FINAL DESIGN REPORT

FOR

GLENBROOK CREEK RESTORATION PROJECT

GLENBROOK, NEVADA

January 2013

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INTRODUCTION

The Glenbrook Creek Restoration Project is a stream and meadow restoration to improve channel morphology and function as well as fish and wildlife habitat for Glenbrook Creek, in Glenbrook, Nevada. The project intends to improve vegetation diversity and wildlife habitat with vegetation management of a 3.5 acre area. Additionally, the project proposes to restore approximately 300 linear feet of stream by removing two culverts, replacing one with an arch culvert that allows fish passage, constructing a section of new channel, and stabilizing portions of the existing channel.

BACKGROUND

Glenbrook Creek is the 15th largest tributary to Lake Tahoe (by watershed area). It is fed by two unnamed tributaries above US Highway 50. The creek itself starts at a culvert below Highway 50 and parallels the Old Lincoln Highway. It flows through a canyon into the neighborhood of Glenbrook, passing first through the Glenbrook HOA, then Upper Meadows LP property, under Old US Highway 50, and through GHOA land before becoming a low gradient stream within a meadow. The meadow is owned by both GHOA and Lawrence Ruvo. Glenbrook Creek eventually enters a more developed area before ending at Lake Tahoe.

The map in Figure 1 shows the location of Glenbrook Creek and the approximate Glenbrook Creek watershed.

As discussed in the 1998 TRPA Memorandum entitled "Glenbrook Creek and Adjacent Wetland Restoration Opportunities," the restoration of the Glenbrook Creek SEZ has the possibility to positively affect the TRPA Water Quality, Wildlife, and Fish Habitat Thresholds (TRPA, 1998). With the lack of vegetation diversity and the presence of noxious weeds throughout the meadow, NTCD has identified an opportunity to improve the area to meet the TRPA Vegetation Threshold. The addition of a stream view footpath is applicable to the TRPA Recreation Threshold. The path will also serve as a water quality and riparian health benefit by keeping foot traffic out of the restoration area and allowing access for monitoring and future vegetation management.

NTCD along with TRPA and expert geomorphologists (Swanson, 1999) have identified the following restoration needs for Glenbrook Creek:

- 1. Improve fish passage by replacing culvert at Old US Highway 50 and removing remnant culvert at abandoned meadow creek crossing.
- 2. Restore riparian health by increasing flood flows to channel downstream of culvert at Old US Highway 50 and improving floodplain connectivity.
- 3. Reduce the input of fine sediment to Lake Tahoe by repairing incised portions of the channel and stabilizing banks.
- 4. Restore riparian heath by removing decadent willows near creek and diversifying the age of vegetation.

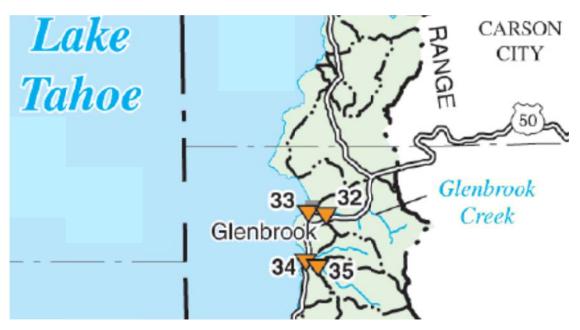


Figure 1. Glenbrook Creek and Watershed. Monitoring locations are indicated by the orange triangles 32 and 33. Monitoring occurred from (USGS, 2002)

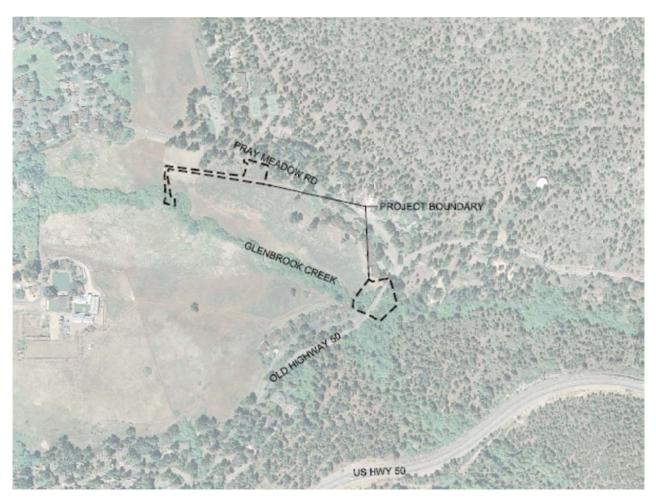


Figure 2. Project area location.

PROJECT LOCATION

The Glenbrook Creek Restoration Project is located in Douglas County, in Glenbrook, NV, along an approximately 1,000 foot length of Glenbrook Creek. The project area is on parcels owned by the Glenbrook Homeowners Association and the Glenbrook Cottage Associations. Appendix A has a list of properties within 300' of the project.

DESCRIPTION

The Glenbrook Creek Restoration Project is a stream and meadow restoration to improve channel morphology and function as well as fish and wildlife habitat for Glenbrook Creek, in Glenbrook, Nevada. The project intends to improve vegetation diversity and wildlife habitat with vegetation management of a 3.5 acre area. Additionally, the project proposes to restore approximately 300 linear feet of stream by removing two culverts, replacing one with an arch culvert that allows fish passage, constructing a section of new channel, and stabilizing portions of the existing channel.

GOALS AND OBJECTIVES

The Glenbrook Creek Restoration Project's goals are as follows:

Goal

The goal of this project is to restore the natural function of the Glenbrook Creek SEZ and create a more visible community resource.

Objectives

- 1. Improve fish habitat through removal of fish barriers and the addition of spawning bed material.
- 2. Improve the water quality delivered to the lake and enhance the SEZ by increasing floodplain connectivity.
- 3. Improve the water quality by reducing bank sediment sources through bank stabilization.
- 4. Enhance wildlife habitat and riparian health through vegetation management.
- 5. Create a community resource and education outlet for stream health by providing a public streamside path.

Results

The anticipated results of this project are as follows:

- 1. A healthier and more diverse riparian vegetation community both within the channel and throughout the surrounding meadow.
- 2. A larger and healthier trout and aquatic macroinvertibrate community.
- 3. A more stable channel that overbanks more frequently.
- 4. A more fire safe community with a viable riparian vegetation management plan.
- 5. A streamside accessible footpath that is a recreational and outreach resource to the Glenbrook community.
- 6. A reduction in suspended sediment, phosphorus, and conductivity to Lake Tahoe through Glenbrook Creek's input.

PROJECT FUNDING

The project received funding from the Nevada Division of State Lands Water Quality and Erosion Control Grants Program, The Glenbrook Homeowners Association, and The Glenbrook Project, a non-profit started to improve the Glenbrook community.

Table 1. Funding sources and amounts for the Glenbrook Creek Restoration Project

Agency	Cash	In Kind	Total
	Funding	Funding	Funds
Nevada Division of State Lands Water Quality and Erosion	\$467,926	-	\$467,926
Control Grants Program			
The Glenbrook Homeowners Association	\$50,000	\$46,000	\$96,000
The Glenbrook Project	\$50,000	\$5,000	\$55,000
Others		\$5,000	\$5,000
TOTAL			\$623,926

PROJECT PARTNERS

Nevada Tahoe Conservation District (NTCD) is the project sponsor and lead agency responsible for planning, designing, and implementing the Glenbrook Creek Restoration Project. NTCD is working closely with project consultants River Run Consulting and WaterWays Consulting to design and construct the best project. Additionally, a number of other important partners will continue to participate in the process to ensure successful project delivery. Project partners include:

- 1. Nevada Tahoe Conservation District (NTCD)
- 2. Nevada Division of State Lands (NDSL)
- 3. Nevada Division of Environmental Protection (NDEP)
- 4. Tahoe Regional Planning Agency (TRPA)
- 5. The Glenbrook Project (TGP)
- 6. The Glenbrook Homeowners Association (GHOA)
- 7. The Great Basin Institute (GBI)
- 8. Tahoe Douglas Fire Protection District (TDFPD)

DRAINAGE AND HYDROLOGY

EXISTING CONDITIONS

Glenbrook Creek has experienced centuries of human interaction. In the past, the area was used for both logging and grazing. Since grazing ceased in the 1980s, the Creek has been largely ignored. The vegetation surrounding the creek is dense and serves as the major influence in the creek's morphology as no large rocks are present in the project reach. Additionally, two crossings exist within the project reach that are outdated and impediments to fish passage and natural flows.

Glenbrook Creek crosses Old Highway 50 through a standpipe to a culvert. The standpipe was installed in the early 1990s as a quick solution to prevent woody debris from clogging the existing culvert (Ramsdell, 2011). Old Highway 50 currently acts as a levee and the culvert restricts flow and drops the creek considerably in elevation. The culvert itself is failing – it has been retrofit with a smaller pipe to abate further collapse (Figure 2). Furthermore, runoff from Old Highway 50 is currently routed directly

into Glenbrook Creek and could be treated with small modifications to the existing pavement and side slope.

The existing culvert is limiting fish passage and may be moderating the flow regime below Old Highway 50. The willow stand surrounding the creek below Old Highway 50 has become decadent (Figure 3). The impoundment upstream of the culvert may serve a role in eliminating peak flows downstream of Old Highway 50, though a detailed study has not been conducted. Removing the stand pipe could increase the frequency of floodplain inundation in the downstream meadow portion of the creek, improving floodplain connectivity and aiding with capture of fine sediment during large flows.

Below Old Highway 50, a remnant culvert and access road is causing entrenchment downstream and should be removed (Figure 4). When Glenbrook Creek becomes low gradient and enters the meadow, the majority of the stream has good width/depth and entrenchment ratios, but its riparian vegetation lacks diversity.





Figure 3. Existing culvert and standpipe at Old Highway 50.



Figure 4. Decadent willows before vegetation management.

LAND CAPABILITY

The U.S. Forest Service and TRPA developed the Bailey land capability system in the early 1970s based primarily on the official USDA soils maps for the Tahoe Region. Each soil type was assigned to a land capability class ranging from 1 to 7, with capability 1 being the most environmentally fragile and sensitive to development. Wherever land was found to be influenced by a stream or high groundwater, it was assigned to capability 1b, also known as "Stream Environment Zone" or SEZ.

The Glenbrook Creek Restoration project is located within TRPA land capabilities class 1b, 3, and 5.

EXISTING SOILS

NRCS soil survey indicates that the project area is within soil map unit 9011—Oxyaquic Cryorthents-Aquic Xerorthents-Tahoe complex, 0 to 15 percent slopes (all restoration work) and 7161 Kingsbeach stony sandy loam, 2 to 15 percent slopes (access and staging and footpath only) (Figure 5). Appendix B contains the map unit descriptions from the USDA Soil Survey for the Tahoe Basin Area, California and Nevada (USDA, NRCS 2007).



Figure 6. Project area NRCS soil map units. The project area is outlined in blue.

WETLANDS

A wetland delineation was conducted by Hauge Brueck Associates during summer 2012. The survey focused on the willow understory as LiDAR is available for the entire Tahoe Basin. The surveyors tied the control into the LiDAR control point at Spooner Summit.

TOPOGRAPHY

A topographic survey was conducted by NTCD with assistance from Atkins North America during fall 2011 and winter 2012. The survey focused on the willow understory as LiDAR is available for the entire Tahoe Basin. The surveyors tied the control into the LiDAR control point at Spooner Summit.

PEAK AND DESIGN FLOW

Based on data from two USGS gages located above Old Highway 50 and near the outlet of the creek to Lake Tahoe, the two year design discharge was calculated at 9 cfs (Appendix D). The 100 year flood of 221 cfs was obtained from the downstream Glenbrook gage analysis found in the USGS report "Estimated Flood Flows in the Lake Tahoe Basin, California and Nevada" (USGS 2002).

DESIGN

GUIDING PRINCIPLES

Utilizing the knowledge of geomopholgist Matt Kiesse, who has looked at the site since 1998, our guiding principle is to repair sections of the creek deemed to provide measurable benefits to water quality, wildlife, aesthetics, and/or stream function. We also strived to minimize the impact on the creek and the surrounding environment by only accessing the most impacted sections of the creek.

SITE SELECTION

NTCD collaborated with the Nevada Division of State Lands, The Glenbrook Homeowners Association, The Glenbrook Project, and the Nevada Division of Wildlife to initially assess restoration potential along the GHOA-owned reaches of Glenbrook Creek. When potential locations were located, NTCD walked the site with geomorphologist Matt Kiesse from River Run Consulting who had initially evaluated the site in 1998. Kiesse and NTCD identified 3 potential restoration locations, the remnant culvert within the meadow, the culvert at Old Highway 50, and an entrenched section between the culverts. NTCD, River Run, and WaterWays Consulting, Inc. developed detailed restoration plans for each site. Upon further examination by NTCD personal, the entrenched section between the culverts was eliminated from the restoration since accessing the site had the potential to create more disturbance than benefit.

CULVERT DESIGN

In order to allow for fish passage at multiple flows, an arch culvert was chosen so that a natural stream bed could be constructed below. Both concrete and galvanized metal options were examined, with galvanized metal being chosen for its combination of strength, durability, ease of installation, and cost effectiveness.

Hydraulic calculations to determine the appropriate culvert size were performed using a culvert calculator provided in the "Hydraflow Express" extension of AutoCAD Civil 3D. The proposed culvert dimensions (12' span x 6.25' rise) will be partially filled with channel substrate and result in an open area of approximately 42.4 square feet available for conveyance. Calculations (Appendix D) used an arch culvert with an equivalent open area to determine the proposed culvert capacity under the 100-year flow of 221 cfs. The proposed culvert will flow partially full under the 100-year flood event.

CHANNEL DESIGN

The Glenbrook Creek Restoration Project proposes to construct approximately 250 linear feet of new channel. The proposed channel alignment was selected to increase channel length and reduce the channel gradient to four percent. The new alignment also removes abrupt turns in the channel and the drop that the standpipe introduced. The proposed inset floodplain will result in more frequent out-of-bank flows, reduces erosive forces on the banks, and allows sediment deposition to occur on the floodplains.

Methodology

Manning's equation was used to determine design channel capacity and confirm design channel dimensions. Calculations were performed using the "Hydraflow Express" extension of AutoCAD Civil 3D. Parameters in the equation include:

- Discharge,
- Channel bed slope,
- Hydraulic radius; and
- Manning's roughness coefficient.

A roughness coefficient of 0.14 was estimated using a depth-based roughness equation applicable to the proposed channel and was used in the analysis (USBOR, 2007).

Results of the bankfull hydraulic analysis were used to determine the acceptable range of channel geometries for the constructed channel. The channel dimensions were iterated until the channel dimensions, channel substrate, and the associated roughness coefficient resulted in a flow depth that was at or near overbanking under design flow conditions. Varying the constructed dimensions will

provide hydraulic complexity and allow the channel to overtop in some areas at flows slightly lower than the design flow.

Substrate Design

The substrate gradations used in the engineered streambed material (ESM) were derived from methods recommended by the United States Bureau of Reclamation (USBR, 2007), the Washington Department of Fish and Wildlife (WDFW, 2003), and the California Department of Fish and Game (CDFG, 2009) (Appendix D). These methods predict the stable rock diameter for a given channel slope and unit discharge. Hydraulic modeling results for the 100-year flood event were used to design the ESM gradation and should therefore remain stable during the 100-year flood event. Channel substrate gradations are listed in the construction documents (See Special Technical Provisions and Project Plans).

Creation of the engineered streambed material gradation requires mixing of different sizes of materials to arrive at the correct proportions. Incorporation of fine material in the gradation will seal the channel against piping and help to keep a greater majority of the low flow on the surface of the channel bed. All constructed reaches of the streambed should be thoroughly jetted after placement to fill voids and effectively seal the surface (Appendix D).

PLANT SELECTION

A seed mix of several native species was chosen to create a healthy and diverse floodplain that mimics the healthy floodplain downstream. Willow stakes were added for additional roughness on this steeper stretch. Because the new channel will not have a seasoning period and the floodplain will be stabilitzed by erosion control fabric, shrubs will be installed for community aesthetics. The plant list is available in Appendix E.

OTHER CONSIDERATIONS

Guardrail is specified to replace the existing wooden fences for traffic safety on Old Highway 50 (Figure 7).

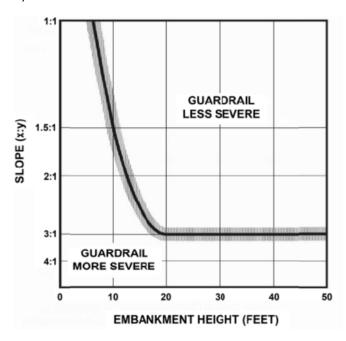


Figure 7. Equal Severity Curve from the California Department of Transportation's Traffic Manual. With an existing slope greater than 2:1 and an embankment height of 15 feet, a guardrail is recommended.

PROJECT PERMITTING

The Glenbrook Creek Restoration Project is approaching the permit process as if it were an EIP project spearheaded by the Funders.

USACE NWP 3

The US Army Corps of Engineers requires projects within Waters of the United States that are less than 0.1 acres to submit a Pre-Construction Notification (PCN) and obtain a Nationwide Permit 3 (NWP 3) which is for "Maintenance." The associated Jurisdictional Wetland Study can be found in Appendix C.

TRPA EIP PROJECT PERMIT

The TRPA EIP Project Review Application and Initial Environmental Checklist for the Glenbrook Creek Restoration Project were submitted to the TRPA on in January 2013 and the permit has been issued.

DOUGLAS COUNTY PERMITS

No Douglas County permits must be obtained prior to construction; however, a Letter of Map Revision (LOMR) must be obtained after construction using the as-built survey since the Creek is a FEMA Zone A.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

The area of disturbance associated with the implementation of the project is expected to be less than an acre in size, therefore, does not trigger a Stormwater Pollution Prevention Plan.

NDEP PERMITS

Two Nevada Division of Environmental Protection (NDEP) permits are required, a Temporary Working in Waterways Permit and a 401 Permit. Both have been obtained.

PROJECT MAINTENANCE

The Glenbrook Homeowners Association is responsible for maintaining the project for the next 20 years. As the entity responsible for managing much of the land within the Glenbrook Community, they are well equipped to care for the project. The project is also designed to be low maintenance.

IRRIGATION

Irrigation will be provided to establish the vegetation in the project area by Glenbrook Homeowners Association. GHOA will maintain the irrigation for one to two growing seasons depending on plant establishment success and then remove temporary irrigation after plant establishment. Maintenance will include periodic checks to ensure proper functioning, coverage and water delivery of the irrigation system. Plants have been selected to be self-sufficient after establishment. More details are provided in the revegetation plan.

CULVERT AT OLD HWY 50

The proposed culvert is designed to pass the 100 year flow. The culvert is expected to need little to no maintenance as it should be able to pass upstream debris.

VEGETATION MANAGEMENT

Although the restoration has the potential to reduce the need for vegetation management, the willows and alders in the riparian corridor will need thinning every 5 years or less as deemed necessary by GHOA. Willows and alders should be thinned so that five to fifteen foot gaps exist every thirty feet of stream channel. Willows and alders should also be cleared near the inlet and outlet of the culvert and in the proximity of any structure.

