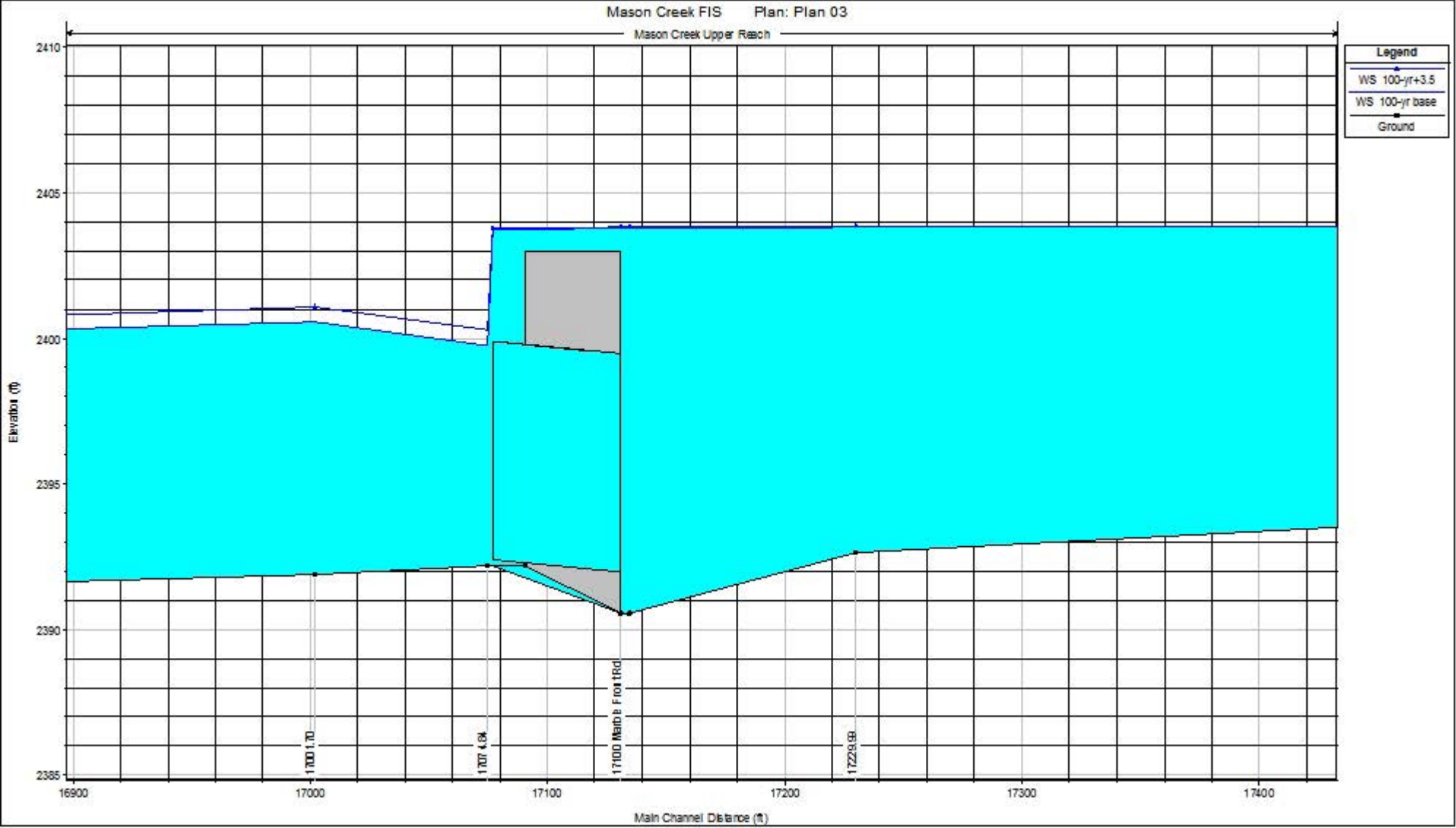

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
2380
2375
2370
Elevation (ft)
9000
9100
9200
9300
9400
Main Channel Distance (ft)

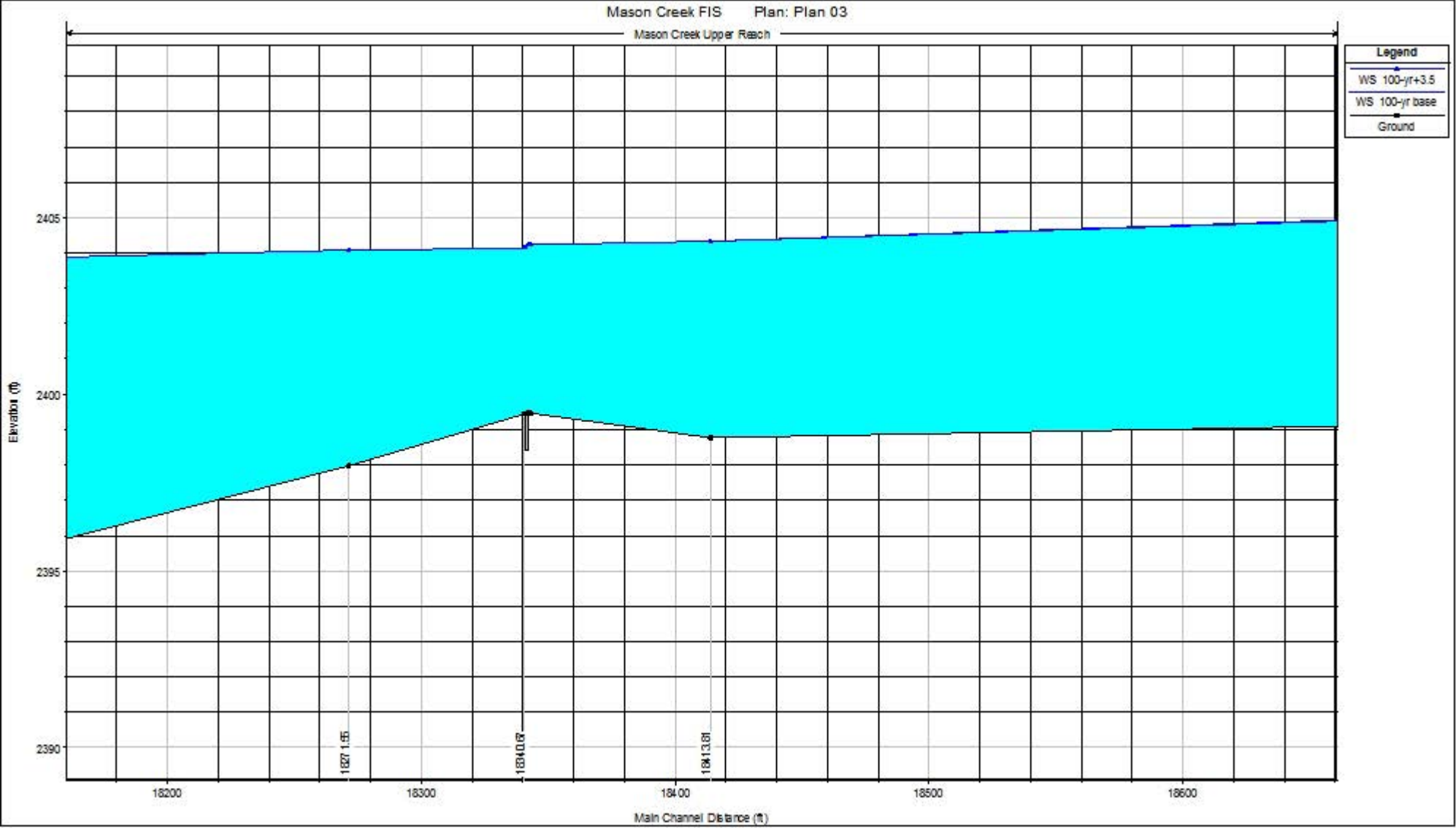

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2385
2380
2375
2370
11000
11100
11200
11300
11400
Main Channel Distance (ft)

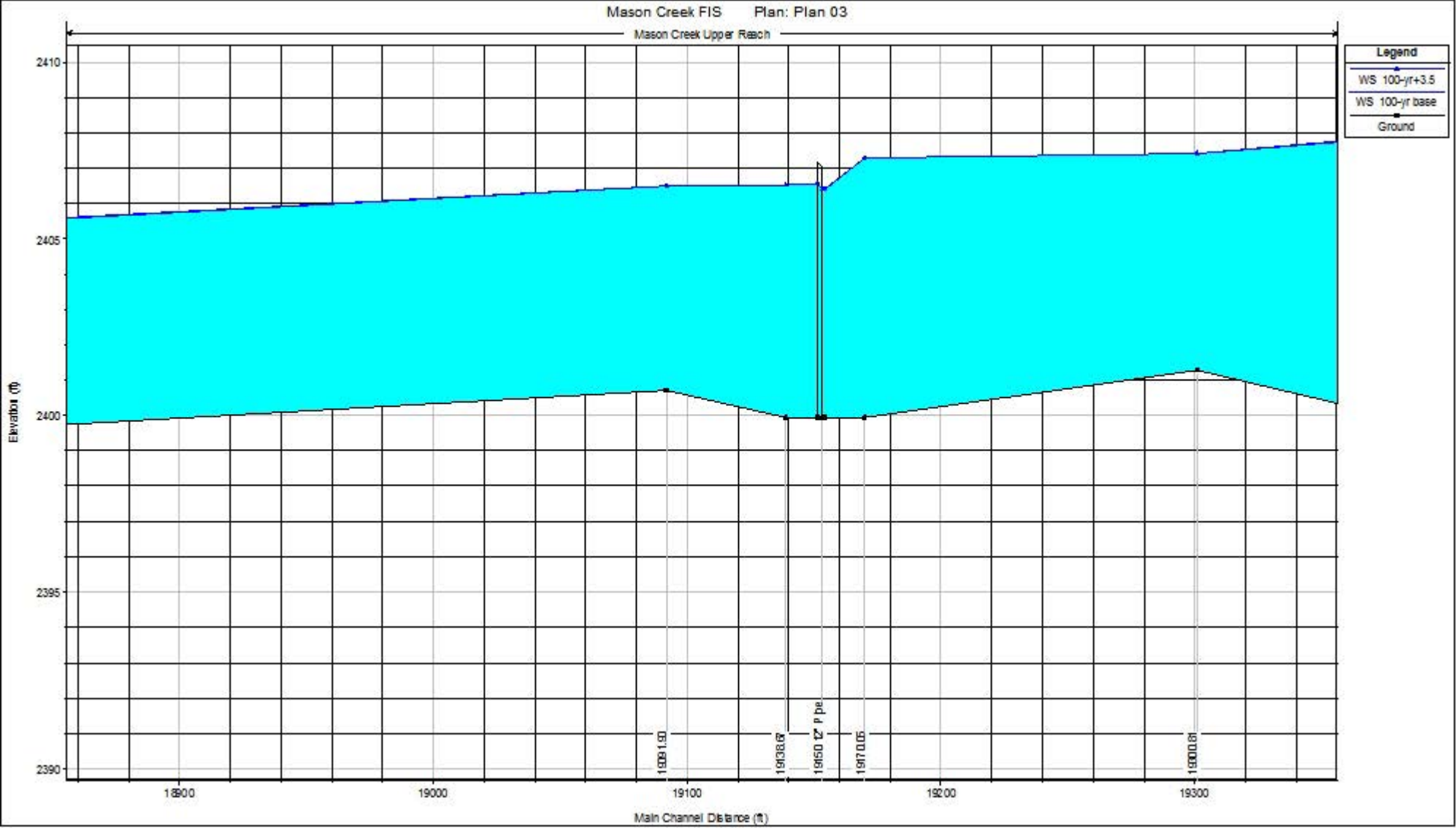

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
2390
2385
2380
2375
2370
Elevation (ft)
11706.08
11769.71
11790 Mason Road
11914.98
11600
11700
11800
11900
12000
12100
Main Channel Distance (ft)

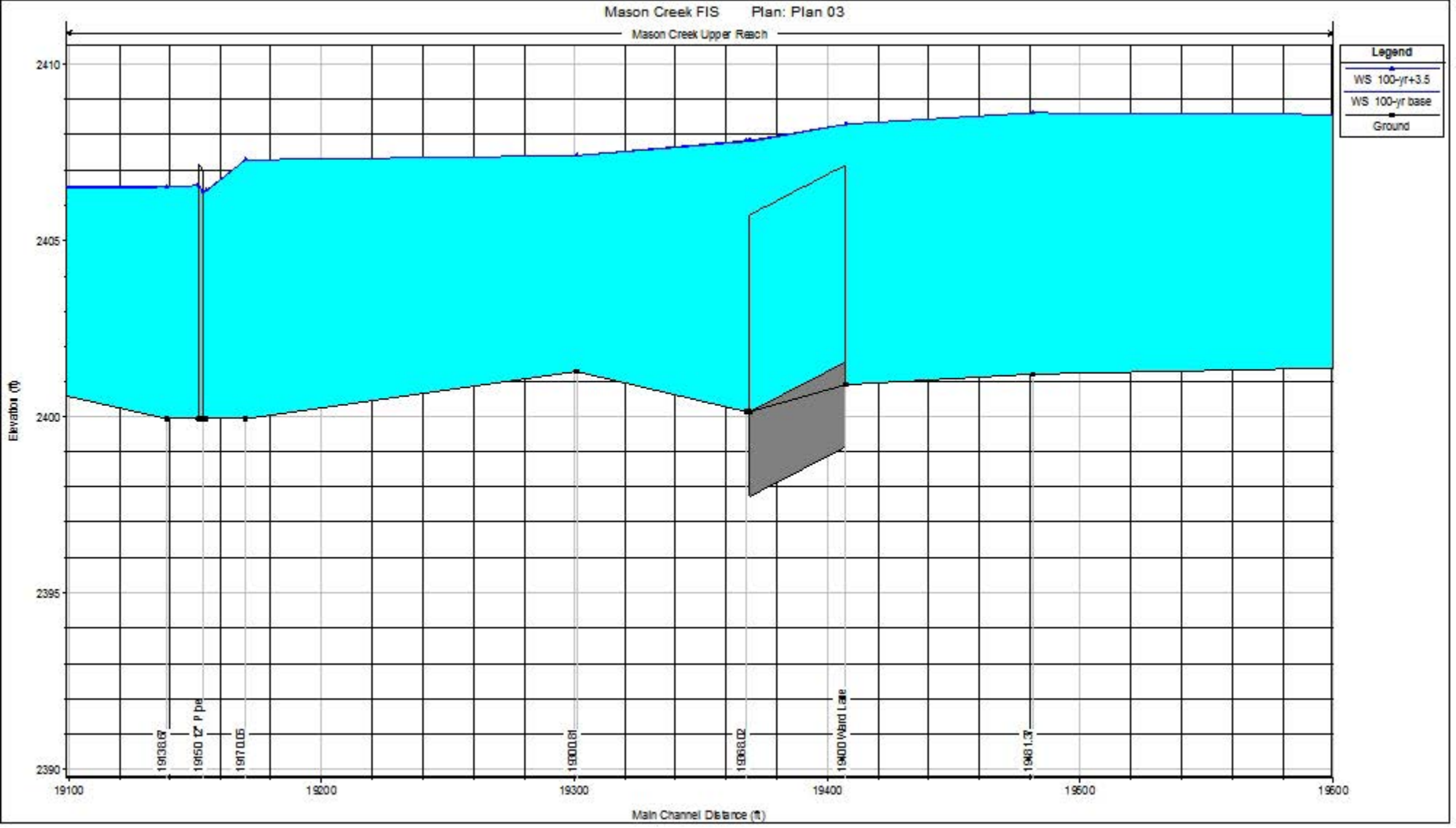

Mason Creek FIS Plan: Plan 03
Mason Creek Lower Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2395
2390
2385
2380
2375
2370
12221.10
12280 Flume
12324.68
12348.11
12485.98
12000
12100
12200
12300
12400
12500
Main Channel Distance (ft)


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2405
2400
2395
2390
2385
2380
16500
16600
16700
16800
16900
17000
Main Channel Distance (ft)

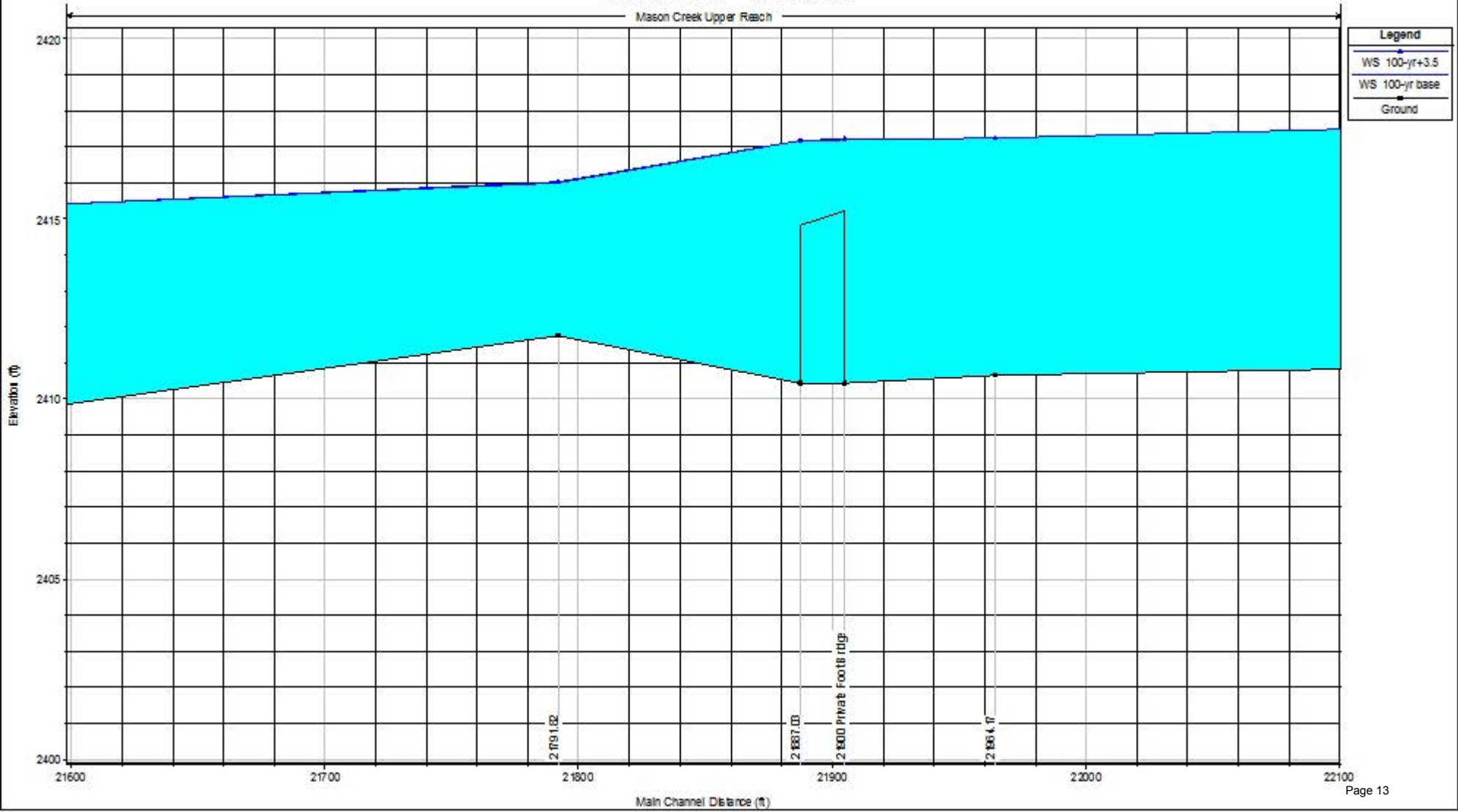

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2410
2405
2400
2395
2390
2385
17001.70
17074.84
17100 Maple Frost Rd
17229.99
16900
17000
17100
17200
17300
17400
Main Channel Distance (ft)

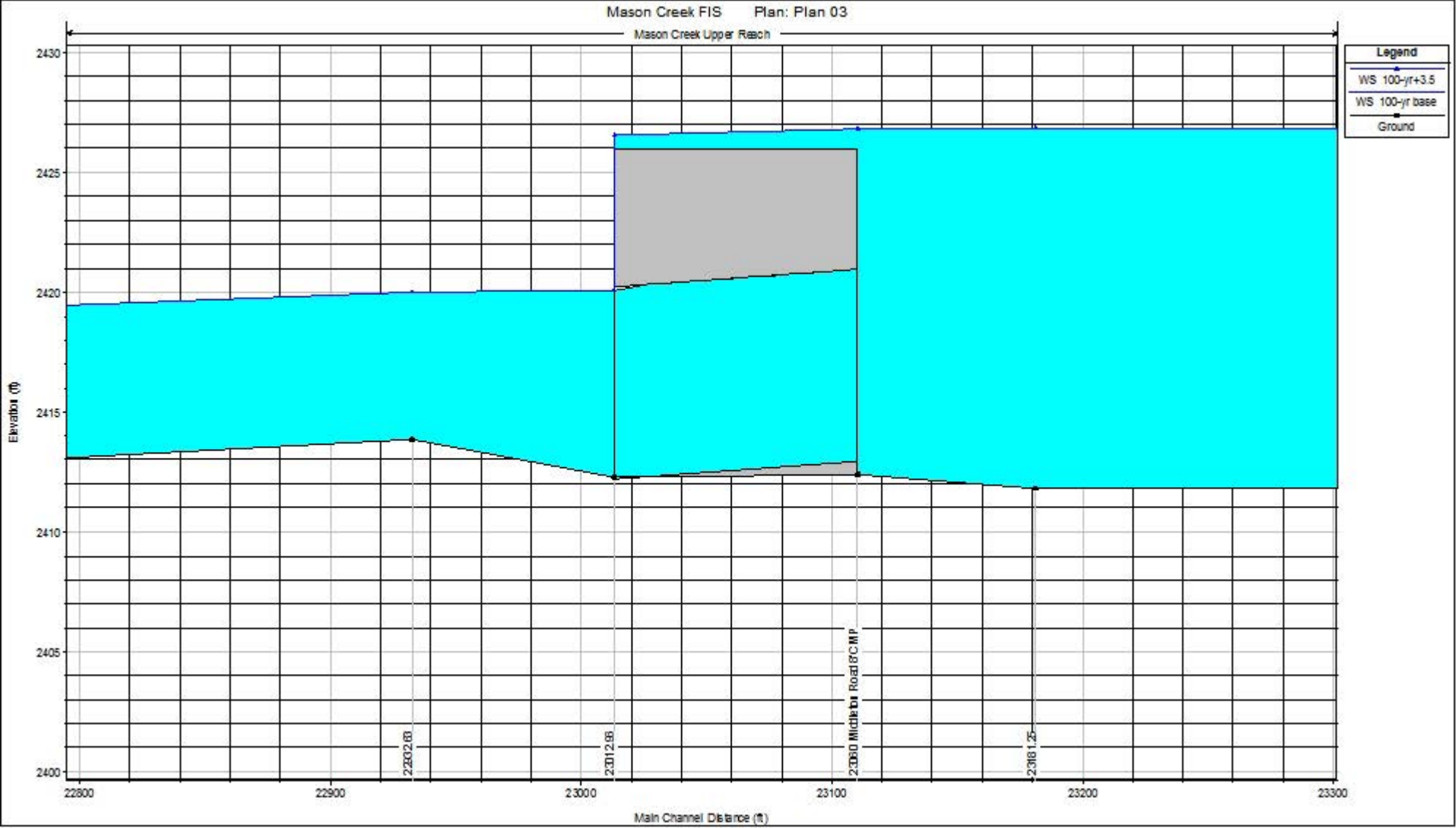

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
2405
2400
2395
2390
Elevation (ft)
18271.55
18340.67
18413.81
18200
18300
18400
18500
18600
Main Channel Distance (ft)

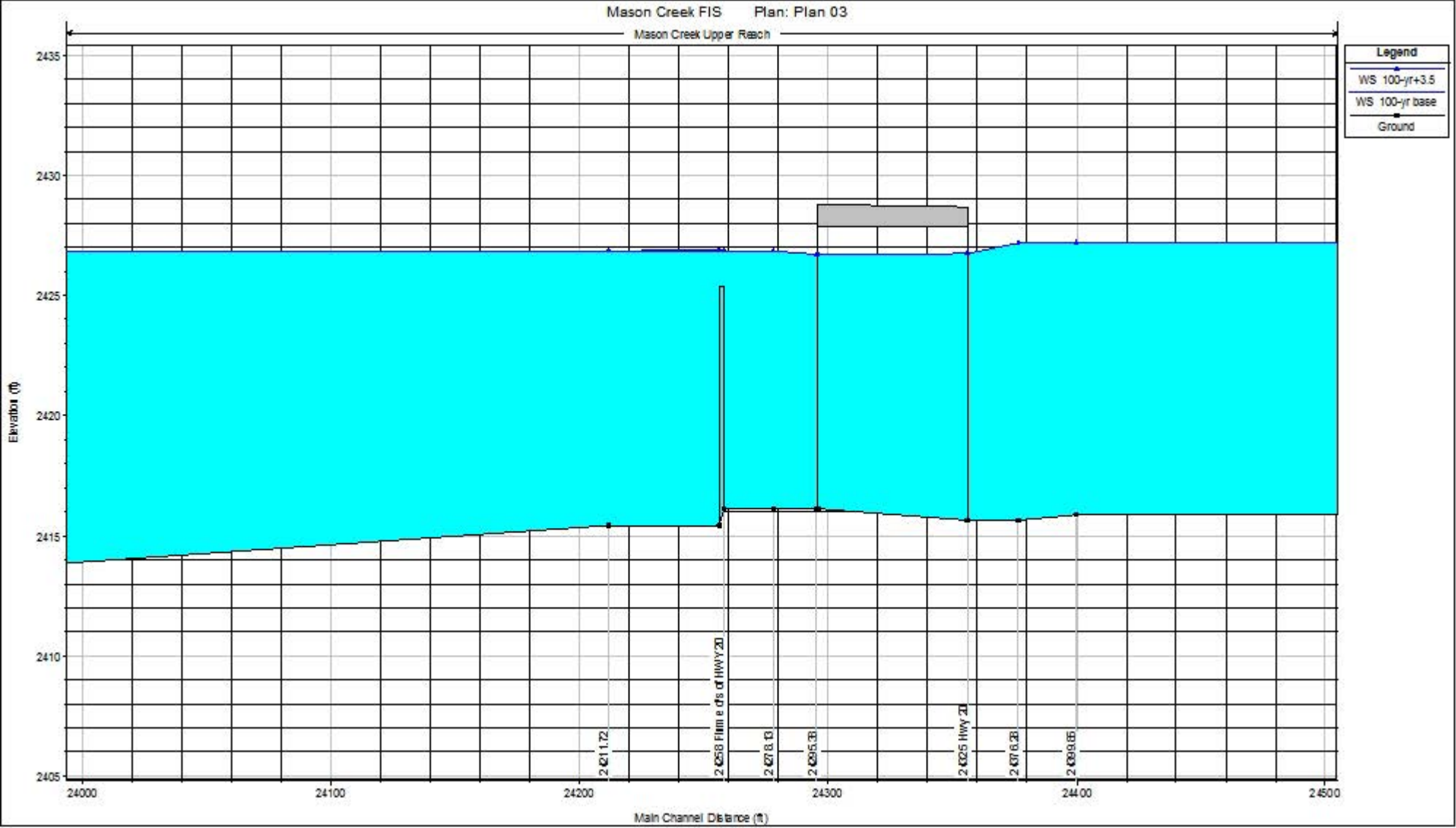

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2410
2405
2400
2395
2390
18900
19000
19100
19200
19300
Main Channel Distance (ft)

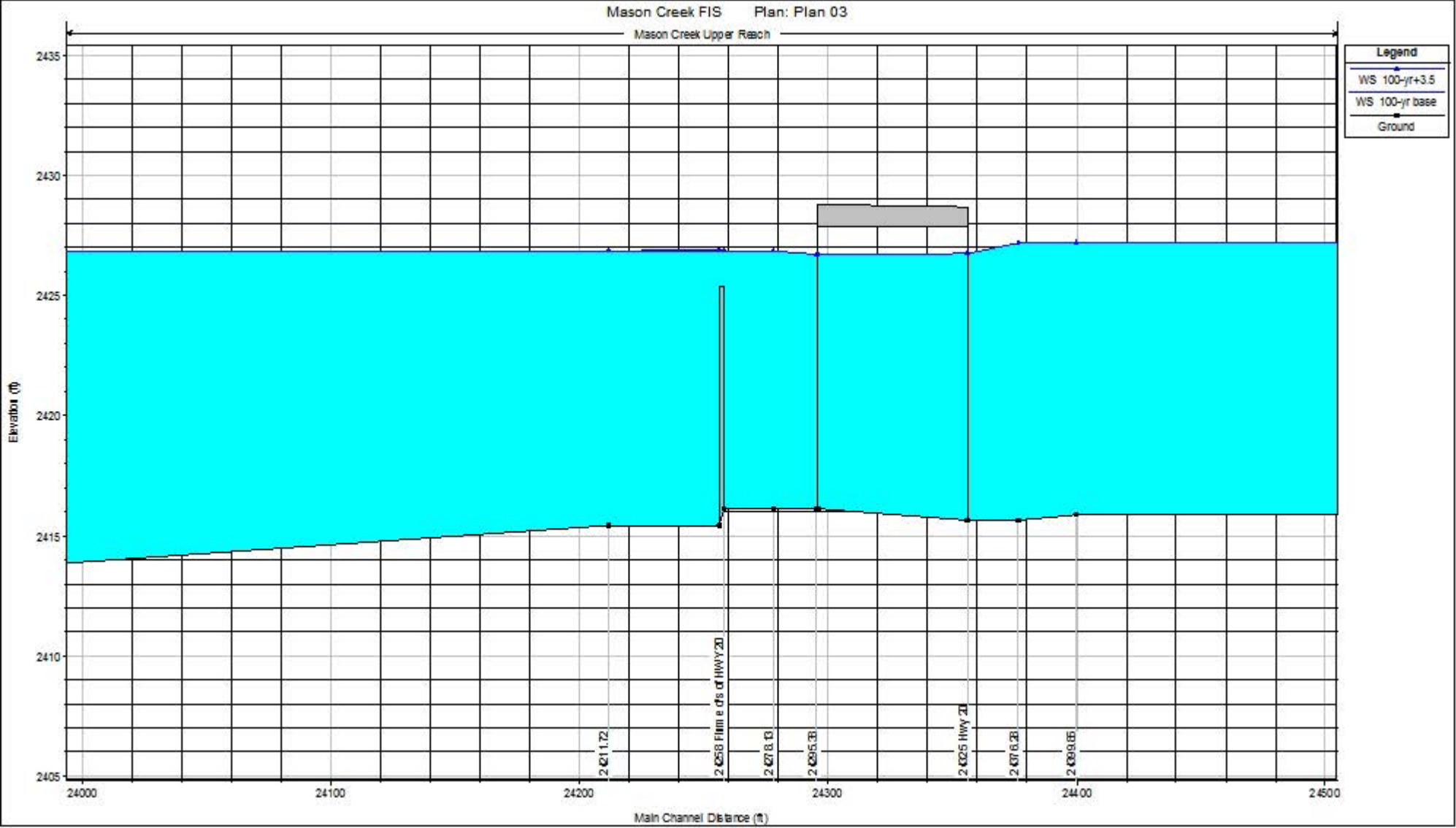

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2410
2405
2400
2395
2390
19100
19200
19300
19400
19500
19600
Main Channel Distance (ft)
19138.67
19150 12" P pe
19170.05
19300.81
19368.02
19400 Ward Lane
19481.37

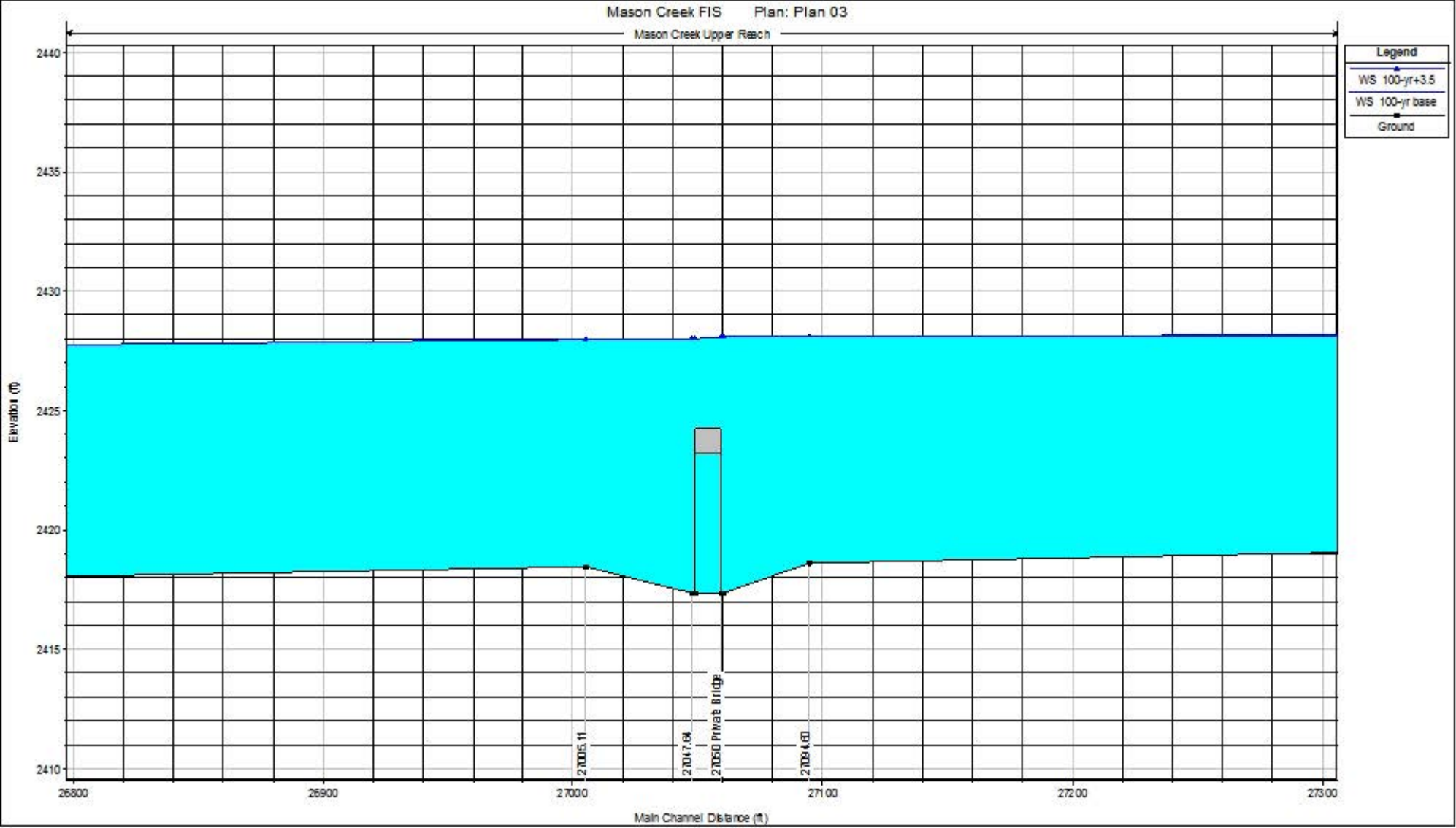
Mason Creek FIS Plan: Plan 03

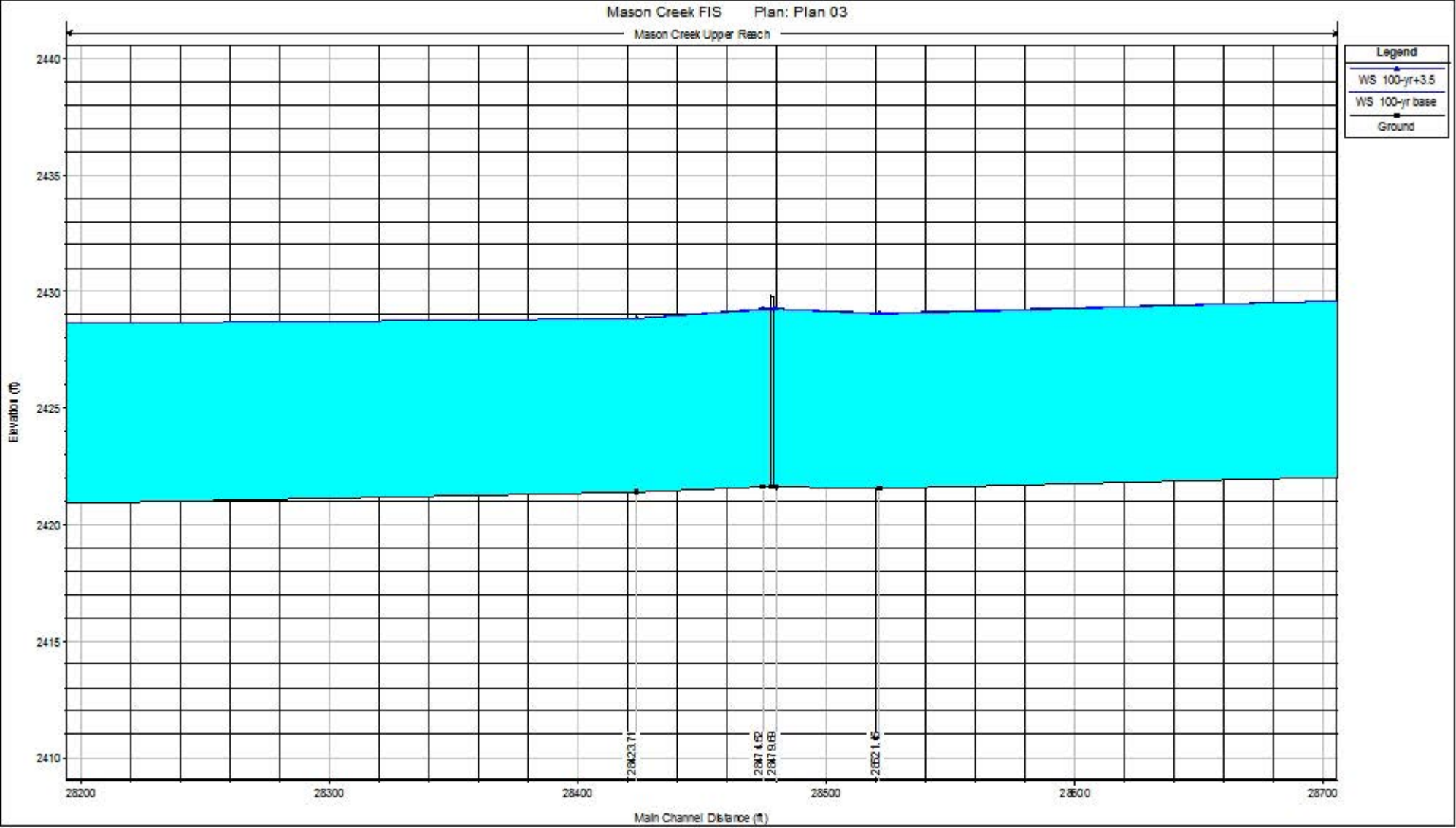


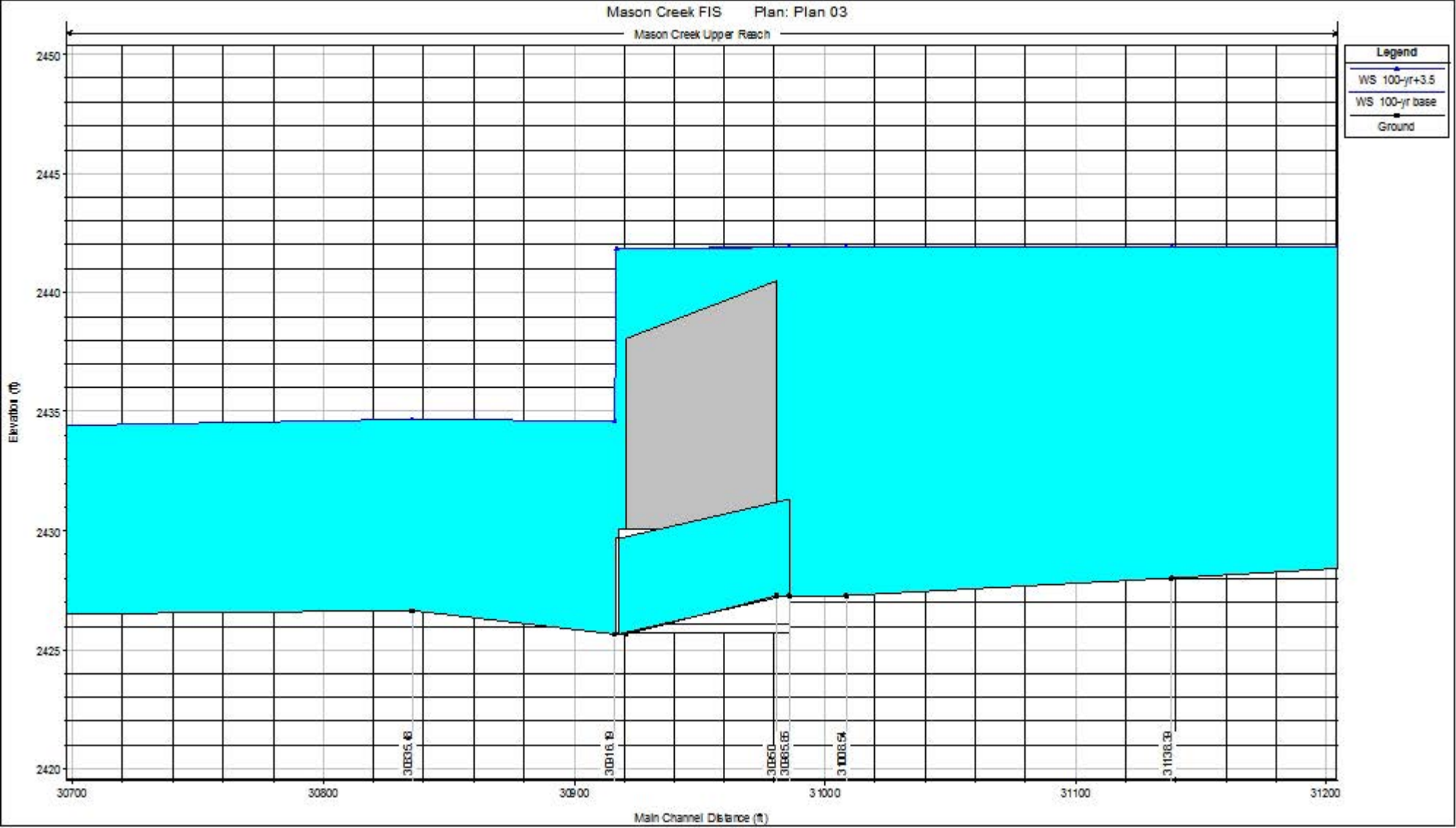

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2430
2425
2420
2415
2410
2405
2400
22800
22900
23000
23100
23200
23300
Main Channel Distance (ft)
22932.63
23012.96
23060 Middleton Road 8'CMP
23181.25

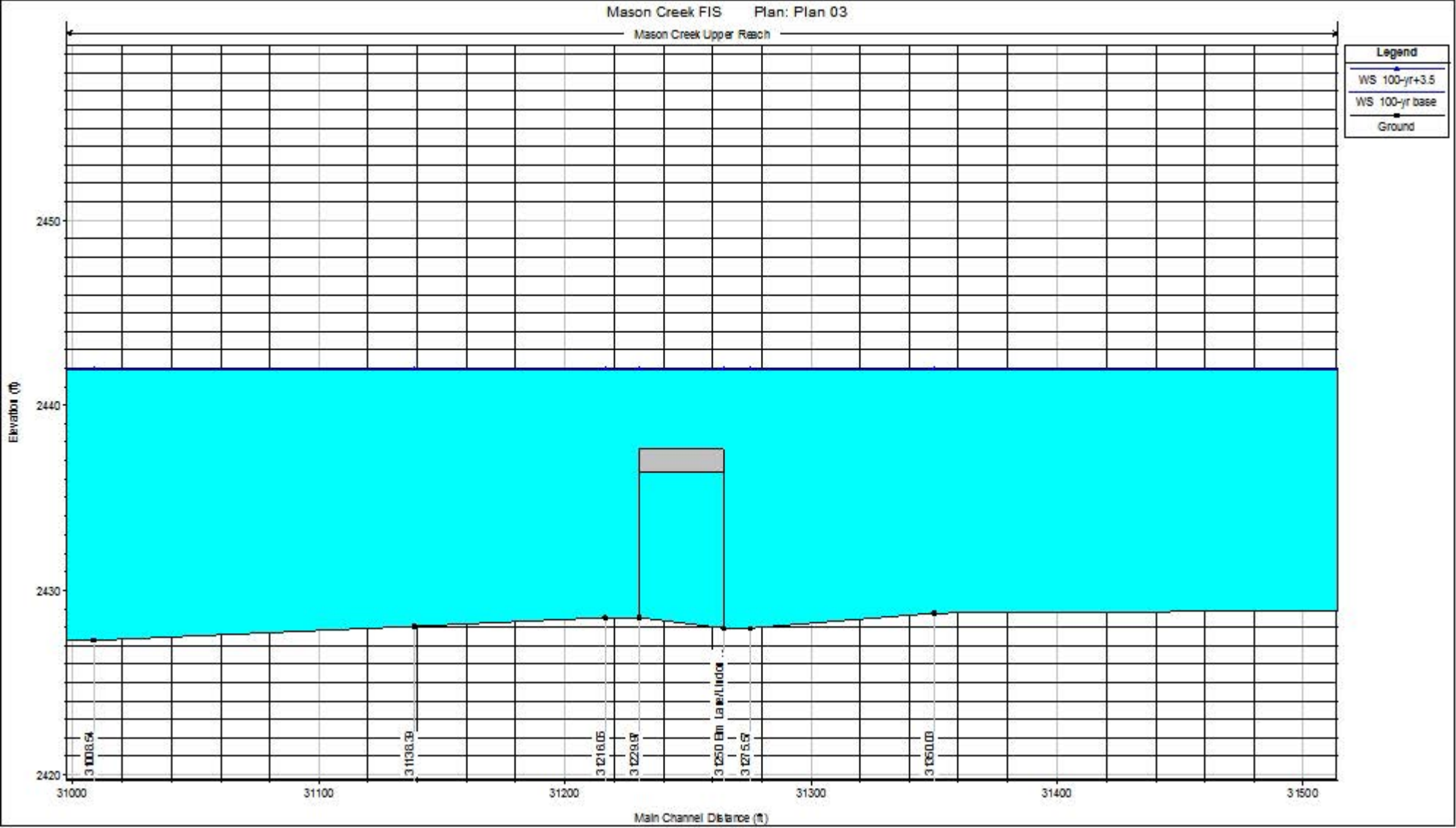

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2435
2430
2425
2420
2415
2410
2405
24000
24100
24200
24300
24400
24500
Main Channel Distance (ft)
24211.72
24258 Flim e d/s of HWY 21
24278.13
24295.38
24325 Hwy 21
24376.28
24399.85

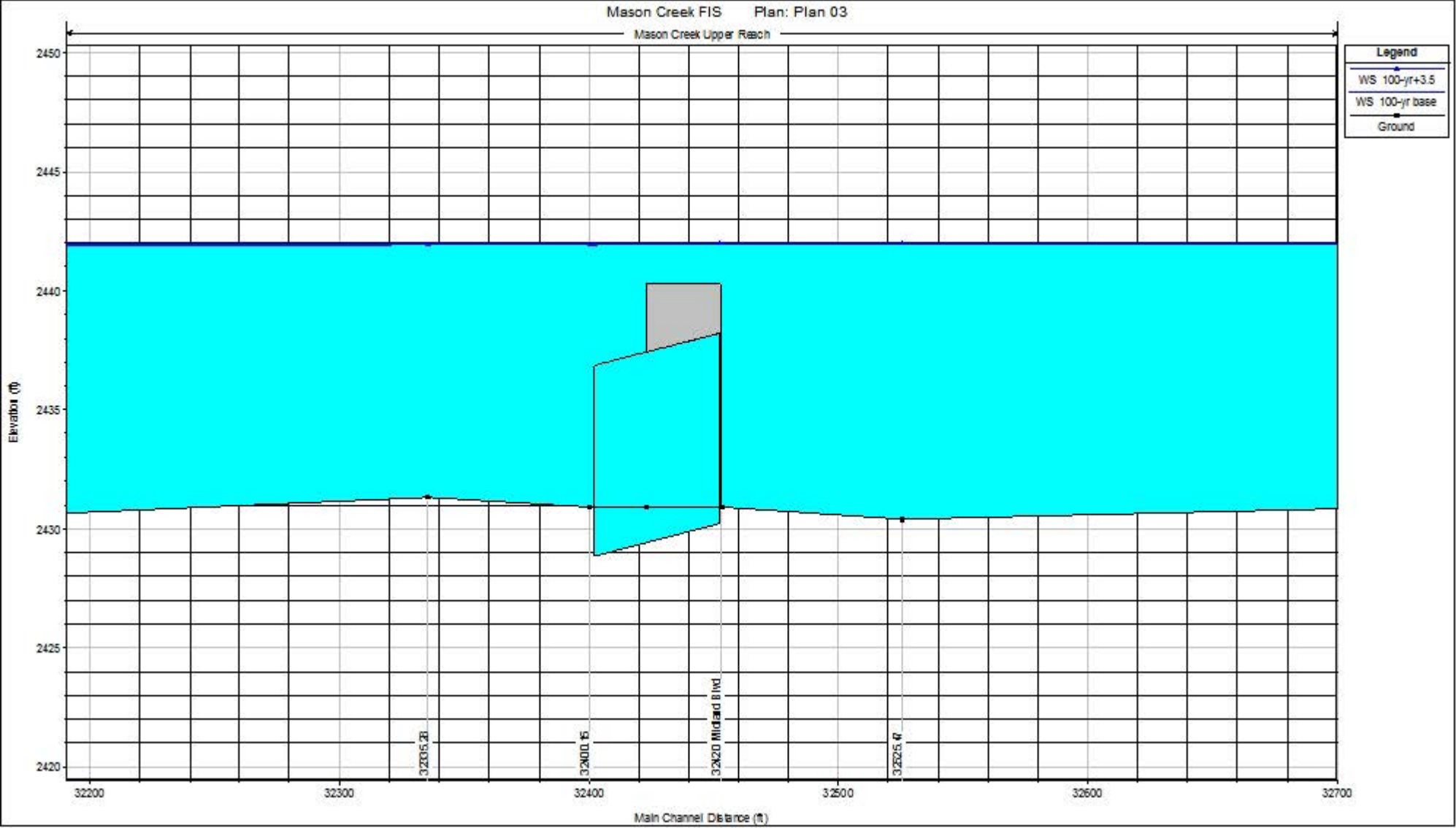

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2435
2430
2425
2420
2415
2410
2405
24000
24100
24200
24300
24400
24500
Main Channel Distance (ft)
24211.72
24258 Flim e d/s of HWY 21
24278.13
24295.38
24325 Hwy 21
24376.28
24399.85

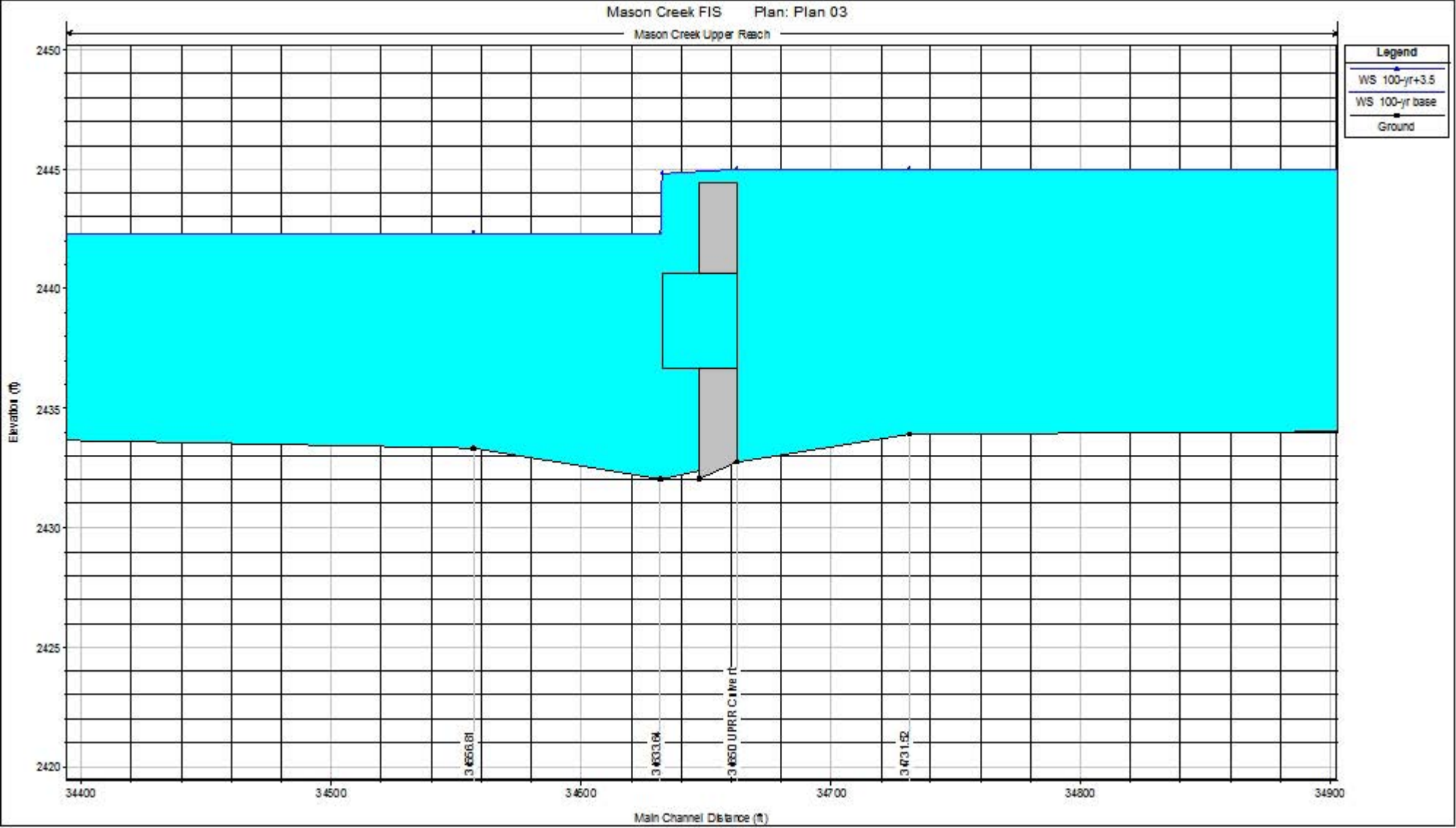

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2440
2435
2430
2425
2420
2415
2410
26800
26900
27000
27100
27200
27300
Main Channel Distance (ft)
27005.11
27047.64
27050 Private Bridge
27084.60

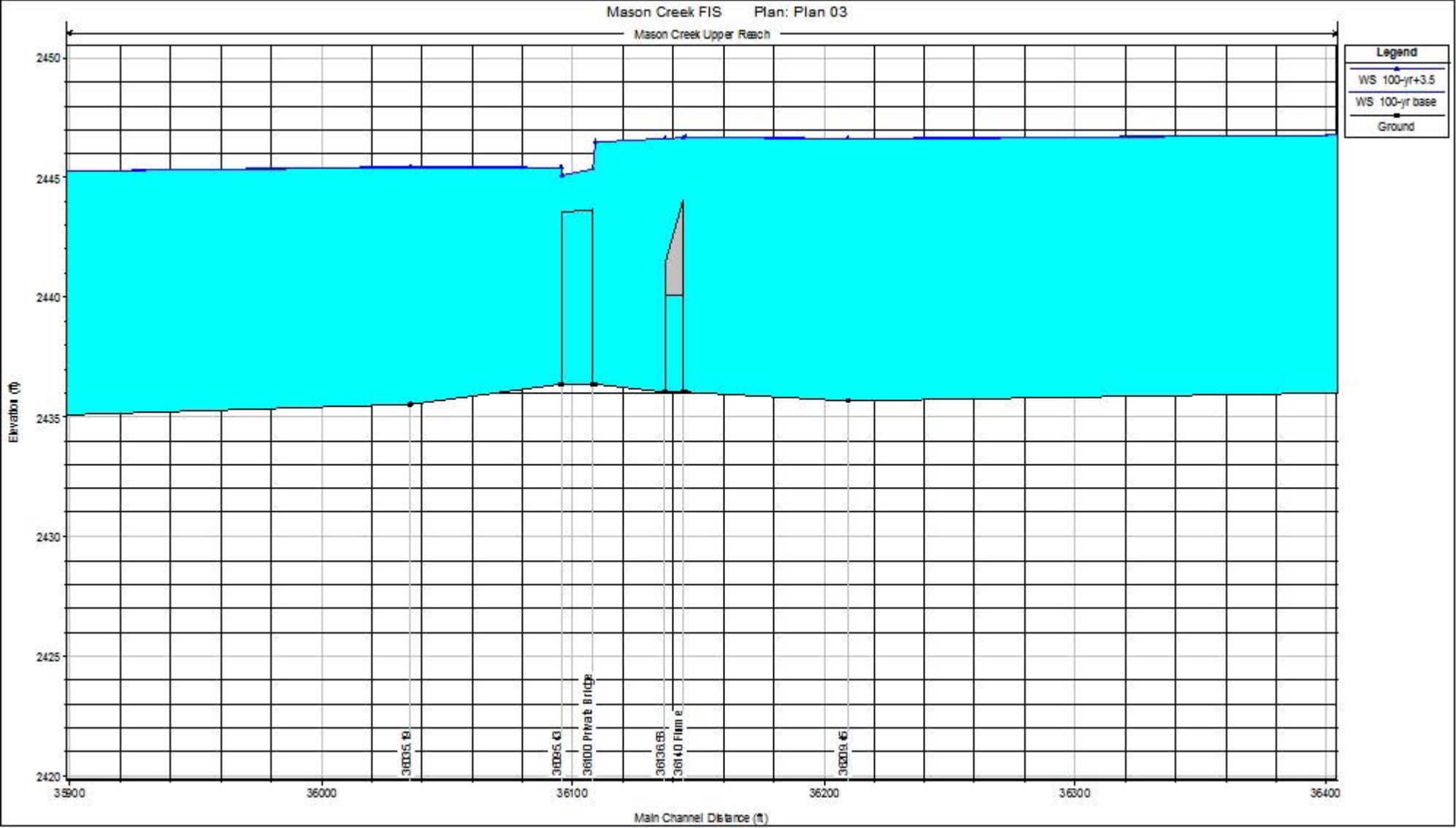

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2440
2435
2430
2425
2420
2415
2410
28200
28300
28400
28500
28600
28700
Main Channel Distance (ft)

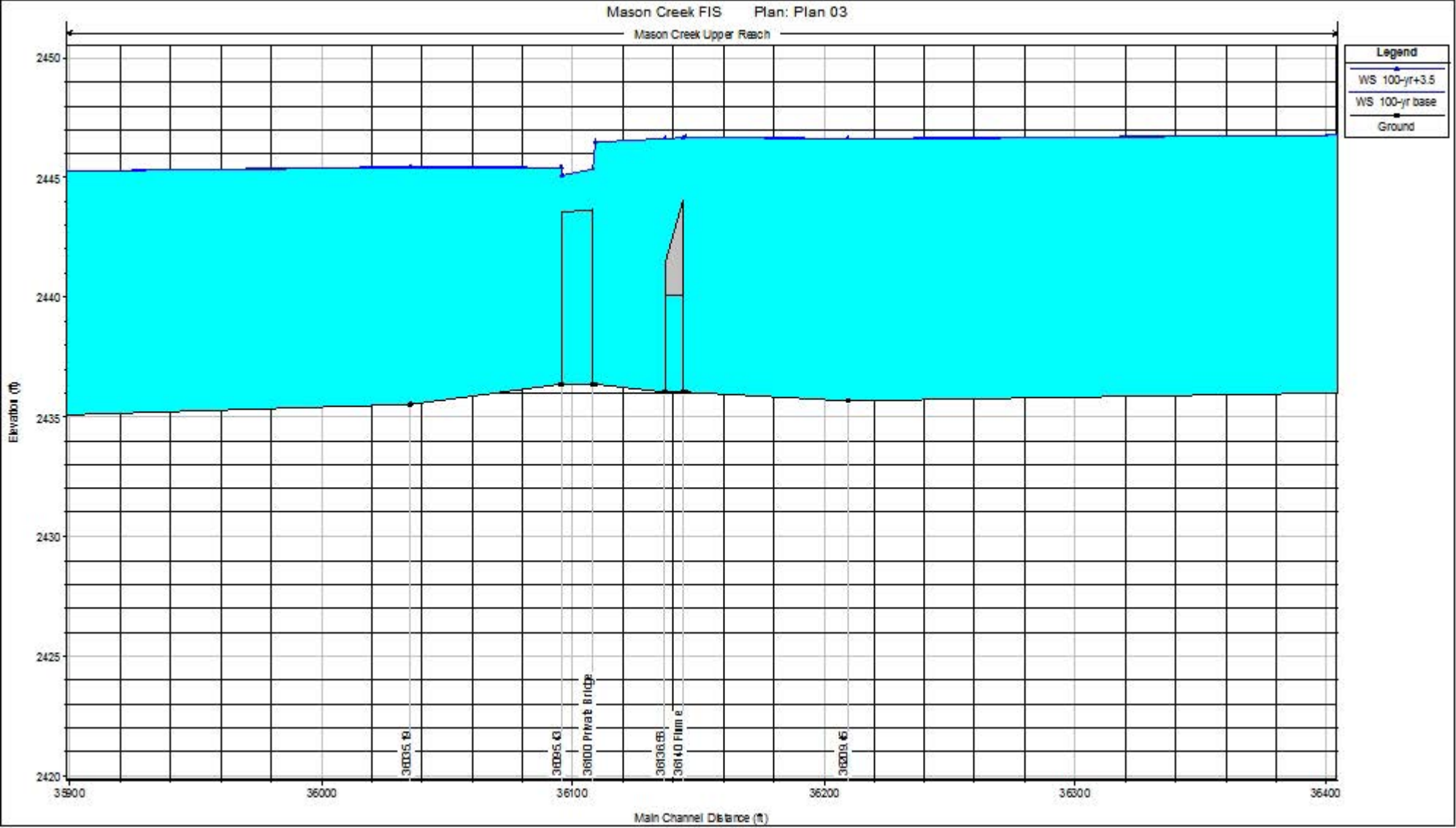

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2445
2440
2435
2430
2425
2420
30700
30800
30900
31000
31100
31200
Main Channel Distance (ft)

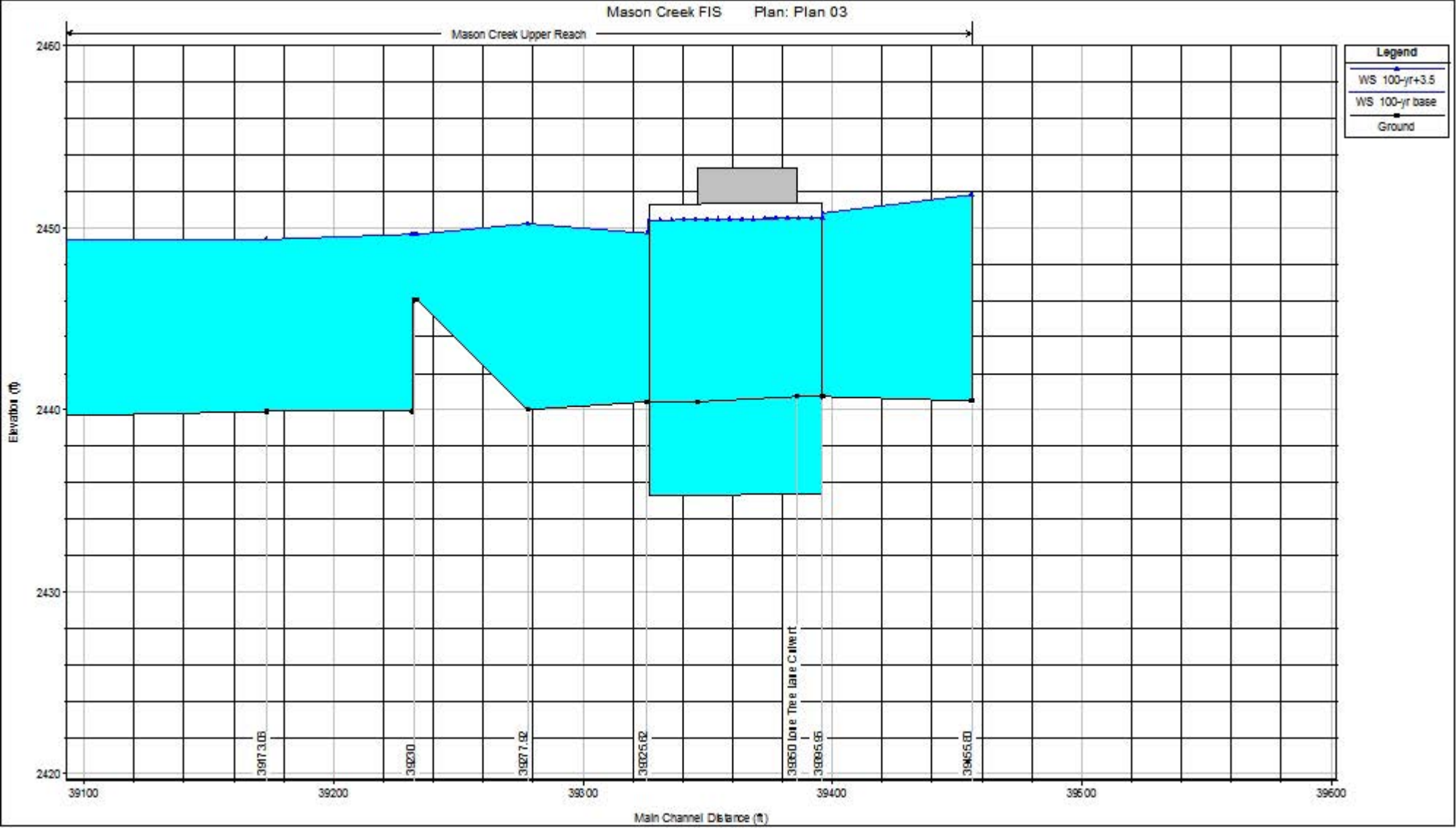

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2440
2430
2420
31000
31100
31200
31300
31400
31500
Main Channel Distance (ft)

