TECHNICAL MEMORANDUM

DOWL

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DATE: 5/5/2025

PROJECT: Leaburg Transportation Analysis – Preliminary Triple Bottom Line Analysis

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This preliminary memorandum introduces the triple bottom line (TBL) analysis under development for the new river crossing options being considered after decommissioning of the Leaburg Hydroelectric Project.

TRANSPORTATION OPTIONS

The project team developed 6 transportation options for consideration. Early research into the options led the project team to modify the list of options under consideration for further analysis. The options considered are listed below:

- Option 1 - Rehabilitate Existing Bridge on the Existing Dam
- Option 2 - Replace existing bridge superstructure and modify substructure
- Option 3 - Leaburg Dam Road to Leashore Drive Connection
- Option 4 - Connect Fish Hatchery Road to Deerhorn Road
- Option 5 - New bridge immediately downstream of dam
- Option 6 - New bridge connection from OR-126 to Fish Hatchery Road

Options deemed appropriate for further consideration include options 1, 3, 5, and 6. The project team also identified that option 3 provided some benefits when paired with other options and added this pairing as new options for further consideration. New options added to TBL analysis:

- Option 1+3 - Rehabilitate existing bridge + Leaburg Dam Road to Leashore Drive construction and emergency access
- Option 5+3 - New bridge immediately downstream of dam + Leaburg Dam Road to Leashore Drive construction and emergency access

Through preliminary analysis, the project team decided to exclude options 2 and 4 from further TBL analysis. Each option is described below. Options 2 and 4 include the reasons for excluding them from further TBL analysis.

Option 1 - Rehabilitate Existing Bridge on the Existing Dam

This option includes maintaining the existing piers supporting the truss bridge during dam removal; backfilling the approaches to the truss spans; and removing, rehabilitating, and reinstalling the steel trusses. No seismic retrofitting would be included.

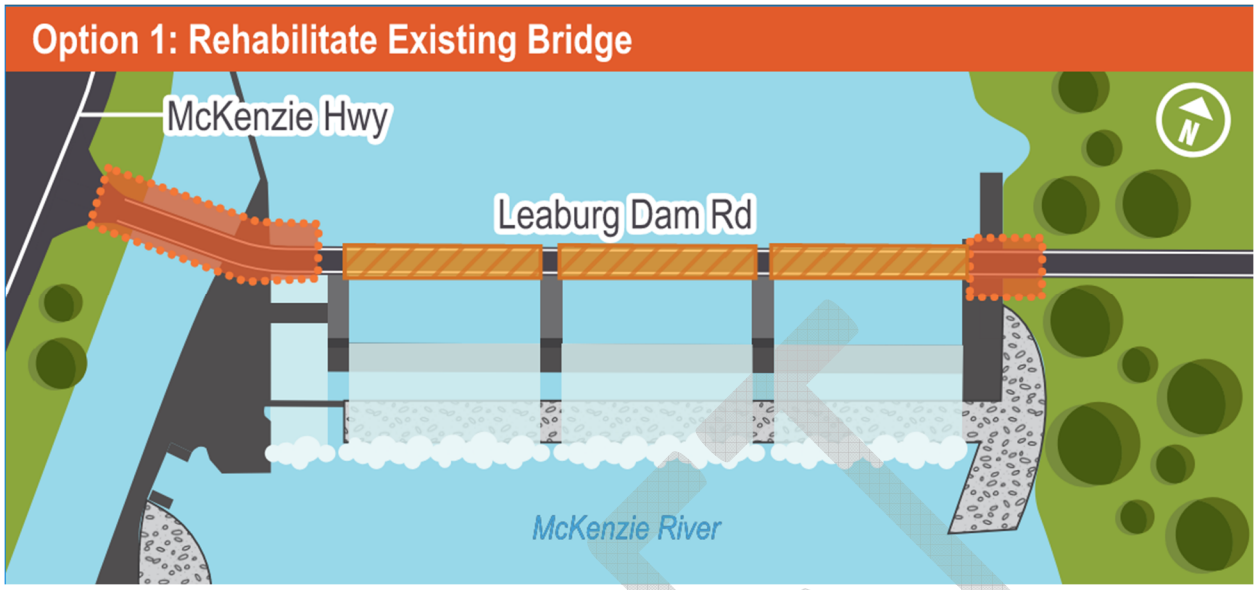

Figure 1 – Option 1 Plan View Graphic

Option 2 - Replace Existing Bridge Superstructure and Modify Substructure *(excluded from further analysis)*

This option includes maintaining the existing piers supporting the truss bridge during dam removal, backfilling the approaches to the truss spans, and replacing the steel trusses with a concrete superstructure designed to carry current vehicle loads. Also, the piers would be seismic retrofitted to meet current standards.

Option 2 was not carried forward in the TBL analysis due to the following reasons:

- Reduced Service Life – Option 2 includes maintaining the existing piers which have a limited remaining service life.
- High Cost – Preliminary cost estimates showed excessively high design and construction costs to rehabilitate the existing piers and seismically retrofit the foundation.
- Historic Impacts – Option 2 includes removing the pier house buildings which eliminates the potential value of preserving this historic structure like option 1.

