PROPOSED STORM WATER MANAGEMENT SYSTEMS

Cascade Locks Resort and Casino

Storm water at the Cascade Locks Resort and Casino project site would be managed through a series of treatment systems, including swales, filters, and treatment ponds. Figure 1 shows the proposed water quality treatment methods and approximate locations. Few studies have been completed to determine the effectiveness of pollutant removal for these methods when used in series (i.e., swales, filters, ponds). It is assumed that, when used in combination, pollutant removal efficiencies are increased.

There is no requirement or standard for managing storm water quality or quantity on the Cascade Locks Resort and Casino project site. The Tribe proposes storm water treatment facilities capable of treating 100 percent of the precipitation that has a statistical probability of recurring in a 24 hour period every two years (i.e., the 2-year, 24-hour storm). This level of volume collection is similar to, or better than, requirements put forth by many municipalities with design standards for storm water management (e.g., City of Portland). For the interchange area, 72 percent of the 2-year 24-hour storm would be treated, which is consistent with Oregon Department of Transportation (ODOT) requirements of other projects potentially affecting the Columbia River and its tributaries.

The 2-year, 24-hour storm is termed the “water quality storm event” and is used to determine flow and treatment capacity for particular storm water management measures. The water quality storm event is representative of more common, smaller runoff events, which are considered to generate the highest concentration of pollutants in storm water.

<u>Treatment Facilities</u>

<u>Resort and Casino Building</u>

Storm water runoff from the resort and casino building roof would drain to five rain gardens located around the building. The rain gardens are designed to remove grit and dust from storm water. Excess flows from the rain gardens would be routed directly to one of two constructed wetlands east of the resort and casino building.

The constructed wetlands would act as finishing ponds, providing water storage and some water quality treatment. They would be designed to retain up to the 25-year storm event. When the water surface elevation exceeds this design standard, water would then flow over the pond embankment and flow to Government Cove at a rate of approximately 2.24 cubic feet per second for a 25-year storm event. No rip-rap or channel protection is required. to prevent erosion.

The constructed wetlands would contain some open water year round and support wetland vegetation. Typical pollutant removal efficiencies for constructed wetlands are up to 80 percent of total suspended sediments (TSS), (EPA, 2006). Based on the combined pollutant removal efficiencies of the individual treatments, the treatment train for storm water from the resort and casino building would remove an estimated 85 to 95 percent of pollutants from storm water generated by the water quality storm event. The storm water treatment system, including the wetland ponds, would be designed to retain up to the 25-year storm event. Therefore, there would be no discharge of storm water to receiving surface waters during the water quality event. The constructed wetlands would be placed at the toe of the fill slope and be set back a minimum of 150 feet from Government Cove. The constructed wetlands would also be configured to minimize the affect on trees and be situated in areas that have previously been disturbed (e.g., access roads).

In addition to the rain garden and wetlands, green roofs could be added to portions of the building to further reduce and slow runoff. Use of rain harvest cisterns to collect and store rain for later use in irrigation is being considered part of the storm water management system at the resort and casino building. If a cistern storage system were implemented, flows in excess of the rain garden capacity would be routed into a cistern. Once the cisterns become full, water would be conveyed to one of the two constructed wetlands east of the building. These two possible measures would reduce and slow runoff rates, further improving the storm water collection system.

Parking Areas and Internal Roadway Network

Storm water from the parking structure would be collected and routed into a treatment vault, otherwise referred to as a storm water filter (i.e., StormFilter[tm]). The storm water filter consists of a series of underground canisters that contain cartridges with mixed media (e.g., carbon, mulch) that would be designed to treat 100 percent of the water quality storm event. Typical configurations of the canisters could remove up to 80 percent of TSS, 43 percent of total copper, 52 percent of zinc and 40 percent of total phosphorus.