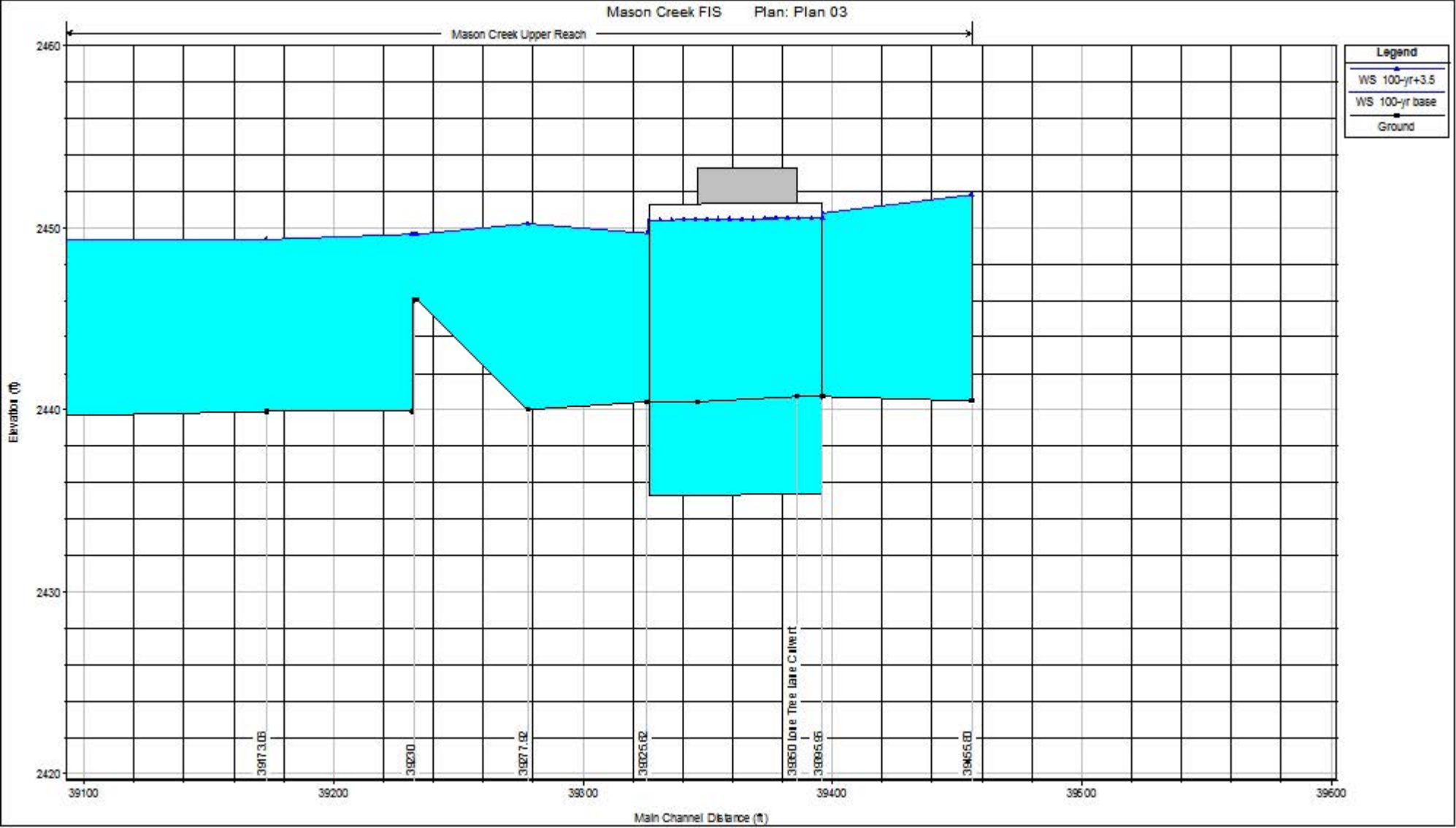

Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2445
2440
2435
2430
2425
2420
32200
32300
32400
32500
32600
32700
Main Channel Distance (ft)
32305.28
32400.15
32420 Midland Blvd
32525.47


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2445
2440
2435
2430
2425
2420
34400
34500
34600
34700
34800
34900
Main Channel Distance (ft)
34656.81
34633.84
34650 UPRR Culvert
34631.52


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2445
2440
2435
2430
2425
2420
35900
36000
36100
36200
36300
36400
Main Channel Distance (ft)
36100 Private Bridge
36140 Flume


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2450
2445
2440
2435
2430
2425
2420
35900
36000
36100
36200
36300
36400
Main Channel Distance (ft)
36100 Private Bridge
36140 Flume


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2460
2450
2440
2430
2420
39100
39200
39300
39400
39500
39600
Main Channel Distance (ft)
39173.08
39230
39277.92
39325.62
39350 Lone Tree Lane Culvert
39395.95
39455.80


Mason Creek FIS Plan: Plan 03
Mason Creek Upper Reach
Legend
WS 100-yr+3.5
WS 100-yr base
Ground
Elevation (ft)
2460
2450
2440
2430
2420
39100
39200
39300
39400
39500
39600
Main Channel Distance (ft)
39173.08
39230
39277.92
39325.62
39350 Lone Tree Lane Culvert
39395.95
39455.80

App_K.5-Sorrento-MasonCr
RAS_100yr & 3.5cfs Flood Depths & Widths

HEC-RAS Plan: Plan 03

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	39455.80	100-yr base	1266.00	2440.50	2451.82	778.53
Upper Reach	39455.80	100-yr+3.5	1269.50	2440.50	2451.83	780.22
Upper Reach	39395.95	100-yr base	1266.00	2440.71	2450.80	454.53
Upper Reach	39395.95	100-yr+3.5	1269.50	2440.71	2450.81	454.87
Upper Reach	39350		Culvert			
Upper Reach	39325.62	100-yr base	1266.00	2440.43	2449.68	117.67
Upper Reach	39325.62	100-yr+3.5	1269.50	2440.43	2449.68	117.58
Upper Reach	39277.92	100-yr base	1266.00	2439.99	2450.21	274.57
Upper Reach	39277.92	100-yr+3.5	1269.50	2439.99	2450.21	275.04
Upper Reach	39233.40	100-yr base	1266.00	2446.02	2449.62	197.35
Upper Reach	39233.40	100-yr+3.5	1269.50	2446.02	2449.62	197.52
Upper Reach	39230		Inl Struct			
Upper Reach	39173.06	100-yr base	1266.00	2439.93	2449.37	196.65
Upper Reach	39173.06	100-yr+3.5	1269.50	2439.93	2449.37	197.48
Upper Reach	38811.66	100-yr base	1266.00	2438.67	2449.05	414.00
Upper Reach	38811.66	100-yr+3.5	1269.50	2438.67	2449.06	414.52
Upper Reach	38308.70	100-yr base	1266.00	2438.50	2448.69	194.91
Upper Reach	38308.70	100-yr+3.5	1269.50	2438.50	2448.70	195.19
Upper Reach	37978.33	100-yr base	1266.00	2439.03	2448.39	134.55
Upper Reach	37978.33	100-yr+3.5	1269.50	2439.03	2448.39	135.60
Upper Reach	37599.42	100-yr base	1266.00	2437.99	2447.83	132.85
Upper Reach	37599.42	100-yr+3.5	1269.50	2437.99	2447.84	133.00
Upper Reach	37187.79	100-yr base	1266.00	2437.38	2447.42	182.56
Upper Reach	37187.79	100-yr+3.5	1269.50	2437.38	2447.43	183.53
Upper Reach	36738.58	100-yr base	1266.00	2436.53	2447.03	277.32
Upper Reach	36738.58	100-yr+3.5	1269.50	2436.53	2447.04	280.15
Upper Reach	36209.45	100-yr base	1266.00	2435.67	2446.61	363.94
Upper Reach	36209.45	100-yr+3.5	1269.50	2435.67	2446.62	364.81
Upper Reach	36145.02	100-yr base	1266.00	2436.02	2446.70	422.65
Upper Reach	36145.02	100-yr+3.5	1269.50	2436.02	2446.71	424.04
Upper Reach	36140		Bridge			
Upper Reach	36136.56	100-yr base	1266.00	2436.02	2446.63	401.77
Upper Reach	36136.56	100-yr+3.5	1269.50	2436.02	2446.64	403.51
Upper Reach	36108.84	100-yr base	1266.00	2436.38	2446.49	370.69
Upper Reach	36108.84	100-yr+3.5	1269.50	2436.38	2446.50	373.08
Upper Reach	36100		Bridge			

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	36095.43	100-yr base	1266.00	2436.38	2445.42	232.42
Upper Reach	36095.43	100-yr+3.5	1269.50	2436.38	2445.43	232.83
Upper Reach	36035.19	100-yr base	1266.00	2435.54	2445.44	249.89
Upper Reach	36035.19	100-yr+3.5	1269.50	2435.54	2445.44	250.15
Upper Reach	35787.97	100-yr base	1266.00	2434.72	2445.11	198.96
Upper Reach	35787.97	100-yr+3.5	1269.50	2434.72	2445.12	199.02
Upper Reach	35229.94	100-yr base	1266.00	2434.29	2445.01	346.22
Upper Reach	35229.94	100-yr+3.5	1269.50	2434.29	2445.01	346.23
Upper Reach	34731.52	100-yr base	1266.00	2433.90	2445.00	687.57
Upper Reach	34731.52	100-yr+3.5	1269.50	2433.90	2445.00	687.74
Upper Reach	34662.34	100-yr base	1266.00	2432.75	2445.00	3041.06
Upper Reach	34662.34	100-yr+3.5	1269.50	2432.75	2445.00	3041.13
Upper Reach	34650		Culvert			
Upper Reach	34633.64	100-yr base	1266.00	2432.04	2442.33	906.98
Upper Reach	34633.64	100-yr+3.5	1269.50	2432.04	2442.33	909.33
Upper Reach	34556.81	100-yr base	1266.00	2433.34	2442.32	1254.32
Upper Reach	34556.81	100-yr+3.5	1269.50	2433.34	2442.32	1257.04
Upper Reach	34015.80	100-yr base	1266.00	2434.43	2442.17	936.25
Upper Reach	34015.80	100-yr+3.5	1269.50	2434.43	2442.18	939.60
Upper Reach	33548.85	100-yr base	1266.00	2433.08	2441.95	1503.44
Upper Reach	33548.85	100-yr+3.5	1269.50	2433.08	2441.95	1505.44
Upper Reach	33084.92	100-yr base	1266.00	2431.86	2441.96	1369.11
Upper Reach	33084.92	100-yr+3.5	1269.50	2431.86	2441.96	1369.52
Upper Reach	32525.47	100-yr base	1266.00	2430.38	2441.95	1339.17
Upper Reach	32525.47	100-yr+3.5	1269.50	2430.38	2441.95	1339.35
Upper Reach	32453.05	100-yr base	1266.00	2430.90	2441.95	1214.48
Upper Reach	32453.05	100-yr+3.5	1269.50	2430.90	2441.95	1214.79
Upper Reach	32420		Culvert			
Upper Reach	32400.15	100-yr base	1266.00	2430.93	2441.92	1352.19
Upper Reach	32400.15	100-yr+3.5	1269.50	2430.93	2441.95	1354.91
Upper Reach	32335.28	100-yr base	1266.00	2431.33	2441.92	1392.84
Upper Reach	32335.28	100-yr+3.5	1269.50	2431.33	2441.94	1394.06
Upper Reach	31882.25	100-yr base	1266.00	2429.24	2441.91	1271.01
Upper Reach	31882.25	100-yr+3.5	1269.50	2429.24	2441.94	1273.37
Upper Reach	31350.03	100-yr base	1266.00	2428.77	2441.91	1364.84
Upper Reach	31350.03	100-yr+3.5	1269.50	2428.77	2441.94	1367.41
Upper Reach	31275.57	100-yr base	1266.00	2427.96	2441.91	2503.14

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	31275.57	100-yr+3.5	1269.50	2427.96	2441.94	2505.12
Upper Reach	31264.37	100-yr base	1266.00	2427.96	2441.91	2279.20
Upper Reach	31264.37	100-yr+3.5	1269.50	2427.96	2441.94	2293.23
Upper Reach	31250		Bridge			
Upper Reach	31229.97	100-yr base	1266.00	2428.51	2441.91	1902.73
Upper Reach	31229.97	100-yr+3.5	1269.50	2428.51	2441.94	1916.32
Upper Reach	31216.05	100-yr base	1266.00	2428.51	2441.91	2166.85
Upper Reach	31216.05	100-yr+3.5	1269.50	2428.51	2441.94	2173.86
Upper Reach	31138.39	100-yr base	1266.00	2428.02	2441.91	1317.62
Upper Reach	31138.39	100-yr+3.5	1269.50	2428.02	2441.94	1322.34
Upper Reach	31008.54	100-yr base	1266.00	2427.29	2441.91	1991.20
Upper Reach	31008.54	100-yr+3.5	1269.50	2427.29	2441.94	1995.47
Upper Reach	30985.85	100-yr base	1266.00	2427.29	2441.90	1950.37
Upper Reach	30985.85	100-yr+3.5	1269.50	2427.29	2441.93	1974.83
Upper Reach	30950		Culvert			
Upper Reach	30916.19	100-yr base	1266.00	2425.66	2434.62	85.49
Upper Reach	30916.19	100-yr+3.5	1269.50	2425.66	2434.63	86.03
Upper Reach	30835.48	100-yr base	1266.00	2426.65	2434.69	191.94
Upper Reach	30835.48	100-yr+3.5	1269.50	2426.65	2434.70	192.63
Upper Reach	30262.09	100-yr base	1266.00	2426.04	2433.64	44.49
Upper Reach	30262.09	100-yr+3.5	1269.50	2426.04	2433.65	44.54
Upper Reach	29732.83	100-yr base	1266.00	2424.12	2432.18	68.79
Upper Reach	29732.83	100-yr+3.5	1269.50	2424.12	2432.19	68.97
Upper Reach	29121.96	100-yr base	1266.00	2423.16	2430.80	57.95
Upper Reach	29121.96	100-yr+3.5	1269.50	2423.16	2430.81	58.11
Upper Reach	28521.45	100-yr base	1266.00	2421.53	2429.05	57.70
Upper Reach	28521.45	100-yr+3.5	1269.50	2421.53	2429.05	58.29
Upper Reach	28479.69	100-yr base	1266.00	2421.63	2429.26	135.21
Upper Reach	28479.69	100-yr+3.5	1269.50	2421.63	2429.27	135.74
Upper Reach	28475		Bridge			
Upper Reach	28474.52	100-yr base	1266.00	2421.63	2429.24	114.82
Upper Reach	28474.52	100-yr+3.5	1269.50	2421.63	2429.24	115.40
Upper Reach	28423.71	100-yr base	1266.00	2421.38	2428.84	100.73
Upper Reach	28423.71	100-yr+3.5	1269.50	2421.38	2428.84	100.86
Upper Reach	27794.44	100-yr base	1266.00	2420.06	2428.20	169.74
Upper Reach	27794.44	100-yr+3.5	1269.50	2420.06	2428.21	171.14

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	27094.60	100-yr base	1266.00	2418.60	2428.11	309.16
Upper Reach	27094.60	100-yr+3.5	1269.50	2418.60	2428.12	309.43
Upper Reach	27060.19	100-yr base	1266.00	2417.35	2428.09	306.01
Upper Reach	27060.19	100-yr+3.5	1269.50	2417.35	2428.10	306.24
Upper Reach	27050		Bridge			
Upper Reach	27047.64	100-yr base	1266.00	2417.35	2428.01	269.96
Upper Reach	27047.64	100-yr+3.5	1269.50	2417.35	2428.02	270.22
Upper Reach	27005.11	100-yr base	1266.00	2418.46	2427.97	214.15
Upper Reach	27005.11	100-yr+3.5	1269.50	2418.46	2427.98	214.99
Upper Reach	26564.38	100-yr base	1266.00	2417.62	2427.54	140.65
Upper Reach	26564.38	100-yr+3.5	1269.50	2417.62	2427.55	141.58
Upper Reach	26098.73	100-yr base	1266.00	2416.76	2427.27	245.77
Upper Reach	26098.73	100-yr+3.5	1269.50	2416.76	2427.28	246.58
Upper Reach	25666.82	100-yr base	1266.00	2415.92	2427.25	754.30
Upper Reach	25666.82	100-yr+3.5	1269.50	2415.92	2427.27	759.99
Upper Reach	25238.43	100-yr base	1266.00	2416.09	2427.23	1201.51
Upper Reach	25238.43	100-yr+3.5	1269.50	2416.09	2427.24	1204.52
Upper Reach	24607.41	100-yr base	1266.00	2415.92	2427.19	623.41
Upper Reach	24607.41	100-yr+3.5	1269.50	2415.92	2427.20	625.87
Upper Reach	24399.85	100-yr base	1266.00	2415.86	2427.18	754.87
Upper Reach	24399.85	100-yr+3.5	1269.50	2415.86	2427.19	755.60
Upper Reach	24376.28	100-yr base	1266.00	2415.65	2427.18	1051.30
Upper Reach	24376.28	100-yr+3.5	1269.50	2415.65	2427.19	1052.71
Upper Reach	24356.23	100-yr base	1266.00	2415.65	2426.74	25.87
Upper Reach	24356.23	100-yr+3.5	1269.50	2415.65	2426.75	25.87
Upper Reach	24325		Bridge			
Upper Reach	24295.38	100-yr base	1266.00	2416.14	2426.72	27.06
Upper Reach	24295.38	100-yr+3.5	1269.50	2416.14	2426.73	27.06
Upper Reach	24278.13	100-yr base	1266.00	2416.14	2426.86	988.36
Upper Reach	24278.13	100-yr+3.5	1269.50	2416.14	2426.87	989.50
Upper Reach	24258		Bridge			
Upper Reach	24211.72	100-yr base	1266.00	2415.45	2426.86	1057.69
Upper Reach	24211.72	100-yr+3.5	1269.50	2415.45	2426.87	1057.78
Upper Reach	23704.54	100-yr base	1266.00	2411.78	2426.85	801.60
Upper Reach	23704.54	100-yr+3.5	1269.50	2411.78	2426.85	801.88
Upper Reach	23181.25	100-yr base	1266.00	2411.80	2426.83	679.71
Upper Reach	23181.25	100-yr+3.5	1269.50	2411.80	2426.84	680.16

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	23110.69	100-yr base	1266.00	2412.40	2426.82	764.96
Upper Reach	23110.69	100-yr+3.5	1269.50	2412.40	2426.83	765.64
Upper Reach	23060		Culvert			
Upper Reach	23012.96	100-yr base	1266.00	2412.28	2420.09	40.12
Upper Reach	23012.96	100-yr+3.5	1269.50	2412.28	2420.09	40.14
Upper Reach	22932.63	100-yr base	1266.00	2413.85	2420.00	114.56
Upper Reach	22932.63	100-yr+3.5	1269.50	2413.85	2420.01	114.89
Upper Reach	22446.59	100-yr base	1266.00	2411.22	2418.06	63.58
Upper Reach	22446.59	100-yr+3.5	1269.50	2411.22	2418.06	63.59
Upper Reach	21964.17	100-yr base	1266.00	2410.67	2417.26	231.64
Upper Reach	21964.17	100-yr+3.5	1269.50	2410.67	2417.26	231.72
Upper Reach	21904.76	100-yr base	1266.00	2410.43	2417.21	251.25
Upper Reach	21904.76	100-yr+3.5	1269.50	2410.43	2417.22	251.34
Upper Reach	21900		Bridge			
Upper Reach	21887.03	100-yr base	1266.00	2410.43	2417.17	233.94
Upper Reach	21887.03	100-yr+3.5	1269.50	2410.43	2417.18	234.19
Upper Reach	21791.82	100-yr base	1266.00	2411.75	2416.01	86.27
Upper Reach	21791.82	100-yr+3.5	1269.50	2411.75	2416.02	86.42
Upper Reach	21331.57	100-yr base	1266.00	2407.22	2414.60	70.37
Upper Reach	21331.57	100-yr+3.5	1269.50	2407.22	2414.61	70.59
Upper Reach	20919.82	100-yr base	1266.00	2405.58	2413.29	74.39
Upper Reach	20919.82	100-yr+3.5	1269.50	2405.58	2413.30	74.67
Upper Reach	20390.74	100-yr base	1266.00	2404.07	2411.86	126.81
Upper Reach	20390.74	100-yr+3.5	1269.50	2404.07	2411.87	127.08
Upper Reach	19811.85	100-yr base	1266.00	2401.71	2408.50	38.61
Upper Reach	19811.85	100-yr+3.5	1269.50	2401.71	2408.50	38.59
Upper Reach	19481.37	100-yr base	1266.00	2401.20	2408.64	507.47
Upper Reach	19481.37	100-yr+3.5	1269.50	2401.20	2408.64	508.48
Upper Reach	19407.24	100-yr base	1266.00	2400.90	2408.30	586.77
Upper Reach	19407.24	100-yr+3.5	1269.50	2400.90	2408.30	586.77
Upper Reach	19400		Culvert			
Upper Reach	19368.02	100-yr base	1266.00	2400.14	2407.81	302.93
Upper Reach	19368.02	100-yr+3.5	1269.50	2400.14	2407.83	307.61
Upper Reach	19300.81	100-yr base	1266.00	2401.28	2407.40	349.91
Upper Reach	19300.81	100-yr+3.5	1269.50	2401.28	2407.41	350.20
Upper Reach	19170.05	100-yr base	1266.00	2399.93	2407.29	518.33

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	19170.05	100-yr+3.5	1269.50	2399.93	2407.30	519.52
Upper Reach	19154.35	100-yr base	1266.00	2399.93	2406.40	149.24
Upper Reach	19154.35	100-yr+3.5	1269.50	2399.93	2406.41	154.40
Upper Reach	19150		Bridge			
Upper Reach	19138.67	100-yr base	1266.00	2399.93	2406.52	222.35
Upper Reach	19138.67	100-yr+3.5	1269.50	2399.93	2406.53	224.80
Upper Reach	19091.90	100-yr base	1266.00	2400.71	2406.50	286.98
Upper Reach	19091.90	100-yr+3.5	1269.50	2400.71	2406.51	288.90
Upper Reach	18713.76	100-yr base	1266.00	2399.16	2405.04	386.15
Upper Reach	18713.76	100-yr+3.5	1269.50	2399.16	2405.04	385.83
Upper Reach	18413.81	100-yr base	1266.00	2398.77	2404.34	614.68
Upper Reach	18413.81	100-yr+3.5	1269.50	2398.77	2404.34	617.98
Upper Reach	18343.04	100-yr base	1266.00	2399.46	2404.24	625.64
Upper Reach	18343.04	100-yr+3.5	1269.50	2399.46	2404.25	627.70
Upper Reach	18342		Inl Struct			
Upper Reach	18340.67	100-yr base	1266.00	2399.45	2404.14	591.19
Upper Reach	18340.67	100-yr+3.5	1269.50	2399.45	2404.14	594.19
Upper Reach	18271.55	100-yr base	1266.00	2397.99	2404.09	603.10
Upper Reach	18271.55	100-yr+3.5	1269.50	2397.99	2404.10	603.54
Upper Reach	18159.60	100-yr base	1266.00	2395.92	2403.89	563.42
Upper Reach	18159.60	100-yr+3.5	1269.50	2395.92	2403.90	564.10
Upper Reach	18120.30	100-yr base	1266.00	2396.85	2403.67	550.74
Upper Reach	18120.30	100-yr+3.5	1269.50	2396.85	2403.73	558.68
Upper Reach	18106.90	100-yr base	1266.00	2396.85	2403.77	572.35
Upper Reach	18106.90	100-yr+3.5	1269.50	2396.85	2403.82	574.34
Upper Reach	18050.33	100-yr base	1266.00	2396.98	2403.84	582.57
Upper Reach	18050.33	100-yr+3.5	1269.50	2396.98	2403.88	583.36
Upper Reach	17614.95	100-yr base	1266.00	2394.28	2403.82	599.46
Upper Reach	17614.95	100-yr+3.5	1269.50	2394.28	2403.86	600.01
Upper Reach	17229.99	100-yr base	1266.00	2392.65	2403.81	779.25
Upper Reach	17229.99	100-yr+3.5	1269.50	2392.65	2403.84	794.53
Upper Reach	17134.78	100-yr base	1266.00	2390.57	2403.80	734.47
Upper Reach	17134.78	100-yr+3.5	1269.50	2390.57	2403.83	738.71
Upper Reach	17100		Culvert			
Upper Reach	17074.84	100-yr base	1266.00	2392.19	2399.76	18.09
Upper Reach	17074.84	100-yr+3.5	1269.50	2392.19	2400.29	19.27

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Upper Reach	17050		Lat Struct			
Upper Reach	17001.70	100-yr base	1264.86	2391.90	2400.57	207.13
Upper Reach	17001.70	100-yr+3.5	1269.50	2391.90	2401.07	216.30
Upper Reach	16950		Lat Struct			
Upper Reach	16893.08	100-yr base	1225.57	2391.63	2400.31	90.37
Upper Reach	16893.08	100-yr+3.5	1269.50	2391.63	2400.81	93.78
Upper Reach	16850		Lat Struct			
Upper Reach	16782.94	100-yr base	1126.36	2390.93	2399.78	37.96
Upper Reach	16782.94	100-yr+3.5	1269.50	2390.93	2400.14	38.92
Upper Reach	16750		Lat Struct			
Upper Reach	16724.91	100-yr base	1097.76	2391.50	2399.79	51.34
Upper Reach	16724.91	100-yr+3.5	1269.50	2391.50	2400.15	56.42
Upper Reach	16720		Inl Struct			
Upper Reach	16640.55	100-yr base	1097.76	2383.20	2398.06	46.08
Upper Reach	16640.55	100-yr+3.5	1269.50	2383.20	2398.73	48.22
Upper Reach	16604.12	100-yr base	1097.76	2389.08	2397.63	31.39
Upper Reach	16604.12	100-yr+3.5	1269.50	2389.08	2398.26	32.22
Upper Reach	16474.67	100-yr base	1097.76	2388.63	2397.01	28.29
Upper Reach	16474.67	100-yr+3.5	1269.50	2388.63	2397.63	29.42
Upper Reach	16401.72	100-yr base	1097.76	2387.80	2397.08	34.90
Upper Reach	16401.72	100-yr+3.5	1269.50	2387.80	2397.72	35.59
Upper Reach	16177.60	100-yr base	1097.76	2387.29	2396.78	32.25
Upper Reach	16177.60	100-yr+3.5	1269.50	2387.29	2397.40	33.66
Upper Reach	15630.49	100-yr base	1097.76	2387.12	2395.07	26.17
Upper Reach	15630.49	100-yr+3.5	1269.50	2387.12	2395.60	27.23
Upper Reach	14987.26	100-yr base	1097.76	2385.47	2392.72	29.22
Upper Reach	14987.26	100-yr+3.5	1269.50	2385.47	2393.11	30.02
Upper Reach	14395.48	100-yr base	1097.76	2384.26	2391.60	40.62
Upper Reach	14395.48	100-yr+3.5	1269.50	2384.26	2391.81	41.23
Upper Reach	13859.21	100-yr base	1097.76	2382.45	2390.86	40.43
Upper Reach	13859.21	100-yr+3.5	1269.50	2382.45	2390.84	40.38
Lower Reach	13177.00	100-yr base	1266.00	2380.62	2390.60	642.36
Lower Reach	13177.00	100-yr+3.5	1269.50	2380.62	2390.61	642.38
Lower Reach	13000		Lat Struct			
Lower Reach	12485.99	100-yr base	1266.00	2379.99	2390.41	681.59
Lower Reach	12485.99	100-yr+3.5	1269.50	2379.99	2390.41	681.83

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Lower Reach	12400		Lat Struct			
Lower Reach	12346.11	100-yr base	1266.00	2378.89	2390.22	433.93
Lower Reach	12346.11	100-yr+3.5	1269.50	2378.89	2390.23	433.97
Lower Reach	12330		Lat Struct			
Lower Reach	12324.69	100-yr base	1266.00	2379.32	2390.18	416.62
Lower Reach	12324.69	100-yr+3.5	1269.50	2379.32	2390.18	416.75
Lower Reach	12300		Lat Struct			
Lower Reach	12281.89	100-yr base	1266.00	2379.69	2390.10	212.23
Lower Reach	12281.89	100-yr+3.5	1269.50	2379.69	2390.10	212.50
Lower Reach	12280		Bridge			
Lower Reach	12227.10	100-yr base	1266.00	2379.64	2389.94	51.07
Lower Reach	12227.10	100-yr+3.5	1269.50	2379.64	2389.94	51.07
Lower Reach	12000		Lat Struct			
Lower Reach	11914.98	100-yr base	1266.00	2379.10	2389.88	421.15
Lower Reach	11914.98	100-yr+3.5	1269.50	2379.10	2389.88	421.15
Lower Reach	11900		Lat Struct			
Lower Reach	11812.99	100-yr base	1266.00	2379.40	2389.82	361.92
Lower Reach	11812.99	100-yr+3.5	1269.50	2379.40	2389.82	361.92
Lower Reach	11790		Culvert			
Lower Reach	11769.71	100-yr base	1266.00	2379.01	2388.71	121.90
Lower Reach	11769.71	100-yr+3.5	1269.50	2379.01	2388.68	103.94
Lower Reach	11706.08	100-yr base	1266.00	2379.60	2388.73	284.15
Lower Reach	11706.08	100-yr+3.5	1269.50	2379.60	2388.70	283.77
Lower Reach	11317.48	100-yr base	1266.00	2377.60	2388.69	438.35
Lower Reach	11317.48	100-yr+3.5	1269.50	2377.60	2388.66	438.31
Lower Reach	11227.84	100-yr base	1266.00	2377.09	2388.43	453.92
Lower Reach	11227.84	100-yr+3.5	1269.50	2377.09	2388.38	428.93
Lower Reach	11200		Culvert			
Lower Reach	11176.73	100-yr base	1266.00	2377.57	2384.80	29.65
Lower Reach	11176.73	100-yr+3.5	1269.50	2377.57	2384.80	29.65
Lower Reach	11101.83	100-yr base	1266.00	2378.66	2383.92	40.51
Lower Reach	11101.83	100-yr+3.5	1269.50	2378.66	2383.93	40.52
Lower Reach	10219.26	100-yr base	1266.00	2375.22	2382.51	108.26
Lower Reach	10219.26	100-yr+3.5	1269.50	2375.22	2382.52	108.63

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Lower Reach	9757.954	100-yr base	1266.00	2374.58	2381.93	323.68
Lower Reach	9757.954	100-yr+3.5	1269.50	2374.58	2381.93	327.10
Lower Reach	9158.981	100-yr base	1266.00	2373.20	2381.63	520.84
Lower Reach	9158.981	100-yr+3.5	1269.50	2373.20	2381.64	520.90
Lower Reach	9122.347	100-yr base	1266.00	2372.08	2381.32	545.30
Lower Reach	9122.347	100-yr+3.5	1269.50	2372.08	2381.30	545.18
Lower Reach	9120		Bridge			
Lower Reach	9104.979	100-yr base	1266.00	2372.08	2380.67	271.05
Lower Reach	9104.979	100-yr+3.5	1269.50	2372.08	2380.67	273.01
Lower Reach	9029.950	100-yr base	1266.00	2372.08	2380.66	373.37
Lower Reach	9029.950	100-yr+3.5	1269.50	2372.08	2380.66	376.27
Lower Reach	8657.601	100-yr base	1266.00	2371.38	2380.29	197.43
Lower Reach	8657.601	100-yr+3.5	1269.50	2371.38	2380.30	197.90
Lower Reach	8061.190	100-yr base	1266.00	2371.89	2379.09	199.22
Lower Reach	8061.190	100-yr+3.5	1269.50	2371.89	2379.13	201.17
Lower Reach	7578.872	100-yr base	1266.00	2369.45	2378.33	70.60
Lower Reach	7578.872	100-yr+3.5	1269.50	2369.45	2378.39	72.02
Lower Reach	7015.177	100-yr base	1266.00	2368.82	2377.48	68.85
Lower Reach	7015.177	100-yr+3.5	1269.50	2368.82	2377.59	70.01
Lower Reach	6508.787	100-yr base	1266.00	2367.52	2376.61	331.43
Lower Reach	6508.787	100-yr+3.5	1269.50	2367.52	2376.84	416.40
Lower Reach	6455.974	100-yr base	1266.00	2367.66	2376.67	474.89
Lower Reach	6455.974	100-yr+3.5	1269.50	2367.66	2376.90	570.22
Lower Reach	6452		Bridge			
Lower Reach	6450.131	100-yr base	1266.00	2367.66	2376.23	419.21
Lower Reach	6450.131	100-yr+3.5	1269.50	2367.66	2376.42	517.88
Lower Reach	6316.238	100-yr base	1266.00	2367.70	2375.74	484.03
Lower Reach	6316.238	100-yr+3.5	1269.50	2367.70	2376.02	515.28
Lower Reach	6173.318	100-yr base	1266.00	2368.50	2375.33	422.10
Lower Reach	6173.318	100-yr+3.5	1269.50	2368.50	2375.70	450.11
Lower Reach	6170		Bridge			
Lower Reach	6167.674	100-yr base	1266.00	2368.50	2375.19	416.98
Lower Reach	6167.674	100-yr+3.5	1269.50	2368.50	2375.58	439.00
Lower Reach	6100		Lat Struct			
Lower Reach	6003.438	100-yr base	1052.14	2367.55	2374.99	421.95
Lower Reach	6003.438	100-yr+3.5	1269.50	2367.55	2375.27	425.94

HEC-RAS Plan: Plan 03 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Top Width
			(cfs)	(ft)	(ft)	(ft)
Lower Reach	6000		Lat Struct			
Lower Reach	5767.068	100-yr base	1028.04	2365.35	2375.09	479.67
Lower Reach	5767.068	100-yr+3.5	1269.50	2365.35	2375.43	489.62
Lower Reach	5750		Lat Struct			
Lower Reach	5710.640	100-yr base	1027.54	2365.60	2375.09	583.36
Lower Reach	5710.640	100-yr+3.5	1269.50	2365.60	2375.43	635.94
Lower Reach	5700		Culvert			
Lower Reach	5666.086	100-yr base	1027.54	2365.31	2371.80	24.69
Lower Reach	5666.086	100-yr+3.5	1269.50	2365.31	2372.60	30.41
Lower Reach	5617.238	100-yr base	1027.54	2366.68	2371.91	55.82
Lower Reach	5617.238	100-yr+3.5	1269.50	2366.68	2372.44	57.69
Lower Reach	5067.331	100-yr base	1027.54	2363.60	2370.89	42.18
Lower Reach	5067.331	100-yr+3.5	1269.50	2363.60	2371.25	43.52
Lower Reach	4520.234	100-yr base	1027.54	2362.60	2370.55	101.97
Lower Reach	4520.234	100-yr+3.5	1269.50	2362.60	2370.85	115.16
Lower Reach	3922.031	100-yr base	1027.54	2361.88	2370.13	284.82
Lower Reach	3922.031	100-yr+3.5	1269.50	2361.88	2370.35	349.42
Lower Reach	3367.967	100-yr base	1027.54	2362.16	2369.48	692.21
Lower Reach	3367.967	100-yr+3.5	1269.50	2362.16	2369.74	837.74
Lower Reach	2736.533	100-yr base	1027.54	2361.88	2368.82	593.26
Lower Reach	2736.533	100-yr+3.5	1269.50	2361.88	2369.19	791.82
Lower Reach	2031.818	100-yr base	1027.54	2361.36	2367.17	109.46
Lower Reach	2031.818	100-yr+3.5	1269.50	2361.36	2367.70	151.21
Lower Reach	1495.336	100-yr base	1027.54	2360.62	2365.59	52.25
Lower Reach	1495.336	100-yr+3.5	1269.50	2360.62	2366.18	74.29
Lower Reach	967.873	100-yr base	1027.54	2358.42	2364.24	43.00
Lower Reach	967.873	100-yr+3.5	1269.50	2358.42	2364.79	56.65
Lower Reach	588.809	100-yr base	1027.54	2359.10	2363.03	82.03
Lower Reach	588.809	100-yr+3.5	1269.50	2359.10	2364.01	117.29
Lower Reach	532.569	100-yr base	1027.54	2358.11	2362.90	69.20
Lower Reach	532.569	100-yr+3.5	1269.50	2358.11	2363.90	71.95

APPENDIX B

Lactalis NPDES Permit and 2013 Permit Renewal Application

June 18, 2013

Mike Lidgard, Permitting Manager
US EPA Region 10
Office of Water and Watersheds
NPDES Permits Unit
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101

Re: NPDES Permit No. ID-002803-7; Application for Reissuance

Dear Mr. Lidgard,

Attached is an updated application for renewal of the Sorrento Lactalis, Inc. (Lactalis) National Pollutant Discharge Elimination System (NPDES) permit (ID-002803-7), for Lactalis's cheese-production facility in Nampa, Idaho. Under this permit, Lactalis is authorized to discharge treated wastewater effluent to the Purdam Drain, an indirect man-made tributary to the Lower Boise River. This permit and authorization to discharge became effective November 1, 2005, and was scheduled to expire October 31, 2010. Lactalis applied for reissuance April 29, 2010, more than 180 days before the expiration of the permit, as required by the terms of the permit. Due to backlog of permit requests, EPA could not renew the permit at that time and, instead, EPA administratively extended the permit on October 27, 2010. EPA recently contacted Lactalis to inform the company that EPA is prepared to work on this permit reissuance now. At our meeting with EPA in Seattle on April 25, 2013, EPA requested Lactalis to submit an updated application request.

History of the Facility

Lactalis's Nampa, Idaho facility produces cheese and whey product with milk that is sourced from Idaho dairies. Since purchasing the plant in 1999, Lactalis has invested more than $230 million in capital improvements, including among other projects a whey dryer in 2010 and a fresh mozzarella expansion scheduled to come online this year. In that same time, the plant's production has increased more than sevenfold, and the number of employees has nearly tripled. In addition to its 700 full-time employees, Lactalis indirectly supports another 5,000+ additional jobs in milk production, trucking, and ancillary services.[1]

Lactalis plans to continue to expand the Nampa facility. The next planned expansion, a new butter production facility, is slated to come online in 2017.

[1] Economic modelers have estimated that every job in cheese manufacturing creates another 7.44 jobs in supporting businesses. Lisa Buddecke & Jan Rogers, "Diversification—Food, Distribution & Manufacturing Equal Economic Stability in Rural Idaho", *Expansion Solutions* (available at http://www.southernidaho.org/published/SIEDO_060709.pdf).

Over the period of the existing permit and throughout its operations at the Nampa facility, Lactalis has demonstrated its commitment to protection of the Lower Boise River watershed. We have invested millions of dollars to improve wastewater quality and to reduce various pollutants of concern in the facility's treated effluent.

Lactalis currently processes approximately 4.5 million pounds of raw milk daily, which is expected to increase to 5 million pounds daily in the coming months as the expanded fresh mozzarella plant comes online, and to 6.5 million pounds daily over the next ten years. One of our corporate initiatives is to reduce our wastewater generation. We continue to recycle treated process water for cleaning operations, which also reduces well water use. We are striving to reduce our well water consumption from 1.0 to less than 0.8 pounds of well water per pound of raw milk processed. Another internal goal is not to exceed ten pounds of influent wastewater for every pound of finished product. We continue to analyze each of our production processes to enhance our reuse of treated process water and to use well water more efficiently.

History of Facility Wastewater Management

Prior to 2005, our Nampa facility's wastewater system consisted of rudimentary pretreatment, on-site storage in unlined lagoons, and land application via dozens of trucks per day hauling wastewater off-site. In 2005, Lactalis constructed a mechanical wastewater treatment facility to better manage our wastewater. The wastewater treatment plant currently includes pre-screening and grit removal, an equalization tank, two sequencing batch reactors, a decant tank, a tertiary clarifier, primary and secondary continuous sand filters, temporary onsite storage for land application, and an inline ultraviolet disinfection system. A dissolved air floatation (DAF) treatment train is also scheduled to become operational in late 2013.

At the time our NPDES permit became effective in 2005, the facility's average monthly wastewater flow was approximately 300,000 gallons per day (gpd). Since then, we have more than doubled raw milk intake and subsequent cheese production. As a result, our current average monthly wastewater flow is approximately 750,000 gpd, an increase of over 100% since the original NPDES permit was issued. Even though production has significantly increased, we continue to strive to minimize wastewater through waste minimization initiatives and reuse.

Our existing NPDES permit stipulated numerous effluent limitations that required us to undertake challenging and expensive design upgrades. We hired highly experienced personnel to operate the treatment plant. Over the past few years, we have established a record of meeting or exceeding the permit's stringent conditions.

Future Wastewater Flows and Permit Implications

Wastewater Flows

Lactalis requests that mass-based limits in our reissued NPDES permit be based on no less than an average monthly wastewater flow of 1.52 million gallons per day (MGD). Our current maximum average monthly wastewater flows are 750,000 gpd. To supply our current and future production plans, we expect to increase our raw milk intake from 4.5 to 6.5 million

pounds per day during the next ten years. Based on our past and predicted ratio of raw milk intake to wastewater flows, we believe that such an increase of raw milk intake will increase our average monthly wastewater flows to 1.52 MGD. See Table 1. These figures do not yet reflect any additional safety factor (e.g., an extra 10% or 20%) to account for faster than forecasted growth.

We request that EPA project our flow needs, and related effluent limits, over a ten-year period. This request reflects the uncertainties posed by the realities of EPA permit writing resources and its inability to guarantee predictable permit renewals as required by its regulations. It has already been eight years since our permit was issued and we do not yet have a new permit. Meanwhile, we have long surpassed the original flow estimates on which our permit limits were calculated.

As we have learned over the course of our existing NPDES permit, the ability to make accurate predictions of wastewater flows is foundational to our long-term ability to comply with mass loading effluent limits. We request that EPA work closely with Lactalis in selecting flow rates that enable us to comply with permit mass limits.

Effluent Limits

Lactalis's most stringent and challenging permit effluent limit is related to total phosphorus. The permit's total phosphorus schedule of compliance required Lactalis to achieve compliance with final total phosphorus limitations within 4½ years following issuance, i.e., by May 1, 2010. The final effluent limitation for average monthly total phosphorus effluent concentrations was 70 micrograms per liter (µg/L). Based upon the then-anticipated average monthly flow of 500,000 gpd, the permit gave a final average monthly phosphorus mass limit of only 0.29 lbs/day.

Our permit also contained limits for other constituents calculated based on our then-anticipated average monthly flow of 500,000 gpd. Lactalis requests that EPA revise all of the effluent limits in the reissued permit to reflect a minimum anticipated production of an average monthly wastewater flow rate of 1.52 MGD. See Table 2.

Seasonal Limits for Total Phosphorus

We are aware that EPA has issued at least one NPDES permit (to the City of Kuna, Idaho) for discharge to a tributary of the Lower Boise River that authorizes seasonal total phosphorus limits. At the time the City of Kuna's permit was issued, EPA noted that the Snake River-Hells Canyon Total Maximum Daily Load (TMDL) was designed to meet a seasonal average chlorophyll-a target. As such, the 70 µg/L load allocation for the Lower Boise River applies seasonally, from May through September (EPA Response to Comments on the Draft NPDES Permit for the City of Kuna, April 2009). Lactalis requests that EPA similarly consider seasonal total phosphorus effluent limitations in our reissued NPDES permit.

Man-Made Waterways

In our meeting with EPA on April 25th, EPA stated its intention to reissue the permit with new temperature, *E. coli*, and ammonia limits based on the application of cold-water biota and contact recreation criteria to a man-made waterway. We believe EPA's position is inconsistent with Idaho's water quality standards (WQS) and the Clean Water Act.

Lactalis discharges into the Purdam Drain, a man-made irrigation drain built and owned by the U.S. Bureau of Reclamation. Under Idaho's approved WQS, the designated uses for man-made waterways include only the uses for which the waterway was developed. IDAPA 58.01.02.101.02. The Purdam Drain was constructed for agricultural purposes.

The man-made waterways provision has been part of Idaho's EPA-approved WQS since 1980. EPA has never disapproved this provision or promulgated its own WQS to replace it in accordance with Section 303 of the CWA. In fact, until recently, EPA has recognized the man-made waterways provision in NPDES permits throughout Idaho, including in Lactalis's permit.

In a recent draft NPDES permit for the City of Greenleaf, which includes a discharge into a man-made waterway, EPA argued that the man-made waterway at issue in that permit was subject to Idaho's WQS for cold water biota and primary contact recreation under Idaho's WQS for "undesignated waterways".

However, under Idaho's approved WQS, man-made waterways are not subject to the designated uses adopted for other unclassified waters. Rather, Idaho's WQS specifically provide that the designated uses for man-made waterways are the uses for which they were created. And EPA has expressly acknowledged this distinction. In response to Idaho's submittal of WQS in 1994, which included some existing and some new or revised standards, EPA initially rejected Idaho's unclassified waters provision and threatened to supersede it with its own, but stopped short of doing so when Idaho adopted rules to protect those waters with fishable and swimmable uses. In its July 31, 1997 final rulemaking, EPA specifically noted that man-made waterways "are not addressed by the state's excluded waters provision but rather protected under a different state provision." 72 FR 41176. EPA further noted that under that other state provision, the man-made waterways are protected "for the uses for which they were developed." *Id.*

EPA does not have authority under the Clean Water Act to apply new beneficial uses to an NPDES permit that are not part of (and, in fact, contradict) the current, EPA-approved WQS. A state's adopted WQS remain the applicable standards for purposes of the Act until EPA approves a change, deletion, or addition to the WQS or until EPA promulgates a more stringent WQS pursuant to Section 303 in the Act. 40 CFR § 131.21(c), (e).

To the extent EPA believes Idaho's WQS for man-made waterways must include protection for fishable and swimmable uses, and not just those uses for which the waterway was created, then EPA's opportunity to address that concern is set forth in Section 303 of the Act. At the permitting stage, the applicant must be held to the standard established in the current approved WQS.

Furthermore, it is not beneficial or necessary to protect for fishable and swimmable uses in the Purdam Drain. The drain does not provide fish habitat and recreation is prohibited.

In an April 16, 2005 Letter from DEQ to Mike Lidgard at EPA regarding Lactalis's original permit, DEQ relayed its determination of the designated and existing uses for Purdam Drain. See Attachment 3. DEQ explained that Purdam Drain is a man-made constructed waterway, which under Idaho's WQS is protected for the use for which it was developed, here – agriculture. DEQ further notes that Idaho's WQS require the protection of existing beneficial uses and therefore DEQ studied the Purdam Drain and similar sized but more-natural streams and determined that "there is no existing cold water aquatic life use in the drain." Attachment 3, p. 2.

Further, in a December 2007 Finding of No Significant Impact and Final Environmental Assessment (EA/FONSI) on the proposed transfer of certain U.S. Bureau of Reclamation (BOR) facilities to the Pioneer Irrigation District (PID), including portions of the Purdam Drain, BOR noted, "The federally-owned drains of the PID-drainage system were authorized under the Reclamation Act of 1902 for irrigation-related purposes… The authorized uses of the federally-owned drains of the PID-drainage system do not include public aspects as referenced above (i.e., nonreimburseable recreation, fish and wildlife enhancement, or flood control purposes)." See Attachment 4, p. 8. BOR further noted, "No fish species have been observed in the drainage segments proposed for transfer. … Overall, the seasonal nature of the irrigation generally prevents establishment of a permanent fisheries in water delivery and drainage system." Attachment 4, p. 24.

Change in Monitoring Location

Lactalis requests that EPA designate a new downstream surface water monitoring location that better reflects the actual and potential impacts of its effluent. We recommend a location a few hundred yards downstream of Lactalis's outfall at the location identified in Figure 16, on page 29 of the Surface Water Monitoring Report included in Attachment 1.

Anti-Backsliding

We do not believe that "anti-backsliding" regulations prohibit EPA from reissuing our permit with effluent limitations, standards, or conditions less stringent than the final limits contained in the previous permit given that the flows will increase and the concentrations will be the same. The anti-backsliding restriction does not apply when the circumstances on which the previous permit was based have materially changed since the permit was issued. We believe that Lactalis's large increase in average monthly wastewater flows is a material change in circumstances that provides a sufficient basis for EPA to increase our effluent limits.

Antidegradation

We believe that Lactalis is not degrading instream water quality, even in light of projected increases in average monthly flows and total phosphorus loadings. We are adding more water along with more total phosphorus, so the concentration of nutrients in our treated

wastewater does not increase. More importantly, Lactalis's treated effluent is consistently higher in quality than the water in the Purdam Drain, Mason Creek, and Lower Boise River. That is, Lactalis is discharging water that is diluting ambient nutrient concentrations in the receiving water. Because Lactalis would be discharging even higher quantities of cleaner-than-ambient water, the dilution effect would increase. Therefore, EPA could appropriately justify an increase in Lactalis's total phosphorus mass limit that would not violate the antidegradation policy.

Lactalis prepared and submitted to EPA a Surface Water Monitoring Report in 2010 to characterize the impact of our effluent on receiving waters. An updated report is included as Attachment 1. This report shows that background concentrations of total phosphorous in the Purdam Drain were, on average, 3.6 times greater than Lactalis's permitted discharge.

Permit Renewal Application

The enclosed permit renewal application includes the following materials:

- Form 1 – General Information
  - Figure 1 – Facility Site Map
- Form 2C – Existing Manufacturing, Commercial, Mining and Silviculture Operations
  - Figure 2a – Water Mass Balance for 2013
  - Figure 2b – Water Mass Balance for 2023
  - Figure 3 – Wastewater Treatment Facility Process Flow Diagram
  - Table 1. Production Volumes (1 page)
  - Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings (6 pages)
  - Table 3. Summary of Effluent Characteristics from May 2012 to April 2013 (1 Year Analysis) (3 pages)
  - Table 4. Summary of Effluent Characteristics from 2008 to 2013 (3 to 5 Year Analyses) (3 pages)
- Attachment 1. Surface Water Monitoring Report 2013
- Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location
- Attachment 3. April 16, 2005 DEQ letter regarding designated and existing uses in the Purdam Drain
- Attachment 4. December 2007 Finding of No Significant Impact and Final Environmental Assessment (EA/FONSI) on the proposed transfer of certain Bureau

of Reclamation (BOR) facilities to the Pioneer Irrigation District (PID) including portions of the Purdam Drain

- Attachment 5. CD of manipulatable Microsoft Excel files of Tables 1, 2 and 3

Effluent characteristics listed on Form 2C section V parts A and B show a summary of the maximum daily, maximum 30-day, and long-term average concentration and mass values for the various requested parameters. With the exception of Chemical Oxygen Demand (COD) and Total Organic Carbon (TOC), all values reported are reflective of parameter values reported to EPA in our monthly Discharge Monitoring Reports from May 2012 through April 2013. Because Lactalis does not routinely sample and analyze our effluent for COD and TOC, the presented data represent the results of an analysis performed in June 2013.

Lactalis desires to work with EPA in expediting the reissuance of our NPDES permit. As we have previously offered, we would be pleased to provide a tour of our Nampa facility. We are confident such a visit would increase the agency's understanding of our processes and commitment to protecting the Lower Boise River watershed. We believe it is critical that EPA and its permit writers have an opportunity to observe and recognize the man-made nature of the Purdam Drain in order to understand the significance of Idaho's WQS for man-made waterways. Please feel free to contact me (208-467-4424) or John Moeller at Forsgren Associates (208-342-3144) with any questions and comments you may have.

Sincerely,

Alban Damour
Plant Manager
Sorrento Lactalis, Inc.

cc: Barry Burnell, Idaho Department of Environmental Quality
Deborah Nelson, Givens Pursley LLP
John Moeller, Forsgren Associates, Inc.

Please print or type in the unshaded areas only. Form Approved. OMB No. 2040-0086.

FORM 1 GENERAL

EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY

GENERAL INFORMATION

Consolidated Permits Program

(Read the "General Instructions" before starting.)

I. EPA I.D. NUMBER

S		T/A	C
F	ID-002803-7		D
1	2 13	14	15

LABEL ITEMS	PLEASE PLACE LABEL IN THIS SPACE
I. EPA I.D. NUMBER	
III. FACILITY NAME	
V. FACILITY MAILING	
VI. FACILITY LOCATION	

GENERAL INSTRUCTIONS

If a preprinted label has been provided, affix it in the designated space. Review the information carefully; if any of it is incorrect, cross through it and enter the correct data in the appropriate fill-in area below. Also, if any of the preprinted data is absent *(the area to the left of the label space lists the information that should appear)*, please provide it in the proper fill-in area(s) below. If the label is complete and correct, you need not complete Items I, III, V, and VI *(except VI-B which must be completed regardless)*. Complete all items if no label has been provided. Refer to the instructions for detailed item descriptions and for the legal authorizations under which this data is collected.

II. POLLUTANT CHARACTERISTICS

INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of **bold-faced terms**.

SPECIFIC QUESTIONS	Mark "X" YES	NO	FORM ATTACHED	SPECIFIC QUESTIONS	Mark "X" YES	NO	FORM ATTACHED
A. Is this facility a **publicly owned treatment works** which results in a **discharge** to **waters of the U.S.**? (FORM 2A)		X		B. Does or will this facility *(either existing or proposed)* include a **concentrated animal feeding operation** or **aquatic animal production facility** which results in a **discharge** to **waters of the U.S.**? (FORM 2B)		X	
	16	17	18		19	20	21
C. Is this a facility which currently results in **discharges** to **waters of the U.S.** other than those described in A or B above? (FORM 2C)	X			D. Is this a proposed facility *(other than those described in A or B above)* which will result in a **discharge** to **waters of the U.S.**? (FORM 2D)		X	
	22	23	24		25	26	27
E. Does or will this facility treat, store, or dispose of **hazardous wastes**? (FORM 3)		X		F. Do you or will you inject at this facility industrial or municipal effluent below the lowermost stratum containing, within one quarter mile of the well bore, underground sources of drinking water? (FORM 4)		X	
	28	29	30		31	32	33
G. Do you or will you inject at this facility any produced water or other fluids which are brought to the surface in connection with conventional oil or natural gas production, inject fluids used for enhanced recovery of oil or natural gas, or inject fluids for storage of liquid hydrocarbons? (FORM 4)		X		H. Do you or will you inject at this facility fluids for special processes such as mining of sulfur by the Frasch process, solution mining of minerals, in situ combustion of fossil fuel, or recovery of geothermal energy? (FORM 4)		X	
	34	35	36		37	38	39
I. Is this facility a proposed **stationary source** which is one of the 28 industrial categories listed in the instructions and which will potentially emit 100 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an attainment area? (FORM 5)		X		J. Is this facility a proposed **stationary source** which is NOT one of the 28 industrial categories listed in the instructions and which will potentially emit 250 tons per year of any air pollutant regulated under the Clean Air Act and may affect or be located in an **attainment area**? (FORM 5)		X	
	40	41	42		43	44	45

III. NAME OF FACILITY

C 1 SKIP Sorrento Lactalis, Inc.

15 16 – 29 30 69

IV. FACILITY CONTACT

A. NAME & TITLE *(last, first, & title)*	B. PHONE *(area code & no.)*
C 2 Prigge, John, Wastewater Manager	(208) 463-6610
15 16 45	46 48 49 51 52- 55

V. FACILTY MAILING ADDRESS

A. STREET OR P.O. BOX

C 3 P.O. Box 1280

15 16 45

B. CITY OR TOWN	C. STATE	D. ZIP CODE
C 4 Nampa	ID	83650
15 16 40	41 42	47 51

VI. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

C 5 4912 Franklin Road

15 16 45

B. COUNTY NAME

Canyon

46 70

C. CITY OR TOWN	D. STATE	E. ZIP CODE	F. COUNTY CODE *(if known)*
C 6 Nampa	ID	83653	
15 16 40	41 42	47 51	52 -54

CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

VII. SIC CODES *(4-digit, in order of priority)*

A. FIRST	B. SECOND
7 2022 *(specify)* Natural Cheese	7 2023 *(specify)* Dry Whey Products
C. THIRD	**D. FOURTH**
7 2026 *(specify)* Cultured Cream Cheese	7 2021 *(specify)* Creamery Butter

VIII. OPERATOR INFORMATION

A. NAME: 8 Sorrento Lactalis, Inc.

B. Is the name listed in Item VIII-A also the owner? ☑ YES ☐ NO

C. STATUS OF OPERATOR *(Enter the appropriate letter into the answer box: if "Other," specify.)*

F = FEDERAL
S = STATE
P = PRIVATE
M = PUBLIC *(other than federal or state)*
O = OTHER *(specify)*

P *(specify)*

D. PHONE *(area code & no.)*: A (208) 463-6610

E. STREET OR P.O. BOX: P.O. Box 1280

F. CITY OR TOWN	G. STATE	H. ZIP CODE
B Nampa	ID	83653

IX. INDIAN LAND

Is the facility located on Indian lands? ☐ YES ☑ NO

X. EXISTING ENVIRONMENTAL PERMITS

	C	T	I	
A. NPDES *(Discharges to Surface Water)*	9	N		ID-002803-7
D. PSD *(Air Emissions from Proposed Sources)*	9	P		PTC0270071
B. UIC *(Underground Injection of Fluids)*	9	U		
E. OTHER *(specify)*	9			LA-000091-02
C. RCRA *(Hazardous Wastes)*	9	R		
E. OTHER *(specify)*	9			

(specify) Industrial Wastewater Resuse Permit for Land Application of Wastewater ID Dept. of Envionmental Quality

XI. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers, and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS *(provide a brief description)*

Dairy Manufacturing Facility Producing Natural (hard) Cheese, Cream Cheese, and Dry Whey Powder Concentrate.

Butter production anticipated to begin in 2017.

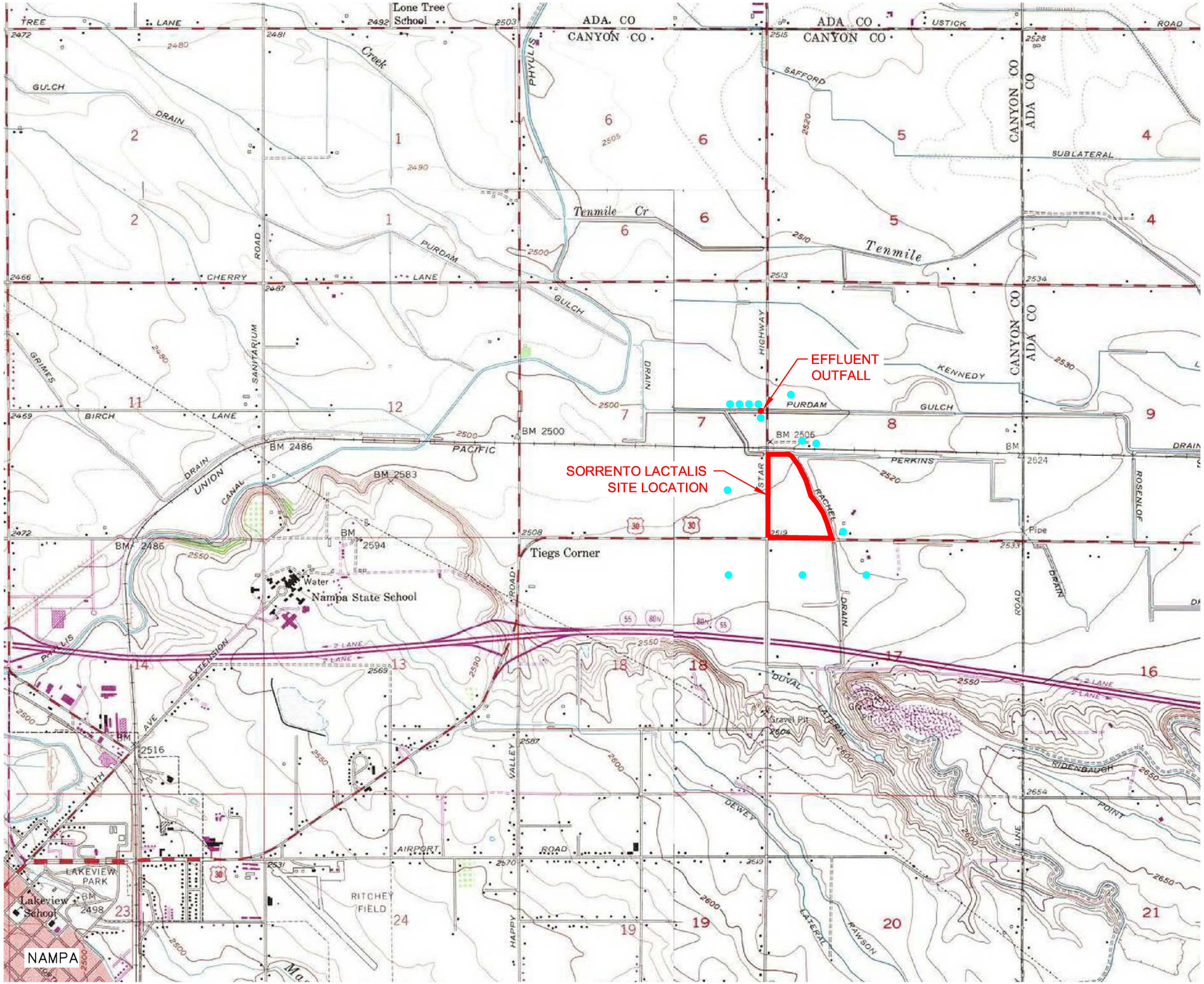
XIII. CERTIFICATION *(see instructions)*

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE *(type or print)*	B. SIGNATURE	C. DATE SIGNED
Alban Damour, Plant Manager		6/18/2013

COMMENTS FOR OFFICIAL USE ONLY

C



LEGEND

● DOMESTIC WATER WELL

GENERAL LOCATION (QUARTER-SECTION) OF DOMESTIC WATER WELLS IDENTIFIED FROM IDAHO DEPARTMENT OF WATER RESOURCES INTERNET MAP SERVER

N

2000 1000 0 2000

SCALE IN FEET

PROJECT NO. 0210023

FIGURE NO. 1

SORRENTO LACTALIS USA

FACILITY SITE MAP

FORSGREN Associates, Inc.
415 SOUTH 4TH STREET, BOISE, ID 83702
PH: 208.342.3144 FAX: 208.383.0819

P:\210023 - Sorrento WW Permitting\CADD\Submittal Drawings\Fig 1 Sorrento Site Map.dwg, 4/16/2010 11:33:03 AM, rb

Please print or type in the unshaded areas only.

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)
ID-002803-7

Form Approved.
OMB No. 2040-0086.
Approval expires 3-31-98.

FORM 2C NPDES

U.S. ENVIRONMENTAL PROTECTION AGENCY
APPLICATION FOR PERMIT TO DISCHARGE WASTEWATER
EXISTING MANUFACTURING, COMMERCIAL, MINING AND SILVICULTURE OPERATIONS
Consolidated Permits Program

I. OUTFALL LOCATION

For each outfall, list the latitude and longitude of its location to the nearest 15 seconds and the name of the receiving water.

A. OUTFALL NUMBER (*list*)	B. LATITUDE			C. LONGITUDE			D. RECEIVING WATER (*name*)
	1. DEG.	2. MIN.	3. SEC.	1. DEG.	2. MIN.	3. SEC.	
001	43.00	36.00	45.00	116.00	29.00	35.00	PURDAM DRAIN

II. FLOWS, SOURCES OF POLLUTION, AND TREATMENT TECHNOLOGIES

A. Attach a line drawing showing the water flow through the facility. Indicate sources of intake water, operations contributing wastewater to the effluent, and treatment units labeled to correspond to the more detailed descriptions in Item B. Construct a water balance on the line drawing by showing average flows between intakes, operations, treatment units, and outfalls. If a water balance cannot be determined (*e.g., for certain mining activities*), provide a pictorial description of the nature and amount of any sources of water and any collection or treatment measures.

B. For each outfall, provide a description of: (1) All operations contributing wastewater to the effluent, including process wastewater, sanitary wastewater, cooling water, and storm water runoff; (2) The average flow contributed by each operation; and (3) The treatment received by the wastewater. Continue on additional sheets if necessary.

1. OUT-FALL NO. (*list*)	2. OPERATION(S) CONTRIBUTING FLOW		3. TREATMENT		
	a. OPERATION (*list*)	b. AVERAGE FLOW (*include units*)	a. DESCRIPTION	b. LIST CODES FROM TABLE 2C-1	
001	ALL PLANT PROCESS WASTEWATER	869,500 GALLONS PER DAY	SCREENING, ACTIVATED SLUDGE (SEQUENCING BATCH REACTORS), CHEMICAL ADDITION, TERTIARY	1-T	3-A
	EXCLUSIVE OF SANITARY (DOMESTIC)	(1.52 MGD FUTURE AVERAGE FLOW	CLARIFICATION, CONTINUOUS SAND FILTRATION, UV DISINFECTION, FLOCCULATION (FOR DAF TANK)	2-D	1-U
	WASTEWATER	SEE APPLICATION LETTER FOR	SLUDGE DEWATERING (BELT FILTER)	1-P	2-H
		FUTURE GROWTH PLANS)		4-A	5-L
				5-H	5-G
				1-G	

OFFICIAL USE ONLY (*effluent guidelines sub-categories*)

CONTINUED FROM THE FRONT

C. Except for storm runoff, leaks, or spills, are any of the discharges described in Items II-A or B intermittent or seasonal?