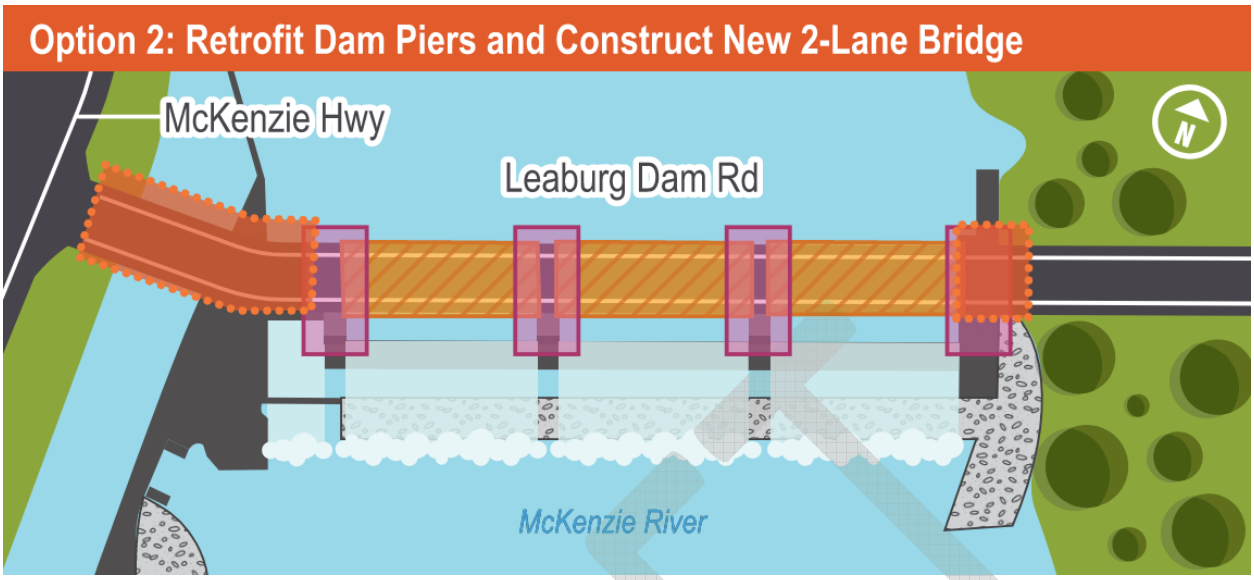

Figure 2 – Option 2 Plan View Graphic

Option 3 - Leaburg Dam Road to Leashore Drive Connection

This option includes construction of a new half-mile, two-lane road between Leaburg Dam Road and Leashore Drive with residents crossing the McKenzie River at the Goodpasture Covered Bridge upstream. A two-lane bridge over Honey Creek would be constructed and designed to current structural and seismic codes. A retaining wall would also be constructed on the river side of the new road with steep rock cut slopes on the uphill side.

Figure 3 – Option 3 Plan View Graphic

Option 1+3 - Rehabilitate Existing Bridge + Leaburg Dam Road to Leashore Drive Construction and Emergency Access

This option combines all of option 1 and a reduced version of option 3. The reduced option 3 would construct a narrower all-weather gravel road between Leaburg Dam Road and Leashore Drive and single-lane bridge over Honey Creek with the purpose of being used only as an emergency access road. The emergency access road would be gated but easily opened in the event of an emergency. The Leaburg Dam Road to Leashore Drive connection would also be used during dam decommissioning and related construction as a temporary detour route, allowing for a narrower temporary work bridge.

Option 4: Connect Fish Hatchery Road to Deerhorn Road *(excluded from further analysis)*

This option includes the construction of a new 3.5-mile, two-lane road between Deerhorn Road and Fish Hatchery Road with residents crossing the McKenzie River at the Bridge Street Bridge downstream. Approximately 1.25 miles of Fish Hatchery Road between Leaburg Dam Road and the beginning of this new alignment would also be modernized to current roadway design standards. Existing bridges over Trout and Ritchie Creeks would be replaced with two-lane bridges constructed and designed to current structural and seismic codes.

Option 4 was not carried forward in the TBL analysis due to the following reasons:

- High Cost – Preliminary cost estimates showed excessively high design and construction costs to construct a public road through a rugged and large area of forest property.
- Property Impacts – Option 4 includes constructing a public road through a several miles of private property.
- Environmental Impacts – Option 4 includes widening a large portion of roadway in and near sensitive forest land.
- Low Public Support – Option 4 includes travel time and safety impacts due to the long connection with many tight turns that would have low public support.
- Rough Terrain – Preliminary road models resulted in high road grades and narrow horizontal curvature that exceed the allowances in modern roadway design standards.