REFERENCES

Pepi, J, J.P. Kiel and C. Shade. Glenbrook Creek and Adjacent Wetland Restoration Opportunities. Memoradum dated April 14, 1998.

Ramsdell, Rob. 2011. Personal Communication.

Swanson, M. et al. Glenbrook Creek Stream Restoration Project. 1999.

- USGS, 2002. Estimated Flood Flows in the Lake Tahoe Basin, California and Nevada. U.S. Soil Geological Service. USDA (U.S. Department of Agriculture). July 2002.
- U.S. Department of the Interior Bureau of Reclamation(USBR). 2007. Rock Ramp Design Guidelines.
- Washington Department of Fish and Wildlife (WDFW). 2003 Design of Road Culverts for Fish Passage.
- U.S. Army Corps of Engineers (USACE). 1994. Hydraulic Design of Flood Control Channels, EM-1110-2-1601
- California Department of Fish and Game (CDFG). 2009. Fish Passage Design and Implementation: Part XII of the California Salmonid Stream Habitat Restoration Manual. Sacramento, CA, CA Department of Fish and Game.

APPENDIX A Addresses within 300' of Project

APN	Street	Town
141811412024	SHORT RD	Glenbrook, NV
141811412025	SHORT RD	Glenbrook, NV
141811412023	SHORT RD	Glenbrook, NV
141811412022	SHORT RD	Glenbrook, NV
141810611001	PRAY MEADOW RD	Glenbrook, NV
141811310001	OLD HWY 50	Glenbrook, NV
141811412029	OLD HWY 30	Glenbrook, NV
141811412028		Glenbrook, NV
141811412030		Glenbrook, NV
ROW		Glenbrook, NV
141811412021	SHORT RD	Glenbrook, NV
141811412021	SHORT RD	Glenbrook, NV
141811412020	SHORT RD	Glenbrook, NV
141811412019	SHORT RD	Glenbrook, NV
141811412014	SHORT RD	Glenbrook, NV
141811412014	OLD HWY 50	Glenbrook, NV
		Glenbrook, NV
141811412012 141811412011	OLD HWY 50 OLD HWY 50	Glenbrook, NV
		•
141811412010 141811311010	OLD HWY 50 GLENBROOK HOUSE RD	Glenbrook, NV
		Glenbrook, NV Glenbrook, NV
141811412009 141811412006	LINCOLN HY LINCOLN HY	•
141811412005		Glenbrook, NV
141811311009	CLENDROOK HOUSE BD	Glenbrook, NV
141811311009	GLENBROOK HOUSE RD LINCOLN HY	Glenbrook, NV Glenbrook, NV
141811412001	LINCOLN HY	Glenbrook, NV
141811412002	GLENBROOK HOUSE RD	Glenbrook, NV
141811311000	GLENBROOK HOUSE RD	Glenbrook, NV
		·
141811311005 141811311004	PRAY MEADOW RD PRAY MEADOW RD	Glenbrook, NV Glenbrook, NV
141811311004	PRAY MEADOW RD	Glenbrook, NV
141811311003	OLD HWY 50	Glenbrook, NV
141811410009	OLD HWT 30	Glenbrook, NV
141811411001	OLD HWY 50	Glenbrook, NV
141811412018	SHORT RD	Glenbrook, NV
141811412017	SHORT RD	Glenbrook, NV
141811412017	SHORT RD	Glenbrook, NV
141811312001	LINCOLN HY	Glenbrook, NV
141811312001	LINCOLINIII	Glenbrook, NV
141811311013		Glenbrook, NV
141811311013	LINCOLN HY	Glenbrook, NV
	LINCOLN HY	•
141811412007	LINCOLIN IT	Glenbrook, NV

APN	Street	Town
141811311014		Glenbrook, NV
141811412003	LINCOLN HY	Glenbrook, NV
141811412004	LINCOLN HY	Glenbrook, NV
141811311011		Glenbrook, NV
141811311012		Glenbrook, NV
141810802004	GLENBROOK RD	Glenbrook, NV
141811311002	PRAY MEADOW RD	Glenbrook, NV
141811311001	PRAY MEADOW RD	Glenbrook, NV
141811301001	LINCOLN HY	Glenbrook, NV
141811301002	LINCOLN HY	Glenbrook, NV
141811303003	THE BACK RD	Glenbrook, NV
141811303004	THE BACK RD	Glenbrook, NV
141811302001	LINCOLN HY	Glenbrook, NV
141811412028		Glenbrook, NV
141811412028		Glenbrook, NV
141811412030		Glenbrook, NV
141811412030		Glenbrook, NV
ROW		Glenbrook, NV
ROW		Glenbrook, NV
141811412016	SHORT RD	Glenbrook, NV
141811412016	SHORT RD	Glenbrook, NV
141811412014	SHORT RD	Glenbrook, NV
141811412014	SHORT RD	Glenbrook, NV
141811411001		Glenbrook, NV
141811411001		Glenbrook, NV
141811401001	OLD HWY 50	Glenbrook, NV
141811401001	OLD HWY 50	Glenbrook, NV
141811412015	SHORT RD	Glenbrook, NV
141811412015	SHORT RD	Glenbrook, NV
141811312001	LINCOLN HY	Glenbrook, NV
141811312001	LINCOLN HY	Glenbrook, NV

APPENDIX B Brief Soil Descriptions

7161 - Kingsbeach stony sandy loam, 2 to 15 percent slopes Composition

Setting

Landform(s)alluvial fans, lake terraces, mountainsSlope2 to 15 percentElevatio6217 to 6709 feetAir temperature: 41 to 46 °FPrecipitatio23 to 33 inchesFrost-free30 to 80 days

Characteristics of Kingsbeach and similar soils

Average total a	vail. water in top five feet 10.1	Soil loss tolerance (T 5	
Available water	capacity High	Wind erodibility group 7	
Parent	alluvium and/or colluvium derived from	Wind erodibility index 38	
	andesite over lacustrine deposits	Land capability class, irrigated:	
Restrictive	none	Land capability class, non-	4e
Depth to Water	60 inches	Hydric soil: no	
Drainage	moderately well drained	Hydrologic D	
Flooding	none	Runoff class: medium	
Ponding	none	Potential frost moderate	

Saturated hydraulic conductivity Moderately Low

Representative soil profile:

Horizon [Depth (inches)	Texture	Ksat	рН	Salinity (mmhos/cm)	SAR
Oi	0 to 1	Slightly decomposed plant	56.7		0 - 0	0 - 0
A	1 to 6	Stony sandy loam	4.0	5.1 to 6.5	0 - 0	0 - 0
Bt1	6 to 20	Loam	0.4	5.1 to 6.5	0 - 0	0 - 0
2Bt2	20 to 30	Sandy clay loam	0.0	5.1 to 6.5	0 - 0	0 - 0
2C	30 to 61	Clay loam	0.0	5.1 to 6.5	0 - 0	0 - 0

Ecological class(es): NRCS Forestland Site - Abies concolor-Pinus lambertiana/Quercus vacciniifolia-Amelanchier utahensis/Pyrola picta

[°]Kingsbeach and similar soils: 80 percent of the unit °Tahoma and similar soils: 10 percent of the unit

[°]Jorge, very gravelly sandy loam and similar soils: 8 percent of the unit

[°]Beaches: 1 percent of the unit °Dunes: 1 percent of the unit

9011 - Oxyaquic Cryorthents-Aquic Xerorthents-Tahoe complex, 0 to 15 percent slopes Composition

Setting

Landform(s) drainageways, mountains Slope 0 to 15 percent Elevatio 6217 to 8793 feet Air temperature: 39 to 46 °F Precipitatio 23 to 61 inches Frost-free 20 to 75 days

Characteristics of Oxyaquic Cryorthents and similar soils

Average total avail. water in top five feet Soil loss tolerance (T Available water capacity Wind erodibility group 8 Parent alluvium and/or colluvium derived from Wind erodibility index 0 Land capability class, irrigated: Restrictive none Land capability class, non-Depth to Water 29 inches 6w Hydric soil: no Drainage somewhat poorly drained

Hydrologic Flooding frequent Runoff class: high **Ponding** none

Potential frost low

Saturated hydraulic conductivity High

Representative soil profile:

						Ksat	рН	Salinity (mmhos/cm)	SAR
Ho	rizon -	D	epth (inches)	Texture				
	Oe		0 t	0 0	Moderately	42.5		0 - 0	0 - 0
					decomposed plant				
					material				
	Α1		0 t	0 2	Gravelly loamy	7.1	5.1 to 6.5	0 - 0	0 - 0
					coarse sand				
	A2		2 t	0 5	Gravelly loamy	7.1	5.1 to 6.5	0 - 0	0 - 0
					coarse sand				
	Bw		5 t	o 9	Gravelly loamy	7.1	5.1 to 6.5	0 - 0	0 - 0
					coarse sand				
	C1		9 t	o 20	Gravelly loamy	7.1	5.1 to 6.5	0 - 0	0 - 0
					coarse sand				
	C2		20 t	o 32	Very gravelly	7.1	5.1 to 6.5	0 - 0	0 - 0
					loamy coarse sand				
	C3		32 t	o 52	Very gravelly	10.6	5.1 to 6.5	0 - 0	0 - 0
					coarse sand				
	C4		52 t	o 80	Coarse sand	10.6	5.1 to 6.5	0 - 0	0 - 0
	C5		80 t	o 112	Coarse sand	10.6	5.1 to 6.5	0 - 0	0 - 0

Ecological class(es): NRCS Forestland Site - Populus tremuloides-Abies concolor/Elymus

Characteristics of Aquic Xerorthents and similar soils

Average total avail. water in top five feet Soil loss tolerance (T 4 Available water capacity Wind erodibility group Moderate 8 Parent alluvium and/or colluvium derived from Wind erodibility index 0 Land capability class, irrigated: Restrictive none Depth to Water 29 inches Land capability class, non-

Drainage poorly drained Hydric soil: no Hydrologic Flooding frequent Runoff class: high **Ponding** none

> Potential frost moderate

Saturated hydraulic conductivity High 6w

Oxyaguic Cryorthents and similar soils: 30 percent of the unit

[°]Aguic Xerorthents and similar soils: 28 percent of the unit

[°]Tahoe, gravelly and similar soils: 15 percent of the unit

[°]Bidart, mucky silt loam and similar soils: 10 percent of the unit

[°]Watah and similar soils: 10 percent of the unit

^oMarla and similar soils: 5 percent of the unit

[°]Riverwash: 2 percent of the unit

Representative soil profile:

		Ksat	рН	Salinity (mmhos/cm)	SAR
Horizon Depth (inches)	Texture				
Oe 0 to 0	Moderately decomposed plant material	42.5		0 - 0	0 - 0
Oa 0 to 1	Highly decomposed plant material	21.3	5.0 to 6.5	0 - 0	0 - 0
A1 1 to 4	Sandy loam	7.1	5.0 to 6.5	0 - 0	0 - 0
A2 4 to 9	Sandy loam	7.1	5.0 to 6.5	0 - 0	0 - 0
C1 9 to 14	Coarse sandy loam	7.1	5.0 to 6.5	0 - 0	0 - 0
C2 14 to 29	Sandy loam	7.1	5.0 to 6.5	0 - 0	0 - 0
C3 29 to 41	Gravelly sandy	7.1	5.0 to 6.5	0 - 0	0 - 0
C4 41 to 45	Loamy coarse sand	7.1	5.0 to 6.5	0 - 0	0 - 0
C5 45 to 59	Sandy loam	7.1	5.0 to 7.3	0 - 0	0 - 0

Ecological class(es): NRCS Forestland Site - Populus tremuloides-Abies concolor/Elymus

Characteristics of Tahoe, gravelly and similar soils

			J	
Average total a	vail. water in top five fe	et 5.5	Soil loss tolerance (T 5	
Available water	capacity Low		Wind erodibility group 8	
Parent	alluvium derived from	granitic and volcani	ic Wind erodibility index 0	
	rock		Land capability class, irrigated:	
Restrictive	none		Land capability class, non-	6w
Depth to Water 6 to 39 inches			Hydric soil: yes	
Drainage	poorly drained		Hydrologic B/D	
Flooding	occasional		Runoff class: very high	
Ponding	occasional		Potential frost high	
Saturated hydra	aulic conductivity	High	_	
Representative	e soil profile:	•		

		Ksat	рН	Salinity (mmhos/cm)	SAR
Horizon Depth (inches)	Texture		•	,	
A1 0 to 10	Mucky gravelly silt loam	4.0	5.1 to 7.3	0 - 0	0 - 0
A2 10 to 27	Gravelly loam	4.0	5.1 to 7.3	0 - 0	0 - 0
Cg1 27 to 32	Gravelly loamy fine sand	22.0	5.1 to 7.3	0 - 0	0 - 0
Cg2 32 to 46	Gravelly fine sand	22.0	5.1 to 7.3	0 - 0	0 - 0

Ecological class(es): NRCS Rangeland Site - Gravelly Flats

APPENDIX C Wetland Delineation

GLENBROOK CREEK RESTORATION PROJECT

Jurisdictional Delineation Report



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1.0 INTRODUCTION

This report presents the results of a preliminary jurisdictional delineation study conducted on the site of the proposed Glenbrook Creek Restoration Project (Project) located approximately 49 miles southwest of Reno and 10 miles north of Stateline, Nevada in northwestern Douglas County, Nevada (Figure 1). The Study Area includes a 2.71-acre section of Glenbrook Creek where it passes under Old U.S. Route 50 via culvert in the Glenbrook community. The Nevada Tahoe Conservation District (NTCD) has requested this study to determine the location and extent of wetland or water features potentially subject to regulation by the U.S. Army Corps of Engineers (Corps) under Section 404 of the Federal Clean Water Act (CWA). The results of this study are considered to be preliminary until they are verified by the respective regulatory agencies and/or permits for impacts to the features are authorized by such agencies.

1.1 Directions to the Study Area

1. From I-80 E in central Reno, take exit 15 to merge onto U.S.-395 S toward Carson City. Drive 10.1 mi then take exit 57B to merge onto U.S.-395 S/S Virginia St toward Virginia City/Carson City/So Lake Tahoe. Continue to follow U.S.-395 S for 17.7 mi then take exit 43 for U.S. 395 Business/North Carson Street for 0.6 mi. Merge onto N Carson St and after 5.6 mi, turn right onto U.S.-50 W/Lincoln Hwy. Drive 12.6 mi and take a sharp right onto Old U.S. Route 50 (restricted usage road). Follow for 0.6 mi to arrive at the Glenbrook Creek crossing.

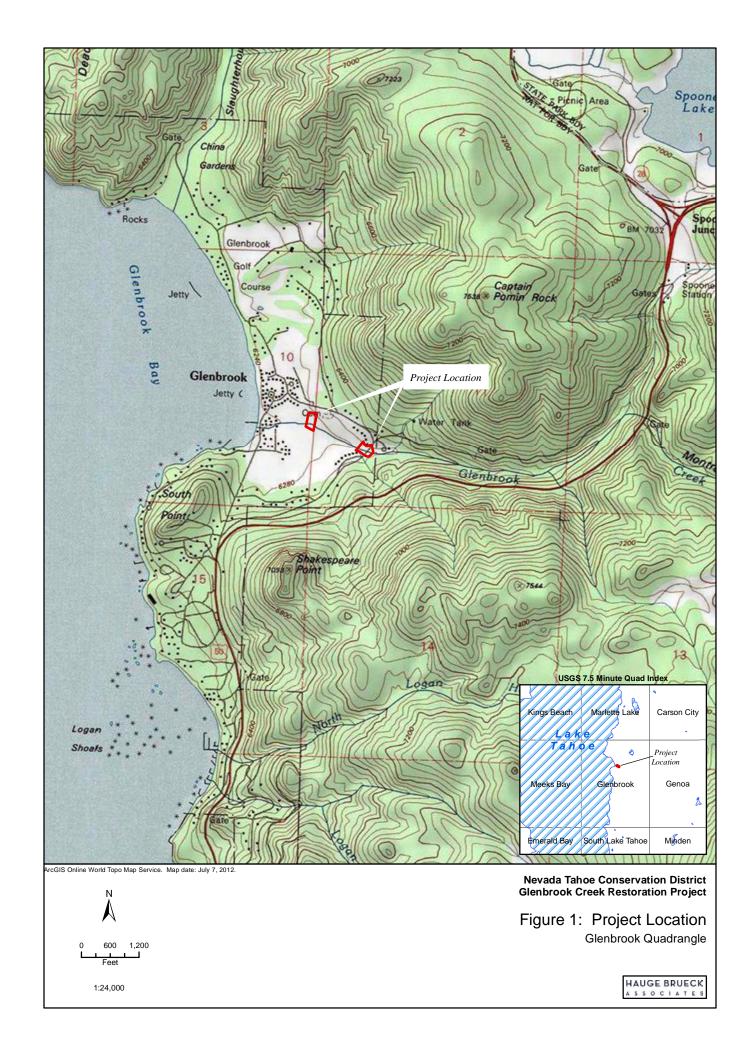
1.2 Contact Information

Meghan Kelly, P.E. Nevada Tahoe Conservation District 400 Dorla Court, P.O. Box 915 Zephyr Cove, NV 89448 Phone: (775) 586-1610 ext. 30

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1.3 Project Description

The Project is a stream and meadow restoration proposed by NTCD to improve channel morphology and function as well as fish and wildlife habitat for Glenbrook Creek. The project proposes to restore approximately 300 linear feet of stream by removing two culverts, replacing one with an arch culvert that allows fish passage, constructing a section of new channel, and stabilizing portions of the existing channel. Construction is slated to occur in the Fall of 2012.



2.0 REGULATORY SETTING

The regulations pertaining to this preliminary delineation study are summarized below and include Waters of the U.S., regulated by Section 404 of the Clean Water Act (CWA), and Waters of the State regulated through (1) Section 401 of the CWA regulating water quality within Waters of the U.S. by the Nevada Department of Conservation and Natural Resources-Department of Environmental Protection (NDCNR-DEP), Bureau of Water Pollution Control and (2) Section 208 of the Clean Water Act by the Tahoe Regional Planning Agency (TRPA).

2.1 Waters of the U.S.

2.1.1 Section 404 of the Clean Water Act

The objective of the CWA is to maintain and restore the chemical, physical, and biological integrity of the Waters of the United States (33 CFR Part 328 Section 328.4). U.S." is the encompassing term for areas that qualify for federal regulation under Section 404 of the CWA. Section 404 of the CWA gives the U.S. Environmental Protection Agency (EPA) and the Corps regulatory and permitting authority regarding discharge of dredged or fill material into "navigable waters of the United States." Section 502(7) of the CWA defines navigable waters as "waters of the United States, including territorial seas." Section 328 of Chapter 33 in the Code of Federal Regulations (CFR) defines the term "waters of the United States" as it applies to the jurisdictional limits of the authority of the Corps under the CWA. A summary of this definition of "waters of the U.S." in 33 CFG 328.3 includes (1) waters used for commerce and subject to tides; (2) interstate waters and wetlands; (3) "other waters" such as intrastate lakes, rivers, streams, and wetlands; (4) impoundments of waters; (5) tributaries of waters; (6) territorial seas; and (7) wetlands adjacent to waters. Therefore, for purposes of determining Corps jurisdiction under the CWA, "navigable waters" as defined in the CWA are the same as "waters of the U.S." defined in the Code of Federal Regulations above. Waters of the U.S. include non-isolated "wetlands" and "other waters of the U.S."