☐ YES (*complete the following table*) ☐ NO (*go to Section III*)

1. OUTFALL NUMBER (*list*)	2. OPERATION(*s*) CONTRIBUTING FLOW (*list*)	3. FREQUENCY		4. FLOW				
		a. DAYS PER WEEK (*specify average*)	b. MONTHS PER YEAR (*specify average*)	a. FLOW RATE (*in mgd*)		B. TOTAL VOLUME (*specify with units*)		C. DURATION (*in days*)
				1. LONG TERM AVERAGE	2. MAXIMUM DAILY	1. LONG TERM AVERAGE	2. MAXIMUM DAILY	

III. PRODUCTION

A. Does an effluent guideline limitation promulgated by EPA under Section 304 of the Clean Water Act apply to your facility?

☐ YES (*complete Item III-B*) ☐ NO (*go to Section IV*)

B. Are the limitations in the applicable effluent guideline expressed in terms of production (*or other measure of operation*)?

☐ YES (*complete Item III-C*) ☐ NO (*go to Section IV*)

C. If you answered "yes" to Item III-B, list the quantity which represents an actual measurement of your level of production, expressed in the terms and units used in the applicable effluent guideline, and indicate the affected outfalls.

1. AVERAGE DAILY PRODUCTION			2. AFFECTED OUTFALLS (*list outfall numbers*)
a. QUANTITY PER DAY	b. UNITS OF MEASURE	c. OPERATION, PRODUCT, MATERIAL, ETC. (*specify*)	

IV. IMPROVEMENTS

A. Are you now required by any Federal, State or local authority to meet any implementation schedule for the construction, upgrading or operations of wastewater treatment equipment or practices or any other environmental programs which may affect the discharges described in this application? This includes, but is not limited to, permit conditions, administrative or enforcement orders, enforcement compliance schedule letters, stipulations, court orders, and grant or loan conditions.

☐ YES (*complete the following table*) ☐ NO (*go to Item IV-B*)

1. IDENTIFICATION OF CONDITION, AGREEMENT, ETC.	2. AFFECTED OUTFALLS		3. BRIEF DESCRIPTION OF PROJECT	4. FINAL COMPLIANCE DATE	
	a. NO.	b. SOURCE OF DISCHARGE		a. REQUIRED	b. PROJECTED

B. OPTIONAL: You may attach additional sheets describing any additional water pollution control programs (*or other environmental projects which may affect your discharges*) you now have underway or which you plan. Indicate whether each program is now underway or planned, and indicate your actual or planned schedules for construction.

☐ MARK "X" IF DESCRIPTION OF ADDITIONAL CONTROL PROGRAMS IS ATTACHED

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)

CONTINUED FROM PAGE 2

V. INTAKE AND EFFLUENT CHARACTERISTICS

A, B, & C: See instructions before proceeding – Complete one set of tables for each outfall – Annotate the outfall number in the space provided.
NOTE: Tables V-A, V-B, and V-C are included on separate sheets numbered V-1 through V-9.

D. Use the space below to list any of the pollutants listed in Table 2c-3 of the instructions, which you know or have reason to believe is discharged or may be discharged from any outfall. For every pollutant you list, briefly describe the reasons you believe it to be present and report any analytical data in your possession.

1. POLLUTANT	2. SOURCE	1. POLLUTANT	2. SOURCE

VI. POTENTIAL DISCHARGES NOT COVERED BY ANALYSIS

Is any pollutant listed in Item V-C a substance or a component of a substance which you currently use or manufacture as an intermediate or final product or byproduct?

☐ YES (*list all such pollutants below*) ☐ NO (*go to Item VI-B*)

NONE

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CONTINUED FROM THE FRONT

VII. BIOLOGICAL TOXICITY TESTING DATA

Do you have any knowledge or reason to believe that any biological test for acute or chronic toxicity has been made on any of your discharges or on a receiving water in relation to your discharge within the last 3 years?

☐ YES (*identify the test(s) and describe their purposes below*) ☐ NO (*go to Section VIII*)

VIII. CONTRACT ANALYSIS INFORMATION

Were any of the analyses reported in Item V performed by a contract laboratory or consulting firm?

☐ YES (*list the name, address, and telephone number of, and pollutants analyzed by, each such laboratory or firm below*) ☐ NO (*go to Section IX*)

A. NAME	B. ADDRESS	C. TELEPHONE (*area code & no.*)	D. POLLUTANTS ANALYZED (*list*)
[illegible] LABORATORIES, INC.	BOISE, IDAHO 83703		TOC TSS AMMONIA (AS N) pH NITRATE+NITRITE (AS N) TOTAL PHOSPHATE AS P

IX. CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

A. NAME & OFFICIAL TITLE (*type or print*)	B. PHONE NO. (*area code & no.*)
C. SIGNATURE	D. DATE SIGNED

Plant Mananger

PLEASE PRINT OR TYPE IN THE UNSHADED AREAS ONLY. You may report some or all of this information on separate sheets (*use the same format*) instead of completing these pages.
SEE INSTRUCTIONS.

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)
ID-002803-7

V. INTAKE AND EFFLUENT CHARACTERISTICS *(continued from page 3 of Form 2-C)*

OUTFALL NO.
001

PART A –You must provide the results of at least one analysis for every pollutant in this table. Complete one table for each outfall. See instructions for additional details.

1. POLLUTANT	2. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (*if available*) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (*if available*) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	3. UNITS (*specify if blank*) a. CONCEN-TRATION	b. MASS	4. INTAKE (*optional*) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
a. Biochemical Oxygen Demand (*BOD*)	9.0	53.3	4.2	25.4	3.1	18.2	58	MG/L	LBS/D			
b. Chemical Oxygen Demand (*COD*)	20.9	121.5						MG/L	LBS/D			
c. Total Organic Carbon (*TOC*)	3.86	22.43						MG/L	LBS/D			
d. Total Suspended Solids (*TSS*)	17.0	96.1	7.8	43.5	4.3	24.5	59	MG/L	LBS/D			
e. Ammonia (*as N*)	1.29	7.57	--	--	0.41	2.42	12	MG/L	LBS/D			
f. Flow	VALUE 0.7692		VALUE 0.7292		VALUE 0.6809		365	MGD		VALUE		
g. Temperature (*winter*)	VALUE 23		VALUE 21		VALUE 20		90	°C		VALUE		
h. Temperature (*summer*)	VALUE 28		VALUE 26		VALUE 25		92	°C		VALUE		
i. pH	MINIMUM 6.50	MAXIMUM 7.73	MINIMUM 6.80	MAXIMUM 7.25			365	STANDARD UNITS				

PART B – Mark "X" in column 2-a for each pollutant you know or have reason to believe is present. Mark "X" in column 2-b for each pollutant you believe to be absent. If you mark column 2a for any pollutant which is limited either directly, or indirectly but expressly, in an effluent limitations guideline, you must provide the results of at least one analysis for that pollutant. For other pollutants for which you mark column 2a, you must provide quantitative data or an explanation of their presence in your discharge. Complete one table for each outfall. See the instructions for additional details and requirements.

1. POLLUTANT AND CAS NO. (*if available*)	2. MARK "X" a. BELIEVED PRESENT	b. BELIEVED ABSENT	3. EFFLUENT a. MAXIMUM DAILY VALUE (1) CONCENTRATION	(2) MASS	b. MAXIMUM 30 DAY VALUE (*if available*) (1) CONCENTRATION	(2) MASS	c. LONG TERM AVRG. VALUE (*if available*) (1) CONCENTRATION	(2) MASS	d. NO. OF ANALYSES	4. UNITS a. CONCEN-TRATION	b. MASS	5. INTAKE (*optional*) a. LONG TERM AVERAGE VALUE (1) CONCENTRATION	(2) MASS	b. NO. OF ANALYSES
a. Bromide (24959-67-9)		X												
b. Chlorine, Total Residual		X												
c. Color		X												
d. Fecal Coliform		X												
e. Fluoride (16984-48-8)		X												
f. Nitrate-Nitrite (*as N*)	X		8.50	52.23	--	--	2.95	17.57	12	MG/L	LBS/D			

CONTINUE ON REVERSE

ITEM V-B CONTINUED FROM FRONT

1. POLLUTANT AND CAS NO. (*if available*)	2. MARK "X"		3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. BELIEVED PRESENT	b. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
			(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
g. Nitrogen, Total Organic (*as N*)		X												
h. Oil and Grease		X												
i. Phosphorus (as P), Total (7723-14-0)	X													
j. Radioactivity														
(1) Alpha, Total														
(2) Beta, Total														
(3) Radium, Total														
(4) Radium 226, Total														
k. Sulfate (*as* SO_4) (14808-79-8)														
l. Sulfide (*as S*)														
m. Sulfite (*as* SO_3) (14265-45-3)														
n. Surfactants														
o. Aluminum, Total (7429-90-5)														
p. Barium, Total (7440-39-3)														
q. Boron, Total (7440-42-8)														
r. Cobalt, Total (7440-48-4)														
s. Iron, Total (7439-89-6)														
t. Magnesium, Total (7439-95-4)														
u. Molybdenum, Total (7439-98-7)														
v. Manganese, Total (7439-96-5)														
w. Tin, Total (7440-31-5)														
x. Titanium, Total (7440-32-6)														

 CONTINUE ON PAGE V-3

00100280 3-7

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)	OUTFALL NUMBER

CONTINUED FROM PAGE 3 OF FORM 2-C

PART C - If you are a primary industry and this outfall contains process wastewater, refer to Table 2c-2 in the instructions to determine which of the GC/MS fractions you must test for. Mark "X" in column 2-a for all such GC/MS fractions that apply to your industry and for ALL toxic metals, cyanides, and total phenols. If you are not required to mark column 2-a (*secondary industries, nonprocess wastewater outfalls, and nonrequired GC/MS fractions*), mark "X" in column 2-b for each pollutant you know or have reason to believe is present. Mark "X" in column 2-c for each pollutant you believe is absent. If you mark column 2a for any pollutant, you must provide the results of at least one analysis for that pollutant. If you mark column 2b for any pollutant, you must provide the results of at least one analysis for that pollutant if you know or have reason to believe it will be discharged in concentrations of 10 ppb or greater. If you mark column 2b for acrolein, acrylonitrile, 2,4 dinitrophenol, or 2-methyl-4, 6 dinitrophenol, you must provide the results of at least one analysis for each of these pollutants which you know or have reason to believe that you discharge in concentrations of 100 ppb or greater. Otherwise, for pollutants for which you mark column 2b, you must either submit at least one analysis or briefly describe the reasons the pollutant is expected to be discharged. Note that there are 7 pages to this part; please review each carefully. Complete one table (*all 7 pages*) for each outfall. See instructions for additional details and requirements.

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
METALS, CYANIDE, AND TOTAL PHENOLS															
1M. Antimony, Total (7440-36-0)															
2M. Arsenic, Total (7440-38-2)															
3M. Beryllium, Total (7440-41-7)															
4M. Cadmium, Total (7440-43-9)															
5M. Chromium, Total (7440-47-3)															
6M. Copper, Total (7440-50-8)															
7M. Lead, Total (7439-92-1)															
8M. Mercury, Total (7439-97-6)															
9M. Nickel, Total (7440-02-0)															
10M. Selenium, Total (7782-49-2)															
11M. Silver, Total (7440-22-4)															
12M. Thallium, Total (7440-28-0)															
13M. Zinc, Total (7440-66-6)															
14M. Cyanide, Total (57-12-5)															
15M. Phenols, Total															
DIOXIN															
2,3,7,8-Tetra-chlorodibenzo-P-Dioxin (1764-01-6)				DESCRIBE RESULTS											

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – VOLATILE COMPOUNDS															
1V. Accrolein (107-02-8)															
2V. Acrylonitrile (107-13-1)															
3V. Benzene (71-43-2)															
4V. Bis (*Chloro-methyl*) Ether (542-88-1)															
5V. Bromoform (75-25-2)															
6V. Carbon Tetrachloride (56-23-5)															
7V. Chlorobenzene (108-90-7)															
8V. Chlorodi-bromomethane (124-48-1)															
9V. Chloroethane (75-00-3)															
10V. 2-Chloro-ethylvinyl Ether (110-75-8)															
11V. Chloroform (67-66-3)															
12V. Dichloro-bromomethane (75-27-4)															
13V. Dichloro-difluoromethane (75-71-8)															
14V. 1,1-Dichloro-ethane (75-34-3)															
15V. 1,2-Dichloro-ethane (107-06-2)															
16V. 1,1-Dichloro-ethylene (75-35-4)															
17V. 1,2-Dichloro-propane (78-87-5)															
18V. 1,3-Dichloro-propylene (542-75-6)															
19V. Ethylbenzene (100-41-4)															
20V. Methyl Bromide (74-83-9)															
21V. Methyl Chloride (74-87-3)															

 CONTINUE ON PAGE V-5

CONTINUED FROM PAGE V-4

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – VOLATILE COMPOUNDS (*continued*)															
22V. Methylene Chloride (75-09-2)															
23V. 1,1,2,2-Tetrachloroethane (79-34-5)															
24V. Tetrachloro-ethylene (127-18-4)															
25V. Toluene (108-88-3)															
26V. 1,2-Trans-Dichloroethylene (156-60-5)															
27V. 1,1,1-Trichloro-ethane (71-55-6)															
28V. 1,1,2-Trichloro-ethane (79-00-5)															
29V Trichloro-ethylene (79-01-6)															
30V. Trichloro-fluoromethane (75-69-4)															
31V. Vinyl Chloride (75-01-4)															
GC/MS FRACTION – ACID COMPOUNDS															
1A. 2-Chlorophenol (95-57-8)															
2A. 2,4-Dichloro-phenol (120-83-2)															
3A. 2,4-Dimethyl-phenol (105-67-9)															
4A. 4,6-Dinitro-O-Cresol (534-52-1)															
5A. 2,4-Dinitro-phenol (51-28-5)															
6A. 2-Nitrophenol (88-75-5)															
7A. 4-Nitrophenol (100-02-7)															
8A. P-Chloro-M-Cresol (59-50-7)															
9A. Pentachloro-phenol (87-86-5)															
10A. Phenol (108-95-2)															
11A. 2,4,6-Trichloro-phenol (88-05-2)															

 CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS															
1B. Acenaphthene (83-32-9)															
2B. Acenaphtylene (208-96-8)															
3B. Anthracene (120-12-7)															
4B. Benzidine (92-87-5)															
5B. Benzo (*a*) Anthracene (56-55-3)															
6B. Benzo (*a*) Pyrene (50-32-8)															
7B. 3,4-Benzo-fluoranthene (205-99-2)															
8B. Benzo (*ghi*) Perylene (191-24-2)															
9B. Benzo (*k*) Fluoranthene (207-08-9)															
10B. Bis (*2-Chloro-ethoxy*) Methane (111-91-1)															
11B. Bis (*2-Chloro-ethyl*) Ether (111-44-4)															
12B. Bis (*2-Chloroisopropyl*) Ether (102-80-1)															
13B. Bis (*2-Ethyl-hexyl*) Phthalate (117-81-7)															
14B. 4-Bromophenyl Phenyl Ether (101-55-3)															
15B. Butyl Benzyl Phthalate (85-68-7)															
16B. 2-Chloro-naphthalene (91-58-7)															
17B. 4-Chloro-phenyl Phenyl Ether (7005-72-3)															
18B. Chrysene (218-01-9)															
19B. Dibenzo (*a,h*) Anthracene (53-70-3)															
20B. 1,2-Dichloro-benzene (95-50-1)															
21B. 1,3-Di-chloro-benzene (541-73-1)															

 CONTINUE ON PAGE V-7

CONTINUED FROM PAGE V-6

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (*continued*)															
22B. 1,4-Dichloro-benzene (106-46-7)															
23B. 3,3-Dichloro-benzidine (91-94-1)															
24B. Diethyl Phthalate (84-66-2)															
25B. Dimethyl Phthalate (131 -11-3)															
26B. Di-N-Butyl Phthalate (84-74-2)															
27B. 2,4-Dinitro-toluene (121-14-2)															
28B. 2,6-Dinitro-toluene (606-20-2)															
29B. Di-N-Octyl Phthalate (117-84-0)															
30B. 1,2-Diphenyl-hydrazine (*as Azo-benzene*) (122-66-7)															
31B. Fluoranthene (206-44-0)															
32B. Fluorene (86-73-7)															
33B. Hexachloro-benzene (118-74-1)															
34B. Hexachloro-butadiene (87-68-3)															
35B. Hexachloro-cyclopentadiene (77-47-4)															
36B Hexachloro-ethane (67-72-1)															
37B. Indeno (*1,2,3-cd*) Pyrene (193-39-5)															
38B. Isophorone (78-59-1)															
39B. Naphthalene (91-20-3)															
40B. Nitrobenzene (98-95-3)															
41B. N-Nitro-sodimethylamine (62-75-9)															
42B. N-Nitrosodi-N-Propylamine (621-64-7)															

 CONTINUE ON REVERSE

CONTINUED FROM THE FRONT

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – BASE/NEUTRAL COMPOUNDS (*continued*)															
43B. N-Nitro-sodiphenylamine (86-30-6)															
44B. Phenanthrene (85-01-8)															
45B. Pyrene (129-00-0)															
46B. 1,2,4-Tri-chlorobenzene (120-82-1)															
GC/MS FRACTION – PESTICIDES															
1P. Aldrin (309-00-2)															
2P. α-BHC (319-84-6)															
3P. β-BHC (319-85-7)															
4P. γ-BHC (58-89-9)															
5P. δ-BHC (319-86-8)															
6P. Chlordane (57-74-9)															
7P. 4,4'-DDT (50-29-3)															
8P. 4,4'-DDE (72-55-9)															
9P. 4,4'-DDD (72-54-8)															
10P. Dieldrin (60-57-1)															
11P. α-Enosulfan (115-29-7)															
12P. β-Endosulfan (115-29-7)															
13P. Endosulfan Sulfate (1031-07-8)															
14P. Endrin (72-20-8)															
15P. Endrin Aldehyde (7421-93-4)															
16P. Heptachlor (76-44-8)															

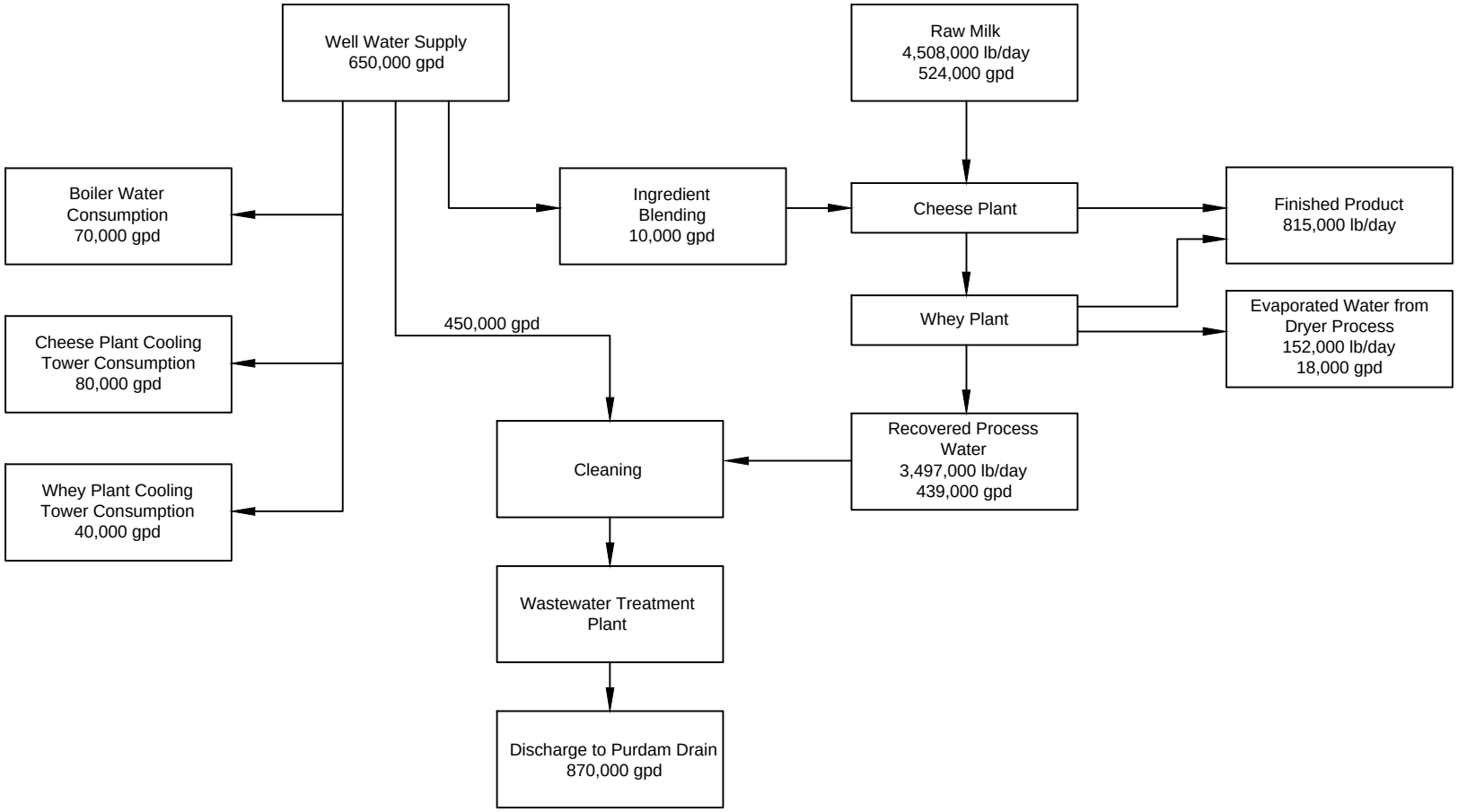
 CONTINUE ON PAGE V-9

001ID-002803-7

EPA I.D. NUMBER (*copy from Item 1 of Form 1*)	OUTFALL NUMBER

CONTINUED FROM PAGE V-8

1. POLLUTANT AND CAS NUMBER (*if available*)	2. MARK "X"			3. EFFLUENT							4. UNITS		5. INTAKE (*optional*)		
	a. TESTING REQUIRED	b. BELIEVED PRESENT	c. BELIEVED ABSENT	a. MAXIMUM DAILY VALUE		b. MAXIMUM 30 DAY VALUE (*if available*)		c. LONG TERM AVRG. VALUE (*if available*)		d. NO. OF ANALYSES	a. CONCEN-TRATION	b. MASS	a. LONG TERM AVERAGE VALUE		b. NO. OF ANALYSES
				(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS	(1) CONCENTRATION	(2) MASS				(1) CONCENTRATION	(2) MASS	
GC/MS FRACTION – PESTICIDES (*continued*)															
17P. Heptachlor Epoxide (1024-57-3)															
18P. PCB-1242 (53469-21-9)															
19P. PCB-1254 (11097-69-1)															
20P. PCB-1221 (11104-28-2)															
21P. PCB-1232 (11141-16-5)															
22P. PCB-1248 (12672-29-6)															
23P. PCB-1260 (11096-82-5)															
24P. PCB-1016 (12674-11-2)															
25P. Toxaphene (8001-35-2)															



DATA SOURCE: SORRENTO LACTALIS, INC. JUNE 18, 2013

FORSGREN Associates Inc.

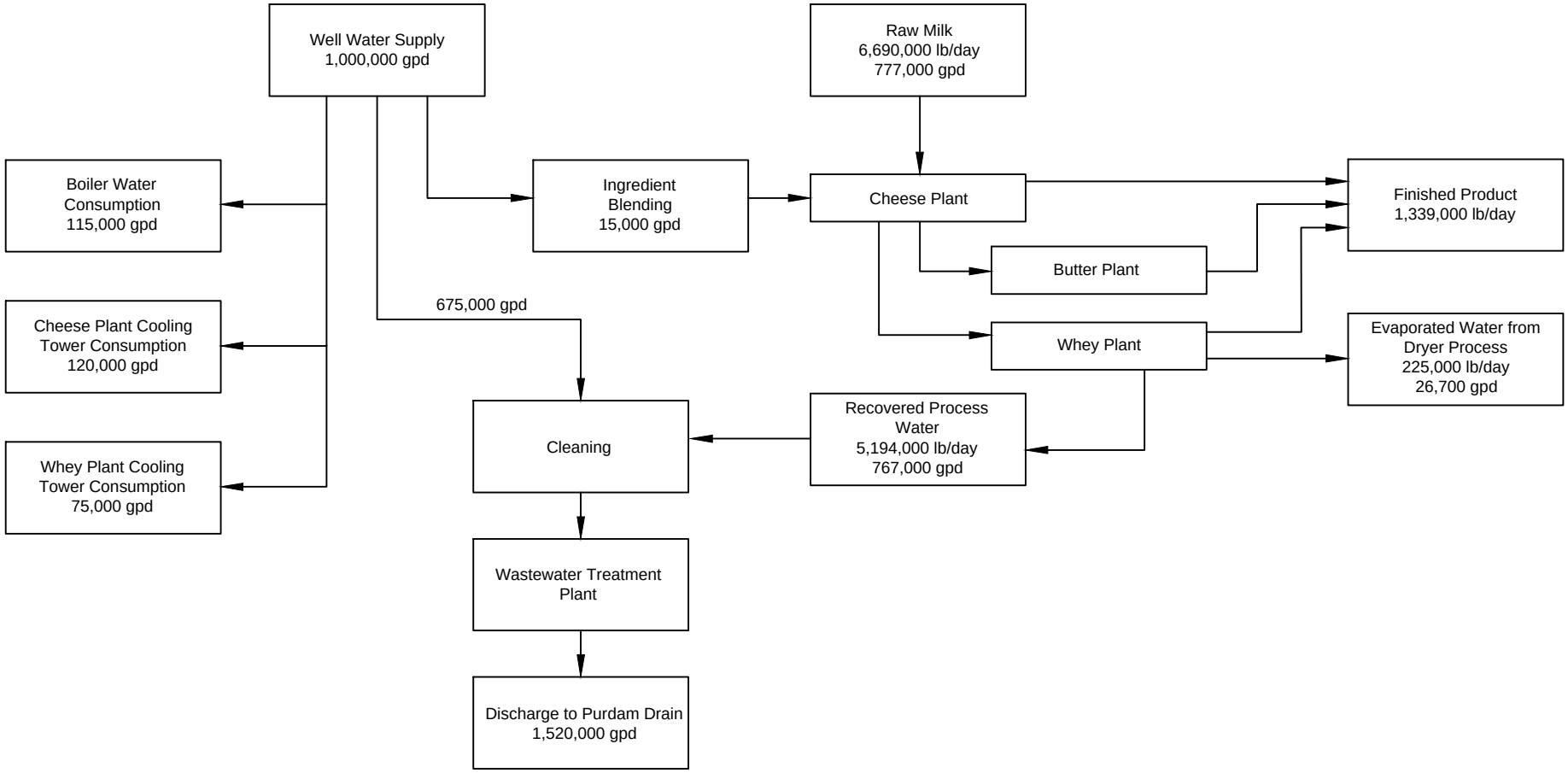
SORRENTO LACTALIS, INC. - NAMPA FACILITY

PROJECTED WATER MASS BALANCE FOR 2013

PROJECT NO. 0213056

SHEET NO. 2a

P:\213056 – Sorrento WW Permitting\CADD\Submittal Drawings\2013 Sorrento Water Mass Balance.dwg 6/18/2013 10:06 AM



DATA SOURCE: SORRENTO LACTALIS, INC. JUNE 18, 2013

FORSGREN Associates Inc.

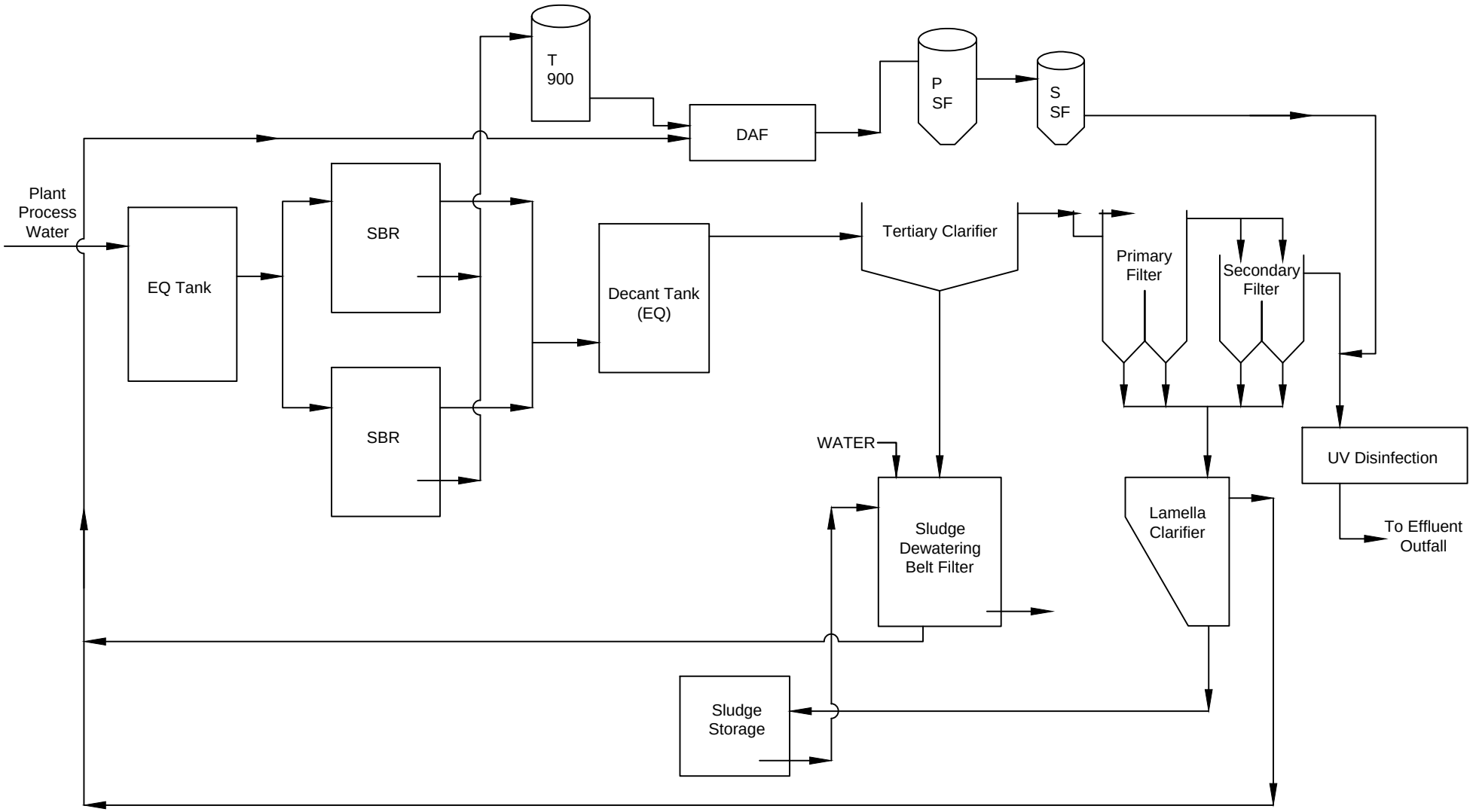
SORRENTO LACTALIS, INC. - NAMPA FACILITY

PROJECTED WATER MASS BALANCE FOR 2023

PROJECT NO. 0213056

SHEET NO. 2b

P:\213056 – Sorrento WW Permitting\CADD\Submittal Drawings\2023 Sorrento Water Mass Balance.dwg 6/18/2013 1:31 PM



DATA SOURCE: SORRENTO LACTALIS, INC. MAY 29, 2013

FORSGREN Associates Inc.	SORRENTO LACTALIS, INC. - NAMPA FACILITY	PROJECT NO. 0213056
	WWTP PROCESS FLOW DIAGRAM	FIGURE NO. 3

Sorrento Lactalis Nampa WWTP
Table 1. Production Values from 2010 to 2023 (in 1000 lbs)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
	Real	Real	Real	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast	forecast
Cheese Only	170,203	175,906	188,024	205,714	231,582	251,282	264,200	275,500	285,000	291,000	297,000	298,000	300,000	315,000
Butter only								35,000	36,207	36,969	37,731	37,858	38,113	40,018
Whey only	14,683	69,745	79,865	83,524	91,435	96,427	101,256	105,480	109,031	111,274	113,516	113,890	114,638	120,245
Total site	184,886	245,651	267,889	289,238	323,017	347,709	365,456	415,980	430,238	439,243	448,248	449,749	452,750	475,263
Total Site w/out down days (lbs/day)	520,805	691,975	754,616	814,755	909,906	979,462	1,029,453	1,171,774	1,211,937	1,237,303	1,262,670	1,266,897	1,275,353	1,338,768
TOTAL Mozzarella	100,817	101,526	110,000	114,000	126,851	126,851	130,000	135,000	137,000	139,000	140,000	140,000	141,000	148,000
FRESH MOZZARELLA	5,042	6,608	7,000	14,000	22,600	38,000	39,000	40,000	40,000	40,000	43,000	44,000	45,000	45,000
TOTAL String	30,282	28,261	29,520	30,470	30,331	30,331	34,000	37,000	40,000	40,000	42,000	42,000	42,000	42,000
TOTAL Cut & Wrap	4,941	5,360	5,236	5,966	6,000	6,100	6,200	6,500	7,000	7,000	7,000	7,000	7,000	7,000
TOTAL Shred	27,678	32,531	34,908	39,478	41,000	44,000	48,000	50,000	52,000	56,000	56,000	56,000	56,000	56,000
TOTAL Mascarpone + cream cheese	1,442	1,621	1,360	1,800	4,800	6,000	7,000	7,000	9,000	9,000	9,000	9,000	9,000	17,000
TOTAL BUTTER								35,000	36,207	36,969	37,731	37,858	38,113	40,018
TOTAL Whey	14,683	69,745	79,865	83,524	91,435	96,427	101,256	105,480	109,031	111,274	113,516	113,890	114,638	120,245
WPC80	8,527	8,944	7,556	8,837	9,669	10,298	10,827	11,290	11,679	11,925	12,171	12,212	12,294	12,909
Permeate Powder	2,915	60,318	69,920	72,187	79,266	83,630	87,929	91,690	94,851	96,848	98,845	99,178	99,844	104,836
SWP	3,241	483	2,388	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500
Milk supply to the plant (klbs)	1,371,161	1,426,318	1,464,533	1,600,544	1,815,797	1,971,337	2,050,300	2,141,200	2,191,700	2,211,900	2,272,500	2,282,600	2,302,800	2,373,500
Milk supply to the plant w/out down days (lbs/day)	3,862,426	4,017,797	4,125,446	4,508,575	5,114,921	5,553,063	5,775,493	6,031,549	6,173,803	6,230,704	6,401,408	6,429,859	6,486,761	6,685,915
Milk supply to the plant w/out down days (gpd)*	449,119	467,186	479,703	524,253	594,758	645,705	671,569	701,343	717,884	724,500	744,350	747,658	754,274	777,432
Influent flow 1000 G	249,000	253,000	279,000	308,676	352,351	387,227	410,060	458,829	469,650	481,878	500,491	508,150	520,871	539,689
Influent flow per day w/out down days (gpd)	701,408	712,676	785,915	869,511	992,538	1,090,780	1,155,099	1,292,475	1,322,958	1,357,403	1,409,834	1,431,409	1,467,243	1,520,250
Influent flow per day w/out down days (MGD)	0.70	0.71	0.79	0.87	0.99	1.09	1.16	1.29	1.32	1.36	1.41	1.43	1.47	1.52
ratio lbs influent/lbs of milk	1.53	1.49	1.60	1.62	1.63	1.65	1.68	1.80	1.80	1.83	1.85	1.87	1.90	1.91

butter operations starts in 2017

Notes:

1. Standard Milk to Gallons = 8.6 lbs per gallon
2. Influent flow is anticipated to match effluent flows from Outfall 001

Sorrento Lactalis Nampa WWTP

Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings

Flow

Existing NPDES Permit Limits	Recent Effluent Characteristics - Past Year and Past 5 Years				Flow Estimates for 2023				Monitoring Requirements	
Flow	**Past Year Data (May 2012 to April 2013) for Flow**				**Flow**					
Average Flow	Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses	Flow*	Average Monthly	Maximum Daily	Instantaneous Maximum	Sample Frequency	Sample Type
mgd	mgd	mgd	mgd		mgd	mgd	mgd	mgd	continuous	recording
0.50	0.77	0.73	0.68	365	1.52	--	--	--		
	Past 5 Years Data (May 2008 to April 2013) for Flow									
	Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses						
	mgd	mgd	mgd							
	0.98	0.73	0.60	1826						

Average flow of 0.50 MGD used to calculate effluent limits in existing NPDES permit.

* Anticipated effluent flow included to calculate loadings in Microsoft Excel. This flow amount can be changed in Excel to calculate different loading amounts.

Phosphorus

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 3 Years							Loadings Based on Anticipated Flow Estimates for 2023							Monitoring Requirements	
Total Phosphorus as P							**Past Year Data (May 2012 to April 2013) for Phosphorus**							**Total Phosphorus as P**								
Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day**	mg/L	lbs/day**	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	monthly	24-hour composite
0.50	0.070	0.29	0.14	0.58	--	--	0.034	0.210	--	--	0.023	0.139	12	1.52	0.070	0.89	0.14	1.77	--	--		
							Past 3 Years Data (May 2010 to April 2013) for Phosphorus															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day										
							0.142	0.783	0.088	0.482	0.032	0.172	39									

* Effluent flow is not a permit limit. It is the average flow used by EPA to calculate loadings in the permit.

** The loading amounts above are calculated in Microsoft Excel based on flow amount and concentration values.

* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.

<-- Phosphorus summary includes only 3 years of data following the EPA implementation of 0.07 mg/L and 0.29 lbs/day permit limits on May 1, 2010.

BOD

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 5 Years							Loadings Based on Anticipated Flow Estimates for 2023							Monitoring Requirements	
BOD_5							**Past Year Data (May 2012 to April 2013) for BOD_5**							**BOD_5**								
Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day	mg/L	lbs/day**	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	weekly	24-hour composite
0.50	10	42	20	84	--	--	9	53.3	4.2	25.4	3.1	18.2	58	1.52	10	127	20	254	--	--		
							Past 5 Years Data (May 2008 to April 2013) for BOD_5															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day										
							9	53.3	4.5	25.4	2.8	15.4	273									

* Effluent flow is not a permit limit. It is the average flow used by EPA to calculate loading in the permit.

** For BOD_5, the max permit limit is 84 lbs/day. If the conversion is done in Microsoft Excel the amount is 83.4 lbs/day.

* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.

Sorrento Lactalis Nampa WWTP
Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings

Temperature

Existing NPDES Permit Limits				Recent Effluent Characteristics - Past Year and Past 4 Years				Anticipated Effluent Temperature Based on Data from 2009 to 2013				Monitoring Requirements	
Temperature				Past Year Data (May 2012 to April 2013) for Temperature				Temperature					
Winter (Jan., Feb., March)				Winter (Jan., Feb., March)				Winter (Jan., Feb., March)					
	Average Monthly	Maximum Daily	Instantaneous Maximum	Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses		Average Monthly	Maximum Daily	Instantaneous Maximum	Sample Frequency	Sample Type
	°C	°C	°C	°C	°C	°C			°C	°C	°C	weekly	grab
	--	--	--	23	20.9	20.3	90		22.9	27.0	--		
Summer (July, Aug., Sept.)				Summer (July, Aug., Sept.)				Summer (July, Aug., Sept.)					
	Average Monthly	Maximum Daily	Instantaneous Maximum	Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses		Average Monthly	Maximum Daily	Instantaneous Maximum		
	°C	°C	°C	°C	°C	°C			°C	°C	°C		
	--	--	--	28	26.3	24.9	92		26.1	29.0	--		
				Past 4 Years Data (Nov. 2009 to April 2013) for Temperature									
				Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses						
				°C	°C	°C							
				27	26.0	**22.9**	308						
				Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses	<-- Temperature summary is based on data from the past 4 years. Data from a fifth year (2008) has been excluded because measurements were taken using faulty equipment.					
				°C	°C	°C							
No limits for temperature in existing NPDES permit.				**29**	27.1	**26.1**	276						

TSS

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 5 Years							Loadings Based on Anticipated Flow Estimates for 2023							Monitoring Requirements	
TSS							Past Year Data (May 2012 to April 2013) for TSS							TSS								
Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day**	mg/L	lbs/day**	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	weekly	24-hour composite
0.50	13	53	25	106	--	--	17	96.1	7.8	43.5	4.3	24.5	59	1.52	13	165	25	317	--	--		
							Past 5 Years Data (May 2008 to April 2013) for TSS															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day										
							17	96.1	7.8	43.5	4.1	22.3	281									

* Effluent flow is not a permit limit. It is the average flow used by EPA to calculate loading in the permit.

** For TSS, the permit limits are 53 lbs/day and 106 lbs/day. If the conversion is done in Microsoft Excel the amounts are 54.2 lbs/day and 104.3 lbs/day.

* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.

Sorrento Lactalis Nampa WWTP
Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings

E. Coli

Existing NPDES Permit Limits			
E. Coli			
	Average Monthly	Maximum Daily	Instantaneous Maximum
	#/100ml	#/100ml	#/100ml
	126	--	406

Existing permit limits for E. Coli not based on flow, and did not include a Maximum Daily limit.

Recent Effluent Characteristics - Past Year and Past 5 Years			
Past Year Data (May 2012 to April 2013) for E. Coli			
Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses
#/100ml	#/100ml	#/100ml	
46	11.4	3.1	61
Past 5 Years Data (May 2008 to April 2013) for E. Coli			
Maximum Daily Value	Maximum 30 Day Value	Long Term Average Value	No. of Analyses
#/100ml	#/100ml	#/100ml	
490	13.9	2.6	294

Anticipated E. Coli Based on Data from 2009 to 2013			
E. Coli			
Average Monthly	Maximum Daily	Instantaneous Maximum	
#/100ml	#/100ml	#/100ml	
126	--	406	

Existing permit limits anticipated to be maintained.

Monitoring Requirements	
Sample Frequency	Sample Type
5x/month	grab

pH

Existing NPDES Permit Limits			
pH			
	Average Monthly	Maximum Daily	Instantaneous Maximum
	s.u.		
	6.0 to 9.0 at all times		

Existing permit limits for pH not based on flow.

Recent Effluent Characteristics - Past Year and Past 5 Years		
Past Year Data (May 2012 to April 2013) for pH		
Maximum Daily Value	Maximum 30 Day Value	No. of Analyses
s.u.	s.u.	
6.50 - 7.73	6.80 - 7.24	365
Past 5 Years Data (May 2008 to April 2013) for pH		
Maximum Daily Value	Maximum 30 Day Value	No. of Analyses
s.u.	s.u.	
6.50 - 8.17	6.80 - 7.68	1711

Anticipated pH Based on Data from 2009 to 2013			
pH			
Average Monthly	Maximum Daily	Instantaneous Maximum	
s.u.			
6.0 to 9.0 at all times			

Existing permit limits anticipated to be maintained.

Monitoring Requirements	
Sample Frequency	Sample Type
daily	grab

Total Ammonia

Existing NPDES Permit Limits						
Total Ammonia						
Flow	Average Monthly		Maximum Daily		Instantaneous Maximum	
mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day
0.50	--	--	--	--	--	--

No limits for ammonia in existing NPDES permit.

Recent Effluent Characteristics - Past Year and Past 5 Years						
Past Year Data (May 2012 to April 2013) for Total Ammonia						
Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses
mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	
1.29	7.57	--	--	0.41	2.42	12
Past 5 Years Data (May 2008 to April 2013) for Total Ammonia						
Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses
mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	
8.54	48.10	8.14	46.01	0.40	2.10	70

Loadings Based on Anticipated Flow Estimate for 2023						
Total Ammonia						
Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum	
mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day
1.52	XX	XX	XX	XX	--	--

* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.

Monitoring Requirements	
Sample Frequency	Sample Type
monthly	24-hour composite

Sorrento Lactalis Nampa WWTP
Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings

Nitrate + Nitrite

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 5 Years							Loadings Based on Anticipated Flow Estimate for 2023							Monitoring Requirements	
Nitrate + Nitrite							Past Year Data (May 2012 to April 2013) for Nitrate + Nitrite							Nitrate + Nitrite								
Flow	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	monthly	24-hour composite
0.50	--	--	--	--	--	--	8.50	52.53	--	--	2.95	17.57	12	1.52	XX	XX	XX	XX	--	--		
							Past 5 Years Data (May 2008 to April 2013) for Nitrate + Nitrite															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.								
No limits for nitrate + nitrite in existing NPDES permit.							13.10	77.06	11.30	66.67	2.35	12.95	70									

Nitrite

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 5 Years							Loadings Based on Anticipated Flow Estimate for 2023							Monitoring Requirements	
Nitrite							Past Year Data (May 2012 to April 2013) for Nitrite							Nitrite								
Flow	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	monthly	24-hour composite
0.50	--	--	--	--	--	--	1.01	5.92	--	--	0.15	0.88	12	1.52	XX	XX	XX	XX	--	--		
							Past 5 Years Data (May 2008 to April 2013) for Nitrite															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.								
No limits for nitrite in existing NPDES permit.							1.01	5.92	0.26	1.56	0.05	0.27	68									

TKN

Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 5 Years							Loadings Based on Anticipated Flow Estimate for 2023							Monitoring Requirements	
Total Kjeldahl Nitrogen (TKN)							Past Year Data (May 2012 to April 2013) for TKN							Total Kjeldahl Nitrogen (TKN)								
Flow	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	quarterly	24-hour composite
0.50	--	--	--	--	--	--	2.81	15.28	--	--	1.79	10.55	12	1.52	XX	XX	XX	XX	--	--		
							Past 5 Years Data (May 2008 to April 2013) for TKN															
							Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses									
							mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.								
No limits for total Kjeldahl nitrogen in existing NPDES permit.							8.42	45.95	5.93	33.51	1.49	7.84	62									

Sorrento Lactalis Nampa WWTP
Table 2. Existing NPDES Permit Limits, Recent Effluent Characteristics, and Anticipated Loadings

	Existing NPDES Permit Limits							Recent Effluent Characteristics - Past Year and Past 3 Years							Loadings Based on Anticipated Flow Estimate for 2023							Monitoring Requirements	
	Orthophosphate							Past Year Data (May 2012 to April 2013) for Orthophosphate							Orthophosphate								
Orthophosphate	Flow	Average Monthly		Maximum Daily		Instantaneous Maximum		Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	Flow*	Average Monthly		Maximum Daily		Instantaneous Maximum		Sample Frequency	Sample Type
	mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day		mgd	mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day	quarterly	24-hour composite
	0.50	--	--	--	--	--	--	0.008	0.047	--	--	0.005	0.032	12	1.52	XX	XX	XX	XX	--	--		
								Past 3 Years Data (May 2010 to April 2013) for Orthophosphate							* Anticipated effluent flow included to calculate loadings in Microsoft Excel. The flow amount can be changed in Excel to calculate different loading amounts.								
								Maximum Daily Value		Maximum 30 Day Value		Long Term Average Value		No. of Analyses	<-- Orthophosphate summary includes only 3 years of data following the EPA implementation of 0.07 mg/L and 0.29 lbs/day permit limit for phosphorus on May 1, 2010.								
								mg/L	lbs/day	mg/L	lbs/day	mg/L	lbs/day										
	No limits for orthophosphate in existing NPDES permit.							0.021	0.117	0.006	0.029	0.006	0.033	63									

Sorrento Lactalis Nampa WWTP
Table 3. Summary of Effluent Characteristics from 2012 to 2013 (1 Year Analysis)

Sample Frequency: Daily

Parameter	Effluent Temp.	Effluent Temp. (Winter)			Effluent Temp. (Summer)			Effluent pH				Effluent Flow		
Value	Average	Long Term Avg.	Max Daily	Max 30 Day	Long Term Avg.	Max Daily	Max 30 Day	Min Daily	Max Daily	Min 30 Day	Max 30 Day	Long Term Avg.	Max Daily	Max 30 Day
Reference in Form 2C [1]		*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-a Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-b Part A*	*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*
Date	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	s.u.	s.u.	s.u.	s.u.	mgd	mgd	mgd
May-12	22.5							6.85	7.39	7.09	7.09	0.7030	0.7490	0.7030
Jun-12	22.9							6.98	7.50	7.11	7.11	0.7032	0.7446	0.7032
Jul-12	25.4				25.4	27	25.4	6.99	7.40	7.11	7.11	0.7292	0.7499	0.7292
Aug-12	26.3				26.3	28	26.3	6.55	7.25	7.08	7.08	0.6799	0.7479	0.6799
Sep-12	23.1				23.1	25	23.1	6.69	7.30	7.03	7.03	0.6717	0.7692	0.6717
Oct-12	21.5							7.00	7.73	7.24	7.24	0.7104	0.7489	0.7104
Nov-12	20.8							6.90	7.60	7.21	7.21	0.6789	0.7499	0.6789
Dec-12	19.8							6.80	7.30	7.00	7.00	0.6498	0.7488	0.6498
Jan-13	19.6	19.6	23	19.6				6.70	7.37	7.00	7.00	0.6571	0.7158	0.6571
Feb-13	20.9	20.9	23	20.9				6.69	7.53	6.94	6.94	0.6494	0.7049	0.6494
Mar-13	20.5	20.5	23	20.5				6.50	7.10	6.88	6.88	0.6688	0.7137	0.6688
Apr-13	20.7							6.70	6.99	6.80	6.80	0.6694	0.7253	0.6694
Long Term Avg.	22.0	20.3			24.9							0.6809		
Max Daily			23			28		6.50	7.73				0.7692	
Max 30 Day				20.9			26.3			6.80	7.24			0.7292

Values included in NPDES renewal application, Form 2C, Section V, Parts A and B

Sample Frequency: Daily

Parameter	Floating Solids, Visible Foam	Oil & Grease
Value	Long Term Avg.	Long Term Avg.
Reference in Form 2C [1]		*column 2-b Part B*
Date	visual	visual
May-12	0	0
Jun-12	0	0
Jul-12	0	0
Aug-12	0	0
Sep-12	0	0
Oct-12	0	0
Nov-12	0	0
Dec-12	0	0
Jan-13	0	0
Feb-13	0	0
Mar-13	0	0
Apr-13	0	0
Long Term Avg.	0	0

Values included in NPDES renewal application, Form 2C, Section V, Parts A and B

Parameter	Number of Measurements
Effluent Temp.	365
Effluent BOD	58
Effluent pH	365
Effluent TSS	59
Nitrogen, Ammonia Total	12
Effluent TSS	59
Nitrogen, Nitrite	12
Nitrogen, Kjeldahl	12
Nitrate + Nitrite Total	12
Phosphate Ortho	12
Phosphate Total	12
Floating Solids, Visible Foam	365
E. Coli	61
Effluent Flow	365
Oil & Grease	365

Sorrento Lactalis Nampa WWTP
Table 3. Summary of Effluent Characteristics from 2012 to 2013 (1 Year Analysis)

Sample Frequency: Weekly

Parameter	Effluent BOD						Effluent TSS						E. Coli (5x per month)		
Value	Long Term Avg.		Max Daily		Max 30 day		Long Term Avg.		Max Daily		Max 30 day		Geometric Mean	Max Daily	Max 30 day
Reference in Form 2C [1]	*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*		*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*		*column 3-c Part B*	*column 3-a Part B*	*column 3-b Part B*
Date	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	MPN/100ml	MPN/100ml	MPN/100ml
May-12	3.0	17.6	3	18.4	3.0	17.6	3.0	17.6	3.0	18.4	3.0	17.6	1.0	1	1.0
Jun-12	3.0	17.9	3	18.6	3.0	17.9	3.2	19.0	4.0	21.7	3.2	19.0	2.5	4	2.5
Jul-12	3.0	18.3	3	18.6	3.0	18.3	3.0	18.3	3.0	18.6	3.0	18.3	1.0	1	1.0
Aug-12	4.2	25.4	9	53.3	4.2	25.4	3.0	18.3	3.0	18.6	3.0	18.3	1.1	2	1.1
Sep-12	3.0	18.6	3	19.1	3.0	18.6	3.0	18.6	3.0	19.1	3.0	18.6	4.7	17	4.7
Oct-12	3.2	19.4	4	23.6	3.2	19.4	3.4	20.6	5.0	30.4	3.4	20.6	1.0	1	1.0
Nov-12	3.0	16.7	3	17.8	3.0	16.7	4.8	25.9	11.0	54.9	4.8	25.9	1.1	2	1.1
Dec-12	3.0	17.6	3	18.5	3.0	17.6	4.2	22.9	7.0	32.4	4.2	22.9	1.6	10	1.6
Jan-13	3.0	16.4	3	17.6	3.0	16.4	7.8	42.6	12.0	67.8	7.8	42.6	10.3	24	10.3
Feb-13	3.0	16.6	3	17.5	3.0	16.6	4.2	23.2	6.0	33.8	4.2	23.2	11.4	46	11.4
Mar-13	3.0	16.2	3	17.3	3.0	16.2	4.4	23.7	6.0	28.8	4.4	23.7	1.0	1	1.0
Apr-13	3.0	17.3	3	17.6	3.0	17.3	7.6	43.5	17.0	96.1	7.6	43.5	1.0	1	1.0
Long Term Avg.															
Max 30 Day															

Sample Frequency: Quarterly

Parameter	Nitrogen, Kjeldahl						Phosphate Ortho					
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day	
Reference in Form 2C [1]												
Date	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
May-12	2.31	14.13	2.31	14.13			0.005	0.031	0.005	0.031		
Jun-12	2.81	15.28	2.81	15.28			0.005	0.027	0.005	0.027		
Jul-12	1.90	11.38	1.90	11.38			0.005	0.030	0.005	0.030		
Aug-12	1.86	11.24	1.86	11.24			0.005	0.030	0.005	0.030		
Sep-12	1.29	7.98	1.29	7.98			0.006	0.037	0.006	0.037		
Oct-12	1.65	10.31	1.65	10.31			0.005	0.031	0.005	0.031		
Nov-12	1.32	7.13	1.32	7.13			0.005	0.027	0.005	0.027		
Dec-12	1.77	10.94	1.77	10.94			0.005	0.031	0.005	0.031		
Jan-13	1.58	9.28	1.58	9.28			0.005	0.029	0.005	0.029		
Feb-13	1.41	7.94	1.41	7.94			0.006	0.034	0.006	0.034		
Mar-13	1.12	6.47	1.12	6.47			0.005	0.029	0.005	0.029		
Apr-13	2.47	14.49	2.47	14.49			0.008	0.047	0.008	0.047		
Average	1.79	10.55					0.005	0.032				
Maximum			2.81	15.28					0.008	0.047		
Max 30 Day					--	--					--	--

Values included in NPDES renewal application, Form 2C, Section V, Parts A and B

Sorrento Lactalis Nampa WWTP
Table 3. Summary of Effluent Characteristics from 2012 to 2013 (1 Year Analysis)

Sample Frequency: Monthly

Parameter	Nitrogen, Ammonia Total						Nitrogen, Nitrite					
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day	
Reference in Form 2C [1]	*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*							
Date	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
May 1, 2012	0.79	4.83	0.79	4.83			0.07	0.43	0.07	0.43		
June 1, 2012	0.75	4.08	0.75	4.08			0.28	1.52	0.28	1.52		
July 3, 2012	0.25	1.50	0.25	1.50			0.09	0.54	0.09	0.54		
August 1, 2012	0.41	2.48	0.41	2.48			0.14	0.85	0.14	0.85		
September 4, 2012	0.24	1.48	0.24	1.48			0.09	0.56	0.09	0.56		
October 1, 2012	0.18	1.12	0.18	1.12			0.07	0.44	0.07	0.44		
November 1, 2012	0.04	0.22	0.04	0.22			0.01	0.05	0.01	0.05		
December 1, 2012	0.46	2.84	0.46	2.84			0.01	0.06	0.01	0.06		
January 3, 2013	0.19	1.12	0.19	1.12			0.01	0.06	0.01	0.06		
February 1, 2013	0.26	1.46	0.26	1.46			0.01	0.06	0.01	0.06		
March 1, 2013	0.06	0.35	0.06	0.35			0.01	0.06	0.01	0.06		
April 1, 2013	1.29	7.57	1.29	7.57			1.01	5.92	1.01	5.92		
Long Term Avg.												

Sample Frequency: Monthly

Parameter	Nitrate + Nitrite Total						Phosphorus Total					
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day	
Reference in Form 2C [1]	*column 3-c Part B*		*column 3-a Part B*		*column 3-b Part B*		*column 3-c Part B*		*column 3-a Part B*		*column 3-b Part B*	
Date	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
May-12	4.83	29.55	4.83	29.55			0.023	0.141	0.023	0.141		
Jun-12	4.9	26.64	4.90	26.64			0.020	0.109	0.020	0.109		
Jul-12	4.32	25.88	4.32	25.88			0.025	0.150	0.025	0.150		
Aug-12	1.94	11.72	1.94	11.72			0.029	0.175	0.029	0.175		
Sep-12	3.42	21.16	3.42	21.16			0.034	0.210	0.034	0.210		
Oct-12	2.35	14.68	2.35	14.68			0.022	0.137	0.022	0.137		
Nov-12	3.29	17.77	3.29	17.77			0.026	0.140	0.026	0.140		
Dec-12	8.50	52.53	8.50	52.53			0.027	0.167	0.027	0.167		
Jan-13	0.44	2.58	0.44	2.58			0.032	0.188	0.032	0.188		
Feb-13	0.06	0.34	0.06	0.34			0.029	0.163	0.029	0.163		
Mar-13	0.07	0.40	0.07	0.40			0.008	0.046	0.008	0.046		
Apr-13	1.29	7.57	1.29	7.57			0.006	0.035	0.006	0.035		
Long Term Avg.	2.95	17.57					0.023	0.139				
Max Daily			8.50	52.53					0.034	0.210		
Max 30 Day					--	--					--	--

Values included in NPDES renewal application, Form 2C, Section V, Parts A and B

Sorrento Lactalis Nampa WWTP
Table 4. Summary of Effluent Characteristics from 2008 to 2013 (3 - 5 Year Analysis)

Sample Frequency: Daily

Parameter	Effluent pH				Effluent Temp. (Winter[2])			Effluent Temp. (Summer[3])		
Value	Min Daily	Max Daily	Min 30 Day	Max 30 Day	Long Term Avg.	Max Daily	Max 30 Day	Long Term Avg.	Max Daily	Max 30 Day
Reference in Form 2C [1]	*column 2-a Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-b Part A*	*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*
Year	s.u.	s.u.	s.u.	s.u.	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C	Deg. C
2008-2009	6.90	7.90	7.42	7.68	*Faulty testing equipment*			*Faulty testing equipment*		
2009-2010	7.20	7.90	7.48	7.64	24.2	26	25.3			
2010-2011	6.90	8.17	7.35	7.66	26.0	27	26.0	26.8	28	27.0
2011-2012	6.60	8.05	6.96	7.25	21.2	25	22.5	26.7	29	27.1
2012-2013	6.50	7.73	6.80	7.24	20.3	23	20.9	24.9	28	26.3
Long Term Avg.					22.9			26.1		
Max Daily	6.50		6.80			27			29	
Max 30 Day		8.17		7.68			26.0			27.1

Sample Frequency: Daily

Parameter	Effluent Flow			Oil & Grease	Floating Solids, Visible Foam
Value	Long Term Avg.	Max Daily	Max 30 Day		
Reference in Form 2C [1]	*column 2-c Part A*	*column 2-a Part A*	*column 2-b Part A*	*column 2-b Part B*	
Year	mgd	mgd	mgd	visual	visual
2008-2009	0.6485	0.7990	0.7099	0	0
2009-2010	0.6224	0.9812	0.7293	0	0
2010-2011	0.5085	0.8552	0.7049	0	0
2011-2012	0.5969	0.8213	0.6868	0	0
2012-2013	0.6809	0.7692	0.7292	0	0
Long Term Avg.	0.6022			0	0
Max Daily		0.9812		0	0
Max 30 Day			0.7293	0	0

Key

Values used in Table 2 as 5-year, 4-year, and 3-year averages.

1. This references the NPDES Permit Application, Form 2C, Section V
2. Winter months: January - March
3. Summer months: July - September
4. Summary includes only the 3 years of data following the EPA implementation of 0.07 mg/l and 0.29 lbs/day permit limit on May 1, 2010.

Sorrento Lactalis Nampa WWTP
Table 4. Summary of Effluent Characteristics from 2008 to 2013 (3 - 5 Year Analysis)

Sample Frequency: Weekly

Parameter	Effluent BOD						Effluent TSS						E. Coli (5x per month)		
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.	Max Daily	Max 30 Day
Reference in Form 2C [1]	*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*		*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*		*column 3-c Part B*	*column 3-a Part B*	*column 3-b Part B*
Year	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	MPN/100ml	MPN/100ml	MPN/100ml
2008-2009	1.5	8.2	7	32.9	3.4	17.9	4.4	23.7	13	75.4	7.6	41.7	3.0	150	13.9
2009-2010	3.2	17.9	7	39.8	4.0	22.7	3.5	19.7	10	62.3	5.3	32.4	2.3	65	5.6
2010-2011	3.1	16.9	6	33.1	4.5	24.8	4.3	23.2	13	78.9	6.6	37.1	2.3	61	8.3
2011-2012	3.0	15.9	5	28.9	3.4	18.8	4.0	20.7	11	63.6	6.4	35.6	2.1	490	5.4
2012-2013	3.1	18.2	9	53.3	4.2	25.4	4.3	24.5	17	96.1	7.8	43.5	3.1	46	11.4
Long Term Avg.	2.8	15.4					4.1	22.3					2.6		
Max Daily			9	53.3					17	96.1				490	
Max 30 Day					4.5	25.4					7.8	43.5			13.9

Sample Frequency: Quarterly

Parameter	Nitrogen, Kjeldahl						Phosphate Ortho						
Value *Reference in Form 2C* [1]	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day		
Year	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	
2008-2009	1.10	6.09	1.63	9.06	1.10	6.14	0.097	0.498	0.419	2.373	0.000	0.000	Prior to 0.07 mg/L limit (May 2010)
2009-2010	1.14	5.24	1.52	9.94	1.25	7.35	0.197	0.128	1.890	0.703	0.069	0.439	
2010-2011	1.12	5.79	1.40	7.18	1.01	4.88	0.008	0.039	0.021	0.117	0.006	0.029	3 year averages and maximums for phosphorus only[4]
2011-2012	2.30	11.54	8.42	45.95	5.93	33.51	0.005	0.027	0.007	0.041	0.005	0.029	
2012-2013	1.79	10.55	2.81	15.28	--	--	0.005	0.032	0.008	0.047	--	--	
Long Term Avg.	1.49	7.84					0.006	0.033					
Max Daily			8.42	45.95					0.021	0.117			
Max 30 Day					5.93	33.51					0.006	0.029	

Key

Values used in Table 2 as 5-year, 4-year, and 3-year averages.

1. This references the NPDES Permit Application, Form 2C, Section V
2. Winter months: January - March
3. Summer months: July - September
4. Summary includes only the 3 years of data following the EPA implementation of 0.07 mg/l and 0.29 lbs/day permit limit on May 1, 2010.

Sorrento Lactalis Nampa WWTP
Table 4. Summary of Effluent Characteristics from 2008 to 2013 (3 - 5 Year Analysis)

Sample Frequency: Monthly

Parameter	Nitrogen, Ammonia Total						Nitrogen, Nitrite					
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day	
Reference in Form 2C [1]	*column 2-c Part A*		*column 2-a Part A*		*column 2-b Part A*							
Year	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day
2008-2009	0.02	0.10	0.08	0.45	0.06	0.33	0.02	0.10	0.07	0.39	0.00	0.00
2009-2010	0.05	0.28	0.16	1.06	0.10	0.65	0.01	0.07	0.03	0.16	0.02	0.09
2010-2011	0.06	0.31	0.16	1.06	0.04	0.16	0.01	0.06	0.08	0.29	0.05	0.17
2011-2012	1.47	7.40	8.54	48.10	8.14	46.01	0.05	0.26	0.50	3.06	0.26	1.56
2012-2013	0.41	2.42	1.29	7.57	-	-	0.15	0.88	1.01	5.92	-	-
Long Term Avg.	0.40	2.10					0.05	0.27				
Max Daily			8.54	48.10					1.01	5.92		
Max 30 Day					8.14	46.01					0.26	1.56

Sample Frequency: Monthly

Parameter	Nitrate + Nitrite Total						Phosphorus Total						
Value	Long Term Avg.		Max Daily		Max 30 Day		Long Term Avg.		Max Daily		Max 30 Day		
Reference in Form 2C [1]	*column 3-c Part B*		*column 3-a Part B*		*column 3-b Part B*		*column 3-c Part B*		*column 3-a Part B*		*column 3-b Part B*		
Year	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	mg/l	lbs/day	
2008-2009	1.53	8.68	4.40	24.79	3.20	17.85	0.181	1.000	1.110	6.288	0.301	1.708	Prior to 0.07 mg/L limit (May 2010)
2009-2010	4.86	26.53	13.10	77.06	11.30	66.67	0.248	0.359	2.240	1.033	0.149	0.797	
2010-2011	1.30	6.29	5.04	23.32	2.26	8.33	0.044	0.235	0.142	0.783	0.088	0.482	3 year averages and maximums for phosphorus only[4]
2011-2012	1.09	5.67	5.83	33.71	1.11	6.69	0.028	0.144	0.036	0.196	0.031	0.178	
2012-2013	2.95	17.57	8.50	52.53	-	-	0.023	0.139	0.034	0.210	-	-	
Long Term Avg.	2.35	12.95					0.032	0.172					
Max Daily			13.10	77.06					0.142	0.783			
Max 30 Day					11.30	66.67					0.088	0.482	

Key

Values used in Table 2 as 5-year, 4-year, and 3-year averages.