Figure 4 – Option 4 Plan View Graphic

Option 5 - New Bridge Immediately Downstream of Dam

This option includes a new two-lane, three-span bridge on a new alignment in the vicinity and roughly parallel downstream of the existing dam. An alignment upstream of the dam could also be considered in future stages. The bridge would be designed to current structural and seismic design codes. A new roadway connection to the McKenzie Highway (OR-126) would also be constructed, designed to current roadway standards.

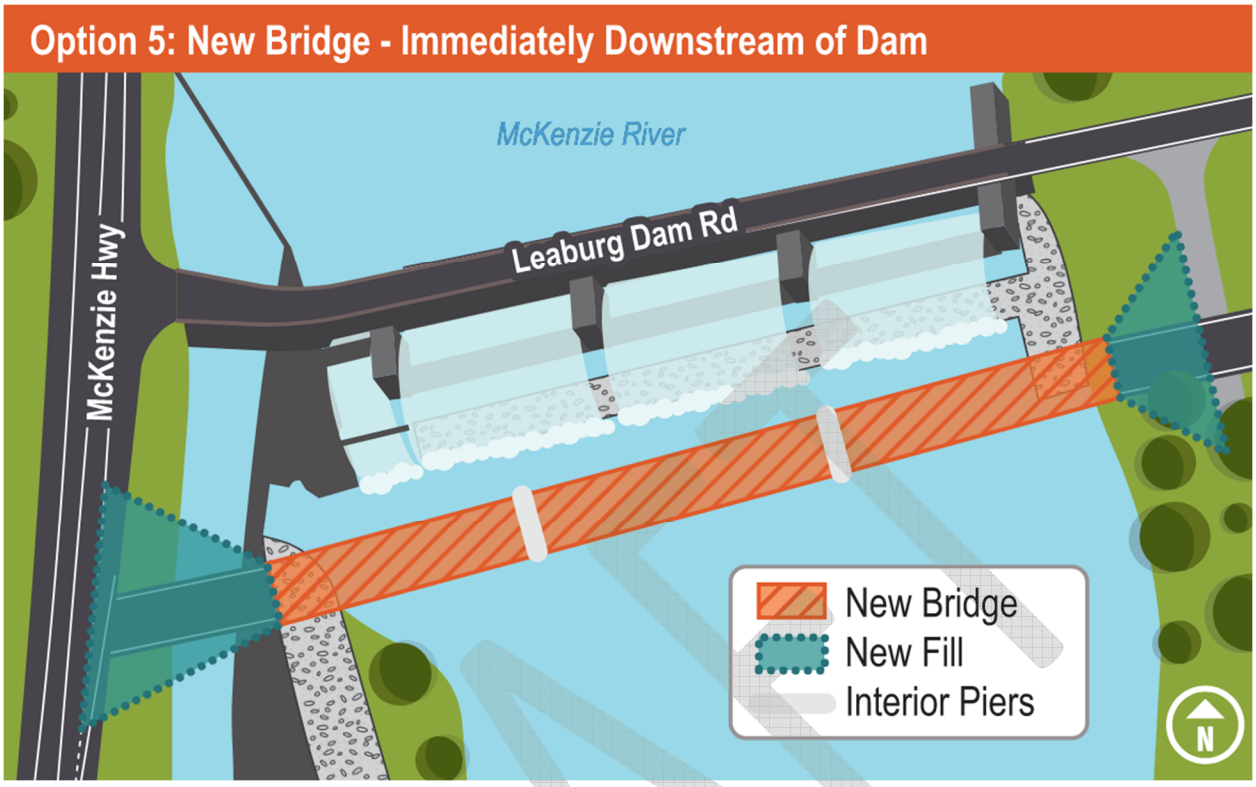

Figure 5 – Option 5 Plan View Graphic

Option 5+3. New Bridge Immediately Downstream of Dam + Leaburg Dam Road to Leashore Drive Construction and Emergency Access

This option combines all of option 5 and a reduced version of option 3. The reduced option 3 would construct a narrower all-weather gravel road between Leaburg Dam Road and Leashore Drive and single-lane bridge over Honey Creek with the purpose of being used only as an emergency access road. The emergency access road would be gated but easily opened in the event of an emergency. The Leaburg Dam Road to Leashore Drive connection would also be used during dam decommissioning and related construction as a temporary detour route, allowing for a narrower temporary work bridge.

Option 6. New Bridge Connection From OR-126 to Fish Hatchery Road

This option would construct a new half-mile road between Fish Hatchery Road and the McKenzie Highway (OR-126). Approximately 1.25 miles of Fish Hatchery Road between Leaburg Dam Road and the beginning of this new alignment, in addition to the private roads on the north side of the McKenzie River, would also be modernized to current roadway design standards. This option includes a new two-lane, three-span bridge on a new alignment approximately 1 mile downstream of the existing dam and replacing the current one-lane bridge over Trout Creek with its current alignment. Both bridges would be designed to current

structural and seismic design codes. The existing one-lane bridge over the canal would also either be replaced or backfilled.