Other waters of the U.S. refer to unvegetated waterways and other water bodies with a defined bed and bank, such as drainages, creeks, rivers, and lakes. This approximately translates to the bank to bank portion of water bodies, up to the ordinary high water mark (OHWM). "Other waters" typically lack hydrophytic vegetation (defined below) and may also lack hydric-soils (defined below). Jurisdiction in non-tidal areas extends to the OHWM, which is defined as:

"...that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impresses on the bank, shelving, changes in the characteristics of the soil, destruction of terrestrial vegetation, the presence of litter and

debris, or other appropriate means that consider the characteristics of the surrounding areas".

CFR 328.3 (e) [51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993]

Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (CFR 328.3, CFR 230.3).

The Corps developed field methods for identifying the location and extent of jurisdictional wetlands (a subset of Waters of the United States) using the Corps Wetland Delineation Manual (Environmental Laboratory 1987). Recently, the Corps issued the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, Version 2.0 (Western Mountain Region Supplement [WMRS]) (Corps 2010) in May 2010. This supplement was intended to address specific wetland issues within the Western Mountain and coastal regions and supersedes much of the 1987 Wetland Delineation Manual.

2.1.2 Significant Nexus of Tributaries

On June 5, 2007, the Corps and the EPA issued joint guidance on implementing the June 19, 2006 U.S. Supreme Court opinions resulting from *Rapanos v. United States* and *Carabell v. United States* (Rapanos) cases (Corps 2007). The agencies received 66,047 public comments on the Rapanos Guidance (65,765 form letters, 282 non-form letters), from States, environmental and conservation organizations, regulated entities, industry associations, and the general public. EPA and the Corps jointly reviewed the comments and released a revised version of the guidance on December 2, 2008 (Corps 2008). The revised guidance states that the agencies will assert jurisdiction over:

- Non-navigable tributaries that are not relatively permanent, where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months);
- Wetlands adjacent to non-navigable tributaries that are not relatively permanent; and
- Wetlands adjacent to but that do not directly abut a relatively permanent non navigable tributary.

The agencies generally will not assert jurisdiction over the following features:

- Swales or erosional features (e.g., gullies, small washes characterized by low volume, infrequent, or short duration flow)
- Ditches (including roadside ditches) excavated wholly in and draining only uplands and that do not carry a relatively permanent flow of water

The agencies will apply the significant nexus standard as follows:

- A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters.
- Significant nexus includes consideration of hydrologic and ecologic factors.

2.1.3 Isolated Areas Excluded from Section 404 Jurisdiction

In addition to areas that may be exempt from Section 404 jurisdiction, some isolated wetlands and waters may also be considered outside of Corps jurisdiction as a result of the Supreme Court's decision in Solid Waste Agency of Northern Cook County (SWANCC) v. United States Army Corps of Engineers (531 U.S. 159 [2001]). Isolated wetlands and waters are those areas that do not have a surface or groundwater connection to, and are not adjacent to a navigable "Waters of the U.S.," and do not otherwise exhibit an interstate commerce connection.

2.2 Waters of the State

2.2.1 Section 401 of the Federal Clean Water Act

Section 401 of the Clean Water Act gives the State Board and Regional Boards the authority to regulate, through water quality certification, any proposed federally-permitted activity which may result in a discharge to water bodies, including wetlands. Among such activities are discharges of dredged or fill material permitted by the U.S. Army Corps of Engineers under 404 of the CWA such as navigational dredging, flood control channelization, levee construction, channel clearing, and fill of wetlands or other water bodies for land development. The State may issue, with or without conditions, or deny certification for activities which may result in such discharges. Nevada Department of Conservation and Natural Resources-Department of Environmental Protection (NDCNR-DEP), Bureau of Water Pollution Control oversees development and implementation of water quality standards, 401 water quality certification, and monitoring, among other activities. NDCNR-DEP issues discharge permits, enforces the state's water pollution control laws and regulations, and provides technical and financial assistance to dischargers.

2.2.2 Section 208 of the Federal Clean Water Act

In 1988 the states of California and Nevada and the United States Environmental Protection Agency (USEPA) adopted the Tahoe Regional Planning Agency (TRPA) Water Quality Management Plan for the Lake Tahoe Basin (TRPA 1988), commonly referred to as the 208 Plan. The 208 Plan identifies water quality problems, proposes solutions or mitigation measures, identifies those entities responsible for implementing solutions, and determines

agencies or jurisdictions responsible for enforcement. TRPA was designated by California, Nevada, and the USEPA as the area wide water quality planning agency under Section 208 of the federal Clean Water Act. Through the 208 Plan, TRPA regulates development and disturbance of Stream Environment Zones (SEZs) within the Lake Tahoe Basin. TRPA defines a stream environment zone as a biological community that derives its characteristics from the presence of surface water or a seasonal high groundwater table. SEZs exhibit the ability to rapidly incorporate nutrients into the usually dense vegetation and moist to saturated soils. SEZs are riparian areas identified by the presence of at least one key indicator or three secondary indicators (TRPA Code Section 37.3.B). No additional land coverage or other permanent land disturbance shall be permitted in SEZs unless an exception is made.

2.2.3 Nevada Administrative Code

Water quality classifications are available in Nevada Administrative Code Chapter 445A, which identifies class waters, i.e., smaller perennial streams that are tributaries to the large rivers in the state. The classification process is ongoing, and not all water bodies have been classified. Water bodies are classified according to their quality and potential beneficial uses. The classification is one criterion used in defining the water quality standards and protections that apply to the streams. The classes range from "A" (highest quality) to "D" (lowest quality). The waters are also identified as trout or non-trout waters. Class designations are assigned to specific segments. The classifications of the streams are currently being revised by the Nevada Division of Environmental Protection and are unavailable at this time.

3.0 STUDY METHODOLOGY

The study methods utilized in the preparation of this report included a background information review and multiple site visits to collect pertinent wetland field data. Prior to conducting the initial field visit a 200-scale color aerial photograph of the Study Area and USGS topographic maps were assessed to determine the locations of potential areas of federal and state jurisdiction. Suspected jurisdictional areas were then field-checked and or sampled for the presence of wetland vegetation, soils, and hydrology. The presence of potentially jurisdictional features on the site was evaluated using the Corps methodologies as described below.

3.1 Background Information Review

Prior to conducting field studies, available reference materials were reviewed including but not limited to:

- Soil Survey of Tahoe Basin Area, California, (USDA NRCS 2007);
- National Hydric Soils List (USDA NRCS 2012);
- Regional Climate Data (National Oceanic and Atmospheric Administration [NOAA] 2012 and USDA 2012); and
- National Wetland Inventory (NWI) Map Data (USFWS 2012) for the Glenbrook 7.5
 Minute USGS quadrangle that characterize wetland and waters of the United States
 according to the Classification of Wetlands and Deepwater Habitats of the United States
 developed by USFWS (Cowardin et al. 1979).

3.2 Field Investigation

3.2.1 Site Visits

On May 31 and June 28, 2012 Amy Parravano and Garth Alling from Hauge Brueck Associates (HBA), conducted a jurisdictional delineation in accordance with the Corps methodologies described below. The extent of potentially jurisdictional waters and wetlands was mapped, quantified, and characterized.

3.2.2 Corps Delineation Methodology

Surveys of the Study Area were conducted using the wetland delineation methodology provided by the Corps in their WMRS to the Wetland Delineation Manual (Corps 2010). This methodology involves observing and recording specific data on wetland vegetation, soils and hydrology. In addition, delineation of non-wetland, "other water" features was conducted according to methodology outlined in the WMRS.

3.2.2.1 Wetlands

The Study Area was evaluated for the presence of potential jurisdictional wetlands according to the WMRS manual. According to the Corps wetland delineation methodology, a wetland must exhibit the following: (1) a prevalence or dominance of hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. These characteristics are defined and described in further detail below.

Hydrophytic Vegetation. Plant species identified on the Study Area were assigned a wetland status according to the U.S. Fish and Wildlife (USFWS) list of plant species that occur in wetlands (Lichvar and Kartesz 2009). This wetland classification system is based on the expected frequency of occurrence in wetlands as shown in Table 1.

Table 1.	Classification	of Wetland-Associated	Plant Species	(Lichvar and Kartesz 2009)

Abbreviation	Plant Species Classification	Probability of Occurring in a Wetland
OBL	Always found in wetlands	>99%
FACW (±)	Usually found in wetlands	67-99%
FAC	Equal in wetland or non-wetlands	34-66%
FACU	Usually found in non-wetlands	1-33%
UPL	Upland	<1%
NI	No indicator status	Insufficient information to determine status
NL	Plants that are not listed (assumed upland species)	Does not occur in wetlands in any region

The WMRS (Corps 2010) requires that a three-step process be conducted to determine if hydrophytic vegetation is present. The procedure first requires the delineator to apply the "50/20 rule" (Indicator 1) described in the manual. To apply the "50/20 rule", dominant species are evaluated within each herb, shrub, and tree stratum of the community. In general, dominants are the most abundant species that individually or collectively account for more than 50 percent of the total coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total. If greater than 50 percent of the dominant species can be classified by an OBL, FACW, or FAC wetland indicator status, ignoring + and qualifiers, hydrophytic vegetation is present.

If the community passes Indicator 1 then the community is hydrophytic. If the community fails Indicator 1 and both hydric soils and wetland hydrology are not present, then hydrophytic vegetation is not present, unless the site is a problematic wetland situation. However, if the

plant community fails Indicator 1 but hydric soils and wetland hydrology are both present, the delineator must apply Indicator 2.

Indicator 2 is known as the Prevalence Index. The prevalence index is a weighted average of the wetland indicator status for all plant species within the sampling plot. Each indicator status is given a numeric code (OBL = 1, FACW = 2, FAC = 3, FACU = 4, and UPL = 5). Indicator 2 requires the delineator to estimate the percent cover of each species in every stratum of the community and sum the cover estimates for any species that is present in more than one stratum. All species are then organized into groups according to their wetland indicator status and the Prevalence Index is calculated using the following formula:

$$A_{OBL} + 2A_{FACW} + 3A_{FAC} + 4A_{FACU} + 5A_{UPL}$$

$$PI = A_{OBL} + A_{FACW} + A_{FAC} + A_{FACU} + A_{UPL}$$

The Prevalence Index will yield a number between 1 and 5. If the Prevalence Index is equal or less than 3, hydrophytic vegetation is present. However, if the community fails Indicator 2, the delineator must proceed to Indicator 3.

Indicator 3 is known as Morphological Adaptations. Some hydrophytes in the Western Mountain Region develop easily recognized physical characteristics (or morphological adaptations) when they occur in wetland areas. Some of these adaptations may include, but are not necessarily limited to, adventitious roots and shallow root systems developed on or near the soil surface. If more than 50 percent of the individuals of a FACU species exhibit morphological adaptations for life in wetlands, that species is considered to be a hydrophyte and its wetland indicator status should be reassigned to FAC. If such observations are made, the delineator must recalculate Indicator 1 and 2 using a FAC indicator status for this species. The vegetation is hydrophytic if either test is satisfied.

Hydric Soils. The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (U.S. Department of Agriculture [USDA], Soil Conservation Service [SCS] 1994). Nearly all hydric soils exhibit characteristic morphologies that result from repeated periods of saturation or inundation for more than a few days, including redoximorphic features such as orange oxidized mottles or light-colored (high value, low chroma) reduced matrix or mottle colors.

The WMRS (Corps 2010) contains a list of 23 hydric soil indicators that are known to occur in the Western Mountain region. Soils samples were collected and described according to the methodology provided in the WMRS. Soil chroma and values were determined by utilizing a standard Munsell soil color chart (Kollmorgen Instruments Corporation 1994). Hydric soils were

determined to be present if any of the soils samples met one or more of the 23 hydric soil indicators described in the WMRS (Corps 2010).

Wetland Hydrology. Wetland hydrology exists in areas that are periodically inundated or have saturated soils at some time during the growing season, and for a sufficient duration to support hydrophytic vegetation (Environmental Laboratory 1987). This condition can either be observed through direct observation of primary indicators (such as ponding, saturation, sediment deposits, algal matting), or through indirect or "secondary" indicators (such as drainage pattern, saturation visible on an aerial photograph, raised ant mounds).

3.2.2.2 Other Waters

For non-wetland, "other water" features, the extent of the Corps jurisdiction is defined by the OWHM. Delineation of other waters was based on observing indicators for the OHWM (33 CFR 328.3), following established Corps criteria and considering hydrological connectivity or isolation. In general, the OHWM for a stream is usually determined through an examination of the recent physical evidence of surface flow. Common physical characteristics that indicate the presence of an OHWM include, but are not limited to, a clear natural line impressed on the bank; evidence of scour; recent bank erosion; destruction of native terrestrial vegetation; sediment deposition; and the presence of litter and debris.

4.0 ENVIRONMENTAL SETTING

The Study Area consists of undeveloped parcels owned by the Glenbrook Home Owners Associate (GHOA) located in Douglas County in the community of Glenbrook, Nevada (Figure 1). The site can be found within Section 11 of Township 14 North and Range 18 East of the Mount Diablo Baseline Meridian, in the Glenbrook 7.5-minute USGS topographic quadrangle. The Study Area is gently sloped to the west, draining into the Glenbrook Bay along the eastern shore of Lake Tahoe at an approximate elevation range of 6,260 to 6,270 feet above mean sea level (msl). To conform with the Corps' delineation map scale requirements, the Study Area has been divided in into two sub-areas that trend from west to east that encompass areas where creek restoration work has been proposed: Study Area West Section (Study Area West) and Study Area East Section (Study Area East). These sub-areas are shown on jurisdictional delineation maps provided as Appendices B1 and B2.

4.1 Vegetation

Vegetation communities characteristic of upland areas within the Study Area include upper montane mixed coniferous forest, ruderal grassland, and yellow rabbitbrush (Chrysothamnus viscidiflorus ssp. viscidiflorus) scrub. Within Study Area East, located immediately upstream of the culvert crossing under Old U.S. Route 50, mixed upper montane coniferous forest occurs along eastern boundaries and is dominated by Jeffrey pine (Pinus jeffreyi) and white fir (Abies concolor). Common forest understory shrub species include mugwort (Artemisia douglasiana), wood rose (Rosa woodsii), Coaltown sagebrush (Artemisia cana), bitterbrush (Purshia tridentata), wax currant (Ribes cereum), yarrow (Achillea millefolium), Gray's lupine (Lupinus grayi), snowberry (Symphoricarpos rotundifolius), and mule's ears (Wyethia mollis). Yellow rabbitbrush scrub occurs along divergent side slopes leading down to the Glenbrook Creek flood plain on the downstream side of the culvert crossing and along north and south facing slopes adjacent to Study Area West. A band of upland ruderal grassland occurs between shrub-dominated hillslopes and the creek channel. Ruderal grassland vegetation supports a mix of the following species: yellow salsify (*Tragopogon dubius*), squirreltail (*Elymus elmoides*), beardless wildrye (Elymus triticoides), orchard grass (Dactlyis glomerata), smooth brome (Bromus inermis ssp. inermis), cheat grass (Bromus tectorum), blue wildrye (Elymus glaucus), corn flower (Centaurea cyanus), prickly lettuce (Lactuca serriola), bull thistle (Cirsium vulgare), cow parsnip (Heracleum maximum), and flix weed (Descurania sophia).

Wetland plant communities along the active floodplain contain a combination of wetlandadapted plants that are sustained by direction saturation or inundation and phreatophytic plants that have a deep root system supported by saturation/inundation as well as groundwater or capillary fringe above the water table in drier summer and fall months. Wetland plant communities in the Study Area can be divided into two general categories: emergent floodplain

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wetlands and riparian floodplain wetlands. A detailed discussion of the plant composition of these communities is provided below in Section 5.1.

4.2 Soils

The USDA Natural Resource Conservation Service (NRCS) has mapped three native soil types within the Study Area. These map units are described in detail below and are illustrated on Figure 2 (USDA, NRCS 2007).

Kingsbeach stony sandy loam, 2 to 15 percent slopes (7161). This soil type is found on moderately sloped upland areas within the Study Area along north and south sides of Glenbrook Creek. This moderately drained soil occurs on alluvial fans and lake terraces and was formed in alluvium and/or colluviums derived from andesite over lacustrine deposits. This map unit is generally comprised of minor components of Tahoma, Jorge, very gravelly sandy loam soil map units. In a typical profile, this soil has a thin (less than one inch) organic layer made up of slightly decomposed plant material. The A horizon is a stony sandy loam to a depth of 6 inches. The B horizon consists of loam to 20 inches and sandy clay loam to 30 inches. The C horizon consists of clay loam down to 60 inches.

Tahoe complex, 0 to 2 percent slopes. This soil type is found within the Study Area at Trout Creek, Herbert Avenue North, and Van Sickle North. This map unit is generally comprised of 55 percent Tahoe silt loam, 25 percent Tahoe silt loam wet and 20 percent minor components such as Marla, Tahoe gravelly, and Watah soils. This poorly drained soil occurs on frequently inundated floodplains and valley flats and was formed in alluvium derived from granitic and volcanic rocks. In a typical profile, this soil is characterized as mucky gravelly silt loam in the upper ten inches, gravelly loam from ten to 27 inches, gravelly loamy fine sand from 27 to 32 inches, and gravelly fine sand from 32 to 46 inches. This soil map unit is classified as hydric, as soil components are poorly drained and/or are frequently ponded or flooded for a long or very long duration during the growing season when they occur in outwash terraces, flood plains, and valley flats (USDA, NRCS 2012).

Oxyaquic Cryorthents-Aquic Xerorthents-Tahoe complex, 0 to 15 percent slopes (9011). This soil type is found along the streambed and lower terrace of Glenbrook Creek in the central portion of the Study Area. This somewhat poorly drained to poorly drained soil occurs in drainageways, floodplains and valley flats and was formed in alluvium and/or colluviums from mixed parent material sources. This map unit is generally comprised of 30 percent oxyaquic cryorthents, 28 percent aquic xerorthents, 15 percent Tahoe, gravelly, and similar soils, and 27 percent minor components. This soil is classified as hydric and contains map unit components that are frequently flooded for long duration or very long duration during the growing season that: (USDA, NRCS 2012).



Soil Description

Kingsbeach stony sandy loam, 2-15% slopes

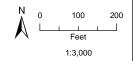
Oxyaquic Cryorthents-Aquic Xerorthents-Tahoe complex, 0-15% slopes

Tahoe complex, 0-2% slopes

Study Area Boundary

Nevada Tahoe Conservation District Glenbrook Creek Restoration Project

Figure 2: Soils



HAUGE BRUECK

Data sources: USDA National Resource Conservation Service Soil Data Mart; USGS National Hydrography Dataset; ESRI StreetMap North America; ArcGIS BING image service. Map date: July 7, 2012.