1. This references the NPDES Permit Application, Form 2C, Section V
2. Winter months: January - March
3. Summer months: July - September
4. Summary includes only the 3 years of data following the EPA implementation of 0.07 mg/l and 0.29 lbs/day permit limit on May 1, 2010.

Attachment 1.

Surface Water Monitoring Report 2013

Surface Water Monitoring Report

Sorrento Lactalis, Inc.

June 14, 2013

Prepared by Forsgren Associates, Inc.

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SURFACE WATER MONITORING REPORT

1.0 INTRODUCTION

Sorrento Lactalis, Inc. (Lactalis) processes dairy products in its facility located in northeast Nampa, Idaho on the northeast corner of Star Road and Franklin Road (see Figure 1). Lactalis was issued a National Pollutant Discharge Elimination System (NPDES) permit by the U.S. Environmental Protection Agency (EPA) authorizing discharge of certain treated wastewaters into the Purdam Drain, which flows into Mason Creek and ultimately the Boise River. The permit became effective November 1, 2005 and was scheduled to expire October 31, 2010. Lactalis's NPDES permit requires monthly flow monitoring and quarterly sampling of surface water at locations upstream and downstream from its effluent outfall. It also requires submittal of a Surface Water Monitoring Report with Lactalis's application for permit renewal.

Purdam Drain downstream of Sorrento Lactalis's outfall.

In accordance with its permit conditions, Lactalis submitted an application dated April 29, 2010, requesting that EPA renew the permit. In its letter dated May 5, 2010, noting receipt of Lactalis's application, EPA requested that surface monitoring results be submitted prior to permit expiration. In October 2010, EPA issued an administrative extension to the original permit with the same effluent limit and monitoring requirement. On April 25, 2013, EPA requested an updated application be submitted.

The following report summarizes the results of Lactalis's surface water monitoring activity. The report also includes results from additional surface water sampling and analyses that Lactalis has undertaken to improve its understanding of water quality in the surrounding drains.

We ask that this information be included as part of our application for permit renewal.

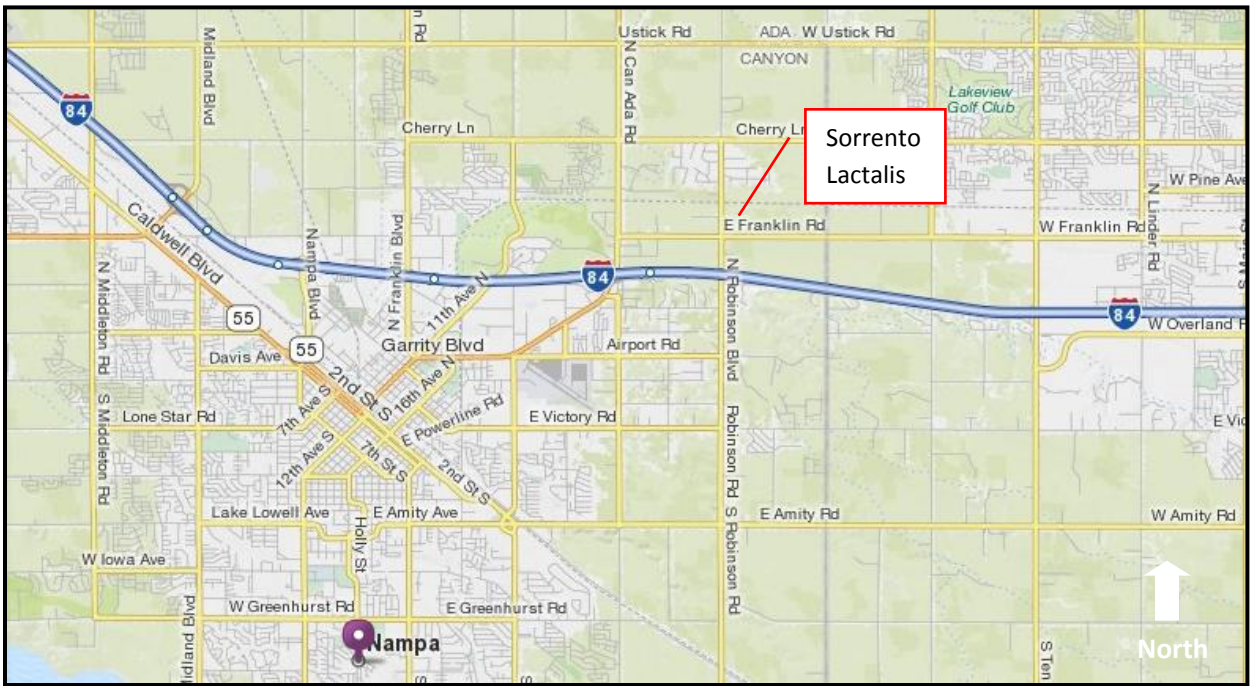


Figure 1 – Facility Location

1.1 Monitoring Requirements

Monitoring requirements from Lactalis's NPDES permit are summarized in Table 1.

Table 1 – Surface Water Monitoring Requirements

Parameter	Units	Sample Location		Sample Frequency	Sample Type
		Upstream	Downstream		
Flow	mgd	●	●	Monthly	Measure
Nitrite	mg/L	●		Quarterly	Grab
Nitrate + Nitrite	mg/L	●		Quarterly	Grab
Total Kjeldahl Nitrogen	mg/L	●		Quarterly	Grab
Total Ammonia as N	mg/L	●	●	Quarterly	Grab
Total Phosphorus as P	mg/L	●	●	Quarterly	Grab
Orthophosphate as P	mg/L	●	●	Quarterly	Grab
pH	s.u.	●	●	Quarterly	Grab
Temperature	°C	●	●	Quarterly	Grab

1.2 Surface Water Sampling Locations

Lactalis's NPDES permit designates two surface monitoring locations on the Purdam Drain: one upstream of its effluent outfall and one far downstream of that outfall. The upstream sample location is immediately upstream of the outfall on the east side of Star Road. The second sample location is approximately 4½ miles downstream from the outfall and immediately south of the culvert where Purdam Drain crosses under Ustick Road. The permit refers to this location as the

"mouth of Purdam Drain into Mason Creek" because the location is approximately 700 feet above the Purdam Drain's confluence with Mason Creek. These surface water sampling locations are shown in Figure 2.

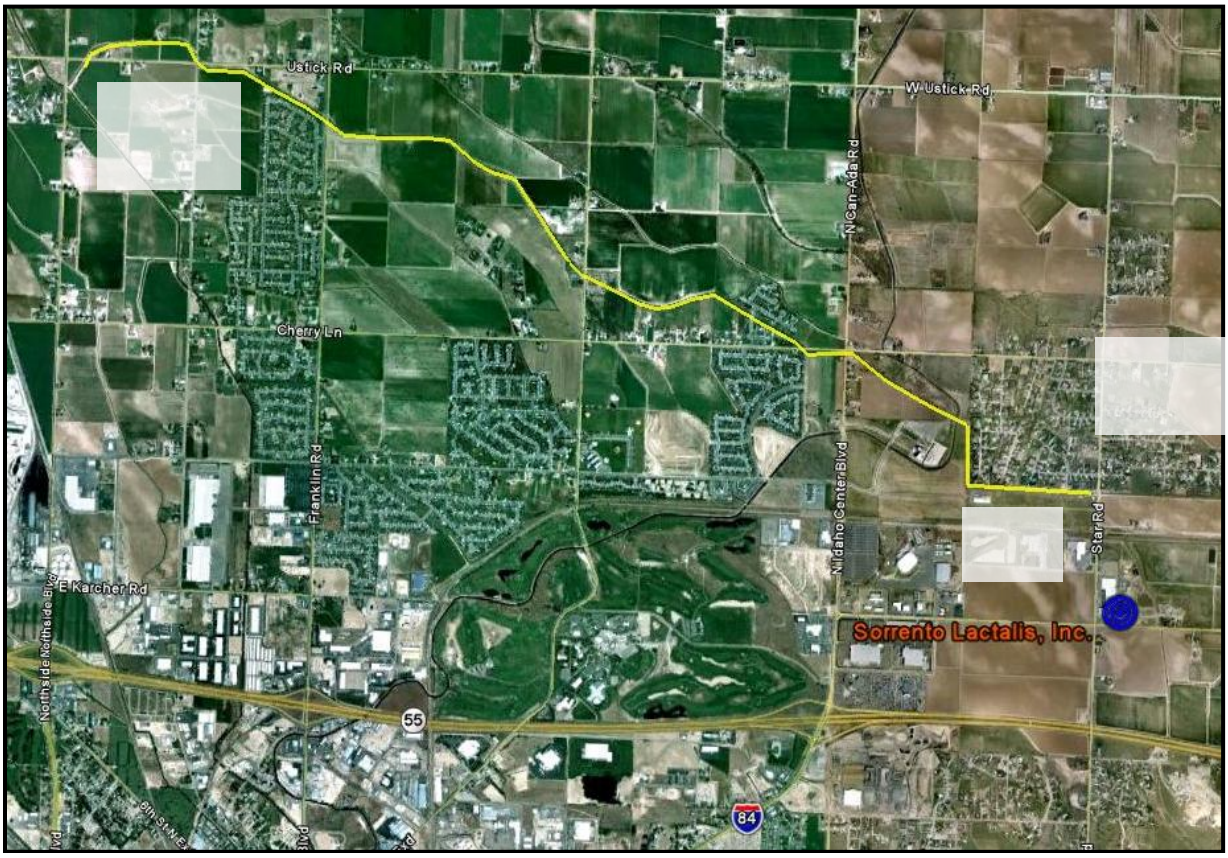


Figure 2 – Surface Water Monitoring Locations

1.3 Sampling and Analysis

A brief description of Lactalis's surface water collection, preservation, and analysis procedures follows.

1.3.1 Sample Collection

Lactalis's laboratory technician collects grab samples at the upstream and downstream locations, generally within an hour of each other. The permit requires sampling of surface water only on a quarterly basis. However, in order to understand more fully the immediate region's overall surface water quality, Lactalis has undertaken a monthly sampling regime, typically on the same day wastewater effluent samples are collected.

Water samples are collected in polypropylene bottles that have been cleaned and provided by Analytical Laboratories, Inc. (ALI). Water samples are then transported to Lactalis's wastewater facility, where they are stored inside a refrigerator at 4°C until picked up by ALI and transported

to its laboratory in Boise, Idaho. ALI generally picks up samples prior to 3 p.m. on the same day of collection. On those days in which ALI is unable to retrieve the samples within the same day of collection, Lactalis delivers the samples to the ALI laboratory.

1.3.2 Physical Parameters

In order to estimate flows at the upstream and downstream locations, Lactalis installed staff gauges adjacent to those locations in January 2006. Discharge rating curves were developed at both locations between January 2006 and June 2006. A "pygmy meter" was used to measure water velocity, a meter stick to measure water depth, and a cloth meter tape to determine channel width. Flow measurements were estimated each month based upon staff gauge readings and calculated from the corresponding rating curve readings.

NPDES upstream monitoring location

Lactalis's laboratory technician measures and records temperature and pH within a few minutes of sample collection using:

- a NIST Traceable Certified Thermometer, manufactured by H-B Instrument Co. Catalog number 41100; and
- a HACH SensION gel filled pH electrode model 51935-00.

1.3.3 Sample Analysis

Analytical tests have been performed by Analytical Laboratories, Inc., a state-certified laboratory in Boise, Idaho. Analytical methods and minimum detection limits (MDLs) for a majority of the required procedures are shown in Table 2.

Table 2 – Analytical Detection Levels

Parameter	Maximum Minimum Level Req'd by Permit	Minimum Detection Limit*	Method*
	mg/L		
Nitrite	0.01	0.01	EPA 353.2
Nitrate + Nitrite	0.1	0.02	EPA 353.2
Total Kjeldahl Nitrogen	0.1	0.10	EPA 351.2
Total Ammonia as N	0.05	0.04	EPA 350.1
Total Phosphorus as P	0.01	0.005	EPA 365.1
Orthophosphate as P	0.01	0.005	EPA 365.1

* Minimum detection limits and test methods for a majority of required procedures

Over the period in which Lactalis's NPDES permit has authorized discharge into Purdam Drain and surface water samples have been collected and analyzed, only three of over hundreds of analytical results have been reported at values greater than the MDLs. That is, in three instances, the MDL exceeded the required maximum minimum level specified by the permit. Each of those analyses was associated with January 22, 2008, samples. Both upstream and downstream samples were analyzed using the high level Total Phosphate analytical method instead of the low level Total Phosphate analytical method. It is unknown if the cause was a chain of custody error or laboratory error.

That same January 22, 2008, sample set was subjected to the appropriate procedure and MDL for Total Kjeldahl Nitrogen (TKN) from water collected upstream of the effluent outfall. Lactalis also analyzed its downstream samples for TKN, even though the analytical requirements for that sample location do not include TKN. It should be noted that the laboratory incorrectly reported the MDL for the downstream sample as 1 milligram per liter (mg/L); that level is ten times greater than the typical MDL for that test method.

1.3.4 Quality Assurance, Quality Control (QA/QC)

Lactalis and ALI established a standardized chain of custody procedure for surface water monitoring. Those protocols are intended to reduce the risk of laboratory errors or that Lactalis might fail to perform a required surface water analytical test because of an improperly completed chain-of-custody forms.

During data analysis and preparation of this surface water monitoring report, Lactalis identified gaps in its analytical data set. The majority of those data gaps occurred during the first two years of operation of the wastewater treatment plant, i.e., the first two years following permit authorization. During that time Lactalis employed multiple wastewater treatment plant managers and the full suite of monitoring did not always occur.

Over the past six years, with the exception of testing for ammonia in the third quarter of 2008, all parameters have been collected and analyzed as required. Additionally, Lactalis initiated routine testing for TKN, nitrite, and nitrate + nitrite from the downstream monitoring location. This optional sampling is intended to highlight variances in upstream and downstream water sample analyses.

2.0 SURFACE WATER MONITORING RESULTS

This section summarizes the results of Lactalis's surface water monitoring program.

2.1 Flow Data and Analysis

Flow data for the Purdam Drain sample locations, from December 2005 through April 2013, are provided in Table 3 and shown graphically in Figure 3.

Table 3 – Purdam Drain Flow

Date	Flow (MGD)	
	Upstream Monitoring Location	Downstream Monitoring Location
December 30, 2005	9.89	17.89
January 26, 2006	6.05	34.14
February 14, 2006	5.40	44.82
March 20, 2006	4.35	31.06
April 18, 2006	9.12	45.59
May 19, 2006	18.76	36.73
June 21, 2006	21.35	22.33
July 28, 2006	26.65	10.48
August 29, 2006	39.22	10.48
September 29, 2006	34.73	13.17
October 31, 2006	16.16	13.17
November 30, 2006	6.32	5.75
December 21, 2006	7.00	32.54
January 10, 2007	5.36	29.24
February 10, 2007	5.36	34.05
March 29, 2007	3.34	43.93
April 15, 2007	3.34	32.17
May 1, 2007	16.16	25.71
June 1, 2007	13.47	12.89
July 12, 2007	25.91	11.27
August 16, 2007	37.39	10.48
September 9, 2007	33.87	9.97
October 12, 2007	20.39	6.62
November 16, 2007	7.18	7.77
December 6, 2007	5.36	18.48
January 16, 2008	5.83	36.35
February 19, 2008	4.91	38.30
March 12, 2008	2.38	40.68
April 22, 2008	6.83	46.01
May 15, 2008	15.60	34.05
June 16, 2008	33.02	21.34
July 20, 2008	37.84	10.48
August 12, 2008	38.30	10.48
September 22, 2008	32.60	8.00
October 31, 2008	13.99	5.75
November 12, 2008	3.96	5.75
December 16, 2008	3.96	10.48
January 21, 2009	3.96	8.00
February 17, 2009	3.96	5.75
March 27, 2009	3.96	5.75
April 14, 2009	7.00	10.48

Date	Flow (MGD)	
	Upstream Monitoring Location	Downstream Monitoring Location
May 21, 2009	13.99	40.68
June 19, 2009	31.77	55.49
July 25, 2009	34.73	53.28
August 14, 2009	19.13	62.28
September 17, 2009	16.16	53.28
October 1, 2009	8.90	22.33
November 10, 2009	2.79	16.05
December 2, 2009	2.79	10.48
January 5, 2010	2.79	10.48
February 2, 2010	1.11	13.17
March 11, 2010	3.96	5.75
April 6, 2010	2.79	5.75
May 5, 2010	7.00	29.24
June 3, 2010	16.16	57.72
July 22, 2010	29.74	57.72
August 6, 2010	22.37	62.28
September 10, 2010	19.13	81.57
October 11, 2010	11.05	36.73
November 16, 2010	3.96	16.05
December 22, 2010	3.96	16.05
January 26, 2011	5.36	13.17
February 10, 2011	3.34	13.17
March 2, 2011	3.96	14.58
April 15, 2011	7.00	22.33
May 3, 2011	7.92	24.00
June 1, 2011	59.13	107.93
July 1, 2011	8.90	57.72
August 15, 2011	19.13	81.57
September 6, 2011	22.37	102.47
October 4, 2011	16.16	86.65
November 1, 2011	1.11	8.00
December 2, 2011	5.36	16.05
January 3, 2012	5.36	16.05
February 15, 2012	3.96	13.17
March 27, 2012	3.96	10.48
April 4, 2012	3.96	8.00
May 2, 2012	11.05	53.28
June 1, 2012	16.16	86.65
July 5, 2012	22.37	86.65
August 1, 2012	16.16	62.28
September 4, 2012	16.16	130.68
October 1, 2012	16.16	48.96

	Flow (MGD)	
	Upstream Monitoring Location	Downstream Monitoring Location
November 1, 2012	8.90	16.05
December 1, 2012	7.00	13.17
January 3, 2013	7.00	10.48
February 1, 2013	5.36	8.00
March 1, 2013	5.36	8.00
April 1, 2013	1.84	5.75

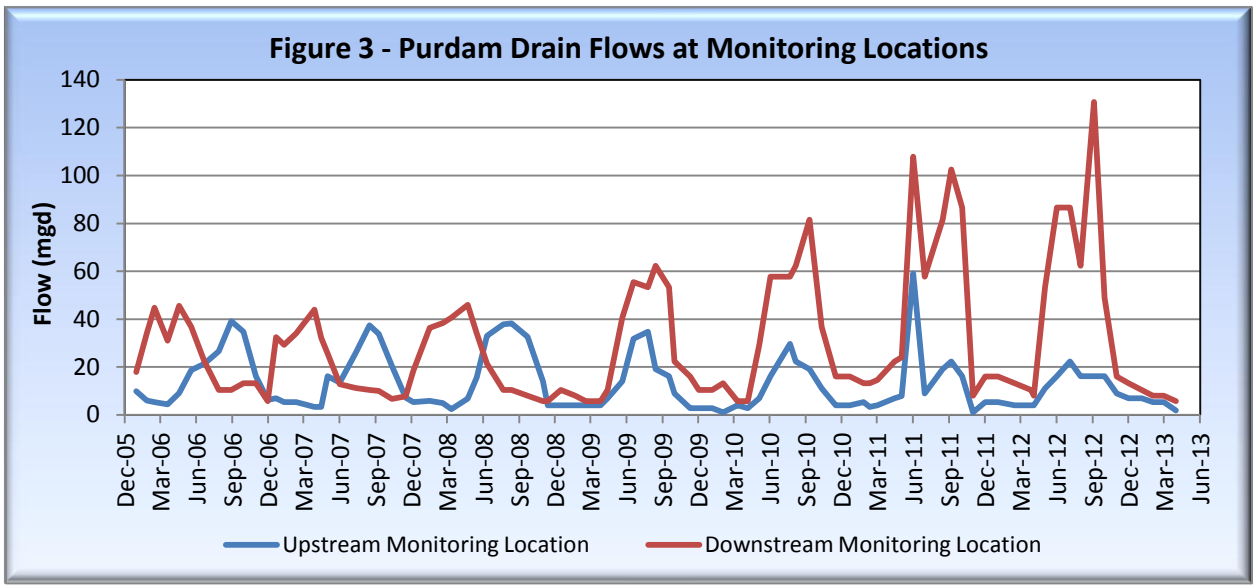


Figure 3 – Purdam Drain Flows at Monitoring Locations

From late 2005 through 2009, downstream flows appeared to lag those of upstream monitoring station. Over the past four years, peaks in upstream and downstream flows have generally coincided temporally. Downstream flows have continued to increase in recent years. The quantity of water withdrawn from the Purdam Drain during summer periods is unknown as is the quantity of water discharged to it from various irrigation drains located along the Purdam Drain. Such unknowns could explain the increase in flows between the upstream and downstream monitoring locations. These external variables between the plant's outfall and the existing downstream monitoring location suggest that the downstream location does not reflect actual or potential impacts of the Sorrento Lactalis effluent on the Purdam Drain.

2.2 Nitrogen Species Data and Analysis

Quarterly analytical results for Lactalis's surface water monitoring program for nitrogen species, as required by its NPDES permit, are provided in Table 4. Occasionally, multiple samples have

been collected and analyzed in a single quarter. For such months, the arithmetic mean of those analytical results was calculated and tabulated. No data have been omitted. Please refer to the Surface Water Monitoring Analytical Results sheet (see Appendix A) for dates on which samples were collected and the results of each analysis.

Table 4– Summary of Surface Water Analytical Results for Nitrogen Species

		Upstream Monitoring Location				Downstream Monitoring Location			
		NH_3	NO_3+ NO_2	NO_2	TKN	NH_3	NO_3+ NO_2*	NO_2*	TKN*
Year	Quarter	(mg/L)				(mg/L)			
2006	Q1 06	<0.04	4.50	0.01	0.38	<0.04			
	Q2 06	0.05		0.06	0.60	<0.04		0.04	0.46
	Q3 06								
	Q4 06	<0.04	5.50	0.04	0.81	<0.04		0.03	0.51
2007	Q1 07	<0.04	4.20	0.02	0.20	<0.04			
	Q2 07		2.40	2.3	0.34		2.5	2.4	0.68
	Q3 07		3.80	2.1	0.33		2.5	1.7	0.37
	Q4 07								
2008	Q1 08	<0.04	4.33	2.05	0.27	<0.04	4.75	4.1	<1**
	Q2 08	<0.04	1.50	0.02	0.36	<0.04			
	Q3 08	<0.04	1.85	0.01	0.26				
	Q4 08	<0.06	4.61	0.02	1.10	<0.04	4.57	0.02	0.76
2009	Q1 09	<0.04	4.72	0.01	0.56	<0.04	4.89	0.02	0.5
	Q2 09	<0.04	1.48	<0.01	0.34	<0.04	2.42	0.02	0.44
	Q3 09	<0.04	2.46	0.02	0.33	<0.04	2.44	0.03	0.49
	Q4 09	<0.10	3.23	0.02	0.49	<0.04	3.68	0.01	0.33
2010	Q1 10	<0.05	4.29	0.01	0.49	<0.04	5.08	0.01	0.41
	Q2 10	<0.06	2.47	0.02	0.36	<0.04	2.86	0.03	0.49
	Q3 10	<0.08	2.15	0.04	0.44	<0.06	2.47	0.06	0.64
	Q4 10	<0.05	3.99	0.02	0.40	<0.04	4.81	0.03	0.34
2011	Q1 11	<0.04	4.32	<0.01	0.39	<0.04	4.69	<0.01	0.34
	Q2 11	<0.05	2.47	<0.01	0.50	<0.06	2.49	0.03	0.63
	Q3 11	0.06	2.79	0.02	0.60	<0.06	2.57	0.02	0.64
	Q4 11	<0.04	5.02	0.01	0.42	<0.18	4.24	0.02	0.51
2012	Q1 12	<0.04	4.27	<0.01	0.39	<0.04	4.62	0.01	0.38
	Q2 12	<0.04	2.57	0.02	0.47	<0.11	4.47	0.05	0.81
	Q3 12	<0.04	2.75	0.03	0.52	<0.06	2.79	0.04	0.71
	Q4 12	<0.04	3.98	<0.01	0.31	<0.04	4.50	<0.01	0.41
2013	Q1 13	<0.07	4.64	0.03	0.64	<0.04	4.80	0.01	0.52
	Q2 13	<0.04	3.46	0.02	0.31	0.04	3.53	0.04	0.59
Mean		**<0.05**	**3.47**	**<0.25**	**0.45**	**<0.05**	**3.71**	**<0.36**	**<0.52**
Median		**<0.04**	**3.80**	**0.02**	**0.39**	**<0.04**	**3.96**	**0.03**	**0.50**
Std Dev		**0.017**	**1.143**	**0.672**	**0.184**	**0.031**	**1.044**	**0.985**	**0.140**

General Note: Some concentrations in this table represent the mean results for samples collected during each quarter if more than one sample was collected and analyzed.

* Data not required by existing NPDES permit.

** Data not included in mean, median and Std Dev calculations.

Ammonia

Ammonia concentrations in upstream and downstream water samples are depicted in Figure 4.

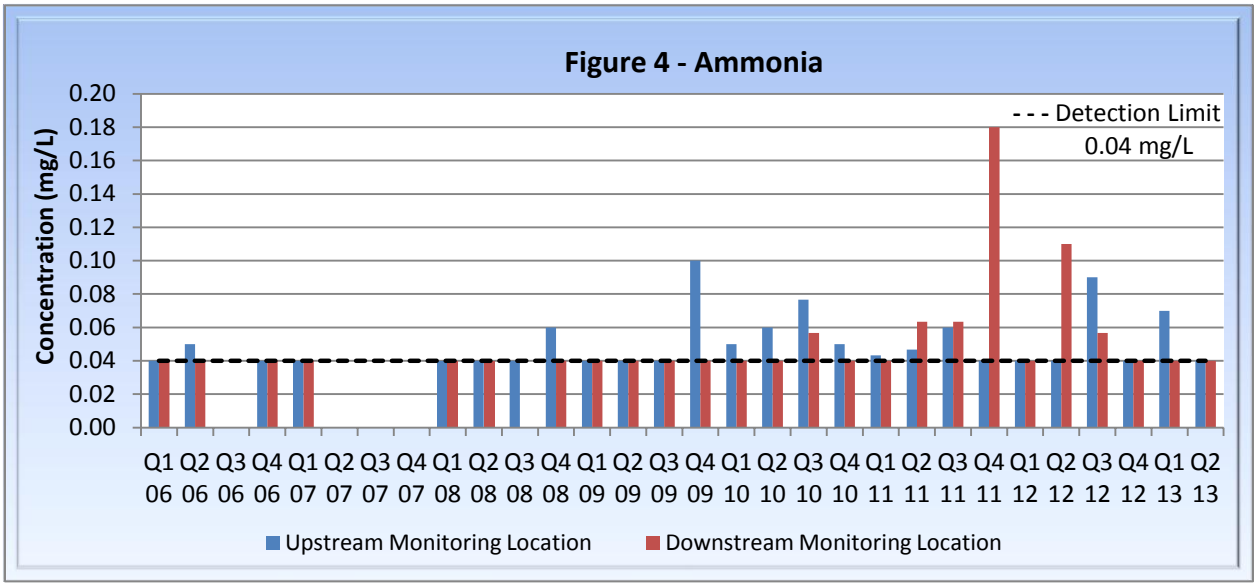


Figure 4 – Ammonia

Ammonia concentrations are generally less than the Method Detection Limit (MDL) (0.04 mg/L) at both upstream and downstream sample locations. . As noted previously, the multiple potential sources of ammonia between the Lactalis outfall and the monitoring location serve to obfuscate any contributions of ammonia by Lactalis. We question the value of analyzing and reporting ammonia concentrations in the Purdam Drain. We suggest that this requirement be deleted from the list of required monitoring parameters in Lactalis's renewed permit.

Nitrate + Nitrite (NO_3+ NO_2) and Nitrite (NO_2)

Nitrate + nitrite (NO_3+ NO_2) and nitrite (NO_2) concentrations in upstream and downstream water samples are depicted in Figures 5 and 6.

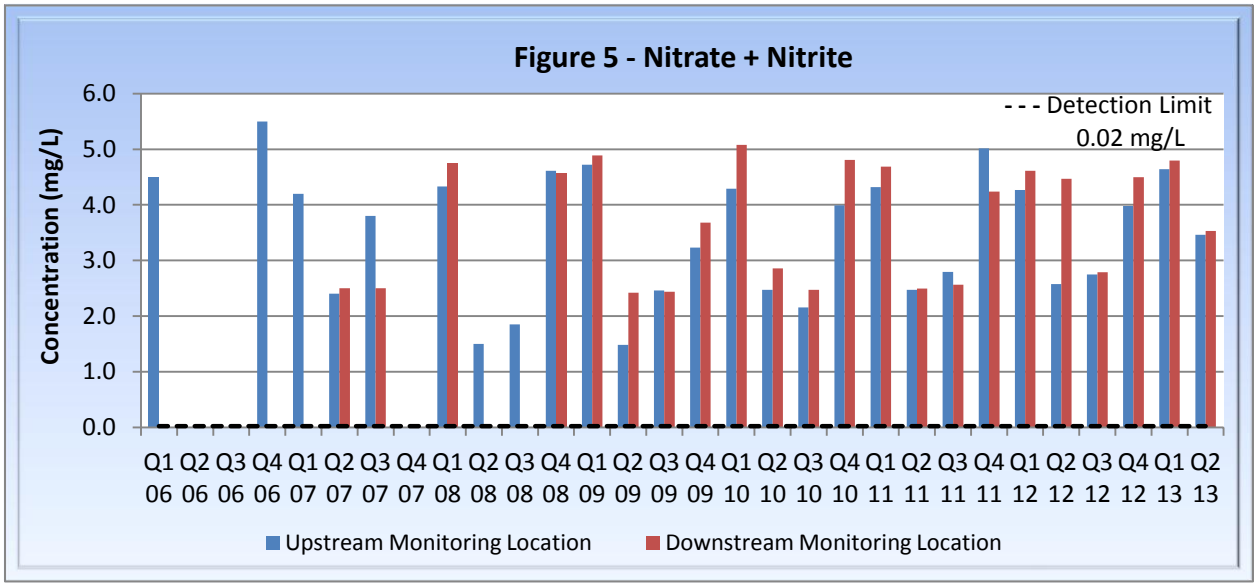


Figure 5 – Nitrate + Nitrate

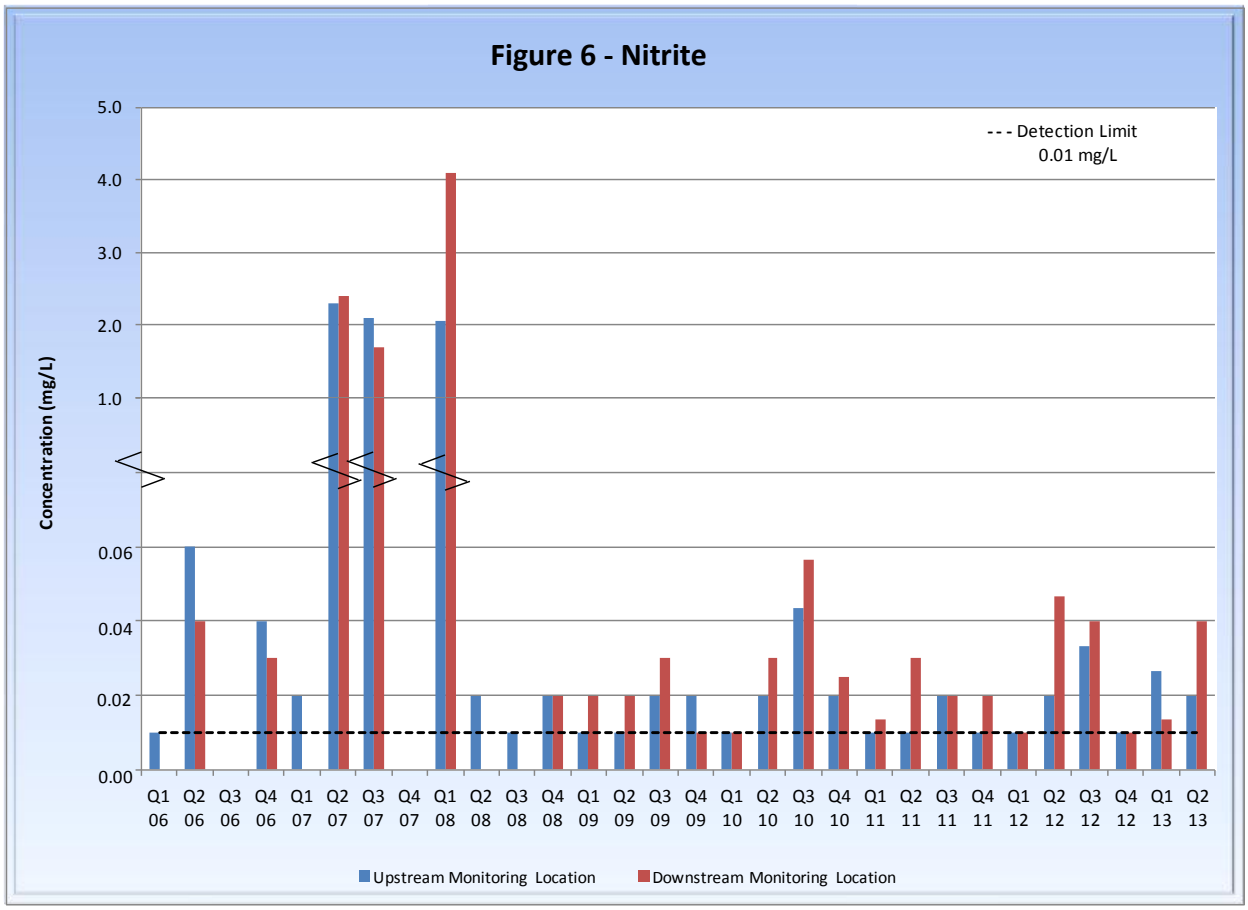


Figure 6 – Nitrate

The concentrations of the inorganic forms of nitrogen (ammonia, nitrate, and nitrite) are generally similar in samples collected from both upstream and downstream locations for each monitoring period. The low ammonia and nitrite concentrations (with the exception of three nitrite samples in 2007Q2, 2007Q3, and 2008Q1) suggest that the majority of inorganic nitrogen present in the Purdam drain is in the form of nitrate. As shown in Figure 6, nitrite concentrations were generally only slightly above detection limits, except in the three samples identified above where the samples ranged from 1.5 to 4.0 mg/L.

Because of the demonstrated predominance of nitrate and the extremely short-life of nitrite in oxygenated surface waters, the data suggest that a requirement to monitor for nitrite provides questionable benefit in assessing potential impact of Lactalis's effluent on surface water quality. We suggest that this requirement be deleted from the list of required monitoring parameters in Lactalis's renewed permit.

Total Kjeldahl Nitrogen

Total Kjeldahl Nitrogen (TKN) concentrations in upstream and downstream water samples are depicted in Figure 7.

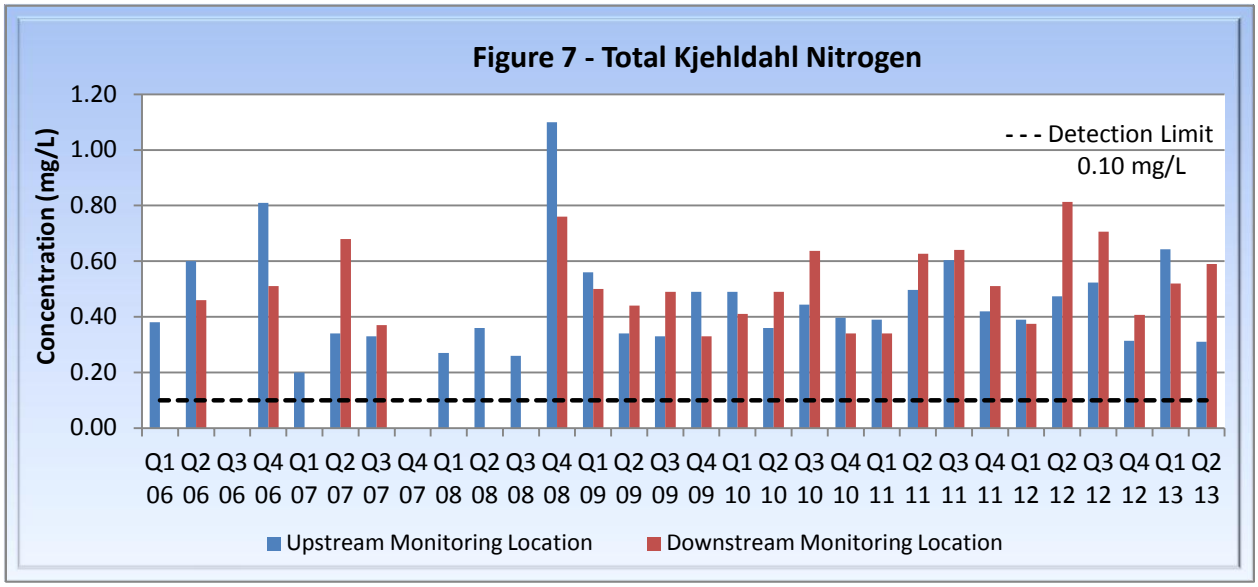


Figure 7 – Total Kjehldahl Nitrogen

TKN represents the combination of organically-bound nitrogen and ammonia. As shown in Figure 4, ammonia concentrations in the Purdam Drain were generally equal to or less than 0.04 mg/L. Thus, upstream and downstream TKN concentrations generally consist of low levels of ammonia and a larger component of organically-bound nitrogen. The existence of high and variable levels of TKN in the data supports the conclusion that the amount of organically-bound nitrogen varies throughout the seasons.

2.3 Phosphate Species, Temperature, and pH

Quarterly analytical results of Lactalis's surface water monitoring program for two phosphate species, temperature, and pH are provided in Table 5.

Table 5– Summary of Surface Water Analytical Results for Phosphate Species, pH, and Temperature

		Upstream Monitoring Location				Downstream Monitoring Location			
		O-P	TP	pH	Temp	O-P	TP	pH	Temp
Year	Quarter	(mg/L)		(s.u.)	(°C)	(mg/L)		(s.u.)	(°C)
2006	Q1 06	0.200	0.220	8.6	10.0	0.20	0.25	8.7	10.0
	Q2 06	0.200	0.210			0.22	0.26		
	Q3 06								
	Q4 06	0.270	0.380	7.5	15.0	0.10	0.16	7.6	14.3
2007	Q1 07	0.080	0.250	8.1	13.5	0.38	0.39		
	Q2 07	0.200	0.200			0.26	0.34		
	Q3 07	0.170	0.220			0.21	0.24		
	Q4 07								
2008	Q1 08	0.220	<0.370	7.5	3.0*	0.21	<0.41	7.0	2*
	Q2 08	0.160	0.170			0.24	0.37		
	Q3 08	0.140	0.200				0.33	7.4	8.1*
	Q4 08	0.210	0.420	7.6	14.2*	0.23	0.31	7.8	6.0*
2009	Q1 09	0.182	0.291	7.8	6.1*	0.22	0.26	7.3	6.5*
	Q2 09	0.085	0.173	7.5	2.4*	0.16	0.29	8.0	4.5*
	Q3 09	0.148	0.188	7.3	5.9*	0.20	0.32	7.9	13*
	Q4 09	0.222	0.255	8.3	1.3*	0.24	0.24	7.7	10.4*
2010	Q1 10	0.209	0.305	7.9	10.0	0.22	0.27	7.9	11.7
	Q2 10	0.125	0.172	7.9	16.5	0.17	0.24	7.9	13.3
	Q3 10	0.178	0.253	7.6	16.4	0.18	0.31	7.7	16.1
	Q4 10	0.225	0.279	7.8	11.7	0.24	0.26	7.8	11.5
2011	Q1 11	0.216	0.290	7.5	9.1	0.23	0.27	7.6	8.7
	Q2 11	0.124	0.226	7.9	11.0	0.14	0.26	7.8	11.0
	Q3 11	0.183	0.245	7.9	14.3	0.19	0.27	7.8	14.0
	Q4 11	0.204	0.237	7.8	11.0	0.22	0.25	7.8	11.0
2012	Q1 12	0.285	0.227	8.0	8.0	0.25	0.22	8.4	8.0
	Q2 12	0.142	0.188	7.8	12.7	0.17	0.24	7.8	12.3
	Q3 12	0.181	0.231	7.9	17.3	0.20	0.35	8.0	17.7
	Q4 12	0.227	0.229	7.9	13.1	0.23	0.24	8.1	13.4
2013	Q1 13	0.220	0.367	7.9	7.3	0.21	0.26	8.0	7.7
	Q2 13	0.280	0.290	7.0	12.0	0.35	0.38	6.9	12.1
Mean		**0.189**	**<0.253**	**7.8**	**10.5***	**0.217**	**<0.285**	**7.8**	**10.6***
Median		**0.200**	**0.234**	**7.8**	**11.0***	**0.217**	**0.265**	**7.8**	**11.0***
Std Dev		**0.051**	**0.066**	**0.330**	**4.549***	**0.056**	**0.058**	**0.385**	**3.747***

General Note: Some concentrations in this table represent the mean results for samples collected during each

Year	Quarter	Upstream Monitoring Location				Downstream Monitoring Location			
		O-P	TP	pH	Temp	O-P	TP	pH	Temp
		(mg/L)		(s.u.)	(°C)	(mg/L)		(s.u.)	(°C)

quarter if more than one sample was collected and analyzed.

* Data not reliable. The same Hach bench-top temperature/pH probe that had provided inaccurate effluent temperature readings prior to Nov 2009 had also been used for surface water temperatures

Ortho-Phosphate and Total Phosphorus

Ortho-phosphate (O-PO_4) and total phosphorus (TP) concentrations in upstream and downstream water samples are depicted in Figure 8 and 9.

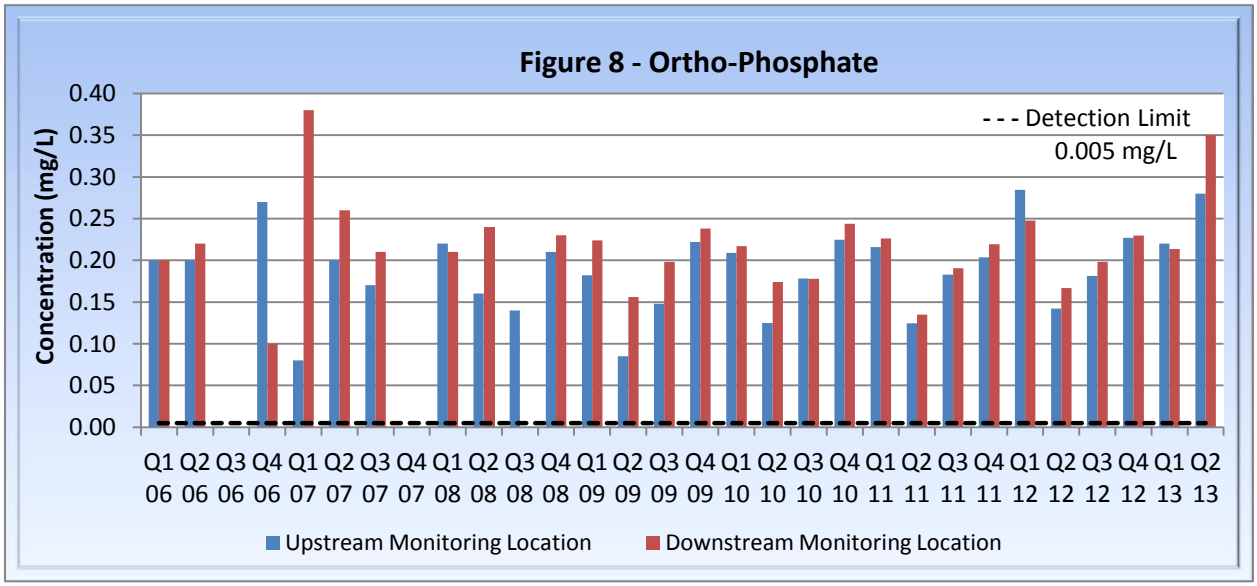


Figure 8 – Ortho-Phosphate

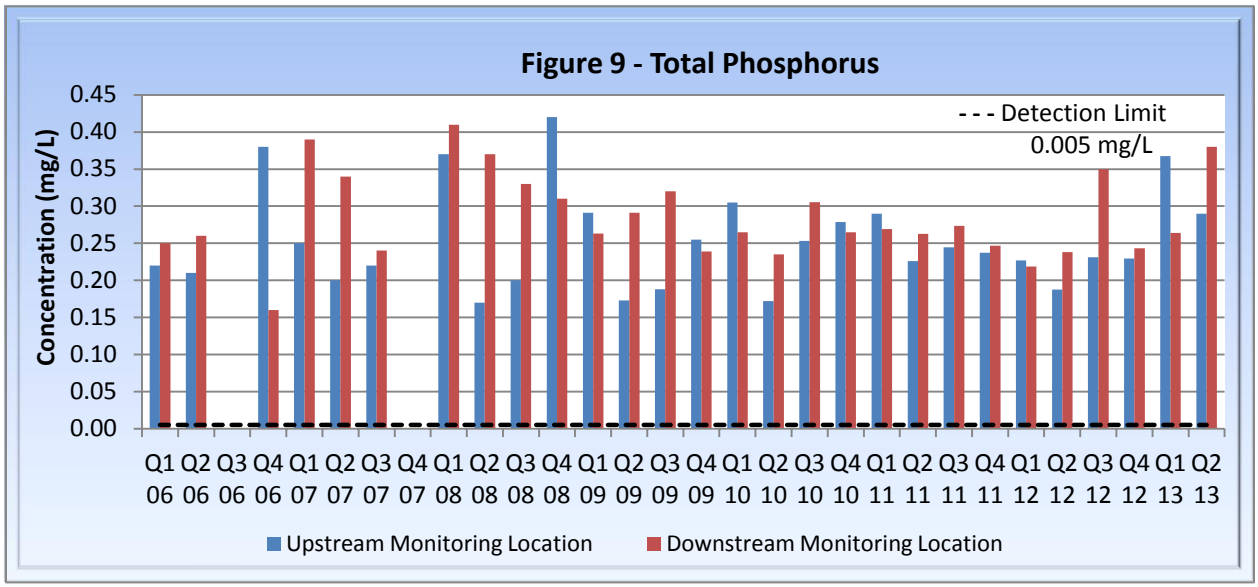


Figure 9 – Total Phosphorus

Table 5 and Figures 8 and 9 suggest a general slight increase in TP and O-PO_4 at the downstream monitoring location compared to the upstream monitoring location. That difference in TP between the two locations ranged from a decrease of 0.310 mg/L to an increase of 0.200 mg/L; the downstream location showed an arithmetic mean increase of 0.024 mg/L total phosphorus compared to the upstream location. Similarly, the difference in O-PO_4 between the two locations ranged from a decrease of 0.120 mg/L to an increase of 0.300 mg/L; the downstream location showed an arithmetic mean increase of 0.023 mg/L ortho-phosphate compared to the upstream location.

It is relevant to note that the downstream monitoring station ("mouth of Purdam Drain into Mason Creek") is located approximately 4½ miles downstream of Lactalis's outfall. We believe that the variability of these phosphorus data suggest that the existing downstream monitoring location is not appropriate to assess actual or potential impacts associated with Lactalis's treated effluent.

Ortho-Phosphate and Total Phosphorus Concentrations

Ortho-phosphate and total phosphorus concentrations at the upstream location are shown in Figure 10 and at the downstream location in Figure 11.

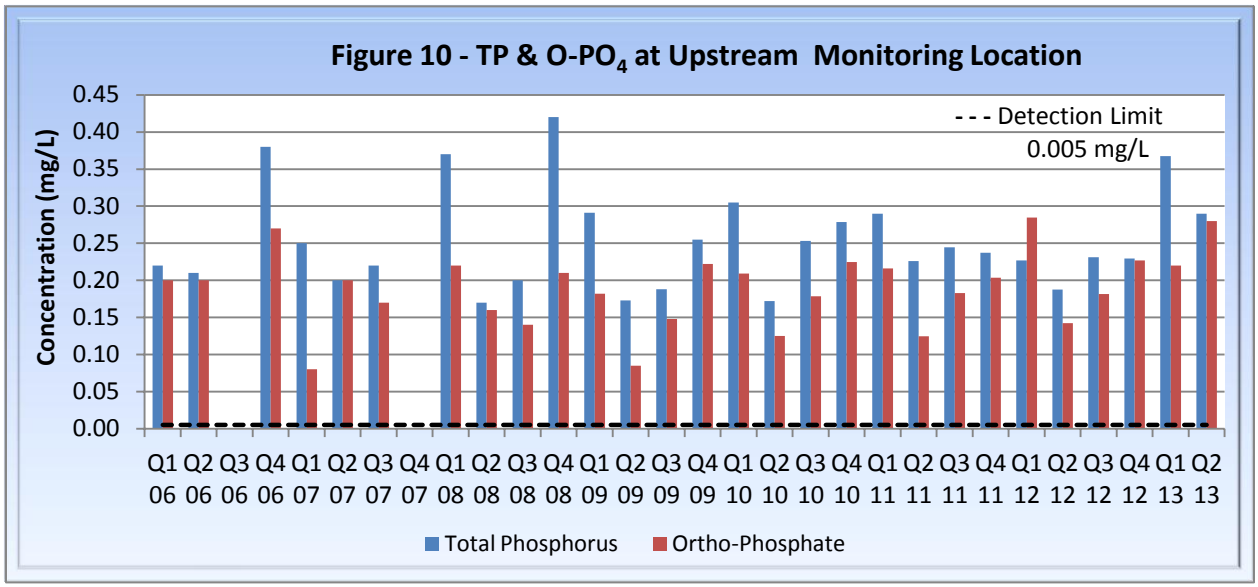


Figure 10 – TP & O-PO_4 at Upstream Monitoring Location

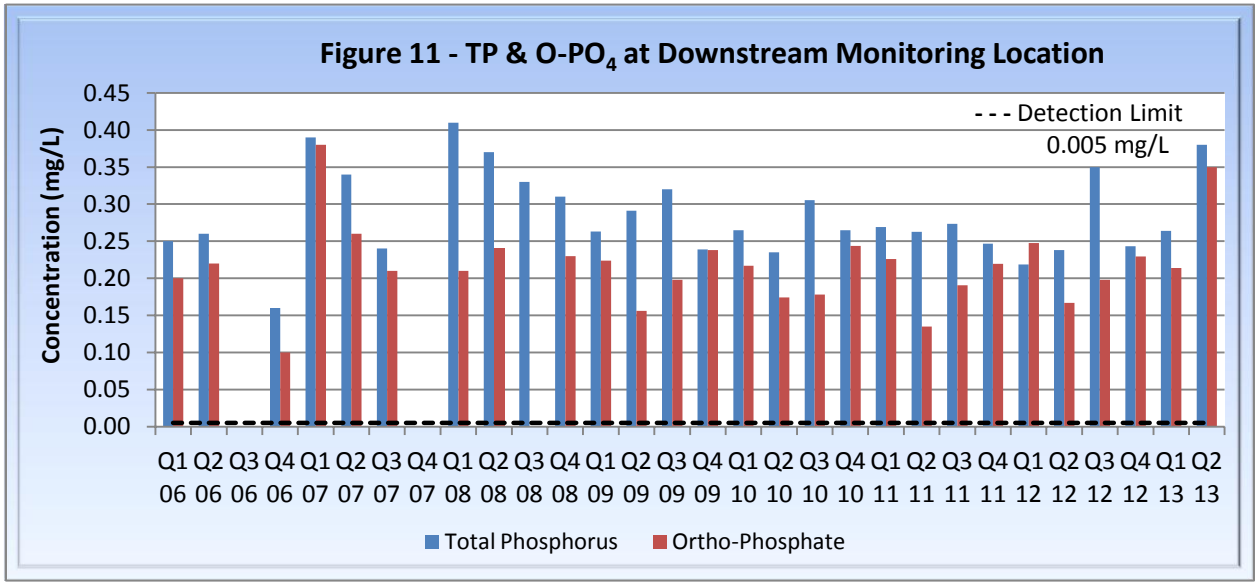


Figure 11 – TP & O-PO_4 at Downstream Monitoring Location

These data indicate that ortho-phosphate comprises from 32% to 100% of total phosphorus over the last 30 quarters of data at the upstream location and 51% to 100% of total phosphorus over the last 30 quarters at the downstream location. Over those periods, the arithmetic mean concentration of ortho-phosphate comprised 74% of total phosphorus in the upstream samples and 76% of total phosphorus in the downstream samples. The variability in these data is to be expected in as much as ortho-phosphate is the chemically active dissolved form of phosphorus

that can be readily assimilated by plants. In-stream variations can be impacted by such variables as temperature, sunlight, plant biomass, and pH.

It was observed in Q1 of 2012 that the ortho-phosphate levels at the upstream and downstream monitoring locations were higher than the total phosphorus levels. These results may reflect a sampling error or laboratory error.

3.0 OPTIONAL BACKGROUND SURFACE WATER MONITORING

Prior sections of this report have noted numerous potential sources of constituents of concern to the Purdam Drain. As part of the permit renewal application, Lactalis initiated additional surface water sampling in order to understand better existing background water quality and the implications of potential water quality impacts associated with discharges of treated effluent from Lactalis's operations. Sampling was initiated at the end of May 2010, prior to the start of the irrigation season, and continued monthly through the summer of 2010. Samples were collected and analyzed on five separate occasions.

3.1 Sampling and Analysis Plan

A Sampling and Analysis Plan was prepared in March, 2010. It is included in the March 24, 2010 letter in Appendix B of this report and is summarized below.

3.1.1 Monitoring Locations

Additional surface water monitoring was undertaken at four locations (in addition to the two locations required by Lactalis's NPDES permit). The locations are described in Table 6 and indicated on an aerial photograph (see Figure 12).

Table 6 – Background Drain Sampling Locations

Monitoring Station	Description	Sampling Location
SW-A	Background - Perkins Drain	Perkins Drain downstream of McDermott Rd.
SW-B	Background - Rachael Drain	Rachael Drain downstream of Franklin Dr.
SW-C	Perkins Drain downstream of Rachael Drain confluence	Perkins Drain approximately 50-ft downstream of Perkins/Rachael confluence
SW-D	Purdam drain downstream of Perkins confluence	Purdam drain approximately 50-ft downstream of Perkins/Rachael confluence
SW-E (current sample pt)	Purdam Drain upstream of outfall	Perkins Drain upstream of Star Rd.
SW-F (current sample pt)	Effluent outfall	Existing effluent outfall sampling location at the wastewater treatment plant

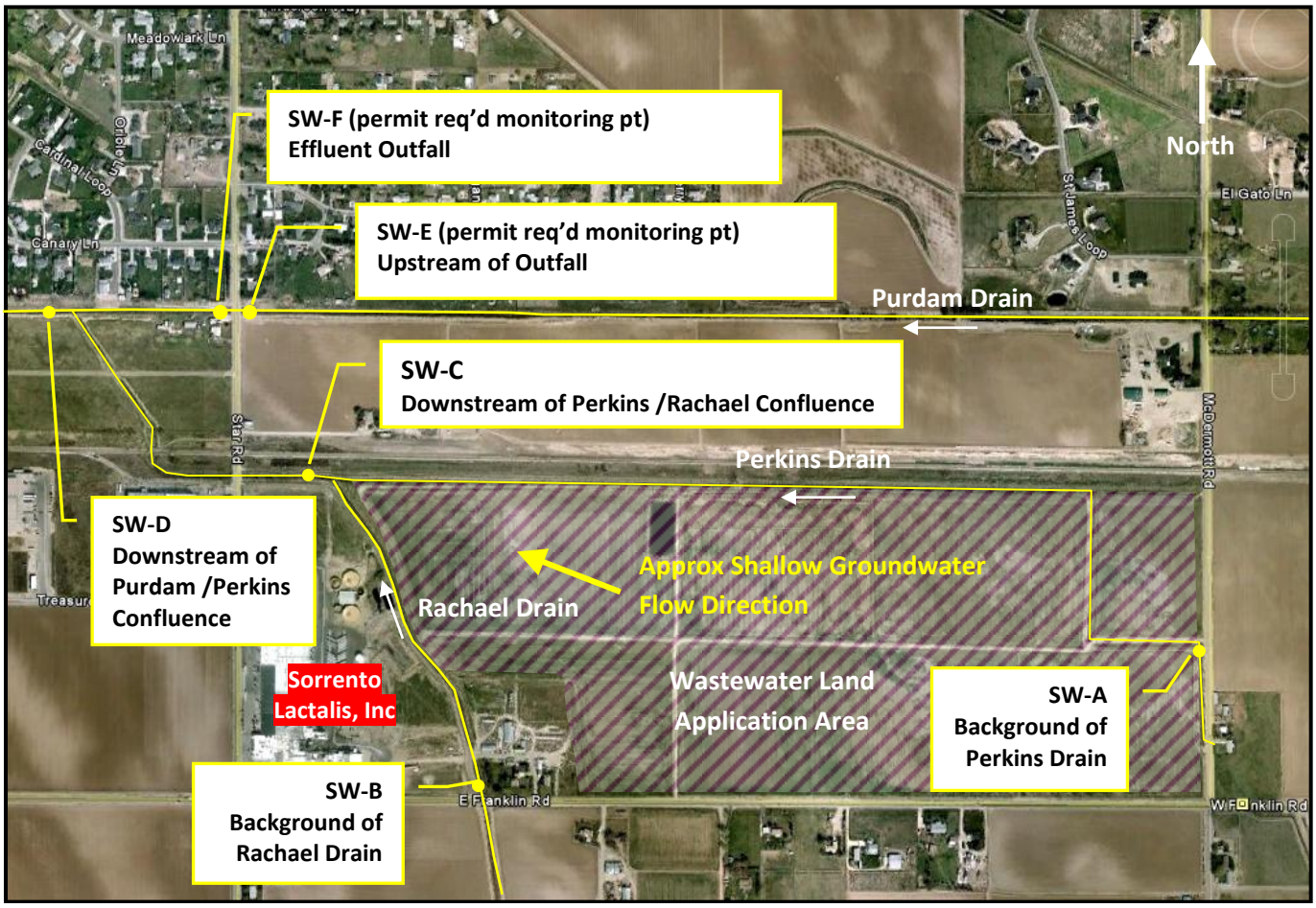


Figure 122 – Background Surface Water Monitoring Locations

Monitoring locations SW-A & SW-B were selected in order to provide an assessment of background water quality data upgradient of Lactalis's land application area and other undocumented lands uses. Monitoring location SW-C is intended to provide data below the convergence of the Perkins and Rachel drains. The difference between background (SW-A + SW-B) and monitoring location SW-C reflects potential impacts of groundwater that may have been impacted by land application and other land uses, i.e., (SW-A + SW-B) – SW-C.
Monitoring location SW-D on the Purdam Drain was selected to provide an insight into water quality data downstream of both Lactalis's outfall and the Perkins Drain. Those data, coupled with background (monitoring stations SW-C & SW-E), help to define potential water quality impacts of Lactalis's effluent on Purdam Drain water quality. Therefore,

Surface Water Impacts = SW-D – (SW-C + SW-E + SW-F)

The downstream monitoring location required by the NPDES permit, i.e., mouth of Purdam Drain into Mason Creek, was also monitored.

3.1.1 Sample Collection and Flow Measuring Procedures

Grab samples were collected at each of the six locations in polypropylene bottles supplied by Analytical Laboratories, Inc (ALI). Following collection, samples were stored in a cooler with ice packets, also supplied by ALI, and transported to the laboratory for analysis. Following collection of each water sample, the cross-sectional area of each sample location was determined using a cloth tape for width and a meter stick to determine depths. Water velocity was measured using a hand-held propeller meter supplied by ALI. Water discharge at each location was calculated from the resultant measurements.

3.1.2 Analytical Parameters

Water samples from each monitoring location were analyzed for the following parameters: flow, total phosphorus, ortho-phosphate, nitrate-N, and Total Dissolved Solids (TDS). Total phosphorus and ortho-phosphate were analyzed because of their importance to the renewal of Lactalis's NPDES permit; nitrate and TDS are parameters associated with reuse/land application permitting.

3.2 Parameter Concentrations

Table 7 summarizes mean water quality concentrations for these background drain locations. Individual data for each of the five sampling periods are provided in Appendix C.

Table 7– Additional Drain Monitoring Summary

Monitoring Location	Flow (MGD) Low/High	Arithmetic Mean Concentration (mg/L)			
		Total Phosphate	Ortho-Phosphate	Nitrate	Total Dissolved Solids
SW-A	0.21/2.13	0.19	0.19	4.20	248
SW-B	1.69/6.01	0.15	0.11	2.74	200
SW-C	2.22/10.89	0.15	0.15	3.14	266
SW-D	7.39/34.30	0.18	0.16	3.36	317
SW-E (existing sample pt)	3.96/32.92	0.17	0.16	2.52	204
SW-F – Effluent (existing sample pt)	0.51/0.69	<0.04	<0.02	3.78	2,266

These data suggest, as hypothesized, that Lactalis's impacts on surface water quality are highly variable and subject to external sources beyond the company's control. For example, background concentrations of TP, O-PO4, and nitrate in the Perkins Drain (SW-A) exceed those from Lactalis's outfall. Rachael Drain background concentrations of TP and O-PO4 also exceed those from the outfall, while slightly less than the outfall for nitrate concentrations. Nutrient data from the remaining background monitoring station, Purdam Drain (SW-E), are consistent with those from Perkins and Rachael drains. Each of these background locations exhibited nutrient concentrations far in excess of those from the outfall. It is also interesting that background

concentrations of nutrients for the Perkins Drain are significantly greater than those associated with the Rachael Drain and the Purdam Drain.

These data further suggest that total phosphorus is primarily comprised of ortho-phosphate (73%-100%) in the Perkins, Rachael, and Purdam Drains and roughly 50% in Lactalis's wastewater effluent.

3.3 Total Phosphorus Mass Loading

Optional surface water monitoring was performed by Lactalis to improve our understanding of the mass of total phosphorus already in the irrigation drains irrespective of Lactalis's contributions. Total phosphorus loadings upstream of Lactalis's effluent outfall (SW-E) ranged from approximately 8 pounds per day (lbs/day) during winter months (prior to the irrigation season) to greater than 50 lbs/day during the irrigation season when drain flows are greater.

TP entering the Purdam drain directly downstream of Lactalis's outfall is represented by monitoring location SW-C, which is the sum of TP loading from SW-A (Perkins Drain) and SW-B (Rachael Drain). Over the course of this limited study, these waters added approximately 3 lbs/day to 13 lbs/day additional total phosphorus into the Purdam Drain. Additional inputs to the Purdam Drain downstream from the Perkins Drain are unknown. Table 8 summarizes the loading of TP at each monitoring location for the five dates in 2010 on which water samples were collected and analyzed.

Table 8– Optional Drain Monitoring - Total Phosphorus Loading

Monitoring Location	Total Phosphorus Loading (lbs/day)				
	March 30, 2010	April 2, 2010	May 6, 2010	June 3, 2010	July 6, 2010
SW-A	0.71	0.68	0.36	0.94	3.62
SW-B	2.68	3.24	1.97	9.52	5.51
SW-C	3.86	2.97	4.80	9.45	13.08
SW-D	11.10	12.78	22.95	44.71	52.60
SW-E (existing sample pt upstream of outfall)	8.25	7.26	9.65	27.45	43.92
SW-F – Lactalis Effluent (existing sample pt)	<0.29[a]	<0.29[a]	0.123	0.149	0.162

Figure 13 depicts the relative loadings of TP identified at each monitoring location on July 6, 2010, with the exception of the existing downstream monitoring site at the mouth of Mason Creek. Water quality and flow data were collected and determined at that monitoring location on July 22, 2010, as a part of Lactalis's routine surface water monitoring program.

The area of each bubble in Figure 13 is proportional to the mass of TP at that monitoring location. Of particular note is the dramatic increase in TP mass between SW-D and the downstream location required by Lactalis's NPDES permit, which is 4 ½ miles downstream. In

this instance, total phosphorus loading increased from 53 lbs/day to 142 lbs/day, a 268% increase. As Figure 13 shows pictorially, total phosphorus loading at every other sampled location is far greater than the total phosphorus released by Lactalis at its outfall (SW-F).

