Section I
APPLICANT INFORMATION

Type the information for Sections I and II.

Name of project: LSNA Floodplain Reconnection Design

OWEB funds requested: $51,996.00 **Total cost of project**†: $68,796

† *This dollar amount refers only to the total cost of the technical assistance activity, and does not include the subsequent planned restoration work.*

PROJECT LOCATION:

This project occurs in one region only. Region 1 ☐ **Region 2** ☐ **Region 3** ☒ **Region 4** ☐ **Region 5** ☐ **Region 6** ☐

This project occurs in multiple regions. Check all that apply. Region 1 ☐ **Region 2** ☐ **Region 3** ☐ **Region 4** ☐ **Region 5** ☐ **Region 6** ☐

This project occurs statewide / in all regions. ☐

This project occurs at (check one): ☐ **Site unknown at this time** ☒ **A single site** ☐ **Multiple sites**

Watershed Name(s)	County or Counties
Luckiamute	Polk

Township, Range, Section(s) (e.g., T1N, R5E, S12)	Longitude, Latitude (e.g., -123.789, 45.613) (required for federal/state reporting)	Watershed code(s) – Please note the 10-digit hydrologic unit code, previously 5th Field HUC
TS10, R4W, S2&3	-123.151, 44.735	1709000305

Applicant	**Project Manager**
Organization: Luckiamute Watershed Council	**Name:**Jean-Paul Zagarola
Address:226 S. Main St., Suite L	**Organization:**Bonneville Environmental Foundation
Independence, OR 97351	**Address:**240 SW 1st Ave.
Phone:503-837-0237	Portland, OR 37204
Fax:	**Phone:**971-832-9097
Email: coordinator@luckiamutelwc.org	**Fax:**
Contact Person: Kristen Larson	**Email:** jpzagarola@b-e-f.org

Payee

Organization: Marys River Watershed Council
Address:PO Box 1041
Corvallis, OR 97339-1041
Phone:541-758-7597
Fax:
Email: xan@mrwc.org
Contact Person: Xan Augerot

CERTIFICATION:

I certify that this application is a true and accurate representation of the proposed work for watershed restoration and that I am authorized to sign as the Applicant or Co-Applicant. By the following signature, the Applicant certifies that they are aware of the requirements (***see Application Instructions***) of an OWEB grant and are prepared to implement the project if awarded.

Applicant Signature: _____ Date: 8/25/2015

Print Name: Kristen M. Larson Title: Council Coordinator

Co-Applicant Signature: _____ Date: _____

Print Name: _____ Agency: _____

Section II
PROJECT SUMMARY

1. **Summary.** Give a brief summary (max. 150 words) of the proposed technical assistance activity *only* (do not confuse the technical assistance with planned restoration). Be sure to mention partners and how OWEB funds will be used.
The proposed technical assistance (TA) project will produce permit-ready designs for re-connecting or enhancing floodplain connections with the Willamette and Luckiamute Rivers at Luckiamute State Natural Area (LSNA). A property of Oregon State Parks in the middle Willamette in Polk County, a preliminary hydrologic analysis identified three potential sites as best candidates at LSNA to increase the frequency and duration of inundation, thus providing increased access to floodplain habitat for Upper Willamette Chinook, steelhead and other native fish. The project will conduct a cost-benefit analysis of the three sites; project partners will then select implementation sites for development of permit-ready designs and funding proposal(s). A monitoring framework for sediment deposition and scour will be established. OWEB funds will support salaries and wages, contracted services, travel, and grant administration. Project partners include Meyer Memorial Trust, United States Geologic Survey, Volunteer Technical Team, Luckiamute Watershed Council, and Oregon Parks and Recreation Department.

2. **What type of technical assistance are you applying for (see Instructions first):**

   ☒ TA#1 Project Design ☐ TA#2 Implementation ☐ TA#3 Landowner Recruitment

3. **What type of support are you seeking? (select only one)**

   ☐ Part-time or full-time in-house support ☐ Part-time or full-time outside contract support ☒ Both

4. **Was this application submitted previously?** ☐ **Yes** ☒ **No**
   If yes, what was the month and year, or application number?

5. **Does this application propose a grant for a property in which OWEB previously invested funds for purchase of fee title or a conservation easement; or is OWEB currently considering an acquisition grant for this property?** ☐ **Yes** ☒ **No**

   If yes, what is the grant number(s)?

6. **Is this project a continuation of a previously OWEB-funded project(s)?** ☒ **Yes** ☐ **No**
   If yes, what was the month and year, or application(s) number? 208-3090-8417, 212-3999-9837

7. **Do you plan to submit a restoration grant application to OWEB as a result of this technical assistance project?** ☒ **Yes** ☐ **No**

8. **What are the proposed start and end dates for the technical assistance project?**
   Start: January 2016 End: May 2017

9. **Is this project related to a proposed or funded Oregon State Weed Board grant application(s)?** ☐ **Yes** ☒ **No**
   If yes, list the month and year, or grant application(s) number, and briefly describe how this project is related to the Weed Board application or grant.

10. **Project Partners.** Show all anticipated funding sources, and indicate the dollar value for cash or in-kind contributions. Be sure to provide a dollar value for each funding source. If the funding source is providing in-kind contributions, briefly describe the nature of the contribution in the Funding Source Column. Check the appropriate box to denote if the funding status is secured or pending. In the Amount/Value Column, provide a total dollar amount or value for each funding source. Match should be directly related to the technical assistance project and not for the restoration phase.

Funding Source	Cash	In-Kind	Secured	Pending	Amount/Value

Name the Partner and what their contribution is.			(x)	(x)	
OWEB	$51,996.00	$	☐	☒	$51,996.00
Landowner(s) or other partners:	$	$	☐	☐	$
Oregon Parks and Recreation Department	$	$3,750.00	☐	☒	$3,750.00
Meyer Memorial Trust	$9,050.00	$	☒	☐	$9,050.00
United State Geologic Survey	$	$800.00	☐	☒	$800.00
Technical Team	$	$3,200.00	☐	☒	$3,200.00
	$	$	☐	☐	$
	$	$	☐	☐	$
	$	$	☐	☐	$
	$	$	☐	☐	$
Total Estimated Funds (add all amounts in the far-right Column):					*$68,796.00

***The total should equal the total cost of the project on page 1 of the application.

11. Have any conditions been placed on match funds from other sources that may affect project completion?
☐ **Yes** ☒ **No**

If yes, explain:

12. Salmon/Steelhead Populations Targeted and Expected Benefits to Salmon/Steelhead

The information provided will be used to by OWEB to better meet federal and state reporting requirements. Completion of this section is required but will not be used to evaluate this application for funding.

☐ This project is **NOT** specifically designed to benefit salmon or steelhead.

► If you check this box, STOP here and GO TO Section III – Project Desciption.

12(a) Targeted Salmon/Steelhead Populations: Select one or more of the salmon ESUs (Evolutionary Significant Unit) or steelhead DPSs (Distinct Population Segment) that the project will address/benefit. For species where the ESU/DPS name is not known or determined, use the species name with unidentified ESU (e.g., Chinook salmon – unidentified ESU). Additional information on the designation and location of the salmon/steelhead populations can be found at http://www.westcoast.fisheries.noaa.gov/maps_data/species_population_boundaries.html.

Chinook Salmon (*Oncorhynchus tshawytscha*)		**Coho Salmon** (*O. kisutch*)	
☐	Deschutes River summer/fall-run ESU	☐	Lower Columbia River ESU
☐	Lower Columbia River ESU	☐	Oregon Coast ESU
☐	Mid-Columbia River spring-run ESU	☐	Southern Oregon/Northern California ESU
☐	Oregon Coast ESU	☐	unidentified ESU
☐	Snake River Fall-run ESU	**Steelhead** (*O. mykiss*)	
☐	Snake River Spring/Summer-run ESU	☐	Klamath Mountains Province DPS
☐	Southern Oregon and Northern California Coastal ESU	☐	Lower Columbia River DPS
☐	Upper Klamath-Trinity Rivers ESU	☐	Middle Columbia River DPS
☒	Upper Willamette River ESU	☐	Oregon Coast DPS
☐	unidentified ESU	☐	Snake River Basin DPS
Chum Salmon (*O. keta*)		☐	Washington Coast DPS (SW Washington)
☐	Columbia River ESU	☒	Upper Willamette River DPS
☐	Pacific Coast ESU	☐	Steelhead/Trout unidentified DPS
☐	unidentified ESU		

12(b) Expected Benefits: Write a brief description of the goals and purpose of the project and how it is expected to benefit salmon/steelhead or salmon/steelhead habitat. This answer should be no longer than 2000 characters which is

approximately 330 words) **See Application Instructions for examples and ideas on how to calculate the number of words or characters in your answer.**

The Luckiamute State Natural Area (LSNA) Floodplain Reconnection Design project will benefit salmon and steelhead by assisting project partners in analyzing, selecting and designing floodplain reconnection projects that will achieve maximum ecological benefit. Based on preliminary hydrologic analysis, areas targeted for potential restoration work could create up to six weeks of additionally inundation, providing increased access to floodplain habitat and refuge from high water events for Chinook and steelhead and other native species. Increased frequency and duration of inundation provides habitat benefits of lower velocity waters and access to nutrients for fish, as well as other benefits such as nutrient exchange, ground water recharge, and improved water quality from increased filtration. The resulting restoration project would address limiting factors of physcial habitat quality (including loss of floodplain connectivity and access to off-channel habitat) and hydrograph (and the resulting decreased channel complexity and habitat diversity).

◆◆

Section III

PROJECT DESCRIPTION

Check one box only and answer the set of questions that applies to the type of technical assistance for which you are applying. **Refer to the Application Instructions for clarification and helpful examples.**

Use this application form to respond to the questions, using additional sheets of paper as necessary.

All PDF pages should be 8½″ x 11″ page size. Do not use color highlights for text emphasis or in tables as the highlight turns black when the application is scanned. If the project involves multiple sites, be specific for each. If the question is in parts (e.g., "a" and "b"), make sure you answer in parts. **Refer to the Application Instructions for clarification and helpful examples.**

☒ TA#1 PROJECT DESIGN

Technical Assistance Activity

1. Describe the problem (not the solution). The technical assistance for which you are seeking support will address which specific watershed priority(ies) or limiting factor(s) and benefit which specific resource(s)? If the technical assistance need is identified in an existing watershed-scale assessment or action plan, or in a subbasin plan, identify the plan and page number.

Luckiamute State Natural Area (LSNA) is an Oregon State Parks property located at an important confluence area of the Luckiamute and Willamette Rivers. The 925-acre property is split between the North and South Tracts and is located entirely within the Luckiamute-Santiam-Willamette Confluence anchor habitat from river miles 108-111. A strong and productive partnership between Oregon Parks and Recreation Department (OPRD) and the Luckiamute Watershed Council (LWC) continues the enhancement and establishment of over 500 acres of riparian and floodplain forest supported by the Willamette SIP (Attachment 2). Through this effort, a combination of invasive species control and installation of over 500,000 native trees and shrubs has transformed project areas at LSNA and dramatically improved riparian and floodplain conditions in the two-year inundation zone.

While floodplain restoration efforts are well underway at LSNA, interaction between the floodplain and the Luckiamute and Willamette Rivers is greatly reduced from historical levels. The altered (regulated) hydrograph of the Willamette River has resulted in elevated summer base flows and attenuated peak flows (Attachment 3, Figure 2-1, pg. 4). Attenuation of high flows limits the frequency and duration of inundation of floodplains. Historical land use practices including construction of roads and establishment of berms along river banks have also disconnected rivers from their floodplains. Lateral connectivity of a river to its floodplain shapes landforms, enhances exchange of nutrients and sediment, provides habitat and refugia for native fish, and enhances flood storage capacity and opportunities for groundwater recharge. Historically, the middle Willamette (Albany to Newberg) was a meandering river; during flooding, sediment aggradation and scour created a landscape of ridges and swales as the floodplain migrated laterally (R. Wallick, 2014). In the Willamette basin, flow management, including peak discharge, resides in the hands of the U.S. Army Corps of Engineers. Opportunities do exist to enhance floodplain connectivity under this regulated hydrograph. However, in the context of a regulated Willamette and absence of a major flood event, creation or enhancement of these connections may require human intervention (J. Rose Wallick, 2015, personal communication).

Annual flooding occurs throughout LSNA; our goal is to increase the frequency and duration of that flooding based on historical levels (pre-dams). The Luckiamute River is an unregulated system regularly overtopping its banks at LSNA. High flows on the Willamette and the adjacent Santiam River have a significant backwatering effect on the Luckiamute. Hydrologic analysis shows that the regulated average annual peak discharge on the Willamette River (Albany gage) is 66,243 cfs, 50% below the historical (pre-dams) figure of 124,215 cfs (Attachment 3, pg. 5, Table 2-2). In winter 2014-2015, the LWC Project Manager observed the Willamette River overtopping its banks in isolated locations at a discharge at or near 50,000 cfs. This patchwork of inundation creates a network of connections with the Luckiamute River throughout LSNA. Although these dynamic processes currently exist at LSNA, they are limited by the modified flow regime of the Willamette, an existing road berm two feet above the adjacent Willamette floodplain and bank conditions along the Luckiamute River. The resulting reduction in inundation and movement of water across the landscape limits normal seasonal sediment transport, nutrient cycling and access to rehabilitated high quality rearing habitat in both rivers' floodplains.

This Technical Assistance (TA) proposal seeks support to address limiting factors identified in the Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead (ODFW 2006), including:

- Physical habitat quality – including loss of floodplain connectivity and access to off-channel habitat
- Hydrograph - reduced occurrence of peak flows that maintain and create habitat, resulting in decreased channel complexity and habitat diversity in lower subbasins and mainstem Willamette River

The planning and implementation of restoration actions that would result from this TA are referenced in several assessments and actions plans. Table 1 presents a summary of key examples.

Table 1: Project Relationship to Regional Priorities

Plan	Year, Author, Page #	Relationship
Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead	2011, Oregon Department of Fish and Wildlife, NOAA Fisheries, pages 5-27 to 5-31 (limiting factors and threats) and 7-19, 21 (key actions)	This proposal seeks to enhance floodplain connectivity to implement recommended action 116-MST-AMO among others (page 7-21).
Draft Upper and Middle Willamette Strategic Action Plan	2015, Willamette Steering Committee (with Third-Stream Research and Consulting), pages 47, 66	Plan goal is *to sustain and enhance seasonally important resources for native fish* and focuses on addressing limiting factors identified in recovery plans and other regional documents. Floodplain reconnection in the Luckiamute-Santiam-Willamette anchor habitat is a target strategy with work at Luckiamute State Natural Area specifically identified as a target action.
LWC Action Plan, Part II	2010, ICF and LWC Technical Advisors; LSNA Action Plan, Part II pages 30-44	*Key Threats Include:* Reduction in magnitude and frequency of inundation

		Strategies include: Evaluation of restoration alternatives to increase floodplain and side-channel connectivity
Oregon Conservation Strategy	2006, ODFW, Willamette Valley Ecoregion (WV-03, Willamette River Floodplain), pages 244-245	*Special Features:* Oregon Start Parks Network of Greenway Properties; *Key habitats*: Aquatic, Bottomland Hardwoods, and Riparian; *Recommended Conservation Actions*: Restore river and floodplain interactions
Willamette Basin Restoration Priorities	2005, OWEB, pages 94-95	Restoration Priority: Restoring Habitats for Threatened, Endangered and Sensitive Species: LSNA (formerly Luckiamute Landing) was identified as a geographic priority for this restoration priority
Luckiamute State Natural Area Master Plan	2009, Oregon State Parks, page 63	Goals for Luckiamute State Natural Area management: Protect, manage, enhance and restore as appropriate, the values and natural functions of the floodplain resources.

Based on the resulting analysis, OPRD and LWC will pursue restoration actions that will benefit species such as Upper Willamette spring Chinook and winter steelhead. By enhancing the frequency and extent of inundation at LSNA, restoration will expand access to high quality habitat and improve complexity of that habitat at varying flows on the mainstem Willamette and Luckiamute Rivers. Furthermore, increased connectivity will enhance groundwater interactions, filtration of fine sediments and exchange of nutrients between aquatic and terrestrial systems.

2. Describe the solution (not the problem). What is the technical *design* solution (not the *restoration* solution)? What range of alternatives will be evaluated?

Through Willamette SIP funding awarded for LSNA Enhancement Phases I and II, the LWC collected inundation data in 2011 and 2012. The LWC then retained RDG to model inundation scenarios and identify potential project opportunities (Attachment 3, RDG Hydrologic Analysis Technical Memorandum, 2013). In the Hydrologic Analysis RDG uses 24,000 cfs as a target flow for increasing off-channel connectivity with the Luckiamute and Willamette Rivers with **an anticipated benefit of four to six additional weeks of inundation in an average year** while allowing for fish movement between the river and floodplain. Based on the findings in the Hydrologic Analysis, LWC then contracted RDG to develop preliminary project concepts and design and construction cost estimates for two of the Site Investigation Areas (SIAs), SIAs 7 and 8 (Attachment 3, map, pg. 16). We limited the number of SIAs and scope of the analysis because of available funding at the time. With the proposed TA funding, we will more closely analyze SIAs 7 and 8, update models and budgets, answer key questions, and include SIA 5 on the Willamette River for consideration. We also seek to ensure we are not overlooking any other worthwhile opportunity at LSNA to ensure SIP-related

restoration work is completed. Work at each site would include some form of bank lowering and channel excavation to increase inundation. Table 2 summarizes alternatives, proposed actions, key questions and possible outcomes for implementation.