4.3 Hydrology

The Study Area is situated on a broad alluvial fan that drains into Lake Tahoe to the west. The Study Area is situated entirely within the Glenbrook Creek watershed, which ranges in elevation from 6,245 to 8,000 feet mean sea level (msl). Headwaters of Glenbrook Creek originate in the Carson Range, just below the north side of South Camp Peak in Toiyabe National Forest at approximately 8000' msl. Glenbrook Creek is a moderate-gradient perennial stream with yearround flows and is mapped as a "blue line" stream by the U.S. Geological Survey (USGS). The creek is conveyed across the Study Area and under Old U.S. Route 50 through an 18-inch diameter culvert, discharging into Lake Tahoe approximately 0.5 mi downstream. The main source of hydrology for wetlands and waters mapped within the Study Area is groundwater that is conveyed through the confined Glenbrook Creek channel and discharged to the ground surface through seasonal fluctuations in the ground water table and direct precipitation (primarily as snow melt). For the purpose of this study, Glenbrook Creek is considered to meet the definition of a relatively permanent water (RPW). Surface and subsurface flows supply the principal source of hydrology for wetlands and waters mapped within the Study Area; all areas mapped as wetlands remain saturated (and in some areas, inundated) for at least 14 days during the growing season.

The Study Area receives between 20 and 35 inches (in) of precipitation a year, with the majority of the precipitation falling during the winter as snow. Based on a preliminary review of precipitation data for the site survey period, a precipitation recorded for the month of May 2012 was 0.12 in and 0.44 in for June 2012; these totals were below the normal monthly averages of 0.81 in for May and 0.75 in for June, according to local rainfall data for the nearest monitoring station in South Lake Tahoe. Annual precipitation in this area for January 1 to June 28, 2012 was 10.73 in, which is well below the average annual range for this area. This information indicates that the hydrology indicators observed during the site surveys (ponding and/or saturation) occurred during a below normal rainfall season (NOAA 2012).

5.0 RESULTS

The entire 2.71-acre Study Area was evaluated for the presence of Waters of the U.S. under Corps jurisdiction, as well as Waters of the State. No portions of the Study Area have been classified as wetlands according to the National Wetland Inventory (NWI) maps (USFWS 2012). The results of jurisdictional site evaluation are described below. Field data were recorded on standard Corps WMRS datasheets provided in Appendix A. Maps in Appendices B1 and B2 depict the extent of potentially jurisdictional areas within Study Area West and East, respectively. A list of plant species observed during the site visits is provided in Appendix C. Representative photographs taken during site surveys to document existing site conditions are provided in Appendix D. Descriptions of potential federal and state jurisdictional waters and wetlands found on the Study Area are provided below.

5.1 Potential Section 404/401 Wetlands

Approximately **0.351 acres** of potential jurisdictional wetlands occur on the Study Area, shown on maps in Appendix B2. The wetlands abut Glenbrook Creek, a perennial stream and Relatively Permanent Water (RPW) that is directly confluent to Lake Tahoe, a Traditional Navigable Waters (TNWs). It is therefore presumed that all features that meet the Corps' wetland criteria within the Study Area will be considered jurisdictional. Potential Section 404 wetlands are classified into two categories based on their vegetation structure (i.e., forested or emergent), plant species composition and wetland indicator status (Lichvar and Kartesz 2009), hydroperiod, and topographic position or landform.

5.1.2 Emergent Floodplain Wetland

Approximately **0.155** acre of emergent floodplain wetland A (refer to Appendix B2) was mapped within Study Area East and is characterized by wetland sample points P4 and P5 (Appendix A). This wetland classification is primarily based on its topographic landform, vegetation structure, and primary hydrology source. These features are perennially saturated to inundated by surface and subsurface flows along the Glenbrook Creek channel. A predominance of perennial OBL and/or FACW-classified wetland vegetation characterized the wetlands along the low stream terrace, such as (*Carex amplifolia*; OBL), *Equisetum arvense*; OBL), (*Equisetum hyemale*; OBL), (*Glyceria elata*; FACW), (*Geum macrophyllum*; FAC), and America speedwell (*Veronica americana*; OBL) and occasional mountain alder saplings in the herb and shrub strata. Depleted Matrix (F3) was the hydric soil indicator found in emergent floodplain wetlands. Wetland hydrology was evidenced by saturation (A3) and oxidized rhizospheres (C3) primary indicators, and drainage patterns (B10) and passing the FAC-neutral test (D5), which are secondary hydrology indicators. Wetland boundaries were defined by the upper edge of the sampled area that exhibited evidence of wetland hydrology, hydric soils and/or a shift to non-hydrophytic vegetation, as evidenced by sample points P2 and P3.

5.1.3 Riparian Floodplain Wetland

Approximately **0.196 acre** of riparian floodplain wetland B was mapped along the lower terrace of the Glenbrook Creek channel in Study Area East and is characterized by sample points P6 through P8 (refer to Appendix A and B2). Riparian wetlands occur on floodplains, springs, seeps, adjacent to running waters, and in other areas with high water tables (Corps 2010). Riparian floodplain wetlands in the Study Area are characterized by stands of mountain alder (Alnus incana; FAC+), creek dogwood (Cornus sericea ssp. sericea; FACU), and shining willow (Salix lasiandra ssp. lasiandra; FACW) that comprised the tree and shrub strata, and a an herbaceous understory of various grasses and forbs, including (but not limited to) common horsetail, rough horsetail, small-fruited bulrush (Scirpus microcarpus; OBL), Idaho fescue (Festuca idahoensis; FACU), Sierra currant (Ribes nevadense; FAC), and arrowleaf groundsel (Senecio triangularis; FACW). Hydric soil indicators observed within riparian wetlands includes Depleted Dark Surface (F7), and Depleted Matrix (F3). These wetlands are supported by vertical fluctuations in the groundwater table (saturation to the ground surface) and direct inundation from the adjacent stream channel during high flow events and by a hillside seep in the southwest corner of wetland B, characterized by sample point P8. Primary wetland hydrology indicators that were observed in these features include Surface Water (A1), High Water Table (A2), and Saturation (A3), as well as Drainage Patterns (B10) and FAC-neutral Test (D5), which are secondary hydrology indicators. Wetland boundaries were interpreted primarily by following drainage-like topography and interpreting a shift in plant species dominance from woody riparian species to upper montane coniferous forest along upland margins.

5.2 Lakes, Ponds and Streams/ Non Tidal Waters/ Other Waters of the U.S.

Approximately **0.074 acre** or **657 linear feet** of non-wetland other waters, Glenbrook Creek and its tributaries, (stream segments 1, 2, 3, 4, and 5 and open water feature W1) was mapped within the Study Area (Appendices B1 and B2). Glenbrook Creek is a Relatively Permanent Water (RPW) and perennial stream that is directly confluent via surface water to Lake Tahoe, a TNW and therefore is considered jurisdictional by the Corps. These non-wetland other water features have a year round flow regime that persists over drier summer months and distinct topography characteristic of Waters of the U.S., and is easily discerned on aerial photographs and USGS maps, indicating the presence of substantial contributing hydrology. The OHWM of Glenbrook Creek ranges from 4 to 6 feet wide and has two 1-foot wide tributaries. The boundaries of other water segments were determined through observation of the Ordinary High Water Mark (OHWM) and bankfull width along the active floodplain. The OHWM was delineated by GPS data collection and topographic data interpretation and measured by the upper limit of standing and/or flowing water, destruction of terrestrial vegetation, scour, well-defined drainage topography, and shelving.

6.0 CONCLUSIONS

6.1 Waters of the U.S. Including Wetlands

A total of 0.425 acre of jurisdictional wetlands and other waters were mapped within the Study Area. The Study Area has two (2) features with positive wetland indicators ranging in size from less than 0.155 acre to 0.196 acre (Table 2). In addition, there are six (6) other water segments ranging from 0.001 acre to 0.034 acre that were actively flowing at the time of the jurisdictional site survey and exhibited evidence of an OHWM. The wetlands abut Glenbrook Creek, an RPW that is confluent to Lake Tahoe. All jurisdictional wetlands have hydric soils characterized by low chroma soils, a predominance of hydrophytic vegetation with FAC, FACW, and/or OBL classified plants, and wetland hydrology characterized by saturation, ponding, drainage patterns, and passing the FAC-neutral test. The area and length of features mapped on-site that meet the definition of jurisdictional wetlands and other waters per Section 404 of the Clean Water Act are listed in Table 2 below.

Table 2. Summary of Potential Section 404 Jurisdictional Areas within the Study Area.

				Area of I Section 404	Potential Jurisdictio	1
Map Feature ID	Wetland/Water Type	Study Area Section	Average Width (ft)	Square Feet (sf)	Linear Feet (If)	Acres (A)
А	Emergent Floodplain	East		6,746		0.155
В	Riparian Floodplain	East		8,528		0.196
Subtotal				15,274		0.351
1	Other Waters	West	4	812	203	0.019
2	Other Waters	East	4	578	144	0.013
3	Other Waters	East	6	1,473	246	0.034
4	Other Waters	East	1	24	24	0.001
5	Other Waters	East	1	40	40	0.001
W1	Other Waters	East		261		0.006
Subtotal		1		3,188	657	0.074
TOTAL				18,462	657	0.425

Impacts to jurisdictional wetlands and waters on site will require a Section 404 permit from the Corps which is being submitted to the Corps concurrent with this report.

6.2 Waters of the State

In conjunction with the Section 404 permit, impacts to all wetlands and waters identified in this report will likely require a Section 401 Water Quality Certification. In Nevada, the Division of Environmental Protection, Bureau of Water Quality Planning (BWQP) is responsible for issuing or denying 401 Water Quality Certification (WQC) for NWPs. Certification is based on a finding that the proposed Section 404 discharge will comply with all pertinent water quality standards. In order to allow certification, special conditions may be required by the State in order to remove or mitigate potential impacts to water quality standards. Such conditions must ultimately be included in the Section 404 permit. In deciding to issue WQC, there needs to be reasonable assurance that the proposed discharge will comply with all applicable State and Federal laws, policies and regulations governing the protection of the beneficial uses of the State's Waters. In determining WQC, the State must make the determination that the NWPs will adequately protect the Waters of the State.

These results are considered to be preliminary until verified by the Corps and/or until any permits are issued by federal and state agencies authorizing activities within this area. The conclusion of this delineation is based on conditions observed at the time of the field surveys conducted on May 31 and June 28, 2012.

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GLENBROOK CREEK RESTORATION PROJECT PRELIMINARY JURISDICTIONAL DELINEATION REPORT	
Appendix A: Corps Delineation Data Forms	

WEILAND DETERMINATION I	DATA FORM -	- Western Wou	untains, Valleys, and Coast Region 1/28/
Project/Site: Glenbrok Creek Res	trationcity		
Applicant/Owner: Glenbrok HOA Investigator(s): Parravano, All	iM Sec		State: NV Sampling Point: Plange: S11, T14N, R18E
			convex, none): CONVEX Slope (%): 1
Subregion (LRR): MCRA 221	Lat: _5 1.	000210	Long: 119 93 (152 Datum: NAD &
Soil Map Unit Name: OCA XT complex, 0-1	210		NWI classification:
Are climatic / hydrologic conditions on the site typical for			(If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology			"Normal Circumstances" present? Yes No
Are Vegetation, Soil, or Hydrology	_ naturally proble	matic? (If n	eeded, explain any answers in Remarks.)
SUMMARY OF FINDINGS – Attach site ma	p showing sa	impling point	locations, transects, important features, etc
Hydrophytic Vegetation Present? Yes	No	Asten Sharans	TOTAL AND BE OF THE PERIOD OF SERVICE WAS TRUCKED
Hydric Soil Present? Yes	No	Is the Sample within a Wetla	
Wetland Hydrology Present? Yes	No		
Remarks: Sample point collecter an bank about c	d w/ih	work a	ivea for outvert removal
VEGETATION – Use scientific names of pla	ants	The Restaurance	Supplies the supplies of the s
VEGETATION - OSC SCIONATIC NATIONS OF PRO-		ominant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:		pecies? Status	Number of Dominant Species
1. Salix lasiandra	25_	FACI	That Are OBL, FACW, or FAC: (A)
2 HINUS INCANA	_20_	V FACI	V Total Number of Dominant
3.		-1-	Species Across All Strata: (B)
4.	45 =	Total Cover	Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)
Sapling/Shrub Stratum (Plot size:)	5	FAC	Prevalence Index worksheet:
2. Salix lasiandra	10	V FACE	Total % Cover of: Multiply by:
3. Alnus incana	10	V FACU	OBL species x 1 =
4. Carnes Since	5	NI	FACW species x 2 =
5. Berberis einnath	2	N'	FAC species x 3 =
	22 =	Total Cover	FACU species x 4 =UPL species x 5 =
Herb Stratum (Plot size:)	15	/ 111	UPL species
1. Glechoma hederada	- 13 -	UPL	
Day a sold of c	6	FACU	Prevalence Index = B/A =
4. Tragopogo dubius		WPL	Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation
5 Galium apanne	<1	FACU	
6. Bromus Inermis	2	FAC	3 - Prevalence Index is ≤3.0¹
7. Elymus tricoides	_ 5	FAC	4 - Morphological Adaptations (Provide supporting
8			data in Remarks or on a separate sheet)
9.		The said was	5 - Wetland Non-Vascular Plants
10:		L. N. — Sportman, etc.	Problematic Hydrophytic Vegetation ¹ (Explain)
11. The second s	117		¹ Indicators of hydric soil and welland hydrology must be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size:		otal Cover	less providence, aguing afacture, eller, beingenet elser set
1		11211 112	Hydrophytic
2.			Vegetation
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Type: C=Concentration, D=E	epletion, RM=Reduced	Matrix, CS=Covered or Coated San	d Grains. ² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ :
Hydric Soil Indicators: (App			
Histosol (A1)		dy Redox (S5)	2 cm Muck (A10) Red Parent Material (TF2)
Histic Epipedon (A2)		ped Matrix (S6) ny Mucky Mineral (F1) (except MLR	아이들이 그 그 그 그래요? 아이는 것이 하는 것이 그는 그 그는 것이 얼마를 하면 하는 것으로 가능이 되었다.
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Sandy Mucky Mineral (S1		eted Dark Surface (F7)	wetland hydrology must be present.
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WETLAND DETERMINATION DA	ATA FORM	– Western Mou	untains, Valleys, and Coast Region 6/28/
Applicant/Owner: Glenbrok Hotal Investigator(s): Paravaro Landform (hillslope, terrace, etc.): MISTOPE Subregion (LRR): MLCA 22 M Soil Map Unit Name: OCAXT (1-15): Are climatic / hydrologic conditions on the site typical for the Are Vegetation, Soil, or Hydrology Are Vegetation, Soil, or Hydrology SUMMARY OF FINDINGS - Attach site map Hydrophytic Vegetation Present? Yes M Hydric Soil Present? Yes M Wetland Hydrology Present? Yes M Persents:	Lat: 39 Lat: 3	ection, Township, Rapid Park Park Park Park Park Park Park Park	NWI classification: (If no, explain in Remarks.) "Normal Circumstances" present? Yes No eeded, explain any answers in Remarks.) locations, transects, important features, etc. d Area nd? Yes No
Upland point I base or discharge from new	culve	of where	re-noted Stream Will
VEGETATION - Use scientific names of plan	nts.		
Tree Stratum (Plot size:) 1	Absolute [Dominant Indicator Species? Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: (A)
3.			Total Number of Dominant Species Across All Strata: (B)
4	=	Total Cover	Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)
Sapling/Shrub Stratum (Plot size:) 1	5	V FAC	Prevalence Index worksheet:
3.			OBL species x 1 = FACW species x 2 =
4.	13.000	The state of the s	FAC species x 3 =
5.		Talal Causa	FACU species x 4 =
Herb Stratum (Plpt size:	=	Total Cover	UPL species x 5 =
1. Heracleum maxmum	15	V FAC	Column Totals: (A) (B)
2. gruiserum arvense	2	one	Prevalence Index = B/A =
3. Allum campanulur		NI	Hydrophytic Vegetation Indicators:
4. Galym triflorum		FACI	
5. Lactura serviola		FAC	
6. Branco inerme	1	FAC	
7. Dactylis glomerata		FACI	4 - Morphological Adaptations (Provide supporting data in Remarks or on a separate sheet)
8.			5 - Wetland Non-Vascular Plants ¹
9		STATE OF THE STATE OF	Problematic Hydrophytic Vegetation ¹ (Explain)
10.	-	VIE L	Indicators of hydric soil and wetland hydrology must
11	21 =	Total Cover	be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size:)		Total Gover	Asia transportation, desiring metallic says has a reasonable
1		The second second	Hydrophytic
2	-	Total Cover	Present? Yes No
% Bare Ground in Herb Stratum	relate built		The second secon
Remarks: Downed nood, cut le	runel	co t no	od chips comprise
the bare grund,			TOTAL TO THE STATE OF THE STATE

0	0	1	•	

Sampling Point: _

file Description: (Describe to the depth	Redox Features	Remarks
Matrix	Color (moist) % Type Loc²	TEXTUIC
Color (moist) -	Color (moist)	> loam
16 7.54R215/3 100		A STATE OF THE PARTY OF THE PAR
10 10	D.C. Share	AND THE REAL PROPERTY OF THE P
	THE RESERVE AND THE PROPERTY OF THE PARTY OF	Carried State of the State of t
	THE WATER BEILD	The Harry Property
Parties of the second s	2/10/2	
		LOVE TO THE SET OF THE
The state of the s	WHO A SHOW IN THE	
	The second of th	All
CONTRACTOR OF THE STREET	The state of the s	Company of the compan
CONTRACTOR OF THE PROPERTY OF THE PARTY OF T	SECTION 31	Grains. ² Location: PL=Pore Lining, M=Matrix.
The second secon	=Reduced Matrix, CS=Covered or Coated Sand LRRs, unless otherwise noted.)	Indicators for Problematic Hydric Soils ³ :
vpe: C=Concentration, D=Depletion, RM=	Reduced Matrix, Co-october	Indicators for Problematic Tyarts
ype: C=Concentration, D=Depletion, RM= ydric Soil Indicators: (Applicable to all		Z GIII WILLER (7110)
Histosol (A1)	Salidy Modern ()	Red Parent Material (TF2)
Histic Epipedon (A2)	Stripped Matrix (S6) Loamy Mucky Mineral (F1) (except MLRA	Very Shallow Dark Surface (TF12)
Black Histic (A3)	Loamy Mucky Mineral (F1) (CXCC)	Other (Explain in Remarks)
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	atation and
Depleted Below Dark Surface (A11)	Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and
Thick Dark Surface (A12)	Redox Dark Surface (F6)	wetland hydrology must be present,
Sandy Mucky Mineral (S1)	Depleted Dark Surface (F7)	unless disturbed or problematic.
Sandy Gleyed Matrix (S4)	Redox Depressions (F8)	and the second of
Restrictive Layer (if present):		. /
		Hydric Soil Present? Yes No
Type:		Hydric Sour Isocom
Depth (inches):		
Soil is not hyd	nic	
Soil is not hyde	nic .	
Soil is not hyde		Secondary Indicators (2 or more required)
Soil is not hyde	ired: check all that apply)	Chained Leaves (B9) (MLRA 1,
Soil is Not NYOU IYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one requi	ired; check all that apply) Water-Stained Leaves (B9) (excep	t Water-Stained Leaves (B9) (MLRA 1,
Soil is not hydusty in the state of the stat	ired; check all that apply) Water-Stained Leaves (B9) (excep MLRA 1, 2, 4A, and 4B)	t Water-Stained Leaves (B9) (MLRA 1, 1, 4A, and 4B) Drainage Patterns (B10)
MYDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one requirements) Surface Water (A1) High Water Table (A2)	ired; check all that apply) Water-Stained Leaves (B9) (excep MLRA 1, 2, 4A, and 4B) Salt Crust (B11)	Water-Stained Leaves (B9) (MLRA 1, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2)
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Wetland Hydrology Indicators: Primary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagen Sparsely Vegetated Concave Surfated Concave Surfat	ired; check all that apply) Water-Stained Leaves (B9) (exception of the property of the prope	Water-Stained Leaves (B9) (MLRA 1, 1, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (Canada
Wetland Hydrology Indicators: Primary Indicators (minimum of one requision of Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagen Sparsely Vegetated Concave Surfaer (B1) Field Observations: Surface Water Present? Water Table Present? Yes Saturation Present? Yes (includes capillary fringe) Describe Recorded Data (stream gauge)	ired; check all that apply) Water-Stained Leaves (B9) (exception of the property of the prope	Water-Stained Leaves (B9) (MLRA 1, 1, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (Canada
Wetland Hydrology Indicators: Primary Indicators (minimum of one requision Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagen Sparsely Vegetated Concave Surfa Field Observations: Surface Water Present? Yes Water Table Present? Yes Saturation Present? Yes (includes capillary fringe) Describe Recorded Data (stream gaug	ired; check all that apply) Water-Stained Leaves (B9) (exception of the property of the prope	Water-Stained Leaves (B9) (MLRA 1, 1, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (Canada
Wetland Hydrology Indicators: Primary Indicators (minimum of one requisions) Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagenty Sparsely Vegetated Concave Surfate (Indicated Concave Surfated Conca	ired; check all that apply) Water-Stained Leaves (B9) (exception of the property of the prope	Water-Stained Leaves (B9) (MLRA 1, AA, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (Canada Saturatio