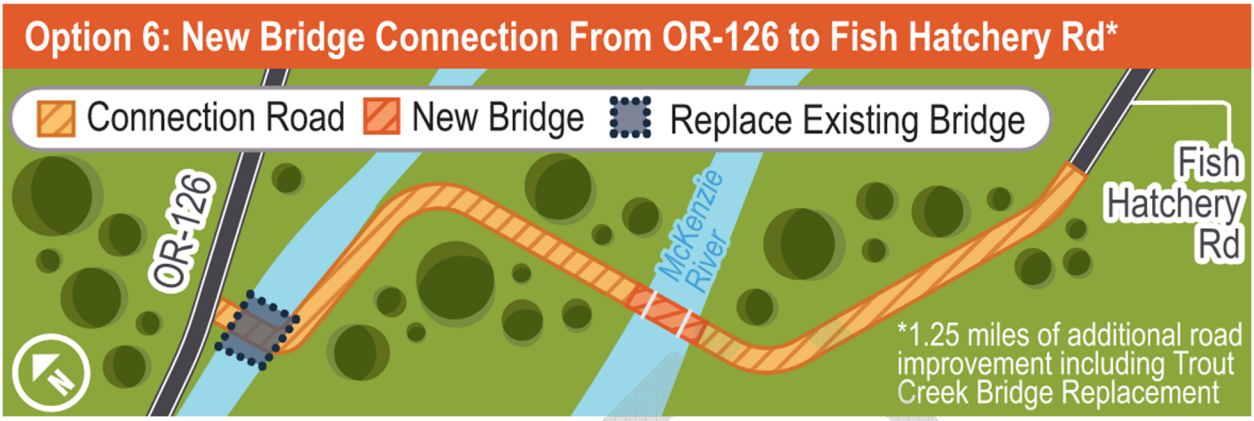

Figure 6 – Option 6 Plan View Graphic

TRIPLE BOTTOM LINE (TBL) ANALYSIS

The Triple Bottom Line (TBL) analysis is a comprehensive framework used to evaluate the life cycle and overall impact of a project or decision. It aims to go beyond traditional financial metrics to also consider social and environmental dimensions. This holistic approach ensures that the economic, social, and environmental consequences of a project are all taken into account, providing a more balanced and responsible assessment.

In the context of the decommissioning the Leaburg Hydroelectric Project, the TBL analysis can help to identify the impacts associated with each transportation option to ensure that the values of the community are appropriately considered during decision making. The framework overview is included below. The project team refined the TBL framework to evaluate the impact of the concerns of the multiple impacted parties, including EWEB ratepayers, Lane County taxpayers, and residents and businesses located near the proposed transportation options.

The TBL analysis includes a qualitative description of the anticipated impact for each transportation option, with quantitative data where available at this stage in the project.

Triple Bottom Line Framework

The initial TBL framework was developed through consultation with staff from EWEB and Lane County, under the guidance of professional consultants. Through a series of input and work sessions in late 2024 and early 2025, the project team identified the components that are relevant to this analysis and could differ from option to option and also community concerns identified through early project outreach. Additional public outreach using the draft TBL framework is planned to ensure that all necessary TBL considerations are adequately documented for evaluation by decision makers. A summary of the TBL framework is included below.

Table 1 – Summary TBL Framework

Leaburg Dam Transportation Options	
Component	**Sub-Component**
ECONOMIC	
Local Economic Activity	During Construction Operating Phase
Construction Economic Impact	Construction Jobs Economic Multiplier
Resident Travel	During Construction Operating Phase
Facility Total cost of Ownership	Capital O&M Risk Costs Grant Opportunities
SOCIAL	
Construction Safety	Crew
Travel safety	During Construction Operating Phase
Resiliency - Major Event safety and recovery	During Construction Operating Phase
Recreation	During Construction Operating Phase
Local Livability	During Construction View - Operating Phase Traffic and noise - Operating Phase Utility access - Operating Phase
ENVIRONMENTAL	
Stormwater	During Construction Operating Phase
Erosion	During Construction Operating Phase
Wetlands, Riparian Zone and Floodplain	During Construction Operating Phase
Vegetation	During Construction Operating Phase
Fisheries and wildlife Impacts	During Construction Operating Phase
Archeological and Cultural importance	Life Cycle
Carbon Footprint	During Construction Life Cycle

Next Steps

This TBL analysis is being developed as a decision-making tool to compare transportation alternatives to replace existing Leaburg Dam access from Highway 126 to the south side of the McKenzie River. The next steps in finalizing the TBL assessment will include virtual meetings, public upriver events, and EWEB and Lane County review. Based on feedback from these events the design team will refine the TBL analysis and finalize this memo by fall of 2025.

EWEB and Lane County staff will work together to determine how the final TBL will be presented to the County Board and public.