Table 2: Restoration alternatives to be evaluated

Location	Proposed Actions	Key Questions	Possible Outcomes
SIA 5 (mainstem Willamette)	• Lower outside bank and excavate channel approximately 5 feet • Add large wood structures	• Cost / benefit of improved and increased available habitat vs. cost? • Risk of bank failure / channel capture? • Acceptable levels of inundation to LSNA interior / farm field?	• Proceed with design • Proceed with modified design • No action – added ecological benefit does not justify cost • No action – unacceptable risk
SIA 7 (lower Luckiamute River)	• Lower outside bank and excavate channel approximately 3 feet • Add large wood structures	• Cost / benefit of small excavation - improved habitat vs. cost? • No or acceptable impacts to private property to north? • Will aggradation occur, at what rate and how will it impact needed level of long term maintenance by OPRD?	• Proceed with design • Proceed with modified design • No action – added ecological benefit does not justify cost of implementation and / or maintenance • No action – unacceptable risk
SIA 8 (lower Luckiamute River)	• Lower outside bank and excavate channel approximately 2 feet • Add large wood structures • Evaluate option of additional grading to better connect the swale to the pond area NW of SIA 8	• Impacts of excavation to road access for OPRD and farming leasee • Will aggradation occur, at what rate and how will it impact needed level of long term maintenance by OPRD? • Potential impacts to farm field • Cost / benefit of small excavation - improved habitat vs. cost? • Costs / benefit of extra grading to connect to pond - improved habitat vs. cost? • No or acceptable impacts to private property to north? • OPRD is assessing options for bank	• Proceed with design • Proceed with modified design • Proceed and include additional grading to pond • No action – added ecological benefit does not justify cost of implementation and / or maintenance • No action – unacceptable risk

		work on the Luckiamute River across and just downstream from SIA 8 to maintain N. Tract road access – project partners need to consider potential for coordination for cost efficiencies and assess if bank work across from SIA 8 will impact project design	

Building on the riparian and floodplain restoration efforts to date and previous floodplain reconnection planning, this technical assistance project will produce a cost/benefit analysis for each SIA assessed and permit-ready design(s) for chosen sites. The analysis will cover key elements including expected ecological benefits, construction and permitting costs, a description of any potential impacts to OPRD or farming operations and other site-specific considerations. Reviewing these elements will ensure we are not overlooking opportunities and/or constraints to meeting restoration objectives. We anticipate that at least two of the SIAs will be selected for implementation in some form based on the analysis and we will submit a restoration proposal for the selected site(s) by spring of 2017.

Project partners designed LSNA restoration project objectives based on desired ecological outcomes set forth in the Willamette SIP (http://www.oregon.gov/oweb/pages/sip_Willamette.aspx) and the LSNA Master Plan (OPRD 2009, pgs. 63, 67). We took a phased approach for implementation to accommodate available funding and implementation capacity. The LWC, with support from partners, submitted SIAs 7 and 8 as part of a pre-proposal for a larger LSNA enhancement project through the Willamette SIP in 2013 (Phase III). Based on feedback from the pre-proposal review team the LWC did not pursue floodplain reconnection funding in the final Phase III proposal. During a subsequent SIP site visit in 2014, OWEB review team members impressed by the revegetation success at the LSNA recommended revisiting floodplain reconnection. Since the pre-proposal submission in 2013, costs for design and construction have changed; OPRD has identified a need to assess site accessibility post-reconnection, particularly with SIA 8; and the LWC and OPRD want to evaluate cost–benefit of SIA 5, located along the Willamette on the North Tract. SIA 5 was not included in the concept development conducted by RDG in 2013, and is anticipated to be potentially more complex due to its location on the mainstem Willamette.

Other SIAs identified and preliminarily assessed in the RDG Hydrologic Analysis are not being pursued for various reasons (Attachment 3, pages 21-22). Some sites are already functioning to convey floodwaters, while others are potentially very expensive or conflict with other management objectives. For example, SIAs 9-11 on the South Tract explore reconnecting remnant gravel ponds. OPRD is currently managing these sites for western pond turtle habitat and reconnecting these sites would be very expensive and destructive to turtle habitat. SIAs 5, 7 and 8 represent the best opportunities to address anthropogenic causes of restricted connectivity at LSNA given current knowledge of costs, benefits and constraints. Further analysis and design is now needed to ensure: **1) reconnections will not negatively impact OPRD's ability to access and manage its property; 2) reconnections have a reasonable cost-benefit ratio; and 3) designs and budgets for permitting and restoration implementation are up to date and adequately informed.** The LWC and partners feel a technical assistance grant to address these objectives is the best next step to move towards floodplain reconnection at LSNA. The proposed TA funding would move us closer to achieving the Willamette SIP desired ecological outcome of improving connectivity between the mainstem Willamette and its floodplain at a site where substantial investment has been made in the health and extent of floodplain forests.

3. What specific technical assistance expertise will you need? How will the technical assistance provider be selected?

River Design Group completed coarse hydrologic analysis and preliminary project planning for LSNA in 2013. Three Site Investigation Areas (SIAs) surfaced as a result which we are now targeting for this TA proposal. We require expertise in hydrology, terrain mapping, hydraulic modeling, engineering and fisheries biology/ecology in order to complete refined analyses, modelling, and design.

The LWC will conduct a competitive selection process to procure professional services. We will develop scopes of work, distribute a Request for Proposals (RFP) and hold an optional site visit for contractors that wish to bid on the project. The contractor will be selected based on criteria established by the LWC and OPRD including budget, expertise, familiarity and experience with the Willamette system, references, and proposal contents.

We also require expertise in geomorphology to establish a monitoring framework and protocol. United States Geologic Survey (USGS) Oregon Water Science Center geomorphic mapping of the Willamette floodplain shows a network of overflow channels, meander scars, and other features of geomorphic processes which can help inform restoration and monitoring planning (Attachment 4).The USGS Oregon Water Science Center will assist project partners in establishing a system to track aggradation / scour at the sites to inform the need for short and/or long term maintenance. The framework and collected data may also help inform work at other locations on the mainstem Willamette.

4. Who will provide guidance for and supervise the technical assistance provider? How will this guidance and supervision be ensured?

The LWC Project Manager (PM), Jean-Paul Zagarola will be the primary point of contact and will provide guidance for the technical assistance provider. Jean-Paul will coordinate with OPRD staff and the LWC Council Coordinator throughout each stage of the project - to develop the scope of work, release the RFP, select the contractor and finalize the project contract. The LWC will convene a volunteer Technical Team of experts from private, local, state and federal agencies/organizations to provide input and feedback throughout the project.

The project management budget for this proposal accounts for PM time for each stage of the process and for collaborative work between the PM, LWC Coordinator, OPRD and the Technical Team to ensure appropriate input and feedback is solicited and incorporated into decision making and design. This collaborative process will include kick-off and design meetings with the LWC, OPRD, contractor, and Technical Team members; updates as part of existing weekly conversations (in-person or via phone) between the Coordinator and PM; and regularly scheduled conference calls or web meetings (e.g. Go-To Meeting) with OPRD as needed for on-going review and feedback of the process. We anticipate at least three Technical Team meetings.

5. How will the success of the completed technical assistance phase be determined? What technical review and design criteria will you employ to evaluate success?

Success will be determined by:

1) A completed report, containing the elements described in question 2, which ensures OPRD, LWC and technical advisors have adequate information to make an informed decision on which SIAs (5, 7, and /or 8) to take to final design phase
2) Completed permit-ready designs for the selected sites

3) A funding proposal submitted for implementation of at least one SIA at LSNA

Resulting Restoration Project

6. Briefly (a) describe the proposed restoration project practice(s) and priorities to result from the technical assistance grant; (b) state measurable objective(s); (c) provide a brief but detailed description of the project; and (d) specify the expected ecological benefits from the project.

a) Proposed Restoration Project Practices

i. Bank lowering and channel excavation on the Luckiamute (SIA 7 and 8) and Willamette (SIA 5) to enhance river–floodplain processes.
ii. Add large wood structures to improve floodplain complexity, hold existing bank line and minimize risk of channel capture
iii. Revegetation and invasive species control at locations of soil disturbance
iv. Monitoring of sediment aggradation or scour at project sites

b) Measurable Objectives:

i. Inundation at LSNA occurs at lower flows than under current conditions
ii. Increased duration of inundation at LSNA than under current conditions
iii. OPRD operations are not negatively impacted

c) Brief but detailed description of the project

Future restoration would include bank lowering and channel excavation and enhancement to facilitate higher frequency and duration of inundation, ultimately improving river-floodplain connectivity and habitat complexity at Luckiamute State Natural Area. Apart from ongoing stewardship by OPRD, implementation of floodplain reconnection projects would represent a final "buttoning up" of floodplain restoration and enhancement proposed through the SIP at LSNA. We anticipate the future project would include a combination of some or all of SIAs 5, 7 and 8. Project implementation for each of SIA 5, 7, and 8 would include the removal of earthen plugs to lower the bank at the site, channel excavation (from two to five feet depending on the SIA) and installation of large wood structures for bank stabilization and habitat complexity. Dependent on the results of this project, there is the potential for additional grading at SIA 8 to further connect the swale to the pond area NW of the site. The future restoration project would also include post-project revegetation to mitigate disturbance caused during construction and prevent establishment of invasive plants. Implementation will also include pre- and post-project monitoring of sediment deposition or scour at implemented SIAs.

d) Expected ecological benefits from the project

Increased river-floodplain connectivity will enhance floodplain processes and provide greater access to high quality floodplain habitat, both temporally and spatially. Riparian and floodplain forest restoration is well underway in the inundation zones for these SIAs. Increasing off-channel habitat will result in greater access to diverse food resources and refugia from high flows for aquatic species than is available under current conditions. Processes associated with inundation are important for the formation of floodplains and floodplain features, deposition of nutrients and sediment to floodplains, and developing a network of varied habitat types available during high flow events (Gregory et al. 2002, Bellmore et al. 2013). An examination of floodplain food web mosaics found that species such as Chinook

and steelhead faced reduced competition for food resources in reconnected floodplain habitats such as side channels (Bellmore et al. 2013). Indeed, juvenile salmon rearing in well-connected floodplain habitats have been shown to experience higher growth rates than those with less access to these habitats, thus better preparing them for their seaward migration (Jeffres et al. 2007, Sommer et al. 2011).

RDG's initial hydrologic analysis completed in 2013 identified potential restoration opportunities that would activate historic connections under the current managed flow regime. RDG used a Willamette target flow of 24,000 cfs (Albany gage) to increase frequency and duration of connectivity from approximately one week per year to four to six weeks per year, a 400-600% increase in an average year. Using the 24,000 cfs target proves to be the most cost effective approach for achieving the desired conditions for favorable rearing habitat (Attachment 3, pg. 12).

The LWC and OPRD seek to implement ecologically beneficial and cost-effective restoration and enhancement projects that achieve desired outcomes without negatively impacting OPRD's ability to manage its property. Using the previous RDG analysis, this technical assistance proposal is focused on SIAs 5, 7 and 8 (Attachment 1, project map) as potential reconnection sites that will achieve the greatest ecological return on investment.

7. Provide evidence of the commitment to implement a restoration project(s) resulting from the project design/development of the technical assistance grant (e.g., what sites and are landowners committed to project implementation?).

Oregon Parks and Recreation Department is committed to identifying and implementing restoration and enhancement projects at LSNA. These actions further the goal in the LSNA Master Plan to "protect, manage, enhance and restore as appropriate, the values and natural functions of the floodplain resources" (pg. 7). OPRD is an active planning and implementation partner on the floodplain and riparian restoration work at LSNA, contributing in-kind and financial resources. Their contribution and support has been invaluable to the success of the project to date. Please see attached letter of support for more information.

8. Discuss in general terms the process and schedule for implementing the restoration project design(s) that will result from the technical assistance grant. Be sure to include whether permits are required.

We will implement this TA project over 2016 and into early 2017. We will initiate contact with permitting agencies during the design phase of the TA. We expect to seek funding for restoration implementation in 2017. Once awarded restoration funding, most of the permitting process will occur in early 2018 as part of the implementation phase. Local, state, and federal permits will be required for implementation. Table 3 provides a general timeline of resulting restoration activities.

Table 3: Resulting Restoration Project Timeline

Activity	**Time Frame**
Permitting initiated (TA)	Winter 2016 - 2017
Implementation funding sought / secured	Spring - Fall 2017
Permitting	January – May 2018
Finalize and distribute bid packet	January – February 2018
Select contractor	March 2018
Construction work (in-water work window)	July – October 2018
Revegetation of disturbed sites	February – March 2019
Plant establishment at disturbed sites	2019 – 2023
Monitoring	Pre / post project activity; ongoing
Maintenance of excavated sites	Periodic, as needed by landowner

References

Bellmore, J.R., C.V. Baxter, K. Martens, P.J. Connolly. 2013. The floodplain food web mosaic: a study of its importance to salmon and steelhead with implications for their recovery. USGS Staff – Published Research. Paper 699. http://digitalcommons.unl.edu/usgsstaffpub

Gregory, S., L. Ashkena, S. Jett, R. WIldman. Flood Inundations / FEMA Floodplains. D. Hulse, S. Gregory, J. Baker. (Eds). 2002. Willamette River Basin Planning Atlas: Trajectories of environmental and ecological change. (2nd edition), Oregon State University Press, Corvallis, Oregon 97333. p. 26-27

Jeffres, C.A., J.J. Opperman, P.B. Moyle. 2008. Ephemeral floodplain habitats provide best growth conditions for juvenile Chinook salmon in a California river. Environmental Biology of Fishes. 83(4), pp 449-458

Sommer, T.R., M.L. Nobriga, W.C. Harrel, W. Batham, W.J. Kimmerer. 2011. Floodplain rearing of juvenile chinook salmon: evidence of enhanced growth and survival. Canadian Journal of Fisheries and Aquatic Sciences, 58(2), pp 325-333

Wallick, R.J. 2014. "Our Evolving Understanding of the Willamette River Floodplain." Within Our Reach. Oregon State University, Corvallis, Oregon. December 11, 2014. http://willametteinitiative.org/tools-resources/our-evolving-understanding-willamette-river-floodplain. Accessed 8/10/2015.

☐ TA#2 IMPLEMENTATION

1. Describe the problem (not the solution). The technical assistance for which you are seeking support will address which specific watershed priority(ies) or limiting factor(s) and benefit which specific resource(s)? If the technical assistance need is identified in an existing watershed-scale assessment or action plan, or in a subbasin plan, identify the plan and page number.

2. Describe the project to be developed and how specific sites and/or activities will be selected, and what form of analysis will be conducted.

3. What specific technical assistance expertise will you need? How will the technical assistance provider be selected?

4. Who will provide guidance for and supervise the technical assistance provider? How will this guidance and supervision be ensured?

5. How will the success of the completed technical assistance project be determined? What technical review will you employ to evaluate success?

6. What specific result do you expect from the successful completion of this technical assistance grant, and what do you anticipate doing about it in the future? If possible, provide a tentative timeline for future action.

☐ TA#3 LANDOWNER RECRUITMENT

1. Describe the problem (not the solution). The technical assistance for which you are seeking support will address which specific watershed priority(ies) or limiting factor(s) and benefit which specific resource(s)? If the technical

assistance need is identified in an existing watershed-scale assessment or action plan, or in a subbasin plan, identify the plan and page number.

2. Describe the method(s) of landowner recruitment. How will recruiting landowners address the watershed priority(ies)/limiting factor(s) described in #1 above?

3. Which watershed restoration program or landowner assistance program are you seeking to enroll landowners in? Have you identified targets for numbers of landowners and acres (or stream miles, etc.)? If so, what are the targets and how many are they? Provide a tentative timeline for enrolling landowners.

4. What specific technical assistance expertise will you need? How will the technical assistance provider be selected?

5. Who will provide guidance for and supervise the technical assistance provider? How will this guidance and supervision be ensured?

6. How will the success of the completed technical assistance phase be determined? What technical review will you employ to evaluate success?

Section IV

TECHNICAL ASSISTANCE BUDGET

IMPORTANT: Read the application instructions and Budget Categories Definitions and Policy Document.

Add additional lines, if necessary.

Totals automatically round to the nearest dollar

A	B	C	D	E	F	G
Itemize projected costs under each of the following categories:	**Unit Number**	**Unit Cost**	**OWEB Funds**	**Cash Match***	**In-Kind Match***	**Total Costs**
	(e.g., # of hours)	(e.g., hourly rate)				(add columns D, E, F)
SALARIES, WAGES AND BENEFITS. List position titles, include only costs of employees charged to this grant.						
LWC Coordinator, partner coordination, communications with PM, budget oversight, assistance with proposal	60	34	2,040			2,040
						0
SUBTOTAL (1)			2,040	0	0	2,040
CONTRACTED SERVICES. Labor, supplies, and materials to be provided by *non-staff* for project implementation.						
Project Manager; BEF - project contractor oversight, convene partners; resulting proposal	142	40	5,680			5,680
Project Management / Consultation - OPRD	75	50	0		3,750	3,750
Tech Team - review site and design	80	40	0		3,200	3,200
Preliminary hydrologic analysis (RDG and PM)			0	9,050		9,050
Cultural Resource Assessment	1	5,000	5,000			5,000
Contractor: Preliminary meetings, survey, data processing, terrain modeling	1	6,800	6,800			6,800
Contractor: Hydraulic modeling, flood model and net-rise letter	1	8,000	8,000			8,000
Contractor: Cost/benefit analysis, meetings, design selection, design plans, reports and specifications	1	14,590	14,590			14,590
Contractor: Assist with agency consultation of initiation of permitting process	1	3,000	3,000			3,000
USGS - Technical Assistance with Sediment Monitoring	20	40	0		800	800
SUBTOTAL (2)			43,070	9,050	7,750	59,870
TRAVEL. Mileage, per diem, lodging, etc. Must use current State of Oregon rates.						
18 miles round trip to LSNA; 10 round trips	180	0.575	104			104
						0
SUBTOTAL (3)			104	0	0	104
MATERIALS/SUPPLIES. Refers to items that are "used up" in the course of the project. Costs to OWEB must be directly related to the implementation of this grant.						
						0
						0
SUBTOTAL (4)			0	0	0	0
EQUIPMENT/SOFTWARE. List portable equipment costing **$300** or more per unit. Must remain property of a governmental entity, tribe, watershed council, SWCD, institution of higher learning or school district.						
						0
						0
SUBTOTAL (5)			0	0	0	0
OTHER. Costs must be necessary and reasonable for successful completion of this grant.						
						0
						0
SUBTOTAL (6)			0	0	0	0
[Add subtotals above] MODIFIED TOTAL DIRECT COSTS (7)			45,214	9,050	7,750	62,014
GRANT ADMIN. Select one of the methods below. Fill in the requested rate. Compute by multiplying MTDC (6) line by this rate.						
Federally Negotiated Indirect Cost Rate	☐		0			0
Federally Accepted 10% *de minimis*	☐	10%	0			0
OWEB Negotiated Indirect Cost Rate	X	15%	6,782			6,782
SUBTOTAL (7)			6,782	0	0	6,782
GRAND BUDGET TOTAL (8) **[Add Modified Total Direct Costs (6), Grant Admin Subtotal (7)]**			51,996	9,050	7,750	68,796

ATTACHMENT A

MATCH FUNDING FORM

Document here the match funding shown on the budget page of your grant application

OWEB accepts all non-OWEB funds as match. An applicant may not use *another OWEB grant* to match an OWEB grant; this includes ODA Weed Board projects because they are funded through OWEB grants. However, an applicant who benefits from a pass-through OWEB agreement with another state agency, by receiving either staff expertise or a grant from that state agency, may use those benefits as match for an OWEB grant. (Example: A grantee may use as match the effort provided by ODFW restoration biologists because OWEB funding for those positions is the result of a pass-through agreement).