WETLAND DETERMINATION DA	ATA FORW - Wester	descriptions of the Party and otherwise work or difference of the Windowski ground additional
roject/Site: GCR	City/County: _	Glenbrook Douglampling Date: 5/31
policant/Owner: Glenbrook HDA		State: NV Sampling Point: 13
estigator(s): Parravano, Alli	Section, Town	nship, Range: SI, TIYN, RISC
ndform (hillslope, terrace, etc.): UPPER HER	ale Local relief (c	concave, convex, none): N/ N/ Slope (%): 3
bregion (LRR): MLRA 22 A	_ Lat: 39,08k	0849 Long: -119,932 47 Datum: NAD
il Map Unit Name: OCAXT, 0-1571	Slope	NWI classification:
e climatic / hydrologic conditions on the site typical for the	nis time of year? Yes	
Vegetation, Soil, or Hydrology	significantly disturbed?	Are "Normal Circumstances" present? YesNo
e Vegetation, Soil, or Hydrology	naturally problematic?	(If needed, explain any answers in Remarks.)
JMMARY OF FINDINGS – Attach site map	showing sampling	point locations, transects, important features, etc.
hydrophytic Vegetation Present? Yes	No_V_	lydos Bulk maturalyss, in a pringer of all the summed muses are
with the second section and the second section and the second section	within	Sampled Area a Wetland? Yes No
TORON OF THE PARTY	No	
temarks:		at bacoto uniting the second s
Vala d Sample and t	1- more	errau above flenborox Creek
GETATION – Use scientific names of pla	The second secon	and south to the out.
A CONTRACTOR OF THE PROPERTY O	Absolute Dominant II	
ree Stratum (Plot size:)	% Cover Species?	Status Number of Dominant Species That Are OBL, FACW, or FAC: (A)
A. M. M. M. Hallen St. S.		Total Number of Dominant Species Across All Strata: (B)
	O = Total Cove	Percent of Dominant Species 5 0
apling/Shrub Stratum (Plot size:)	= Total Cove	That Are OBL, FACW, or FAC: (A/B) Prevalence Index worksheet:
		Total % Cover of: Multiply by:
		Total % Cover of. Ividitiply by.
· <u> </u>	<u> </u>	OBL species 2 x 1 = 2
		OBL species $2 \times 1 = 2$ FACW species $10 \times 2 = 20$
THE LINE OF THE UNIT OF THE STATE OF THE STA		OBL species
		OBL species
erb Stratum (Plot size:		OBL species
lerb Stratum (Plot size:		OBL species $3 \times 1 = 2$ FACW species $10 \times 2 = 20$ FAC species $4 \times 3 = 12$ FACU species $9 \times 4 = 36$ UPL species $15 \times 5 = 75$ Column Totals: 42×6 (B)
lerb Stratum (Plot size: Smort 7a Occidentalis Heraglum maximum		OBL species
Jerb Stratum (Plot size: Smort 79 Occidentalis Hraclem maximum		OBL species $3 \times 1 = 2$ FACW species $10 \times 2 = 20$ FAC species $4 \times 3 = 12$ FACU species $9 \times 4 = 36$ UPL species $15 \times 5 = 75$ Column Totals: 42×6 (B)
Hero Stratum (Plot size: Smorth 79 Occidentalis Heraclum maximum Lactrica sernola Equisatum arvense Alnus mana		OBL species
lerb Stratum (Plot size: Smorth 79 Occidentalis Heraclum maximum Lactuca Sernola Equiseum arvense Alnus mana Dactulis alomerata		OBL species $\begin{array}{cccccccccccccccccccccccccccccccccccc$
Herb Stratum (Plot size: Morn Ra Occidentalis Heraclum maximum Lactrica sernola Equisium arvense Alnus mana		OBL species $\begin{array}{cccccccccccccccccccccccccccccccccccc$
Herb Stratum (Plot size: Smorth 79 Occidentalis Heraclum maximum Lactrica sernola Equiselum arvense Alnus incana Dactrilis glomerata taraxalam officinale loa praknsis		OBL species
Lactuca Services Lactuca Services Lactuca Services Lactuca Services Lactuca Services Alnus incana Dactulis alomerata taraxalam officinale loa praknsis		OBL species
lerb Stratum (Plot size: Smort 79 Occidentalis Heraclum maximum Lactrica sermola Equiscum arvense Alnus incana Dactrilis alomerata Taraxacam officinale Poa praknsis		OBL species
Herb Stratum (Plot size: Smort Fa Occidentalis Heracleum maximum Lactuca Sernola Equiseum arvense Alnus meana Dactulis alomerata taraxalam officinale Poa praknsis		OBL species
Herb Stratum (Plot size: Comornita Occidentalis Lactuca Sernola Lactuca	15 V 4 2 10 V I 5 1	OBL species
Heracleum maximum Lactrica sernola Equisitum arvense Alnus mana Dactrilis glomerata	15 V 4 2 10 V I 5 1	OBL species
Herb Stratum (Plot size: - Compact Reg Occidentalis - Lactuca Sernola - Lactuca Sernol	15 V 4 2 10 V I 5 1	OBL species

Sampling Point: P3

ile Description: (Describe to the dep	oth needed to document the indicator or confirm	
Matrix	110007	Texture Remarks
ches) 22 Color (moist) %	Color (moist) % Type Loc	loan
The SUR 2.5/1 100		2000年1月1日 1月1日 1月1日 1月1日 1月1日 1月1日 1日 1
7/100		The state of the second and the said had
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Marie	AND REPORTED TO THE PARTY AND PROPERTY.	The state of the s
	The second secon	Visibility to Sale Sale Sale Sale Sale Sale Sale Sale
Carrier Control of the Control of th		rains. ² Location: PL=Pore Lining, M=Matrix.
D. Davistian D.	M=Reduced Matrix, CS=Covered or Coated Sand G	Indicators for Problematic Hydric Soils ³ :
ype: C=Concentration, D=Depletion, R dric Soil Indicators: (Applicable to a	all I RRs. unless otherwise noted.)	Indicators for Problematic 17
	Sandy Redox (S5)	2 cm Muck (A10)
Histosol (A1)	Stripped Matrix (S6)	Red Parent Material (TF2)
Histic Epipedon (A2)	Loamy Mucky Mineral (F1) (except MLRA 1	Very Shallow Dark Surface (TF12)
Black Histic (A3)	Loamy Gleyed Matrix (F2)	Other (Explain in Remarks)
Hydrogen Sulfide (A4)	Depleted Matrix (F3)	t budeophytic vegetation and
Depleted Below Dark Surface (A11)	Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present,
Thick Dark Surface (A12)	Depleted Dark Surface (F7)	unless disturbed or problematic.
Sandy Mucky Mineral (S1)	Redox Depressions (F8)	unless disturbed of problematic.
Sandy Gleyed Matrix (S4)	Redox Bop. os and	AND SECTION OF THE SE
estrictive Layer (if present):		1/
Type:		Hydric Soil Present? Yes V No
Depth (inches):	but low chroma soils	
remarks: redox prigint,	but low chroma soils	
YDROLOGY Motional Hydrology Indicators:		Secondary Indicators (2 or more required)
YDROLOGY Motional Hydrology Indicators:	nuired: check all that apply)	
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one reco	quired; check all that apply) Water-Stained Leaves (B9) (except	Secondary Indicators (2 or more required)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one reconstructions)	juired; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognitions) Surface Water (A1) High Water Table (A2)	juired; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognized Water (A1) High Water Table (A2) Saturation (A3)	water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognized Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)	water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recompleted of the control of the c	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living	Secondary Indicators (2 or more required) — Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) — Drainage Patterns (B10) — Dry-Season Water Table (C2) — Saturation Visible on Aerial Imagery (C9 Roots (C3) — Geomorphic Position (D2)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognized Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3)	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recomplete of the control of the co	water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognized Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5)	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recomplete Marks (Marks) Water Marks (Marks) Sediment Deposits (Marks) Drift Deposits (Marks) Algal Mat or Crust (Marks) Iron Deposits (Marks) Surface Soil Cracks (Marks)	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
YDROLOGY Wetland Hydrology Indicators: Primary Indicators (minimum of one recognized water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6)	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations:	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR ery (B7) face (B8)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR other (Explain in Remarks) Poeth (inches): Depth (inches): Oxidized Rhizospheres Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7)
Primary Indicators (minimum of one reconstruction (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Water Table Present? Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Popeth (inches): Depth (inches):	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7)
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Water Table Present? Yes Seturation Present? Yes Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Poepth (inches): 722 No Depth (inches): 722 Depth (inches): 722	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Water Table Present? Yes Seturation Present? Yes Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Poepth (inches): 722 No Depth (inches): 722 Depth (inches): 722	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Water Table Present? Yes Seturation Present? Yes Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Popeth (inches): Depth (inches):	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No
Primary Indicators (minimum of one reconstruction of the property of the prope	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Poepth (inches): 722 No Depth (inches): 722 Depth (inches): 722	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No
Primary Indicators (minimum of one reconstruction (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Image Sparsely Vegetated Concave Surfield Observations: Surface Water Present? Water Table Present? Yes Seturation Present? Yes Yes	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) No Depth (inches): 722 No Depth (inches): 722 Ige, monitoring well, aerial photos, previous inspection	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No
Primary Indicators (minimum of one reconstruction of the property of the prope	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils Stunted or Stressed Plants (D1) (LR Other (Explain in Remarks) Poepth (inches): No Depth (inches):	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Roots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3) (C6) — FAC-Neutral Test (D5) R A) — Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7) Wetland Hydrology Present? Yes No

WETLAND DETERMINATION D	DATA FORM -	Western Mou	untains, Valleys, and Coast Region 6/28
Project/Site: GCK		County: 6/e1	1 1 1/1 -1
Applicant/Owner: Flenbrook HoA			State: VV Sampling Point:
20			ange: SII, TIYN, RISE
andform (hillslope, terrace, etc.): mid kr			
ubregion (LRR): MCRA 22A	100 26	.08678	Convex, none): (1) 19.932229 Slope (%): + 1 Long: -119.932229 Datum: NAD
1 CAST IN		00	
oil Map Unit Name:	10 11		NWI classification:
re climatic / hydrologic conditions on the site typical for t		THE WALL TO BE A STATE OF	(If no, explain in Remarks.)
re Vegetation, Soil, or Hydrology			"Normal Circumstances" present? Yes V No
re Vegetation, Soil, or Hydrology			eeded, explain any answers in Remarks.)
UMMARY OF FINDINGS – Attach site map	p showing sar	mpling point	locations, transects, important features, etc
	No	In the Cample	Court of the Decideration of the State of th
The state of the s	No	Is the Sample within a Wetla	
	No	Charles and American	
Creek active frod pl	air,	olbino m	ctland along flenbook
EGETATION – Use scientific names of pla		minnet ledienter	Dominana Test washabast
Tree Stratum (Plot size:)		minant Indicator ecies? Status	Dominance Test worksheet: Number of Dominant Species
. <u> </u>			That Are OBL, FACW, or FAC: (A)
A SEE A SEE AND STREET OF STREET			Total Number of Dominant
· · · · · · · · · · · · · · · · · · ·			Species Across All Strata: (B)
			Percent of Dominant Species 1 17
Sapling/Shrub Stratum (Plot size:)	= To	otal Cover	That Are OBL, FACW, or FAC: 100 (A/B)
			Prevalence Index worksheet:
Charles In the Control of the Contro		1	Total % Cover of: Multiply by:
			OBL species x 1 = FACW species x 2 =
A THE STATE OF THE	-		FAC species x 3 =
			FACU species x 4 =
lerb Stratum (Plot size:)	= To	otal Cover	UPL species x 5 = 100 miles
Equision arvense	28	/ OBL	Column Totals: (A) (B)
Hracleum maximum		FAC	Prevalence Index = B/A =
Urtica diogia	2	FAC	Hydrophytic Vegetation Indicators:
Elymus glaucus		NPL	1 - Rapid Test for Hydrophytic Vegetation
Alnus iniana		FACW	2 - Dominance Test is >50%
Alive campanulatum	_ 41	NI	3 - Prevalence Index is ≤3.0¹
			4 - Morphological Adaptations (Provide supporting
			data in Remarks or on a separate sheet) 5 - Wetland Non-Vascular Plants ¹
0.	- L	V The state of the	Problematic Hydrophytic Vegetation ¹ (Explain)
1. all North Version and Applications in the	Daw V	The state of the s	¹Indicators of hydric soil and wetland hydrology must
	34 = Tol	al Cover	be present, unless disturbed or problematic.
Voody Vine Stratum (Plot size:)		3070	CONTRACTOR OF THE PROPERTY OF
			Hydrophytic
			Vegetation Present? Yes No
·			
6 Bare Ground in Herb Stratum	= Tot	al Cover	

Profile Description	(0)	-value	z ordiores S	STATE OF THE	4-3450	SATA		Sampling Point: PH
Donth		the depth				or confirm	n the absence of indica	tors.)
Depth (inches)	Matrix Color (moist)	%	Color (moist)	x Feature %	Type	Loc ²	Texture	Remarks
2-16 2	5/102,5/1	97	CUP 3/2	3	0	M	siltyloam	HI LE TO THE TOTAL OF THE PARTY
7	17/1		291	0			silialipani	AVVIV
The state of the s		NO HAD	and the state of the state of	and the Samuel		-	THE ENGLISH	West Committee of the C
		-		-	-			N. LAA
						The state of		A STATE OF THE STA
and the same				1	1210		The Real Property of the Parket	
						a remain	Site of all the second	Party Seliment and
		13 Sept.	The Str Str	for all	Harris In	- Service	The Manager of the	THE POST OF THE PROPERTY OF TH
7	THE STREET	C 75 - 20		1 13	-	visita hen	The Property of	Tomas -
Tuno: C-Conson	testion D-Desisti	DM-D		-			2 2	Value of the second
¹ Type: C=Concen Hydric Soil Indica	ators: (Applicable	e to all I F	PRS unless other	ovise not	d or Coate	ed Sand Gr		=Pore Lining, M=Matrix. blematic Hydric Soils ³ :
Histosol (A1)	(_ Sandy Redox (2 cm Muck (A1	
Histic Epipedo	on (A2)		Stripped Matrix				Red Parent Ma	A STATE OF THE PARTY OF THE PAR
Black Histic (A		In all a	Loamy Mucky N		1) (except	t MLRA 1)		Dark Surface (TF12)
Hydrogen Sulf	fide (A4)		Loamy Gleyed			- 15-36	Other (Explain	
	w Dark Surface (A	(11)	Depleted Matrix	(F3)				
Thick Dark Sur		_	Redox Dark Su				³ Indicators of hydro	phytic vegetation and
Sandy Mucky		_	Depleted Dark	The state of the s	7)			gy must be present.
Sandy Gleyed			Redox Depress	ions (F8)			unless disturbed	d or problematic.
Restrictive Layer	(ii present).							
Type:	(ii present).	- 11/2	- Control Control					San San Paris Company
Type:	Epined /	1	- American con-	- 1-	y 2	/	Hydric Soil Present?	
Type:	K'deconpo	xed	om ma	we	can	tent	Hydric Soil Present?	
Type:	Epined /	xed	om ma	He	can	Hent		
Type:	t'deconpu	xed	om ma	ute	can	tent		
Type:	Maleon pa				can	tent	. Low chr	oma soils
Type:	Y Indicators:		heck all that apply)			Low Chr	orna soils ators (2 or more required)
Type:	y Indicators: (minimum of one ro		heck all that apply)	es (B9) (e)		Secondary Indica	ators (2 or more required) and Leaves (B9) (MLRA 1,
Type:	y Indicators: (minimum of one re (A1) ble (A2)		heck all that apply Water-Stair MLRA 1	ned Leave	es (B9) (e)		Secondary Indica Water-Staine 4A, and 4	ators (2 or more required) ad Leaves (B9) (MLRA 1,
Type:	y Indicators: (minimum of one re (A1) ble (A2)		heck all that apply	ned Leave 1, 2, 4A , a	es (B9) (e) nd 4B)		Secondary Indica — Water-Staine 4A, and 4 Drainage Pat	ators (2 or more required) ad Leaves (B9) (MLRA 1, BB)
Type:	y Indicators: (minimum of one re (A1) ble (A2)		heck all that apply Water-Stair MLRA 1	ned Leave 1, 2, 4A, a B11) ertebrates	es (B9) (e) nd 4B) s (B13)		Secondary Indica — Water-Staine 4A, and 4 Drainage Pat — Dry-Season	elors (2 or more required) ed Leaves (B9) (MLRA 1, BB) tterns (B10) Water Table (C2)
Type:	y Indicators: (minimum of one re (A1) ble (A2) 31) osits (B2)		neck all that apply Water-Stair MLRA 1 Salt Crust (Aquatic Inv	ned Leave , 2, 4A, a B11) ertebrates Sulfide Od	es (B9) (e) nd 4B) s (B13) lor (C1)	xcept	Secondary Indica Water-Staine 4A, and 4 Drainage Pal Dry-Season V Saturation Vi	etors (2 or more required) ed Leaves (B9) (MLRA 1, es) tterns (B10) Water Table (C2) sible on Aerial Imagery (C
Type:	y Indicators: (minimum of one re (A1) ble (A2) 31) osits (B2) B3)		neck all that apply Water-Stain MLRA 1 Salt Crust (Aquatic Inv	ned Leave 1, 2, 4A, a B11) ertebrates Sulfide Od hizospher	es (B9) (e) and 4B) s (B13) lor (C1) es along L	xcept _iving Root	Secondary Indica Water-Staine 4A, and 4 Drainage Pat Dry-Season V Saturation Vi	ators (2 or more required) ad Leaves (B9) (MLRA 1, BB) tterns (B10) Water Table (C2) sible on Aerial Imagery (C Position (D2)
Type:	y Indicators: (minimum of one m (A1) ble (A2) 31) osits (B2) B3) ust (B4) B5)		heck all that apply Water-Stain MLRA 1 Salt Crust (Aquatic Inv Hydrogen S	ned Leave 1, 2, 4A, a B11) ertebrates Sulfide Od hizospher f Reduced	es (B9) (e) and 4B) s (B13) for (C1) es along L d Iron (C4)	xcept Living Root	Secondary Indica Water-Staine 4A, and 4 Drainage Pat Dry-Season V Saturation Vi s (C3) — Geomorphic Shallow Aqui	ators (2 or more required) ad Leaves (B9) (MLRA 1, BB) tterns (B10) Water Table (C2) sible on Aerial Imagery (C) Position (D2) ttard (D3)
Type: Depth (inches): Remarks: Primary Indicators (inches): Surface Water High Water Tate Saturation (A3) Water Marks (inches): Sediment Deposits (inches): Algal Mat or Cruling Deposits (inches): Surface Soil Crustian	y Indicators: (minimum of one m (A1) ble (A2) 31) osits (B2) B3) ust (B4) B5)	equired; c	heck all that apply Water-Stain MLRA 1 Salt Crust (Aquatic Inv Hydrogen S Oxidized R Presence o	ned Leave 1, 2, 4A, a B11) ertebrates Sulfide Od hizospher f Reduced Reductio	es (B9) (e) and 4B) s (B13) lor (C1) es along L d Iron (C4) on in Tilled	xcept Living Root) I Soils (C6)	Secondary Indica Water-Staine 4A, and 4 Drainage Pal Dry-Season V Saturation Vi s (C3) — Geomorphic Shallow Aqui FAC-Neutral	ators (2 or more required) ad Leaves (B9) (MLRA 1, BB) tterns (B10) Water Table (C2) sible on Aerial Imagery (C Position (D2) tard (D3)

0,10,0

Yes ____ No ____ Depth (inches): ___

(includes capillary fringe)

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Saturation Present?