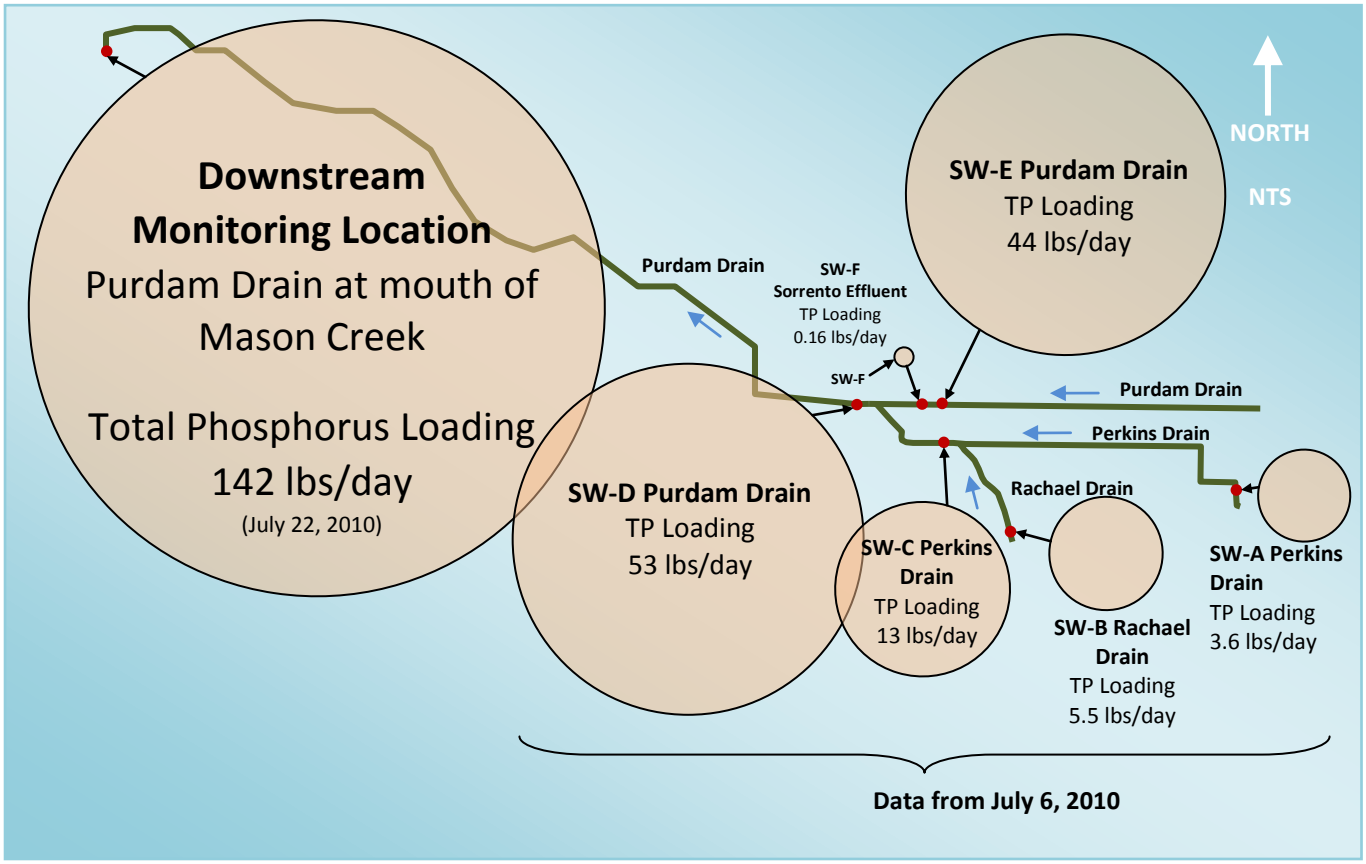


Figure 13 – Schematic of Relative TP Loading in Drains and Lactalis Effluent

As shown in Table 5, total phosphorus concentrations at upstream and downstream locations have remained relatively consistent throughout the year. Therefore, the greatest TP mass loading occurs during periods of high flows. Bubble schematics for total phosphorus loadings on May 6, 2010, and June 3, 2010 would be similar to that of Figure 13. Each of those dates coincided with the higher flows of the irrigation season.

Total phosphorus loadings prior to irrigation season (March 3 and April 2, 2010) showed relatively consistent loadings between SW-D and the downstream monitoring location. Figure 14 depicts the increase in total phosphorus loading between SW-D and the downstream monitoring location calculated for each date.

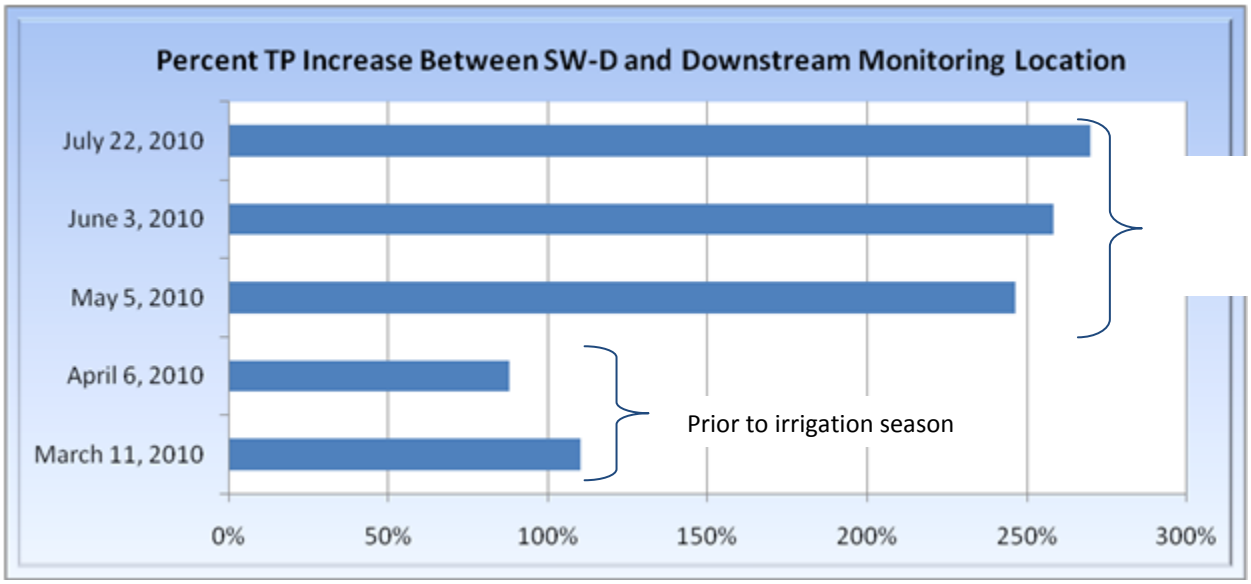


Figure 14 – Percent Total Phosphorus Increase Between SW-D and the Downstream Monitoring Location

The 247%-268% increase in TP mass between May and July from SW-D to the designated downstream monitoring location suggests that undefined influences affect water quality in the drain that cannot be reasonably attributed to Lactalis. Approximately 700 to 900 acres of agricultural land are estimated to drain into the Purdam Drain between Lactalis's effluent outfall and the downstream monitoring location. Those lands may significantly impact flows and constituent concentrations in the Purdam Drain. Their full impact on the water quality of the Purdam Drain remains unknown.

We believe that this surface water study suggests impacts from unknown sources of total phosphorus on the Purdam Drain and its direct tributaries. The study also suggests that EPA should reconsider the location of Lactalis's existing downstream monitoring station.

3.1 Nitrate Loading

Lactalis's optional surface water monitoring program also aids in understanding the mass of nitrate in irrigation drains upstream and immediately downstream of its outfall. Table 9 depicts the nitrate mass from each monitoring location for the five dates in 2010 on which samples were collected and analyzed.

Table 9– Additional Drain Monitoring - Nitrate Mass

Monitoring Location	Nitrate Loading (lbs/day)				
	March 30, 2010	April 2, 2010	May 6, 2010	June 3, 2010	July 6, 2010
SW-A	16.6	18.0	8.4	29.5	52.3
SW-B	67.8	64.9	39.3	75.2	120.3
SW-C	81.7	64.9	104.7	181.7	268.8
SW-D	326.8	255.6	358.6	578.6	789.0
SW-E (existing sample pt)	132.0	118.8	133.6	302.0	576.5
SW-F – Lactalis Effluent (existing sample pt)	27.9	40.1	15.7	9.8	6.4

Figure 15 depicts nitrate loading on each sample date in the Purdam and Perkins drains, upstream and downstream of Lactalis's outfall.

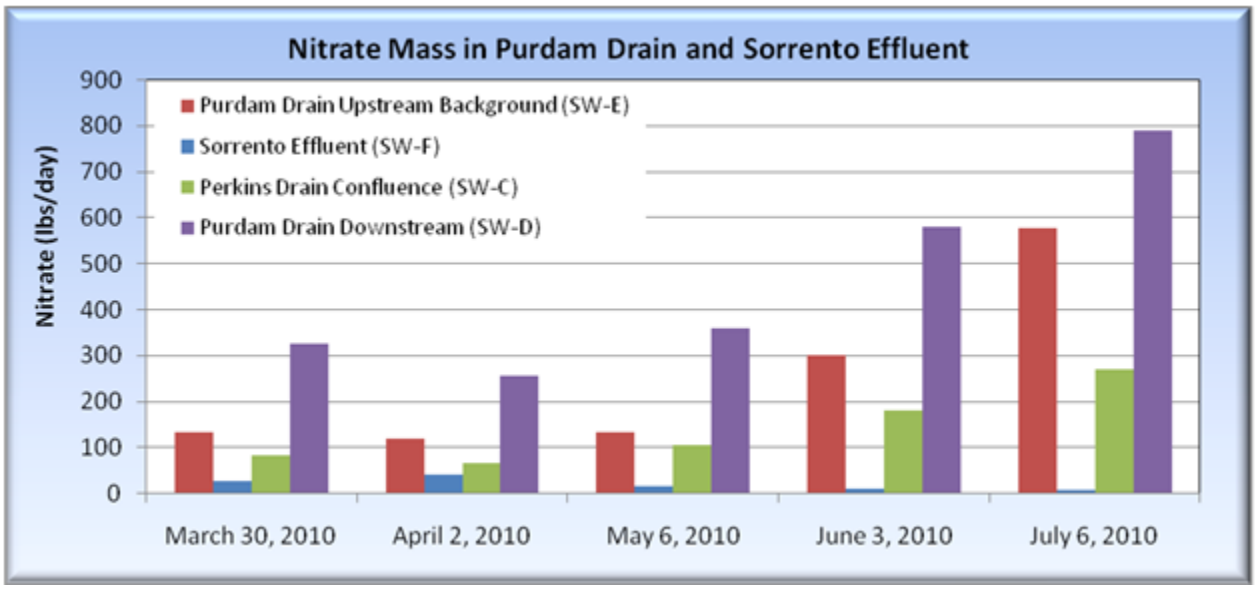


Figure 15 – Nitrate Loading in Drains and Sorrento Effluent

These data suggest that nitrate loadings from the Purdam Drain (SW-E) and Perkins Drain (SW-C) accounted for a majority of nitrate in the Purdam Drain (SW-D) downstream of Lactalis's outfall.

4.0 CONCLUSIONS AND RECOMMENDATIONS

These surface water data suggest that Lactalis's impacts on water quality in the Purdam Drain and downstream waterways are limited. Arithmetic mean total phosphorus concentrations at the

upstream monitoring location were <0.253 mg/L based on 28 quarters of data. That is, background concentrations of total phosphorus in the Purdam Drain were, on average, 3.6 times greater than Lactalis's permit limit (0.07 mg/L).

The Idaho Department of Environmental Quality (DEQ) has adopted the *Idaho Antidegradation Implementation Procedures* rule which includes changes to Idaho's Water Quality Standards in the Idaho Administrative Code (IDAPA) Chapter 58.01.02, Sections 010 and 052. The rule requires DEQ to evaluate effects on water quality for each parameter of concern and to determine whether an activity or discharge results in an improvement, no change, or degradation of water quality. The rule also specifies that water quality effects will be based on the calculated change in concentration in the receiving water as a result of a new or reissued permit. Because background concentrations of total phosphorus have ranged from two to six times greater than that in Lactalis's effluent, we anticipate that DEQ will determine that the Lactalis's existing total phosphorus effluent limit does not degrade water quality.

If EPA maintains the current TP concentration limit of 0.07 mg/L in Lactalis's renewed permit we request that the mass-based limit be based on an average monthly wastewater flow of 1.52 MGD. That flow would increase Lactalis's TP mass loading limit to 0.89 lbs/day and accommodate planned and potential facility expansion,. That increased loading would represent less than 1% of TP mass in the Purdam Drain at the mouth of Mason Creek during peak flow periods.

Finally, Lactalis requests that EPA designate a new downstream surface water monitoring location that better reflects the actual and potential impacts of its effluent. We recommend a location a few hundred yards downstream of Lactalis's outfall at the location identified below in Figure 16 as "Proposed Downstream Surface Water Monitoring Location 1" and as SW-D in our study. The location is on land zoned "U" for university controlled by Boise State University.

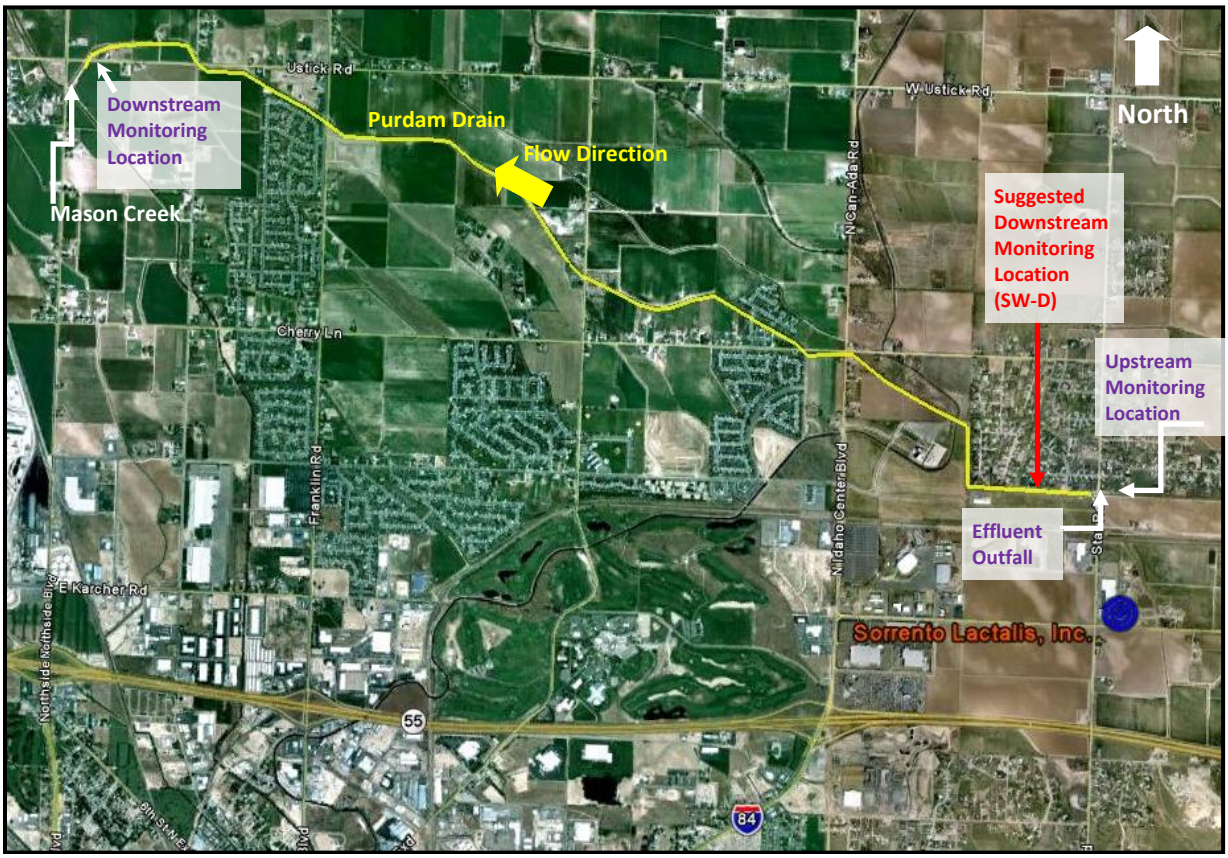


Figure 16 – Surface Water Monitoring Location

APPENDICES

Appendix A Surface Water Monitoring Analytical Results
Appendix B Sampling and Analysis Plan
Appendix C Optional Background Surface Water Monitoring Results

Appendix A.

Surface Water Monitoring Analytical Results

Sorrento lactalis, Inc.
Surface Water Monitoring Analytical Results

	Upstream Monitoring Location								Downstream Monitoring Location							
	NH_3 direct (as N)	NO_3+ NO_2 (as N)	NO_2 (as N)	TKN	O-PO_4 (as P)	T-P (as P)	pH	Temp[b]	NH_3 direct (as N)	NO_3+ NO_2[a] (as N)	NO_2[a] (as N)	TKN[a]	O-PO_4 (as P)	T-P (as P)	pH	Temp[b]
Date	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	Deg C	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	Deg C
3/15/2006	<0.04	4.50	0.01	0.38	0.20	0.22	8.6	10	<0.04				0.20	0.25	8.7	10
6/26/2006	0.05		0.06	0.60	0.20	0.21			<0.04		0.04	0.46	0.22	0.26		
11/30/2006															7.7	13.6
12/14/2006	0.04	5.50	0.05	0.53	0.31	0.36	7.5	15							7.5	15
12/21/2006															7.7	
12/29/2006	<0.04		0.03	1.09	0.22	0.40			<0.04		0.03	0.51	0.10	0.16		
3/29/2007	<0.04	4.20	0.02	0.20	0.08	0.25	8.05	13.5	<0.04				0.38	0.39		
6/22/2007		2.40	2.30	0.34	0.20	0.20				2.50	2.40	0.68	0.26	0.34		
8/31/2007		3.80	2.10	0.33	0.17	0.22				2.50	1.70	0.37	0.21	0.24		
1/22/2008	<0.04	4.27	4.1	0.55	0.22	<0.5[c]	7.9		<0.04	4.74	4.10	<1[c]	0.21	<0.5[c]	7.9	
3/21/2008	<0.04	4.40	0.01	0.27	0.21	0.23	7	3	<0.04				0.21	0.32	7	2
5/15/2008	<0.04	1.50	0.02	0.36	0.16	0.17			<0.04				0.24	0.37		
7/11/2008						0.23								0.33		
7/21/2008															7	13.6
8/12/2008															7.2	6.1
9/22/2008															7.9	4.5
9/25/2008	<0.04	1.85	0.01	0.26	0.14	0.16										
10/16/2008	<0.04	4.74	0.02	1.20	0.21	0.55	7.4	27								
11/12/2008	<0.04	4.07	0.02	0.52	0.22	0.26	7.7	13.4	<0.04	4.29	0.02	0.64	0.23	0.27	7.6	13.6
11/12/2008							7.8	16							8.02	4.3
11/12/2008							7.1	8.3								
12/16/2008	0.10	5.01	0.03	1.57	0.21	0.45	7.5	8.3	<0.04	4.85	0.02	0.88	0.23	0.35	7.73	0.06
12/16/2008							8.07	12								
1/21/2009	<0.04	4.61	0.02	0.83	0.22	0.34	7.6	16	<0.04[d]	4.82	0.02	0.41	0.24	0.25	7.42	3.9
1/21/2009							7.7	3								
2/17/2009	<0.04	4.34	0.01	0.55	0.206	0.285	7.98	3.6	<0.04	4.66	0.01	0.55	0.210	0.261	6.98	7.8
3/27/2009	<0.04	5.21	0.01	0.30	0.119	0.249	8.02	1.8	<0.04	5.18	0.02	0.55	0.223	0.278	7.62	7.8
4/14/2009	<0.04	1.44	<0.01	0.10	0.078	0.144	7.75	1	<0.04	2.40	0.02	0.53	0.142	0.290	7.9	5.9
5/21/2009	<0.04	1.74	<0.01	0.49	0.099	0.201	7.42	1.1	<0.04	2.79	0.02	0.38	0.155	0.292	7.68	6.4
6/19/2009	<0.04	1.25	0.01	0.43	0.077		7.38	5.1	<0.04	2.07	0.03	0.42	0.172		8.28	1.3
7/25/2009							7.4	5.6							7.8	14
8/14/2009	<0.04	2.46	0.02	0.36	0.155	0.188	7.3	5.4	<0.04	2.44	0.03	0.67	0.201	0.320	8.07	12
9/17/2009				0.30	0.141		7.11	6.8				0.31	0.195		7.7	
10/1/2009	<0.04	1.82	0.02			0.168			<0.04	2.27	0.01			0.207	7.59	1.3
10/13/2009				0.42								0.30				
10/31/2009							8.28	1.3								
10/16/2009					0.225								0.244			
11/10/2009	<0.04	4.09	0.02	0.37	0.211	0.246			<0.04	4.41	0.02	0.42	0.219	0.257	7.59	16
12/2/2009	0.23	3.78	0.02	0.68	0.230	0.350			<0.04	4.37	0.01	0.39	0.250	0.253	7.99	14
1/5/2010	0.07	4.91	0.02	0.67	0.228	0.361			<0.04	6.21	0.02	0.34	0.242	0.284	7.7	16
2/2/2010	<0.04	4.24	0.01	0.38	0.207	0.261	7.46	10	<0.04	4.68	0.01	0.42	0.220	0.256	7.86	10
3/11/2010	<0.04	3.72	0.01	0.43	0.193	0.292	8.3	10	<0.04	4.34	0.01	0.48	0.190	0.255	8.2	9
4/6/2010	<0.04	4.00	0.02	0.24	0.168	0.231			<0.04	3.98	0.02	0.37	0.191	0.234	8.1	9
5/5/2010				0.49	0.100	0.138	7.9	17				0.56	0.162	0.232	7.8	16
6/3/2010	0.07	0.93	0.01	0.34	0.108	0.148	7.83	16	<0.04	1.74	0.03	0.54	0.169	0.240	7.75	15
7/22/2010	0.08	2.15	0.05	0.46	0.151	0.227	7.1	18	0.05	2.45	0.05	0.66	0.165	0.295	7.6	17
8/6/2010	<0.04	2.59	0.06	0.60	0.200	0.278	7.82	18	<0.04	2.64	0.10	0.85	0.191	0.367	7.83	18
9/10/2010	0.11	1.72	0.02	0.27	0.184	0.254	7.78	13.1	0.08	2.32	0.02	0.4	0.213	0.254	7.77	13.4
10/11/2010	0.07	3.32	0.02	0.31	0.215	0.234	7.97	14.1	<0.04	3.43	0.03	0.38	0.212	0.238	7.94	14.3
11/16/2010	<0.04	3.94	NT	0.30	0.226	0.256	7.86	12	<0.04	4.23	NT	0.30	0.263	0.286	7.96	12
12/22/2010	<0.04	4.71	0.02	0.58	0.233	0.346	7.47	8.9	<0.04	6.77	0.02	0.34	0.256	0.270	7.63	8.1
1/26/2011	0.05	4.56	0.01	0.55	0.232	NT	7.34	9	<0.04	4.91	0.01	0.33	0.251	NT	7.43	9
2/10/2011	<0.04	4.13	<0.01	0.38	0.206	0.29	7.35	8.2	<0.04	5.14	<0.01	0.26	0.225	0.269	7.59	8.4
3/2/2011	<0.04	4.27	0.01	0.24	0.210	NT	7.70	10.1	<0.04	4.02	0.02	0.43	0.202	NT	7.79	8.6

Note[a]: Data not required per current NPDES permit.

Note[b]: Data not reliable. The Hach bench top temp/pH probe which had been providing inaccurate effluent temperature readings prior to Nov 2009

Note[c]: Tests run at Minimum Detection Limits greater than required by current NPDES permit due to laboratory error.

Note[d]: NT = Not tested

Note[e]: LE = Lab error

Sorrento lactalis, Inc.
Surface Water Monitoring Analytical Results

	Upstream Monitoring Location								Downstream Monitoring Location							
	NH_3 direct (as N)	NO_3+ NO_2 (as N)	NO_2 (as N)	TKN	O-PO_4 (as P)	T-P (as P)	pH	Temp[b]	NH_3 direct (as N)	NO_3+ NO_2[a] (as N)	NO_2[a] (as N)	TKN[a]	O-PO_4 (as P)	T-P (as P)	pH	Temp[b]
Date	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	Deg C	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(s.u.)	Deg C
4/15/2011	<0.04	3.53	0.01	0.41	0.095	0.239	8.18	9	0.06	2.33	0.02	0.58	0.116	0.264	7.72	10
5/3/2011	<0.04	1.31	<0.01	0.51	0.076	0.128	7.86	12	<0.04	2.91	0.04	0.65	0.122	0.230	7.98	11
6/1/2011	0.06	2.57	NT	0.57	0.202	0.311	7.57	12	0.09	2.24	NT	0.65	0.167	0.294	7.65	12
7/1/2011	0.07	3.00	NT	0.64	0.217	0.294	7.87	16.8	0.07	2.70	NT	0.68	0.217	0.316	7.80	15
8/15/2011	0.07	2.80	0.02	0.61	0.177	0.219	7.90	16	0.08	2.51	0.02	0.61	0.172	0.246	7.90	17
9/6/2011	<0.04	2.58	NT	0.56	0.154	0.221	7.84	10	<0.04	2.49	NT	0.63	0.183	0.258	7.77	10
10/4/2011	<0.04	5.12	NT	0.40	0.164	0.199	7.68	15	<0.04	2.69	NT	0.46	0.194	0.240	7.68	10
11/1/2011	<0.04	5.09	NT	0.42	0.221	0.228	7.92	10	<0.04	5.19	NT	0.42	0.233	0.236	7.88	11
12/2/2011	<0.04	4.84	0.01	0.44	0.226	0.285	7.72	8	0.46	4.83	0.02	0.65	0.231	0.264	7.79	12
1/3/2012	<0.04	4.43	NT	0.40	0.302	0.249	7.70	8	<0.04	4.87	NT	0.33	0.25	0.251	8.07	8
2/15/2012	<0.04	4.10	<0.01	0.38	0.267	0.205	8.39	8	<0.04	4.36	0.01	0.42	0.245	0.186	8.64	8
March 2012	no discharge								no discharge							
4/4/2012	<0.04	4.01	0.02	0.40	0.200	0.230	8.42	11	0.19	8.88	0.08	0.72	0.206	0.230	8.21	11
5/2/2012	<0.04	1.64	0.02	0.43	0.103	0.132	7.87	11	<0.04	2.09	0.02	0.57	0.128	0.187	7.95	11
6/1/2012	<0.04	2.07	0.02	0.59	0.124	0.201	7.15	16	0.10	2.43	0.04	1.15	0.166	0.297	7.31	15
7/5/2012	0.16	3.82	0.06	0.83	0.175	0.225	8.40	16.6	0.09	2.65	0.08	0.94	0.196	0.402	8.06	17.2
8/1/2012	<0.04	2.49	0.02	0.39	0.177	0.244	7.45	18	<0.04	3.09	0.02	0.61	0.194	0.336	8.12	18
9/4/2012	0.07	1.93	0.02	0.35	0.192	0.225	7.74	17.3	<0.04	2.62	0.02	0.57	0.204	0.312	7.91	17.8
10/1/2012	<0.04	2.03	LE	0.29	LE	0.155	8.11	16.4	<0.04	2.89	LE	0.38	LE	0.219	8.19	16.1
11/1/2012	<0.04	4.34	<0.01	0.29	0.216	0.248	8.18	12	<0.04	4.39	<0.01	0.40	0.214	0.245	8.35	13
12/1/2012	<0.04	5.57	0.01	0.36	0.238	0.285	7.54	11	<0.04	6.22	0.01	0.44	0.245	0.266	7.67	11
1/3/2013	0.13	5.80	0.06	1.26	0.216	0.606	8.06	6	<0.04	5.03	0.01	0.69	0.216	0.296	8.41	6
2/1/2013	<0.04	4.20	0.01	0.41	0.249	0.285	7.22	8	<0.04	4.55	0.02	0.41	0.248	0.276	7.45	8
3/1/2013	<0.04	3.93	0.01	0.26	0.195	0.211	8.43	8	<0.04	4.81	0.01	0.46	0.177	0.220	8.08	9
4/1/2013	<0.04	3.46	0.02	0.31	0.280	0.290	7.02	12	0.04	3.53	0.04	0.59	0.350	0.380	6.92	12.1
Mean	<0.05	3.51	<0.18	0.48	0.178	<0.259	7.7	10.9	<0.06	3.80	<0.20	<0.53	0.209	<0.278	7.8	10.8
Median	<0.04	3.94	<0.02	0.41	0.200	<0.239	7.8	10.6	<0.04	3.98	<0.02	<0.48	0.210	<0.264	7.8	11.0
Std Dev	0.034	1.274	0.711	0.251	0.053	0.094	0.38	5.27	0.061	1.445	0.732	0.188	0.046	0.058	0.35	4.56

Note[a]: Data not required per current NPDES permit.
Note[b]: Data not reliable. The Hach bench top temp/pH probe which had been providing inaccurate effluent temperature readings prior to Nov 2009
Note[c]: Tests run at Minimum Detection Limits greater than required by current NPDES permit due to laboratory error.
Note[d]: NT = Not tested
Note[e]: LE = Lab error

Appendix B.

Sampling and Analysis Plan

FORSGREN Associates Inc.

March 24, 2010

John Prigge
Wastewater Manager
Sorrento-Lactalis
4912 E. Franklin Rd.
Nampa, ID 83653

Re: Sampling and Analysis Plan - Drains

Dear John:

In order to better define existing background water quality and water quality impacts associated with Sorrento operations, we propose to initiate a limited surface water sampling plan in the area. We propose to begin sampling within the week to capture data for the permit application prior to irrigation season and continue to collect data through the summer to supplement the permit application data as needed.

Proposed monitoring stations, analytical parameters, and suggested schedule are shown below.

Monitoring Locations

We propose monitoring at four locations in addition to the two locations currently monitored by Sorrento. The locations are shown on the attached figure.

Monitoring Station	Description	Sampling Location
SW-A	Background - Perkins Drain upstream of Land Application (LA)	Perkins Drain downstream of McDermott Rd.
SW-B	Background - Rachael Drain upstream of LA	Rachael Drain downstream of Franklin Dr.
SW-C	Perkins Drain downstream of LA	Perkins Drain approximately 20-ft downstream of Perkins/Rachael confluence
SW-D	Purdam drain downstream of Perkins confluence	Purdam drain approximately 20-ft downstream of Perkins/Rachael confluence.
SW-E (existing)	Purdam Drain upstream of outfall	Perkins Drain upstream of Star Rd. – existing sampling location
SW-F	Effluent outfall	Existing effluent outfall sampling

Monitoring Station	Description	Sampling Location
(existing)		location at the wastewater treatment plant (approximate 2,000-ft south of discharge point at Purdam Drain)
SW-G (existing)	Purdam Drain at Mason Creek downstream of outfall (referred to as "mouth of Purdam")	Purdam Drain at Ustick Rd. (south of Ustick Rd, east of Northstart

Monitoring stations A & B will provide background data upgradient of Sorrento's land application area. Monitoring location C will provide data below the convergence of the Perkins and Rachel drains. The difference between background (A & B) and monitoring station C should provide an indication of the impact of groundwater flow through the land application area on the Perkins drain.

Groundwater impacts from Sorrento land application area = C – (A+B)

Monitoring station D on the Purdam Drain will provide data downstream of both the effluent outfall and the Perkins Drain. These data, along with the background data (monitoring stations C & E), will help define potential impacts of the effluent outfall on the drain.

Sorrento Impacts = D – (C+E+F)

The downstream monitoring station G (Purdam Drain at Mason Creek) should continue to be monitored as required by the NPDES permit. However, because this location is located approximately 4.5 miles downstream of the effluent outfall, many variables could contribute to an increase in phosphorus at that point (e.g., runoff from ag land). Therefore it is not a useful location for isolating Sorrento's impacts.

Parameters

We suggest that the monitoring locations be sampled for the parameters shown in the table below.

Parameter	Analytical Cost- Per sample
Flow	30-60 minutes per location (Forsgren)
Flow meter	$30/day (Analytical Laboratories, Inc).
Total Phosphorus	$21 (Analytical Laboratories, Inc)
Ortho Phosphorus	$17 (Analytical Laboratories, Inc)
Nitrate-N	$18 ($25 for Nitrate Low 0.02 mg/l) (Analytical Laboratories, Inc)
Total Dissolved Solids	$12 (Analytical Laboratories, Inc)

Total and ortho-phosphorus are critical parameters for NPDES permitting and nitrate and Total Dissolved Solids (TDS) are important for reuse/land application permitting.

Schedule

In order to monitor flows and water quality prior to irrigation season, we propose sampling each location, with the exception of monitoring point G (Mouth of Mason Cr.), twice prior to irrigation season. The first samples and flow measurements will be taken before the end of March, and then again in early April. The samples taken in April can correspond with the monthly sampling currently performed by Sorrento, with our suggested additional monitoring locations also being sampled. Subsequently, all locations will be sampled for water quality parameters monthly, on the same day, throughout the summer. Flow measurements will be taken twice during the irrigation season.

Work Plan

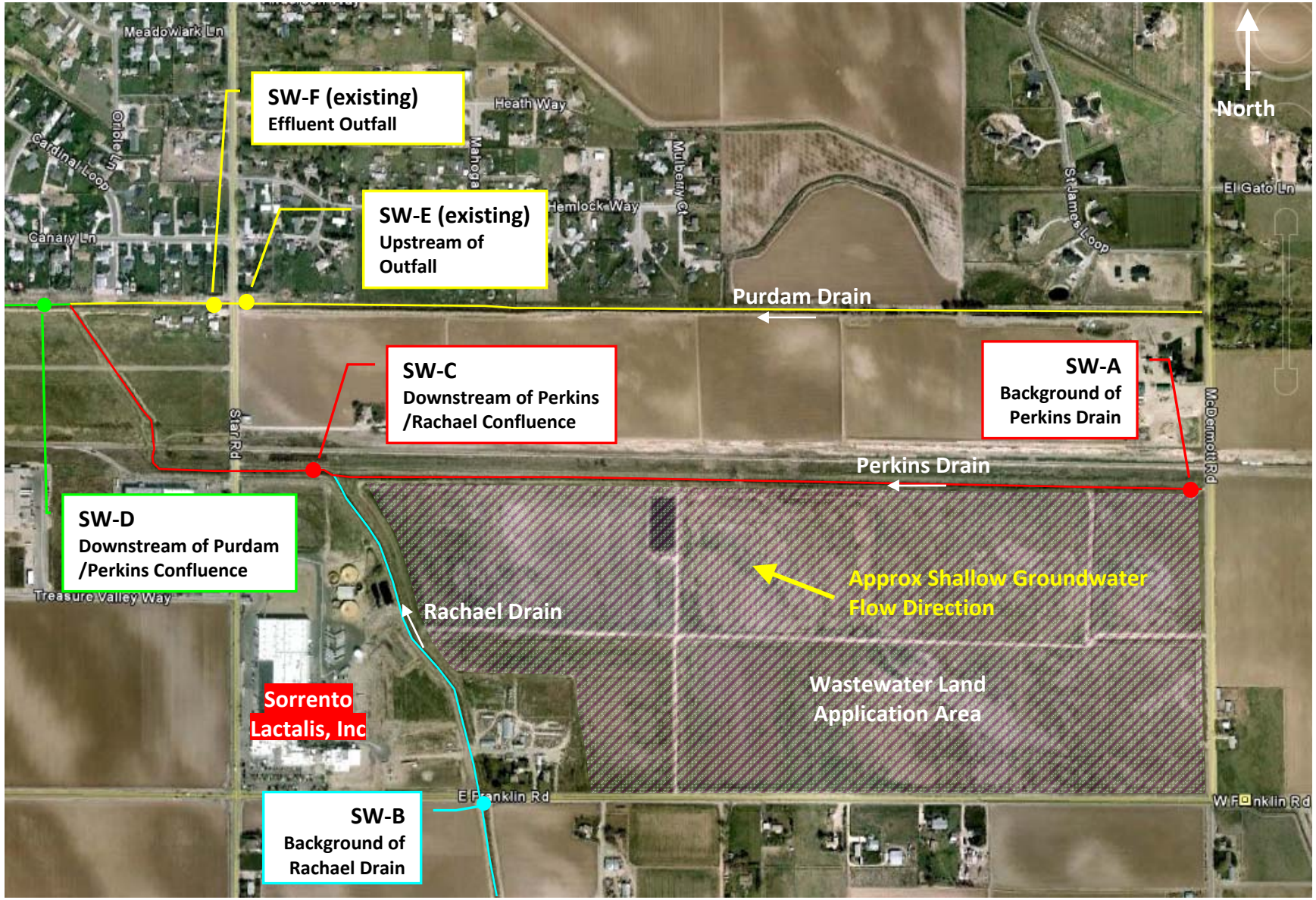
Forsgren proposes to determine flow at each location not currently measured by Sorrento with a staff gage. We would convey the first two sets of samples to Analytical Labs for analysis. We propose to pay for these first two sets of analyses under our existing authorized scope of work. We suggest that all samples be collected by the same person to promote consistency. Options include Sorrento monitoring the additional points (A-D) in addition to the locations currently monitored (E&G). Or Forsgren could monitor all locations until we have gathered the data necessary for permitting purposes.

Let's chat when you have had an opportunity to consider this proposal. We are pleased to be working with you on this important project.

Thank you,

John R. Moeller, Ph.D.
Forsgren Associates

Enc: Surface Water Monitoring Station Figure



Sorrento Lactalis - Surface Water Monitoring Stations Figure

Appendix C.

Optional Background Surface Water Monitoring Results

Sorrento Lactalis, Inc.
Optional Background Surface Water Monitoring Results

Date	Test Performed	Units	Background of Perkins Drain	Background of Rachael Drain	Confluence of Perkins and Rachael Drains	Purdam Drain downstream of confluence	Purdam Drain Upstream of Outfall	Effluent Outfall
			SW-A	SW-B	SW-C	SW-D	SW-E	SW-F
30-Mar-10	Flow	cfs	0.63	2.62	4.21	11.44	6.12	1.06
		mgd	0.41	1.69	2.72	7.39	3.96	0.68
	Nitrate	mg/l	4.9	4.8	3.6	5.3	4.0	4.9
		lb/d	16.6	67.8	81.7	326.8	132.0	27.9
	Ortho Phosphate	mg/l	0.21	0.15	0.17	0.18	0.21	<0.05
		lb/d	0.71	2.12	3.86	11.10	6.93	<0.29
	Total Phosphate	mg/l	0.21	0.19	0.17	0.18	0.25	<0.05
		lb/d	0.71	2.68	3.86	11.10	8.25	<0.29
	Total Dissolved Solids	mg/l	262	244	300	368	274	2170
		lb/d	890	3,446	6,808	22,693	9,039	12,375
2-Apr-10	Flow	cfs	0.63	3.54	3.44	12.48	6.12	1.06
		mgd	0.41	2.29	2.22	8.07	3.96	0.69
	Nitrate	mg/l	5.3	3.4	3.5	3.8	3.6	7
		lb/d	18.0	64.9	64.9	255.6	118.8	40.1
	Ortho Phosphate	mg/l	0.2	0.13	0.15	0.17	0.19	<0.05
		lb/d	0.68	2.48	2.78	11.44	6.27	<0.29
	Total Phosphate	mg/l	0.2	0.17	0.16	0.19	0.22	<0.05
		lb/d	0.68	3.24	2.97	12.78	7.26	<0.29
	Total Dissolved Solids	mg/l	308	248	314	452	298	2150
		lb/d	1,046	4,732	5,822	30,406	9,831	12,304
6-May-10	Flow	cfs	0.33	4.56	8.09	26.61	13.77	0.91
		mgd	0.21	2.95	5.23	17.20	8.90	0.59
	Nitrate	mg/l	4.7	1.6	2.4	2.5	1.8	3.2
		lb/d	8.4	39.3	104.7	358.6	133.6	15.7
	Ortho Phosphate	mg/l	0.19	0.07	0.11	0.14	0.09	<0.005
		lb/d	0.34	1.72	4.80	20.08	6.68	<0.025
	Total Phosphate	mg/l	0.2	0.08	0.11	0.16	0.13	0.025
		lb/d	0.36	1.97	4.80	22.95	9.65	0.123
	Total Dissolved Solids	mg/l	284	160	232	278	130	2150
		lb/d	505	3,933	10,117	39,875	9,649	10,561
3-Jun-10	Flow	cfs	2.49	9.3	13.48	48.79	50.93	0.79
		mgd	1.61	6.01	8.71	31.53	32.92	0.51
	Nitrate	mg/l	2.2	1.5	2.5	2.2	1.1	2.3
		lb/d	29.5	75.2	181.7	578.6	302.0	9.8
	Ortho Phosphate	mg/l	0.09	0.12	0.13	0.14	0.09	0.005
		lb/d	1.2	6.0	9.4	36.8	24.7	0.021
	Total Phosphate	mg/l	0.07	0.19	0.13	0.17	0.1	0.035
		lb/d	0.9	9.5	9.4	44.7	27.5	0.149
	Total Dissolved Solids	mg/l	166	190	212	240	120	2480
		lb/d	2,228	9,525	15,404	63,118	32,943	10,574
6-Jul-10	Flow*	cfs	3.29	5.74	16.85	53.07	25.01	1.05
		mgd	2.13	3.71	10.89	34.30	16.16	0.68
	Nitrate	mg/l	3.9	2.4	3.7	3	2.1	1.5
		lb/d	52.3	120.3	268.8	789.0	576.5	6.4
	Ortho Phosphate	mg/l	0.27	0.1	0.18	0.19	0.2	0.005
		lb/d	3.6	5.0	13.1	50.0	54.9	0.021
	Total Phosphate	mg/l	0.27	0.11	0.18	0.2	0.16	0.038
		lb/d	3.6	5.5	13.1	52.6	43.9	0.162
	Total Dissolved Solids	mg/l	220	160	270	248	196	2380
		lb/d	2,953	8,021	19,618	65,222	53,807	10,148
Average Concentrations	Nitrate	mg/l	4.20	2.74	3.14	3.36	2.52	3.78
	Ortho Phosphate	mg/l	0.19	0.11	0.15	0.16	0.16	<0.02
	Total Phosphate	mg/l	0.19	0.15	0.15	0.18	0.17	<0.04
	Total Dissolved Solids	mg/l	248	200	266	317	204	2,266

Grey cells represent calcuated values

*note: On July 6th groundwater seeping into the canals was evident on the sides of the ditches

Attachment 2.

Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 1 – Purdam Drain NPDES Upstream Monitoring Location
Date Taken: May 23, 2013

Purdam Drain at NPDES upstream monitoring location, looking downstream (west). Star Road is located across the top of the photo. There are two agricultural runoff pipes, one on each side, which drain into the Purdam Drain. These two are located directly upstream of Star Road. Agricultural drains are common throughout the length of the Purdam Drain and are also common in other irrigation drains. The water is translucent with no aquatic life or vegetation observed below the water surface. There is vegetation along the steep embankments on either side.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 2– Sorrento Lactalis Plant Outfall along south side of Purdam Drain downstream of Star Road
Date Taken: May 23, 2013

Purdam Drain at Star Road, looking downstream (west). The drain is trapezoidal and runs straight, bordering two private properties. The drain is approximately 8 feet wide, and the water surface is roughly 12 vertical feet beneath the road surface. On the right (north side), the Nampa & Meridian Irrigation District has an easement along the drain. The red arrow points at the approximate location of the NPDES permitted outfall.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 3 – Purdam Drain at Potential Downstream Monitoring Location
Date Taken: May 23, 2013

Purdam Drain at potential downstream monitoring location, looking upstream (east). This new potential downstream monitoring location is downstream of Star Road. It is approximately 250 yards downstream of the NPDES permitted outfall and 75 feet upstream of the Perkins Drain confluence. The water is translucent with no aquatic life or vegetation observed below the water surface. The drain is approximately 8 feet wide and runs parallel along the neighboring properties. There is vegetation along the embankments on either side.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

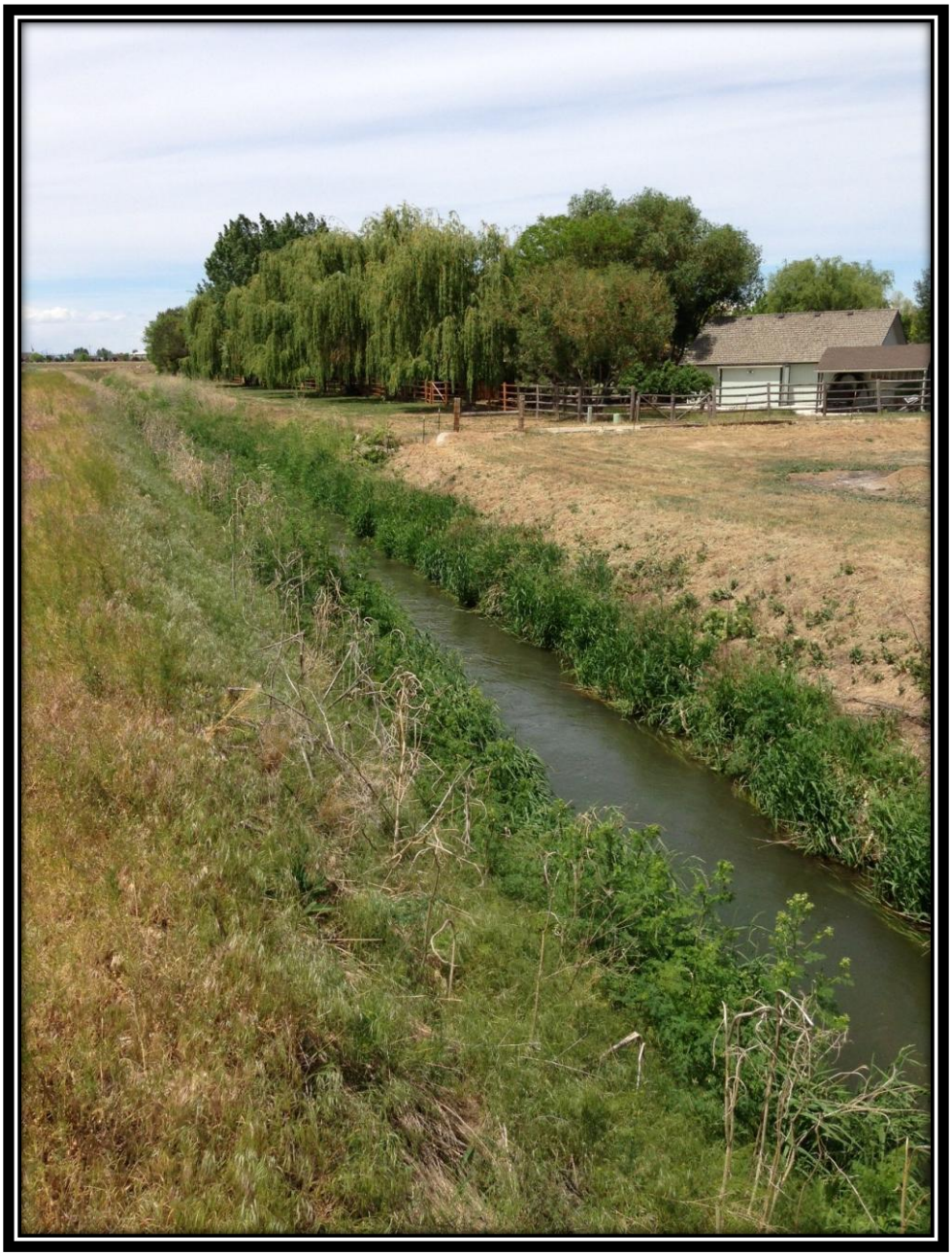


Photo 4 – Purdam Drain downstream of confluence with Perkins Drain and Star Road
Date Taken: May 23, 2013

Purdam Drain, downstream of the Perkins Drain confluence and looking west (downstream). The top of the embankment is roughly 10-15 vertical feet above the water surface. Vegetation is visible on the embankments but not below the water surface. The drain continues to run parallel between two property lines.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 5– Purdam Drain NPDES Upstream Monitoring Location
Date Taken: March 30, 2010

Purdam Drain flowing from right to left (east to west) and entering a culvert under Star Road. The man in the photo was at the existing upstream NPDES monitoring location which is just east of Star Road. As seen in Photo 1, the drain was vegetated along its embankment (nearest the water) with no aquatic life or vegetation observed below the water surface. The corrugated pipe in the background drains a neighboring agricultural field to the drain, as is common along this drain and other irrigation drains.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 6 – Purdam Drain downstream of confluence with Perkins Drain
Date Taken: March 30, 2010

Purdam Drain taken roughly 300 yards downstream (west) of the NPDES permitted outfall, looking upstream (east). The channel is trapezoidal due to its man-made nature and runs straight, bordering two private properties. The Perkins Drain confluence is identified with a red arrow. The drain was approximately 8 feet wide. Similar to previous photos, no vegetation was visible beneath the water surface.

Attachment 2. Photos of Purdam Drain from May 2013 and March 2010 including potential new downstream monitoring location.

Photo 7 – Purdam Drain
Date Taken: March 30, 2010

Purdam Drain was observed to be approximately 1.5 feet deep and 8 feet wide as shown in previous photos. It is trapezoidal with steep embankments on either side. The water was translucent with no visible aquatic life or vegetation below the water surface. This was before irrigation water was turned on for the year.

Attachment 3.

April 16, 2005 DEQ letter regarding designated and existing uses in the Purdam Drain

June 16, 2005

Mike Lidgard
NPDES Permits
Region 10
Seattle, WA

RE: Discharge of Treated Effluent to Purdam Drain, near Nampa, Idaho

Dear Mr. Lidgard:

Sorrento Lactalis is preparing to discharge treated effluent from a cheese factory into Purdam Drain, near Nampa, Idaho. The discharge is to be authorized under the Clean Water Act by a NPDES permit pending issuance by EPA. In preparing the permit, EPA has inquired of DEQ the beneficial use for which Purdam Drain is protected. This letter relays DEQ's determination of the designated and existing use for Purdam Drain so as to inform calculation of appropriate water quality based effluent limits and determination of whether more treatment than based on national technology based limits might be necessary.

Purdam Drain, as its name indicates, functions to carry away excess irrigation water and agricultural runoff. Purdam Drain is not designated in section 140 of Idaho's Water Quality Standards and Wastewater Treatment Requirements, IDAPA 58.01.02 (WQS). It is a tributary to Mason Creek, which is designated in Section 140 for protection of cold water aquatic life.

DEQ staff visited Purdam Drain near the proposed point of discharge on April 13, 2005. DEQ determined Purdam Drain was a man-made, constructed waterway, based on the following observations: 1) the bank for Purdam Drain is regular, deeply incised, steeply trapezoidal cross-section; 2) the channel is straight and turns abruptly to follow property lines; and 3) there are remnants of old excavation material. An examination of digitized aerial imagery further confirmed the fact that Purdam Drain flows along property lines, rather than natural drainages in the topography. Additional evidence that Purdam Drain was developed to convey agricultural water is evident by: 1) frequent drain pipes entering from agricultural fields; and 2) its control and management by the Nampa-Meridian Irrigation District.

Therefore, DEQ has determined that Purdam Drain is a "man-made waterway" as defined in section 03.63 of Idaho's WQS, and thus, is protected as called for in section 101.02 – Man-Made Waterways. As stated in section 101.02 "man-made waterways are to be protected for the use for which they were developed". Since the Purdam Drain was developed and is used to convey agricultural water, the water quality criteria for agricultural water supply set forth in section 252.02 of the WQS should be applied.

The WQS also require the protection of existing beneficial uses. DEQ has visited the Purdam drain. During this visit, DEQ observed no fish. While this limited observation of the aquatic life uses in the drain does not allow us to make a definitive determination as to existing uses, there is other information which DEQ believes suggests that cold water aquatic life is not an "existing use" in the drain.

DEQ monitored ten sites on five streams draining the nearby Boise Foothills, of similar size but more natural in character than Purdam Drain, in the summer of 1996. We believe these similar but more natural sites can be used for evaluating the likelihood of cold water biota use in the drain. Six of the ten sites were dry. The other four sites ranged in flow from 1.3 cfs to 13.3 cfs. Aquatic macroinvertebrates were sampled at each of these four sites and no cold water indicators organisms were found.

Based upon DEQ's experience evaluating water bodies in Idaho, DEQ believes the physical character of the drain, the lack of riparian areas, the fact DEQ observed no fish during its visit, and comparison to the similar sites discussed above, suggest that there is no existing cold water aquatic life use in the drain. In this case, we believe the narrative criteria in Section 200 will be protective of any aquatic life that may be present in the drain. Therefore, any water quality-based effluent limits calculated for the proposed Sorrento discharge should be based on meeting the narrative criteria in Section 200 and the agricultural water supply criteria in Section 252.02. These criteria will protect the agricultural use of the water as well as the uses identified at 100.03 (b),(c), 100.04 and 100.05, which apply to all surface waters of the state including Purdam Drain. Effluent limits should also be sufficiently stringent to protect the downstream cold water aquatic life use in Mason Creek, using the full flow of Purdam Drain for mixing.

Sincerely,

Barry N. Burnell

Barry N. Burnell
Administrator
Water Quality Division

BNB:MM:te

c: Doug Conde, DEQ Ag's Office
Brian Nickel, EPA Region 10
Dusty Galliher, Sorrento Lactalis
Craig Shepard, Boise Regional Office

Attachment 4.

December 2007 Finding of No Significant Impact and Final Environmental Assessment (EA/FONSI) on the proposed transfer of certain Bureau of Reclamation (BOR) facilities to the Pioneer Irrigation District (PID) including portions of the Purdam Drain

RECLAMATION
Managing Water in the West

Finding of No Significant Impact
Final Environmental Assessment

Pioneer Irrigation District
Proposed Title Transfer
Boise Project, Idaho

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
Boise Idaho

December 2007

U.S. Department of the Interior

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

Mission of the Bureau of Reclamation

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

FINDING OF NO SIGNIFICANT IMPACT

Pioneer Irrigation District Proposed Title Transfer
Boise Project, Idaho

U.S. Department of the Interior
Bureau of Reclamation
Snake River Area Office

PN FONSI 07-07

Introduction

The Bureau of Reclamation (Reclamation) prepared this Finding of No Significant Impact (FONSI) to comply with the Council on Environmental Quality's regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA). This document briefly describes the Proposed Action, the alternatives considered, the scoping process, Reclamation's consultation and coordination activities, and Reclamation's finding. The Final Environmental Assessment (EA) fully documents the analyses.

Background

Where appropriate, Reclamation works with project beneficiaries and other stakeholders to transfer ownership of certain Federal irrigation facilities to non-Federal entities that request a transfer and are capable of managing the facilities, and where the Federal investment in the facilities has been repaid.

Pioneer Irrigation District (PID), established in 1901, diverts water from the Boise River into a system of laterals and canals for delivery to lands in Canyon County, Idaho. PID constructed the majority of the water conveyance system. Pursuant to contracts beginning in 1913 between Reclamation and PID, Reclamation constructed drainage system facility improvements (conveyance channels) within PID's service area. The United States holds title to these drainage facilities, including the associated land interests. These facilities represent approximately 35 percent of the total drainage system currently operated and maintained by PID.

At the request of PID, Reclamation analyzed the effects of transferring to the District, the United States' title, rights, and interests to these drainage facilities within PID's service area that were constructed and are owned by Reclamation. Through transfer of title, Reclamation

would be divested of any responsibility for the operation, maintenance, management, regulation of, and liability for the subject facilities. The primary result of the title transfer would be elimination of duplicative administrative actions performed by Reclamation and the District relative to the operation and maintenance (O&M) of the facilities. PID has fully met its repayment obligation to the United States Treasury for the costs associated with the construction of the drainage facilities.

In August 2007, Reclamation issued a Draft EA to document the analysis of the potential effects of title transfer on the human environment.

Purpose and Need

Reclamation's purpose and need for the proposed title transfer is to reduce or eliminate costs associated with administering the project facilities that could be efficiently and effectively managed by non-Federal entities and which are not of national importance. This action would allow Reclamation to use its resources more effectively in other areas of water resource management and allow PID to be more efficient in its O&M of the transferred facilities.

The facilities and land interests included in this proposal are limited to those federally-owned facilities which are operated and maintained by PID and lie within the District's boundary (approximately 35 percent of the total drainage system currently operated and maintained by PID). At present, even though PID has paid in full its repayment obligations for the federally-owned portion of the drainage system, title remains with the United States.

Alternatives Considered

The EA addressed two alternatives: Alternative A – No Action; and Alternative B – Proposed Action, Title Transfer. NEPA regulations require the action agency to consider a No Action alternative for comparative analysis purposes.

Alternative A – No Action

Under the No Action alternative, the United States (Reclamation) would retain its interests in the conveyance channels and PID would continue to operate and maintain these channels as part of its irrigation and drainage systems. Reclamation would continue to involve PID for review of and concurrence with any requests by individuals, organizations, or other government entities to modify, encroach upon, or use Reclamation's conveyances.

Alternative B – Proposed Action, Title Transfer

Under the Proposed Action, the Secretary of the Interior would convey to PID all interest in and right/title to Reclamation's drainage facilities and associated land interests within the District's

service area. These facilities are all operated and maintained by PID and represent approximately 35 percent of the total drainage system currently operated and maintained by PID. These facilities consist of drainage conveyance channels and associated rights-of-way, easements, and fee title lands. No other land areas are involved. No water rights, storage rights, water distribution/management agreements, or facilities of other entities would be affected.

The Preferred Alternative

Reclamation intends to proceed with further activities toward the transfer of title as described in Alternative B. This alternative would eliminate administrative costs associated with Reclamation's administration of the existing federally-owned facilities that lie within PID's boundary. This alternative is consistent with the Federal government's initiative to work better and cost less. The proposed transfer would require development of terms and conditions for a transfer, along with subsequent legislation by Congress to authorize Reclamation to complete a title transfer in accordance with defined terms and conditions.

Environmental Commitments

As part of the EA, Reclamation analyzed the potential effects of title transfer on the human environment. By regulation (36 CFR 800), title transfer is considered to adversely affect cultural resources where such resources exist. This section summarizes mitigation measures for these adverse effects. Implementation of these mitigation activities will be required prior to or as part of the proposed title transfer.

Alternative B includes the transfer of title to all conveyance facilities (drainage channels) that are currently owned by Reclamation. Federal law and regulation define "historic properties" to include prehistoric and historic sites, buildings, structures, districts, and objects that are included in or eligible for inclusion in the National Register of Historic Places. When a historic property is in Federal ownership, the agency must seek alternatives that would avoid or minimize adverse effects. Thus, Federal ownership provides a measure of protection to historic properties, and when title leaves Federal control, the loss of protection constitutes an adverse effect.

A Reclamation-sponsored Class III cultural resources survey identified one National Register-eligible property (i.e., the drainage system). Reclamation and the State Historic Preservation Office (SHPO) have agreed that Reclamation would mitigate the adverse effect to the PID drainage system by documenting the significance of the PID drainage system to the development of agriculture in the Treasure Valley. The documentation would be presented as a separate historic narrative and include historic records, modern and historic photographs, and drawings. This mitigation would be stipulated in a Memorandum of Agreement (MOA) to be signed by the SHPO, Reclamation, and PID, prior to implementation of the Proposed

Action. The stipulated mitigation could be completed prior to, or following the proposed transfer, in accordance with the MOA.

Reclamation found no other adverse environmental effects requiring mitigation during the analysis.

Consultation and Coordination

During the EA process, Reclamation coordinated and consulted with other groups and agencies. This section briefly describes these activities.

National Historic Preservation Act of 1966

The National Historic Preservation Act of 1966 (NHPA), requires that prior to authorizing an undertaking, Federal agencies must take into account the effect of the undertaking on any properties eligible for or listed on the National Register of Historic Places. Federal regulations entitled Protection of Historic Properties (36 CFR 800) defines the process for implementing requirements of the NHPA, including consultation with the appropriate State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation.

Continuing consultation and coordination has been conducted with the SHPO pursuant to requirement of the NHPA. The SHPO reviewed and concurred with the scope of work for addressing cultural resources (Section 3.6), and would be party to a negotiated MOA governing treatment and/or protection of any resources eligible for nomination to the National Register of Historic Places.

Endangered Species Act

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. On March 2, 2007, Reclamation sent letters to the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) to request current lists of listed and proposed species for the area that may be affected by the transfer of title. In March 2007, Reclamation received an email from USFWS containing an updated species list covering the project area. Additionally, Reclamation received a letter dated March 12, 2007 from NOAA Fisheries concluding that no ESA-listed species under their jurisdiction occur within the watersheds of the project area. Reclamation concludes that title transfer will have no effect on any threatened and endangered species.

Tribal Coordination and Consultation

The NEPA scoping letter referenced above was sent to involved Indian Tribes in order to determine if the tribes have issues or concerns related to the proposed title transfer. No

indication has been received from the tribes that such issues or concerns exist, and no further consultation is deemed warranted.

Public Comments during the Scoping Process and Reclamation's Responses

Pursuant to NEPA requirements, as part of EA preparation, Reclamation sent a "scoping letter" (dated February 27, 2007) requesting comments, concerns and identification of issues related to Proposed Action. The letter was sent to potentially affected and concerned agencies, organizations, individuals, and Tribes. Appendix C contains a copy of the scoping letter and the mailing list.

Thirteen written responses to the scoping letter were received during a 30-day comment period; a listing of the entities and individuals who provided comments is provided below.

- Ada County Highway District (ACHD)
- Ada County Parks and Waterways
- Canyon County Parks, Recreation and Waterways
- City of Boise, Public Works Department
- City of Caldwell, Office of City Engineer and Public Works Director
- City of Caldwell, Mayor
- City of Nampa, Public Works Department
- F.A.C.T.S. (Foundation for Ada/Canyon Trail Systems)
- Hamilton, Michaelson & Hilty, LLP
- James Budolfson
- Idaho Water Users Association
- Idaho Department of Parks and Recreation
- Spectrum Environmental, Inc.

Comment correspondence is summarized in a table and included in Appendix C. The main issues mentioned, which are addressed in the EA, were:

- Transfer of the subject facilities to a different public entity (addressed in Section 2.4)
- Use of facility corridors (easements, rights-of-way, etc.) for public pathways (addressed in Section 3.1),
- Status of other use agreements (e.g. city utility easements) associated with facility segments (addressed in Section 3.1), and

- Use of drains for urban stormwater runoff (addressed in Section 3.2).

Comments to the Draft Environmental Assessment and Reclamation's Responses

The Draft EA was mailed to approximately 110 Federal, State, local agencies, elected officials, Indian tribes, irrigation districts, and interest groups for a 30-day comment period. During the preparation of the Final EA, Reclamation focused on the respondent's issues and questions from initial scoping to determine if there were any significant effects.

Reclamation received letters supporting the proposed action from the City of Eagle, the Idaho Waters Users Association, and Moffatt Thomas representing Pioneer Irrigation District. Comments letters noting specific concerns were received from Ada County Development Services; City of Nampa Public Works Department; Andy Tiller; Hamilton, Michaelson, and Hilty representing the City of Caldwell; and Perkins Coie representing Ada County Highway District. The Final EA includes the specific comments and Reclamation's associated responses in Appendix F. Several common concerns were addressed in the comment letters. These concerns are summarized in the subsections below, along with Reclamation's general response to each concern.

Concern 1 – Environmental Protection Agencies' (EPA) Statement on Stormwater Runoff

The September 14, 2007 letter from Perkins Coie, on behalf of the ACHD, included a July 20, 2007 letter from the EPA regarding irrigation return flows and stormwater runoff (Appendix F). Reclamation acknowledges that EPA's letter provides clarification of issues associated with a long-standing legal or regulatory concern that Reclamation and affected irrigation districts have had regarding the introduction of stormwater runoff to single-purpose irrigation drains. The EPA statement is applicable to the current situation, where some of the drains within the PID boundaries are federally owned, and a post-transfer situation, where the full drainage system would be owned by PID. The EPA position does not affect the existing requirement for discharges to federally-owned drainage facilities within the PID boundaries to be authorized under a permit from Reclamation and approved by the irrigation district (see Reclamation's *Regional Policy on the Discharge of Stormwater Drainage*, Appendix B). Reclamation has identified five authorized stormwater discharges to Reclamation facilities within the PID boundaries; these authorized discharges would not be affected by the proposed title transfer. PID has indicated that following a potential transfer, the District would review and make decisions on future requests for stormwater discharge permits analogous to their current role in approving permit applications for Reclamation's authorization of any non-agricultural discharges to canals or drains.

Concern 2 – Urban Runoff: Volume/Timing and Water Quality Issues

The Draft EA summarized positions taken by PID regarding the District's concerns about managing urban stormwater volumes in the drainage system facilities and the regulatory status of irrigation return flows and/or stormwater runoff. As noted above, legal and regulatory concerns are clarified by EPA's July 20, 2007 guidance letter. The information included in the Draft EA was intended to disclose and clarify the District's interest in approaching Reclamation about a potential title transfer. Reclamation's purpose for considering a potential title transfer is reflected in its title transfer framework (Appendix A) which is to reduce costs and responsibility for project facilities that can be efficiently and effectively managed by non-Federal entities and that are not of national importance. While the proposed title transfer would address Reclamation's purpose and need and satisfy PID's intent for seeking title transfer, it would not resolve current disagreements between PID and other entities regarding urban runoff volume and timing and urban runoff water quality. Reclamation has revised the Final EA to reflect the differing positions of other entities regarding urban runoff volume and timing and urban runoff water quality.

Concern 3 – Reclamation's Framework for the Transfer of Title

Several comment letters referenced Reclamation's Framework for the Transfer of Title and questioned whether the proposed transfer to PID would meet criteria in the Framework. Specific criteria that were referenced in the comments involve:

- The Federal Treasury, and thereby the taxpayer's financial interest, must be protected (criterion #1). In this case, PID has met its repayment obligation and the Federal Treasury will therefore be protected.
- There must be compliance with all applicable State and Federal laws (criterion #2). Reclamation fully intends to comply with all State and Federal laws during any potential title transfer. Specific Federal legislation would be required to authorize Reclamation to transfer title. Regarding issues relating to PID's approach to permitting stormwater discharges, Reclamation's understanding is that if a transfer is authorized, the District would review and make decisions on future requests for stormwater discharge permits analogous to their current role in approving permit applications for Reclamation's authorization of any non-agricultural discharges to canals or drains. This understanding is reflected in the Final EA.
- The public aspects of the project must be protected (criterion #6). Public aspects referenced in the Framework for the Transfer of Title involve authorized non-reimbursable uses, i.e., authorized uses for which the United States is not reimbursed under a repayment contract or similar agreement. These uses generally include recreation, fish and wildlife enhancement, and/or flood control where authorized for specific Reclamation projects. The federally-owned drains of the PID drainage system were authorized under the Reclamation Act of 1902 for irrigation-related purposes and

> predominantly involve easements (rather than fee title ownership) obtained for those irrigation purposes. The authorized uses for the federally-owned drains of the PID drainage system do not include additional public aspects as referenced above (i.e., nonreimbursable recreation, fish and wildlife enhancement, or flood control purposes). As a result, the proposed title transfer is consistent with Reclamation's application of the Framework for the Transfer of Title relative to public aspects of the project.