At the time of application, match funding for OWEB funds requested does not have to be *secured*, but you must show that at least 25% of match funding has been *sought*. On this form, you do not necessarily need to show authorized signatures ("secured match"), but the more match that is secured, the stronger the application. Identify the type of match (cash or in-kind), the status of the match (secured or pending), and either a dollar amount or a dollar value (based on local market rates) of the in-kind contribution.

If you have questions about whether your proposed match is eligible or not, see Allowable Match document in OGMS http://apps.wrd.state.or.us/apps/oweb/fiscal/nologin.aspx under Technical Assistance application or contact your local OWEB regional program representative (contact information available in the instructions to this application).

Project Name: LSNA Floodplain Reconnection Design Applicant: Luckiamute Watershed Council

Match Funding Source	Type (√ one)	Status (√ one)*	Dollar Value	Match Funding Source Signature/Date*
Oregon Parks and Recreation Dept.	☐ cash ☒ in kind	☐ secured ☒ pending	$3,750.00	
Meyer Memorial Trust	☒ cash ☐ in kind	☒ secured ☐ pending	$9,050.00	See grant agreement
United States Geologic Survey	☐ cash ☒ in kind	☐ secured ☒ pending	$800.00	
Volunteer Technical Team	☐ cash ☒ in kind	☐ secured ☒ pending	$3,200.00	
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ pending		

* **IMPORTANT:** If you checked the "Secured" box in the Status Column for any match funding source, you must provide either the signature of an authorized representative of the match source in the final Column, or attach a letter of support from the match funding source that specifically mentions the dollar amount you show in the Dollar Value Column.

ATTACHMENT B

Technical Assistance Project - Proposed Metrics Form

OWEB receives a portion of its funds from the federal government and is required to report how its grantees have used both federal and state funds. The information you provide in the following form will be used for federal and state reporting purposes.

Please provide specific values, do not enter values like "2-3" or "<100". Enter your best approximation of what the project will accomplish.

If you have any questions, please contact Ginger Lofftus, PCSRF Reporting Assistant at 503-986-5372, ginger.lofftus@state.or.us or Cecilia Noyes, OWEB Federal Reporting Coordinator at 503-986-0204, cecilia.noyes@state.or.us.

Step 1 – Use the type of Technical Assistance (TA#1, TA#2, or TA#3) selected for this application to determine the sections of this metrics form to complete.

Section II (Project Summary) – question 2 and Section III (Project Description) of this application show the type of Technical Assistance selected for this application. The Application Instructions for Section II, Question 2 provide descriptions of the three types of technical assistance.

TA#1 Project Design applications must complete metrics questions in Sections ***A, B,*** & ***C*** of this form.

TA#2 Implementation applications must complete metrics questions in Sections ***A, B***, & ***C*** of this form.

TA#3 Landowner Recruitment applications must complete metrics questions in Section D of this form.

Section A

TA#1 or TA#2 Technical Assistance Project: Restoration Planning/Coordination Activities

1. Will this technical assistance project conduct one or more of the restoration planning/coordination activities listed below for question 2?

   ☒ **Yes** ☐ **No** If you answer No, skip to Section B.

2. Select the ***primary*** restoration planning/coordination activities to be conducted by this project. Do not select activities that will result from the planning/coordination activities. For example, a project will conduct a habitat restoration scoping/feasibility study to be used in developing engineering/designs for restoration, but the project itself will not produce the designs; for this example you would not report engineering/design work.

3. For each of the selected activities indicate whether the project will be implementing an existing plan and provide the name and description of the plan.

Restoration Planning/Coordination Activity	**Name of Plan (Author, date, title, name, source, source address.**	**Description and scope of Plan to be implemented or developed, including extent, purpose and application of the plan (limited to 4000 characters).**
☒ Engineering/design work for restoration projects. This includes developing information necessary for permits or other requirements to implement restoration projects.	*Existing Plan to be Implemented by this Project: Recovery Plan (Oregon Department of Fish and Wildlife, NOAA Fisheries, 2011, Upper Willamette River Conservation and Recovery Plan for Chinook Salmon and Steelhead)	Implement recommended action 116-MST-AMO - enhance floodplain connectivity to address limiting factors of physical habitat and hydrograph.
☒ Habitat restoration scoping and feasibility studies. This includes analysis and consideration of alternatives or recommendations for future restoration.	*Existing Plan to be Implemented by this Project: Action Plan (ICF and LWC Technical Advisors, 2010, LWC Action Plan Part II)	Key strategies in identified for the target area include evaluation of restoration alternatives to increase floodplain and side-channel connectivity.
☐ Develop a restoration/action plan	Not Required at Proposed	Not Required at Proposed
☐ Develop monitoring plans or sampling protocols	Not Required at Proposed	Not Required at Proposed
☐ Evaluate/analyze restoration plans and projects. This includes technical reviews and selection processes to ensure priority restoration projects are implemented.	*Existing Plan to be Implemented by this Project: _____	_____
☐ Design/maintain restoration data systems	*Existing Plan to be Implemented by this Project: _____	_____
☐ Other Planning/Coordination Activities. This can be used if a significant planning /coordination activity to be conducted by this project is not defined by any of the activities listed above. Description: _____	New Plan to be Developed by this Project :_____ or *Existing Plan to be Implemented by this Project: _____	_____

***List the existing restoration plan under which this project is being implemented (e.g., Recovery Plan, Subbasin Plan, Restoration Plan, Watershed Assessment, Limiting Factor Analysis, etc.). If no plan exists, enter 'None.' If this project provides technical assistance related to salmon/steelhead populations, listing the associated Recovery Plan is suggested.**

Section B

TA#1 or TA#2 Technical Assistance Project: Assessment/Survey Activities

4. Assessment Document/Report: Will this project assess or evaluate salmonids and/or their habitat (e.g., by completing a limiting factors analysis or an evaluation of past restoration measures) and summarize the results in a document or report?

☐ **Yes** ☒ **No**

5. Will this project conduct salmonid surveys or assess/survey streams or habitat?

☐ **Yes** ☒ **No** If you answer No skip to Section C.

6. Check all of the stream assessment/survey activities to be conducted

☐ Salmonid presence/absence survey	☐ Habitat use by salmonids assessed/surveyed
☐ Instream habitat condition assessment	☐ Rapid Bioassessment
☐ Fish passage impediments assessed/inventoried	☐ Other (explain):_____

7. _____ Estimated total miles of stream(s) assessed/surveyed (to nearest 0.01 mile) [*do not double count areas of overlap]*

8. _____ Estimated number of fish passage impediments/barriers to be assessed/surveyed/inventoried.

9. Will this project conduct habitat assessments or surveys?

☐ **Yes** ☐ **No** If you answer No skip to Section C.

10. Check all of the habitat assessment/survey activities to be conducted

☐ Riparian condition	☐ Conducting LiDAR surveys
☐ Road condition/inventory	☐ Landscape mapping
☐ Upland habitat conditions	☐ Floodplain mapping
☐ Wetland habitat conditions	☐ Forest inventories
☐ Estuarine/nearshore habitat conditions	☐ Overall watershed condition assessment or mapping
☐ Invasive species	☐ Stream typing
	☐ Other (explain):_____

11. _____ Estimated total acres of habitat to be assessed/surveyed (to nearest 0.1 acre) [*do not double count areas of overlap]*

Section C

TA#1 or TA#2 Technical Assistance Project: Summary Metrics

These summary metrics apply to ***all*** of the restoration planning/coordination, and assessment/survey activities reported for this technical assistance project under Sections A and B (above).

12. 97.7 Estimated acres of habitat encompassed or affected by this technical assistance project (to nearest 0.1 acre)

13. 0.10 Estimated miles of stream encompassed or affected by this technical assistance project (to nearest 0.01 mile)

14. 0 Estimated number of fish passage barriers expected to be addressed by this technical assistance project.

15. Report the percentages of the total project cost for the activities reported in Section A and for activities reported in Section B; ***the two percentages should sum to 100%.***

    a. 100 Estimated percentage of the total project cost for the Restoration/Planning activities reported in Section A.

    b. 0 Estimated percentage of the total project cost for Assessment/Survey activities reported in Section B.

Section D

TA#3 Technical Assistance Project: Landowner Recruitment.

16. _____ Estimated number of landowners/managers to be contacted for the purpose of assisting them in future watershed conservation, protection or restoration projects

17. _____ Estimated cost of the habitat restoration to be applied as a result of this TA#3 Landowner Recruitment Technical Assistance project.

18. Select one or more of the following types of habitat restoration expected to be applied as a result of this landowner recruitment project. If you do not expect habitat restoration to result from this project select 'None'

☐ Fish Screening	☐ Riparian Habitat	☐ Urban-Impact Reduction
☐ Fish Passage	☐ Upland Habitat	☐ Other (explain):_____
☐ Instream Flow	☐ Wetland	☐ None
☐ Instream Habitat	☐ Estuarine/Nearshore	

ATTACHMENT C

Racial and Ethnic Impact Statement

This form is used for information purposes only and must be included with the grant application.

Chapter 600 of the 2013 Oregon Laws require applicants to include with each grant application a racial and ethnic impact statement. The statement provides information as to the disproportionate or unique impact the proposed policies or programs may have on minority persons[1] in the State of Oregon if the grant is awarded to a corporation or other legal entity other than natural persons.

1. ☐ The proposed grant project policies or programs could have a disproportionate or unique positive impact on the following minority persons:

   Indicate all that apply:

   - ☐ Women
   - ☐ Persons with Disabilities
   - ☐ African-Americans
   - ☐ Hispanics
   - ☐ Asians or Pacific Islanders
   - ☐ American Indians
   - ☐ Alaskan Natives

2. ☐ The proposed grant project policies or programs could have a disproportionate or unique negative impact on the following minority persons:

   Indicate all that apply:

   - ☐ Women
   - ☐ Persons with Disabilities
   - ☐ African-Americans
   - ☐ Hispanics
   - ☐ Asians or Pacific Islanders
   - ☐ American Indians
   - ☐ Alaskan Natives

3. ☒ The proposed grant project policies or programs will have no disproportionate or unique impact on minority persons.

If you checked numbers 1 or 2 above, on a separate sheet of paper, provide the rationale for the existence of policies or programs having a disproportionate or unique impact on minority persons in this state. Further provide evidence of consultation with representative(s) of the affected minority persons.

I HEREBY CERTIFY on this 24day of August, 2015, the information contained on this form and any attachment is complete and accurate to the best of my knowledge.

Signature:

Printed Name: Kristen M. Larson

Title: Council Coordinator

[1] "Minority persons" are defined in SB 463 (2013 Regular Session) as women, persons with disabilities (as defined in ORS 174.107), African-Americans, Hispanics, Asians or Pacific Islanders, American Indians and Alaskan Natives.

ATTACHMENT D
GRANT ADMINISTRATION
AND INDIRECT COST SELECTION FORM

To comply with the Federal Uniform Administrative Requirements (2 CFR) OWEB requires all applicants to complete this form. Part One will certify the applicant is a legal entity. Part Two selects the type of indirect rate the applicant is requesting in the application. Part Three applies only if you select an OWEB Negotiated Indirect Cost Rate.

PART ONE:

Sub-recipients or grantees must be legal entities. Identify your organizational type as one of the following:

☐ State or local government: FEIN _____

☒ Non-profit organization: FEIN 45-2177036

☐ Institution for Higher Education: FEIN _____

☐ Individual (not eligible for indirect or administrative costs)

PART TWO:

Applicant must select one of the following indirect rates. This rate will apply for the life of this grant, including any future extensions for time, and cannot be changed.

☐ **Federally Negotiated Indirect Cost Rate.** We have an approved indirect cost rate with a Federal (cognizant) agency. A copy of our most recently approved rate agreement is attached; if necessary, we will provide a more current rate once it is approved. No additional receipts will be required for this indirect cost rate.

Our current Federally Negotiated Indirect Cost Rate is _____%.

☐ **Federally Accepted *de minimis* Indirect Rate.** We have never received a federally negotiated indirect cost rate. We request, as a condition of this grant, to charge a flat *de minimis* indirect cost rate of 10% of modified total direct costs (MTDC). No additional receipts will be required for this indirect cost rate.

☒ **OWEB Negotiated Indirect Cost Rate.** We do not currently plan to obtain a federally negotiated indirect rate. We would like to negotiate an indirect rate of modified total direct costs (MTDC). Receipts for our indirect cost pool will be required for rates above 10%.

We request an indirect rate of 15% (not over 15%) Fill out Part Three.

PART THREE:

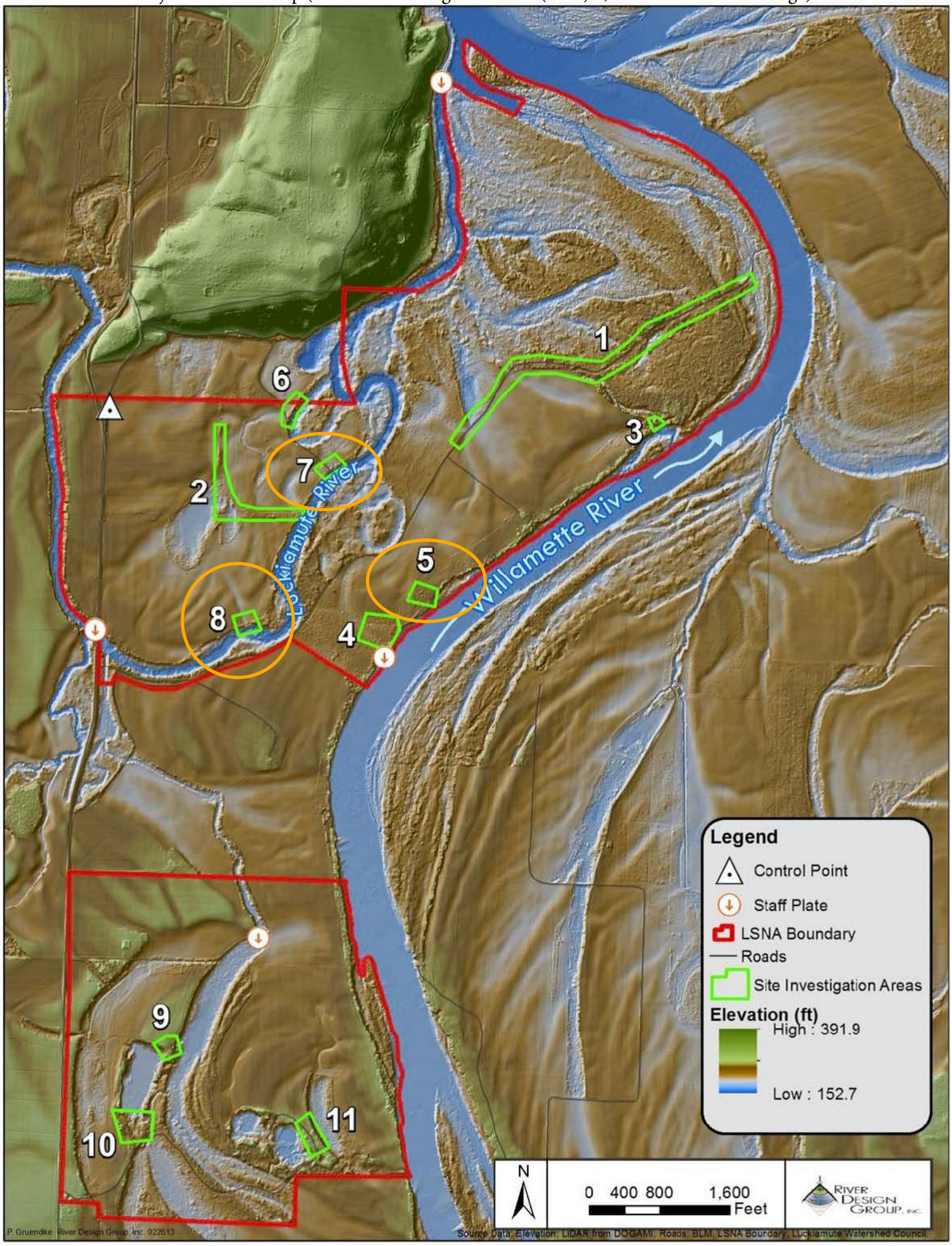
Applicants who select an OWEB Negotiated Indirect Cost Rate must select a cost allocation plan.

☐ **Less than 10%, no receipts required.** If the rate is below 10%, OWEB will allow the billing to follow the *de minimis* rules (no receipts.)

☐ **Receipt billing.** Grant administration costs are charged to grants on an item-by-item basis. Receipts for items $250 and over must be submitted. All receipts must be kept and provided to OWEB on request.