Wetland Hydrology Present? Yes

WETLAND DETERMINATION D			
roject/Site: GCR	City	County: Blenb	mole / Druglas Sampling Date: 5/3//12
pplicant/Owner: Slenbrook HOA			State: NV Sampling Point: £5
vestigator(s): Parrowano, Allin	Ø Sed	ction, Township, Rar	nge: SII, TI4N, R18E
adjects (billeless terrans ata): 15.1 +Crra	a la	cal relief (concave, o	convex, none): CM (AVC Slope (%): 4
bregion (LRR): MUA 22A	101 29	086866	Long:119.93243 SDatum:
2011			
	590510	1	NWI classification:
e climatic / hydrologic conditions on the site typical for the		And the same of th	(If no, explain in Remarks.)
e Vegetation, Soil, or Hydrology			Normal Circumstances" present? Yes No
e Vegetation, Soil, or Hydrology	naturally proble	matic? (If ne	eded, explain any answers in Remarks.)
JMMARY OF FINDINGS - Attach site map	showing sa	ampling point le	ocations, transects, important features, etc
Hydric Soil Present? Yes	No No No	Is the Sampled within a Wetlan	
Remarks: Wetland point cille	ted w/h	n activi	ereck floodplain.
GETATION – Use scientific names of pla		Cart Surios File	
ree Stratum (Plot size:)		pecies? Status	Dominance Test worksheet:
ee stratum (Flot size.	70 0000	1	Number of Dominant Species That Are OBL, FACW, or FAC: (A)
			Total Number of Dominant Species Across All Strata: (B)
	=	Total Cover	Percent of Dominant Species That Are OBL, FACW, or FAC: [A/B]
apling/Shrub Stratum (Plot size:)	15	/ FACE	Prevalence Index worksheet:
AINW INCAMA			Total % Cover of: Multiply by:
Ribbs inerme	- 4		OBL species x 1 =
		1999	FACW species x 2 =
CANADA CA	1204/100	College I stated across	FAC species x 3 =
	15 =	Total Cover	FACU species x 4 =
lerb Stratum (Plot size:)			UPL species x 5 =(D)
Carex amplifylia	30	V OBL	Column Totals: (A) (B)
Equisetur arrense	35	OBC	Prevalence Index = B/A =
a faisible hyennie	8	OBL,	Hydrophytic Vegetation Indicators:
Olyuna elata	5	FACW	1 - Rapid Test for Hydrophytic Vegetation
olim macriphyllom		FAC	2 - Dominance Test is >50%
Vennica amencana		OBL	3 - Prevalence Index is ≤3.01
			4 - Morphológical Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
			5 - Wetland Non-Vascular Plants ¹
	A COLUMN TO THE REAL PROPERTY OF THE PERTY O	Chile markets	Problematic Hydrophytic Vegetation¹ (Explain)
0	THE RESERVE OF THE PERSON OF T	- Company of the	Indicators of hydric soil and wetland hydrology must
	80 =	Total Cover	be present, unless disturbed or problematic.
Voody Vine Stratum (Plot size:)		and the second	Hydrophytic
)			Vegetation
% Bare Ground in Herb Stratum 20	F. Charles	Total Cover	Present? Yes No
Remarks: Dominated by obligate	- 11		· · · · · · · · · · · · · · · · · · ·

Depth Matrix	Redox Features Color (moist) % Type Loc²	Texture Remarks
inches) Color (moist) %	Color (moist) % Type Loc2	The state of the s
1-16 SYR 11/1 100	The state of the s	Silty clay loan
	The state of the s	ON PETERSON OF THE STREET
	SHOW THE CALL SHOW THE TAX AND ADDRESS OF	All level to the States recorded to the
COLUMN TOWARD PORTON	THE NAME OF THE PARTY.	ELLAS ALTILIBRA
		CAN BE THE A SECTION OF STREET WITH DESIGNATION OF THE SECTION OF
		The second secon
A ST AND ADDRESS OF THE PARTY O	The state of the s	And approved them are not exceeded to the control of the control o
	did directly by 12 years in the properties.	A STATE OF THE PARTY OF THE PAR
CAN BE SUBSIDE STA	stray as it is markly a continue group with a day.	yprophysikteAapricts
T - C-Consentration D=Depletion PM=	Reduced Matrix, CS=Covered or Coated Sand Gr	rains. ² Location: PL=Pore Lining, M=Matrix.
Type: C=Concentration, D=Depletion, RM- Tydric Soil Indicators: (Applicable to all	RRs. unless otherwise noted.)	Indicators for Problematic Hydric Soils ³ :
	Sandy Redox (S5)	2 cm Muck (A10)
Histosol (A1) Histic Epipedon (A2)	Stripped Matrix (S6)	Red Parent Material (TF2)
Black Histic (A3)	Loamy Mucky Mineral (F1) (except MLRA 1)	Very Shallow Dark Surface (TF12)
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Other (Explain in Remarks)
Depleted Below Dark Surface (A11)	Depleted Matrix (F3)	
Thick Dark Surface (A12)	Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and
Sandy Mucky Mineral (S1)	Depleted Dark Surface (F7)	wetland hydrology must be present, unless disturbed or problematic.
Sandy Gleyed Matrix (S4)	Redox Depressions (F8)	unless disturbed of problematic.
Restrictive Layer (if present):	Company of the Compan	No. was the second and the
Type:		Hydric Soil Present? Yes No
Depth (inches):		Hydric Soil Present? Yes No
Low Choma, sa		
YDROLOGY	winds with the state of the sta	
Wetland Hydrology Indicators:	action 186	THE RESIDENCE OF THE PROPERTY OF THE PARTY O
Primary Indicators (minimum of one required	t; check all that apply)	Secondary Indicators (2 or more required)
Surface Water (A1)	Water-Stained Leaves (B9) (except	Water-Stained Leaves (B9) (MLRA 1, 2
High Water Table (A2)	MLRA 1, 2, 4A, and 4B)	/ 4A, and 4B)
Saturation (A.4)	Salt Crust (B11)	V Drainage Patterns (B10)
Saturation (A3)	Salt Crust (B11) Aquatic Invertebrates (B13)	✓ Drainage Patterns (B10) Dry-Season Water Table (C2)
Water Marks (B1)	Aquatic Invertebrates (B13)	Dry-Season Water Table (C2)
Water Marks (B1) Sediment Deposits (B2)	Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1)	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3)	Aquatic Invertebrates (B13)Hydrogen Sulfide Odor (C1)Oxidized Rhizospheres along Living Ro	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4)	 Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) 	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5)	Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6)	 Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C Stunted or Stressed Plants (D1) (LRR A 	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B	Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C Stunted or Stressed Plants (D1) (LRR A Other (Explain in Remarks)	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B' Sparsely Vegetated Concave Surface (Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C Stunted or Stressed Plants (D1) (LRR A Other (Explain in Remarks)	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B' Sparsely Vegetated Concave Surface (Field Observations:	Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Ro Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C Stunted or Stressed Plants (D1) (LRR A Other (Explain in Remarks)	Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
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WETLAND DETERMINATION	DATA FORM -	Western Mo	untains, Valleys, and Coast Region 🔰 28
Project/Site: GCR	City/	County Do	uglas Sampling Date: 5/31/1;
Applicant/Owner: Glehbrook HOA			State: NV Sampling Point: Pla
A - I - A	ano Sect	ion, Township, R	ange: S11, T14N, R18E
Landform (hillslope, terrace, etc.): were fer	race loc	al relief (concave	convex, none): flat Slope (%): 4
Subregion (LRR): MLRA 22 A	Lat: 39	086787	Long: -119.931724 Datum: NADA
1 1 1 1 m	-1530 slopes	1	NWI classification:
Are climatic / hydrologic conditions on the site typical for		Vas No	(If no, explain in Remarks.)
Are Vegetation, Soil, or Hydrology		and the second	
Are Vegetation, Soil, or Hydrology			eeded, explain any answers in Remarks.)
			locations, transects, important features, etc
Hydrophytic Vegetation Present? Yes			The second like a State of Second like the sec
Hydric Soil Present? Yes	No V	Is the Sample	
Wetland Hydrology Present? Yes	No V	within a Wetla	nd? Yes No V
Non-wetland riparia	n. Point	collec	ted on upper terrace
above creek			ilsurvey of reportore
VEGETATION – Use scientific names of pl			a sove free report put
		ninant Indicator	Dominance Test worksheet:
Tree Stratum (Plot size:)	% Cover Spe		Number of Dominant Species
1 Alnus incana	20 1	FACH	
2. Populus fremuloides	15 'L	FACU	Total Number of Dominant
3.		ALC: PER CONTRACTOR	Species Across All Strata: (B)
4	35		Percent of Dominant Species
Sapling/Shrub Stratum (Plot size:)	= 10	tal Cover	That Are OBL, FACW, or FAC: (A/B)
1. Libis nevadence	1	FAC	Prevalence Index worksheet:
2. Populus tremuloides	5 V	- FACH	Total % Cover of: Multiply by:
3. Alnes incana	3_ L	FAC	OBL species
4.			FAC species
5.	-		FACU species 50 x 4 = 200
Herb Stratum (Plot size:	= Tol	tal Cover	UPL species 20 x 5 = 100
1. Paa paathsis	_30 -	FACU	Column Totals: 104 (A) 359 (B)
2. Equisation arrense	10	OYSL	Prevalence Index = B/A = 3,45
3. Occhylis glorerata	5	UPL	Hydrophytic Vegetation Indicators:
4 Elymis elymids	15	VIL	1 - Rapid Test for Hydrophytic Vegetation
5	<u> </u>	Larad Mr.	2 - Dominance Test is >50%
6	(ext)#	MESS AN EXCENSES	3 - Prevalence Index is ≤3.01
8			4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
9.		District in	5 - Wetland Non-Vascular Plants 6 - Wetland Plants 7 - Wetland Plants 7 - Wetland Plants 7 - Wetland Plants 8 - Wetlants 8 - Wetland Plants 8 - Wetlants 8 - Wetland Plants 8 - Wetlants 8 - Wetland Plants 8 -
10.		T BASE	Problematic Hydrophytic Vegetation ¹ (Explain)
11. Property years and the second sec	make I - 1 and the	in instant is	¹Indicators of hydric soil and wetland hydrology must
	00 = Tota	l Cover	be present, unless disturbed or problematic.
Woody Vine Stratum (Plot size:)			
1.	 	Angelogical Control	Hydrophytic
Δ.		10	Vegetation Present? YesNo
% Bare Ground in Herb Stratum 40	= Tota	l Cover	X 6 1 7 A 4 7 5 A V A T & B & B A .
Remarks:	+.	1	
wetland vig in fina	nol m	11	

-	0		

Sampling Point: Plo

Depth Matrix	Redox Features	
(inches) Color (moist) %	Color (moist) % Type ¹ Loc ²	Texture Remarks
0-16 SYR2/3 100.		Sittlean - coloble
		ALC: XXXXX LOG VIDAL CO.
THE SECOND SECON	Compared the same of the same	The state of the s
		THE PERSON NAMED IN COLUMN
	The state of the s	
	the second second second	SATURDAY TO THE TANK AND A CO.
		and the high south state of the second state o
The state of the s	Not the second of the second o	Company of the compan
The state of the American State of	oplose secretary Propagation Consultation	Taken Geral Tere redund
	and the second second	2 Co. Di Bara Linias Manhartin
ype: C=Concentration, D=Depletion, RM=	Reduced Matrix, CS=Covered or Coated Sand Gra	ains. ² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ :
ydric Soil Indicators: (Applicable to all L		The state of the s
_ Histosol (A1)	Sandy Redox (S5)	2 cm Muck (A10) Red Parent Material (TF2)
_ Histic Epipedon (A2)	Stripped Matrix (S6)	Very Shallow Dark Surface (TF12)
Black Histic (A3)	Loamy Mucky Mineral (F1) (except MLRA 1) Loamy Gleyed Matrix (F2)	Very Shallow Dark Surface (1712) Other (Explain in Remarks)
_ Hydrogen Sulfide (A4) Depleted Below Dark Surface (A11)	Depleted Matrix (F3)	_ curo (Explain in residence)
Thick Dark Surface (A12)	Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and
Sandy Mucky Mineral (S1)	Depleted Dark Surface (F7)	wetland hydrology must be present,
Sandy Gleyed Matrix (S4)	Redox Depressions (F8)	unless disturbed or problematic.
estrictive Layer (if present):		
Type:		
		Hydric Soil Present? Yes No
	dicature observed	Table lights countries through
OROLOGY	dicature observed	and the country tree to
OROLOGY Vetland Hydrology Indicators:		Secondary Indicators (2 or more required)
PROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one required	; check all that apply)	Secondary Indicators (2 or more required)
PROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1)		Secondary Indicators (2 or more required)
PROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required	; check all that apply) Water-Stained Leaves (B9) (except	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2
POROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3)	; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B)
PROLOGY Tetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)	; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2)
PROLOGY Tetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2)	; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS)
PROLOGY Tetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)	; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS)
rDROLOGY retland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3)	; check all that apply) Water-Stained Leaves (B9) (except	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9, 54) (C3) Geomorphic Position (D2) Shallow Aquitard (D3)
remarks: M hydric incomplete in the control of the	; check all that apply) Water-Stained Leaves (B9) (except	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
remarks: M hydric incomplete in the control of the	; check all that apply) Water-Stained Leaves (B9) (except	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) (S) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
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PROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B7 Sparsely Vegetated Concave Surface (Bield Observations: urface Water Present? Vater Table Present? Ves Naturation Present? Yes Naturation Present? Ves Naturation Present? Yes Naturation Prese	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Root Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A) Other (Explain in Remarks) Depth (inches): Depth (inches): Depth (inches): Wetla	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7)
remarks: Managery Indicators: rimary Indicators (minimum of one required Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B7 Sparsely Vegetated Concave Surface (Beld Observations: urface Water Present? Yes New Concave	Check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Root Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A) Other (Explain in Remarks) Depth (inches): 7 b Depth	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 (S) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A) Frost-Heave Hummocks (D7)

WETLAND DETERMINATION D	ATA FORM	M – Western Mou	ntains, Valleys, and Coast Region 6/2
roject/Site: FCR	(City/County: Plex	brok Daglasmpling Date: 5/31/
pplicant/Owner: Glenbrook HOA	+		State: NV Sampling Point: \$7
ivestigator(s): Alling, Parrava	no	Section, Township, Rai	1 1 1 1 1 1 1 1 1 1 1 1 1
andform (hillslope, terrace, etc.): Lower HUTT			
		9,086737	
1 1 1 1			
il Map Unit Name: 0 CAX Complex		1. Slopes	NWI classification:
e climatic / hydrologic conditions on the site typical for the	his time of yea		(If no, explain in Remarks.)
e Vegetation, Soil, or Hydrology	significantly	disturbed? Are "	Normal Circumstances" present? Yes No
e Vegetation, Soil, or Hydrology	naturally pro	blematic? (If ne	eded, explain any answers in Remarks.)
	showing	sampling point lo	ocations, transects, important features, etc
Hydric Soil Present? Yes Yes Yes	No	Is the Sampled within a Wetlan	1/
Wetland Hydrology Present? Yes	No	Contraction of the	at united to the second of
Remarks: collected w/m actvr	flood	plain - do,	n. by riparia plants
EGETATION – Use scientific names of pla	nts.	A Commonwealth	estatori
	Absolute	Dominant Indicator	Dominance Test worksheet:
ree Stratum (Plot size:)		Species? Status	Number of Dominant Species
Salix lucida seplasiand	2/	FACIA	That Are OBL, FACW, or FAC: (A)
Alnus ginces	3-	- FAUN	Total Number of Dominant
			Species Across All Strata: (B)
	115	= Total Cover	Percent of Dominant Species
apling/Shrub Stratum (Plot size:)	40	= rotal Cover	That Are OBL, FACW, or FAC: (A/B)
Cornus sincla	20	VN	Prevalence Index worksheet:
			Total % Cover of: Multiply by:
	A STEE		OBL species x 1 =
			FAC appeies x 2 = x 2 =
		The second second	FACU species
Street Pales and Market	20	= Total Cover	UPL species x 5 =
erb Stratum (Plot size:	15	1 mm	Column Totals: (A) (B)
Equiseton hyemale	_ 20		(A) (B) (B) (B) (B) (B) (B) (B) (B) (B) (B
	-	Constitution of	Prevalence Index = B/A =
			Hydrophytic Vegetation Indicators:
A ANSAR DOOR CONTRACT FOR ELECTION		The state of the s	1 - Rapid Test for Hydrophytic Vegetation
A STATE LOVE - DEBATE ENGINEER		21 10 10 10 10 10 10 10 10 10 10 10 10 10	2 - Dominance Test is >50%
			3 - Prevalence Index is ≤3.0¹ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
		Contract of	5 - Wetland Non-Vascular Plants ¹
D. All St. Critical Regions and The Critical Regions and Critical Region Regions and Critical Regions and Critical Regions and Critical	COMP.	CONTRACTOR OF CONTRACTOR	Problematic Hydrophytic Vegetation ¹ (Explain) Indicators of hydric soil and wetland hydrology must
	25	= Total Cover	be present, unless disturbed or problematic.
loody Vine Stratum (Plot size:)		Carried States	n Pala El Pala III. Apo de ristores esses trepeza
			Hydrophytic
	124/32	- New January	Vegetation Present? Yes No
Bare Ground in Herb Stratum 75		= Total Cover	
page Stoung in nero Strattini (.)		17 - 20 - 20 - 20 - 20 - 20 - 20 - 20 - 2	