Attachments: Preliminary Cost Table and Preliminary TBL Framework

Leaburg Transportation Analysis - Preliminary Cost

Options	Low (-30%)	Baseline	High (+50%)
1: Rehabilitate Existing Bridge	$12,180,000	$17,400,000	$26,100,000
2: ~~Retrofit Existing Piers and Construct New 2-Lane Bridge~~	~~$21,180,000~~	~~$30,250,000~~	~~$45,370,000~~
3: Connect Leaburg Dam Rd. to Leashore Dr.	$8,240,000	$11,780,000	$17,660,000
~~4: Connect Leaburg Dam Rd. to Deerhorn~~	~~$33,350,000~~	~~$47,640,000~~	~~$71,460,000~~
5: New Bridge Adjacent the Existing Bridge / Dam	$15,650,000	$22,360,000	$33,540,000
6: New Bridge approx. 1.25 Miles Downstream	$15,220,000	$21,740,000	$32,610,000
Options 1 and 3 Combined	$19,140,000	$27,340,000	$41,010,000
Options 5 and 3 combined	$22,040,000	$31,480,000	$47,210,000

ECONOMIC

Component	Sub-Component	Description	1: Rehabilitate Existing Bridge	3: Leaburg Dam Road to Leashore Drive Connection	1+3: Rehabilitate Existing Bridge + Leaburg to Leashore Dr. Construction and Emergency Access	5: New Bridge Immediately Downstream of Dam	5+3: New Bridge Immediately Downstream of Dam + Leaburg to Leashore Dr. Construction and Emergency Access	6: New Bridge Connection from OR-126 To Fish Hatchery Road
Local Economic Activity	**During Construction**	Disruptions to logging and blueberry trucks	Major construction traffic delays on temporary diversion bridge. Short delays are expected since the contractor will be sharing the facility.	Minor disruption due to minor construction traffic delays.	Minor disruption due to minor construction traffic delays.	Minor disruption due to minor construction traffic delays.	Minor disruption due to minor construction traffic delays.	Medium disruption due to construction traffic delays and detour.
	Operating Phase	Route changes to logging and blueberry trucks	No change.	This option would add just under 4 miles one way for log trucks and refrigerated trucks. Refrigerated trucks may not be able to use the covered Goodpasture Bridge.	Potential for improved access with alternate route available.	No change.	Potential for improved access with alternate route available.	This option would reduce about 2.5 miles one way for log trucks and refrigerated trucks.
Construction Economic Impact	**Construction Jobs**	Estimated potential jobs created for alternative construction	98 construction jobs	57 construction jobs	145 construction jobs	127 construction jobs	174 construction jobs	123 construction jobs
	Economic Multiplier	Local economic benefit from construction job creation and construction materials	175 indirect jobs created $26,000,000 indirect economic benefit	102 indirect jobs created $15,100,000 indirect economic benefit	258 indirect jobs created $38,400,000 indirect economic benefit	226 indirect jobs created $33,600,000 indirect economic benefit	310 indirect jobs created $46,000,000 indirect economic benefit	219 indirect jobs created $32,600,000 indirect economic benefit
Resident Travel	**During Construction**	Change in time for residents to travel construction route	Major construction traffic delays on temporary diversion bridge. Periods of stopped traffic due to contractor working on bridge.	Minor construction traffic delays on Leaburg Dam Road and Leashore Drive.	Minor construction traffic delays on temporary diversion bridge, Leaburg Dam Road, and Leashore Drive.	Minor construction traffic delays on Leaburg Dam Road and McKenzie Highway (OR-126).	Minor construction traffic delays on Leaburg Dam Road, Leashore Drive, and McKenzie Highway (OR-126).	Major construction traffic delays on Fish Hatchery Road and private drives on opposing side of McKenzie River. Short detours over Trout Creek and Canal. Minor construction traffic delays on McKenzie Highway (OR-126).
	Operating Phase	Change in time for residents to travel transportation alternative	No impact anticipated	Estimated 9 minutes additional travel time from beginning of Leaburg Dam Road to existing bridge connection on McKenzie Highway (OR-126)	No impact anticipated. Greater reliability for travel.	Negligible additional travel time	Negligible additional travel time. Greater reliability for travel.	Estimated 8 minutes additional travel time from beginning of Leaburg Dam Road to existing bridge connection on McKenzie Highway (OR-126)
Facility Total cost of Ownership	**Capital**	Transportation alternative cost estimate	$17,400,000	$11,780,000	$27,340,000	$33,540,000	$31,480,000	$21,740,000
	O&M	Estimated cost of ongoing operations and maintenance of transportation alternative.	$50,800 per year	$54,800 per year	$91,400 per year	$29,600 per year	$70,200 per year	$281,400 per year
	Risk Costs	Description of risk register and cost for insurance						
	Grant Opportunities	Potential to secure grant funding for construction or operations and maintenance						