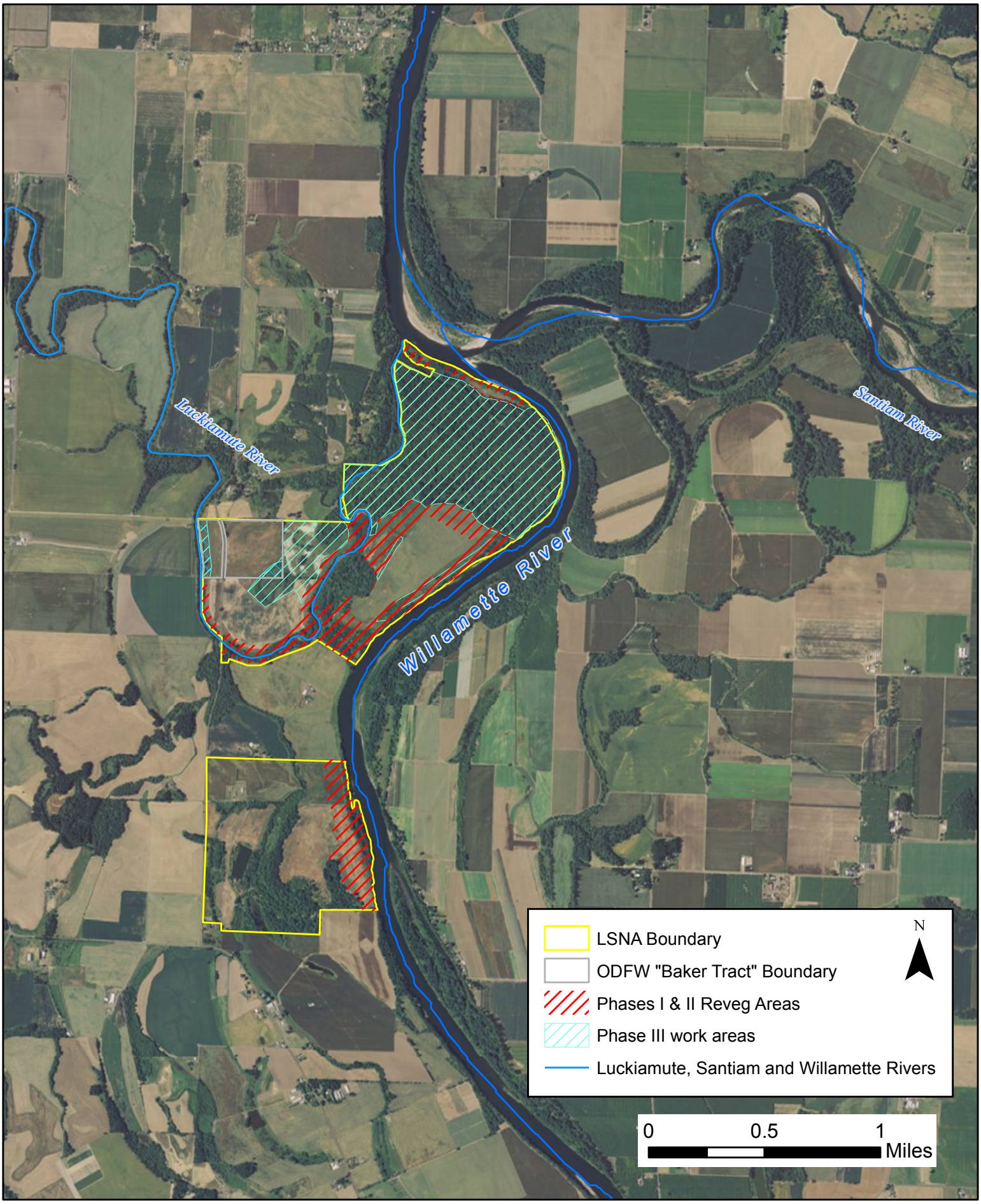
☒ **Cost allocation.** The applicant has accounting practices in place that support charging costs to a cost allocation pool and must submit cost allocation supporting documentation for allocations $250 and over. Most agencies divide administration costs either on FTE, time worked, or as a percentage of their modified total direct costs (MTDC).

Attachment 1: Project Location Map (focus site investigation areas (SIAs) 5, 7 and 8 circled in orange)



Potential project locations identified during remote sensing (excerpted RDG Technical Memo, 2013).

Attachment 2: Luckiamute State Natural Area Project Context, Current Work Areas



Luckiamute Watershed Council, June 2015

Attachment 3

RIVER DESIGN GROUP, INC.

Technical Memorandum

LSNA Hydrologic Analysis

DATE: May 20, 2013

TO: Mr. Peter Guillozet, Project Manager
Luckiamute Watershed Council

FROM: Peter Gruendike
River Design Group, Inc.

SUBJECT: Hydrologic Analysis and Recommendations for the Luckiamute State Natural Area

1 INTRODUCTION

The Luckiamute Watershed Council (LWC) contracted with River Design Group, Inc. (RDG) to provide technical assistance for hydrologic analysis and project planning for floodplain enhancement projects at the Luckiamute State Natural Area (LSNA). Major floodplain revegetation efforts are currently underway at the LSNA so this document focuses primarily on potential efforts to improve the hydrologic connectivity of the river-floodplain interface at the site. The hydrologic analysis conducted through remote sensing was used to highlight and identify potential locations that could be investigated more rigorously for possible floodplain restoration or enhancement projects. Potential projects identified through remote sensing were field verified and assessed to determine the feasibility, potential impacts, and overall benefits of the recommended projects.

Owned and managed by the Oregon Parks and Recreation Department (OPRD), the LSNA is divided into two tracts, the North Tract and South Tract, totaling approximately 926 acres. The LSNA contains important floodplain habitats at the confluence of the Luckiamute and Willamette rivers and is considered part of the Luckiamute-Santiam anchor habitat on the Willamette River. Anchor habitats are cold water reaches of the Willamette River that are known to sustain cold water fishes and are considered of high ecological value. The LSNA is home to a variety of at-risk native species that include western pond turtles and red-legged frogs, as well as ESA threatened spring Chinook salmon and steelhead. Figure 1 shows the location of the LSNA project area within the Willamette Basin and its proximity to local municipalities and geographic features.

This Technical Memorandum provides a summary of the hydrologic analysis and recommendations for potential ecological enhancement projects at the LSNA.

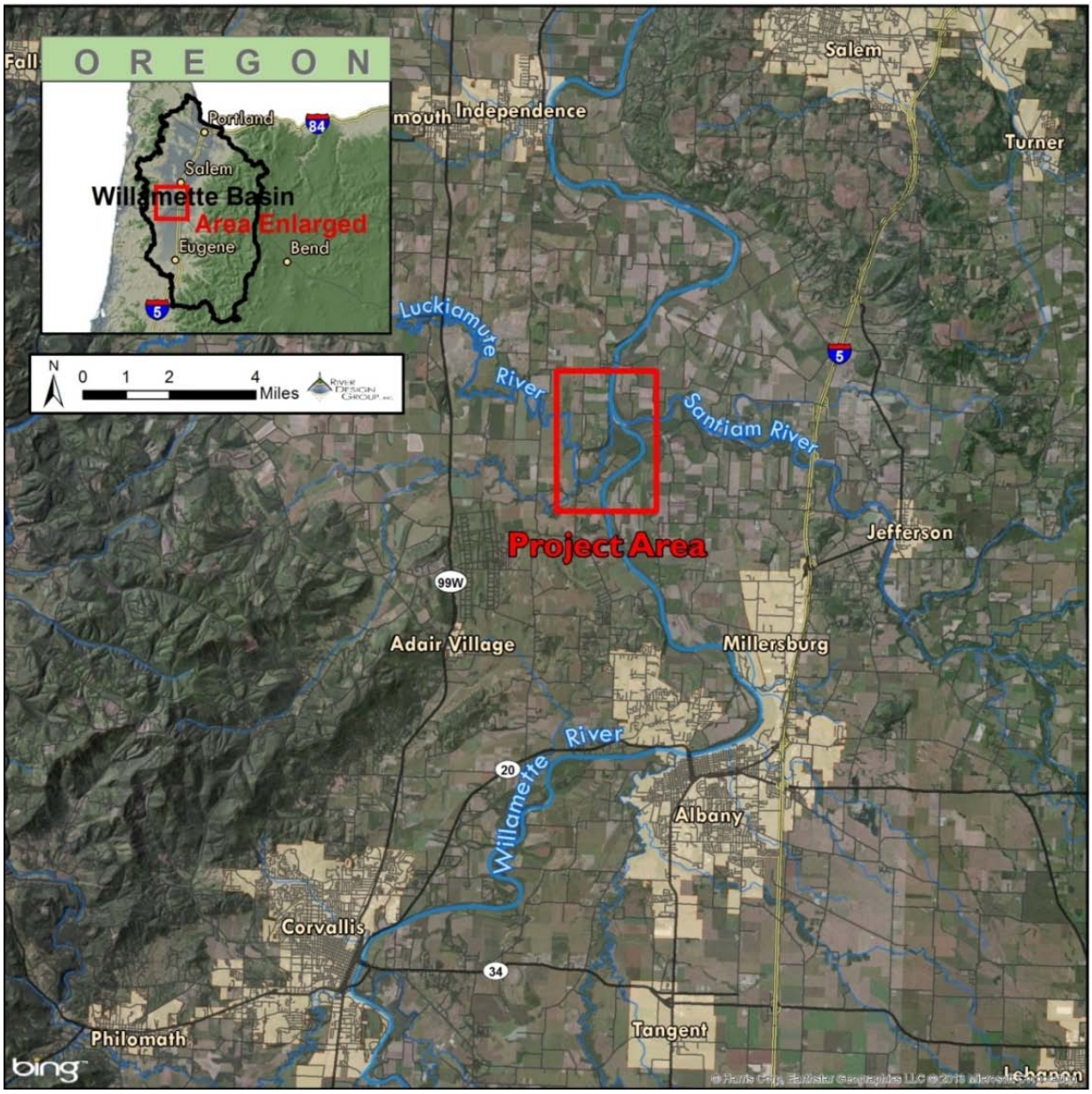


Figure 1-1. Location map of the LSNA project area.

2 HYDROLOGIC ANALYSIS

The LSNA contains a large dynamic floodplain near the confluence of the Luckiamute, Santiam, and Willamette rivers. Despite significant reductions to the frequency and magnitude of large flood events on the Willamette and Santiam rivers due to flood control operations, the LSNA still experiences annual flooding throughout much of the property. The following sections evaluate the effects of flood control operations on the Willamette River and summarize the U.S. Geological Survey (USGS) stream gage at Albany; the gage used in the floodplain inundation mapping analysis and the subsequent site investigation recommendations. The Albany gage was used to characterize river flows and stage for the LSNA project areas because of its long

period of record, its consistent stage-discharge relationship, and its close proximity to the project site. The hydrology of the Luckiamute River watershed may play an important role in hydrologic function at the site, but this analysis was not evaluated as part of this effort. We recommend future hydrologic investigations include a review of the Suver gage on the Luckiamute River. Our expectation is that water surface elevations and floodplain inundation at the LSNA is controlled more so by the Willamette River than the Luckiamute River. However, during more localized precipitation events, LSNA inundation would be primarily affected by Luckiamute River flows.

2.1 Willamette Basin Hydrology

The Willamette River is highly regulated by 13 dams including 11 flood control dams and 2 reregulating dams (although Foster Dam serves partially as a re-regulating dam for the larger upstream Green Peter Dam) that affect the natural flow of water in the Willamette River Basin (OWRD 1991; Rounds 2010). In reviewing the history of flood control operations in the Willamette River Basin, three river management periods were delineated:

- Pre-1942: Historical or Pre-regulation period
- 1943 to 1968: Dam Construction period
- 1969 to Present: Regulated period

Table 2-1 includes a list of the dams upstream from the Albany area and their date of completion. Flood control operations have had a profound effect on the Willamette River hydrograph. Runoff retention and later release from flood control reservoirs effectively reduces flood peaks while increasing base flows relative to the historical condition.

Table 2-1. Flood control dams located in the Willamette Basin upstream from the USGS Albany gage.

Dam Name	Location	Year Completed	Height (ft)	Storage (acre-ft)	Upstream Dams
Blue River Dam	Blue River	1969	270	89,500	
Cottage Grove Dam	CF Willamette River	1942	95	32,900	
Cougar Dam	SF McKenzie River	1963	452	219,000	
Dexter Dam	MF Willamette River	1954	93	NA	Lookout Point, Hills Creek
Dorena Dam	Row River	1949	145	77,600	
Fall Creek Dam	Fall Creek	1966	180	125,000	
Fern Ridge Dam	Long Tom River	1941	44	116,800	
Hills Creek Dam	MF Willamette River	1961	304	355,500	
Lookout Point Dam	MF Willamette River	1954	276	455,800	Hills Creek

Figure 2-1 shows annual peak flows for the Willamette River recorded at the Albany gage station (USGS #14174000). The Albany gage was used to calibrate stage discharge relationships for the hydrologic analysis for the LSNA project area. Annual peak flow data have been continuously monitored at the Albany gage since 1877. As flow data preceded the Dam

Construction period which began in 1943, peak flow comparisons can be made over the 133 years the gage has been operational. Table 2-2 includes a breakout of the average annual peak discharge for the Historical, Dam Construction, and Regulated periods. Over time, the magnitude and variability of annual peak flows have been reduced and simplified. At the Albany gage, the average annual peak flow is now about half what it was historically, and the regulated 2-year return interval discharge is approximately 65% of the historical, pre-dam 2-year discharge. Metering peak flows has reduced flood impacts to human infrastructure and enabled occupation and development of the Willamette River floodplain.

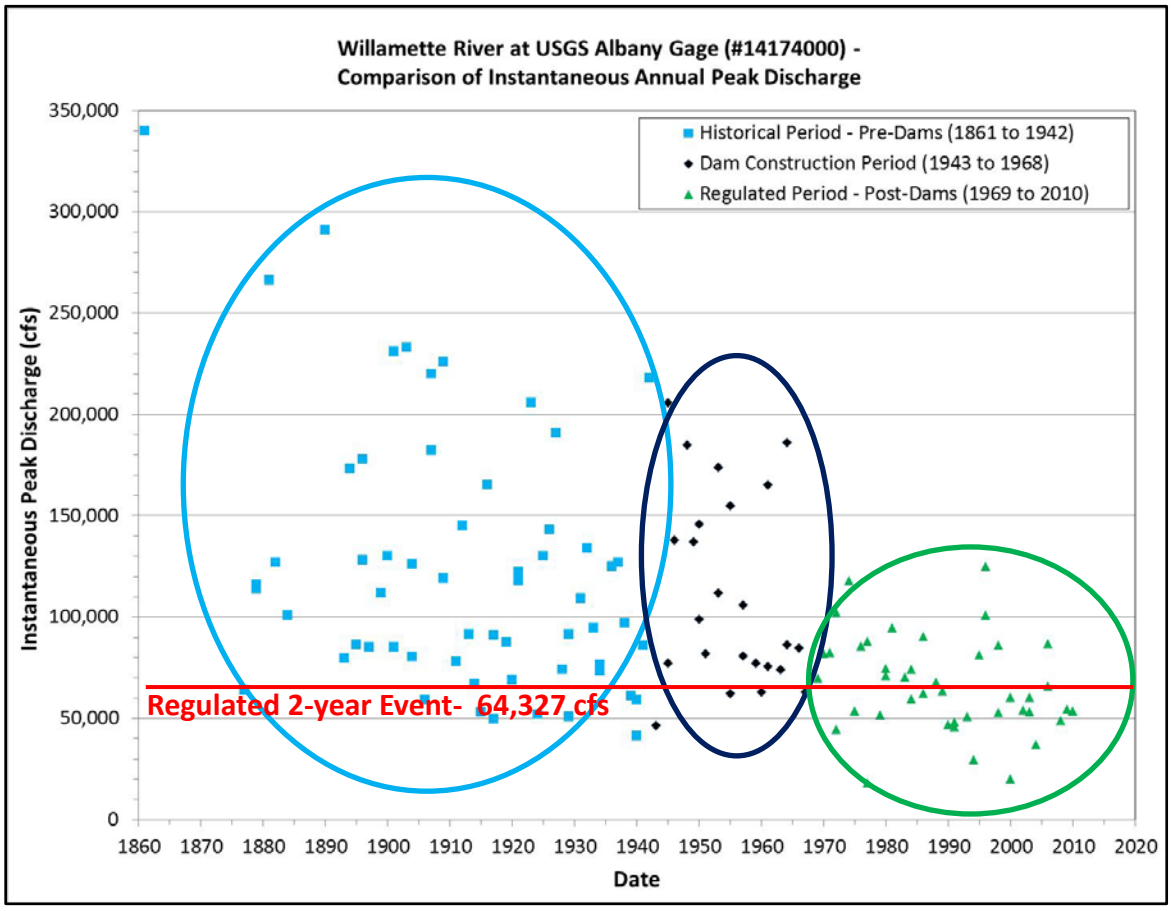


Figure 2-1. A comparison of annual peak flows at the Albany gage on the Willamette River from 1892 to 2010. The three primary river management periods are highlighted. The actual regulated 2-year discharge at the Albany gage is included for illustration. The USACE target 2-year discharge at the Albany gage is 69,500 cfs.

Table 2-2. A comparison of the average annual peak discharge for the Willamette River at the Albany gage for the three river management periods. The 2-year discharge for the Historical and Regulated periods is included for comparison.

River Management Period	Average Annual Peak Discharge (cfs)
Historical Period - Pre-Dams (1861 to 1942)	124,215
Dam Construction Period (1943 to 1968)	109,352
Regulated Period - Post-Dams (1969 to 2010)	66,243
Historical Period 2-year Discharge	106,409
Regulated Period 2-year Discharge	64,327

A 17B flood frequency analysis was completed for the Regulated period (1969 to 2010). Flood frequency results for the Albany gage are included in Table 2-3.

Table 2-3. The flood frequency analysis for the USGS Albany gage (#14174000). The analysis is based on the Regulated period from 1969 to 2010.

Return Period (years)	Percent Change Exceedance (%)	Expected Probability (cfs)	Confidence Limit 0.05 (cfs)	Confidence Limit 0.95 (cfs)
100	1.0	138,016	160,481	115,855
50	2.0	125,982	145,483	107,821
20	5.0	110,073	125,489	96,579
10	10.0	97,738	110,021	87,331
5	20.0	84,703	93,901	76,947
2	50.0	64,327	70,031	59,110
1.25	80.0	48,466	53,364	43,756
1.01	99.0	28,121	33,926	24,118

Figure 2-2 includes a comparison of average mean annual hydrographs from the three river management periods at the Albany gage. The hydrographs show the lower average mean daily discharge in the February to June period, and higher base flows from July through October associated with the regulated period. This pattern illustrates the dampened peak flows and higher base flows derived through flood control operations. Figure 2-3 compares the mean daily flow on September 1 across the three river management periods to show how a representative daily average flow during the base flow portion of the hydrograph has changed over time. Mean daily flows are averaged in Table 2-4 for comparison.

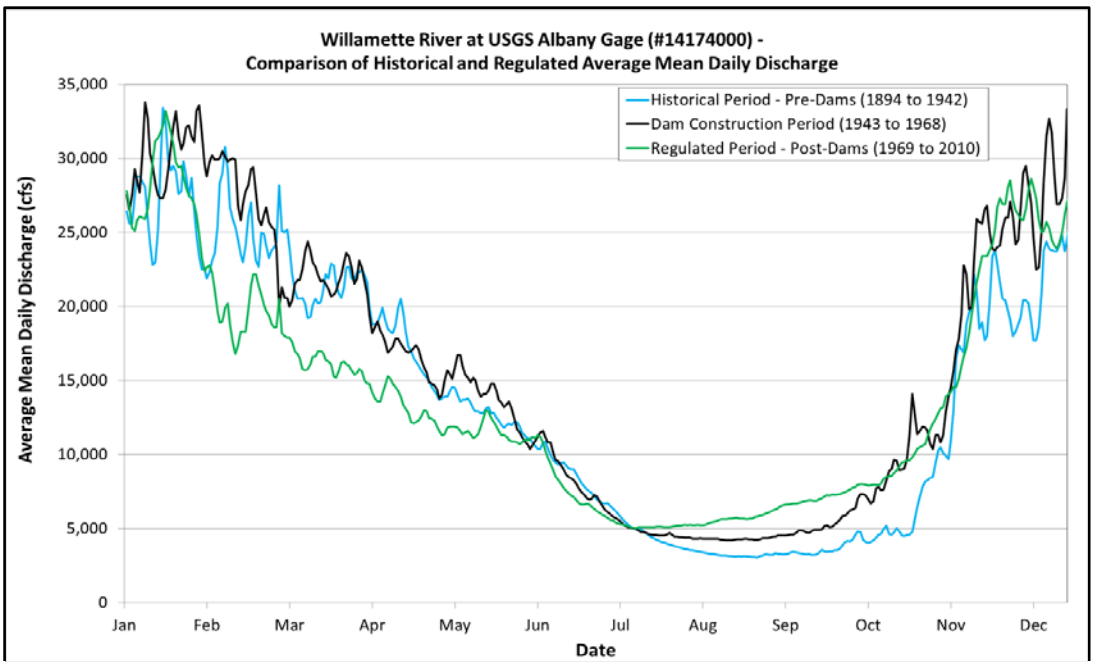


Figure 2-2. A comparison of average mean annual hydrographs for the Willamette River from 1894 to 2010. The three primary river management periods are highlighted. The graph illustrates lower peak flows and higher base flows characteristic of the Regulated period relative to the Historical and Dam Construction periods.