Comment letters also noted the Framework's general guidance that a project would remain in Federal ownership if substantive objections by a project beneficiary cannot be resolved. Reclamation recognizes that other entities are interested in, and have expressed concerns about, management of stormwater runoff in a potential post-transfer scenario. These concerns are relevant to Reclamation's Framework for the Transfer of Title rather than to the NEPA analysis, and it is premature in the title transfer process to determine that such concerns cannot be resolved. The terms and conditions for a transfer, along with any related transfer legislation, may address and resolve current objections.

Concern 4 – Economic Issues

Economic issues referenced in comments received by Reclamation include potential costs to taxpayers for drainage infrastructure that may be needed if urban stormwater could not be discharged to PID drains. Reclamation has identified five authorized stormwater discharges to Reclamation facilities within the PID boundaries; these authorized discharges would not be affected by the proposed title transfer. PID has indicated that following a potential transfer, the District would review and make decisions on future requests for stormwater discharge permits analogous to their current role in approving permit applications for Reclamation's authorization of any non-agricultural discharges to canals or drains. Reclamation understands that PID's current policy is to not allow or accept stormwater from non-agricultural sources in its facilities. While PID's policy may affect third-party costs for accommodating stormwater runoff, Reclamation believes that the proposed title transfer would not change PID's current policy and would not result in significant economic impacts to current or future authorized discharges.

One comment letter referenced potential economic costs for urban members of PID if a transfer resulted in additional liabilities for these members without corresponding urban runoff benefits. The relevant drainage facilities are transferred facilities, meaning that PID is currently responsible for O&M issues. As a result, liability is effectively with PID in the current situation and would also be with the District following the proposed title transfer. One effect of title transfer would be that Reclamation would no longer be involved in any questions regarding liabilities that may be incurred by PID for transferred portions of the drainage system, thereby eliminating the potential for Reclamation to incur costs related to such involvement (see Section 2.3 of the EA). As analyzed in the EA, title transfer would not affect PID's current stormwater runoff policies or the District's O&M of the overall drainage system.

Concern 5 – General Information Not Included in the Draft EA Analysis

Some comments on the Draft EA included references to additional information not directly referenced or incorporated in Reclamation's NEPA analysis.

As noted above, the EPA's July 20, 2007 letter was attached to one comment letter and was referenced in another letter. It is included in this Final EA (Appendix F).

The September 14, 2007 letter from Hamilton, Michaelson & Hilty, LLP, on behalf of the City of Caldwell, references an analysis of stormwater runoff from agricultural areas and from urban areas that was completed by the City. This information was subsequently provided by Hamilton, Michaelson & Hilty, LLP, in an October 3, 2007 letter. Reclamation has added language to the Final EA to reference this analysis.

One of the comment letters references: (a) the potential for perennial flow in most or all of the drains, (b) observations that some fishing occurs in the drains, and (c) an Idaho Department of Environmental Quality (DEQ) study that includes Mason Creek. Reclamation contacted PID about drain flows. Reclamation has further evaluated each of these issues as noted in Appendix F. Reclamation has added language to the Final EA, as appropriate, to address these issues.

Changes to the Final Environmental Assessment

Reclamation received comments from the aforementioned entities and where appropriate, the Final EA was revised to reflect their concerns.

The Bald eagle was delisted and subsequently removed from the threatened and endangered species list in July 2007 (72 FR 37346). Therefore, the analysis covering this species has been deleted from the Final EA.

Reclamation also updated the distribution list and added Appendix F to present the comments received on the Draft EA and Reclamation's responses to those comments.

In addition, the Draft EA included a draft version of Reclamation's *Regional Policy on the Discharge of Stormwater Drainage (Water Quality).* The finalized version is included as Appendix B to the Final EA.

Where appropriate the FONSI and Final EA reflect clarification and/or revisions regarding specific comments related to stormwater and urban runoff, the public aspects of the project, and the economic issues associated with the proposed title transfer. Additionally, Reclamation incorporated editorial revisions to clarify aspects of the document and to address additional information.

Finding

Reclamation's EA for the proposed title transfer shows that the Proposed Action will have no significant effect on the human environment. Reclamation therefore concludes that preparation of an Environmental Impact Statement is not required, and that this FONSI satisfies the requirements of NEPA.

Recommended:

Celestino P. Tafoya — December 10, 2007

Celestino Tafoya
Deputy Area Manager
Boise, Idaho

Date

Approved:

12/10/2007

Mr. Jerrold Gregg
Snake River Area Manager
Boise, Idaho

Date

RECLAMATION
Managing Water in the West

Finding of No Significant Impact
Final Environmental Assessment

Pioneer Irrigation District
Proposed Title Transfer
Boise Project, Idaho

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
Boise Idaho

December 2007

U.S. Department of the Interior

The mission of the Department of the Interior is to protect and provide access to our Nation's natural and cultural heritage and honor our trust responsibilities to Indian tribes and our commitments to island communities.

Mission of the Bureau of Reclamation

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
ACHD	Ada County Highway District
AOI	Area of impact
CDC	Conservation Data Center
CWA	Clean Water Act
District	Pioneer Irrigation District
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FONSI	Finding of No Significant Impact
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
ITA	Indian Trust Asset
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act of 1966
NMID	Nampa & Meridian Irrigation District
NOAA Fisheries	National Oceanic and Atmospheric Administration Fisheries
NPDES	National Pollution Discharge Elimination System
O&M	Operation and maintenance
PID	Pioneer Irrigation District
Reclamation	Bureau of Reclamation
SHPO	State Historic Preservation Office
T&E	Threatened and Endangered
USFWS	U.S. Fish and Wildlife Service

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Chapter 1 INTRODUCTION

Where appropriate, the U.S. Bureau of Reclamation (Reclamation) works with project beneficiaries and other stakeholders to transfer ownership of certain Federal irrigation facilities to non-Federal entities that request a transfer and are capable of managing the facilities, and where the Federal investment in the facilities has been repaid.

Pioneer Irrigation District (PID or District) has requested transfer to the District of all rights, title, and interest in the drainage facilities within PID's service area which were constructed, and are owned, by the United States. These facilities represent approximately 35 percent of the total drainage system currently operated and maintained by PID. On November 27, 2006, Reclamation and PID entered into a Memorandum of Agreement (MOA) to document the areas of responsibility and cooperative efforts necessary for pursuing the title transfer process.

Reclamation's goal in considering PID's request for title transfer is to reduce or eliminate its administrative costs associated with the operation and maintenance (O&M) of the facilities. While Reclamation provides oversight, PID operates, maintains, manages, and administers the facilities proposed for title transfer, and has done so since the facilities were originally constructed. Reclamation involves PID for review and concurrence with any actions affecting the facilities or related land interests. The proposed title transfer presents opportunities for enhancing efficiencies for both Reclamation and PID.

Reclamation has determined that the title transfer would not interfere with PID's capability to continue to operate and maintain the relevant facilities, and that PID has fully met its repayment obligation to the United States Treasury for the costs associated with construction of these facilities, including acquisition of associated land interests. The proposed transfer also would not interfere with O&M for the remaining Federal portions of the Boise Project.

Pursuant to requirements of the National Environmental Policy Act (NEPA), this environmental assessment (EA) documents Reclamation's analysis of the environmental effects of transferring title for the subject facilities and associated land interests to PID as proposed.

1.1 Background

PID, established in 1901, is an irrigation district organized and existing under the laws of the State of Idaho. The boundaries of PID are shown on Figure 1.

PID diverts water from the Boise River into a system of canals and laterals for delivery to lands in Canyon County, Idaho, including the Cities of Caldwell and Nampa. PID manages return flows from irrigated lands through a system of drainage channels. PID constructed the majority of the water conveyance system and currently owns approximately 65 percent of the total drainage system.

Pursuant to contracts beginning in 1913 between Reclamation and PID, Reclamation constructed drainage system facility improvements (conveyance channels) within PID's service area. This work included utilizing existing land interests and obtaining necessary land interests (primarily easements and/or rights-of-way, with limited instances of fee title) for construction, operation, and maintenance of the facilities.

The facilities constructed by Reclamation on behalf of PID (the proposed title transfer facilities) are shown on Figure 1. The United States holds title to these drainage facilities, including the associated land interests. These facilities represent approximately 35 percent of the total drainage system operated and maintained by PID. The District has operated and maintained the facilities constructed by Reclamation, as an integral part of its system, since the facilities were first completed. This relationship between PID and Reclamation has been governed by a series of contracts.

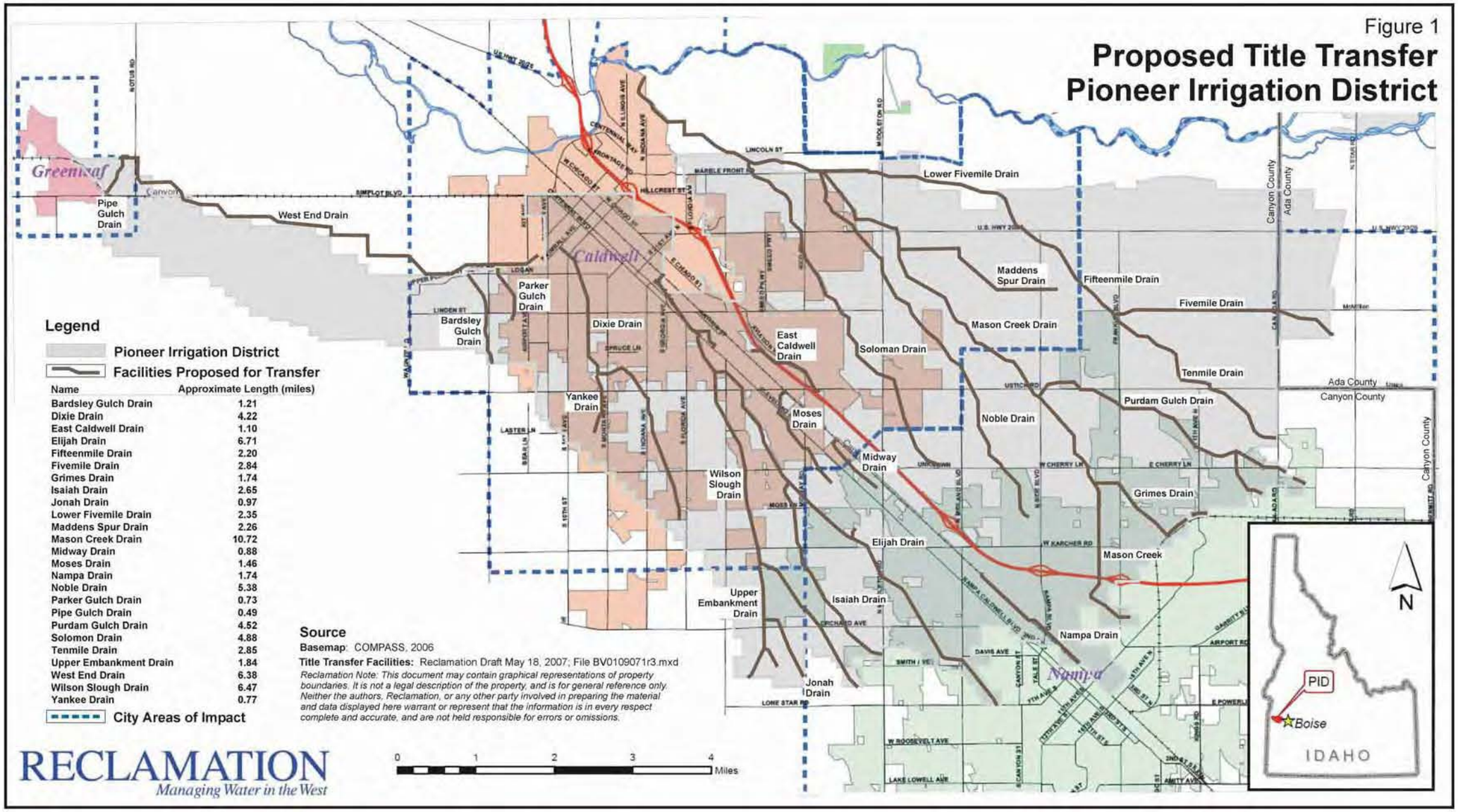
In 1995, as part of the Federal Government's National Performance Review and with the goal of increasing the efficiency and cost-effectiveness of government, Reclamation established a national program to transfer title of facilities that had national importance and which could more efficiently and effectively be managed by non-Federal entities. Reclamation's "Framework for the Transfer of Title" (Appendix A) outlines the criteria that must be met prior to implementing any transfer of title action. These criteria are:

1. The Federal Treasury and thereby the taxpayers' financial interests must be protected.
2. There must be compliance with all Federal and State laws.
3. Interstate compacts and agreements must be protected.
4. The Secretary of Interior's Native American trusts responsibilities must be met
5. Treaty obligations and international agreements must be fulfilled.
6. The public aspects of the projects must be protected.

Reclamation's intent is to transfer title directly to non-Federal entities that are competent to manage the facilities and are willing and able to fulfill legal obligations associated with taking ownership of those facilities. Reclamation believes that PID meets these requirements and is a viable candidate for title transfer.

Figure 1

Proposed Title Transfer Pioneer Irrigation District



Legend

Pioneer Irrigation District

Facilities Proposed for Transfer

Name	Approximate Length (miles)
Bardsley Gulch Drain	1.21
Dixie Drain	4.22
East Caldwell Drain	1.10
Elijah Drain	6.71
Fifteenmile Drain	2.20
Fivemile Drain	2.84
Grimes Drain	1.74
Isaiah Drain	2.65
Jonah Drain	0.97
Lower Fivemile Drain	2.35
Maddens Spur Drain	2.26
Mason Creek Drain	10.72
Midway Drain	0.88
Moses Drain	1.46
Nampa Drain	1.74
Noble Drain	5.38
Parker Gulch Drain	0.73
Pipe Gulch Drain	0.49
Purdam Gulch Drain	4.52
Solomon Drain	4.88
Tenmile Drain	2.85
Upper Embankment Drain	1.84
West End Drain	6.38
Wilson Slough Drain	6.47
Yankee Drain	0.77

City Areas of Impact

Source

Basemap: COMPASS, 2006

Title Transfer Facilities: Reclamation Draft May 18, 2007; File BV0109071r3.mxd

Reclamation Note: This document may contain graphical representations of property boundaries. It is not a legal description of the property, and is for general reference only. Neither the authors, Reclamation, or any other party involved in preparing the material and data displayed here warrant or represent that the information is in every respect complete and accurate, and are not held responsible for errors or omissions.

RECLAMATION
Managing Water in the West

1.2 Purpose and Need for Action

At the request of PID, Reclamation is considering a proposal to transfer title for certain Federal drains and associated real property interests to PID. The facilities and land interests included in this proposal are limited to those federally-owned facilities which are operated and maintained by PID and lie within the District's boundary (approximately 35 percent of the total drainage system currently operated and maintained by PID). At present, even though PID has paid in full its repayment obligations for the federally-owned portion of the drainage system, title remains with the United States.

Reclamation's purpose and need for the proposed title transfer is to reduce or eliminate costs associated with administering the project facilities that could be efficiently and effectively managed by non-Federal entities and which are not of national importance.

PID's purpose and need is to reduce or eliminate costs associated with Reclamation's oversight and coordination and to fully consolidate its authority to manage the drainage facilities.

PID operates and maintains the subject Federal facilities as part of its larger, integrated irrigation water conveyance system, and is responsible for decisions regarding facility use or modification consistent with the contracts beginning in 1913 between Reclamation and PID. In this case, increasingly frequent third-party requests for modification to or encroachment on these Federal facilities require separate review by both Reclamation and PID. Prior to granting a request, Reclamation involves PID for review and approval per Regional policy. The administrative process associated with joint Reclamation/PID review and approval presents an opportunity for streamlining and improving efficiencies for both Reclamation and PID, as well as for the applicants.

Overall, the proposed title transfer would address the defined purpose and need by consolidating all responsibilities for the drainage system with one entity, thereby reducing Reclamation's administration for facilities that PID has operated and maintained since they were constructed or improved in the early 1900s. The proposed transfer is consistent with the criteria outlined in Reclamation's "Framework for the Transfer of Title" (Appendix A).

1.3 Scope of the Proposed Transfer

1.3.1 Project and Facilities Description

The Reclamation facilities proposed for title transfer to PID are illustrated on Figure 1 and listed on Table 1. These facilities are comprised of 25 water conveyance channel segments totaling approximately 77 miles in length. All are drainage channels designed, sized, and constructed to manage high groundwater levels, irrigation return flows, and stormwater runoff from agricultural fields.

Land interests associated with the title transfer facilities are primarily easements or rights-of-way reserved in the initial patents or acquired by Reclamation from underlying landowners as part of the development process, prior to construction.[1] The purposes of and rights granted by the easements and rights-of-way are centered on construction, operation, and maintenance of PID's agricultural irrigation/drainage water management system.

These easements and rights-of-way are defined as narrow strips of land within which the drainage channel is constructed and include sufficient room on one or both sides of the channel to provide access for operations and maintenance (e.g., monitoring and adjusting waterflows, removing sediment and debris, lining and refurbishing ditches and performing other maintenance activities with appropriate personnel and equipment).

With one exception, all facilities proposed for title transfer are within Canyon County, Idaho. The exception is a stretch of the Fivemile Drain less than one mile in length located in Ada County in the northeastern portion of the PID.

No land parcels or facilities outside of the drainage channel corridors listed on Table 1 are involved in the proposed PID title transfer. No water rights or water storage facilities/capacities would be transferred or affected by the Proposed Action.

[1] In a limited number of cases, Reclamation obtained fee title to lands within which the channels are constructed, operated, and maintained.

Table 1. Proposed PID title transfer facilities

Conveyance	Approximate Length (miles)
Bardsley Gulch Drain	1.21
Dixie Drain	4.22
East Caldwell Drain	1.70
Elijah Drain	6.71
Fifteenmile Drain	2.20
Fivemile Drain	2.84
Grimes Drain	1.74
Isaiah Drain	2.65
Jonah Drain	0.97
Lower Fivemile Drain	2.35
Maddens Spur Drain	2.26
Mason Creek Drain	10.72
Midway Drain	0.88
Moses Drain	1.46
Nampa Drain	1.61
Noble Drain	5.38
Parker Gulch Drain	0.73
Pipe Gulch Drain	0.49
Purdam Gulch Drain	4.52
Solomon Drain	4.88
Tenmile Drain	2.85
Upper Embankment Drain	1.84
West End Drain	6.38
Wilson Slough Drain	6.47
Yankee Drain	0.77
Total	**77.36**

1.3.2 Reclamation Interests to be Transferred

The proposed title transfer would completely divest Reclamation of any interest in the subject facilities. All responsibility for the ownership, operation, maintenance, management, regulation, and liability for the facilities would be completely with PID.

Ownership of the facilities would be transferred to PID including associated land interests (primarily easements and rights-of-way). Related to easements and rights-of-way, the purposes of and rights granted under the original agreements would remain unchanged. Any other third party legal rights or agreements related to the facilities, involving individuals or entities other than Reclamation and PID, would also be transferred and remain unchanged, including (but not limited to) five authorized stormwater discharges that have been identified.

1.4 Regulatory Compliance

Various laws and Executive Orders apply to the Proposed Action. The legal and regulatory environment within which the Federal activity would be conducted depends on which alternative is implemented. A summary of major laws and Executive Orders follows.

1.4.1 National Environmental Policy Act

Under the NEPA, Reclamation is responsible for determining if the Proposed Action might have significant effects to the environment. If Reclamation, based upon the analysis presented in the EA, determines that effects would not be significant, a Finding of No Significant Impact (FONSI) would be completed to fulfill the NEPA compliance. If potentially significant effects are identified, Reclamation must consider these, including potential for avoidance or mitigation in issuing its Record of Decision (ROD). This EA reports Reclamation's analysis pursuant to NEPA requirements.

1.4.2 Endangered Species Act

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat. As part of the ESA's Section 7 process, an agency must request a list of species from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) that identifies threatened and endangered species within or near the action area. The agency then must evaluate impacts to those species. If the action may impact any listed species, the agency must consult with USFWS or NOAA Fisheries. Section 3.4 presents analysis of and conclusions regarding potential for impact to listed species.

1.4.3 National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA), requires that prior to authorizing an undertaking, Federal agencies must take into account the effect of the undertaking on any properties eligible for or listed on the National Register of Historic Places. Federal regulations entitled Protection of Historic Properties (36 CFR 800) defines the process for implementing requirements of the NHPA, including consultation with the appropriate State Historic Preservation Office (SHPO) and the Advisory Council on Historic Preservation (ACHP). Section 3.6 presents analysis and conclusions relevant to NHPA requirements.

1.4.4 Executive Order 13007: Indian Sacred Sites

Executive Order 13007, dated May 24, 1996, instructs Federal agencies to promote accommodation of, access to, and protection of the physical integrity of American Indian sacred sites. A "sacred site" is a specific, discrete, narrowly delineated location on Federal land. An Indian tribe or an Indian individual determined to be an appropriately authoritative representative of an Indian religion must identify a site as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. However, this is provided that the tribe or authoritative representative has informed the agency of the existence of such a site. Analysis related to this requirement is presented in Section 3.7.

1.4.5 Executive Order 12898: Environmental Justice

Executive Order 12898, dated February 11, 1994, instructs Federal agencies, to the greatest extent practicable and permitted by law, make achieving environmental justice part of its mission by addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low income populations. Environmental justice means the fair treatment of people of all races, income, and cultures with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment implies that no person or group of people should shoulder a disproportionate share of negative environmental impacts resulting from the execution of environmental programs. No environmental justice issues are associated with the proposed title transfer.

1.5 Similar or Related Actions

In 2001, a comparable title transfer was completed in the Nampa & Meridian Irrigation District (NMID) immediately east of PID. In this transfer, NMID received title to all Reclamation distribution, conveyance, and drainage facilities, and associated land interests.

Three other transfer of title actions have occurred or are in process within Reclamation's Snake River Area Office administrative boundaries. These actions involve Reclamation facilities within the Burley Irrigation District, the Fremont-Madison Irrigation District, and the American Falls Reservoir District No. 2 (Section 3.10).

Chapter 2 DESCRIPTION OF THE ALTERNATIVES

This EA addresses two alternatives: Alternative A – No Action and Alternative B – Proposed Action, Title Transfer. As required by NEPA, the No Action alternative (i.e., the future without the Proposed Action) forms the basis for analyzing the effects of the Proposed Action.

Another alternative considered, but eliminated from detailed consideration, is transfer of the subject facilities to a different local jurisdiction, specifically one or more of the local municipalities. Discussion of the reasons why this alternative was not considered is provided in Section 2.4, below.

2.1 Alternative A – No Action

Under the No Action alternative, the United States (Reclamation) would retain its interests in the conveyance channels and PID would continue to operate and maintain these channels as part of its irrigation and drainage systems. Reclamation would continue to involve PID for review of and concurrence with any requests by individuals, organizations, or other government entities to modify, encroach, or use Reclamation's conveyances.

2.2 Alternative B – Proposed Action, Title Transfer

If the proposed transfer of title occurs, the purposes of the facilities (i.e., either irrigation or agricultural drainage) would remain the same. The District would continue to operate and maintain the facilities as part of its integrated system in a manner consistent with past and current practices. The title transfer would not alter the purpose, management, or use of the facilities.

2.2.1 Facilities and Land Interests

The Proposed Action is a transfer by Reclamation to PID of all interest in and right/title to Reclamation's drainage facilities and associated land interests within PID's service area. The subject facilities are illustrated on Figure 1 and listed (with approximate length) on Table 1.

These facilities are operated and maintained by PID and lie generally within the PID boundary. These facilities consist of drainage conveyance channels and associated rights-of-way, easements, and fee title lands. No other land areas are involved. No water rights, storage rights, water distribution/management agreements, or facilities of other entities would be affected.

Reclamation does not currently have the authority to transfer title of these facilities and lands. Specific legislation would need to be passed by Congress. If the decision is made to proceed with the title transfer, Reclamation understands that PID would work with their Congressional delegation to draft legislation with provisions that are consistent with Reclamation's 1995 Framework for Title Transfer (USBR 1995) and, where appropriate, environmental commitments made by Reclamation through the NEPA process.

2.2.2 Costs

PID has met its repayment obligation to the United States for construction of the segments and has borne the cost of operating and maintaining the facilities since they were constructed. Specific to the proposed title transfer, PID entered into a MOA (November 27, 2006) with Reclamation which provides for sharing all necessary and reasonable costs of complying with NEPA. Outside of hazardous materials surveys, costs not associated with the NEPA process would generally be paid by PID. Subsequent to the title transfer, if authorized, PID would bear all costs of continuing O&M of the facilities.

2.3 Limitations and Liabilities

It is Reclamation’s intent that effective on the transfer of title to PID, the U.S. Government would no longer be held liable for damages of any kind arising out of any act, omission, or occurrence relating to the title transfer segments. Nothing in this alternative would increase the liability of the U.S. Government beyond that currently provided in the Federal Tort Claims Act (28 U.S.C. 2671 et seq.).

2.4 Alternatives Considered but Eliminated from Further Study

NEPA requires Reclamation to consider alternatives developed through public scoping. However, only those alternatives that are reasonable and meet the purpose and need of the Proposed Action must be analyzed.

Some comments received during scoping (Appendix C), suggested that Reclamation's interests in the federally-owned drainage system segments should be transferred to an entity or entities other than PID (specifically, local municipalities). The intent of this suggestion was that one or more of those entities might utilize the segments for recreational pathways or for urban stormwater runoff.

Reclamation's framework for title transfer indicates that non-Federal governmental entities may be considered as beneficiaries for the purposes of title transfer. In this case, the majority of the drainage system is currently owned, operated, and maintained by PID. The proposed transfer of the remaining portion of the drainage system to PID would consolidate ownership with one entity that has demonstrated its ability to effectively operate and maintain the relevant facilities since the early 1900s. In addition, PID has fully met its repayment obligation to the U.S. Treasury for costs associated with construction of the facilities proposed for transfer.

Title transfer to an entity other than PID would result in PID owning a majority of the drainage system and a second entity owning a minority of the system. This situation could:

- Increase rather than decrease the degree of coordination required for system operations, since the two separate entities involved would need to operate outside of the established relationships between Reclamation and PID;
- Shift, rather than eliminate, the need for duplicative administrative actions for events such as crossing permit review and approval; and
- Add uncertainty about procedures, effectiveness, and legal relationships for O&M of the drainage system compared to the District's established O&M since the early 1900s.

For these reasons, Reclamation believes that the proposed transfer of title to PID makes more sense than a possible transfer to another entity. However, Reclamation recognizes that other entities are interested in, and have expressed concerns about, management of stormwater runoff in a potential post-transfer scenario. These concerns are relevant to Reclamation's Framework for the Transfer of Title rather than to the NEPA analysis, and it is premature in the title transfer process to determine that such concerns cannot be resolved. The terms and conditions for a transfer, along with any related title transfer legislation, may address and resolve the expressed concerns.

Chapter 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The scope of this EA is defined by the Proposed Action, as compared with the No Action alternative. Analysis is focused on identifying and evaluating potential environmental impacts resulting specifically from the proposed transfer of Reclamation's interests in the subject drainage conveyances. No other Federal interests are involved (e.g., reservoirs, water rights, water storage rights, river diversion facilities, storage, and irrigation system operations).

NEPA requires analysis only of resource categories or issues in which there is or could be potential for adverse impact from a Proposed Action. Therefore, the resources analyzed in this EA include:

- Land use
- Hydrology and water quality
- Biological resources (vegetation, wildlife, birds, mammals, reptiles, amphibians, fish)
- Threatened and endangered species
- Special status species
- Cultural resources
- Indian sacred sites
- Indian trust assets
- Hazardous materials and waste

This chapter also describes cumulative impacts of the alternatives.

3.1 Land Use

3.1.1 Affected Environment

Jurisdiction over land use and development within the PID is held predominantly by Canyon County and the Cities of Caldwell and Nampa.

As shown on Figure 1, most PID lands and proposed title transfer facilities lie within Canyon County, and also within either the corporate boundary or designated Area of Impact (AOI—

growth boundary) of Caldwell and Nampa. The only exceptions to this are the West End Drain, which lies mostly in Canyon County west of the Caldwell AOI, with less than one mile in the City of Greenleaf's AOI; the Jonah Drain, Upper Embankment Drain and a portion of the Wilson Slough Drain which are in Canyon County south of the Caldwell, and west of the Nampa, AOI; and less than one mile section of the Fivemile Drains that lies in Ada County (but is not included within any City AOI).

The overall area in which PID lies has been experiencing relatively intense development pressure, with large portions of the District (particularly those within Caldwell and Nampa jurisdiction) being converted from agricultural to urban/suburban uses. As of 2004, an estimated 50 percent of District lands had undergone this conversion (Koberg 2007). With this development have come increasing requests by local jurisdictions and/or developers to use or modify some of the conveyance facilities. Of particular concern are requests to:

- Realign or reconstruct conveyance channels and/or encroach upon associated land interests
- Use channel corridors for recreation trails, and
- Conduct urban stormwater runoff from developments and roadways to drainage facilities.

The first two of these concerns are addressed below; urban stormwater issues are discussed in Section 3.2. In all cases involving the drainage facilities proposed for title transfer, Reclamation reviews requests for modification or third-party use of its facilities jointly with PID, and prior to granting a request, requires review by and concurrence from PID. As noted in Chapter 1, this is because PID is responsible and liable for O&M of the irrigation delivery and drainage systems, including those portions owned by Reclamation. Discussions below are therefore focused on PID policy, procedure, and decision criteria related to facility modification and use requests.

Facility Realignment, Reconstruction, or Encroachment

PID considers all requests to physically modify conveyance systems and/or encroach within the fee title, easement, or right-of-way strips of land used by PID for access, operation, and maintenance. Examples of facility modification include temporary or permanent realignment or reconstruction as part of project development; encroachments include such uses as utility line placements and fencing.

PID determines if the proposed modifications or uses would interfere with the District's O&M activities, increase maintenance or repair requirements, or create unacceptable safety or liability risks. Where an easement or right-of-way granted to PID or Reclamation is involved, the licensee/permittee must also obtain the permission of the underlying fee title owner.

Recreation Trail Uses

PID considers all requests for construction of pathways along its drains. Recreational pathways raise unique concerns about the risks inherent in public activity, particularly by children, close to irrigation or drainage ditches.

PID determines if pathways would unreasonably interfere with the District's O&M activities, increase maintenance or repair requirements, or create unacceptable safety or liability risks. As noted above, where an easement or right-of-way granted to PID or Reclamation is involved, the licensee must also obtain the permission of the underlying fee title owner.

3.1.2 Environmental Consequences

Alternative A – No Action

Under the No Action alternative, Reclamation would retain the property interests in its segments. PID would continue to manage, operate, and maintain these segments for their intended irrigation drainage/conveyance purposes, as parts of the integrated PID conveyance system. PID and Reclamation would each continue to separately review requests for approval of construction, encroachment, or third-party use affecting the title transfer segments. Reclamation would continue to require PID concurrence prior to granting such requests, and PID indicates that the District's criteria for approval would remain centered on preventing interference with the District's O&M activities, increases in maintenance and repair costs, or unacceptable safety or liability risks. This alternative would perpetuate the duplication of administrative tasks resulting from separate review and decision-making by both Reclamation and PID.

Alternative B – Proposed Action, Title Transfer

Under the Proposed Action, Reclamation's interest in the conveyances would be transferred to PID. Reclamation would no longer be involved in reviewing or deciding upon requests for modification or third-party use of the subject facilities.

The effect of this change would be elimination of the duplication inherent in joint review and approval of modification or use requests by both Reclamation and PID. PID indicates that current policies and processes would continue such that the Proposed Action would have no effect upon the use and development of land within the District's boundaries.

PID would continue to manage, operate, and maintain the title transfer segments for their intended irrigation drainage and conveyance purposes. The District would have ultimate approval authority related to requests for facility modification or third-party use, and the criteria by which the District determines whether to approve or deny such requests would remain unchanged.

3.2 Hydrology and Water Quality

3.2.1 Affected Environment

An important concern raised during the scoping process and public review of the Draft EA for this NEPA analysis is the desire by local highway and land use jurisdictions (i.e., ACHD, Cities of Boise, Caldwell, and Nampa) to continue current discharges of urban stormwater runoff to the conveyance facilities and use of the conveyances for additional urban runoff discharges as development proceeds.

As noted previously, the area in which PID lies is experiencing high pressure for urban growth and development. In 2004, roughly half of the land in the PID had already been converted from agricultural to urban or suburban uses. This trend is expected to continue, with most land within PID's boundary eventually becoming urbanized. Of particular relevance are the Comprehensive Plans of Caldwell and Nampa. Both plans anticipate conversion of all lands within the City AOIs (see Figure 1) to urban/suburban uses.[1]

Local highway districts, cities, and counties manage urban stormwater drainage in accordance with State and Federal Clean Water Act (CWA) requirements, and, given the rapid rate of urbanization, are seeking efficient and cost-effective means to meet this responsibility (Caldwell 2006; ACHD 2007). This has resulted in consideration of the existing conveyance system as at least part of the solution for meeting urban stormwater management challenges. Reclamation has identified five currently authorized stormwater discharges to the federally-owned portion of the PID drainage system.

PID indicates that two significant issues have caused the District to adopt a position of not allowing new urban stormwater discharges into its system and moving to rectify instances of existing, unauthorized discharges. These issues are centered on (1) the volume and timing of urban runoff, and (2) urban runoff water quality. Related specifically to the facilities proposed for title transfer, Reclamation's *Regional Policy on the Discharge of Stormwater Drainage (Water Quality)"* (USBR 1992) (Final policy letter in Appendix B) recognizes both of these issues and requires irrigation districts (e.g., PID) to approve any proposals to discharge urban runoff into Reclamation facilities. The five existing authorized stormwater discharges have been permitted in accordance with this policy.

[1] The City of Caldwell Comprehensive Plan is currently being revised. The existing plan shows agricultural uses in the outer areas of the AOI. The expectation for the revised plan is that all land in the City's AOI will be designated for urban/suburban uses (Billingsley 2007).

Urban Runoff Volume and Timing

The drainage system was designed and constructed to manage high groundwater levels and surface drainage from agricultural lands. Specific to the facilities proposed for title transfer, the contract of February 27, 1913 between PID and the Federal Government specifies that the purpose of the drains to be constructed by the Federal Government is to drain away seepage water. Facilities were designed to manage "pre-development" flows from these lands. Per State law (Idaho Code section 42-1204), PID is responsible for maintaining the system and managing flows in a manner that prevents damage to adjacent properties from flooding or other failures of system facilities.

Reclamation's *Regional Policy on the Discharge of Stormwater Drainage (Water Quality)* (USBR 1992) notes that runoff volume from impervious surfaces in urban areas is greater than runoff from agricultural areas, and states that Reclamation needs to manage and monitor entering flows relative to drain capacity or face potential increased liability for flood damage. Even though local highway districts, cities, and counties generally require new developments to retain runoff volumes in excess of "predevelopment" flows onsite, large storm events can result in runoff volumes in excess of planned onsite retention facilities. PID's legal position is that the District's liability for damage caused by flooding would be increased if PID conveyance channels were being used to manage stormwater runoff from such developments. Other entities disagree with PID's position on this issue, and the City of Caldwell indicates that they have completed a study concluding that the City's existing stormwater policy reduces peak discharges of stormwater over what would be anticipated from an undeveloped agricultural field (Appendix F).

Urban Runoff Water Quality

The Federal CWA regulates discharges of water (i.e., from pipes or other "point source" outlets) to "waters of the United States" (e.g., streams or wetlands) if those discharges contain material or chemical compounds exceeding defined threshold levels. The regulated materials or chemical compounds and their respective threshold levels are defined by the Environmental Protection Agency (EPA) and State water quality standards. The primary mechanism for EPA regulation and oversight is the National Pollution Discharge Elimination System (NPDES) permit. It is through the NPDES permitting process that requirements for water treatment are set.

Irrigation activities, including irrigation return flows and stormwater discharges from agricultural lands, are exempt from the definition of a point source, and from the requirement to operate under an NPDES permit. PID operates under this exemption.

PID has expressed the concern that because a NPDES permit is required for municipal (urban) stormwater discharges, if PID permits urban stormwater discharges into its system, the agricultural exemption could be lost and the District would incur the expense and liability

associated with obtaining a NPDES permit and meeting associated water treatment requirements (Appendix F). Other entities disagree with PID's position on this issue, and a July 20, 2007 letter from the EPA provides additional information regarding irrigation return flows and stormwater runoff relative to regulatory requirements (Appendix F).

3.2.2 Environmental Consequences

Alternative A – No Action

Under the No Action alternative, Reclamation would retain its interests in the facilities. PID would continue to manage, operate, and maintain these facilities for their intended irrigation drainage or conveyance purposes, as part of the integrated PID conveyance system, and according to their legal and contractual responsibility. Pursuant to Pacific Northwest Region policy, Reclamation would continue to require PID approval of any proposal to discharge urban runoff into these facilities and would work with PID to identify and address instances of existing, unauthorized discharges. Reclamation would continue to be available to participate in multi-jurisdictional planning efforts to explore alternative approaches to urban runoff discharges. Unless changed through multi-jurisdiction negotiation and definition of mutually acceptable alternative approaches, PID indicates that the District's current position of not allowing unauthorized urban runoff discharges to its system would remain in force. The five identified stormwater discharges currently authorized would also remain unchanged.

Alternative B – Proposed Action, Title Transfer

Under the Proposed Action, Reclamation's interest in the conveyances would be transferred to PID. Reclamation would no longer be involved in potential planning efforts in considering or deciding upon proposals to discharge urban stormwater runoff into the subject facilities.

Given Reclamation's current policy regarding discharge of stormwater drainage (i.e., requiring irrigation district approval), the primary effect of this change would be elimination of any duplication in the joint review and approval of requests by both Reclamation and PID.

It is anticipated that the Proposed Action would not affect urban stormwater management within PID's boundaries. PID would retain authority over any stormwater discharges to its system and would continue to manage, operate, and maintain the title transfer segments for their intended irrigation drainage or conveyance purposes. As with the No Action alternative, PID indicates that the District's current position of not allowing unauthorized urban runoff discharges to its system would remain in force until a mutually acceptable alternative management approach can be defined and agreed upon with involved jurisdictions. The five stormwater discharges currently authorized would also remain unchanged.

3.3 Biological Resources

PID boundaries encompass approximately 35,200 acres with diverse land uses and numerous plant and animal species. However, the proposed title transfer segments (drainage channels and associated easements and rights-of-way) represent a minor fraction of the total area, and provide relatively uniform and limited habitat for plant and animal species.

The title transfer facilities are single channels with identified access-ways. They are generally found near agricultural, residential, commercial, or open range. All of the drains have perennial flows with the exception of the Bardsley Gulch Drain, Parker Gulch Drain, Solomon Drain, and the Yankee Drain; all other conditions are similar. PID uses the access-ways to inspect, operate, maintain, and repair these drainage ditches. Irrigation levels vary annually based on local and regional precipitation and snow pack levels, and vary seasonally based on availability of natural flow water and Reclamation reservoir water storage. The irrigation season is typically between April 1st and October 15th.

PID conducts periodic vegetation management along the channel corridors and mechanical removal of plants, sediments, and debris to maintain sufficient flow within the drains. Debris from drain maintenance is piled along the easements and leveled by heavy equipment. In rare instances when debris cannot be stored onsite, PID hauls it to another location (Zirschky 2007).

Portions of the title transfer segments have been surrounded by urban developments. Where this occurs, segments and associated easements have generally been altered (e.g., channel lining, fencing, landscaping) to cooperate with the requirements of cities, counties, utilities, or other landowners. Mason Creek Drain has also been modified, but to a smaller degree than other highly-maintained drains.

Information was collected on plant and animal species that occur within or adjacent to the PID boundaries in order to identify species that might be impacted by the Proposed Action. Based on the amount of area and total number of species present, only dominant well-known plant and wildlife species are discussed in this section. Federally-threatened, endangered, and State species of concern are addressed in Sections 3.4 and 3.5. Relevant information has been obtained through literature reviews, interviews with PID staff, consultation with local, State and Federal agencies, and prior experience with the habitat characteristics of the affected area. This information was used to assess the potential, or probability of occurrence of key species within the action area, taking into consideration historic, current, and proposed management practices and adjacent development.

3.3.1 Vegetation

Affected Environment

Vegetative communities within the PID service area include both native and non-native/introduced species. Vegetation along the title transfer segments is largely in the latter category due to historic construction, operation, maintenance, and management activities.

Introduced plant species within the PID are generally either non-native invasive species or Idaho-listed noxious weeds. These species have been historically introduced to the area and spread through contaminated crop seed, domestic livestock, landscaping and horticulture, recreation activities, and other human uses. While invasive species pose a significant threat to local ecosystems, there are no regulatory actions associated with them. In contrast, noxious weeds are non-native plants that have been designated "noxious" by State law because of their potential harm to the Idaho economy. While there have been no comprehensive noxious weeds inventories conducted for the entire area, a general list of Idaho-designated noxious weed species can be found at http://www.agri.idaho.gov/Categories/PlantsInsects/NoxiousWeeds/watchlist.php.

Table 2 below lists the species likely to be found within or immediately adjacent to the proposed title transfer facilities. This is a general list of the dominant species, and not a complete inventory of the area.

Table 2. Common vegetation communities found within the proposed action area

Communities	General Species Likely to be Present (Common Name)
Agricultural	Sugar beets, wheat, barley, potatoes, corn, dry beans, alfalfa hay, pasture grasses, and others.
Residential	Locust, oak, pine, maple, elm, Kentucky bluegrass, rye, fescue (lawn mix), as well as other species, generally non-native, associated with residential lawns and landscaping.
Riparian species	Willow species, cottonwoods, Russian olive, various sedge, rush, and grass species, cat tails, and other native, invasive, and noxious weed species associated with riparian areas in southwest Idaho.
Open range species	Big Sagebrush (Great Basin, Wyoming), gray and green rabbit brush, blue bunch wheatgrass, Great Basin wild rye, squirrel tail, Sanburg's bluegrass, six-week fescue, and other native range species associated with southwest Idaho.
Invasive Species	Cheatgrass, medusahead wild rye, Reed canary grass, foxtail barley, witch grass, verbena, kochia, Russian thistle, bur butter-cup, halogeton, various mustard species, and others.
Noxious weeds	Purple loosestrife, Eurasian watermilfoil, Rush skeleton weed, white top, Canada thistle, field bind weed, puncture vine, Russian and Spotted knapweed, and others.

PID's vegetation management requirements and methods along the District's conveyance system vary depending on the purpose and destination of the waterway. Only mechanical and biological control measures are used for the drains (including the title transfer facilities); chemical controls are prohibited (Zirschky 2007). Mechanical controls are generally restricted to mowing, but hand thinning and other mechanical measures can be implemented as well. Biological control measures are currently limited to the management of purple loosestrife (*Lythrum salicaria*). The two agents currently used to control the purple loosestrife are varieties of the *Galerucella calmariensis* and *Galerucella pusilla*, or more commonly, the Golden and Black Margined Loosestrife beetles.

Invasive and noxious weed control is the primary vegetation-related management concern. All landowners and managers are required by the State of Idaho to control noxious weeds on their property per Idaho Statutes, specifically Title 22 (Agriculture and Horticulture), Chapter 24 (Noxious Weeds). The primary terrestrial invasive and noxious weed species of concern within the affected area include, but are not limited to: puncture vine or goathead (*Tribulus terrestris*); white top (*Lepidium draba*, previously known as *Cardaria draba*); and Canada thistle (*Cirsium arvense*) (Zirschky 2007). Aquatic vegetation of concern includes, but is not limited to: Eurasian Watermilfoil (*Myriophyllum spicatum*); algae; and other emergent, submerged, and floating aquatic plants.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no change in habitat conditions along the subject drainage facilities. Current vegetation management activities and treatment methods would continue as part of PID's normal O&M.

Alternative B – Proposed Action, Title Transfer

Effects on vegetation under the Proposed Action would be the same as those described above for No Action. PID's management, operation, and maintenance of the title transfer facilities would remain unchanged after transfer of title, thus avoiding adverse impacts and providing the same potential for long-term beneficial impacts. Reclamation concludes that the Proposed Action would have no effect on vegetation.

3.3.2 Fish and Wildlife

Affected Environment

Fish

No fish species have been observed in the drainage segments proposed for transfer. Species in some of the larger canal segments could include rainbow trout, minnows such as the red-sided shiner and long-nosed dace, sculpins, and other general fish species found in local seasonal tributaries. Overall, the seasonal nature of irrigation generally prevents establishment of a permanent fisheries in water delivery and drainage system.

Birds

Several species of waterfowl, shore birds, upland game birds, raptors, and passerines have been observed within the area surrounding the title transfer facilities. Typical species are listed in Table 3.

Table 3. Common bird species found in the proposed action area

Classification	General Species Likely to be Present (Common Name)
Waterfowl	Canada goose, mallard, chukar, grey partridge, blue winged teal, western grebe, and others.
Shore Birds	Blue heron, curlew, killdeer, California gull, and avocet.
Upland Game Birds	Ring-necked pheasant, mourning dove, and California quail (habitat generally limited in urban areas).
Raptors	Northern harrier, Swainson's hawk, red tailed hawk, ferruginous hawk, prairie falcon, bald eagle, and American kestrel.
Passerines	Red winged blackbird, western meadowlark, American robin, horned lark, starlings, European and barn swallows, crows, ravens, magpie, and others.

Mammals

Mammals potentially occurring in the affected area are limited due to the amount of development on surrounding lands. Small mammals include the western harvest mouse, pocket gopher, deer mouse, kangaroo rat, voles, Piute ground squirrel, and other rodents. Larger species potentially found in the area include striped skunk, coyote, red fox, badger, raccoon, and occasionally mule deer.

Reptiles and Amphibians

Reptile and amphibian species potentially occurring in the affected area include the Pacific tree frog, boreal toad, spadefoot toad, western toad, racer, gopher snake, garter snake, rattlesnakes, whiptail and leopard lizards, fence lizards, horned lizards, side-botched lizards, tiger salamander, and others. The diversity and abundance of reptiles and amphibians is expected to be moderate due to the developed nature of the surrounding habitat and the seasonal nature of the irrigation system use.

Environmental Consequences

Alternative A – No Action

Under the No Action Alternative, there would be no change in habitat conditions along the subject drainage facilities. Current management activities would continue as part of PID's normal O&M.

Alternative B – Proposed Action, Title Transfer

Effects on wildlife under the Proposed Action would be the same as those described above for No Action. PID's management, operation, and maintenance of the title transfer facilities would remain unchanged after transfer of title, thus avoiding adverse impacts and providing the same potential for long-term beneficial impacts. Reclamation concludes that the Proposed Action would have no effect no fish and wildlife.

3.4 Threatened and Endangered Species

This section discusses the potential occurrence of and impact to federally-designated threatened and endangered species associated with the affected area. Information regarding species potentially occurring in the Canyon County area was obtained through correspondence with the USFWS and NOAA Fisheries and review of the Idaho Conservation Data Center's (CDC) conservation database.

Probability of occurrence and potential for impacts to these species was assessed based on literature reviews, discussions with PID staff; consultation with local, State, and Federal agencies, professional knowledge, and the habitat characteristics of the affected environment (see Section 3.3). No formal field investigations were conducted.

3.4.1 Affected Environment

Two species protected under the ESA, are identified as occurring/potentially occurring within or near the title transfer area: gray wolf (*Canis lupus*), and the Idaho springsnail (*Pyrgulopsis*

idahoensis). Each of these is discussed below, relative to likelihood of occurrence in the proposed action area.

Gray Wolf

Habitat for these wide-ranging mammals must include three primary components: (1) secluded denning and rendezvous sites to raise pups, (2) a sufficient, year-round prey base of ungulates and beaver, and (3) sufficient land area that is not subject to disturbance from humans. Wolves prefer habitat with low road density, limited human populations, and low potential for human interactions (IDFG 2005). Gray wolf territories are generally large, sometimes encompassing up to 100 to 260-square miles. No pack activity, nor the occurrence of any individuals, has been recorded in or near the title transfer area. Therefore, based on the type and condition of habitat, proximity to human development, and lack of historic use by the species, it is unlikely that gray wolves would inhabit the area.

Idaho Springsnail

The Idaho springsnail is a small aquatic snail with a conical shell that has been federally-protected under the ESA since 1992. Presently its distribution is limited to the flowing waters of the Snake River, more specifically occurring at sites near C.J. Strike Reservoir upstream to Bancroft Springs (Pacific Bio 2007). Occurrence of this specie in the proposed action area is highly unlikely given the seasonal nature of flow in the irrigation ditches and the relative absence of known habitat requirements.

3.4.2 Environmental Consequences

Alternative A – No Action

Based on the location of the affected area and the amount, type, and condition of habitat present, it is unlikely that any federally-designated threatened or endangered species are present.

Under the No Action Alternative, there would be no change in habitat conditions along the subject drainage facilities. Current vegetation management activities and treatment methods would continue as part of PID's normal O&M.

Alternative B – Proposed Action, Title Transfer

Potential effects on current federally-listed or endangered species under the Proposed Action would be the same as those described above for No Action. PID's management, operation, and maintenance of the title transfer facilities would remain unchanged after transfer of title, thus avoiding adverse impacts and providing the same potential for long-term beneficial impacts. Reclamation concludes that the Proposed Action would have no effect on threatened and endangered species.

3.5 Special Status Species

3.5.1 Affected Environment

Eight state-listed species of concern (five animals and three plants) are noted by the CDC as potentially occurring in the study area. These are shown on Table 4.

With the exception of the Western ground snake, these species are all ranked S2 according to the CDC's Special Status Species Ranking System.[2] The S2 rank is defined as "imperiled because of rarity or because of other factors demonstrably making it vulnerable to extinction (typically 6 – 20 occurrences)." The Western ground snake is ranked S3, "vulnerable (typically 21 – 100 occurrences)."

Table 4. State listed species of concern

Common Name	Scientific Name	Plant/Animal
Woodhouse's Toad	*Bufo woodhousii*	Amphibian Animal
Northern Leopard Frog	*Rana pipians*	Amphibian Animal
Western Ground Snake	Sonora semiannulata	Reptilian Animal
Piute Ground Squirrel	*Spermophilus mollis artemisae*	Vertebrate Animal
Speckled Dace	*Rhinichthys osculus*	Vertebrate Animal
Slickspot Peppergrass[3]	*Lepidium papilliferum*	Vascular Plant
Cusick's False Yarrow	*Chaenactis cusickii*	Vascular Plant
American Wood Sage	*Teucrium canadense var. occidentale*	Vascular Plant

[2] Ranks represent a prioritization scheme used by the CDC to determine the conservation status of a species. Ranks refer to species status within Idaho. They are based primarily on the number of known occurrences, but other factors such as habitat quality, estimated population size and trend, range of distribution, and threats to species or habitat are also considered. The ranking scale is from S5 (demonstrably widespread, abundant and secure) to S1 (critically imperiled; especially vulnerable to extinction).

[3] Slickspot Peppergrass was also proposed to the USFWS to be listed as Threatened. The proposed listing was denied, but this decision is currently in litigation.

Woodhouse's Toad

The Woodhouse's Toad is a riparian dependent species. Toads aestivate during the summer months, becoming active only during wet weather (Leonard et al. 1993). During the breeding season the toads are highly visible in and around ephemeral breeding ponds and streams, but outside the breeding season they are very difficult to observe (Nussbaum, Brodie, and Storm 1983). A terrestrial lifestyle and limited dependency on water compared to other amphibian species makes it possible for Woodhouse Toads to exist around seasonal sources of water, and irrigation waterways can provide seasonal water supplies for reproduction activities. Although the title transfer area and facilities have little pristine habitat, it is possible that isolated populations of this animal could be present.

Northern Leopard Frog

Although widespread throughout North America, Idaho populations have been declining for years but have been reported in the Snake River and its tributaries (IDFG 2005). The frog is restricted to habitats with permanent water sources, needed in every life stage, and prefers still bodies of water such as ponds, marshes, or slow moving sections of streams and rivers. Given this requirement, Mason Creek is the only title transfer segment that could potentially support small isolated populations (i.e., all others carry water only seasonally). However, based on water quality associated with local agriculture and development, it is unlikely that Northern leopard frogs are present.

Western Ground Snake

The Western Ground Snake is listed as an unprotected non-game species with an S3 ranking. The snake is small with varying patterns ranging from orange and black stripes to pale gray color, and has little or no dorsal striping. It is restricted in Idaho to the southwestern corner along the Snake River and its surrounding drainages, with arid conditions and loose or sandy soils. It is found in rocky areas to low desert shrub areas (Diller and Wallace 1981). Given the historic and continuing level of disturbance in the title transfer area (i.e., development, agriculture, and grazing activities), there remains little habitat for Western Ground Snakes. Small numbers of the specie may occur associated with isolated pockets of rocky outcrops.

Piute Ground Squirrel

The Piute Ground Squirrel occurs in Idaho north of the Snake River from Bliss to Dubois (Yensen 2003). The Piute Ground Squirrel lives in areas of native shrubs, primarily sagebrush and winterfat. Much of their former range has been removed due to agricultural conversion, habitat degradation associated with recreation, livestock, and wildfire (Yensen 2003). Little, if any, suitable habitat remains in the title transfer area and it is unlikely that Piute Ground Squirrels are present in or near the title transfer segments.

Speckled Dace

The Speckled dace is a small minnow fish found in North America, west of the Rocky Mountains. Its southern Idaho distribution is limited to the Snake River and its tributaries and drainages. The dace can survive in a number of different habitats, but prefers shallow, cool, and slow moving waters. The ephemeral nature of the affected area's waterways (including the title transfer segments) makes it unlikely that sustainable populations of the Speckled dace occur.

Slickspot Peppergrass

Slickspot peppergrass is generally restricted to microhabitats known as slickspots, also referred to as mini-playas, or nitric sites. These low spots in the landscape appear sporadically throughout the sagebrush-steppe community, collecting water as shallow basins. They range in size from about one to twelve square meters, and are high in both clay and salts (Fisher et al. 1996), with properties more hydric than the surrounding arid soils. In the title transfer area (and specifically along the title transfer segments), the level of development, agriculture, and livestock grazing has significantly altered the landscape, and historic slickspots that may have occurred have likely been degraded to such an extent that it is unlikely any Slickspot peppergrass individuals or dormant seeds are present.

Cusick's False Yarrow

Cusick's false yarrow has been a concern in Idaho and Oregon for many years. It is restricted in distribution to clay outcrops in Malheur County, Oregon, and adjacent counties of Owyhee and Canyon in Idaho (Moseley 1994a). Only nine occurrences have been documented in the state of Idaho. Two locations in Owyhee County, the lowlands and higher elevation sights in the Succor Creek and Squaw Creek drainages, and one historic location in Canyon County are the only areas in Idaho where this species has been observed. The Canyon County occurrence is known to be extirpated (Moseley 1994a) and it is unlikely that additional occurrences are present within the title transfer area.

American Wood Sage

The American Wood Sage is widespread throughout the United States and Canada, but is limited in its Idaho distribution to only four counties, Ada, Canyon, Owyhee, and Washington. It is found growing along streambanks and moist bottomlands. Based on the type of habitat and overall condition generally associated with the title transfer segments, and the historic and current use/treatment of these corridors, it is unlikely that American Wood Sage would be present. However, isolated populations could persist in protected areas with limited human use.

3.5.2 Environmental Consequences

Alternative A – No Action

Several state-identified species of concern could utilize or occur in the affected area, but are not dependent on the habitat or location.

Under the No Action alternative, there would be no change in habitat conditions along the subject drainage facilities. PID would continue to manage, operate, and maintain the subject drainage facilities for their intended irrigation drainage/conveyance purposes.

Alternative B – Proposed Action, Title Transfer

Potential effects on current state-listed species of special concern (if present) under the Proposed Action would be the same as those described above for No Action. PID's management, operation, and maintenance of the title transfer facilities would remain unchanged after transfer of title, thus avoiding adverse impacts and providing the same potential for long term beneficial impacts. Reclamation concludes that the Proposed Action would have no effect on current state-listed species of special concern.

3.6 Cultural Resources

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: archaeological resources (prehistoric and historic), architectural resources, and traditional cultural resources.

Archaeological resources are locations where human activity measurably altered the earth or left deposits of physical remains (e.g., stone flakes, arrowheads, or bottles). Archaeological resources may be either prehistoric or historic and can include campsites, roads, fences, trails, dumps, battlegrounds, mines, and a variety of other features.

Architectural resources include standing buildings, dams, canals, bridges, and other structures of historic or aesthetic significance.

Traditional cultural resources can include archaeological resources, buildings, neighborhoods, prominent topographic features, habitats, plants, animals, and minerals that Native Americans and other groups consider essential for the continuance of traditional cultures.

Only significant cultural resources, whether known or unknown, warrant consideration with regard to adverse impacts from a proposed action. To be considered significant, these resources must meet one or more criteria as defined in 36 CFR 60.4 for inclusion in the

National Register of Historic Places (National Register). These criteria include association with an important event, association with a famous person, embodiment of the characteristics of an important period in history, or the ability to contribute to scientific research. Resources must also possess integrity (i.e., its important historic features must be present and recognizable). Resources eligible to the National Register are known as historic properties.

Resources generally must be more than 50 years old to be considered for protection under existing cultural resource laws. However, more recent structures, such as Cold War era military buildings or designs by influential architects, may warrant protection if they are considered to have exceptional significance.

Several Federal laws and regulations have been established to manage cultural resources, including the National Historic Preservation Act (NHPA) (1966) as amended, the Archaeological and Historic Resources Preservation Act (1974), the American Indian Religious Freedom Act (1978), the Archaeological Resources Protection Act (1979), and the Native American Graves Protection and Repatriation Act (1990). In addition, coordination with federally-recognized Native American tribes must occur in accordance with Executive Order 13084, Consultation and Coordination with Indian Tribal Governments.

Because the proposed transfer of title is considered a Federal "undertaking," Reclamation must consider the potential effects of the proposed transfer on cultural resources that are included in or eligible for inclusion in the National Register. Pursuant to Section 106 of the NHPA and 36 CFR 800, Reclamation is conducting consultation with the Idaho State Historic Preservation Officer (SHPO). As required under the NHPA, Section 106, Reclamation identified historic properties within the area of potential effects (or the affected environment under NEPA), applied the National Register criteria (36 CFR 63) to properties that have not been previously evaluated for National Register eligibility, and determined whether the proposed transfer would adversely affect such properties.

3.6.1 Affected Environment

The affected environment includes the geographic area or areas within which the proposed transfer may directly or indirectly cause changes in the character or use of historic properties, if such properties exist. The drainage system and lands within 100 feet of the drains are considered to be the affected environment for the project. As part of the identification process, a records search and intensive archaeological survey of 20 percent (20 miles) of the affected environment was conducted. Prior to conducting the survey, aerial photographs of the affected environment were examined to identify any structures in the area that would be examined as part of the survey.

The records search identified six previously recorded historic cultural resources within the affected environment. These resources include canals, bridges, railroad spurs, and a segment of the Oregon Trail. The Notus Canal, the A-Drain, and the segment of the Oregon Trail are

considered to be eligible to the National Register, two bridges are not eligible, and the railroad spur is unevaluated.

The results of the 20 linear mile survey of drainage ditches in the PID indicated that all of the lands were highly disturbed. Many of the drains were located in residential subdivisions or along urban streets. Most were paralleled on at least one side by a dirt access/maintenance road. The drains were typically U-shaped to V-shaped in cross section and varied from 5 to 20 feet deep and 10 to 25 feet wide. Most of the drains had corrugated metal or PVC pipe running into them to drain the adjacent fields or developments. Where the drains passed under paved streets or field access roads, they typically flowed through corrugated metal or concrete pipes. Concrete riprap was common around the culverts. Some concrete box culverts were present at the larger road crossings.

The intensive survey yielded three possible historic cultural resources – a small bridge, a basalt riprap feature, and an isolated find (a glass bottle). None of these newly identified resources are considered eligible for the National Register. Based on the results of the records search and the intensive survey of 20 miles of ditches it is likely that the remaining 57 miles of ditches are similarly disturbed and also would not contain significant prehistoric or historic resources. For detailed information concerning the records search, survey methodology, and results, refer to PID Title Transfer, Canyon County, Idaho Final, Archaeological Survey Report (TEC 2007).

As part of the survey, the drainage system was recorded and evaluated. The drainage system is considered eligible to the National Register as a part of the larger PID irrigation system under Criterion C for its association with the development of agriculture in the Treasure Valley. Although some features associated with the drains have been replaced over the years, the system is in essentially the same location as it was when it was built in the early 1910s and retains historic integrity. Reclamation's enhancement of the drainage systems through construction of the drain segments proposed for transfer contributed to the agricultural development of the Treasure Valley as part of the Boise Project. Reclamation's construction of these segments for PID is also indicative of Reclamation's historic role in assisting in the further development of existing non-Federal irrigation systems (as opposed to the construction of dams or entire irrigation systems).

3.6.2 Environmental Consequences

A proposed action or alternative affects a significant cultural resource when it alters the property's characteristics, including relevant features of the environment or use that qualify it as significant under National Register criteria. Impacts may be the result of transferring it out of Federal ownership, physically altering, damaging, or destroying all or part of a resource, or altering characteristics of the surrounding environment that contribute to the importance of the resource. In addition to affecting National Register-listed or eligible resources, a proposed

action or alternative could affect traditional cultural properties that are protected under a number of other Federal laws.

Alternative A – No Action

Under the No Action alternative, Reclamation would retain its interests in its conveyance channels and PID would continue to operate and maintain these channels as part of its irrigation and drainage systems. There would be no title transfer, and therefore no impact to any National Register-eligible resources.

Alternative B – Proposed Action, Title Transfer

Under the Proposed Action, Reclamation would transfer to PID all conveyance facilities (drainage channels) that are currently owned by Reclamation. The title transfer has the potential to adversely affect one National Register-eligible property (i.e., the drainage system). Under 36 CFR 800, transfer of property out of Federal ownership without adequate conditions to ensure its long-term preservation, is considered to be an adverse effect to a National Register-eligible property.

The six previously recorded sites that intersect or are located in the affected environment are not included in the title transfer and their uses would not change; therefore, the proposed transfer would have no adverse effect on these six sites.

3.6.3 Mitigation Measures

Reclamation and the SHPO have agreed that adverse effects to the PID drainage system can be mitigated by documenting the significance of the PID drainage system to the development of agriculture in the Treasure Valley. The documentation would be presented as a separate historic narrative and include historic records, modern and historic photographs and drawings. This mitigation would be stipulated in a MOA to be signed by the SHPO, Reclamation, and PID, prior to implementation of the Proposed Action. The stipulated mitigation could be completed prior to or following the transfer, in accordance with the MOA.

3.7 Indian Sacred Sites

Federal responsibility for Indian sacred sites is defined in Executive Order 13007 and identifies Indian sacred sites as specific, discrete, narrowly delineated locations on Federal land identified by Indian tribes or knowledgeable practitioners as sacred by virtue of their religious significance to, or ceremonial use by, an Indian religion. Executive Order 13007 grants tribal access to sacred sites on Federal land.

3.7.1 Affected Environment

Involved Indian tribes, including the Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho, the Shoshone-Paiute Tribes of the Duck Valley Reservation, and the Nez Perce Tribe were informed of the proposed title transfer through the NEPA scoping process (see Section 4.1). No information indicating issues related to Indian sacred sites was offered by the Tribes.

Reclamation is not aware of any Indian sacred sites on these lands or within the easements or rights-of-way on which the majority of the facilities are located. Due to the extent of disturbance and present usage of the facility corridors and character of surrounding land uses, Reclamation believes it is very unlikely that Indian sacred sites would be present. The facility corridors are narrow, physically altered over time, and surrounded by farm fields and either urban or suburban development. The existing landscape bears no resemblance to that present before the Boise Valley was settled. The conditions of privacy and natural landscape integrity normally required for Indian religious purposes are no longer present.

3.7.2 Environmental Consequences

Alternative A—No Action

Under the No Action alternative, there would be no title transfer. Therefore, there would be no effect upon Indian sacred sites, if such were present.

Alternative B—Proposed Action, Title Transfer

No Indian sacred sites have been identified on title transfer lands. Therefore, the Proposed Action would have no effect.

3.8 Indian Trust Assets

Indian Trust Assets (ITAs) are legal interests in property held in trust by the United States (with the Secretary of the Interior acting as trustee) for Indian tribes or Indian individuals. Examples of ITAs are lands, minerals, hunting and fishing rights, and water rights. In many cases, ITAs are on-reservation; however they may also be found off-reservation.

The United States has an Indian trust responsibility to protect and maintain rights reserved by or granted to Indian tribes or Indian individuals by treaties, statutes, and executive orders. These rights are sometimes further interpreted through court decisions and regulations. This trust responsibility requires that officials from Federal agencies, including Reclamation, take all actions reasonably necessary to protect ITAs when administering programs under their control.

The Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho, a federally-recognized tribe, have trust assets both on and off their Reservation. In the Treaty of Fort Bridger (1868), Article 4 states, "...they (the Shoshone and the Bannock) shall have the right to hunt on the unoccupied lands of the United States." This has been further interpreted to mean federally-owned lands. Reclamation (for The United States) must protect the hunting rights of the Shoshone-Bannock Tribes on lands it holds in fee title.

Two other federally-recognized Tribes, the Shoshone-Paiute Tribes of the Duck Valley Reservation and the Burns Paiute Tribe of Burns Paiute Indian Colony of Oregon have cultural and religious interests in the Boise Valley. These off-reservation interests are not considered to be ITAs.

3.8.1 Affected Environment

The Shoshone-Bannock Tribes, the Shoshone-Paiute Tribes, and the Nez Perce Tribes were notified of the Proposed Action through the NEPA scoping process (see Section 4.1). The Tribes have not identified ITAs in the area that could be affected by the Proposed Action.

Overall, the amount of land involved in the proposed title transfer that is held by Reclamation is extremely small and comprised of discontinuous, narrow corridors. This land base does not support a significant habitat for fisheries or wildlife and therefore does not represent ITA values.

3.8.2 Environmental Consequences

Alternative A—No Action

The No Action alternative would have no effect on ITAs.