SOCIAL

Component	Sub-Component	Description	1: Rehabilitate Existing Bridge	3: Leaburg Dam Road to Leashore Drive Connection	1+3: Rehabilitate Existing Bridge + Leaburg to Leashore Dr. Construction and Emergency Access	5: New Bridge Immediately Downstream of Dam	5+3: New Bridge Immediately Downstream of Dam + Leaburg to Leashore Dr. Construction and Emergency Access	6: New Bridge Connection from OR-126 To Fish Hatchery Road
Construction Safety	**Crew**	Description of potential construction risks	Medium. Structural hazards of working on an aging bridge, fall hazards from working at height and over water, traffic and roadway risks from passing vehicles, environmental and weather-related hazards like strong winds or precipitation.	Low. Traffic and roadway risks from passing vehicles or work zone intrusions, environmental hazards from heavy vegetation or wildlife.	Medium. Structural hazards of working on an aging bridge, fall hazards from working at height and over water, traffic and roadway risks from passing vehicles and/or work zone intrusions, environmental and weather-related hazards like strong winds, precipitation, heavy vegetation and/or wildlife.	Structural hazards of working on a new bridge, fall hazards from working at height and over water, traffic and roadway risks from passing vehicles, environmental and weather-related hazards like strong winds or precipitation	Structural hazards of working on a new bridge, fall hazards from working at height and over water, traffic and roadway risks from passing vehicles and/or work zone intrusions, environmental and weather-related hazards like strong winds, precipitation, heavy vegetation and/or wildlife.	Structural hazards of working on a new bridge, fall hazards from working at height and over water, traffic and roadway risks from passing vehicles, environmental and weather-related hazards like strong winds or precipitation
Travel safety	**During Construction**	Description of potential safety risks and functionality for all users of the road, including freight, bikes, peds, and emergency services	Temporary work/access bridge in place for 6-9 months - 2 lanes to allow for public access and construction. Increased congestion due to flagging/construction-induced delays, potential for conflict between construction crew/equipment and road users.	Minor disruptions.	Temporary work/access bridge in place for 6-9 months - 2 lanes to allow for public access and construction. Increased congestion due to flagging/construction-induced delays, potential for conflict between construction crew/equipment and road users.	Temporary work/access bridge in place for 6-9 months - 2 lanes to allow for public access and construction. Increased congestion due to flagging/construction-induced delays, potential for conflict between construction crew/equipment and road users.	Temporary work/access bridge in place for 6-9 months - 2 lanes to allow for public access and construction. Increased congestion due to flagging/construction-induced delays, potential for conflict between construction crew/equipment and road users.	Minor disruptions.
	Operating Phase	Description of potential safety risks and functionality for all users of the road, including freight, bikes, peds, and emergency services	No change. Current bridge is single lane and does not meet standards for bike or pedestrian usage.	New road will be consistent with current HWY 126. A multi-lane bridge over Honey Creek provides enhanced escapability and reliability. A stalled vehicle on a single lane bridge could create a very unsafe condition during an evacuation.	This option provides increased safety over Option 1 alone due to the Leaburg to Leashore Dr. emergency access.	A new bridge provides enhanced safety for the river crossing. Roadway width will be 24 feet with a 6 foot sidewalk for safe pedestrian and bike crossing. A multi-lane option provides enhanced escapability and reliability. A stalled vehicle on a single lane bridge could create a very unsafe condition during an evacuation.	This option provides increased safety over Option 5 alone due to the Leaburg to Leashore Dr. emergency access. A multi-lane option provides enhanced escapability and reliability. A stalled vehicle on a single lane bridge could create a very unsafe condition during an evacuation.	A new bridge provides enhanced safety for the river crossing. Roadway width will be 24 feet with a 6 foot sidewalk for safe pedestrian and bike crossing. This option provides potentially safer access to highway over the current location. A multi-lane option provides enhanced escapability and reliability. A stalled vehicle on a single lane bridge could create a very unsafe condition during an evacuation.
Resiliency - Major Event safety and recovery	**During Construction**	Qualitative assessment of resiliency risk relative to winter storms, flood, landslide, seismic, heat, wildfire, smoke, drought etc. during construction	Minor risk. The temporary work bridge may be less resilient to major hazards for the 6-9 months it is in place.	Minor risk. A seismic event or major precipitation event during construction may increase landslide risk before stabilization is complete.	Minor risk. The temporary work bridge may be less resilient to major hazards for the 6-9 months it is in place. A seismic event or major precipitation event during construction may increase landslide risk before stabilization is complete.	Minor risk. The temporary work bridge may be less resilient to major hazards for the 6-9 months it is in place.	Minor risk. The temporary work bridge may be less resilient to major hazards for the 6-9 months it is in place. A seismic event or major precipitation event during construction may increase landslide risk before stabilization is complete.	Minor risk. Current route will continue through construction. The existing bridge lacks seismic resilience.