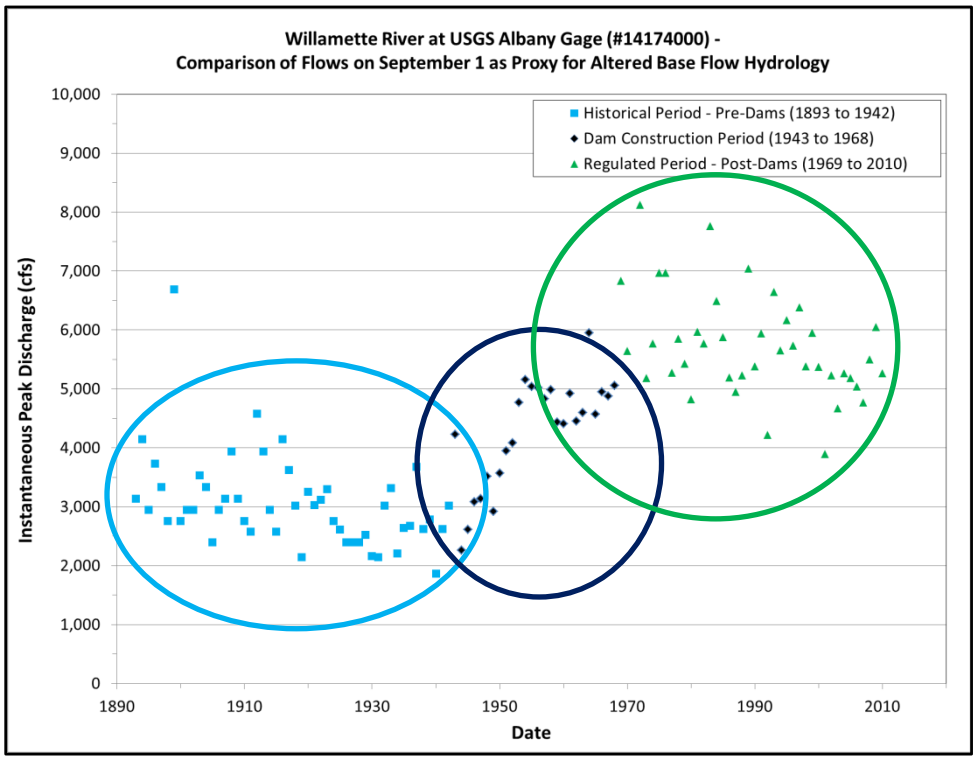


Figure 2-3. A comparison of the mean daily flow on September 1 for each year in the three river management periods as a proxy for summer base flow changes over time in respect to flood control operations in the Willamette River basin.

Table 2-4. A comparison of the mean daily discharge on September 1 for the Willamette River at the Albany gage for the three river management periods.

River Management Period	Mean Daily Discharge On September 1 (cfs)
Historical Period - Pre-Dams (1861 to 1942)	3,054
Dam Construction Period (1943 to 1968)	4,283
Regulated Period - Post-Dams (1969 to 2010)	5,815

In summary, flood control operations have reduced flood magnitudes while also increasing summer time base flows beneficial for irrigation, industrial water availability, dilution of municipal and industrial discharges, and recreation. Hydrographic modifications have influenced the magnitude of return interval events, such as the 2-year discharge, and have influenced geomorphic and ecological function in the Willamette River corridor. Compared to historical flows, regulated flows are less likely to interact with the Willamette River floodplain due to the lower discharge magnitude.

2.2 Staff Plate Analysis

RDG established a staff plate network around the LSNA project area to characterize water surface elevations in the LSNA project area and to better understand how water surface elevations in the LSNA relate to Willamette River discharge. Establishing rating curves for the project area is an incremental step in determining existing and potential floodplain inundation frequency and duration. The four staff plate network was set up to monitor floodplain inundation both laterally from the Willamette River to the LSNA interior, and longitudinally paralleling the river from the upstream floodplain to the mouth of the Luckiamute River. Figure 2-4 shows the locations of the staff plate network at the LSNA.

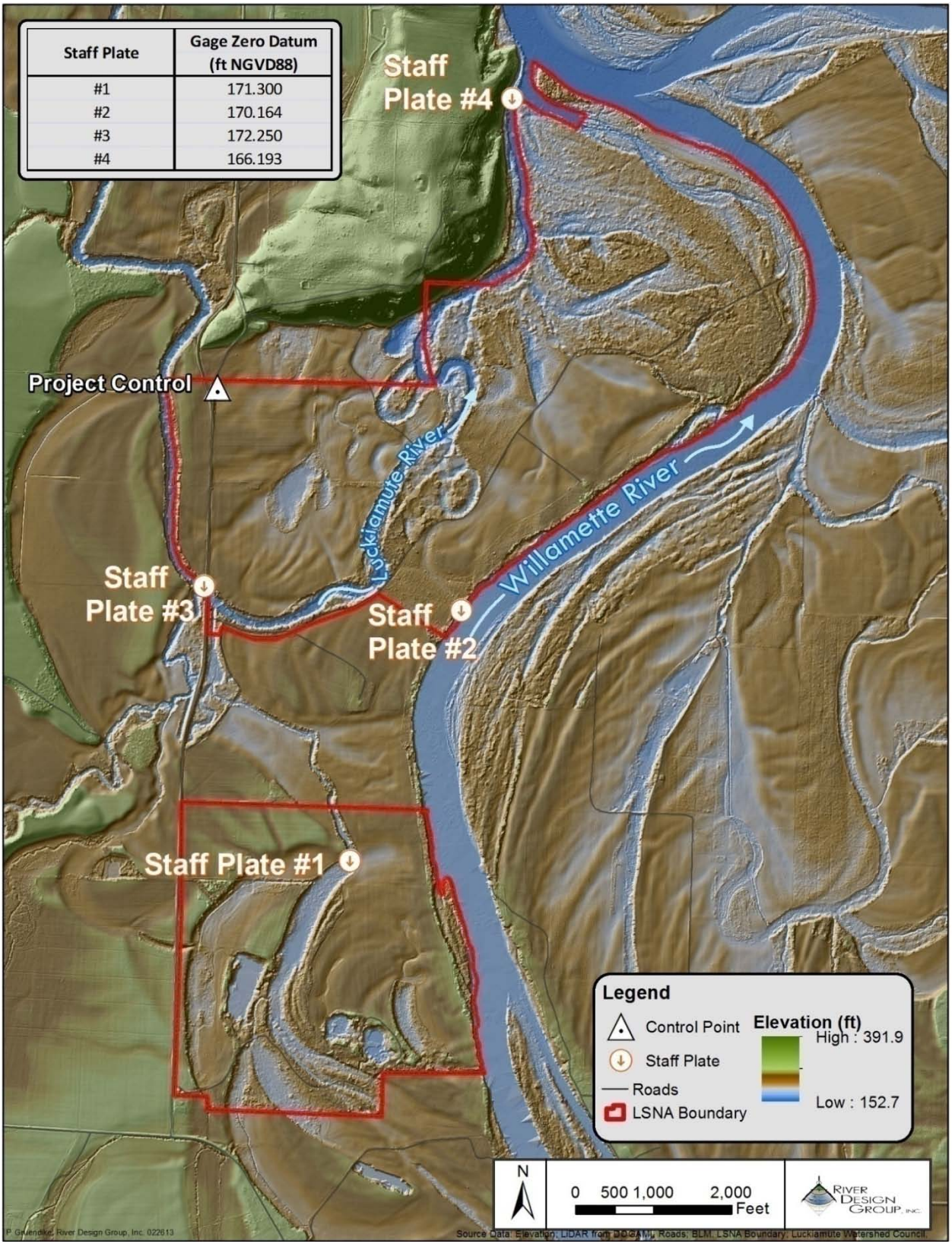


Figure 2-4. Staff plate locations were intended to monitor lateral and longitudinal floodplain inundation at the LSNA properties.

Each staff plate was installed following a multi-step process.

- Selected staff plate location.
- Dug a 1 ft deep by 1 ft wide hole with a post hole digger.
- Drove the 2 inch by 10 ft metal conduit pole into the hole approximately 2 ft using a post driver.
- Poured concrete into the 1 ft hole to anchor conduit pole.
- Fixed three sections of 3 ft tall staff plates to conduit with sheet metal screws.
- Used GNSS GPS unit to survey a minimum of two measurement increments on the bottom staff plate to establish real-world elevation at each staff plate.

Figure 2-5 includes a photo of a completed staff plate.

Figure 2-5. Staff Plate #3 near the confluence of Soap Creek and the Luckiamute River.

The local landowners involved with the project and LWC staff, recorded water surface elevations at the staff plate locations. Landowners and LWC staff provided RDG with the date, time, and observed stage for each staff plate observation. Landowners and LWC staff also pin flagged high water marks when they were unable to access that staff plate networks. RDG used GNSS enabled RTK GPS to later survey the pin flagged observed high water elevations.

For each staff plate observation, RDG calculated the time of travel from the staff plate network to the nearest gage using methods from Harris (1968). The time of travel correction was necessary to best estimate the river discharge at the time of the staff plate observation. This method then enabled a more precise comparison of observed river stage to river discharge.

Figure 2-6 includes a representative rating curve from Staff Plate #4.

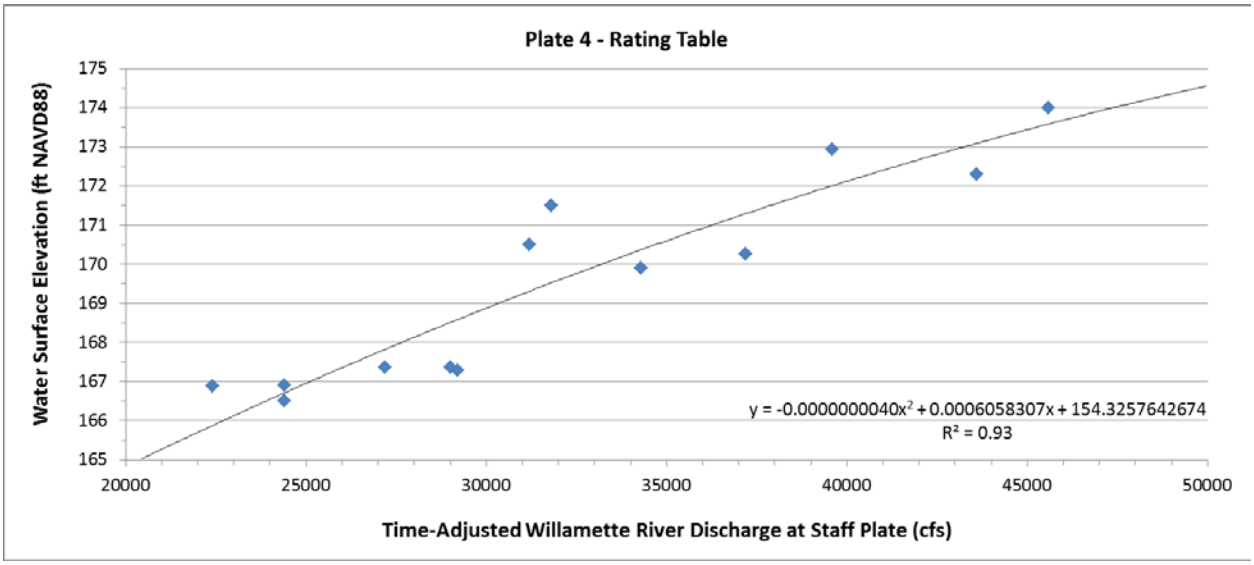


Figure 2-6. Rating curves for Staff Plate #4 at the LSNA. The curve was formulated by relating observed water surface elevations at the staff plate to the time-corrected Willamette River discharge at the USGS Albany gage.

2.3 Flow Duration Analysis

A flow duration analysis was completed for the USGS Albany gage in order to better understand the frequency and duration of high flow events on the Willamette River during the Regulated period. Mean annual flows for the Regulated period were used to complete the flow duration analysis. Table 2-5 includes the flow duration data. Figure 2-7 includes the flow duration curve for the USGS Albany gage

Table 2-5. Flow duration data for the USGS Harrisburg gage and USGS Albany gage over the regulated period of record (1969 – 2010).

Percent of Time Exceeded	Equivalent Number of Days	Albany Gage Discharge (cfs)	Albany Gage Height (ft)*
99	361	3,960	2.32
95	347	4,501	2.65
90	329	4,940	2.90
80	292	5,600	3.27
50	183	9,060	4.98
25	91	15,500	7.61
15	55	22,900	10.17
10	37	30,900	12.63
5	18	43,200	16.00
2	7	54,300	18.72
1	4	61,159	20.27
0.1	0.4	85,998	25.38

*Gage heights based on USGS rating tables accessed on 02/15/2013.

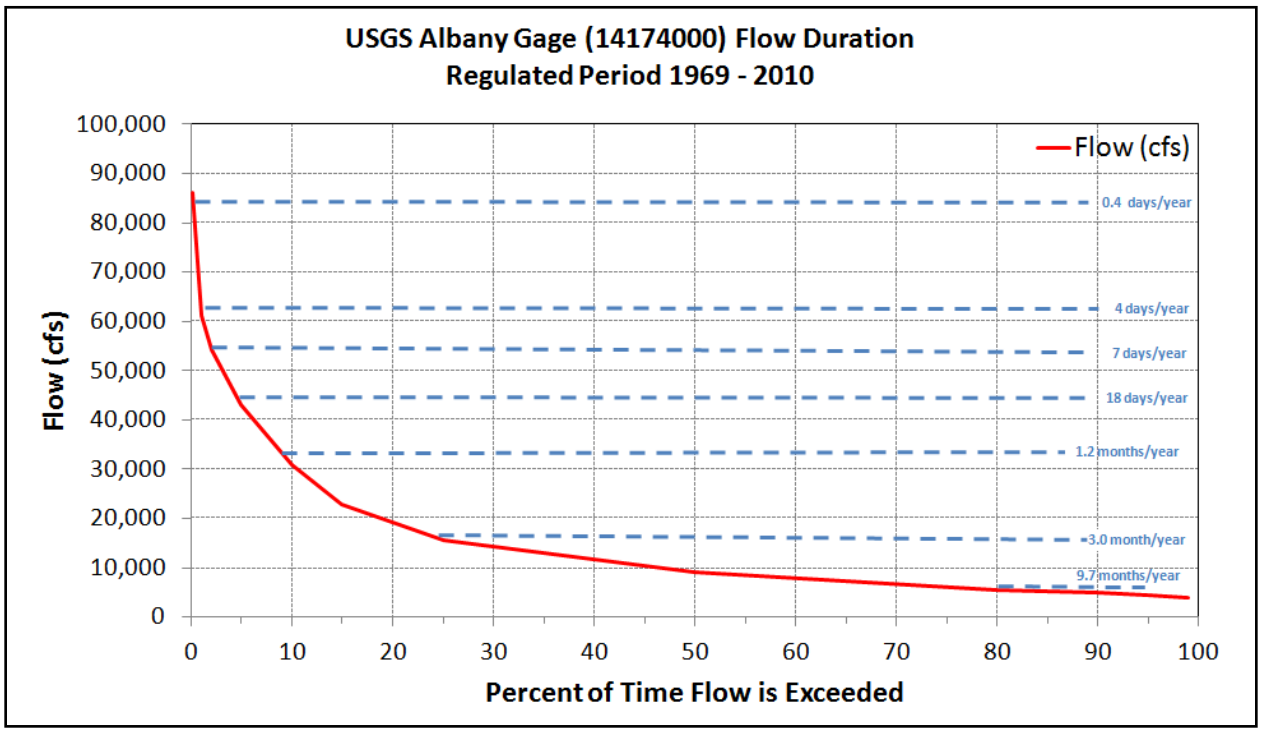


Figure 2-7. The USGS Albany gage flow duration curve based on the regulated period (1969 - 2010).

The flow duration data and the rating table information were used to assess existing and potential floodplain inundation frequency and duration for the LSNA. For example, using the rating curve for Staff Plate #4, a water surface elevation of 173.1 ft equates to a Willamette River discharge of approximately 43,500 cfs. The Albany gage's flow duration curve suggests 43,500 cfs is exceeded less than5% of the year, or approximately 2 weeks per year on average.

From an ecological perspective, increasing the frequency and duration of connection between off-channel floodplain habitats with the Luckiamute and Willamette rivers is expected to benefit juvenile fish that occupy these habitats during winter high flows. Due to river regulation, the Willamette River connects with off-channel habitats much less frequently and for shorter durations relative to historical conditions. Average mean daily flows now exceed 25,000 cfs from mid to late November, and then during the January to February period (see Figure 2-2). For the LSNA, we used 24,000 cfs as a target flow for increasing off-channel connectivity with the Luckiamute and Willamette rivers. This flow occurs for approximately 4-6 weeks in an average year. The water surface elevation associated with the 24,000 cfs event would inundate the LSNA area and allow for fish movement between the river and floodplain.

2.4 Inundation Mapping

ArcGIS tools were used to simulate floodplain inundation to assess potential areas of floodplain inundation. The LiDAR dataset was used to create the underlying topographic surfaces for the project sites and water surface elevations were modeled to inundate various floodplain acreages. Inundation maps for the LSNA (Figure 2-8) were created for the following discharges at the USGS Albany gage; 18,500 cfs, 24,000 cfs, 36,000 cfs, 43,500 cfs, 55,000 cfs, and 69,500 cfs.