From this location, the water would be routed to a biofilter pond for secondary water quality treatment. Water quality ponds are typically planted with grass and treat water through biological uptake of nutrients (e.g., phosphorus) and through filtration of sediments. They can also aid in detention. Estimated pollutant removal efficiencies for wet detention ponds are 67 percent of TSS, 48 percent of phosphorous, and 25 percent of metals (EPA, 2006). Runoff generated from the parking structure in excess of the water quality storm event would bypass the storm water filter and discharge to the biofilter pond, which would have the capacity to treat at least the 10-year storm, 24-hour event. Larger storm events would result in discharge from the biofilter pond via pipe to the constructed wetlands.

Storm water from the north surface parking lot would be routed into landscape swales and then discharged to a storm water filter, which would be designed to treat the water quality storm event. Landscape swales are vegetated depressions with inlets and outlets (i.e., water flows through the facilities). Swales treat water by removing sediments and providing some biological uptake of nutrients (e.g., phosphorus), which increases as the water residence time increases. In general, the current literature reports that a well-designed, well-maintained swale system can be expected to remove 81 percent of TSS, 30 percent for total phosphorus, and 36 percent of metals (EPA, 2006). Flows from the storm water filter would discharge to one of the constructed wetlands on the east side of the resort and casino building. Flows from the parking lot in excess of the water quality storm event would be discharged directly to the constructed wetland.

Storm water from the west surface parking lot would first be routed to landscape swales, which would provide a first level of treatment. Water from the swales, along with runoff from Port Industrial Parkway, would be routed into a large storm water filter. The landscape swales and storm water filter would be designed to detain and treat the water quality storm event. As a result, approximately 80 to 90 percent of pollutants would be removed and no offsite discharge of water would occur during a water quality storm event. For larger storm events, water would flow from the storm water filter to an existing 29-inch outfall into Herman Creek Cove. In a 25-year event, storm water would discharge to the easterly end of Herman Creek Cove at a rate of approximately 1.5 cubic feet per second. The outfall would likely be armored with a rip-rap pad approximately 4 feet wide by 5 feet long, located 3 to 5 feet above the ordinary high water level. If any riparian vegetation were removed for this armoring, it would be replanted along the cove area.

The maintenance building and its immediate surroundings would have a separate primary storm water treatment system to provide containment in the event of an accidental spill or release of hazardous materials or pollutants. Runoff from the area associated with the maintenance operations would be routed into a water quality pond located just east of the maintenance building. This water quality pond would treat the water quality storm event through infiltration. Excess flows from the pond would be conveyed through a pipe under the parking lot to the storm water filter associated with the west surface parking lot. The outlets from the pond would include structures that could be closed to prevent flow from the pond into the pipe infrastructure system in the event of a spill. Flows from the west surface parking lot and maintenance operation area in excess of the water quality event would be routed from the storm water filters to the existing 29-inch outfall into Herman Creek Cove, described above.

Interchange Area

Storm water pollutants generated by the proposed Forest Lane Interchange with I-84 would be managed by combined pollution reduction and detention basins designed to treat 72 percent of a 2-year, 24-hour storm event. This level of treatment is a commonly used and accepted treatment level for roadways and is typically required for similar projects by ODOT. A combination of treatment facilities would be used, including treatment/detention ponds, swales, and proprietary facilities. The water quality treatment and detention system would be designed so that discharge to receiving waters would be similar to existing water quality and hydrologic conditions. Detention facilities will be designed to capture runoff such that the post-development runoff rates from the site do not exceed the pre-development runoff rates for the 2-, 10-, and 25-year 24-hour return storm.

Due to the topographic relief of the interchange area, storm water from the eastern portion of the interchange area would be conveyed to detention basins and then to Government Cove via a vegetated swale. The number and size of the detention basins would be determined in later stages of project design, but would likely follow existing patterns through existing ditches, swales, and culverts (under I-84) to the existing outfall.

Drainage from the western portion of the interchange area would be routed to combination detention/water quality ponds. The number and size of the detention basins would be determined in later stages of project design. Overflow from these ponds would eventually flow into Herman Creek via shallow surface flow.

The eastbound I-84 auxiliary lane would be treated and a majority of the storm water conveyed to Herman Creek (95 percent). The remaining area would be conveyed west and ultimately discharged to Dry Creek. The storm water from this lane would be treated and detained before discharging to these water bodies.