Alternative B—Proposed Action, Title Transfer

Given that ITAs are not present on title transfer lands, the Proposed Action would have no effect on Tribal ITA interests.

3.9 Hazardous Materials and Waste

In May 2007, a Hazardous Materials and Wastes Survey of the relevant lands to be transferred was completed in accordance with Reclamation policy. No issues of concern were identified on Reclamation fee lands and no environmental consequences related to hazardous materials are anticipated under the title transfer scenario.

3.10 Cumulative Impacts of the Proposed Alternative

NEPA requires cumulative effects analysis of a proposed action to assess its incremental effects (impacts) when viewed in conjunction with the effects of past, current, and reasonably foreseeable future projects.

In this case, the principal incremental effect from the Proposed Action would be to cultural resources (see Section 3.6). This effect would be mitigated by documenting the significance of the PID drainage system to the development of agriculture in the Treasure Valley. Within the region, other similar title transfer actions that have occurred or are in the process include:

- The Nampa & Meridian Irrigation District (NMID-Boise Project) has received title to distribution, conveyance, and drainage facilities, and rights-of-way.
- The Burley Irrigation District (Minidoka Project) received title to all district facilities, lands, rights-of-way, and natural flow water rights on February 24, 2000. Transferred facilities included pumping plants, canals, drains, laterals, roads, pumps, checks, headgates, transformers, pumping plant substations, and buildings. Also transferred were other improvements, appurtenances to the land, and those used for the delivery of water from the headworks (but not the headworks themselves) of the Southside Canal at the Minidoka Dam.
- The Fremont-Madison Irrigation District requested transfer of certain facilities including the Cross Cut Diversion Dam and Canal, all related conveyance facilities, the Teton Exchange Wells, and State of Idaho Water Right 22-7022. This transfer was completed on September 10, 2004, in accordance with Public Law 108-8.
- The American Falls Reservoir District #2 requested transfer of the Milner-Gooding Canal and associated land interests and facilities, lands associated with Dog Creek Dam and Reservoir, lands associated with an airport beacon near the city of Gooding, and lands adjacent to a National Park Service Monument near Eden, Idaho. Transfer legislation was introduced in Congress, but no legislation has been enacted as of July 2007.

These title transfers, like the proposed PID title transfer, have resulted in or would result in an adverse effect due to loss of protection of Federal law. These adverse effects have been or would be similarly mitigated through historic or other documentation as agreed to by Reclamation and the SHPO.

No other incremental or cumulative environmental effects are expected to occur as a result of the Proposed Action. Urban growth is expected to continue in the area, regardless of the Proposed Action. Accordingly, land use conversion from agricultural to urban/suburban uses would be expected to continue and additional needs for development-specific stormwater management facilities would be expected. As described in Sections 3.1 and 3.2, it is anticipated that the Proposed Action would not affect land use or current stormwater

management policies within PID's boundaries. PID indicates that the District's current position of not allowing unauthorized urban runoff discharges to its system would remain in force both prior to and following a transfer, until a mutually acceptable alternative management approach can be defined and agreed upon with involved jurisdictions; the five identified stormwater discharges currently authorized would also remain unchanged. Because the Proposed Action would not result in a change to current land use or stormwater discharge issues, no cumulative effects are anticipated relative to impacts from other actions.

Regardless of the Proposed Action, the potential value of the subject drainage facilities for a variety of resources and uses is likely to increase over time, particularly because of continued urban development in the area.

Despite the level of disturbance and active management, conditions along these conveyance channels do provide cover, nesting, forage, migration, and other values/uses for wildlife and open space value for humans. As urban development continues to displace habitat and reduce open space in the surrounding area, the conveyance corridors would likely increase substantially in importance. Thus, the continued O&M of these facilities would likely result in increasing benefits for plant and wildlife species, and for people living in the area.

The Proposed Action does not involve issues affecting, or affected by, large-scale environmental variation such as climate change. Accordingly, large-scale environmental variation has not been further addressed.

Chapter 4 CONSULTATION AND COORDINATION

4.1 Agency Consultation

4.1.1 Endangered Species Act

The Endangered Species Act (ESA) requires all Federal agencies to ensure that their actions do not jeopardize the continued existence of listed species or destroy or adversely modify their critical habitat.

Pursuant to Section 7 of the ESA, Reclamation requested relevant species lists from the USFWS and the NOAA Fisheries on March 2, 2007. In March 2007, Reclamation received an email from USFWS containing an updated species list covering the project area. Additionally, Reclamation received a letter dated March 12, 2007 from NOAA Fisheries concluding that no ESA-listed species under their jurisdiction occur within the watersheds of the project area. Appendix E contains relevant correspondence. Reclamation concludes that the Proposed Action would have no effect on USFWS and NOAA Fisheries listed species.

4.1.2 National Historic Preservation Act

The NHPA of 1966, requires that prior to authorizing an undertaking, Federal agencies must take into account the effect of the undertaking on any properties eligible for or listed on the National Register of Historic Places. Federal regulations entitled Protection of Historic Properties (36 CFR 800) defines the process for implementing requirements of the NHPA, including consultation with the appropriate SHPO and the ACHP.

Continuing consultation and coordination has been conducted with the SHPO pursuant to requirement of the NHPA. The SHPO reviewed and concurred with the scope of work for addressing cultural resources (Section 3.6), and would be party to a negotiated MOA governing treatment and/or protection of any resources eligible for nomination to the National Register of Historic Places.

4.2 Consultation and Coordination with Tribal Governments

The NEPA scoping letter referenced above was sent to both inform and involve Indian Tribes in order to determine if the tribes have issues or concerns related to the proposed title transfer. No indication has been received from the tribes that such issues or concerns exist, and no further consultation is deemed warranted.

4.3 Public Involvement

Pursuant to NEPA requirements, as part of EA preparation, Reclamation sent a "scoping letter" (dated February 27, 2007) requesting comments, concerns, and identification of issues related to Proposed Action. The letter was sent to potentially affected and concerned agencies, organizations, individuals, and Tribes. Appendix C contains a copy of the scoping letter and the mailing list.

Twelve written responses to the scoping letter were received during a 30-day comment period; a listing of the entities and individuals who provided comments is provided below.

- Ada County Highway District (ACHD)
- Ada County Parks and Waterways
- Canyon County Parks, Recreation and Waterways
- City of Boise, Public Works Department
- City of Caldwell, Office of City Engineer and Public Works Director
- City of Caldwell, Mayor
- City of Nampa, Public Works Department
- F.A.C.T.S. (Foundation for Ada/Canyon Trail Systems)
- Hamilton, Michaelson & Hilty, LLP
- James Budolfson
- Idaho Water Users Association
- Idaho Department of Parks and Recreation
- Spectrum Environmental, Inc.

Copies of the comment correspondence are included as Appendix C. The main issues that were raised and addressed in the EA consisted of:

- Transfer of the subject facilities to a different public entity (addressed in Section 2.4)

- Use of facility corridors (easements, rights-of-way, etc.) for public pathways (addressed in Section 3.1),
- Status of other use agreements (e.g. city utility easements) associated with facility segments (addressed in Section 3.1), and
- Use of drains for urban stormwater runoff (addressed in Section 3.2).

On August 10, 2007, Reclamation distributed the Draft EA for a 30-day public review. Reclamation posted the Draft EA on the Pacific Northwest Region's website. Reclamation received eight comment letters. Appendix F contains these comments and Reclamation's response, where appropriate.

In December 2007, Reclamation distributed the Final EA, letters notifying the recipient of the Final EA's availability, and press releases to the offices, organizations, individuals, and media outlets identified on the following distribution list.

REFERENCES

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	Amphibians and Reptiles of the Pacific Northwest. The University Press of Idaho, Moscow, Idaho. 332 pp.
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Attachment 5.

CD of manipulatable Microsoft Excel files of Tables 2, 3 and 4

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Authorization to Discharge under the National Pollutant Discharge Elimination System

In compliance with the provisions of the Clean Water Act, 33 U.S.C. §1251 *et seq.*, as amended by the Water Quality Act of 1987, P.L. 100-4, the "Act",

Sorrento Lactalis, Inc.
P.O. Box 1280
4912 Franklin Road
Nampa, ID 83653

is authorized to discharge from a cheese processing facility located in Nampa, Idaho, at the following location:

Outfall	Receiving Water	Latitude	Longitude
001	Purdam Drain	43° 36' 45" N	116° 29' 35" W

in accordance with discharge point(s), effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective November 1, 2005.

This permit and the authorization to discharge shall expire at midnight, October 31, 2010.

The permittee must reapply for a permit reissuance on or before April 30, 2010, 180 days before the expiration of this permit, if the permittee intends to continue operations and discharges at the facility beyond the term of this permit.

Signed this 14th day of September, 2005.

/s/ Robert R. Robichaud for
Michael F. Gearheard, Director
Office of Water and Watersheds

Schedule of Submissions

The following is a summary of some of the items the permittee must complete and/or submit to EPA Region 10 during the term of this permit:

Item	Due Date
1. Discharge Monitoring Reports (DMR)	DMRs are due monthly and must be postmarked by the 10th day of the month following the monitoring month (see Part III.B.).
2. Quality Assurance Plan (QAP)	The permittee must provide EPA Region 10 and IDEQ with written notification that the Plan has been developed and implemented by January 31, 2006 (see II.A.). The Plan must be kept on site and made available to EPA Region 10 and IDEQ upon request.
3. Best Management Practices (BMP) Plan	The permittee must provide EPA Region 10 and IDEQ with written notification that the Plan has been developed and implemented by January 31, 2006 (see II.C.). The Plan must be kept on site and made available to EPA Region 10 and IDEQ upon request.
4. NPDES Renewal Application	The application must be submitted by April 30, 2010 (see V.B.).
5. Surface Water Monitoring Report	The Report must be submitted with the NPDES renewal application (by April 30, 2010).
6. Compliance Schedule	Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date (see III.J.)

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I. Limitations and Monitoring Requirements

A. Discharge Authorization

During the effective period of this permit, the permittee is authorized to discharge pollutants from outfall 001 to Purdam Drain, within the limits and subject to the conditions set forth herein. This permit authorizes the discharge of only those pollutants resulting from facility processes, waste streams, and operations that have been clearly identified in the permit application process.

B. Effluent Limitations and Monitoring

1. The permittee must limit and monitor discharges from outfall 001 as specified in Table 1, on the following page. All figures represent maximum effluent limits unless otherwise indicated. The permittee must comply with the effluent limits in the table at all times unless otherwise indicated, regardless of the frequency of monitoring or reporting required by other provisions of this permit.
2. Minimum Levels. For all effluent monitoring, the permittee must use methods that can achieve a minimum level (ML) less than the effluent limitation, to the extent practicable. For parameters that do not have effluent limitations, the permittee must use methods that can achieve MLs less than or equal to those specified in Table 2.
3. The permittee must not discharge any waste streams, including spills and other unintentional or non-routine discharges of pollutants, that are not part of the normal operation of the facility as disclosed in the permit application, or any pollutants that are not ordinarily present in such waste streams.
4. The permittee must not discharge hazardous materials in concentrations found to be of public health significance or to impair beneficial uses of the receiving water.
5. The permittee must not discharge chemicals or toxic pollutants in concentrations that impair beneficial uses of the receiving water.
6. The permittee must not discharge deleterious materials in concentrations that impair beneficial uses of the receiving water.
7. The permittee must not discharge floating, suspended or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair beneficial uses of the receiving water.
8. The permittee must not discharge excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing beneficial uses of the receiving water.
9. For all pollutants subject to effluent monitoring requirements but not effluent limits, the permittee must report the average monthly and maximum daily effluent values on the monthly discharge monitoring reports (See Part III.B.).

Table 1: Effluent Limitations and Monitoring Requirements

Parameter	Units	Effluent Limitations			Monitoring Requirements	
		Average Monthly	Maximum Daily	Instantaneous Maximum	Sample Frequency	Sample Type
Outfall Flow	mgd	–	–	–	continuous	recording
Biochemical Oxygen Demand (BOD_5)	mg/L	10[1]	20[1]	–	weekly	24-hour composite
	lbs/day	42	84	–		
Total Suspended Solids (TSS)	mg/L	13[1]	25[1]	–	weekly	24-hour composite
	lbs/day	53	106	–		
E. Coli Bacteria[4]	#/100ml	126[2]	–	406	5x/month	grab
pH	s.u.	6.0 to 9.0 at all times			daily	grab
Total Ammonia as N	mg/L	–	–	–	monthly	24-hour composite
	lbs/day	–	–	–		
Total Phosphorus as P (Interim)[3]	mg/L	0.48[1]	0.96[1]	–	monthly	24-hour composite
	lbs/day	2.00	4.02	–		
Total Phosphorus as P (Final)[3]	mg/L	0.070	0.140	–	monthly	24-hour composite
	lbs/day	0.29[1]	0.58[1]	–		
Floating, Suspended or Submerged Matter	Narrative Limitation (see I.B.7.)				monthly	visual
Oil and Grease	No Visible Sheen				monthly	visual
Nitrate + Nitrite as N	mg/L	–	–	–	monthly	24-hour composite
Nitrite as N	mg/L	–	–	–	monthly	24-hour composite
Total Kjeldahl Nitrogen	mg/L	–	–	–	quarterly[5]	24-hour composite
Orthophosphate as P	mg/L	–	–	–	quarterly[5]	24-hour composite
Temperature	°C	–	–	–	weekly	grab

Footnotes:
1. Effluent limits based on an average flow of 0.5 mgd (500,000 gallons per day).
2. The permittee must report the monthly geometric mean E. Coli concentration.
3. See part II.B. of this permit for the total phosphorus schedule of compliance.
4. Reporting is required within 24 hours of a maximum daily limit violation. See Part III.G. of this permit.
5. Quarters are defined as January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31. Results must be reported on the DMR for the last month of the quarter (i.e. the March, June, September and December DMRs)

C. Surface Water Monitoring

The permittee must perform the following receiving water monitoring program to monitor changes that may occur as a result of activities associated with the discharges from the facility.

1. The permittee must establish monitoring stations in accordance with Table 2. The monitoring stations must be approved be IDEQ.
2. The permittee must begin monitoring the receiving water by January 31, 2006 and continue for four (4) years.
3. The permittee must sample the receiving water on the same day as effluent sampling, to the extent practicable.

4. The permittee must analyze all samples for the parameters listed in Table 2 to achieve minimum levels (MLs) that are equivalent to or less than those listed in Table 2. The permittee may request different MLs. Such a request must be in writing and must be approved by EPA Region 10. Once approved, these MLs supersede the maximum MLs in Table 2.

Table 2: Surface Water Monitoring Requirements

Parameter (units)	Sample Locations	Sample Frequency	Sample Type	Maximum ML
Flow (mgd)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	monthly	measure	---
Nitrite (mg/L)	Upstream of outfall	quarterly[1]	grab	0.01
Nitrate + Nitrite (mg/L)	Upstream of outfall	quarterly[1]	grab	0.1
Total Kjeldahl Nitrogen (mg/L)	Upstream of outfall	quarterly[1]	grab	0.1
Total Ammonia as N (mg/L)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	quarterly[1]	grab	0.05
Total Phosphorous as P (mg/L)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	quarterly[1]	grab	0.01
Orthophosphate as P (mg/L)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	quarterly[1]	grab	0.01
pH (s. u.)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	quarterly[1]	grab	---
Temperature (°C)	Upstream of outfall, mouth of Purdam Drain into Mason Creek	quarterly[1]	grab	---

1. Quarters are defined as January 1 through March 31, April 1 through June 30, July 1 through September 30, and October 1 through December 31.

5. Quality assurance/quality control plans for all monitoring must be documented in the Quality Assurance Plan required under Part II.A., "Quality Assurance Plan".

6. The permittee must submit surface water monitoring results to EPA Region 10 and IDEQ with the next NPDES permit application, which is due by April 30, 2010 (see Part V.B). At a minimum, the report must include the following:

   a) Dates of sample collection and analyses.

   b) Results of sample analysis for all samples.

   c) Relevant quality assurance/quality control (QA/QC) information.

II. Special Conditions

A. Quality Assurance Plan (QAP)

The permittee must develop a quality assurance plan (QAP) for all monitoring required by this permit. The permittee must provide EPA Region 10 and IDEQ with written notification that the Plan has been developed and implemented by January 31, 2006. Any existing QAPs may be modified for submittal under this section.

1. The QAP must be designed to assist in planning for the collection and analysis of effluent and receiving water samples in support of the permit and in explaining data anomalies when they occur.
2. Throughout all sample collection and analysis activities, the permittee must use the EPA-approved QA/QC and chain-of-custody procedures described in *Requirements for Quality Assurance Project Plans* (EPA/QA/R-5) and *Guidance for Quality Assurance Project Plans* (EPA/QA/G-5). The QAP must be prepared in the format that is specified in these documents.
3. At a minimum, the QAP must include the following:
   a) Details on the number of samples, type of sample containers, preservation of samples, holding times, analytical methods, analytical detection and quantitation limits for each target compound, type and number of quality assurance field samples, precision and accuracy requirements, sample preparation requirements, sample shipping methods, and laboratory data delivery requirements.
   b) Map(s) indicating the location of each sampling point.
   c) Qualification and training of personnel.
   d) Name(s), address(es) and telephone number(s) of the laboratories, used by or proposed to be used by the permittee.
4. The permittee must amend the QAP whenever there is a modification in sample collection, sample analysis, or other procedure addressed by the QAP.
5. Copies of the QAP must be kept on site and made available to EPA and/or IDEQ upon request.

B. Total Phosphorus Schedule of Compliance

1. The permittee must achieve compliance with the final total phosphorus effluent limitations of Part I.B. (Table 1), by May 1, 2010.
2. Until compliance with the effluent limits is achieved, at a minimum, the permittee must complete the tasks and reports listed in Table 3.
3. The permittee must submit an Annual Report of Progress, which outlines the progress made towards reaching the compliance date for the total phosphorus effluent limitations. The annual Report of Progress must be submitted by November 1 of each year. The first report is due November 1, 2006 and annually thereafter, until compliance with the total phosphorus effluent limits is achieved. See also Part III.J., "Compliance Schedules". At a minimum, the annual report must include:
   a) An assessment of the previous year of total phosphorus data and comparison to the effluent limitations.
   b) A report on progress made towards meeting the final effluent limitations, including the applicable deliverable required under paragraph 2 (Table 3).

c) Further actions and milestones targeted for the upcoming year.

Table 3: Tasks Required Under the Schedule of Compliance for Total Phosphorus		
Task No.	**Due at End of Year**	**Task Activity**
1	1	**Source investigation:** The permittee must investigate the sources, extent, transport, and fate of phosphorus in outfall 001. **Deliverable:** The permittee must prepare a report of findings and recommendations for further actions to reduce effluent phosphorus concentrations.
2	1	**Receiving water fate and transport study:** The permittee must complete a study to determine what fraction of the phosphorus discharged from outfall 001 reaches the mouth of Purdam Drain. **Deliverable:** The permittee must prepare a report of findings.
3	2	**Feasibility study:** The permittee must investigate the feasibility of measures to reduce phosphorus concentrations in outfall 001 to meet the final effluent limits. Evaluations should consider short and long term aspects of: 1) effectiveness of the measures (e.g., reduction of phosphorus, affords long-term protection, minimizes short term environmental impacts, and complies with effluent limits); 2) implementability of the measures (e.g., technical feasibility); and 3) costs. Readily implementable measures must be designed and constructed as soon as feasible. Measures that are more technically difficult or have more unknowns may need further investigations. **Deliverable:** The permittee must submit: 1) A report of the findings on the feasibility of measures; and 2) Design documents and/or construction completion reports for those measures that are readily implemented.
4[1]	3	**Design and construction:** The permittee must construct measures to reduce phosphorus concentrations in outfall 001 to achieve the effluent limits. **Deliverable:** The permittee must submit construction completion reports, and/or progress reports if more technically difficult or unknown conditions prevent completion.
5[1]	4	Continued design and construction. **Deliverable:** The permittee must submit construction completion reports, and/or progress reports if more technically difficult or unknown conditions prevent completion.
6[1]	4 1/2	Construction completed and operating such that effluent limits are achieved.

Footnotes:
1. Tasks scheduled past Year 2 are listed in anticipation of potential unknown conditions. The permittee is not required to complete these later tasks if compliance with the effluent limits is achieved sooner.

C. Best Management Practices Plan

1. Purpose:

Through implementation of the best management practices (BMP) plan, the permittee must prevent or minimize the generation and the potential for the release of pollutants from the facility to the waters of the United States through normal and ancillary activities.

2. Development and Implementation Schedule:

The permittee must provide EPA Region 10 and IDEQ with written notification that the BMP plan has been developed and implemented by January 31, 2006. Any existing BMP plans may be modified for submittal and approval under this section. The permittee must implement the provisions of the plan as conditions of this permit by January 31, 2006.

3. Documentation

The permittee must maintain a copy of the BMP Plan at the facility and make it available to EPA, IDEQ or an authorized representative upon request.

4. Elements of the BMP Plan

a) The BMP Plan must be consistent with the objectives above and the general guidance contained *in Guidance Manual for Developing Best Management Practices* (EPA 833-B-93-004, October 1993) and *Storm Water Management For Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices* (EPA 832-R-92-006) or any subsequent revision to these guidance documents.

b) Specific Best Management Practices. The BMP Plan must establish specific BMPs or other measures to achieve the purpose of the BMP Plan under subpart A, and which ensure that the following specific requirements are met:

(i) Solids, sludges, or other pollutants removed in the course of treatment or control of water and wastewaters must be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

(ii) Ensure proper management of solid and hazardous waste in accordance with regulations promulgated under the Resource Conservation and Recovery Act (RCRA). Management practices required under RCRA regulations must be referenced in the BMP Plan.

5. BMP Plan Modification

a) The permittee must amend the BMP Plan whenever there is a change in the facility or in the operation of the facility which materially increases the generation of pollutants or their release or potential release to surface waters.

b) The permittee must amend the BMP Plan whenever it is found to be ineffective in achieving the general objective of preventing and minimizing the generation and the potential for the release of pollutants from the facility to the waters of the United States and/or the specific requirements above.

c) Any changes to the BMP Plan must be consistent with the objectives and specific requirements listed above.

III. General Monitoring, Recording and Reporting Requirements

A. Representative Sampling (Routine and Non-Routine Discharges)

Samples and measurements must be representative of the volume and nature of the monitored discharge.

In order to ensure that the effluent limits set forth in this permit are not violated at times other than when routine samples are taken, the permittee must collect additional samples at the appropriate outfall whenever any discharge occurs that may reasonably be expected to cause or contribute to a violation that is unlikely to be detected by a routine sample. The permittee must analyze the additional samples for those parameters limited in Part I.B. of this permit that are likely to be affected by the discharge.

The permittee must collect such additional samples as soon as the spill, discharge, or bypassed effluent reaches the outfall. The samples must be analyzed in accordance with paragraph III.C ("Monitoring Procedures"). The permittee must report all additional monitoring in accordance with paragraph III.D ("Additional Monitoring by Permittee").

B. Reporting of Monitoring Results

The permittee must summarize monitoring results each month on the Discharge Monitoring Report (DMR) form (EPA No. 3320-1) or equivalent. The permittee must submit reports monthly, postmarked by the 10th day of the following month. The permittee must sign and certify all DMRs, and all other reports, in accordance with the requirements of Part V.E. of this permit ("Signatory Requirements"). The permittee must submit the legible originals of these documents to the Director, Office of Compliance and Enforcement, with copies to IDEQ at the following addresses:

US EPA Region 10
Attn: PCS Data Entry Team
1200 Sixth Avenue, OCE-133
Seattle, Washington 98101

Idaho Department of Environmental Quality
Boise Regional Office
1445 N. Orchard Street
Boise, ID 83706

C. Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR 136, unless other test procedures have been specified in this permit or approved by EPA as an alternate test procedure under 40 CFR 136.5.

D. Additional Monitoring by Permittee

If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR 136 or as specified in this permit, the permittee must include the results of this monitoring in the calculation and reporting of the data submitted in the DMR.

Upon request by EPA, the permittee must submit results of any other sampling, regardless of the test method used.

E. Records Contents

Records of monitoring information must include:

1. the date, exact place, and time of sampling or measurements;
2. the name(s) of the individual(s) who performed the sampling or measurements;
3. the date(s) analyses were performed;
4. the names of the individual(s) who performed the analyses;
5. the analytical techniques or methods used; and
6. the results of such analyses.

F. Retention of Records

The permittee must retain records of all monitoring information, including, all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, copies of DMRs, a copy of the NPDES permit, and records of all data used to complete the application for this permit, for a period of at least five years from the date of the sample, measurement, report or application. This period may be extended by request of EPA or IDEQ at any time.

G. Twenty-four Hour Notice of Noncompliance Reporting

1. The permittee must report the following occurrences of noncompliance by telephone within 24 hours from the time the permittee becomes aware of the circumstances:

a) any noncompliance that may endanger health or the environment;

b) any unanticipated bypass that exceeds any effluent limitation in the permit (See Part IV.F., "Bypass of Treatment Facilities");

c) any upset that exceeds any effluent limitation in the permit (See Part IV.G., "Upset Conditions"); or

d) any violation of a maximum daily discharge limitation for any of the pollutants in Table 1 of Part I.A.

2. The permittee must also provide a written submission within five days of the time that the permittee becomes aware of any event required to be reported under subpart 1 above. The written submission must contain:

   a) a description of the noncompliance and its cause;

   b) the period of noncompliance, including exact dates and times;

   c) the estimated time noncompliance is expected to continue if it has not been corrected; and

   d) steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

3. The Director of the Office of Compliance and Enforcement may waive the written report on a case-by-case basis if the oral report has been received within 24 hours by the NPDES Compliance Hotline in Seattle, Washington, by telephone, (206) 553-1846.

4. Reports must be submitted to the addresses in Part III.B ("Reporting of Monitoring Results").

H. Other Noncompliance Reporting

The permittee must report all instances of noncompliance, not required to be reported within 24 hours, at the time that monitoring reports for Part III.B ("Reporting of Monitoring Results") are submitted. The reports must contain the information listed in Part III.G.2 of this permit ("Twenty-four Hour Notice of Noncompliance Reporting").

I. Changes in Discharge of Toxic Pollutants

The permittee must notify the Director of the Office of Water and Watersheds and IDEQ as soon as it knows, or has reason to believe:

1. That any activity has occurred or will occur that would result in the discharge, on a **routine or frequent** basis, of any toxic pollutant that is not limited in the permit, if that discharge may reasonably be expected to exceed the highest of the following "notification levels":

   a) One hundred micrograms per liter (100 ug/l);

   b) Two hundred micrograms per liter (200 ug/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 ug/l) for 2,4-dinitrophenol and for

2-methyl-4, 6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

c) Five (5) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

d) The level established by EPA in accordance with 40 CFR 122.44(f).

2. That any activity has occurred or will occur that would result in any discharge, on a **non-routine or infrequent** basis, of any toxic pollutant that is not limited in the permit, if that discharge may reasonably be expected to exceed the highest of the following "notification levels":

   a) Five hundred micrograms per liter (500 ug/l);

   b) One milligram per liter (1 mg/l) for antimony;

   c) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

   d) The level established by EPA in accordance with 40 CFR 122.44(f).

3. The permittee must submit the notification to Office of Water and Watersheds at the following address:

   US EPA Region 10
   Attn: NPDES Permits Unit Manager
   1200 Sixth Avenue, OWW-130
   Seattle, Washington 98101

J. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit must be submitted no later than 14 days following each schedule date.

IV. Compliance Responsibilities

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification, or for denial of a permit renewal application.

B. Penalties for Violations of Permit Conditions

1. Civil and Administrative Penalties. Pursuant to 40 CFR Part 19 and the Act, any person who violates section 301, 302, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under section 402, or any requirement imposed in a pretreatment

program approved under sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $32,500 per day for each violation).

2. Administrative Penalties. Any person may be assessed an administrative penalty by the Administrator for violating section 301, 302, 306, 307, 308, 318 or 405 of this Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of this Act. Pursuant to 40 CFR 19 and the Act, administrative penalties for Class I violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $32,500). Pursuant to 40 CFR 19 and the Act, penalties for Class II violations are not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act and the Federal Civil Penalties Inflation Adjustment Act (28 U.S.C. § 2461 note) as amended by the Debt Collection Improvement Act (31 U.S.C. § 3701 note) (currently $11,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $157,500).

3. Criminal Penalties:

   a) Negligent Violations. The Act provides that any person who negligently violates sections 301, 302, 306, 307, 308, 318, or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, or any requirement imposed in a pretreatment program approved under section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of $2,500 to $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation, or by imprisonment of not more than 2 years, or both.

   b) Knowing Violations. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of $5,000 to $50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

   c) Knowing Endangerment. Any person who knowingly violates section 301, 302, 303, 306, 307, 308, 318 or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious

bodily injury, shall, upon conviction, be subject to a fine of not more than $250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

d) False Statements. The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

C. Need To Halt or Reduce Activity not a Defense

It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with this permit.

D. Duty to Mitigate

The permittee must take all reasonable steps to minimize or prevent any discharge in violation of this permit that has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The permittee must at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by the permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

F. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur that does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs 2 and 3 of this Part.

2. Notice.

   a) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it must submit prior notice, if possible at least 10 days before the date of the bypass.

   b) Unanticipated bypass. The permittee must submit notice of an unanticipated bypass as required under Part III.G ("Twenty-four Hour Notice of Noncompliance Reporting").

3. Prohibition of bypass.

   a) Bypass is prohibited, and the Director of the Office of Compliance and Enforcement may take enforcement action against the permittee for a bypass, unless:

      (i) The bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

      (ii) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance; and

      (iii) The permittee submitted notices as required under paragraph 2 of this Part.

   b) The Director of the Office of Compliance and Enforcement may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 3.a. of this Part.

G. Upset Conditions

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee meets the requirements of paragraph 2 of this Part. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2. Conditions necessary for a demonstration of upset. To establish the affirmative defense of upset, the permittee must demonstrate, through

properly signed, contemporaneous operating logs, or other relevant evidence that:

a) An upset occurred and that the permittee can identify the cause(s) of the upset;

b) The permitted facility was at the time being properly operated;

c) The permittee submitted notice of the upset as required under Part III.G, "Twenty-four Hour Notice of Noncompliance Reporting;" and

d) The permittee complied with any remedial measures required under Part IV.D, "Duty to Mitigate."

3. Burden of proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

H. Toxic Pollutants

The permittee must comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that establish those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

I. Planned Changes

The permittee must give notice to the Director of the Office of Water and Watersheds as specified in part III.I.3. and IDEQ as soon as possible of any planned physical alterations or additions to the permitted facility whenever:

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as determined in 40 CFR 122.29(b); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are subject neither to effluent limitations in the permit, nor to notification requirements under Part III.I ("Changes in Discharge of Toxic Substances").

J. Anticipated Noncompliance

The permittee must give advance notice to the Director of the Office of Compliance and Enforcement and IDEQ of any planned changes in the permitted facility or activity that may result in noncompliance with this permit.

V. General Provisions

A. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause as specified in 40 CFR 122.62, 122.64, or 124.5. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or a

notification of planned changes or anticipated noncompliance does not stay any permit condition.

B. Duty to Reapply

If the permittee intends to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. In accordance with 40 CFR 122.21(d), and unless permission for the application to be submitted at a later date has been granted by the Regional Administrator, the permittee must submit a new application at least 180 days before the expiration date of this permit.

C. Duty to Provide Information

The permittee must furnish to EPA and IDEQ, within the time specified in the request, any information that EPA or IDEQ may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee must also furnish to EPA or IDEQ, upon request, copies of records required to be kept by this permit.

D. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or that it submitted incorrect information in a permit application or any report to EPA or IDEQ, it must promptly submit the omitted facts or corrected information.

E. Signatory Requirements

All applications, reports or information submitted to EPA and IDEQ must be signed and certified as follows.

1. All permit applications must be signed as follows:
   a) For a corporation: by a responsible corporate officer.
   b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.
   c) For a municipality, state, federal, Indian tribe, or other public agency: by either a principal executive officer or ranking elected official.
2. All reports required by the permit and other information requested by EPA or IDEQ must be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   a) The authorization is made in writing by a person described above;
   b) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field,

superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company; and

c) The written authorization is submitted to the Director of the Office of Compliance and Enforcement and IDEQ.

3. Changes to authorization. If an authorization under Part V.E.2 is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part V.E.2. must be submitted to the Director of the Office of Compliance and Enforcement and IDEQ prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this Part must make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Availability of Reports

In accordance with 40 CFR 2, information submitted to EPA pursuant to this permit may be claimed as confidential by the permittee. In accordance with the Act, permit applications, permits and effluent data are not considered confidential. Any confidentiality claim must be asserted at the time of submission by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice to the permittee. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR 2, Subpart B (Public Information) and 41 Fed. Reg. 36902 through 36924 (September 1, 1976), as amended.

G. Inspection and Entry

The permittee must allow the Director of the Office of Compliance and Enforcement, EPA Region 10; IDEQ; or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and
4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

H. Property Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to persons or property or invasion of other private rights, nor any infringement of federal, tribal, state or local laws or regulations.

I. Transfers

This permit is not transferable to any person except after notice to the Director of the Office of Water and Watersheds as specified in part III.I.3. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory).

J. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 510 of the Act.

K. Reopener

This permit may be reopened in order to incorporate any wasteload allocation granted to the facility in an approved TMDL.

VI. Definitions

1. "Act" means the Clean Water Act.
2. "Administrator" means the Administrator of the EPA, or an authorized representative.
3. "Average monthly discharge limitation" means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

4. "Best Management Practices" (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of wasters of the United States. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage areas.
5. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.
6. "Composite" - see "24-hour composite".
7. "Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day.
8. "Director of the Office of Compliance and Enforcement" means the Director of the Office of Compliance and Enforcement, EPA Region 10, or an authorized representative.
9. "Director of the Office of Water and Watersheds" means the Director of the Office of Water and Watersheds, EPA Region 10, or an authorized representative.
10. "DMR" means discharge monitoring report.
11. "EPA" means the United States Environmental Protection Agency.
12. "Grab" sample is an individual sample collected over a period of time not exceeding 15 minutes.
13. "IDEQ" means the Idaho Department of Environmental Quality.
14. "Maximum daily discharge limitation" means the highest allowable "daily discharge."
15. "Method Detection Limit (MDL)" means the minimum concentration of a substance (analyte) that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.
16. "Minimum Level (ML)" means the concentration at which the entire analytical system must give a recognizable signal and an acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method-specified sample weights, volumes and processing steps have been followed.
17. "NPDES" means National Pollutant Discharge Elimination System, the national program for issuing, modifying, revoking and reissuing, terminating,

monitoring and enforcing permits . . . under sections 307, 402, 318, and 405 of the CWA.

18. "QA/QC" means quality assurance/quality control.
19. "Regional Administrator" means the Regional Administrator of Region 10 of the EPA, or the authorized representative of the Regional Administrator.
20. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
21. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
22. "24-hour composite" sample means a combination of at least 8 discrete sample aliquots of at least 100 milliliters, collected over periodic intervals from the same location, during the operating hours of a facility over a 24 hour period. The composite must be flow proportional. The sample aliquots must be collected and stored in accordance in accordance with procedures prescribed in the most recent edition of *Standard Methods for the Examination of Water and Wastewater* and the permittee's Quality Assurance Plan (see Part II.A. of this permit).

APPENDIX C
Agency Correspondence

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Idaho Fish and Wildlife Office
1387 SOUTH VINNELL WAY, SUITE 368
BOISE, ID 83709
PHONE: (208)378-5243 FAX: (208)378-5262

Consultation Code: 01EIFW00-2015-SLI-0707 August 11, 2015
Event Code: 01EIFW00-2015-E-00743
Project Name: Preliminary Draft EA for Lactalis' US BOR Use Authorization Application

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Please note the module for identifying proposed and designated critical habitat by your defined project area is currently incomplete. At this time, we ask that you use the following County by County list to aid you in determining whether your project may affect proposed or designated critical habitat in your action area.

Canada Lynx (*Lynx canadensis*)
Designated Critical Habitat: (designated February 24, 2009) Boundary County.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2009-02-25/pdf/E9-3512.pdf#page=1
Printable Maps:
http://www.fws.gov/mountain-prairie/species/mammals/lynx/criticalhabitat_files/20081222_fedreg_unit3_draft.

GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/lunx_ch.zip
KML for Google Earth: (None Currently Available)

Selkirk Mountains Woodland Caribou (*Rangifer tarandus Caribou*)
Proposed Critical Habitat: (proposed Noveber 30, 2011) Bonner and Boundary Counties.

Federal Register Notice: http://www.fws.gov/idaho/home/2011-30451FINALR.pdf
Printable Maps: http://www.fws.gov/idaho/home/Map1_sub1_150.pdf
GIS Data: (None Currently Available)
KML for Google Earth: (None Currently Available)

Bull Trout (*Salvelinus confluentus*)
Designated Critical Habitat: (designated September 30, 2010) Adams, Benewah, Blaine, Boise, Bonner, Boundary, Butte, Camas, Clearwater, Custer, Elmore, Gem, Idaho, Kootenai, Lemhi, Lewis, Nez Perce, Owyhee, Shoshone, Valley, and Washington Counties.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2010-10-18/pdf/2010-25028.pdf#page=2
Printable Maps: http://www.fws.gov/pacific/bulltrout/CH2010_Maps.cfm#CHMaps
GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/bulltrout.zip
KML for Google Earth:
http://www.fws.gov/pacific/bulltrout/finalcrithab/BT_FCH_2010_KML.zip

Kootenai River White Sturgeon (*Acipenser transmontanus*)
Designated Critical Habitat: (designated July 9, 2008) Boundary County.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2008-07-09/pdf/E8-15134.pdf#page=1
Printable Maps: (None Currently Available)
GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/fch_73fr39506_acit_2009.zip
KML for Google Earth: (None Currently Available)

Slickspot Peppergrass (*Lepidium papilliferum*)
Proposed Critical Habitat: Ada, Canyon, Elmore, Gem, Owyhee, and Payette Counties.

Federal Register Notice: http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27727.pdf
Printable Maps: http://www.fws.gov/idaho/Lepidium.html
GIS Data: (None Currently Available)
KML for Google Earth: (None Currently Available)

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

Official Species List

Provided by:

Idaho Fish and Wildlife Office
1387 SOUTH VINNELL WAY, SUITE 368
BOISE, ID 83709
(208) 378-5243

Consultation Code: 01EIFW00-2015-SLI-0707
Event Code: 01EIFW00-2015-E-00743

Project Type: ** OTHER **

Project Name: Preliminary Draft EA for Lactalis' US BOR Use Authorization Application
Project Description: At the request of Sorrento Lactalis, Inc., the US Bureau of Reclamation is considering its Application to authorize an increase in instantaneous discharge to the Purdam Drain in Canyon County, Idaho from the current peak instantaneous rate of approximately 1.2 cfs, to 4.5 cfs to accommodate anticipated expansion of Lactalisâ Nampa cheese processing plant.

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:

Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Canyon, ID

Endangered Species Act Species List

There are a total of 1 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Flowering Plants	Status	Has Critical Habitat	Condition(s)
Slickspot peppergrass *(Lepidium papilliferum)*	Proposed Endangered	Proposed	

Critical habitats that lie within your project area

There are no critical habitats within your project area.

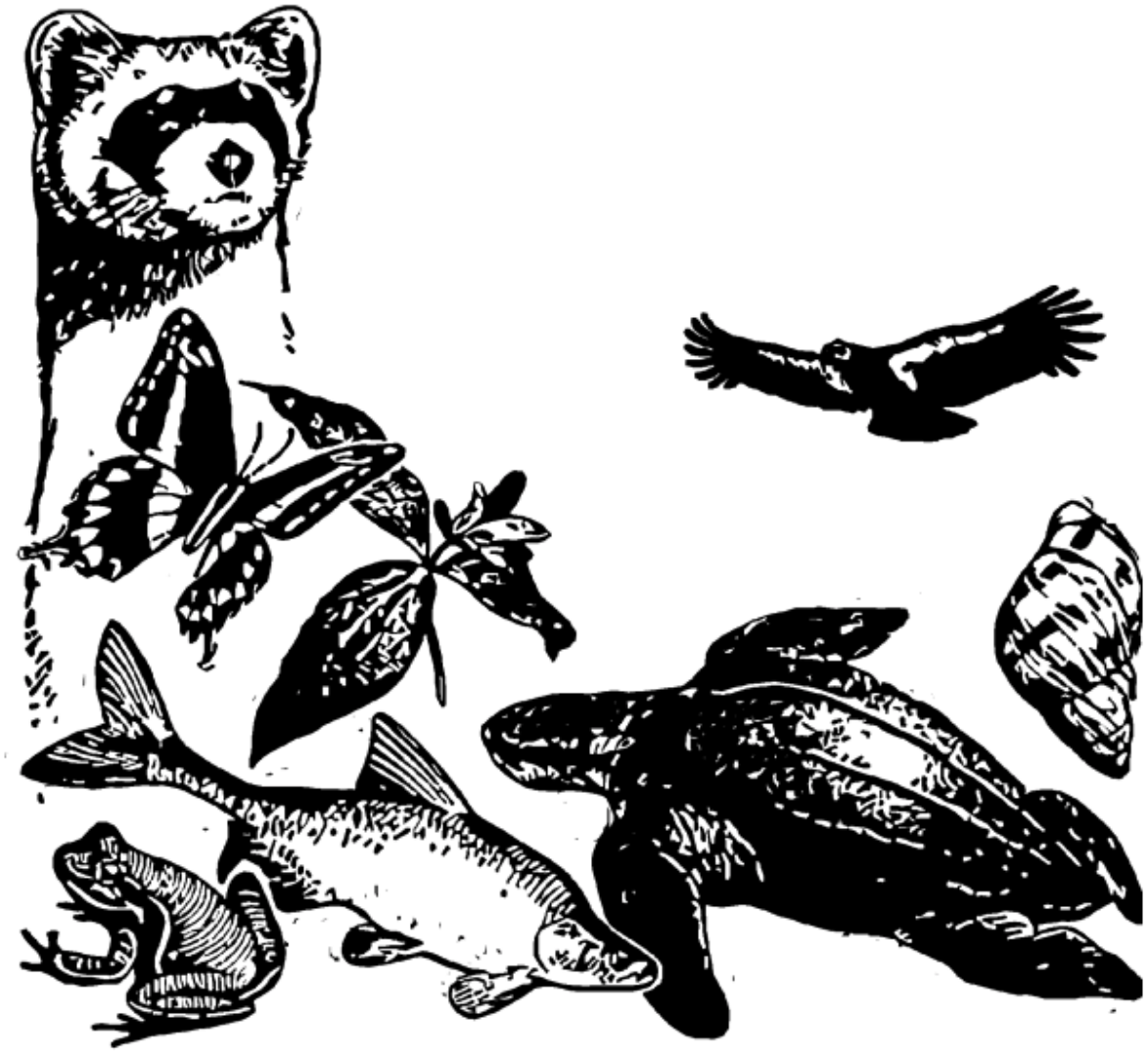
U.S. Fish & Wildlife Service

Sorrento ESA

IPaC Trust Resources Report

Generated March 17, 2016 07:57 AM MDT, IPaC v3.0.0

This report is for informational purposes only and should not be used for planning or analyzing project level impacts. For project reviews that require U.S. Fish & Wildlife Service review or concurrence, please return to the IPaC website and request an official species list from the Regulatory Documents page.



IPaC - Information for Planning and Conservation (http://ecos.fws.gov/ipac/): A project planning tool to help streamline the U.S. Fish & Wildlife Service environmental review process.

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U.S. Fish & Wildlife Service

IPaC Trust Resources Report

NAME

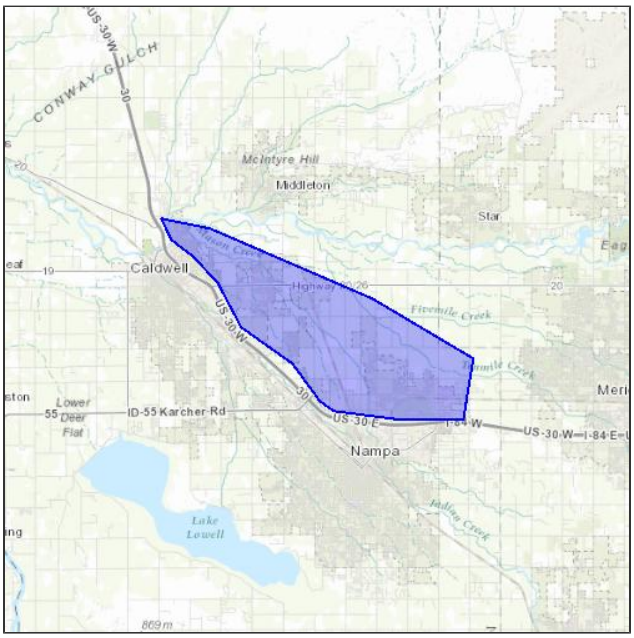
Sorrento ESA

LOCATION

Ada and Canyon counties, Idaho

IPAC LINK

http://ecos.fws.gov/ipac/project/TBZOM-X27ER-GNDDX-KJHT7-PSLWEE



U.S. Fish & Wildlife Service Contact Information

Trust resources in this location are managed by:

Idaho Fish And Wildlife Office
1387 South Vinnell Way, Suite 368
Boise, ID 83709-1657
(208) 378-5243

Endangered Species

Proposed, candidate, threatened, and endangered species are managed by the Endangered Species Program of the U.S. Fish & Wildlife Service.

This USFWS trust resource report is for informational purposes only and should not be used for planning or analyzing project level impacts.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list from the Regulatory Documents section.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can only be obtained by requesting an official species list either from the Regulatory Documents section in IPaC or from the local field office directly.

The list of species below are those that may occur or could potentially be affected by activities in this location:

Flowering Plants

Slickspot Peppergrass Lepidium papilliferum — Proposed Endangered

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=Q34X

Critical Habitats

There are no critical habitats in this location

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity that results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish & Wildlife Service.[1] There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

Any person or organization who plans or conducts activities that may result in the take of migratory birds is responsible for complying with the appropriate regulations and implementing appropriate conservation measures.

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1. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

Additional information can be found using the following links:

- Birds of Conservation Concern
  http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Conservation measures for birds
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Year-round bird occurrence data
  http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

The following species of migratory birds could potentially be affected by activities in this location:

Bald Eagle Haliaeetus leucocephalus — Bird of conservation concern
Season: Wintering
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B008

Black Rosy-finch Leucosticte atrata — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J4

Brewer's Sparrow Spizella breweri — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HA

Burrowing Owl Athene cunicularia — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0NC

Calliope Hummingbird Stellula calliope — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0K3

Cassin's Finch Carpodacus cassinii — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0J6

Eared Grebe Podiceps nigricollis — Bird of conservation concern
Season: Breeding

Ferruginous Hawk Buteo regalis — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06X

Fox Sparrow Passerella iliaca — Bird of conservation concern
Season: Breeding

Green-tailed Towhee Pipilo chlorurus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0IO

Lewis's Woodpecker Melanerpes lewis — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HQ

Loggerhead Shrike Lanius ludovicianus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FY

Long-billed Curlew Numenius americanus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B06S

Peregrine Falcon Falco peregrinus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0FU

Rufous Hummingbird selasphorus rufus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0E1

Sage Thrasher Oreoscoptes montanus — Bird of conservation concern
Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0ID

Short-eared Owl Asio flammeus — Bird of conservation concern
Year-round
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0HD

Swainson's Hawk Buteo swainsoni — Bird of conservation concern

Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B070

Western Grebe aechmophorus occidentalis — Bird of conservation concern

Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0EA

Willow Flycatcher Empidonax traillii — Bird of conservation concern

Season: Breeding
https://ecos.fws.gov/tess_public/profile/speciesProfile.action?spcode=B0F6

Wildlife refuges and fish hatcheries

There are no refuges or fish hatcheries in this location

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

This location overlaps all or part of the following wetlands:

Freshwater Emergent Wetland

PEM1C	2.88 acres
PEM1Frx	2.5 acres
PEM1F	2.2 acres

Freshwater Forested/shrub Wetland

PFO1A	3.35 acres

PFO1/EM1C	1.21 acres
PFO1C	1.06 acres

Freshwater Pond

PUBFrx	2.36 acres
PUBFh	1.21 acres
PAB4Fx	0.191 acre

Lake

L1UBHrx	30.7 acres

Other

PUSCrx	29.4 acres

Riverine

R3UBH	237.0 acres
R4SBCx	36.1 acres
R3USA	1.01 acres

A full description for each wetland code can be found at the National Wetlands Inventory website: http://107.20.228.18/decoders/wetlands.aspx

United States Department of Agriculture
Natural Resources Conservation Service

Plant Guide

SLICKSPOT PEPPERGRASS

Lepidium papilliferum (L.F. Hend.) A. Nelson & J.F. Macbr.

Plant Symbol = LEPA17

Contributed by: USDA NRCS Idaho Plant Materials Program

Sheri Hagwood, USDI Bureau of Land Management

Alternate Names
Idaho pepperweed.
Lepidium montanum Nutt. Var. *papilliferum* (L.F. Hend.) C.L. Hitchc.

Uses
Slickspot peppergrass is a small, flowering plant in the mustard family which grows in unique microsites known as slick spots within the semiarid sagebrush-steppe of the Snake River Plain of southwestern Idaho. No large ungulates, either domestic or wild use the plant (USDI, 2009). This species has no known agricultural, economic, or other human uses at this time. This species may have scientific significance due to its evolutionary isolation which is an important subject in conservation biology research.

Status
The U.S. Fish and Wildlife Service determined that slickspot peppergrass is a threatened species under the Endangered Species Act of 1973. The ruling became effective December 7, 2009. In 2011the U.S. Fish and Wildlife Service proposed to designate approximately 58,000 acres of critical habitat for slickspot peppergrass in Ada, Elmore, Payette, and Owyhee Counties in Idaho (USDI, 2011). In 2012 the decision was reversed by the United States District Court of Idaho (U.S. District Court of Idaho, 2012).

Description
General: Slickspot peppergrass is an intricately branched, tap-rooted plant, averaging 2 to 8 inches tall, but occasionally reaching up to 16 inches in height. Leaves and stems are covered with fine, soft hairs, and the leaves are divided into linear segments. Flowers are numerous, 0.1 inches in diameter, white, and have four petals. Fruits (siliques) are 0.1 inch across, round in outline, flattened and two-seeded (Moseley, 1994). Plants can be annual or biennial. The annual form reproduces by flowering and setting seed in its first year, and dies within one growing season. The biennial form initiates growth in the first year as a vegetative rosette and flowers and sets seed the second year (Meyer, 2005). A third, but uncommon flowering pattern involves two episodes of reproduction, one late in the first year and one in the second year (White, 2009).

Distribution: Slickspot peppergrass is endemic to Idaho's Snake River Plains and adjacent foothills. The species occupies an area of approximately 90 x 256 miles with a disjunct population on the Owyhee Plateau. An early record of slickspot peppergrass in Bannock County, Idaho (Atwood and DeBolt, 2000) appears to have been in error (DeBolt, pers. comm., 2012). For current distribution, consult the Plant Profile page for this species on the PLANTS Web site.

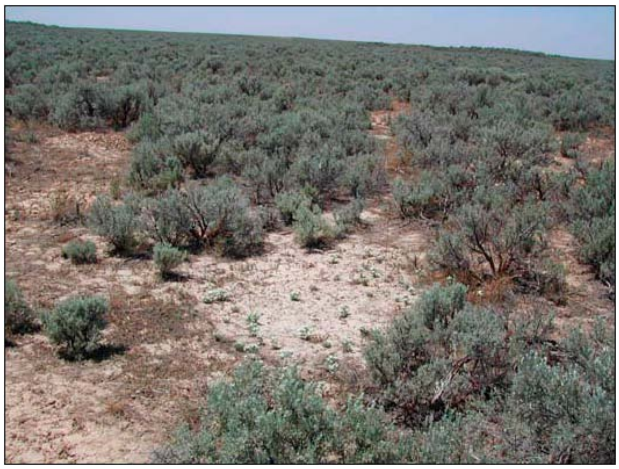
Habitat: Slickspot peppergrass is specialized to occupy a specific microhabitat within the sagebrush steppe vegetation of the Snake River Plains of southwestern Idaho. This specific microhabitat is referred to as "slick spots" which are small-scale sites of water accumulation in the gently undulating landscape. Dominant perennial species of the sagebrush steppe are usually excluded from slick spots, presumably because of the their inability to tolerate winter flooding even though the climatic regime of this region is characterized by low and variable winter and spring precipitation and dry summers with a mean annual precipitation under 10 inches (Meyer, 2005).

Slick spots are visually distinct small-scale (mostly between 10 to 20 square feet) depressions in the soil that collect water. These sparsely vegetated microsites are created by unusual edaphic conditions. Drainage swales commonly bisect the landscape and often contain the slick spots with ponded water. Slick spot soils are silt to clay

in texture and mostly devoid of vegetation. Below the surface layer is a vesicular layer (defined as a structure probably caused by capillary pressure within air-filled voids surrounded by water) that is partially impermeable to water infiltration and can cause water ponding. The soil profile below the vesicular layer is dominated by a clay layer. Chemical properties indicate that soils are sodic and/or saline (high electrical conductivity, EC), have very low levels of C and N, and P and K levels are variable. The compositions of humic acids within slick spots fall within the range of values commonly reported for other soils (Palazzo 2008).

Slick spots have a common visual appearance. The first visual cue is the smooth pan-like surface. Typically, the slick spot follows the general slope of prevailing landforms with a slight leveling or break on steeper slopes. On mostly level surfaces, slick spots are very shallow but rarely are closed depressions. They sometimes include smaller areas where remnants of thin soil-algal crusts indicate surface ponding of water (Fisher, 1996).

Slick spots contain no perennial grasses or shrubs. Other than slickspot peppergrass, a wide variety of moss and lichen species cover 10 to 90 percent of the surface. Weedy invasions of cheatgrass, *Bromus tectorum* and burr buttercup *Ceratocephala falcata* (R*anunculus testiculatus*) rooted in surface cracks and in surface crusts are common (Fisher, 1996).



Slickspot. Photo by Dana Quinney, Idaho Army National Guard.

Adaptation

Slickspot peppergrass is found almost exclusively in the slick spots of southwestern Idaho. It has been infrequently documented to occur on disturbed soils along graded dirt roads and badger mounds but these observations are rare. In adapting to the environment of the lower Snake River Plains, slickspot peppergrass has undergone modifications in its adaptive strategy relative to a closely related and possible ancestor *Lepidium montanum*, a widely distributed species (biennial to perennial growth form) that is found in a variety of open habitats in arid to semiarid regions of the southern Intermountain area. The most obvious adaptation is the shift from biennial to summer annual. The dry summers in southwest Idaho have apparently applied strong selection pressure to the annual habit. Even in years when biennial forms are successful, their contribution to seed production may be small (Meyer, 2005). A third, but uncommon flowering pattern which involves two episodes of reproduction, one late in the first year and one in the second year is also an adaptive strategy to maintain gene flow within the species (White 2000). Another major adaptive feature is the evolution of seed dormancy that permits seeds to persist in the seed bank (Meyer, 2005).

Establishment

Slickspot peppergrass reproduces by seed. Seed germinates in the spring. Annual types are single-stemmed with few flowers and seeds. Biennial types overwinter as rosettes, blooming and setting seed the following spring or summer. The biennial types have multiple stems with hundreds of flowers and seeds. . Flowering usually takes place in late April and May, fruit set occurs in June and seed is ripe in late June to early July. Based on a 4 year demography study, survivor ship of the annual form was demonstrated to be higher than survivorship of biennial forms and the number of plants can vary widely from year to year depending on seasonal precipitation patterns (Meyer, 2005).

Laboratory seed germination studies with various combinations of temperatures, moist chilling, and gibberlic acid treatments resulted in low germination percentages. Highest laboratory germination percentages (10 %) are obtained with 6 weeks of dry after-ripening at 50º C followed by 8 weeks of moist chilling. Tetrazolium based viability studies in combination with seed bank retrieval studies consistently showed seed viability to be very high (95 %+) (Meyer, 2005). Seed located near the soil surface show higher rates of germination and viability and the greatest seedling emergence rate. Deep burial of seed (greater than 5.5 inches) may preserve them beyond the 12 year period of viability (USDI 2009).

Slickspot peppergrass relies primarily on cross pollination for successful seed production (Robertson, 2004). Through hand pollination experiments, it was determined that individual plants receiving pollen from distant sources had significantly higher percent fruit set than those relying on pollen from neighboring plants. Self pollinated plants produced little or no fruit.

Twenty five insect families from 5 orders have been observed and collected from slickspot peppergrass at 2 study sites in southwestern Idaho. The diversity of insects encountered on flowers differed between the study sites. The insects most likely responsible for pollinating slickspot peppergrass include members of the Apidae, Colletidae and Halitidae families of the Hymenoptera order (bees, ants, and wasps) (Robertson 2003).

Management
Conservation management plans have been implemented to address the need to: maintain and enhance habitat; reduce intensity, frequency, and size of natural- and human-caused wildfires; minimize loss of habitat associated with wildfire-suppression activities; reduce the potential for invasion of nonnative plant species from wildfire; minimize the loss of habitat associated with rehabilitation and restoration techniques; minimize the establishment of invasive non-native species; minimize the degradation or loss of habitat from off road vehicle use; mitigate the negative effects of military training and other associated activities; and minimize the impact of ground disturbances caused by livestock trampling during periods when soils are saturated (USDI, 2009).

Pests and Potential Problems
The most abundant insect herbivore of slickspot peppergrass is a chrysomelid beetle, *Phyllotreta* sp. which chews holes in the petals of the flower. This herbivory reduces the effectiveness of insect pollination, but does not physically inhibit pollination or seed production (Leavitt, 2006). The U.S. Fish and Wildlife Service does not consider herbivory by the chrysomelid beetle to be a significant threat at this time (USDI, 2009).

The Owyhee harvester ant was recently identified as a potentially important seed predator of slickspot peppergrass but there is no information indicating what the actual magnitude or severity of this threat may be (USDI, 2009).

Environmental Concerns
The U.S Fish and Wildlife Service determined that slickspot peppergrass is a threatened species under the Endangered Species Act of 1973. The ruling became effective December 7, 2009. The primary threat to slickspot peppergrass is the present or threatened destruction, modification, or curtailment of its habitat and range due to the increased frequency and extent of wildfires under a fire regime modified and exacerbated by the spread of invasive plants, particularly nonnative annual grasses such as cheatgrass. Other threats to slickspot peppergrass include human development, potential seed predation by harvester ants, and habitat fragmentation and isolation of small populations (USDI 2009).

Seeds and Plant Production
No commercial or restoration known.

Cultivars, Improved, and Selected Materials (and area of origin)
None

References

Atwood, N.D. and A. DeBolt. 2000. Field Guide to the Special Status Plants of the Bureau of Land Management Lower Snake River District. USDA-BLM. 12 p.

DeBolt, A. 2012. Boise, Idaho: Idaho Botanical Garden. Natural Communities Specialist.

Fisher, H., Eslick, L., Seyfried, M. 1996. Edaphic factors that characterize the Distribution of *Lepidium papilliferum*. Technical Bulletin No. 96-6 Idaho Bureau of Land Management. 23 p.

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Prepared By
Loren St. John, USDA NRCS Plant Materials Center, Aberdeen, Idaho

Dan Ogle, USDA NRCS Idaho State Office, Boise, Idaho

Citation
St. John, L. and D.G. Ogle. Plant Guide for Slickspot Peppergrass (*Lepidium papilliferum*). USDA Natural Resources Conservation Service, Plant Materials Center, Aberdeen, ID

Published December, 2009

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APPENDIX D
Public Scoping

Pacific Northwest Region
Boise, Idaho

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Media Contact: Annette Ross (208) 378-5322 John Petrovsky (208) 383-2224

Released On: March 27, 2015

Reclamation Seeks Public Input on Proposed Increase in Discharge from Sorrento Plant

BOISE, Idaho - The Bureau of Reclamation is seeking public comment to help identify issues and concerns that may be associated with a proposed increase in wastewater flows from the Sorrento Lactalis dairy products facility in Nampa. Comments are due by April 27, 2015.

Sorrento is proposing to substantially increase production at the Nampa facility over the next several years. This growth in production will increase the plant?s wastewater flows from 1.2 cubic feet per second to approximately 4.5 cfs. Sorrento has submitted an application to Reclamation to accommodate this increase in discharge from its treatment plant.

Sorrento's wastewater flows into the Purdam Drain next to its Nampa facility. From the Purdam Drain, the discharge flows down Mason Creek to the Boise River. The quality of the discharge is governed by a National Pollutant Discharge Elimination System permit issued by the U.S. Environmental Protection Agency.

In accordance with the National Environmental Policy Act, Reclamation is preparing an Environmental Assessment to determine if Sorrento?s proposed action will have any significant impact on the human population or the natural environment. Reclamation will also consider whether there are any alternatives to the proposed action that would lessen or avoid impacts. The alternatives that are being considered include:

â€¢ No Action - Defined as denial of the application for increased discharge.

â€¢ The Proposed Action - Defined as approval of the Sorrento consent to use application for an increase in discharge from 1.2 cfs to 4.5 cfs to the Purdam Drain, Mason Creek and the Boise River.

â€¢ A New Pipeline Discharge Facility - Defined as seeking a route for a new pipeline dedicated to discharge of Sorrento?s waste to the Boise River.

The deadline for written comments is April 27, 2015. They can be sent to Rich Jackson, Natural Resource Specialist, Bureau of Reclamation, Snake River Area Office, 230 Collins Road, Boise, ID 83702 or by email at rjackson@usbr.gov.

# # #

Reclamation is the largest wholesale water supplier and the second largest producer of hydroelectric power in the United States, with operations and facilities in the 17 Western States. Its facilities also provide substantial flood control, recreation, and fish and wildlife benefits. Visit our website at www.usbr.gov and follow us on Twitter @USBR.

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

MAR 2 6 2015

IN REPLY REFER TO:

SRA-1208
PRJ-28.00

Subject: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Sorrento) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Dear Interested Party:

The Bureau of Reclamation has received an application from Sorrento for Application for Transportation and Utility Systems and Facilities on Federal Lands (Application). This Application seeks Reclamation's approval to increase an existing National Pollutant Discharge System-permitted wastewater discharge to the Purdam Drain in Canyon County, Idaho, from the current peak instantaneous rate of approximately 1.2 cubic feet per second (cfs) to approximately 4.5 cfs (Proposed Action) to accommodate anticipated expansion of Sorrento's Nampa cheese production plant. The purpose of this letter is to inform interested and affected parties of the proposal and to solicit comments pursuant to the National Environmental Policy Act of 1969. Enclosed is a Scoping Information Package describing the project proposal.

Scoping is a public involvement process used to determine the scope of issues to be addressed and identify issues related to a proposed action. Analysis of the proposal is ongoing and will be documented in an environmental assessment with an estimated completion date in September 2015. Comments received in response to this solicitation will be used to identify potential environmental issues related to the Proposed Action and to identify alternatives to the Proposed Action that meet the purpose of and need for the project.

Please send your written comments by **April 27, 2015**, to: Mr. Rich Jackson, Natural Resource Specialist, Bureau of Reclamation, Snake River Area Office, 230 Collins Road, Boise, Idaho 83702, or via email at rjackson@usbr.gov.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

The primary contact for questions and comments for this analysis is Mr. Rich Jackson, Natural Resource Specialist, at 208-383-2285.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosure: Scoping Information Package

Jerry Rose, phone # 454-0223
Message verbally presented by Mr. Rose to Rich Jackson for consideration on the Sorrento Project Proposal.

Mr. Rose has over a ¼ mile Mason Creek frontage.
With Sorrento's proposed increase discharge through the drain into Mason Creek:

- What else, water quality wise will be affecting the water erosion, siltation, and water quality chemistry issues in Mason Creek. **01-01**
    - Stormwater and Sorrento's water mixing and having water quality and erosional concerns. How much siltation and how debris due to this? **01-02**
    - Large industrial companies along Mason Creek that are/could potentially discharging effluent that, when combined with Sorrento's effluent, could cause water quality concerns. **01-03**
    - Discharge from Solomon drain in combination with Sorrento's discharge creating a greater water quality concerns. **01-04**
    - Water temperature could increase and cause ecological problems. **01-05**

Alternatives: Consider these common remediation techniques: **01-06**

- Evaporation ponds
- Sand Filters

Jackson, Richard <rjackson@usbr.gov>

Sorrento Lactalis, In Increase Effluent Flow application

1 message

Brent Orton <borton@cityofcaldwell.org> Tue, Apr 14, 2015 at 1:02 PM
To: "rjackson@usbr.gov" <rjackson@usbr.gov>
Cc: "mcc@givenspursley.com" <mcc@givenspursley.com>, Garret Nancolas <gnancolas@cityofcaldwell.org>, Lee Van De Bogart <lvandebogart@cityofcaldwell.org>, Robb MacDonald <rmacdonald@cityofcaldwell.org>, Mark Zirschky <mark@pioneerirrigation.com>

Good afternoon Mr. Jackson:

I am writing in response to the request for comments on the referenced application received by the City of Caldwell on March 26. 2015. Thank you for the opportunity to comment. We have reviewed the application and have been approached by the applicant with a to explain their application and answer our questions. Based on the application provided and promises to evaluate and improve the receiving facility, if necessary, the City of Caldwell is comfortable with and supportive of the proposed action. **02-01**

Sincerely,

Brent Orton

Brent Orton, PE, MSCE

Public Works Director

City of Caldwell, Idaho

208 455 4734

208 455 3012 (Fax)

MALLEA LAW OFFICES

KENNETH L. MALLEA
ATTORNEY AT LAW

78 SW 5TH AVENUE, SUITE I
POST OFFICE BOX 857
MERIDIAN ID 83680-0857

TELEPHONE
(208) 888-2790
FAX
(208) 888-2789
E-MAIL
KLM@MALLEALAW.COM

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April 15, 2015

Mr. Rich Jackson, Natural Resource Specialist
United States Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

Re: SRA-1208
PRJ-28.00 (Sorrento Lactalis Increased Flow)

Dear Mr. Jackson:

I represent Charles and Norma Paynter whose mailing address is 2911 Lincoln Road Caldwell, ID 83605-8027. They are long time residents on this property and their land is used for grazing and for growing alfalfa.