Full page maps are also included in Appendix A. The maps show potential floodplain inundation extents with increasing Willamette River discharge. This information is informative for predicting floodplain inundation associated with restoration actions that increase connectivity between the Willamette River and the adjacent floodplain in the LSNA area.

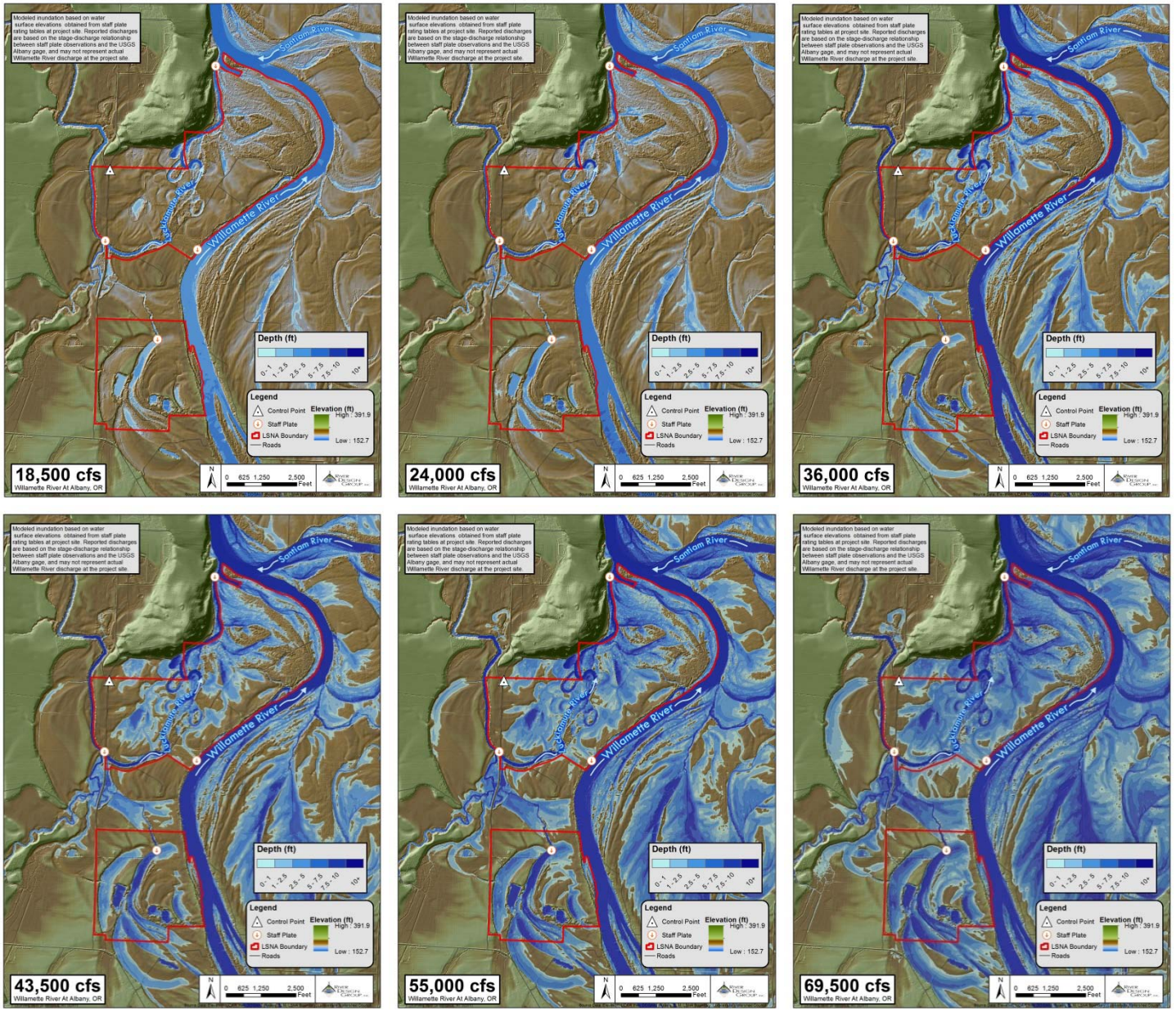


Figure 2-8. Inundation maps prepared for the LSNA for flows from 18,500 cfs to 69,500 cfs. Full page maps are included in Appendix A.

The resulting inundation maps differ from a hydraulic model as they do not consider obstructions to flow, only areas that are lower in elevation than the modeled discharge water surface elevations. In this regard, inundation mapping provides a useful depiction of areas that could be inundated through restoration actions such as berm/levee removal, or floodplain grading. Aerial photography taken by Eagle Digital Imaging, Inc. on April 2, 2012 during flood conditions(Figure 2-9) and ground photographs taken under various conditions were used to validate inundation patterns. Comparing the inundation maps to the 2012 flood air photo also enable the reviewer to identify potential locations where inundation is currently constrained by floodplain infrastructure or topographic features. Areas that do not appear to be flooded in the air photo but are inundated in the inundation maps should be investigated to assess potential limitations to floodplain inundation.

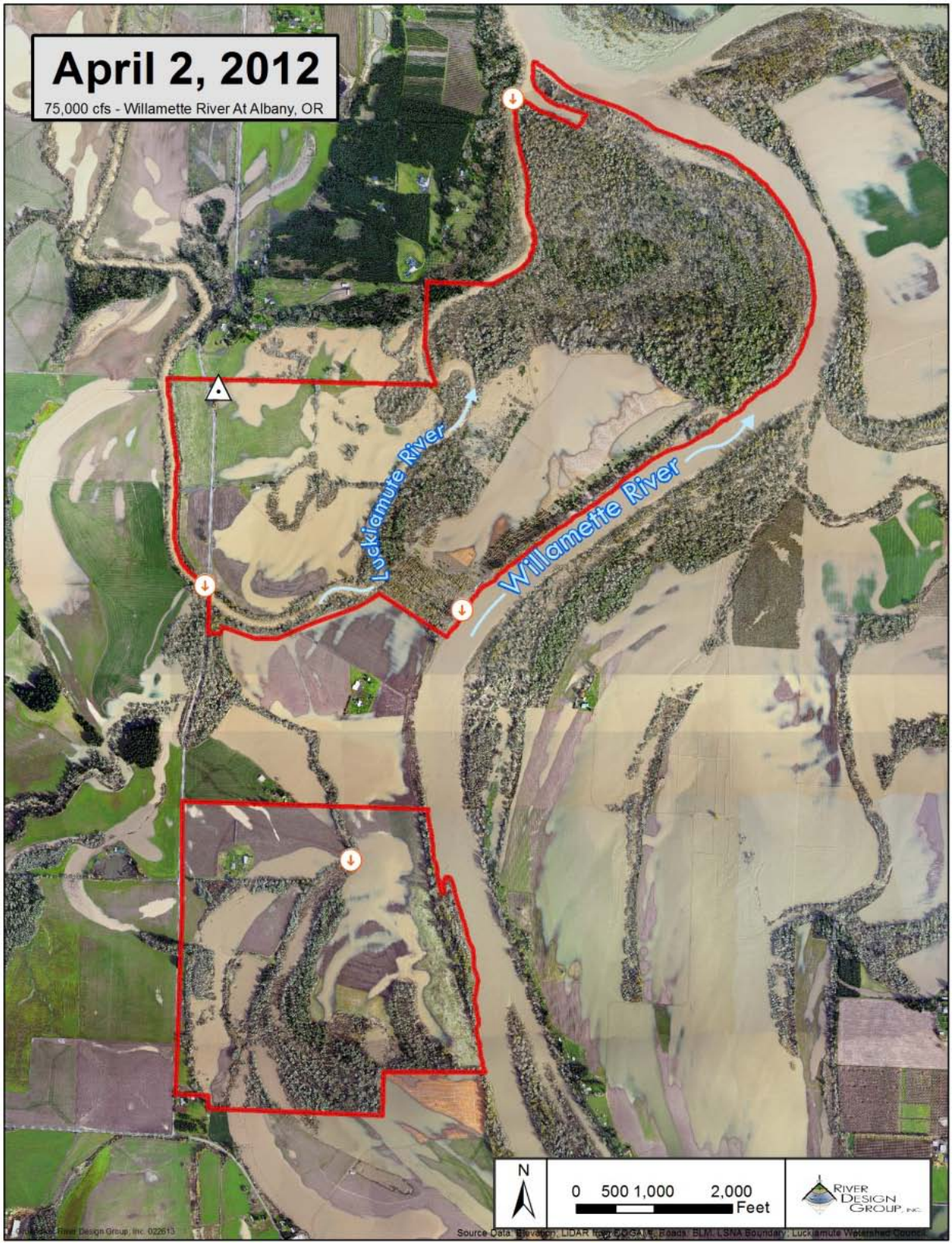


Figure 2-9. Aerial photograph of the LSNA taken on April 2, 2012. The USGS Albany gage registered approximately 75,000 cfs during air photo acquisition. The event was greater than a 2-year flood but less than a 5-year flood at the Albany gage.

3 Remote Sensing Project Scoping

RDG completed remote sensing using the LiDAR surface model and floodplain inundation layers to prepare an initial project scoping. Through the remote sensing effort, potential projects were described for 8 sites in the North Tract and 3 sites in the South Tract (Figure 3-1). The field investigation summarized in *4 Site Reconnaissance* included ground truthing each of the 11 potential project sites.

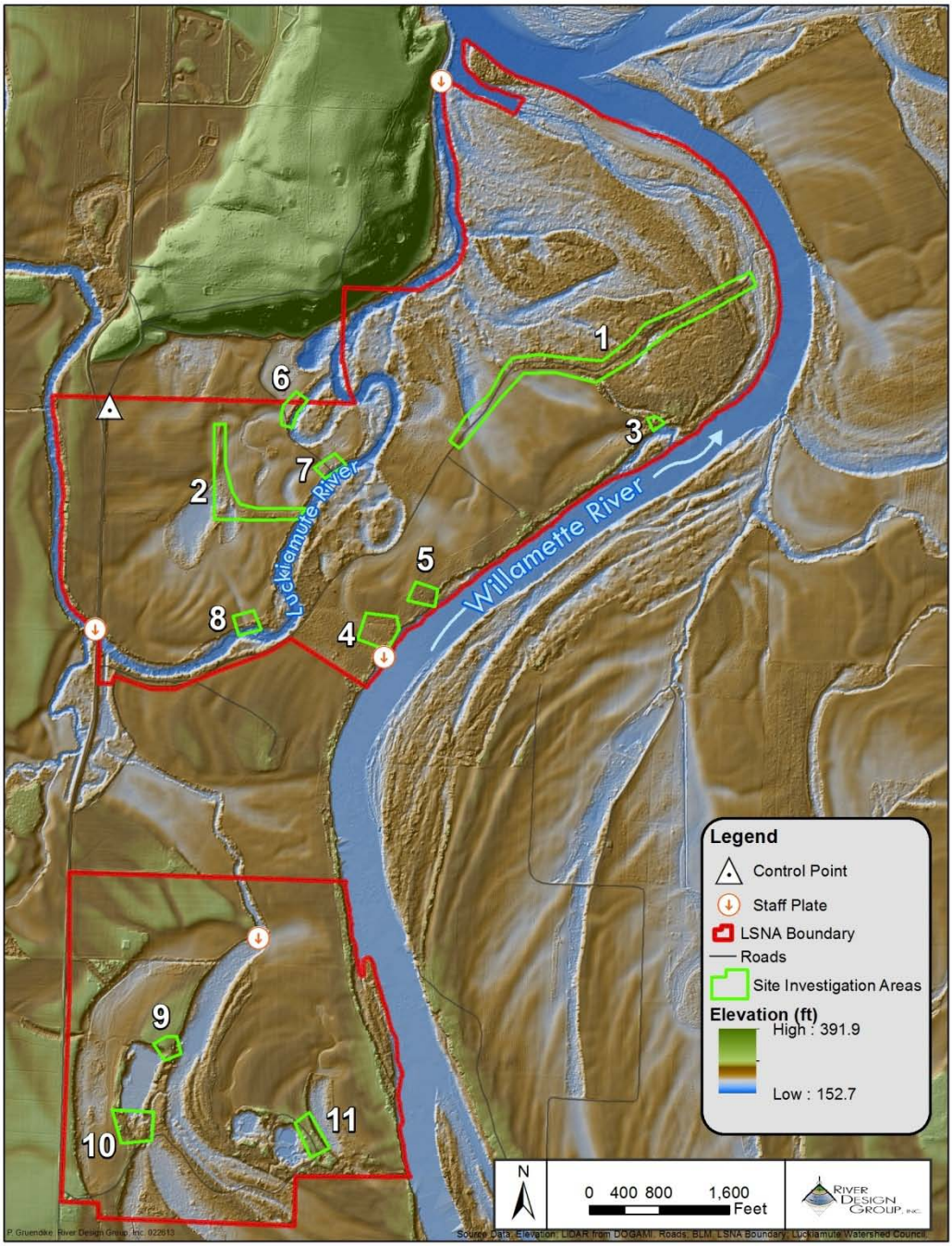


Figure 3-1. Potential project locations identified during remote sensing.

Potential project sites focused on existing roads and floodplain topography that are believed to obstruct flows across the floodplain (Table 3-1). Additional sites for field investigation included land surfaces between the Luckiamute River and floodplain swales and floodplain surfaces that isolate gravel pit ponds from historical meander scrolls.

Table 3-1. Site investigation areas (SIAs) for the LSNA. Information includes a brief summary of existing site conditions and recommendations for future investigations.

Site	Existing Site Characteristics	Recommendation
SIA1	Existing road berm is approximately 2 ft above the adjacent floodplain. Road berm restricts flood water access to floodplain swales.	Investigate road berm to determined degree of current flow through the road prism and the potential for either removing or modifying the road berm to improve floodplain continuity.
SIA2	Existing north-south and east-west floodplain berms channel floodplain swale connectivity adjacent to the Luckiamute River	Explore the potential for removing or modifying berm to improve connectivity among floodplain swales, the Luckiamute River, and a gravel pond. Investigate potential for improving gravel pond habitat.
SIA3	Flood channel linking Willamette River and interior LSNA floodplain may be blocked at Willamette River bank.	Investigate the potential for increase flow into flood channel by removing possible blockage in flood channel.
SIA4	Existing flood channel conveys overbank flows from the Willamette River into interior LSNA floodplain. Mature floodplain forest with multi-level canopy.	Investigate potential to lower the flood channel bed elevation to convey flow at a lower stage on the Willamette River.
SIA5	Existing road berm is approximately 2 ft above the adjacent floodplain. Road berm restricts flood water access to floodplain swales.	Investigate road berm to determined degree of current flow through the road prism and the potential for either removing or modifying the road berm to improve floodplain continuity.
SIA6	A potential floodplain fill may be limiting floodwater access to overflow channels.	Investigate site to determine if actual blockage is present. Blockage removal would increase inundation extent at northern LSNA boundary.
SIA7	A high outside bank on the Luckiamute River may be limiting connectivity between the river and the adjacent floodplain.	Investigate the site to determine if river bank modification has occurred that limits overbank flows. Evaluate the potential to lower the outside bank to improve river-floodplain connectivity.
SIA8	A high outside bank on the Luckiamute River may be limiting connectivity between the river and the adjacent floodplain.	Investigate the site to determine if river bank modification has occurred that limits overbank flows. Evaluate the potential to lower the outside bank to improve river-floodplain connectivity.
SIA9	Gravel pit ponds are isolated during low flows but connect at flood flows. Ponds	Evaluate the potential to modify connections between the gravel pit ponds and the

Table 3-1. Site investigation areas (SIAs) for the LSNA. Information includes a brief summary of existing site conditions and recommendations for future investigations.

Site	Existing Site Characteristics	Recommendation
	may be fish sinks that could be better connected to improve egress from ponds to historical meander scrolls that connect with Soap Creek and the Luckiamute River.	meander scrolls. Determine if gravel pit pond habitat could be improved by reducing shoreline gradients and planting native species.
SIA10	Gravel pit ponds are isolated during low flows but connect at flood flows. Ponds may be fish sinks that could be better connected to improve egress from ponds to historical meander scrolls that connect with Soap Creek and the Luckiamute River.	Evaluate the potential to modify connections between the gravel pit ponds and the meander scrolls. Determine if gravel pit pond habitat could be improved by reducing shoreline gradients and planting native species.
SIA11	Gravel pit ponds are isolated during low flows but connect at flood flows. Ponds may be fish sinks that could be better connected to improve egress from ponds to historical meander scrolls that connect with Soap Creek and the Luckiamute River.	Evaluate the potential to modify connections between the gravel pit ponds and the meander scrolls. Determine if gravel pit pond habitat could be improved by reducing shoreline gradients and planting native species.

4 Site Reconnaissance

On April 19, 2013, RDG conducted a field visit of the SIAs identified through remote sensing and listed previously in section *3 Remote Sensing Project Scoping*. RDG staff used GNSS enabled RTK GPS to evaluate elevations at the eleven SIAs listed in Table 3-1. In general, RDG determined that hydrologic connection at the LSNA is predominantly dictated by existing floodplain topography and not by the presence or absence of man-made obstructions. Relatively intact, the LSNA acts as a functional floodplain and floodwaters are primarily limited by USACE dam operations in the Willamette basin, and not by modifications to the existing topography at the site.

Major modifications to the natural floodplain topography present at the site were mostly attributed to gravel extraction activities in the South Tract. In most cases, the topography identified in the SIA that limits floodplain inundation is adjacent to topography with similar or higher elevations which in turn means that major excavation activities would be necessary to significantly increase floodplain inundation area or inundation frequency. A few recommended actions could be taken to increase floodplain inundation and/or habitat quality with varying degrees of risk and associated impacts.

Historical gravel extraction in the South Tract has produced a series of deep ponds that affect ecological resources in a variety of ways. First, gravel ponds can act as stranding zones for native fish when they use the floodplain during periods of high flow. As floodwaters recede, fish

such as juvenile spring Chinook salmon move towards deeper waters. Wetted areas that become disconnected from the mainstem river tend to trap fish where they are subjected to predation and degraded water quality. Secondly, overburden from mining activities act as levees and limit floodwaters from reaching other portions of the floodplain.

As an example, at the LSNA South Tract, the west pond embankments act as a barrier until approximately 43,500 cfs (~2 weeks/year), limiting flood flows from connecting the swales to the east and west of the pond. Figure 4-1 shows the west pond and the surrounding embankments. As high flows connect this area of the floodplain to the Willamette River, fish access floodplain areas for food resources and to escape high velocities and turbulence present in the main channel. As flows begin to recede, fish returning to the main channel from floodplain margins could be drawn to the deep water in the west pond and become trapped as the pond disconnects from the rest of the floodplain and river. Fish trapped in the pond would be subjected to poor water quality and predation.