0	-		
-	. 1	Ш	

Sampling Point: P7

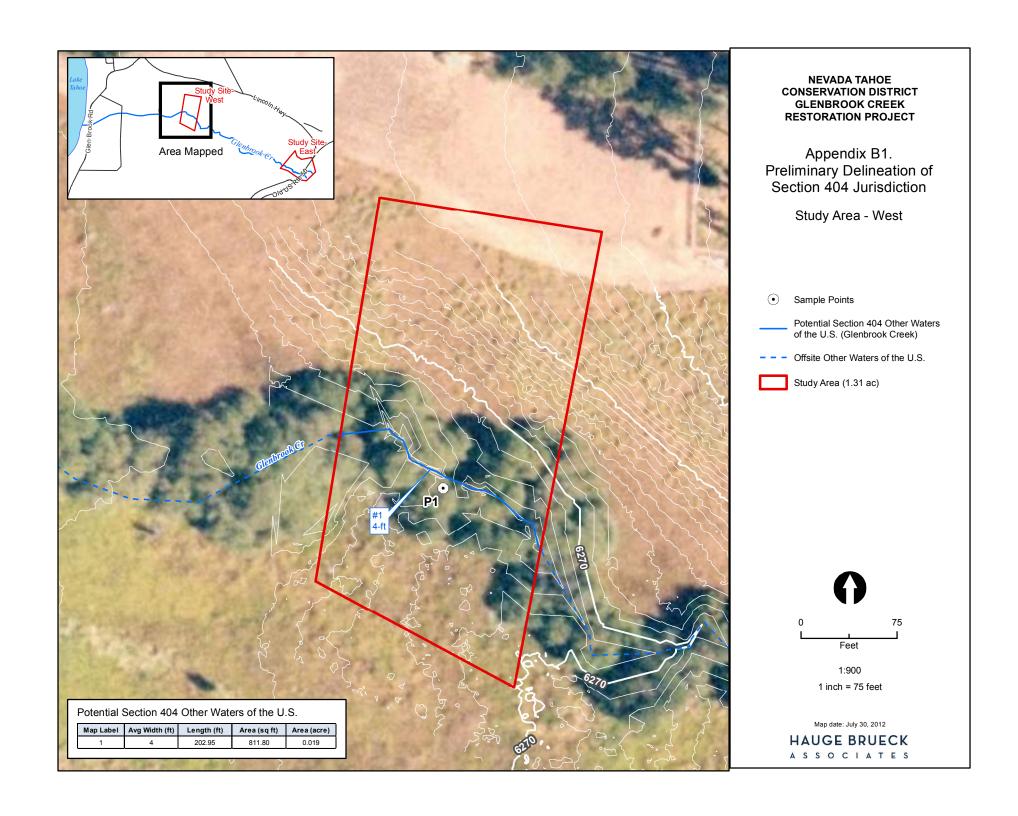
Depth Matrix inches) Color (moist) %	Redox Features Color (moist) % Type¹ Loc²	Texture Remarks
7. Syk2.5/15	SHOP	loan of free coarse sano
	The state of the s	AND ADDRESS OF TAXABLE VALUE OF
	man professors (20 Section 1971)	12 No. 18 Mary annual Countries and
	THE PART OF THE PA	
The second of the second of		AND AND A LOCAL PROPERTY OF
Carlotte State of the State of	The second secon	the fall manager at small the applications of the same transfer all the same
TO THE PERSON STATES	one and the second seco	The second secon
Lizza de la managa a	COLUMN EXCEMBRATA (C. C. SERVICE EMPARAMENTARIA)	Amphilips in the Late of the State of the St
	=Reduced Matrix, CS=Covered or Coated Sand G	rains. ² Location: PL=Pore Lining, M=Matrix. Indicators for Problematic Hydric Soils ³ :
ydric Soil Indicators: (Applicable to all		
Histosol (A1) Histic Epipedon (A2)	Sandy Redox (S5) Stripped Matrix (S6)	2 cm Muck (A10) Red Parent Material (TF2)
Black Histic (A3)	Loamy Mucky Mineral (F1) (except MLRA 1)	
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Other (Explain in Remarks)
Depleted Below Dark Surface (A11)	Depleted Matrix (F3)	
_ Thick Dark Surface (A12)	Redox Dark Surface (F6)	³ Indicators of hydrophytic vegetation and
_ Sandy Mucky Mineral (S1)	Depleted Dark Surface (F7) Redox Depressions (F8)	wetland hydrology must be present; unless disturbed or problematic.
Sandy Gleyed Matrix (S4) estrictive Layer (if present):	Redox Depressions (F8)	unless disturbed of problematic.
Type:		
		Hydric Soil Present? Yes No
Depth (inches):	cition mut.	Hydric Soil Present? Tes No
Depth (inches):	citio met.	Hydric Soil Present? Tes No
Depth (inches): Demarks:	e See	Secondary Indicators (2 or more required)
Depth (inches): emarks: Low Chora , Cn+	e See	Secondary Indicators (2 or more required)
Depth (inches): emarks: LOW Chron, Chi- /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2)	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
Depth (inches): emarks: LOW Chorn, Children /DROLOGY /etland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3)	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10)
Depth (inches): emarks: CDROLOGY // DROLOGY // Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1)	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2)
Depth (inches): emarks: CDROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2)	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS
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Depth (inches): emarks: COW Chrond, Chrond / DROLOGY / Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4)	d; check all that apply) — Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) — Salt Crust (B11) — Aquatic Invertebrates (B13) — Hydrogen Sulfide Odor (C1) — Oxidized Rhizospheres along Living Roc — Presence of Reduced Iron (C4)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 ots (C3) — Geomorphic Position (D2) Shallow Aquitard (D3)
Depth (inches): Demarks:	d; check all that apply) — Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) — Salt Crust (B11) — Aquatic Invertebrates (B13) — Hydrogen Sulfide Odor (C1) — Oxidized Rhizospheres along Living Roc — Presence of Reduced Iron (C4) — Recent Iron Reduction in Tilled Soils (C6)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
Depth (inches): emarks: COW Chrond, Chrond / DROLOGY / Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4)	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Roce Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (C9 Ots (C3) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5)
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Depth (inches): emarks: COW Chara, Chara Toronto Char	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Rod Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A) Other (Explain in Remarks)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
Depth (inches): emarks: DROLOGY Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B Sparsely Vegetated Concave Surface (ield Observations:	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Rod Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A) Other (Explain in Remarks)	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
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Depth (inches): emarks: COW Chara , Chara // DROLOGY // Vetland Hydrology Indicators: rimary Indicators (minimum of one require Surface Water (A1) High Water Table (A2) // Saturation (A3) Water Marks (B1) Sediment Deposits (B2) Drift Deposits (B3) Algal Mat or Crust (B4) Iron Deposits (B5) Surface Soil Cracks (B6) Inundation Visible on Aerial Imagery (B Sparsely Vegetated Concave Surface (ield Observations: urface Water Present? // Jessent? // Jessent/ // Jessen	d; check all that apply) Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) Salt Crust (B11) Aquatic Invertebrates (B13) Hydrogen Sulfide Odor (C1) Oxidized Rhizospheres along Living Rod Presence of Reduced Iron (C4) Recent Iron Reduction in Tilled Soils (C6) Stunted or Stressed Plants (D1) (LRR A) Other (Explain in Remarks) No Depth (inches): Depth (inches):	Secondary Indicators (2 or more required) Water-Stained Leaves (B9) (MLRA 1, 2 4A, and 4B) Drainage Patterns (B10) Dry-Season Water Table (C2) Saturation Visible on Aerial Imagery (CS) Geomorphic Position (D2) Shallow Aquitard (D3) FAC-Neutral Test (D5) Raised Ant Mounds (D6) (LRR A)
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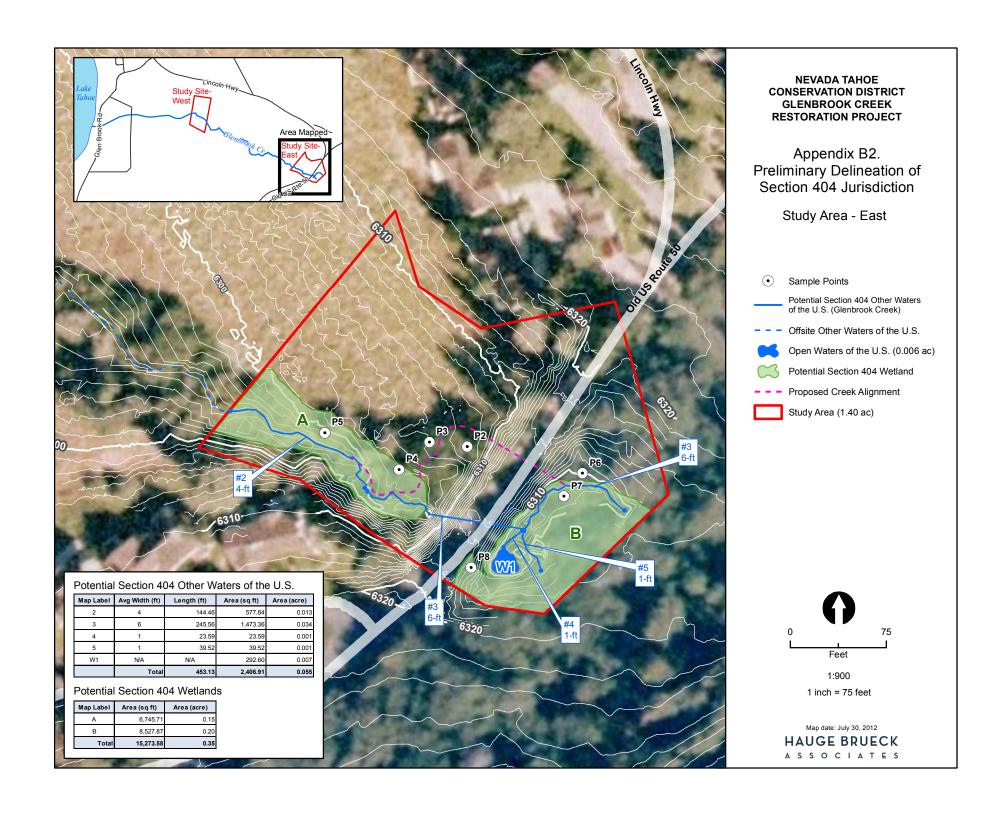
State: W Sampling Date: 5/3/1/3 State: W Sampling Point P 8 Vinship, Range: S11, T14/V, R18E (concave, convex, none): C0 V/X Slope (%): 8 S8 Long: -119.532.03 Datum: MAD83 NWI classification: Datum: MAD83 NWI classification: No (If no, explain in Remarks.) Are "Normal Circumstances" present? Yes No (If needed, explain any answers in Remarks.) S9 point locations, transects, important features, etc.
e Sampled Area n a Wetland? Yes No
RESERVED THE RESERVED TO SERVED THE SERVED T
Indicator Status Number of Dominant Species That Are OBL, FACW, or FAC: (A)
Total Number of Dominant Species Across All Strata: Percent of Dominant Species That Are OBL, FACW, or FAC: (A/B)
FACW Prevalence Index worksheet:
FACU species x 4 =
Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0¹ 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet) 5 - Wetland Non-Vascular Plants¹
Problematic Hydrophytic Vegetation¹ (Explain) ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
Hydrophytic Vegetation Present? Yes No

Sampling Point: P8

	alam (analam	0/	Redox Features	Tout	Decreates
	olor (moist)		Color (moist) % Type ¹ Loc ²		Remarks
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			educed Matrix, CS=Covered or Coated Sand		ocation: PL=Pore Lining, M=Matrix.
lydric Soil Indica	tors: (Applic	able to all LR	Rs, unless otherwise noted.)	Indicat	ors for Problematic Hydric Soils ³ :
Histosol (A1)			Sandy Redox (S5)	2 c	m Muck (A10)
_ Histic Epipedo		_	Stripped Matrix (S6)		d Parent Material (TF2)
Black Histic (A			Loamy Mucky Mineral (F1) (except MLRA		ry Shallow Dark Surface (TF12)
Hydrogen Sulf		-	Loamy Gleyed Matrix (F2)	Oth	ner (Explain in Remarks)
Depleted Below		e (A11)	Depleted Matrix (F3)	1	
Thick Dark Su			Redox Dark Surface (F6)		ors of hydrophytic vegetation and
Sandy Mucky		_	Depleted Dark Surface (F7)		and hydrology must be present,
Sandy Gleyed			Redox Depressions (F8)	unie	ess disturbed or problematic.
Restrictive Layer	(II present):				
Type:					ANCHON
Depth (inches):				Hydric So	il Present? Yes No
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GLENBROOK CREEK RESTORATION PROJECT PRELIMINARY JURISDICTIONAL DELINEATION REPORT
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Appendix B: Maps of Potential Jurisdictional Wetlands and Waters





Appendix C: List of Plant Species Observed During the Delineation	
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	Appendix 6. List of Flant Species Observed During the Defineation

Appendix C. List of plant species observed on May 31 and June 28, 2012 within the Glenbrook Creek Restoration Study Area vicinity

Scientific Name	Common Name	Wetland Indicator ¹	Native Y/N		
ANGIOSPERMS (DICOTYLEDONS)					
APIACEAE	CARROT FAMILY				
Cicuta douglasii	Water hemlock	OBL	Υ		
Ligusticum grayi	Gray's lovage	FAC	Υ		
Heracleum maximum	Cow parsnip	FAC	Υ		
Foeniculum vulgare	Fennel	UPL	N		
Ozmorhiza occidentalis	Western sweet cicely	UPL	Υ		
APOCYNACEAE	DOGBANE FAMILY				
Apocynum androsaemifolium	Spreading dogbane	UPL	Υ		
ASTERACEAE	SUNFLOWER FAMILY				
Achillea millefolium	Yarrow	FACU	Υ		
Artemisia cana	Coaltown sagebrush	FACU	Υ		
Artemisia douglasiana	Mugwort	FACW	Υ		
Centaurea cyanus	Cornflower	FACU	N		
Chrysothamnus viscidiflorus ssp. viscidiflorus	Yellow rabbitbrush	UPL	Y		
Cirsium vulgare	Bull thistle	FACU	N		
Lactuca serriola	Wire lettuce	FACU	N		
Senecio triangularis	Arrowleaf groundsel	FACW	Υ		
Sonchus asper	Prickly sow thistle	FACU	N		
Taraxacum officinale	Dandelion	FACU	N		
Tragopogon dubius	Yellow salsify	UPL	N		
Wyethia mollis	Woolly mules ears	UPL	Υ		
BERBERIDACEAE	BARBERRY FAMILY				
Berberis pinnata	Shiny leaf Oregon grape	NI	N		
BETULACEAE	BIRCH FAMILY				
Alnus incana ssp. tenuifolia	Mountain alder	FACW	Υ		
BRASSICACEAE	MUSTARD FAMILY				
Arabis holboellii	Holboell's rock cress	UPL	Υ		
Barbarea orthoceras	Winter cress	FACW	Υ		
Brassica nigra	Black mustard	UPL	N		
Descurania incana	Mountain tansy mustard	FACU	Υ		
Descurania sophia	Flix weed	UPL	N		
Lepidium densiflorum var.	Dense-flower peppergrass	FACU	Y		
macrocarpum					
Lepidium perfoliatum	Klamath peppergrass	FACU	N		
CAPRIFOLIACEAE	HONEYSUCKLE FAMILY				
Symphoricarpos rotundifolius var. rotundifolius	Mountain snowberry	UPL	Y		
CHENOPODIACEAE	GOOSEFOOT FAMILY				
Atriplex triangularis	Fat hen	NI	N		
Rumex crispus	Curly dock	FAC	N		
CORNACEAE	DOGWOOD FAMILY				

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¹ Lichvar R. W. and J. T. Kartesz. 2009. North American Digital Flora: National Wetland Plant List, version 2.4.0 (https://wetland_plants.usace.army.mil). U.S. Army Corps of Engineers, Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, NH, and BONAP, Chapel Hill, NC. (June 22, 2012)

Scientific Name	Common Name	Wetland Indicator ¹	Native Y/N
Cornus sericea ssp. sericea	Creek dogwood	NI	Y
FABACEAE	PEA FAMILY		
Lupinus grayi	Gray's lupine	UPL	Y
Lupinus polyphyllus var. burkei	Meadow lupine	FAC	Y
Trifolium pratense	Red clover	FACU	N
GROSSULARIACEAE	GOOSEBERRY FAMILY		
Ribes aureum	Wax currant	FAC	Y
Ribes inerme var. inerme	White-stemmed gooseberry	FAC	Υ
Ribes nevadense	Sierra currant	FAC	Υ
Ribes viscosissimum	Sticky currant	FAC	Υ
LAMIACEAE	MINT FAMILY		
Agastache urticifolia	Giant hyssop	FACU	Υ
Glechoma hederacea	Creeping Charlie	NI	N
ONAGRACEAE	EVENING PRIMROSE FAMILY		
Gayophytum diffusum ssp. parviflorum	Gayophytum	UPL	Y
PAEONIACEAE	PEONY FAMILY		
Paeonia brownii	Brown's peony	UPL	Υ
POLYGONACEAE	BUCKWHEAT FAMILY		
Polygonum douglasii	Douglas' knotweed	FACU	Υ
ROSACEAE	ROSE FAMILY		
Geum macrophyllum	Largeleaf avens	FAC	Υ
Potentilla glandulosa var. ashlandica	Sticky cinquefoil	FAC	Y
Rosa woodsii var. ultramontana	Mountain rose	FAC	Υ
Rubus parviflorus	Thimbleberry	FACU	Υ
RUBIACEAEA	MADDER FAMILY		
Galium aparine	Goose-grass	FACU	Υ
Galium triflorum	Sweet scented bedstraw	FACU	Υ
SALICACEAE	WILLOW FAMILY		
Populus tremuloides	Quaking aspen	FACU	Υ
Salix lasiandra ssp. lasiandra	Shining willow	FACW	Υ
Salix scouleriana	Scouler's willow	FAC	Υ
SAPINDACEAE	SOAPBERRY FAMILY		
Acer sp.	Maple (cultivated)	NI	N
SCROPHULARIACEAE	FIGWORT FAMILY		
Penstemon gracilentus	Slender penstemon	UPL	Υ
Verbascum thapsus	Common mullein	FACU	N
Veronica americana	American speedwell	OBL	Υ
URTICACEAE	NETTLE FAMILE		
Urtica dioica	Stinging nettle	FAC	Υ
A	NGIOSPERMS (MONOCOTYLEDO	NS)	
CYPERACEAE	SEDGE FAMILY		
Carex amplifolia	Big-leaf sedge	OBL	Υ
Carex nebrascensis	Nebraska sedge	OBL	Υ
Carex praegracilis	Many-ribbed sedge	FACW	Υ
Scirpus microcarpus	Small-fruited bulrush	OBL	Υ
JUNCACEAE			<u> </u>
JUNGAGLAL	RUSH FAMILY		
Juncus balticus	Baltic rush	FACW	Y
		FACW FACW	Y
Juncus balticus	Baltic rush		

Scientific Name	Common Name	Wetland Indicator ¹	Native Y/N
Smilacena stellata	Star Solomon's seal	NI	Υ
POACEAE	GRASS FAMILY		
Agrostis sp.	bentgrass		
Agrostis stolonifera	Creeping bentgrass	FACW	Y
Bromus carinatus var. carinatus	Mountain brome	UPL	Y
Bromus inermis ssp. inermis	Smooth brome	FAC	N
Bromus tectorum	Cheat grass	UPL	N
Dactylis glomerata	Orchard grass	UPL	N
Elymus elymoides var. californicus	Squirrel tail grass	UPL	Y
Elymus glaucus	Blue wildrye	UPL	Y
Ellymus trachycaulus ssp. subsecundus	Sender wheatgrass	FAC	Y
Elymus triticoides	Beardless wildrye	FAC	Y
Festuca idahoensis	Idaho fescue	FACU	Υ
Glyceria elata	Tall manna grass	FACW	Υ
Hordeum brachyanterum	Meadow barley	FACW	Υ
Poa pratensis	Kentucky bluegrass	FACU	N
	GYMNOSPERMS		
PINACEAE	PINE FAMILY		
Abies concolor	White fir	UPL	Υ
Pinus jeffreyi	Jeffrey pine	UPL	Υ
	SEEDLESS VASCULAR PLANTS		
EQUISETACEAE	HORSETAIL FAMILY		
Equisetum arvense	Common horsetail	OBL	Y
Equisetum hyemale	Rough horsetail	OBL	Υ

 GLENBROOK CREEK RESTORATION PROJECT PRELIMINARY JURISDICTIONAL DELINEATION REPORT
Appendix D: Representative Photographs of the Study Area
Appendix 2. Representative i netegraphie et the etady Area



Photo 1: View of P1 in non-wetland riparian portion of Glenbrook Creek on fill soils within western portion of Study Area. May 28, 2012



Photo 2: View of upland sample point P2 within proposed creek alignment, facing east. May 28, 2012.