	Operating Phase	Qualitative assessment of resiliency risk relative to winter storms, flood, landslide, seismic, heat, wildfire, smoke, drought, etc. for transportation option	No change. The existing bridge lacks seismic resilience.	New bridge over Honey Creek is much smaller and would be built to seismic standards. Requires several retaining walls which could increase concern for future landslides. Future route onto Goodpasture wooden bridge not resilient to seismic and wildfire. Increased reliance and traffic over a historic timber structure - leading to faster deterioration.	The existing bridge lacks seismic resilience. New bridge over Honey Creek would be built to seismic standards. Requires several retaining walls which could increase concern for future landslides. Future route onto Goodpasture wooden bridge not resilient to seismic and wildfire. Increased reliance and traffic over a historic timber structure - leading to faster deterioration.	New bridge would be built to seismic standards, improving seismic resilience.	New main bridge over McKenzie River would be built to seismic standards, improving seismic resilience. New bridge over Honey Creek would be built to seismic standards. Requires several retaining walls which could increase concern for future landslides. Future route onto Goodpasture wooden bridge not resilient to seismic and wildfire. Increased reliance and traffic over a historic timber structure - leading to faster deterioration. However, having a secondary emergency road as a backup also increases overall resilience.	New bridge would be built to seismic standards, improving seismic resilience. Timber Trout Creek Bridge would be replaced, improving structural deficiencies and improving resilience.
Recreation	**During Construction**	Description of transportation option's contribution to promoting recreation for all users of the road, including cars, bikes, peds during construction	Limited impacts. Temporary working bridge may impact the recrational use of the river and river banks near the bridge.	No change	Limited impacts. Temporary working bridge may impact the recrational use of the river and river banks near the bridge.	Limited impacts. Temporary working bridge may impact the recrational use of the river and river banks near the bridge.	Limited impacts. Temporary working bridge may impact the recrational use of the river and river banks near the bridge.	Limited impacts. Temporary working bridge may impact the recrational use of the river and river banks near the bridge.
	Operating Phase	Description of transportation option's contribution to promoting recreation for all users of the road, including cars, bikes, peds during construction	17400000	11780000	27340000	33540000	31480000	21740000
Neighbor Liveability	**During Construction**	Description of impacts of construction including visual, noise, dust, diesel PM, etc.	Limited impacts. The construction maintains existing structures. Temporary working bridge may require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Ground work may cause minimal dust.	Significant impact. Temporary working bridge may require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Significant ground work may cause dust. New permanent road will pass by various properties.	Medium impact. Temporary working bridge may require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Significant ground work may cause dust. New road will pass by various properties. Emergency access road will require less construction time than permanent road.	Medium impact. New bridge and temporary working bridge will require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Ground work may cause dust.	Medium impact. New bridge and temporary working bridge will require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Ground work may cause dust. New road will pass by various properties. Emergency access road will require less construction time than permanent road.	Significant impact. New bridge will require pile driving. Heavy equipment will contribute to noise and diesel particulate matter. Significant ground work may cause dust. New road will pass by various properties.
	View - Operating Phase	Number of houses with potential for new road view for transportation option	0 Houses	13 Houses	13 Houses	5 Houses	18 Houses	18 houses, including Whitewater Ranch
	Traffic and noise - Operating Phase	Qualitative description of change in expected traffic for residents for transportation option	No change	Goodpasture Bridge and residents on Leashore Dr. may see around 85 additional daily vehicles in winter months (based on January traffic counts). More traffic may be expected in summer months when more visitors are seeking recreation, though this may be minimal if Lloyd Knox Park is no longer operating.	No change	No change	No change	Residents on Fish Hatchery Rd. may see around 47 additional daily vehicles in winter months (based on January traffic counts). More traffic may be expected in summer months when more visitors are seeking recreation, though this may be minimal if Lloyd Knox Park is no longer operating.
	Utility access - Operating Phase	Potential disturbances in utilities to neighbors during construction	*Placeholder - Item Pending Design Locate*	*Placeholder - Item Pending Design Locate*	*Placeholder - Item Pending Design Locate*	*Placeholder - Item Pending Design Locate*	*Placeholder - Item Pending Design Locate*	*Placeholder - Item Pending Design Locate*