Figure 4-1. The west pond at the South Tract is a sink for fish moving from the Willamette River into the interior floodplain during high flows. The berm surrounding the pond also limits connection between the river and floodplain. The photo is a view south from SIA #9.

By excavating the areas at SIAs #9 and #10 to the existing floodplain elevation, the floodplain areas of the west pond and west swale would become connected on a more frequent basis, at approximately 36,000 cfs (3-4 weeks/year). Because the bottom of pond elevation is lower than the surrounding floodplain, fish stranding in the west pond could still be an issue. Additional

floodplain grading could be completed to the north of the pond with the excavated material used to fill the pond to a more natural floodplain elevation. This would not only increase the acreage of inundated floodplain, but would reduce stranding issues for native fish. However, the amount of fill necessary to grade the pond to create a natural floodplain feature may be cost prohibitive. Also, competing interests with this type of project are present at the west pond site and may affect the feasibility of this type of project. Currently a variety of wildlife use the west pond, including western pond turtles which are on the Oregon Department of Fish and Wildlife's (ODFW) Sensitive Species list. Recreational uses such as bird watching and fishing are also common activities at the west pond.

At the LSNA North Tract, most access roads are located at the existing floodplain elevation and do not adversely impact site inundation potential. Two sites located at SIAs #7 and #8 could have minor bank modifications that would allow swales to connect with the Willamette River at slightly lower flows than under current conditions. Bank modifications would require a small amount of excavation to lower the existing top of bank elevation, and the installation of large wood structures could be used to increase the modified bank stability. Additional habitat structures could be constructed within swales to provide higher quality habitats.

Figure 4-2. At SIA #8, the existing access road is set at the same elevation as the invert of the swale. The bank elevation could be lowered slightly to allow floodwater to access the swale and the pond located to the north.

Table 4-1 includes recommended actions based on the site conditions observed during field reconnaissance, a basic cost estimate is also provided.

Table 4-1. Site investigation areas (SIAs) for the LSNA. Information includes a brief summary of existing site conditions and recommended actions.

Site	Site Characteristics from Site Visit	Recommended Action	Anticipated Cost[1]
SIA1	Road elevation is only slightly higher than the existing floodplain in places, and floodwaters are able to access the floodplain to the south east.	No Action	NA
SIA2	Topography behind berm consistent with top of berm elevation. Inundation limited by existing topography.	No Action	NA
SIA3	Existing flood channel conveys overbank flows from the Willamette River into interior LSNA floodplain. Mature floodplain forest with multi-level canopy to the north.	No Action	NA
SIA4	Existing flood channel conveys overbank flows from the Willamette River into interior LSNA floodplain. Mature floodplain forest with multi-level canopy.	No Action	NA
SIA5	Existing flood channel conveys overbank flows from the Willamette River into interior LSNA floodplain at high flows.	Lower the outside bank and excavate channel approximately 5 ft to an elevation of 175.0 ft to improve river-floodplain connectivity. Large wood structures could be constructed on the Willamette River bank to hold the existing bank line and minimize risk of channel capture. Continue riparian reforestation to stabilize eroding banks.	Medium
SIA6	A natural high bank limits extent of flooding. The adjacent banks match the floodplain elevation and allow water to access the LSNA floodplain.	No Action	NA
SIA7	A high outside bank on the Luckiamute River may be limiting connectivity between the river and the adjacent floodplain.	Lower the outside bank and excavate channel approximately 3 ft to an elevation of 170.0 ft to improve river-floodplain connectivity. Large wood structures could be	Medium

Table 4-1. Site investigation areas (SIAs) for the LSNA. Information includes a brief summary of existing site conditions and recommended actions.

Site	Site Characteristics from Site Visit	Recommended Action	Anticipated Cost[1]
		constructed on the Luckiamute River bank to hold the existing bank line and minimize risk of channel capture. Continue riparian reforestation to stabilize eroding banks.	
SIA8	A high outside bank on the Luckiamute River may be limiting connectivity between the river and the adjacent floodplain.	Lower the outside bank and excavate channel approximately 2 ft to elevation of 172.0 ft to improve river-floodplain connectivity. Additional channel grading could be completed to better connect the swale to the pond area 1000' NW. Large wood structures could be constructed on the Luckiamute River bank to hold the existing bank line and minimize risk of channel capture. Continue riparian reforestation to stabilize eroding banks.	Medium
SIA9	Gravel pond features act as floodplain berms and limit the extent of floodplain connectivity with existing sloughs and the rivers. Gravel ponds act as fish stranding zones and result in loss of native fish due to predation and poor water quality.	Lower berm elevations around gravel pit ponds by 12 ft to approximately 174.0 to match surrounding wetland/slough elevations. Excavated material could be used to fill gravel ponds to similar elevation to alleviate stranding issues. Additional material to fill ponds could be acquired by grading field to the north of the west pond.	Medium for berm excavation, high for pond fill/floodplain grading.
SIA10	Gravel pond features act as floodplain berms and limit the extent of floodplain connectivity with existing sloughs and the rivers. Gravel ponds act as fish stranding zones and result in loss of native	Lower berm elevations around gravel pit ponds by 8 ft to approximately 174.0 to match surrounding wetland/slough elevations. Excavated material could be used to fill gravel	Low for berm excavation, high for pond fill/floodplain grading.

Table 4-1. Site investigation areas (SIAs) for the LSNA. Information includes a brief summary of existing site conditions and recommended actions.

Site	Site Characteristics from Site Visit	Recommended Action	Anticipated Cost[1]
	fish due to predation and poor water quality.	ponds to similar elevation to alleviate stranding issues. Additional material to fill ponds could be acquired by grading field located to the north of the west pond.	
SIA11	Floodplain connectivity limited by existing high topography. Gravel ponds act as fish stranding zones and result in loss of native fish due to predation and poor water quality.	Lower berm elevations between gravel ponds and slough by 15 ft to approximately 170.0 to match existing slough elevations. Excavated material could be used to fill gravel ponds to similar elevation to alleviate stranding issues. Additional material to fill ponds could be acquired by grading field located to the north of the ponds.	Low for berm excavation, high for pond fill/floodplain grading.

[1]: Anticipated cost scale; Low = less than $25, 000, Medium = $25,000 - $100,000, High = greater than $100,000.

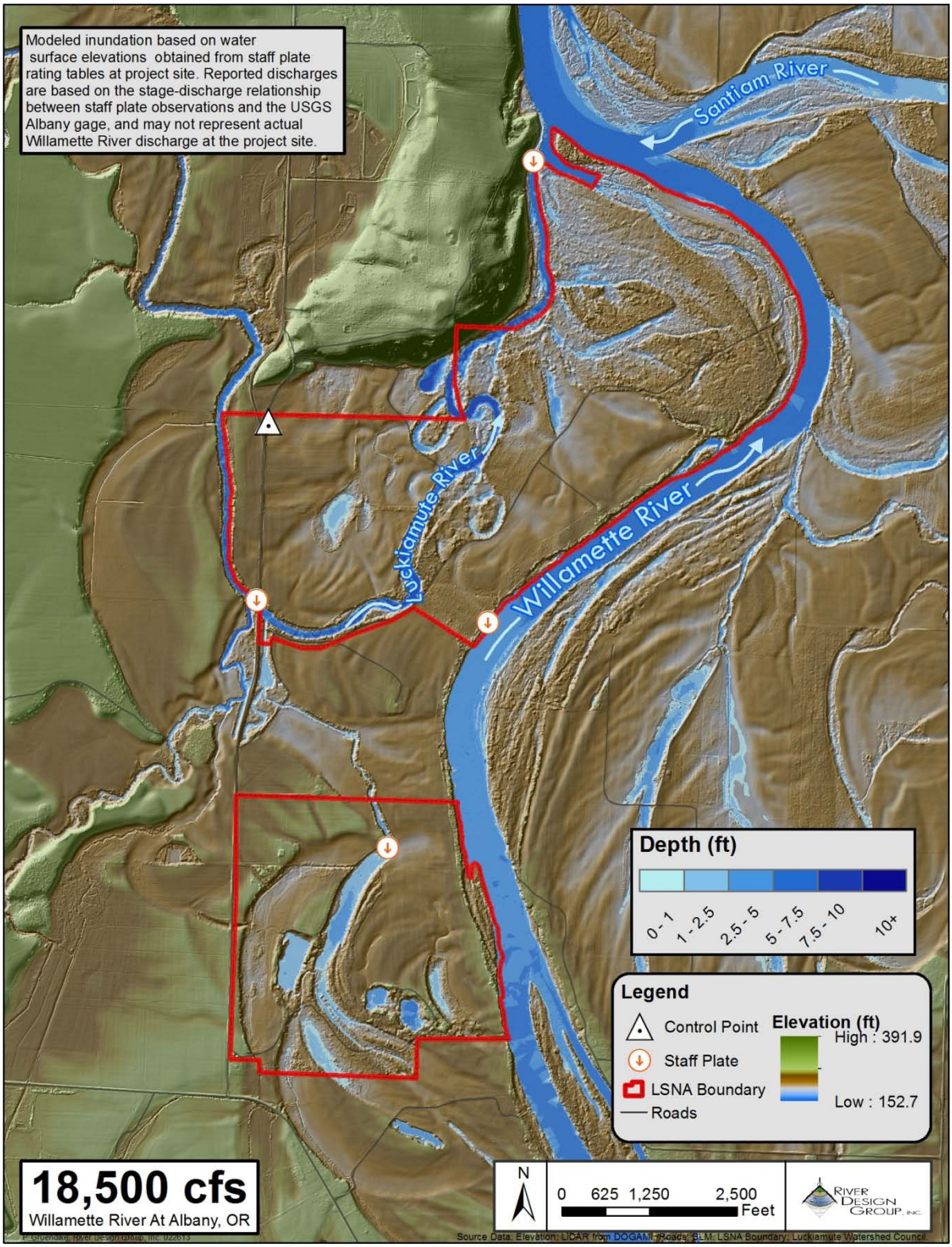
5 Summary

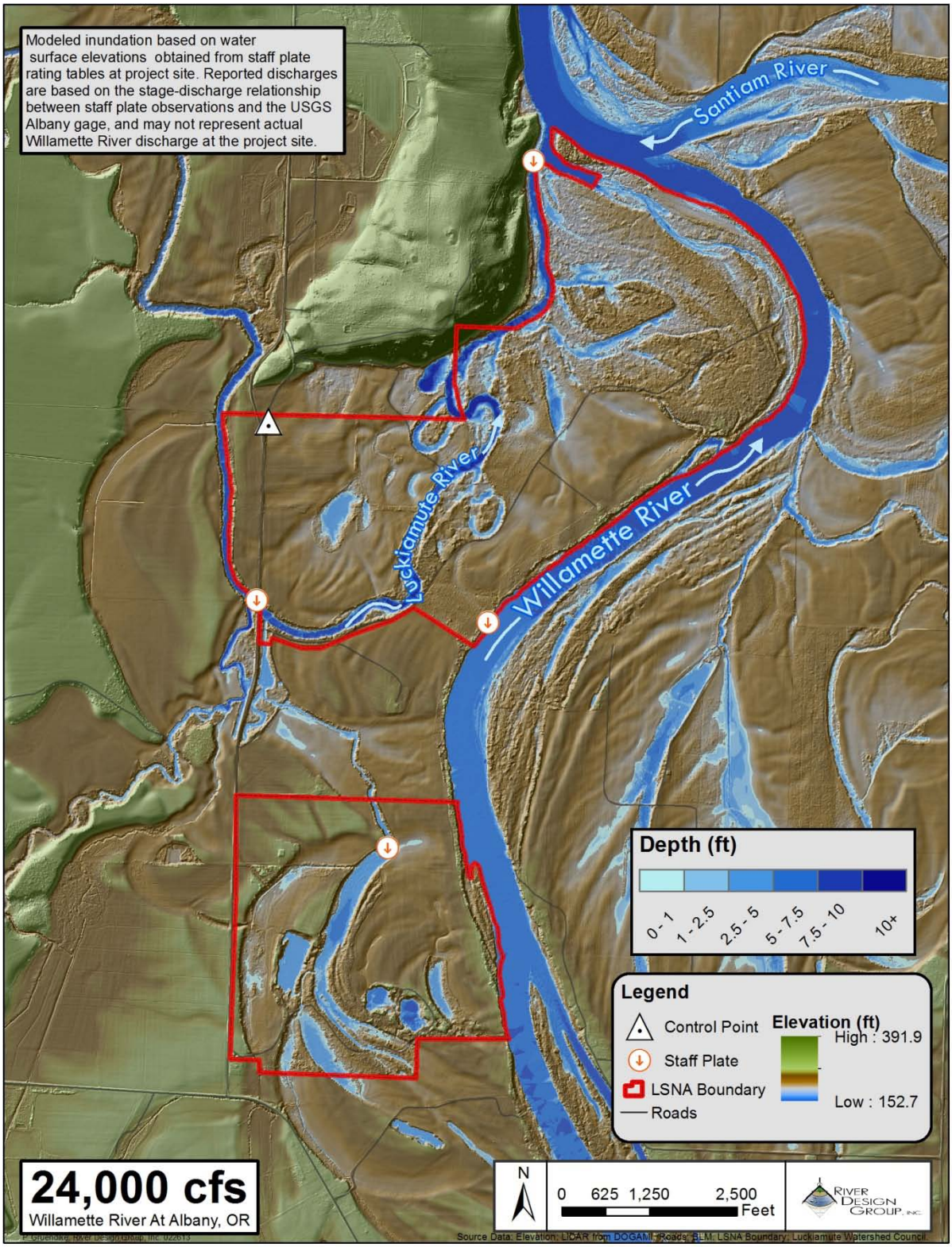
The LSNA provides a variety of habitats for native fish and wildlife found in the Willamette River basin. Major revegetation efforts are currently underway at the site to shift site conditions from historical agricultural and gravel extraction land uses to a naturally functioning floodplain. Combined remote sensing and field reconnaissance efforts were used to identify target areas for improvement of hydrologic function and habitat quality. A field review of potential habitat enhancement areas identified during the intial remote sensing analysis determined that most of the LSNA is characterized by the historical topography with minimial human modifications. There are select opportunities to improve floodplain inundation extent and frequency at LSNA.

6 References

Oregon Parks and Recreation Department (OPRD) 2009. Luckiamute State Natural Area Master Plan.