Storm Water Effluent Calculations

Table 1 shows the storm water treatment each location receives and the percent of pollutants removed after a 2-year, 24-hour storm. Pollutant concentrations of storm water influent were based on information from the Oregon Association of Clean Water Agencies' (ACWA's) *Analysis* *of Oregon Urban Runoff Water Quality Monitoring Data Collected from 1990 to 1996* (Strecker et al., 1997). ACWA's report assesses differences in storm water runoff in urban areas of Oregon relative to different land uses. Land use categories in the report are transportation, commercial, residential, and open areas; pollutant concentrations are provided for TSS, total copper, total zinc, and total phosphorus. The land use categories used to determine pollutant concentrations in storm water influent at each of the treatment locations for the proposed project are noted in parenthesis next to each treatment location in Table 1. Based on this estimate of pollutant loading, zero pollutant loading would occur from the resort and casino (and associated maintenance and parking facilities) for storm events that are equal to or smaller than the water quality storm event (2-year, 24-hour) because no discharge would occur from the treatment facility at that event size. Table 1 reports the pollutant loads in discharge from the transportation improvements associated with the interchange, loop road, and I-84.

Table 1. Cascade Locks Resort and Casino Treatment by Location: 2-Year 24-Hour Storm

Area	TSS			Total Copper			Total Zinc			Total Phosphorus		
	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)
Resort and Casino (Open)												
Influent Total (2-yr, 24-hr storm)	121,221	2,090	58.0	8	2,090	0.004	52	2,090	0.025	347	2,090	0.166
Rain Garden Percent Removal	100%	100%		100%	100%		100%	100%		100%	100%	
Estimated Effluent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**
Maintenance Building (Transportation)												
Influent Total (2-yr, 24-hr storm)	12,909	76	169.0	26	76	0.335	18	76	0.236	29	76	0.376
Water Quality Pond Percent Removal	100%	100%		100%	100%		100%	100%		100%	100%	
Estimated Effluent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**
Parking Structure (Commercial)												
Influent Total (2-yr, 24-hr storm)	176,414	1,918	92.0	61	1,918	0.032	322	1,918	0.168	750	1,918	0.391
StormFilter™ Percent Removal[1]	80%	0%		43%	0%		52%	0%		40%	0%	
Estimated Effluent	35,283	1,918	18.4	35	1,918	0.018	155	1,918	0.081	450	1,918	0.235
Water Quality Pond Percent Removal	100%	100%		100%	100%		100%	100%		100%	100%	
Estimated Effluent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**
North Parking Lot (Commercial)												
Influent Total (2-yr, 24-hr storm)	114,331	1,243	92.0	40	1,243	0.032	209	1,243	0.2	486	1,243	0.391
Landscape Swales Percent Removal	100%	100%		100%	100%		100%	100%		100%	100%	
Estimated Effluent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**
West Parking Lot (Commercial)												
Influent Total (2-yr, 24-hr storm)	429,264	4,666	92.0	61	4,666	0.013	322	4,666	0.069	750	4,666	0.161
Landscape Swales Percent Removal	100%	100%		100%	100%		100%	100%		100%	100%	
Estimated Effluent	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**	**0.0**	**0.0**	**0.000**

Table 1. Cascade Locks Resort and Casino Treatment by Location: 2-Year 24-Hour Storm