This property is just below Canyon Hill and situated between Lincoln Road and the Boise River. Mason Creek traverses through my clients' property a distance of approximately one-half mile.

My clients are OPPOSED to the application to allow Sorrento Lactalis, Inc. to increase effluent flow through Mason Creek. 03-01

Mason Creek is not at the present time and has not for many years been maintained. The creek is very shallow, slow moving and full of sediment as it winds through their property. Mason Creek can barely handle the current discharge of 1.2 cfs from Sorrento Lactalis. The proposed increase effluent discharge as it passes into Mason Creek will result in flooding of my clients' property. The bearing capacity of the ditch simply cannot handle the proposed increased discharge. 03-02

Separate and apart from the problem with the increased discharge flow, there is the additional concern regarding the nutrients which will become significantly increased into Mason Creek. The increased nitrogen and phosphorus and other pollutants will result in a one-half mile long algae and plant infested unhealthy drain through my clients' property. The flow will be a danger to livestock and will constitute a public and private nuisance. It is well known that the 03-03

surface water in Mason Creek has an immediate effect upon the ground water. Higher concentration of pollutants in Mason Creek will be leached into the ground water.

Many beekeepers in the area have been having both their honey bees and alfalfa leafcutter bees die for no apparent reason. It has been a huge problem and they have recently discovered that these bees are getting their drinking water from the ditches which are loaded with chemicals. Our agriculture depends on pollination. 03-04

The combined consequences of increased flow and dramatically increased nutrient levels will work an unreasonable burden upon my clients and all other individuals owning property adjacent to Mason Creek.

My clients are completely opposed to alternative 1 as set forth in the March 26, 2015 letter from Area Manager, Gerald D. Gregg. Any increased effluent from the plant should be handled under alternative 3, thereby placing all direct and indirect costs of the increased discharge directly on the source, rather than placing direct and indirect costs onto owners adjacent to Mason Creek and the Purdam Drain. 03-05

Thank you for the opportunity to provide these comments to your office.

Very truly yours,

K Mallea

Kenneth L. Mallea

KLM/dm
cc: Charles and Norma Paynter

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Derek Tanaka
6405 E Monroe St
Nampa, Id 83687

April 15, 2015

Mr. Rich Jackson:

In response to the letter that was reevived regarding SRA-1208, PRJ-28.00, proposing the Request to Allow Sorrento Lactalis, Inc (Sorrento) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho; I would choose either Alternative 2 or Alternative 3 but most definitely I DO NOT want Alternative 1. 04-01

Sincerely,

Derek Tanaka

Jackson, Richard <rjackson@usbr.gov>

Comments on Sorrento Increase Effluent Flow to Purdam Drain

1 message

CASSIE HILL <chillwigs@cableone.net> Thu, Apr 16, 2015 at 5:42 PM
To: rjackson@usbr.gov

Mr. Rich Jackson

My name is Cassie Hill, I am the Conservator and Guardian of Margaret Hill, who has an interest in what is being proposed in allowing Sorrento Lactalis, Inc. to increase Effluent Flow to Purdam Drain, Canyon County, Idaho. Her reply # is SRA-1208 / PRJ-28.00.

My response for now is Alternative #2 (no action) by default. There just is not enough information given at this time with the environmental impact concerning Alternatives #1 and #3. **05-01**

I would like to have a complete analysis so that I can make a more informed decision and I do support there being additional alternative choices. **05-02**

Thank You,

Cassie Hill, Conservator/Guardian of Margaret Hill

Jackson, Richard <rjackson@usbr.gov>

Increasing effluent flow into Purdam Drain

1 message

Angela <angelaj310@gmail.com> Sat, Apr 18, 2015 at 8:44 AM
To: "rjackson@usbr.gov" <rjackson@usbr.gov>

Dear Mr. Rich Jackson,

I am writing in response to the letter I received about Sorrento Lactalis increasing Effluent Flow to Purdam Drain. Purdam Drain runs through the middle of my property and is the primary source of water for my animals.

My concern is if the current discharge of 1.2 cubic feet per second is increased to 4.5 cubic feet per second is it going to cause any potential harm to my animals who drink from it? **06-01**

Thank you in advance for taking the time to respond to my email.

Sincerely,

Ms. Angela Jolley
Property Owner
208-371-1071

CANYON HIGHWAY DISTRICT No. 4
15435 HIGHWAY 44
CALDWELL, IDAHO 83607

TELEPHONE 208/454-8135
FAX 208/454-2008

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April 23, 2015

Mr. Rich Jackson
Natural Resource Specialist
Bureau of Reclamation
Snake River Area Office
230 Collins Road
Boise, Idaho 83702

Re: Proposed Use Authorization Application by Sorrento Lactalis, Inc. for Increased Effluent Flow to Purdam Drain, Canyon County, Idaho
SRA-1208 PRJ-28.00

Dear Mr. Jackson:

Thank you for providing the opportunity to comment on the scoping for the above referenced application. Canyon Highway District No. 4 is a local highway jurisdiction that has responsibility to operate public highways (roadways) in the area downstream of the referenced effluent discharge location in Canyon County. Culverts and bridges convey the Purdam Drain, and waterways to which it is a tributary (particularly Mason Creek), under the District's roads. The District is concerned that the proposed effluent discharge may have adverse impacts on these crossings of public highways.

Potential impacts and concerns identified include:

- Capacity to convey the additional flow without impacting the structure, road, or adjoining upstream properties. **07-01**
- Water quality (i.e. temperature, corrosively, etc.) that may decrease the structural life of concrete structures or metal pipe used at these crossings. **07-02**
- Other water quality issues that could impact the Highway District's operations, uses, or permitting. **07-03**
- That effluent quantity and quality limits established are monitored to assure that these limits are not exceeded at any time. **07-04**

The District requests that these issues be considered in the evaluation of the proposed increased effluent discharge and any adverse impacts, including increased short or long-term costs to the public, be mitigated. **07-05**

Please contact me at (208) 454-8135 if you have any questions or need additional information.

Respectfully,

Timothy Richard
District Engineer

Boise Office
Golden Eagle Building
1101 W. River St., Ste. 110
P.O. Box 7985
Boise, Idaho 83707
Tel. (208) 629-7447
Fax (208) 629-7559

Challis Office
1301 E. Main Ave.
P.O. Box 36
Challis, Idaho 83226
Tel. (208) 879-4488
Fax (208) 879-4248

Twin Falls Office
161 Fifth Avenue South
P.O. Box 1295
Twin Falls, Idaho 83303
Tel. (208) 969-9585

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OFFICES, PLLC

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SNAKE RIVER AREA OFFICE
BOISE, IDAHO
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David P. Claiborne *
david@sawtoothlaw.com

S. Bryce Farris
bryce@sawtoothlaw.com

Evan T. Roth
evan@sawtoothlaw.com

Daniel V. Steenson
dan@sawtoothlaw.com

Andrew J. Waldera
andy@sawtoothlaw.com

James R. Bennetts, of counsel
jim@sawtoothlaw.com

Attorneys licensed in Idaho
** Also licensed in Washington*

April 23, 2015

Mr. Rich Jackson
Natural Resource Specialist
Bureau of Reclamation
Snake River Area Office
230 Collins Rd.
Boise, ID 83702

Re: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Sorrento) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Dear Mr. Jackson:

These comments are submitted on behalf of Nampa & Meridian Irrigation District with regard to the above-referenced matter.

Nampa Meridian Irrigation District owns and operates the Purdam Drain at the location of the proposed discharge. Nampa & Meridian Irrigation District and Sorrento have entered into Agreements which limit the amount of discharge to the Purdam Drain to not more than 1.16 cfs (750,000 gallons per day). Any increase to the discharge above 1.16 cfs would require Nampa & Meridian Irrigation District's written consent and an amendment/modification to the prior agreements. 08-01

Please feel free to contact me with any questions or concerns.

Yours very truly,

S. Bryce Farris

cc: Client

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Mr. Rich Jackson
Natural Resource Specialist
Bureau of Reclamation
Snake River Area Office
230 Collins Road
Boise, Idaho 83702

Richard Bicandi
1905 Mason Rd.
Caldwell, Idaho 83605

April 25, 2015

Dear Sir,

I received your letter asking for comments on the application by Sorrento Lactalis to increase their waste water discharge to the Purdam Drain from 1.2 cfs to 4.5 cfs. I receive my irrigation water from Mason Creek which is part of the Purdam Drain. Our property boarders the Boise River and I am aware of the need to limit pollutants that are getting to the river.

The Sugar Factory has a waste water problem and they use evaporation ponds to help with this waste as well as irrigating land surrounding the plant. The J. R. Simplot Company's potato plant west of Caldwell originally used evaporation ponds but now uses the waste water to irrigate the land surrounding the plant. Neither of these companies discharge their waste water into live streams or drains.

In years past the waste from Sorrento Lactalis was trucked to Murphy and spread on a farm there. I visited that farm and saw the product that they were putting on the ground. It was smelly and did not seem to help the growth of the plants. They did this because they were not allowed to discharge their waste into the drains. I am sure they have managed to clean the product that now goes into Purdam Drain but I worry about the acids, nitrates, and other unseen pollutants that are in the water. The State of Idaho is trying to remove nitrates that are in the river and are paying farmers to run water through a series of ponds trying to settle out the pollutants already in the water before it goes back into the river. As farmers, we must limit the irrigation water from our fields that returns to the river.

I am surprised that Sorrento Lactalis received permission to discharge ANY waste into the drains. I understand the need to fix this problem as inexpensively as possible but I don't feel that adding to the ill health of the river is the best way. **09-01**

Sincerely,

Richard Bicandi

Richard Bicandi

Boise Office
Golden Eagle Building
1101 W. River St., Ste. 110
P.O. Box 7985
Boise, Idaho 83707
Tel. (208) 629-7447
Fax (208) 629-7559

Challis Office
1301 E. Main Ave.
P.O. Box 36
Challis, Idaho 83226
Tel. (208) 879-4488
Fax (208) 879-4248

Twin Falls Office
161 Fifth Avenue South
P.O. Box 1295
Twin Falls, Idaho 83303
Tel. (208) 969-9585

SAWTOOTH LAW
OFFICES, PLLC

David P. Claiborne *
david@sawtoothlaw.com

S. Bryce Farris
bryce@sawtoothlaw.com

Evan T. Roth
evan@sawtoothlaw.com

Daniel V. Steenson
dan@sawtoothlaw.com

Andrew J. Waldera
andy@sawtoothlaw.com

James R. Bennetts, of counsel
jim@sawtoothlaw.com

Attorneys licensed in Idaho
** Also licensed in Washington*

Friday, May 08, 2015

Via Email to rjackson@usbr.gov and U.S. Mail

Rich Jackson
Natural Resource Specialist
Bureau of Reclamation
Snake River Area Office
230 Collins Road, Boise, Idaho 83702

Dear Mr. Jackson:

I write you on behalf of Pioneer Irrigation District ("Pioneer" or "District") in response to the Bureau of Reclamation's ("BOR") March 26, 2015 "Interested Party" correspondence soliciting comment regarding Sorrento Lactalis, Inc.'s ("Sorrento") pending application to increase effluent discharge to the Purdam Drain from its cheese processing plant in Nampa, Idaho. Pioneer thanks BOR for the opportunity to participate in the NEPA scoping process.

As BOR is aware, Pioneer delivers irrigation water to approximately 34,400 acres of productive agricultural, residential, and urban lands within its boundary. Pioneer also acts as BOR's agent operating and maintaining the Federal drains within the District's boundary, including the Purdam Drain (aka the Purdam Gulch Drain ("Drain")), under contracts dating from 1913 and 1915. The Drain originates within Nampa & Meridian Irrigation District ("NMID"), flows northwesterly into Pioneer, and discharges to Mason Creek Drain within Pioneer. Mason Creek Drain is tributary to the Boise River. The majority of the Drain is located in Pioneer.

Sorrento seeks additional authorization from BOR to discharge up to 4.5 cfs of instantaneous peak flow of process wastewater to the Purdam Drain; an increase of 3.3 cfs from its current discharge limit of 1.2 cfs. Sorrento seeks this authorization in response to anticipated plant growth and the corresponding processing of up to 6.5 million pounds of milk per day post-expansion.

Pioneer has a variety of water quantity and water quality concerns regarding Sorrento's proposed increased wastewater discharge, both as the operating agent of the portion of the Drain located in the District and as a water right owner who diverts water from Mason Creek Drain and delivers the same to thousands of acres irrigated under the Highline Canal portion of the District's irrigation delivery system. From a water quantity standpoint, Pioneer owes a duty under Idaho Code Section 42-1204, among other legal authorities, as the operator of the Drain to operate and maintain the same so as not to damage the 10-01

property of others. Thus, the question arises whether the Drain has sufficient capacity to accommodate Sorrento's proposed increased discharges without overtopping—a concern already articulated by BOR in its Scoping Information Package.

With respect to water quality, the existing Sorrento NPDES Permit (Permit No. ID-002803-7) imposes effluent limitations and sets monitoring requirements for flow, BOD, TSS, Bacteria (*E. coli*), pH, Ammonia, Phosphorous, Nitrogen components (nitrate and nitrite), Total Nitrogen, and orthophosphate. The presence of these pollutants in Sorrento's wastewater, particularly in excessive quantities, raises Drain (and downstream facility) operation and end water use concerns. **10-02**

From a Drain (and downstream facility) operation standpoint (*i.e.*, operation of the Drain, Mason Creek Drain, the Mason Creek Feeder Canal, and the Highline Canal), increased suspended solids such as silt or sediment can reduce facility capacity over time, interfere with diversion structures and associated measuring devices, and require additional maintenance to address these issues. Similarly, elevated concentrations of total and ortho-phosphorus in the Drain (and downstream canals and laterals) can exacerbate algae and moss growth requiring additional maintenance to maintain channel capacity and water transmission efficiency. **10-03**

Beyond operational concerns, Pioneer also is concerned with potential adverse effects upon end water use with respect to the water it delivers. For example, Pioneer owns water right nos. 63-2276 (43 cfs) and 63-32515 (53 cfs), both diverted from Mason Creek Drain into the Mason Creek Feeder Canal, and conveyed into the Highline Canal for delivery through the Highline Canal laterals. The Highline Canal supplies irrigation water to approximately 8,200 acres in total, approximately 4,900 of which are supplied downstream of the Mason Creek Feeder Canal. The Mason Creek Feeder Canal diversion from Mason Creek Drain is located approximately five (5) miles from the existing Sorrento wastewater discharge point to the Drain. The lands irrigated under the Highline Canal system downstream of the Mason Creek Feeder Canal comprise a mix of human and animal exposure risk pathways through the direct irrigation of residential and urban lands, and through the irrigation of a variety of food crops (including raw edibles such as onions, beans, peas, and leafy greens) and forage crops (alfalfa, triticale, and other hay grasses). Bacteria (pathogenic *E. coli*) is a pollutant of particular concern due to its transmissivity, persistence, and adverse health effects (both human and livestock). **10-04**

Unfortunately, no industrial wastewater treatment facility is perfect. Mechanical failures and human error are unavoidable, and plant upsets are less a question "if," and more appropriately a question of "when." The question then becomes whether and to what extent the risk of the inevitable plant upset is tolerable in any given locale. **10-05**

Pioneer respectfully submits that Sorrento's requested increased wastewater discharge authorization is not appropriate for the locale for at least two reasons: (1) the multiple pathways for human and livestock exposure in the immediate vicinity, and downstream, of the Drain outfall (already discussed above); and (2) Sorrento's well-documented history of past NPDES Permit violations. **10-06**

In August 2010, the EPA filed a civil action against Sorrento in the United States District Court for the District of Idaho alleging dozens of NPDES Permit violations/discharge exceedances occurring between December 2005 and September 2008. A copy of the underlying judicial complaint in Case No. 1:10-cv-00413-LMB is attached hereto. The complaint alleged violations of daily and/or monthly **10-07**

discharge exceedances for a variety of pollutants, including *E. coli*, BOD, pH, Phosphorus, and TSS, as well as sampling protocol and self-reporting-based permit violations. Ultimately, Sorrento and EPA disposed of the case through a stipulated judgment whereby Sorrento agreed to pay a civil penalty of $315,000 to resolve the action.

Other publicly available records establish that Sorrento likely violated the terms of its NPDES Permit in July 2011 due to an excessive discharge of *E. coli* measuring upwards of 490 mpn/100 ml on July 5, 2011. *See*, *e.g.*, the attached Declaration of P. Steven Porter, Ph.D., dated December 5, 2013. Sorrento's discharge monitoring reports ("DMRs") and related correspondence to the Idaho Department of Environmental Quality suggest that that the *E. coli* sample result may have been the result of operator error (*i.e.*, "unintentional contamination" of the sample taken). Thus, out of fairness to Sorrento, it is possible that the July 5, 2011 sample result was compromised. However, the converse is also possible—the sample may have been accurate because Sorrento was unable verify its "contaminated sample" theory as a matter of fact. **10-08**

Regardless of the July 5, 2011 sample report, Sorrento's DMRs produced between January 2011 and September 2012 show that Sorrento repeatedly avoided discharge to the Drain in favor land application as an alternative means of wastewater disposal because discharges to the Drain would have exceeded pollution limits set forth in its NPDES Permit. Sorrento's land application of wastewater may have allowed it to avoid further NPDES Permit discharge violations, but such discharges further indicate the fickle nature (or spotty reliability) of its onsite wastewater treatment facility operations. **10-09**

Giving Sorrento every benefit of the doubt, perhaps it has made adjustments to its wastewater treatment facility that have allowed it to stay within the confines of its NPDES Permit ***and*** avoid repeated discharge to its land application site. Pioneer hopes that is the case. However, the District, BOR, and the public-at-large have legitimate and reasonable grounds to be concerned based on Sorrento's past track record. If the existing plant struggled to meet NPDES Permit limits, what confidence should Pioneer and others have that a larger plant processing multiple millions of pounds more milk per day will perform better? Consequently, Pioneer questions whether Sorrento's proposal is appropriate in the locale and under the circumstances given the potential adverse impacts upon the human and natural environments. **10-10**

Separately, and with respect to BOR's NEPA process (specifically BOR's Scoping Information Package), Pioneer questions why the agency identifies only three review alternatives. For example, why is discharge to, and treatment by, the larger City of Nampa POTW not identified as a potential alternative? Likewise, why is wastewater exportation and land application offsite not identified as a potential alternative (Sorrento used this trucking method prior to obtaining its NPDES Permit)? Admittedly, discharge to the Nampa POTW and exportation off site via trucking are more expensive options than local land application or discharge to the Drain, but the economics may pencil out from Sorrento's perspective should the company be faced with the No Action alternative (Alternative No. 2—continuing to discharge at no more than 1.2 cfs). **10-11**

Pioneer also believes that BOR's "area to be considered" is too narrowly defined, particularly given the upper discharge limit sought (4.5 cfs). Preliminary hydraulic estimates undertaken by Pioneer suggest that the likely travel time between Sorrento's discharge into the Drain reaching Mason Creek Drain is approximately two (2) hours during typical irrigation season Drain flows of 60 cfs. Because Pioneer's

Mason Creek Feeder Canal diversion is located only 0.34 miles downstream of the confluence of the Drain and the creek, the travel time of Sorrento's effluent into Pioneer's irrigation distribution system is only marginally longer than two (2) hours. While Drain flows and creek flow provide some attenuation/dilution of Sorrento's discharges, major plant upsets are less attenuated and pollutants will enter Pioneer's live water distribution system in relatively short order. Consequently, Pioneer respectfully submits that more than just the Drain and a portion of Mason Creek Drain stand to be affected by Sorrento's proposal (*i.e.*, the "area to be considered" should include Pioneer's Mason Creek Feeder Canal and portions of the Highline Canal as well). 10-12

Pioneer again thanks BOR for the opportunity to provide input at this early stage of the NEPA process. Pioneer further requests that BOR continue to keep the District informed regarding the same because it is committed to participating throughout this matter given its stake in the Drain/creek/canal system. Should BOR have any questions regarding these comments, please feel free to contact me at (208) 629-7447.

Respectfully submitted,

Andrew J. Waldera

AJW/dll
Enclosures
cc: Pioneer Irrigation District

Appendix D. Index of Comments Received on Scoping Document for US Bureau of Reclamation Environmental Assessment for Proposed Use Authorization Application to allow Sorrento Lactalis to increase instantous discharge to Purdam Drain

Comments received during notice and comment period - March 23, 2015 to April 27, 2015

Document #	Author of Comment	Comment Receipt
01	Rose, Jerry	X
02	Orton, Brent; City of Caldwell	X
03	Paynter, Charles and Norma	X
04	Tanaka, Derek	X
05	Hill, Margaret	X
06	Jolley, Angela	X
07	Richard, Timothy; Canyon Highway District No. 4	X
08	Nampa & Meridian Irrigation District	X
09	Bicandi, Richard	X
10	Pioneer Irrigation District	XX

X - Comment received during notice and comment period (i.e. received between March 23, 2015 and April 27, 2015.
XX - Comment received after 30 day notice and comment period following extension request (i.e. between April 28, 2015 and May 8, 2015).

Appendix D. Index of Comments Received on Scoping Document for US Bureau of Reclamation Environmental Assessment for Proposed Use Authorization Application to allow Sorrento Lactalis to increase instantous discharge to Purdam Drain	
Scoping Comment #	**Response to Scoping Comment**
Water Quality Concerns	
Impact to Facility Use/Drain Operations from Effluent	
01-01	Water quality chemistry is discussed in Chapter 3.2.
01-02, 01-03, 01-04	Potential water quality impacts due to mixing are discussed in Chapter 3.2.
03-03, 09-01, 10-05	Constituent loading to the drain is addressed in Chapter 3.2.
07-02, 10-03	Potential water quality impacts to existing structures are discussed in Chapter 3.2.
07-03, 10-02	Potential water quality impacts to drain operations are addressed inChapter 3.2.
Impact to Human Health and Exposure to Animals	
01-05	Potential ecological impacts from water quality are discussed in Chapter 3.2.
03-03, 03-04, 10-03, 10-04, 10-06	Potential water quality impacts to plants and animals are addressed inChapter 3.2.
10-04, 10-06, 10-10	Potential impacts to humans health are addressed in Chapter 3.2.
Impacts to Groundwater	
03-03	Potential impacts to groundwater are discussed in Chapter 3.2.
Water Quantity Concerns	
Impact to Drain Capacity	
01-01, 01-02	Erosion and siltation potentials to the drain are discussed in Chapter 3.1.
03-02, 10-01	Flooding potentials for Purdam Drain and Mason Creek are included in Chapter 3.1.
03-02	Structural analyses of the streambeds are discussed in Chapters 3.1 and 3.2.
06-01	Potential risk to animals from increased flows are addressed inChapter 3.1.
07-01, 10-03	Potential water quantity impacts to existing structures are included in Chapter 3.1.
Future Agreements	
08-01	It is noted that Lactalis would need a modified agreement with the Nampa & Meridian Irrigation District to increase flows.
Permit Requirements	
07-04, 10-05	Monitoring requirements are included in Chapter 3.2, and Appendix B.
10-06, 10-07, 10-08, 10-09, 10-10	Past NPDES permit violations / discharge exceedances are outside the scope of the draft EA and proposed action. Under all alternatives, Lactalis would be required to continue to meet current and future NPDES permit limits.
Wastewater Discharge Alternatives	
Alternative Preference	
02-01	Comments supporting the proposed action are acknowledged.
03-01, 03-05, 04-01	Comments opposing the proposed action are acknowledged. The draft EA will evaluate the proposed action and reasonable alternatives. Project Alternative are presented in Chapter 2.
03-05, 04-01, 05-01	Comments stating alternative preferences are acknowledged. The draft EA will evaluate the proposed action and reasonable alternatives. Project Alternative are presented in Chapter 2.
Additional Suggested Alternatives	
01-06, 05-02, 10-11	Wastewater treatment process alternatives at the Lactalis plant are included in Chapter 2. Alternatives considered do include the City of Nampa WWTP, increased land application, and trucking effluent for offsite disposal.
10-12	The affected environment of the proposed action is discussed throughout Chapter 3.
Cumulative Impacts	
03-05, 07-05	Potential direct and indirect costs associated with the Proposed Action are the responsibilty of the project propoent as discussed in Chapter 2.1.

APPENDIX E
EA Distribution

990 RESERVE DRIVE LLC
2280 GRASS VALLEY HWY NO 122
AUBURN, CA 95603

MR ERNESTO ALVAREZ
17750 POLARA WAY
NAMPA, ID 83687

MR CORI L ALVEY
6640 CHERRY LN
NAMPA, ID 83687

MR PHILIP H ANDRE
11200 HWY 20-26
CALDWELL, ID 83605

MS SHERI A ARKOOSH
6666 CHERRY LN
NAMPA, ID 83687

ASTORIA PARK SUBDIVISION
HOMEOWNERS ASSOC INC
PO BOX 1090
MERIDIAN, ID 83680

MR LOUIE M ASUMENDI
8620 USTICK RD
NAMPA, ID 83687

ATLANTIC PACIFIC CONSTRUCTION
INC
2595 W HUNGRY CREEK ST
MERIDIAN, ID 83642-5633

AUGUSTA INVESTMENT
MANAGEMENT LLC
2320 POTOSI ST STE 130
LAS VEGAS, NV 89146

B L IDAHO 2 LLC
6700 E GLACIER DR
BOISE, ID 83716

BAKER CHARITABLE TRUST 3
250 S BEECHWOOD DR SUITE 120
BOISE, ID 83709

MELODEE MORGAN BARRUS
18189 NORTHSIDE BLVD
NAMPA, ID 83687

COREY BARTON
1977 E OVERLAND RD
MERIDIAN, ID 83642-6649

MR BRIAN BASABE
1447 CANYON CV APT 31
OGDEN, UT 84401

MR DAVID BAUM
9625 LINDEN RD
NAMPA, ID 83687

BB ONE LLC
250 S BEECHWOOD
BOISE, ID 83709

MR RICHARD L BICANDI
1905 MASON RD
CALDWELL, ID 83605

MR JAMES R BOATMAN
8186 E JACOB DR
NAMPA, ID 83687

MR DANIEL BOW
10502 LINDEN RD
NAMPA, ID 83687

GERALD L BOW
19506 MIDDLETON RD
CALDWELL, ID 83606

BOW LIVING TRUST
19506 MIDDLETON RD
CALDWELL, ID 83605

MR STEPHEN BOW
10546 LINDEN ST
NAMPA, ID 83687

MR AARON J BOWRON
714 MASON RD
CALDWELL, ID 83605

MR RONALD BROOKS
4702 LINCOLN RD
CALDWELL, ID 83605

BROWN CONSTRUCTION INC
PO BOX 495
NAMPA, ID 83653-0495

MR TRAVIS S BRUEGEMAN
8163 E BOREALIS DR
NAMPA, ID 83687

BURROW LIVING TRUST
18795 MIDLAND BLVD
NAMPA, ID 83687

MS CAROLE SUE BYERS
6199 E MONROE ST
NAMPA, ID 83687

CALDWELL 94 LLC
PO BOX 63411
COLORADO SPRINGS, CO 80962

CALDWELL CITY OF
PO BOX 1179
CALDWELL, ID 83606

CENTENNIAL DEV LLC
2358 S TITANIUM PLACE
MERIDIAN, ID 83642-6867

CHAPMAN RAY E AND HAZEL H
FAMILY TRUST A
17648 NORTHSIDE BLVD
NAMPA, ID 83687

AARON B CLAYTON
8110 E JACOB DR
NAMPA, ID 83687

CNI DEVELOPMENT LLC
2090 S MOHAWK ST
LAS VEGAS, NV 89146

MR JERRY K COLE
2809 POLK ST
CALDWELL, ID 83605

MR PATRICK COLWELL
4220 LINCOLN RD
CALDWELL, ID 83605

MR JOHN ALVIN CROSIAR
10741 HWY 20-26
CALDWELL, ID 83605

DAVIS MARION C AND PATRICIA A
TRUST
3409 LINCOLN RD
CALDWELL, ID 83605

RAUL A DE LUNA
4416 LINCOLN RD
CALDWELL, ID 83605

DANA K DEVLIN
22026 RIO VISTA DR
CALDWELL, ID 83605

MR JACOB ECHEVARRIA
6794 CHERRY LN
NAMPA, ID 83687

MR MATHEW D EELLS
6910 N LINDER RD
MERIDIAN, ID 83642

MR STEVEN T EYTON
4414 LINCOLN RD
CALDWELL, ID 83605

FEATHER RIVER LLC
1905 MASON RD
CALDWELL, ID 83605

MR MELVIN FOSTER
3421 LINCOLN RD
CALDWELL, ID 83605

FOX JON AND FOX EVELYN TRUST
11665 MARBLE FRONT RD
CALDWELL, ID 83605

MR MICHAEL V GALLUP
6472 CHERRY LN
NAMPA, ID 83687

GERALD GEIER
10741 HWY 20-26
CALDWELL, ID 83605

ROSS N GIEM
8068 E JACOB DR
NAMPA, ID 83687

MR KENNETH E GORDY
819 MASON RD
CALDWELL, ID 83605

MR JOSEPH C GUARINO
6494 CHERRY LN
NAMPA, ID 83687

MR CLINT HAMMOND
4110 LINCOLN RD
CALDWELL, ID 83605

MR KENNETH D HARTLEY
18052 NORTHSIDE BLVD
NAMPA, ID 83687

MR JACOB M HASSARD
6698 CHERRY LN
NAMPA, ID 83687

HEARTLAND TOWNHOMES PROP
MGMT LLC
2358 S TITANIUM PLACE
MERIDIAN, ID 83642-6867

MR ALBERT J HELZER
11855 MARBLE FRONT RD
CALDWELL, ID 83605

HENDRIKSE FAMILY TRUST RESTATED
6190 N SHANDEE DR
MERIDIAN, ID 83646

MR ALEXANDER HENKEL
17065 N TANNER PL
NAMPA, ID 83687

HILL MARGARET REVOCABLE TRUST
8081 E AUSTRALIS DR
NAMPA, ID 83687

MR GEORGE R HOBBS
7073 SOUTHERN VISTA CT
STAR, ID 83669

MR RYAN HOOD
8850 USTICK RD
NAMPA, ID 83687

STACY HOUSE
6209 E MONROE ST
NAMPA, ID 83687

HOUSTON FAMILY FARMS LLC
18818 PRESCOTT LN
NAMPA, ID 83687

IFI PARTNERS II
5699 N RIFFLE WAY
GARDEN CITY, ID 83714

MR STEVEN H JACKSON
6317 E MONROE ST
NAMPA, ID 83687

MR MICHAEL J JARDINE
18840 MIDLAND BLVD
NAMPA, ID 83687

MR MICHAEL V JOELSON
7755 USTICK RD
NAMPA, ID 83687

MR HUGH RAY JR JOHANNSEN
8178 E JACOB DR
NAMPA, ID 83687

MR MARK C JOHNSON
6564 CHERRY LN
NAMPA, ID 83687

RAYDEAN JOHNSON
7799 USTICK RD
NAMPA, ID 83687

MS ANGELA J JOLLEY
17225 11TH AVE N
NAMPA, ID 83687

MR STEVEN L JORDAN
20465 WARD LN
CALDWELL, ID 83605

JORSTAD FAMILY TRUST
PO BOX 705
PAYETTE, ID 83661

MR GERALD T KEULMAN
8731 W BEN CT
BOISE, ID 83714

CARSON A KIDWELL
20392 WARD LN
CALDWELL, ID 83605

KOTTER ROBERT H AND MARY JEAN TRUST
18911 MIDLAND BLVD
NAMPA, ID 83687

ANTHONY M LA FORD
8166 E JACOB DR
NAMPA, ID 83687

LEPEL GLENN AND LEPEL LUCILLE FAMILY TRUST
502 N HAWTHORNE DR
MIDDLETON, ID 83644-5438

MR JOHN ALLEN LEWIS
17034 N CAN ADA RD
NAMPA, ID 83687

ASA JAMES LOUGH
6650 CHERRY LN
NAMPA, ID 83687

LYONSDALE PARK SUB HOMEOWNERS ASSOCIATION INC
PO BOX 1987
BOISE, ID 83701

MR RANDY MARSHALL
6305 E MONROE ST
NAMPA, ID 83687

MATSUMOTO BROTHERS INC
PO BOX 112
MIDDLETON, ID 83644

MR JOHN D MC CRODEN
17136 N CAN ADA RD
NAMPA, ID 83687

MR DUANE L MC MURDIE
8124 E JACOB DR
NAMPA, ID 83687

MCMILLAN AND COMPANY INC
PO BOX 2627
EAGLE, ID 83616

DAMON MOYSARD
702 MASON RD
CALDWELL, ID 83605

CITY OF NAMPA
411 3RD ST S
NAMPA, ID 83651

MR KEVIN L NEAGLE
8135 E BOREALIS DR
NAMPA, ID 83687

MR STANFORD L NEAL
6257 E MONROE ST
NAMPA, ID 83687

MR RONALD NIBLETT
406 ASPEN DR
DAYTON, NV 89403

NORTHPOINTE SUBDIVISION
HOMEOWNERS ASSOC INC
8050 E BOREALIS DR
NAMPA, ID 83687

MR MICHAEL J NUTSCH
17341 11TH AVE N
NAMPA, ID 83687

MR BRIAN PATTERSON
9173 USTICK RD
NAMPA, ID 83687

MR CHARLES S JR PAYNTER
PO BOX 3
CALDWELL, ID 83606

MR DAVID PRIEST
4210 LINCOLN RD
CALDWELL, ID 83605

MR RAYMOND PUGA
20527 WARD LN
CALDWELL, ID 83605

MR DANIEL R RABEHL
6744 CHERRY LN
NAMPA, ID 83687

MR JOHN E REEVES
6293 E MONROE ST
NAMPA, ID 83687

REILLY RODNEY K TRUSTEE
1735 E BORZOI CT
MERIDIAN, ID 83642

JOCABED COMPEAN RINCON
8152 E JACOB DR
NAMPA, ID 83687

MR KENNETH D ROBERTS
6280 CHERRY LN
NAMPA, ID 83687

BRICE C RONCACE
6269 E MONROE ST
NAMPA, ID 83687

ANA ROQUE
6393 E MONROE ST
NAMPA, ID 83687

JERRY ALAN ROSE
4511 MARBLE FRONT RD
CALDWELL, ID 83605

ROSEN SHARON REVOCABLE TRUST
18834 MIDLAND BLVD
NAMPA, ID 83687

MR JOE A SALAZAR
4406 LINCOLN RD
CALDWELL, ID 83605

LEW SAMUELS
8058 S SNOW BIRD AVE
BOISE, ID 83716

MR RICHARD M JR SAYERS
8082 E JACOB DR
NAMPA, ID 83687

JERRY E SHAFER
6245 E MONROE ST
NAMPA, ID 83687

MR WESLEY GENE SHAFFER
2715 POLK ST
CALDWELL, ID 83605

MR STEVEN D SHAW
16896 IDAHO CENTER BLVD
NAMPA, ID 83687

MS LYNETTE SKEEN
10236 LINDEN RD
NAMPA, ID 83687

MR TYLER W SMITH
20499 WARD LN
CALDWELL, ID 83605

SERGEY STADNITSKY
205 DE ANZA BLVD NO 38
SAN MATEO, CA 94402

KELLIE A STAFFORD
4309 RIO ROBLES DR
AUSTIN, TX 78745

ALEKSANDR STASYUK
6281 E MONROE ST
NAMPA, ID 83687

SUNDANCE INVESTMENTS LLLP
3405 E OVERLAND RD STE 150
MERIDIAN, ID 83642

MR BRENT SWARTZENTRUBER
6329 E MONROE ST
NAMPA, ID 83687-9168

MR DEREK TANAKA
6405 E MONROE ST
NAMPA, ID 83687

MR GREGORY B TAYLOR
18963 MIDLAND BLVD
NAMPA, ID 83687

MR DAVID THURGOOD
8255 USTICK RD
NAMPA, ID 83687-8021

MR BLAKE W TOONE
20463 WARD LN
CALDWELL, ID 83605

MR DALE E TOWNSEND
4604 LINCOLN RD
CALDWELL, ID 83605-8028

TRADER ROAD LTD PARTNERSHIP
PO BOX 231
WEISER, ID 83672

MR JOEL VAN LITH
18641 CHICKEN DINNER RD
CALDWELL, ID 83607

MR WILLIAM VAN PAEPEGHEM
422 KCID RD
CALDWELL, ID 83605

VASSAR EDWIN TRUST
4815 MARBLE FRONT RD
CALDWELL, ID 83605

GIFFORD VASSAR
617 MASON RD
CALDWELL, ID 83605

VASSAR JACQUELINE R LIFE ESTATE
18805 MIDLAND BLVD
NAMPA, ID 83687

MR JEFFREY W VOLKEN
17754 POLARA WAY
NAMPA, ID 83687

VOLT ASSET HOLDINGS TRUST XVI
13801 WIRELESS WAY
OKLAHOMA CITY, OK 73134

ROBIN T WALKER
6536 CHERRY LN
NAMPA, ID 83686

MR MICHAEL SCOTT WALLACE
8009 E AUSTRALIS DR
NAMPA, ID 83687

MR JIMMY S WALTERS
18909 MIDLAND BLVD
NAMPA, ID 83687

MS TAMMY J WEATHERFORD
6221 E MONROE ST
NAMPA, ID 83687

JERALD D WHITE
6800 CHERRY LN
NAMPA, ID 83687

MR DOUGLAS WILDER
4412 LINCOLN RD
CALDWELL, ID 83605

MR DUSTIN NEIL WILSON
8096 E JACOB DR
NAMPA, ID 83687

SHAILA WOODALL
17096 N LYONSDALE PLACE
NAMPA, ID 83687

WOODGATE SUBDIVISION
HOWEOWNERS ASSOC INC
PO BOX 1246
MERIDIAN, ID 83680

MR GREGORY K YARLOTT
6422 CHERRY LN
NAMPA, ID 83687

MS BARBARA KAYE YOUNG
11200 HWY 20-26
CALDWELL, ID 83605

MR JAMES H. WERNTZ, DIRECTOR
ENVIRONMENTAL PROTECTION AGENCY
950 W BANNOCK STREET SUITE 900
BOISE, ID 83702

MR BRIAN T. KELLY, DIRECTOR
US FISH AND WILDLIFE SERVICE
1387 S VINNELL WAY SUITE 368
BOISE, ID 83709

MR CAL GROEN, DIRECTOR
IDAHO DEPARTMENT OF FISH AND GAME
PO BOX 25
BOISE, ID 83707

MR SCOTT REINECKER, SUPERVISOR
IDAHO DEPARTMENT OF FISH AND GAME
3101 S. POWERLINE ROAD
NAMPA, ID 83686

MR RICK WARD
IDAHO DEPARTMENT OF FISH AND GAME
3102 S. POWERLINE ROAD
NAMPA, ID 83686

MS CINDY ROBERTSON
IDAHO DEPARTMENT OF FISH & GAME
PO BOX 25
BOISE, ID 83707

TONI HARDESTY, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL QUALITY
1410 N. HILTON
BOISE, ID 83706

MR GARY SPACKMAN, DIRECTOR
IDAHO DEPARTMENT OF WATER RESOURCES
322 E. FRONT STREET
BOISE, ID 83720

MR JOHN WESTRA, WESTERN REGIONAL MANAGER
IDAHO DEPARTMENT OF WATER RESOURCES
2735 AIRPORT WAY
BOISE, ID 83705

LEE VAN DE BOGART
PROJECT ENGINEER
621 CLEVELAND BLVD
CALDWELL, ID 83605

MR DAN HUNTER
ASSISTANT DIRECTOR
111N. 11TH AVENUE, #140
CALDWELL, ID 83605

MR TIM RICHARD
CANYON HIGHWAY DISTRICT NO. 4
15435 HWY. 44
CALDWELL, ID 83607

KERI K. SMITH-SIGMAN
CFM STATE FLOODPLAIN COORDINATOR
322 E. FRONT STREET
BOISE, ID 83720

MR REX BARRIE
BOISE RIVER WATER MASTER
PO BOX 767
STAR, ID 83669

MR CLINTON PINE
NAMPA & MERIDIAN IRRIGATION DISTRICT
1503 1ST STREET SOUTH
NAMPA, ID 83651

MR MARK ZIRSCHKY
PIONEER IRRIGATION DISTRICT
PO BOX 426
CALDWELL, ID 83606-0426

MR MICHAEL P DIMMICK
BOISE RIVER FLOOD CONTROL DISTRICT #10
PO BOX 140396
GARDEN CITY, ID 83714-0396

MR TIM PAGE
BOISE PROJECT BOARD OF CONTROL
2465 OVERLAND ROAD
BOISE, ID 83705-3155

HONORABLE NATHAN SMALL
CHAIRMAN
SHOSHONE- BANNOCK TRIBAL COUNCIL
P.O. BOX 306 PIMA DRIVE
FORT HALL, ID 83203-0306

MR. WES JONES
EMERGENCY MANAGER
SHOSHONE-BANNOCK TRIBES
P.O. BOX 306 PIMA DRIVE
FORT HALL, ID 83203-0306

MR. CLEVE DAVIS
ENVIRONMENTAL PROGRAM
MANAGER
SHOSHONE-BANNOCK TRIBES
P.O. BOX 306 PIMA DRIVE
FORT HALL, ID 83203-0306

MR. CHAD COLTER
FISH AND WILDLIFE DIRECTOR
SHOSHONE-BANNOCK TRIBES
P.O. BOX 306 PIMA DRIVE
FORT HALL, ID 83203-0306

OwnerName	AGENCY	Address	City	State	ZipCode	Country
990 RESERVE DRIVE LLC		2280 GRASS VALLEY HWY NO 122	AUBURN	CA	95603	
MR ERNESTO ALVAREZ		17750 POLARA WAY	NAMPA	ID	83687	
MR CORI L ALVEY		6640 CHERRY LN	NAMPA	ID	83687	
MR PHILIP H ANDRE		11200 HWY 20-26	CALDWELL	ID	83605	
MS SHERI A ARKOOSH		6666 CHERRY LN	NAMPA	ID	83687	
ASTORIA PARK SUBDIVISION HOMEOWNERS ASSOC INC		PO BOX 1090	MERIDIAN	ID	83680	
MR LOUIE M ASUMENDI		8620 USTICK RD	NAMPA	ID	83687	
ATLANTIC PACIFIC CONSTRUCTION INC		2595 W HUNGRY CREEK ST	MERIDIAN	ID	83642-5633	
AUGUSTA INVESTMENT MANAGEMENT LLC		2320 POTOSI ST STE 130	LAS VEGAS	NV	89146	
B L IDAHO 2 LLC		6700 E GLACIER DR	BOISE	ID	83716	
BAKER CHARITABLE TRUST 3		250 S BEECHWOOD DR SUITE 120	BOISE	ID	83709	
MELODEE MORGAN BARRUS		18189 NORTHSIDE BLVD	NAMPA	ID	83687	
COREY BARTON		1977 E OVERLAND RD	MERIDIAN	ID	83642-6649	
MR BRIAN BASABE		1447 CANYON CV APT 31	OGDEN	UT	84401	
MR DAVID BAUM		9625 LINDEN RD	NAMPA	ID	83687	
BB ONE LLC		250 S BEECHWOOD	BOISE	ID	83709	
MR RICHARD L BICANDI		1905 MASON RD	CALDWELL	ID	83605	
MR JAMES R BOATMAN		8186 E JACOB DR	NAMPA	ID	83687	
MR DANIEL BOW		10502 LINDEN RD	NAMPA	ID	83687	
GERALD L BOW		19506 MIDDLETON RD	CALDWELL	ID	83606	
BOW LIVING TRUST		19506 MIDDLETON RD	CALDWELL	ID	83605	
MR STEPHEN BOW		10546 LINDEN ST	NAMPA	ID	83687	
MR AARON J BOWRON		714 MASON RD	CALDWELL	ID	83605	
MR RONALD BROOKS		4702 LINCOLN RD	CALDWELL	ID	83605	
BROWN CONSTRUCTION INC		PO BOX 495	NAMPA	ID	83653-0495	
MR TRAVIS S BRUEGEMAN		8163 E BOREALIS DR	NAMPA	ID	83687	
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MS CAROLE SUE BYERS		6199 E MONROE ST	NAMPA	ID	83687	
CALDWELL 94 LLC		PO BOX 63411	COLORADO SPRINGS	CO	80962	
CALDWELL CITY OF		PO BOX 1179	CALDWELL	ID	83606	
CENTENNIAL DEV LLC		2358 S TITANIUM PLACE	MERIDIAN	ID	83642-6867	
CHAPMAN RAY E AND HAZEL H FAMILY TRUST A		17648 NORTHSIDE BLVD	NAMPA	ID	83687	
AARON B CLAYTON		8110 E JACOB DR	NAMPA	ID	83687	
CNI DEVELOPMENT LLC		2090 S MOHAWK ST	LAS VEGAS	NV	89146	
MR JERRY K COLE		2809 POLK ST	CALDWELL	ID	83605	
MR PATRICK COLWELL		4220 LINCOLN RD	CALDWELL	ID	83605	
MR JOHN ALVIN CROSIAR		10741 HWY 20-26	CALDWELL	ID	83605	
DAVIS MARION C AND PATRICIA A TRUST		3409 LINCOLN RD	CALDWELL	ID	83605	
RAUL A DE LUNA		4416 LINCOLN RD	CALDWELL	ID	83605	
DANA K DEVLIN		22026 RIO VISTA DR	CALDWELL	ID	83605	
MR JACOB ECHEVARRIA		6794 CHERRY LN	NAMPA	ID	83687	
MR MATHEW D EELLS		6910 N LINDER RD	MERIDIAN	ID	83642	
MR STEVEN T EYTON		4414 LINCOLN RD	CALDWELL	ID	83605	
FEATHER RIVER LLC		1905 MASON RD	CALDWELL	ID	83605	
MR MELVIN FOSTER		3421 LINCOLN RD	CALDWELL	ID	83605	
FOX JON AND FOX EVELYN TRUST		11665 MARBLE FRONT RD	CALDWELL	ID	83605	
MR MICHAEL V GALLUP		6472 CHERRY LN	NAMPA	ID	83687	
GERALD GEIER		10741 HWY 20-26	CALDWELL	ID	83605	
ROSS N GIEM		8068 E JACOB DR	NAMPA	ID	83687	
MR KENNETH E GORDY		819 MASON RD	CALDWELL	ID	83605	
MR JOSEPH C GUARINO		6494 CHERRY LN	NAMPA	ID	83687	
MR CLINT HAMMOND		4110 LINCOLN RD	CALDWELL	ID	83605	
MR KENNETH D HARTLEY		18052 NORTHSIDE BLVD	NAMPA	ID	83687	
MR JACOB M HASSARD		6698 CHERRY LN	NAMPA	ID	83687	
HEARTLAND TOWNHOMES PROP MGMT LLC		2358 S TITANIUM PLACE	MERIDIAN	ID	83642-6867	
MR ALBERT J HELZER		11855 MARBLE FRONT RD	CALDWELL	ID	83605	
HENDRIKSE FAMILY TRUST RESTATED		6190 N SHANDEE DR	MERIDIAN	ID	83646	
MR ALEXANDER HENKEL		17065 N TANNER PL	NAMPA	ID	83687	
HILL MARGARET REVOCABLE TRUST		8081 E AUSTRALIS DR	NAMPA	ID	83687	
MR GEORGE R HOBBS		7073 SOUTHERN VISTA CT	STAR	ID	83669	
MR RYAN HOOD		8850 USTICK RD	NAMPA	ID	83687	
STACY HOUSE		6209 E MONROE ST	NAMPA	ID	83687	
HOUSTON FAMILY FARMS LLC		18818 PRESCOTT LN	NAMPA	ID	83687	
IFI PARTNERS II		5699 N RIFFLE WAY	GARDEN CITY	ID	83714	
MR STEVEN H JACKSON		6317 E MONROE ST	NAMPA	ID	83687	
MR MICHAEL J JARDINE		18840 MIDLAND BLVD	NAMPA	ID	83687	
MR MICHAEL V JOELSON		7755 USTICK RD	NAMPA	ID	83687	
MR HUGH RAY JR JOHANNSEN		8178 E JACOB DR	NAMPA	ID	83687	
MR MARK C JOHNSON		6564 CHERRY LN	NAMPA	ID	83687	
RAYDEAN JOHNSON		7799 USTICK RD	NAMPA	ID	83687	
MS ANGELA J JOLLEY		17225 11TH AVE N	NAMPA	ID	83687	
MR STEVEN L JORDAN		20465 WARD LN	CALDWELL	ID	83605	
JORSTAD FAMILY TRUST		PO BOX 705	PAYETTE	ID	83661	
MR GERALD T KEULMAN		8731 W BEN CT	BOISE	ID	83714	
CARSON A KIDWELL		20392 WARD LN	CALDWELL	ID	83605	
KOTTER ROBERT H AND MARY JEAN TRUST		18911 MIDLAND BLVD	NAMPA	ID	83687	
ANTHONY M LA FORD		8166 E JACOB DR	NAMPA	ID	83687	
LEPEL GLENN AND LEPEL LUCILLE FAMILY TRUST		502 N HAWTHORNE DR	MIDDLETON	ID	83644-5438	
MR JOHN ALLEN LEWIS		17034 N CAN ADA RD	NAMPA	ID	83687	
ASA JAMES LOUGH		6650 CHERRY LN	NAMPA	ID	83687	
LYONSDALE PARK SUB HOMEOWNERS ASSOCIATION INC		PO BOX 1987	BOISE	ID	83701	
MR RANDY MARSHALL		6305 E MONROE ST	NAMPA	ID	83687	
MATSUMOTO BROTHERS INC		PO BOX 112	MIDDLETON	ID	83644	
MR JOHN D MC CRODEN		17136 N CAN ADA RD	NAMPA	ID	83687	
MR DUANE L MC MURDIE		8124 E JACOB DR	NAMPA	ID	83687	
MCMILLAN AND COMPANY INC		PO BOX 2627	EAGLE	ID	83616	
DAMON MOYSARD		702 MASON RD	CALDWELL	ID	83605	
CITY OF NAMPA		411 3RD ST S	NAMPA	ID	83651	
MR KEVIN L NEAGLE		8135 E BOREALIS DR	NAMPA	ID	83687	
MR STANFORD L NEAL		6257 E MONROE ST	NAMPA	ID	83687	
MR RONALD NIBLETT		406 ASPEN DR	DAYTON	NV	89403	
NORTHPOINTE SUBDIVISION HOMEOWNERS ASSOC INC		8050 E BOREALIS DR	NAMPA	ID	83687	
MR MICHAEL J NUTSCH		17341 11TH AVE N	NAMPA	ID	83687	

OwnerName	AGENCY	Address	City	State	Zipcode
MR BRIAN PATTERSON		9173 USTICK RD	NAMPA	ID	83687
MR CHARLES S JR PAYNTER		PO BOX 3	CALDWELL	ID	83606
MR DAVID PRIEST		4210 LINCOLN RD	CALDWELL	ID	83605
MR RAYMOND PUGA		20527 WARD LN	CALDWELL	ID	83605
MR DANIEL R RABEHL		6744 CHERRY LN	NAMPA	ID	83687
MR JOHN E REEVES		6293 E MONROE ST	NAMPA	ID	83687
REILLY RODNEY K TRUSTEE		1735 E BORZOI CT	MERIDIAN	ID	83642
JOCABED COMPEAN RINCON		8152 E JACOB DR	NAMPA	ID	83687
MR KENNETH D ROBERTS		6280 CHERRY LN	NAMPA	ID	83687
BRICE C RONCACE		6269 E MONROE ST	NAMPA	ID	83687
ANA ROQUE		6393 E MONROE ST	NAMPA	ID	83687
JERRY ALAN ROSE		4511 MARBLE FRONT RD	CALDWELL	ID	83605
ROSEN SHARON REVOCABLE TRUST		18834 MIDLAND BLVD	NAMPA	ID	83687
MR JOE A SALAZAR		4406 LINCOLN RD	CALDWELL	ID	83605
LEW SAMUELS		8058 S SNOW BIRD AVE	BOISE	ID	83716
MR RICHARD M JR SAYERS		8082 E JACOB DR	NAMPA	ID	83687
JERRY E SHAFER		6245 E MONROE ST	NAMPA	ID	83687
MR WESLEY GENE SHAFFER		2715 POLK ST	CALDWELL	ID	83605
MR STEVEN D SHAW		16896 IDAHO CENTER BLVD	NAMPA	ID	83687
MS LYNETTE SKEEN		10236 LINDEN RD	NAMPA	ID	83687
MR TYLER W SMITH		20499 WARD LN	CALDWELL	ID	83605
SERGEY STADNITSKY		205 DE ANZA BLVD NO 38	SAN MATEO	CA	94402
KELLIE A STAFFORD		4309 RIO ROBLES DR	AUSTIN	TX	78745
ALEKSANDR STASYUK		6281 E MONROE ST	NAMPA	ID	83687
SUNDANCE INVESTMENTS LLLP		3405 E OVERLAND RD STE 150	MERIDIAN	ID	83642
MR BRENT SWARTZENTRUBER		6329 E MONROE ST	NAMPA	ID	83687-9168
MR DEREK TANAKA		6405 E MONROE ST	NAMPA	ID	83687
MR GREGORY B TAYLOR		18963 MIDLAND BLVD	NAMPA	ID	83687
MR DAVID THURGOOD		8255 USTICK RD	NAMPA	ID	83687-8021
MR BLAKE W TOONE		20463 WARD LN	CALDWELL	ID	83605
MR DALE E TOWNSEND		4604 LINCOLN RD	CALDWELL	ID	83605-8028
TRADER ROAD LTD PARTNERSHIP		PO BOX 231	WEISER	ID	83672
MR JOEL VAN LITH		18641 CHICKEN DINNER RD	CALDWELL	ID	83607
MR WILLIAM VAN PAEPEGHEM		422 KCID RD	CALDWELL	ID	83605
VASSAR EDWIN TRUST		4815 MARBLE FRONT RD	CALDWELL	ID	83605
GIFFORD VASSAR		617 MASON RD	CALDWELL	ID	83605
VASSAR JACQUELINE R LIFE ESTATE		18805 MIDLAND BLVD	NAMPA	ID	83687
MR JEFFREY W VOLKEN		17754 POLARA WAY	NAMPA	ID	83687
VOLT ASSET HOLDINGS TRUST XVI		13801 WIRELESS WAY	OKLAHOMA CITY	OK	73134
ROBIN T WALKER		6536 CHERRY LN	NAMPA	ID	83686
MR MICHAEL SCOTT WALLACE		8009 E AUSTRALIS DR	NAMPA	ID	83687
MR JIMMY S WALTERS		18909 MIDLAND BLVD	NAMPA	ID	83687
MS TAMMY J WEATHERFORD		6221 E MONROE ST	NAMPA	ID	83687
JERALD D WHITE		6800 CHERRY LN	NAMPA	ID	83687
MR DOUGLAS WILDER		4412 LINCOLN RD	CALDWELL	ID	83605
MR DUSTIN NEIL WILSON		8096 E JACOB DR	NAMPA	ID	83687
SHAILA WOODALL		17096 N LYONSDALE PLACE	NAMPA	ID	83687
WOODGATE SUBDIVISION HOWEOWNERS ASSOC INC		PO BOX 1246	MERIDIAN	ID	83680
MR GREGORY K YARLOTT		6422 CHERRY LN	NAMPA	ID	83687
MS BARBARA KAYE YOUNG		11200 HWY 20-26	CALDWELL	ID	83605
MR JAMES H. WERNTZ, DIRECTOR	ENVIRONMENTAL PROTECTION AGENCY	1435N ORCHARD STREET	BOISE	ID	83706
MR BRIAN T. KELLY, DIRECTOR	US FISH AND WILDLIFE SERVICE	1387 S VINNELL WAY SUITE 368	BOISE	ID	83709
MR CAL GROEN, DIRECTOR	IDAHO DEPARTMENT OF FISH AND GAME	PO BOX 25	BOISE	ID	83707
MR SCOTT REINECKER, SUPERVISOR	IDAHO DEPARTMENT OF FISH AND GAME	3101 S. POWERLINE ROAD	NAMPA	ID	83686
MR RICK WARD	IDAHO DEPARTMENT OF FISH AND GAME	3102 S. POWERLINE ROAD	NAMPA	ID	83686
MS CINDY ROBERTSON	IDAHO DEPARTMENT OF FISH AND GAME	PO BOX 25	BOISE	ID	83707
TONI HARDESTY, DIRECTOR	DEPARTMENT OF ENVIRONMENTAL QUALITY	1410 N. HILTON	BOISE	ID	83706
MR GARY SPACKMAN, DIRECTOR	IDAHO DEPARTMENT OF WATER RESOURCES	322 E. FRONT STREET	BOISE	ID	83720
MR JOHN WESTRA, WESTERN REGIONAL MANAGER	IDAHO DEPARTMENT OF WATER RESOURCES	2735 AIRPORT WAY	BOISE	ID	83705
LEE VAN DE BOGART	PROJECT ENGINEER	621 CLEVELAND BLVD	CALDWELL	ID	83605
MR DAN HUNTER	ASSISTANT DIRECTOR	111N. 11TH AVENUE, #140	CALDWELL	ID	83605
MR TIM RICHARD	CANYON HIGHWAY DISTRICT NO. 4	15435 HWY. 44	CALDWELL	ID	83607
KERI K. SMITH-SIGMAN	CFM STATE FLOODPLAIN COORDINATOR	322 E. FRONT STREET	BOISE	ID	83720
MR REX BARRIE	BOISE RIVER WATER MASTER	PO BOX 767	STAR	ID	83669
MR CLINTON PINE	NAMPA & MERIDIAN IRRIGATION DISTRICT	1503 1ST STREET SOUTH	NAMPA	ID	83651
MR MARK ZIRSCHKY	PIONEER IRRIGATION DISTRICT	PO BOX 426	CALDWELL	ID	83606-0426
MR MICHAEL P DIMMICK	BOISE RIVER FLOOD CONTROL DISTRICT #10	PO BOX 140396	GARDEN CITY	ID	83714-0396
MR TIM PAGE	BOISE PROJECT BOARD OF CONTROL	2465 OVERLAND ROAD	BOISE	ID	83705-3155

APPENDIX F
Tribal Correspondence

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

IN REPLY REFER TO:

SRA-1208
PRJ-28.00

MAR 23 2015

Honorable Nathan Small
Chairman
Shoshone- Bannock Tribal Council
P.O. Box 306 Pima Drive
Fort Hall, ID 83203-0306

Subject: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Lactalis) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Nathan

Dear ~~Mr.~~ Chairman:

The Bureau of Reclamation has received an application from Lactalis for Application for Transportation and Utility Systems and Facilities on Federal Lands (Application). This Application seeks Reclamation approval to increase an existing National Pollutant Discharge System (NPDES)-permitted wastewater discharge to the Purdam Drain in Canyon County, Idaho, from the current peak instantaneous rate of approximately 1.2 cubic feet per second (cfs) to approximately 4.5 cfs (Proposed Action) to accommodate anticipated expansion of Lactalis's Nampa cheese production plant. The purpose of this letter is to inform interested and affected Tribal public of the proposal and to solicit comments pursuant to the National Environmental Policy Act of 1969 (NEPA). Enclosed is a Scoping Information Package describing the project proposal.

Scoping is a public involvement process used to determine the scope of issues to be addressed and identify issues related to a proposed action. Analysis of the proposal is ongoing and will be documented in an environmental assessment with an estimated completion date in September 2015. Comments received in response to this solicitation will be used to identify potential environmental issues related to the proposed action and to identify alternatives to the proposed action that meet the purpose of and need for the project.

Please send your written comments by **April 27, 2015**, to: Mr. Rich Jackson, Natural Resource Specialist, Bureau of Reclamation, Snake River Area Office, 230 Collins Road, Boise, Idaho 83702, or via email at rjackson@usbr.gov.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

If you would like to meet and discuss this project further, please contact Ms. Allyn Meuleman at gmeuleman@usbr.gov, 208-383-2258, or mail your request to:

Bureau of Reclamation
Ms. Allyn Meuleman
Native American Affairs Coordinator
230 Collins Road
Boise, ID 83702-4520

The primary contact for questions and comments for this analysis is Mr. Rich Jackson, Natural Resource Specialist, at 208-383-2285.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosure

cc: Mr. Wes Jones
Emergency Manager
Shoshone-Bannock Tribes
P.O. Box 306 Pima Drive
Fort Hall, ID 83203-0306

Mr. Cleve Davis
Environmental Program Manager
Shoshone-Bannock Tribes
P.O. Box 306 Pima Drive
Fort Hall, ID 83203-0306

Mr. Chad Colter
Fish and Wildlife Director
Shoshone-Bannock Tribes
P.O. Box 306 Pima Drive
Fort Hall, ID 83203-0306

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

MAR 2 3 2015

IN REPLY REFER TO:

SRA-1208
PRJ-28.00

Honorable Lindsey Manning
Chairman
Shoshone-Paiute Tribes
P.O. Box 219
Owyhee, NV 89832

Subject: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Lactalis) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Lindsey

Dear ~~Mr. Chairman~~:

The Bureau of Reclamation has received an application from Lactalis for Application for Transportation and Utility Systems and Facilities on Federal Lands (Application). This Application seeks Reclamation approval to increase an existing National Pollutant Discharge System (NPDES)-permitted wastewater discharge to the Purdam Drain in Canyon County, Idaho, from the current peak instantaneous rate of approximately 1.2 cubic feet per second (cfs) to approximately 4.5 cfs (Proposed Action) to accommodate anticipated expansion of Lactalis's Nampa cheese production plant. The purpose of this letter is to inform interested and affected Tribal public of the proposal and to solicit comments pursuant to the National Environmental Policy Act of 1969 (NEPA). Enclosed is a Scoping Information Package describing the project proposal.

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Bureau of Reclamation
Allyn Meuleman
Native American Affairs Coordinator
230 Collins Road
Boise, ID 83702-4520

The primary contact for questions and comments for this analysis is Mr. Rich Jackson, Natural Resource Specialist, at 208-383-2285.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosure

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

MAR 2 3 2015

IN REPLY REFER TO:

SRA-1208
PRJ-28.00

Honorable Charlotte Rodrique
Chairperson
Burns Paiute General Council
100 Pasigo Street
Burns, OR 97720-9303

Subject: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Lactalis) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Charlotte

Dear Chairperson:

The Bureau of Reclamation has received an application from Lactalis for Application for Transportation and Utility Systems and Facilities on Federal Lands (Application). This Application seeks Reclamation approval to increase an existing National Pollutant Discharge System (NPDES)-permitted wastewater discharge to the Purdam Drain in Canyon County, Idaho, from the current peak instantaneous rate of approximately 1.2 cubic feet per second (cfs) to approximately 4.5 cfs (Proposed Action) to accommodate anticipated expansion of Lactalis's Nampa cheese production plant. The purpose of this letter is to inform interested and affected Tribal public of the proposal and to solicit comments pursuant to the National Environmental Policy Act of 1969 (NEPA). Enclosed is a Scoping Information Package describing the project proposal.

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If you would like to meet and discuss this project further, please contact Ms. Allyn Meuleman at gmeuleman@usbr.gov, 208-383-2258, or mail your request to:

Bureau of Reclamation
Ms. Allyn Meuleman
Native American Affairs Coordinator
230 Collins Road
Boise, ID 83702-4520

The primary contact for questions and comments for this analysis is Mr. Rich Jackson, Natural Resource Specialist, at 208-383-2285.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosure

United States Department of the Interior

BUREAU OF RECLAMATION
Pacific Northwest Region
Snake River Area Office
230 Collins Road
Boise, ID 83702-4520

MAR 2 3 2015

IN REPLY REFER TO:

SRA-1208
PRJ-28.00

Honorable Jason Walker
Chairman
Northwestern Shoshone Tribe
505 Pershing Ave., Suite 200
Pocatello, ID 83201

Subject: Request for Comments Regarding a Proposed Use Authorization Application to Allow Sorrento Lactalis, Inc. (Lactalis) to Increase Effluent Flow to Purdam Drain, Canyon County, Idaho

Dear Mr. Chairman:

The Bureau of Reclamation has received an application from Lactalis for Application for Transportation and Utility Systems and Facilities on Federal Lands (Application). This Application seeks Reclamation approval to increase an existing National Pollutant Discharge System (NPDES)-permitted wastewater discharge to the Purdam Drain in Canyon County, Idaho, from the current peak instantaneous rate of approximately 1.2 cubic feet per second (cfs) to approximately 4.5 cfs (Proposed Action) to accommodate anticipated expansion of Lactalis's Nampa cheese production plant. The purpose of this letter is to inform interested and affected Tribal public of the proposal and to solicit comments pursuant to the National Environmental Policy Act of 1969 (NEPA). Enclosed is a Scoping Information Package describing the project proposal.

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Please send your written comments by **April 27, 2015**, to: Mr. Rich Jackson, Natural Resource Specialist, Bureau of Reclamation, Snake River Area Office, 230 Collins Road, Boise, Idaho 83702, or via email at rjackson@usbr.gov.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in

your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

If you would like to meet and discuss this project further, please contact Ms. Allyn Meuleman at gmeuleman@usbr.gov, 208-383-2258, or mail your request to:

Bureau of Reclamation
Ms. Allyn Meuleman
Native American Affairs Coordinator
230 Collins Road
Boise, ID 83702-4520

The primary contact for questions and comments for this analysis is Mr. Rich Jackson, Natural Resource Specialist, at 208-383-2285.

Sincerely,

Jerrold D. Gregg
Area Manager

Enclosure

APPENDIX G
Comments and Reclamation's Responses

(To be included in FONSI/Final EA)