ENVIRONMENTAL

Component	Sub-Component	Description	1: Rehabilitate Existing Bridge	3: Leaburg Dam Road to Leashore Drive Connection	1+3: Rehabilitate Existing Bridge + Leaburg to Leashore Dr. Construction and Emergency Access	5: New Bridge Immediately Downstream of Dam	5+3: New Bridge Immediately Downstream of Dam + Leaburg to Leashore Dr. Construction and Emergency Access	6: New Bridge Connection from OR-126 To Fish Hatchery Road
Stormwater	**During Construction**	Area of impervious surface during construction (including staging areas)	0.7 Acres	1.5 Acres	1.0 Acres	1.0 Acres	1.3 Acres	5.5 Acres
	Operating Phase	Area of impervious surface of transportation alternative	0.1 Acres	1.0 Acres	0.25 Acres	0.35 Acres	0.5 Acres	4.5 Acres
Erosion	**During Construction**	Total acreage of disturbed areas (including staging)	3.1 Acres	4.6 Acres	4.4 Acres	3.4 Acres	4.7 Acres	11.6 Acres
	Operating Phase	Description of high risk or "steep" slope (% TBD) areas for transportation option	Potential for erosion and settlement from the replacement of Spans 1, 2, 3, and 7 with embankment.	Potential for landslides along steep cut slope areas.	Potential for erosion and settlement from the replacement of Spans 1, 2, 3, and 7 with embankment. Potential for landslides along steep cut slope areas.	Potential for erosion and settlement along river banks adjacent to bridge abutments and former canal area.	Potential for erosion and settlement along river banks adjacent to bridge abutments and former canal area. Potential for landslides along steep cut slope areas.	Potential for erosion and settlement along river banks adjacent to bridge abutments and former canal area.
Wetlands, Riparian Zone and Floodplain	**During Construction**	Total acreage of disturbed areas (including staging) and any required mitigation	0.5 Acres in McKenzie River floodplain. Temp dewatering for bent work and erosion control BMPs for mitigation.	Erosion control BMPs around Honey Creek bridge construction.	0.5 Acres in McKenzie River floodplain. Temp dewatering for bent work and erosion control BMPs for mitigation. Erosion control BMPs around Honey Creek bridge construction.	0.5 Acres in McKenzie River floodplain. Temp dewatering for bent work and erosion control BMPs for mitigation.	0.5 Acres in McKenzie River floodplain. Temp dewatering for bent work and erosion control BMPs for mitigation. Erosion control BMPs around Honey Creek bridge construction.	4.5 Acres in McKenzie River floodplain. Temp dewatering for bent work and erosion control BMPs for mitigation. Erosion control BMPs around Trout Creek bridge construction.
	Operating Phase	Total acreage of disturbed areas for transportation option and any required mitigation	No impact anticipated	No impact anticipated	No impact anticipated.	0.5 Acres in McKenzie River floodplain. Scour from new bridge piers.	0.5 Acres in McKenzie River floodplain. Scour from new bridge piers	4.5 Acres in McKenzie River floodplain. Scour from new bridge piers.
Vegetation	**During Construction**	Total acreage of disturbed areas (including staging)	17400000	11780000	27340000	33540000	31480000	21740000
	Operating Phase	Total acreage of disturbed areas for transportation option	0.1 Acres	1.6 Acres	1.4 Acres	0.4 Acres	1.7 Acres	8.6 Acres
Fisheries and wildlife Impacts	**During Construction**	Description of in-water structures during construction	Temporary work & access bridge in McKenzie River	Bridge removal in McKenzie River. Temporary work bridge in Honey Creek	Temporary work & access bridge in McKenzie River. Temporary work bridge in Honey Creek	Temporary work bridge, new bridge, and bridge removal in McKenzie River	Temporary work bridge, new bridge, and bridge removal in McKenzie River. Temporary work bridge in Honey Creek	Temporary work bridge, new bridge, and bridge removal in McKenzie River. Temporary work bridge in Trout Creek
	Operating Phase	Description of in-water structures for transportation option	No change from existing in McKenzie River	Fish passage improvements in Honey Creek.	No change from existing in McKenzie River. Fish passage improvements in Honey Creek.	New bridge in McKenzie River	New bridge in McKenzie River. Fish passage improvements in Honey Creek.	New bridge in McKenzie River. Fish passage improvements in Trout Creek.
Archeological and Cultural importance	**Life Cycle**	Description of impact to historical and cultural resources	Rehabilitation measures to the existing bridge may have substantial impacts to the registered historic structure. No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.	No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.	Requires substantial impacts to the registered historic structure. No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.	No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.	No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.	No known cultural sites have been identified, however ground disturbances have the potential to uncover cultural resources.
Carbon Footprint	**During Construction**	Qualitative estimate of GHG Emissions from construction detour including driving time and embodied emissions in materials	Minor construction GHG emissions from minor construction traffic congestion. No change to operating phase emissions.	Minor GHG emissions. Operating phase emissions may increase due to route increases of up to 4 miles for traffic to Fish Hatchery Rd.	Minor GHG emissions from minor construction traffic congestion.	Minor construction GHG emissions from minor construction traffic congestion. No change to operating phase emissions.	Minor construction GHG emissions from minor construction traffic congestion. No change to operating phase emissions.	Minor construction GHG emissions from minor construction traffic congestion. Operating phase GHG emissions may decrease slightly due to a more direct route to Fish Hatchery Rd.
	Life Cycle	Qualitative estimate of lifecycle GHG emissions from embodied emissions in final structure construction, maintenance regime, and vehicle use	Construction: 2,255 MT CO2e Annual Maintenance: 8 MT CO2e	Construction: 1,147 MT CO2e Annual Maintenance: 8 MT CO2e	Construction: 3,190 MT CO2e Annual Maintenance: 14 MT CO2e	Construction: 2,696 MT CO2e Annual Maintenance: 5 MT CO2e	Construction: 3,631 MT CO2e Annual Maintenance: 11 MT CO2e	Construction: 2,643 MT CO2e Annual Maintenance: 44 MT CO2e