Photo 3: View of upland sample point P3 on upper terrace of Glenbrook Creek, facing northwest. May 28, 2012.



Photo 4: View of wetland sample point P4 showing low chroma soils/depleted matrix, collected along upper boundary of emergent floodplain wetland along Glenbrook Creek. May 28, 2012.

PAGE D-3 HAUGE BRUECK ASSOCIATES JULY 2012



Photo 5: View of wetland sample point P5 with tall manna grass and scouring rush collected within low terrace of Glenbrook Creek. May 28, 2012.



Photo 6: View of upland sample point P6 upslope of Glenbrook Creek channel. May 28, 2012.

PAGE D-4 HAUGE BRUECK ASSOCIATES JULY 2012



Photo 7: View of wetland sample point P7 at within active floodplain of Glenbrook Creek. May 28, 2012.



Photo 8: View of wetland sample point P8 collected within small-fruited bulrush dominated hillside seep. May 28, 2012.



Photo 9: View of area to be restored by realignment of creek channel. June 28, 2012.



Photo 10: View of actively flowing creek channel mapped as other waters at the culvert opening under Old U.S. Route 50. June 28, 2012.



Photo 11: View of rabbitbrush scrub, ruderal grassland, and riparian woodland plant communities within the Study Area. June 28, 2012.

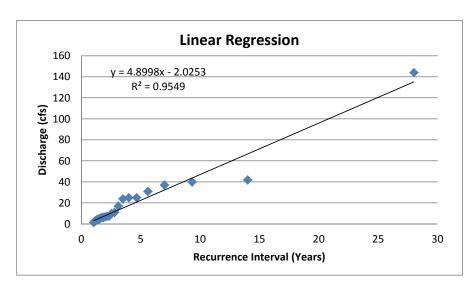


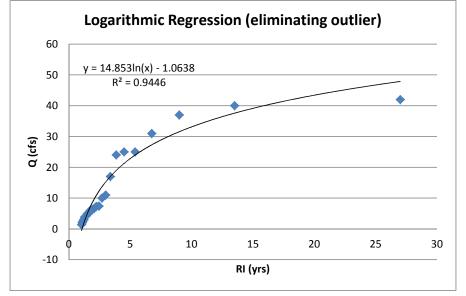
Photo 12: View of area to be restored downstream of existing culvert crossing, facing west. June 28, 2012.

APPENDIX D Engineering Calculations

Calculation of Discharge Frequency for Glenbrook Creek

	Recurrence	Discharge
Rank	Interval	(cfs)
1	28	144
2	14	42
3	9.33333333	40
4	7	37
5	5.6	31
6	4.66666667	25
7	4	25
8	3.5	24
9	3.11111111	17
10	2.8	11
11	2.54545455	10
12	2.33333333	7.4
13	2.15384615	7.3
14	2	6.7
15	1.86666667	6.3
16	1.75	6.2
17	1.64705882	5.7
18	1.55555556	517
19	1.47368421	4.9
20	1.4	4.3
21	1.33333333	4
22	1.27272727	3.8
23	1.2173913	3
24	1.16666667	2.9
25	1.12	2.3
26	1.07692308	2
27	1.03703704	1.4





Linear Regression Results

Recurrence	Discharge (cfs)
1	2.8745
2	7.7743
5	22.4737
10	46.9727
20	95.9707
25	120.4697
50	242.9647
100	487.9547

Logarithmic Regression Results

8	
Recurrence	Discharge (cfs)
1	-1.0638
2	9.231515
5	22.84118
10	33.1365
20	43.43181
25	46.74616
50	57.04148
100	67.33679

Final Calculations

rillai Calculations			
Recurrence	Discharge		
(yr)	(cfs)	Notes	
		avg between	
2	9	2 estimates	
		avg between	
20	70	2 estimates	
100		From USGS Report	

Mannings Roughness Calculations for Proposed Bankfull Channel

 Project:
 Glenbrook Creek

 Project #:
 12-001

 Date:
 5/7/2012

 Calculated by:
 B.M.S.

Instructions: Enter variables in RED cells only

Design equations to determine roughness coefficient of typical channel section

Bankfull Flows (Q=9 cfs)

```
Mussetter (1989)
Equation for steep, boulder conditions
(8/f)^{0.5} = 1.11 (d/D_{84})^{0.46} (D_{84}/D_{50})^{-0.85} S^{-0.39}
n = 0.0926 R^{1/6} f^{1/2}
  Therefore: n = 0.236 R^{1/6} (d/D_{84})^{-0.46} (D_{84}/D_{50})^{0.85} S^{0.39}
                                     d = hydraulic depth Area/Top Width
                                     S = slope
                                     R = hydraulic radius
Equation developed for:
  d/D<sub>84</sub> range (0.24 to 3.72)
     D<sub>50</sub> range (0.1 to 2.1 feet)
                                                      S = 0.04
  S range (0.54 to 16.8 percent)
                                                      R = 0.75
                                                                         ft
                                                      d = 0.85
                                                                         ft
                                                    D_{84} = 1.5
                                                                         ft
                                                    D_{50} = 0.8
                                                                         ft
                                                  d/D_{84} = 0.57
                                      n = 0.14
```

- 1.) Bathurst, J.C., 1985, Flow resistance estimation in mountain rivers, Journal of Hydraulic Engineering, ASCE, Vol. 111, No.4
- 2.) California Department of Fish and Game (CDFG). 2009. Fish Passage Design and Implementation: Part XII of the California Salmonid Stream Habitat Restoration Manual. Sacramento, CA, CA Department of Fish and Game.
- 3.) U.S. Department of the Interior Bureau of Reclamation. 2007. Rock Ramp Design Guidelines.
- 4.) Julien, P.Y. 2002. River Mechanics. Cambridge University Press, Cambridge, United Kingdon

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2013 by Autodesk, Inc.

Monday, Aug 20 2012

Bankfull Channel @ 4% (2-yr)

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	ape	 	-

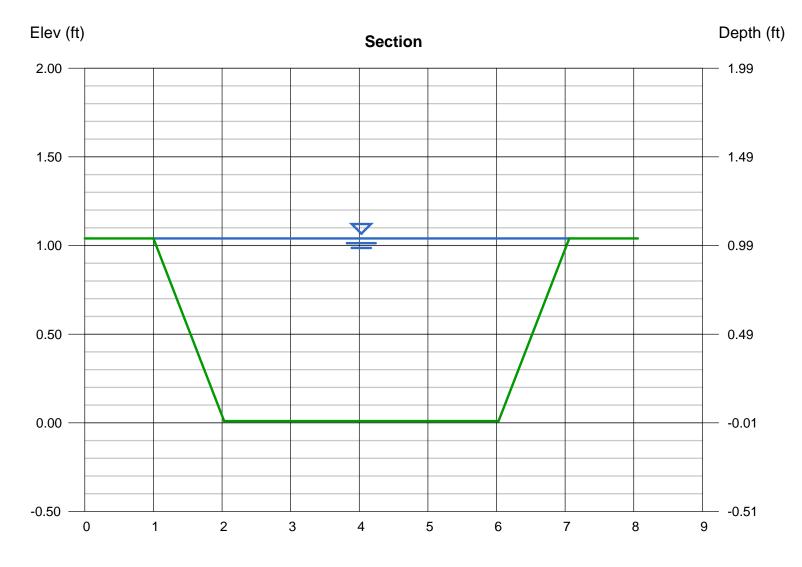
Bottom Width (ft) = 4.00 Side Slopes (z:1) = 1.00, 1.00 Total Depth (ft) = 1.03 Invert Elev (ft) = 0.01 Slope (%) = 4.00 N-Value = 0.140

Calculations

Compute by: Known Q Known Q (cfs) = 9.00

Highlighted

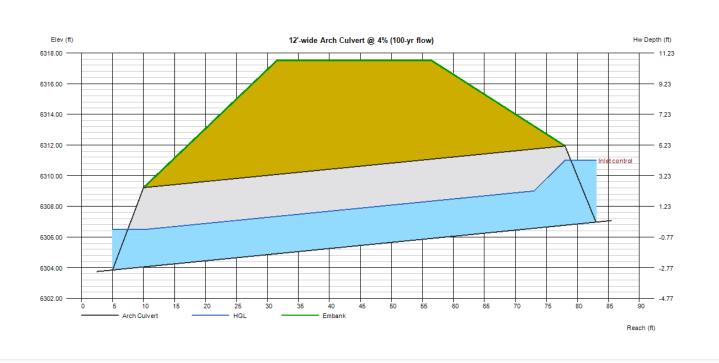
= 1.03Depth (ft) Q (cfs) = 9.000Area (sqft) = 5.18Velocity (ft/s) = 1.74Wetted Perim (ft) = 6.91Crit Depth, Yc (ft) = 0.52Top Width (ft) = 6.06EGL (ft) = 1.08



Reach (ft)

12'-wide Arch Culvert @ 4% (100-yr flow)

Invert Elev Dn (ft)	= 6304.05	Calculations	
Pipe Length (ft)	= 68.00	Qmin (cfs)	= 221.00
Slope (%)	= 4.00	Qmax (cfs)	= 221.00
Invert Elev Up (ft)	= 6306.77	Tailwater Elev (ft)	= Normal
Rise (in)	= 62.0		
Shape	= Arch	Highlighted	
Span (in)	= 124.0	Qtotal (cfs)	= 221.00
No. Barrels	= 1	Qpipe (cfs)	= 221.00
n-Value	= 0.024	Qovertop (cfs)	= 0.00
Culvert Type	Arch Corrugated Metal	Veloc Dn (ft/s)	= 9.15
Culvert Entrance	= Mitered to slope (A)	Veloc Up (ft/s)	= 9.15
Coeff. K,M,c,Y,k	= 0.03, 1, 0.0463, 0.75, 0.7	HGL Dn (ft)	= 6306.48
		HGL Up (ft)	= 6309.20
Embankment		Hw Elev (ft)	= 6311.01
Top Elevation (ft)	= 6317.50	Hw/D (ft)	= 0.82
Top Width (ft)	= 25.00	Flow Regime	= Inlet Control
Crest Width (ft)	= 100.00		



Engineered Streambed Material Calculations

Project: Glenbrook Creek Project #: 12-001 Date: 5/7/2012 Calculated by: B.M.S.

Instructions: Enter variables in RED cells only

Calculations to determine the gradation and thickness of engineered streambed material used in the roughened channel

1. Inputs

Proposed Channel Conditions Site Data		
Design Flow*	60 cfs	
Channel Width =	6 ft	
q =	10.0 cu.ft./sec ft	
gravity, g	32.2 ft/sec^2	
Slope, S	0.04 ft/ft	
t co et will be senteined wi	this absence beauty during 400 on accept (004 at	,

2. Equations to Calculate D₅₀ particle size

	Bathhurst (1987)
developed for:	slope (0.23 to 9%)
	particle dia. (0.35 to 11 inches)
D50 =	3.56 q^2/3 S^.75 / g^1/3
D50 =	0.5 ft

Robinson et al. (1998)		
developed for:	slope (2% to 40%) particle dia. (0.6 to 11 inches)	
D50 =	$D_{50} = [q_{\text{design}} / (8.07 \times 10^{-6} \text{ S}^{-0.58})]^{0.529}$	
	$q_{design} (m^3/s/m) = 0.93$	
	$D_{50} (mm) = 177$	
D50 =	0.6 ft	

Abt and Johnson (1991)	
developed for:	slope (1% to 20%) particle dia. (1 to 6 inches)
D50 =	e 0.436 qualing 0.56 S^0.43 qualing = q * sizing factor sizing factor = 1.35
D50 =	0.5 ft

Choose Dsn = 0.5 ft

Proposed Culvert Conditions Site Data

204 cfs

12 ft

17.0 cu.ft./sec ft Design Flow Channel Width = gravity, g Slope, S 32.2 ft/sec^2 0.04 ft/ft

2. Equations to Calculate D50 particle size

	Bathhurst (1987)
developed for:	slope (0.23 to 9%)
	particle dia. (0.35 to 11 inches)
D50 =	3.56 q^2/3 S^.75 / g^1/3
D50 =	0.7 ft

Robinson et al. (1998)		
developed for:	slope (2% to 40%) particle dia. (0.6 to 11 inches)	
D50 =	= [q _{design} / (8.07 x 10 ⁻⁶ S ^{-0.58})] ^{0.529}	
	q_{design} (m ³ /s/m) = 1.58	
	D ₅₀ (mm) = 235	
D50 =	= 0.8 ft	

Abt and Johnson (1991)		
developed for:	slope (1% to 20%)	
	particle dia. (1 to 6 inches)	
D50 =	0.436 qsizing^0.56 S^0.43	
	q _{sizing} = q * sizing factor	
	sizing factor = 1.35	
D50 =	0.6 ft	

Choose Dsn = 0.7 ft

3. Develop Grain Size Distribution Utilizing the Calculated D50

Washinton Department of Fish and Wildlife Grain Size Distribution (WDFW, 2003) D84/D100 = 0.4

D84/D50 =	2.5	
D84/D16 =	8	
WDFW Substrate Gr	adation	
D100 =	3.1 ft	
D84 = D50 =	1.3 ft	
D50 =	0.5 ft	
D16 = D8 =	0.48 in	
D8 =	0.10 in	

Note: WDFW gradation above is based on wide variety of stream beds in different environments. The D ₆₄/D₁₀₀ ratio of 0.4 may give too large of boulder size. Judgment should be made to adjust size to something reasonable for the site. ACOE EM 1110-2-1601 suggests using D_{100} =2x D_{50} . If using ACOE steep slope methods to size substrate then D_{84} =1.5 D_{30} (WDFW, 2003). The largest rock should not be greater in size than 1/4 of the active channel width.

Rock Structures: Use D₉₄ to D₁₀₀ Engineered Streambed Material: Use <D₉₄ Bankline Rock: Use D₅₀ to D₈₄

Resulting Engineered Streambed Material Gradation

Size Class	Particle Diamter	
D100 =	2.0 ft	
D84 =	1.5 ft	
D50 =	0.8 ft	
D16 =	4.0 in	
D8 =	0.08 in	

Justification

Choose largest size of Engineered Streambed Material to be equal to the D 84 calculated using the WDFW gradation. This size exceeds the ACOE recommendation of D 100=2 x D50.

4. ESM Thickness

Thickness greater or equal to max(1.5XD₅₀ or D₁₀₀) (ACOE EM 1110-2-1601)

or if D₁₀₀ is set to protrude above surface by 1/3 then use 0.67D ₁₀₀ (Flosi et.al.)

T = 2.0 ft

Note: Use thickness of 2 feet within culvert. Otherwise thickness is about 1 foot with large rocks (1' to 2' dia) distributed through the channel and along t

5. References

1. U.S. Department of the Interior Bureau of Reclamation. 2007. Rock Ramp Design Guidelines.
 2.) Washington Department of Fish and Wildlife. 2003 Design of Road Culverts for Fish Passage
 3.) U.S. Army Corps of Engineers. 1994. Hydraulic Design of Flood Control Channels, EM-1110-2-1601

4.) California Department of Fish and Game (CDFG). 2009. Fish Passage Design and Implementation: Part XII of the California Salmonid Stream Habitat Restoration Manual. Sacramento, CA, CA Department of Fish and

APPENDIX E Seed Mixes

Riparian Mix

Scientific Name	Common Name	PLS Lbs/Acre
Glyceria elata	Tall manna grass	1.00
Leymus triticoides	Creeping wildrye	5.00
Mimulus guttatus	Yellow Monkeyflower	0.05
Scirpus microcarpus	Small-fruited bulrush	1.00
Juncus balticus	Baltic rush	0.10
Agastache urticifolia	Sierra horsemint	0.25
Potentilla gracilis	Cinquefoil	0.10
Agrostis stolonifera	Creeping bentgrass	1.00
Rosa woodsii	Woods rose	0.50
Penstemon rydbergii	Penstemon	0.50
Carex nebraskensis	Nebraska sedge	0.50
Delphinium glaucum	Sierra Larkspur	0.25
Ribes aureum	Golden currant	0.25
Lupine polyphyllus	Lupine	0.25
	TOTALS	10.75

Upland Mix

Scientific Name	Common Name	PLS Lbs/Acre
Bromus carinatus var. carinatus	Mountain brome	4.00
Elymus glaucus	Blue wildrye	3.00
Elymus elymoides var. californicus	Squirrel tail grass	2.00
Artemisia tridentata ssp. vaseyana	Mountain Big Sagebrush	0.25
Purshia tridentata	Antelope Bitterbrush	1.00
Achillea millefolium	Yarrow	0.25
Paeonia brownii	Brown's peony	0.25
Linum lewisii	Blue Flax	0.25
Eschscholzia californica	California Poppy	0.25
Eriogonum umbellatum ssp. polyanthum	Sulfur Flowered Buckwheat	0.25
Gaillardia pulchella	Indian Blanketflower	0.25
Lupinus argenteus	Silvery Lupine	0.25
Wyethia mollis	Mule's Ears	1.00
	TOTAL	13.00

Containers

Scientific Name	Common Name	Wetland Indicator	Native Y/N
Cornus sericea ssp. sericea	Creek dogwood	NI	Υ
Ribes nevadense	Sierra currant	FAC	Y
Betula papyrifera	White Birch	FAC	N
Populus tremuloides	Quaking Aspen	UPL	Y
Amelanchier alnifolia	Serviceberry	FACU	Y