APPENDIX A
LSNA INUNDATION MAPS


Modeled inundation based on water surface elevations obtained from staff plate rating tables at project site. Reported discharges are based on the stage-discharge relationship between staff plate observations and the USGS Albany gage, and may not represent actual Willamette River discharge at the project site.
Santiam River
Willamette River
Lucklamute River
Depth (ft)
0 - 1
1 - 2.5
2.5 - 5
5 - 7.5
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
18,500 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation: LiDAR from DOGAMI; Roads: BLM; LSNA Boundary: Lucklamute Watershed Council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Depth (ft)
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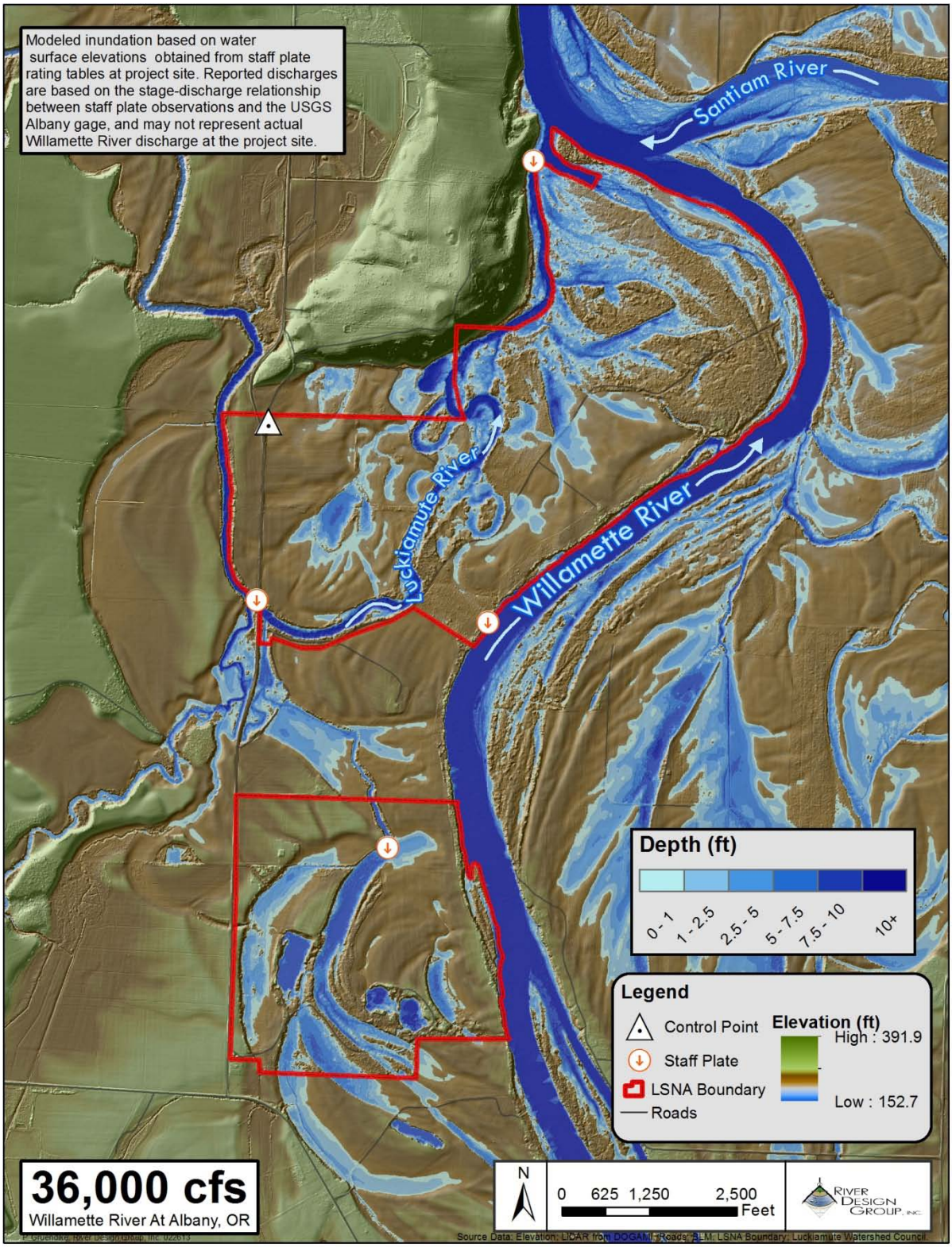
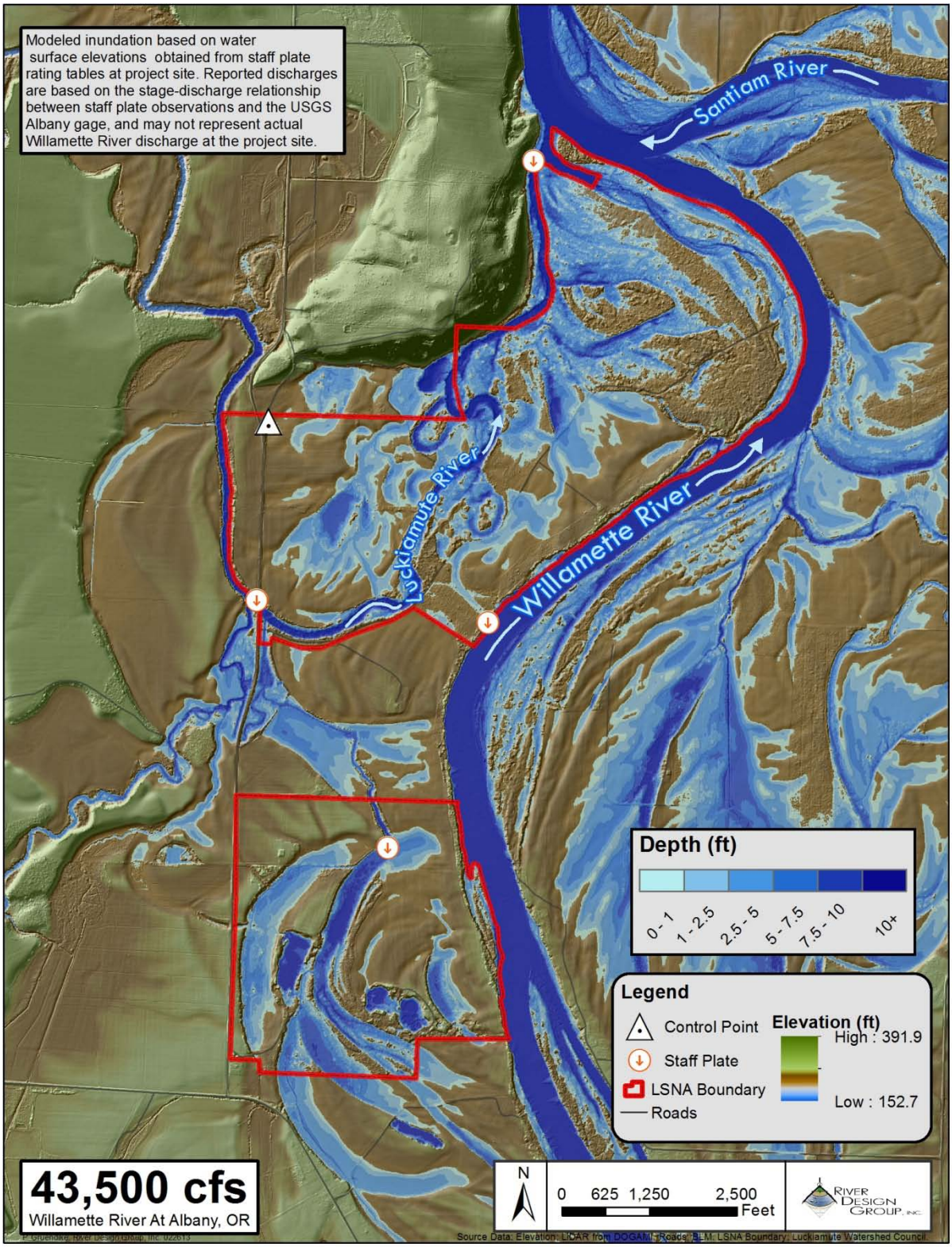
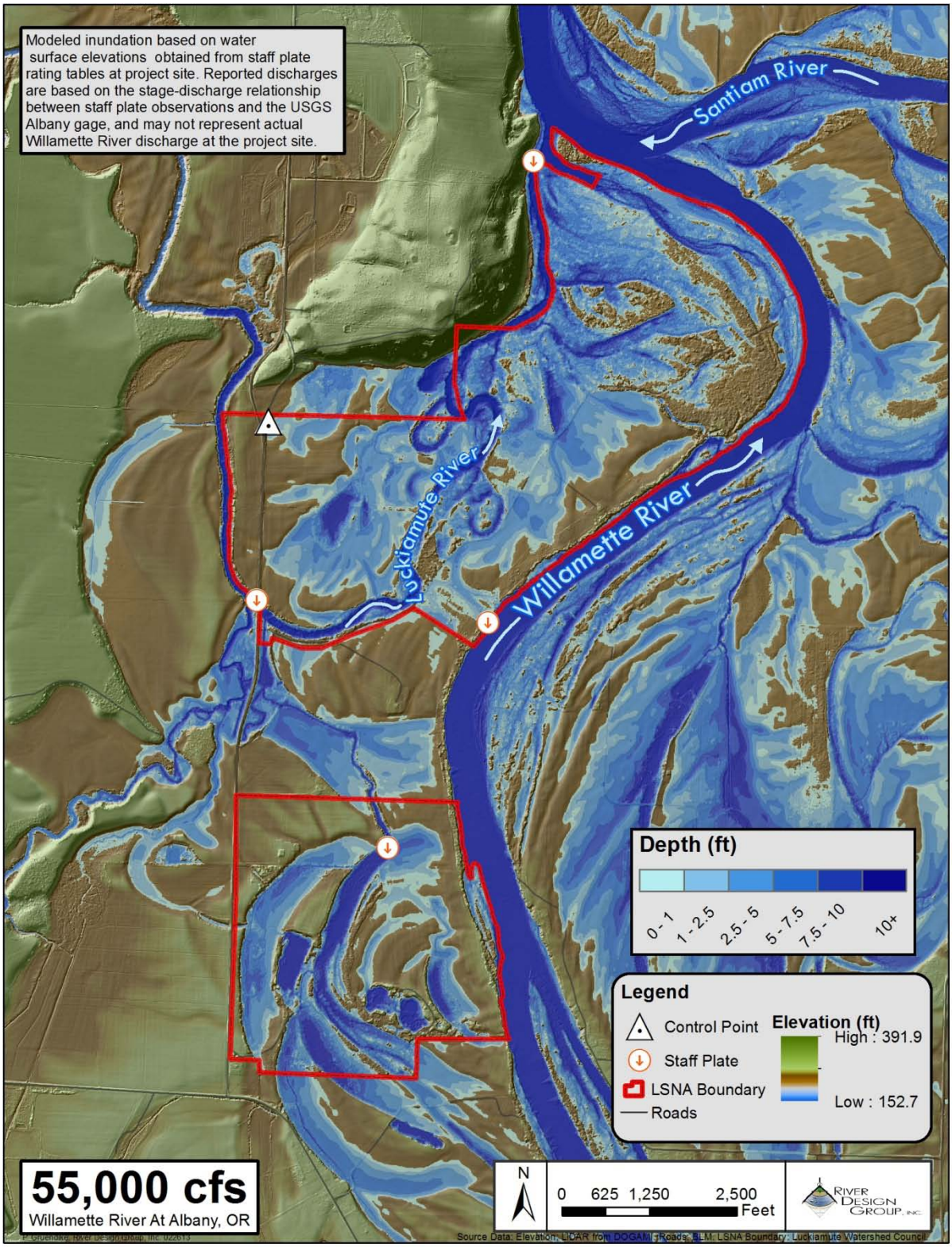
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
24,000 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation: LiDAR from DOGAMI; Roads: BLM; LSNA Boundary: Lucklamute Watershed Council


Modeled inundation based on water surface elevations obtained from staff plate rating tables at project site. Reported discharges are based on the stage-discharge relationship between staff plate observations and the USGS Albany gage, and may not represent actual Willamette River discharge at the project site.
Santiam River
Willamette River
Lucklamute River
Depth (ft)
0 - 1
1 - 2.5
2.5 - 5
5 - 7.5
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
36,000 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation: LiDAR from DOGAMI; Roads: BLM; LSNA Boundary: Lucklamute Watershed Council


Modeled inundation based on water surface elevations obtained from staff plate rating tables at project site. Reported discharges are based on the stage-discharge relationship between staff plate observations and the USGS Albany gage, and may not represent actual Willamette River discharge at the project site.
Santiam River
Willamette River
Luckiamute River
Depth (ft)
0 - 1
1 - 2.5
2.5 - 5
5 - 7.5
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
43,500 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation: LiDAR from DOGAMI; Roads: BLM; LSNA Boundary: Luckiamute Watershed Council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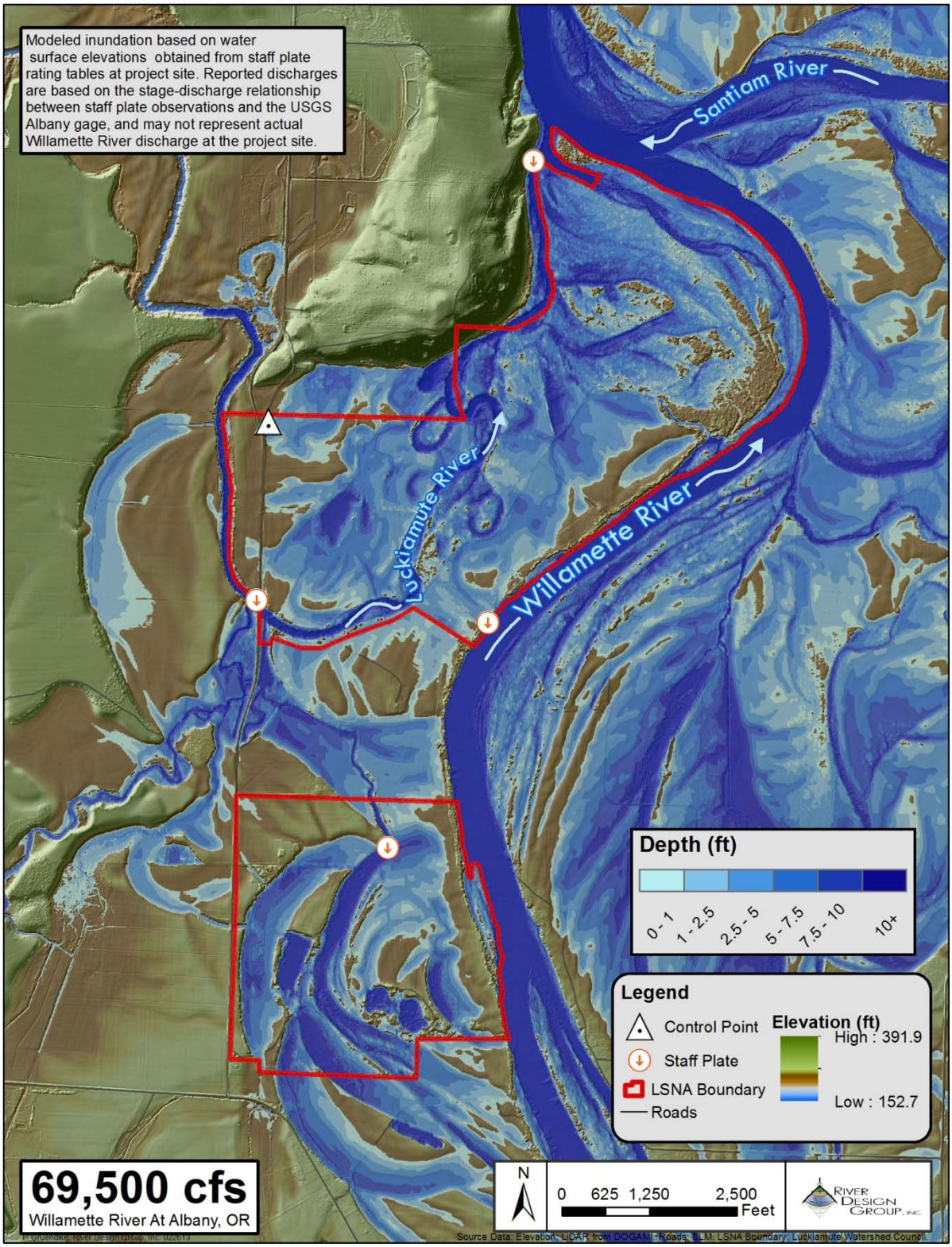
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
55,000 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation, LiDAR from DOGAMI; Roads, BLM; LSNA Boundary, Luckiamute Watershed Council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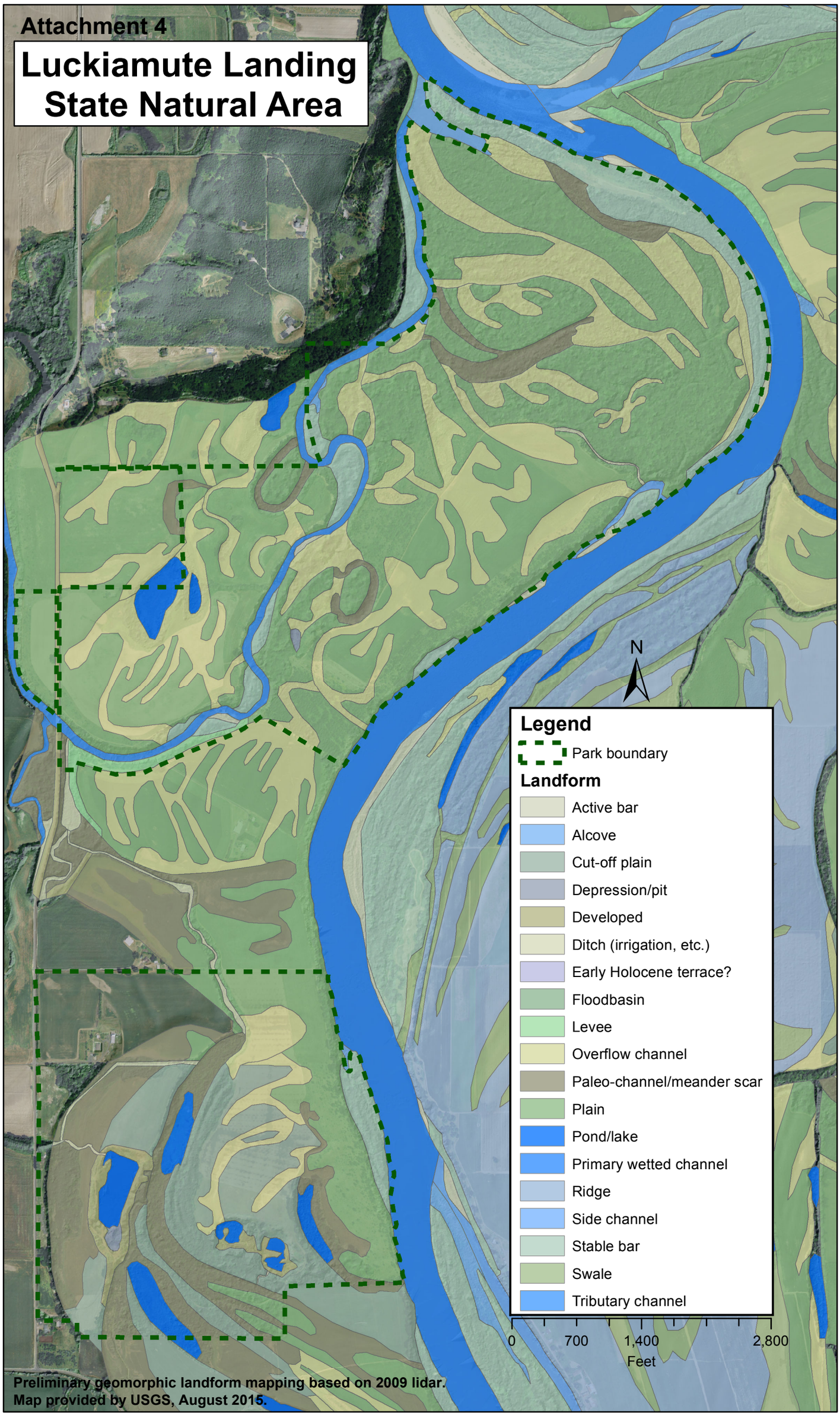
7.5 - 10
10+
Legend
Control Point
Staff Plate
LSNA Boundary
Roads
Elevation (ft)
High : 391.9
Low : 152.7
69,500 cfs
Willamette River At Albany, OR
N
0 625 1,250 2,500
Feet
River Design Group, Inc.
Source Data: Elevation: LiDAR from DOGAMI; Roads: BLM; LSNA Boundary: Lucklamute Watershed Council

Attachment 4

Luckiamute Landing State Natural Area



Preliminary geomorphic landform mapping based on 2009 lidar.
Map provided by USGS, August 2015.

Photos of Proposed Site Investigation Areas (SIAs)

Figure 1: SIA 5 on the mainstem Willamette

Figure 2: SIA 5; note large wood and other debris present from prior inundation

Figure 3: SIA 7 on the Luckiamute River

Figure 4: SIA 8; note depression in access road

Oregon
Kate Brown, Governor

Parks and Recreation Department
Valleys Region Office
2501 SW 1st Ave Ste 100
Portland, OR 97201-4751
503-731-3293
FAX 503-731-3296

Nature HISTORY Discovery

August 19, 2015

Willamette Special Investment Partnership
Technical Review Team

Dear Review Team,

This letter is in support of the grant request that the Luckiamute Watershed Council has submitted for Luckiamute State Natural Area.

Luckiamute State Natural Area is a 915-acre natural area located at the confluence of the Luckiamute, Willamette and Santiam Rivers. It is rich in plant and animal diversity, and is managed to protect and restore floodplain functions and habitat values in this mid-Willamette Valley area.

We have enjoyed a productive partnership with the Luckiamute Watershed Council over the past several years, and are excited to see the hard work and dedication LWC has devoted to LSNA translate into hundreds of acres of restored floodplain plant communities. OPRD is an active planning and implementation partner on the restoration work at LSNA, and has contributed in-kind and financial resources to the projects to date.

Through the current proposal, LWC seeks to investigate opportunities for additional restoration at LSNA. OPRD is committed to identifying and implementing the projects at LSNA that help further the Master Plan's goal of, "protect, manage, enhance and restore as appropriate, the values and natural functions of the floodplain resources." The funding proposal is highly compatible with this goal.

Work with the Luckiamute Watershed Council has been a very successful endeavor and I hope that you will further the progress made at this site by supporting their grant request.

Sincerely,

Andrea Berkley

Natural Resource Specialist