Area	TSS			Total Copper			Total Zinc			Total Phosphorus		
	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)
East Interchange (Transportation)												
Influent Total (2-yr, 24-hr storm)	228,319	1,351	169.0	453	1,351	0.335	319	1,351	0.236	508	1,351	0.376
Vegetated Swale Percent Removal[2]	81%	9%		36%	9%		36%	9%		29%	9%	
Estimated Effluent	43,380	1,229	35.3	290	1,229	0.236	204	1,229	0.166	361	1,229	0.293
Detention Basin Percent Removal‡	48%	13%		18%	13%		18%	13%		35%	13%	
Estimated Effluent	**22,557**	**1,069**	**21.0**	**238**	**1,069**	**0.222**	**167**	**1,069**	**0.156**	**235**	**1,069**	**0.221**
West Interchange (Transportation)												
Influent Total (2-yr, 24-hr storm)	236,262	1,398	169.0	468	1,398	0.335	330	1,398	0.236	526	1,398	0.376
Vegetated Swale Percent Removal[2]†	81%	9%		36%	9%		36%	9%		29%	9%	
Estimated Effluent	44,889	1,272	35.3	299	1,272	0.236	211	1,272	0.166	373	1,272	0.293
Detention Basin Percent Removal‡	48%	13%		18%	13%		18%	13%		35%	13%	
Estimated Effluent	**23,342**	**1,107**	**21.0**	**245**	**1,107**	**0.222**	**173**	**1,107**	**0.156**	**242**	**1,107**	**0.221**
I-84 Auxiliary Lane- West Side (Transportation)												
Influent Total (2-yr, 24-hr storm)	9,802	58	169.0	19	58	0.335	13,688	58	0.236	21,808	58	0.376
Vegetated Swale Percent Removal[2]	81%	9%		36%	9%		36%	9%		29%	9%	
Estimated Effluent	**1,862**	**53**	35.3	**12**	**53**	0.236	**8,760**	**53**	0.166	**15,484**	**53**	0.293
Detention Basin Percent Removal‡	48%	13%		18%	13%		18%	13%		35%	13%	
Estimated Effluent	**968**	**46**	**5,965**	**10**	**46**	**0.790**	**7,183**	**46**	**0.156**	**10,065**	**46**	**0.221**

1. Gerstner, 2006; Darcy, 2006; Contech Stormwater Solutions, 2006

2. EPA, 2006.

† Based on an 0.25 in/hr infiltration rate.

‡ Based on an 0.5 in/hr infiltration rate.

Percent removal values for pollutants were taken from the EPA's database, *Stormwater Menu of BMPs* (EPA, 2006a). For some pollutants, the database lists percent removal values as a range of typical values. For purposes of this analysis, a median value was used in the effluent calculations when the database presented a range of removal values. Removal efficiencies for StormFilter^{TM} were estimated based on personal communication with the product representative at Contech Stormwater Solutions and a Contech Stormwater Solutions Parameter Brief (Contech, 2006).

The volume of runoff and associated pollutant loading was based on the assumption that impervious areas generated 100 percent runoff of the 2-year, 24-hour storm volume (i.e., no evapotranspiration).

Table 2 summarizes the effluent concentrations from a 2-year, 24-hour storm with the proposed storm water treatments. Effluent concentrations were determined for the three receiving waters: Herman Creek Cove, Herman Creek, and Government Cove.

Table 2. Cascade Locks Resort and Casino Storm Water Effluent from a 2-Year, 24-Hour Storm

Area	TSS			Total Copper			Total Zinc			Total Phosphorus		
	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)	Mass (1000 mg)	Volume Rain (1000 L)	Conc. (mg/L)
Herman Creek Cove												
Total in Effluent to Herman Creek Cove	**0.000**	**0.000**	**0.0**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Herman Creek												
Total in Effluent to Herman Creek (from West Interchange)	**23,342**	**1,107**	**21.0**	**245**	**1,107**	**0.222**	**173**	**1,107**	**0.156**	**242**	**1,107**	**0.221**
Government Cove												
Total in Effluent to Government Cove (from East Interchange)	**22,557**	**1,069**	**21.0**	**238**	**1,069**	**0.222**	**167**	**1,069**	**0.156**	**235**	**1,069**	**0.221**
Dry Creek												
Total in Effluent to Dry Creek (from auxiliary lane)	**968**	**46**	**5,965**	**10**	**46**	**0.790**	**7,183**	**46**	**0.156**	**10,065**	**46**	**0.221**

Hood River Alternative: Option A

Storm water for Hood River Alternative Option A would be managed through a series of storm drains, water quality ponds, and filters. Storm water in excess of the 25-year event would be discharged into the ground via a groundwater injection system located in the southeastern portion of the trust land (see Figure 2). Runoff from precipitation that falls on the undeveloped portions of the parcel would be diverted around the buildings to flow downhill, using existing drainage-ways.

There is no requirement or standard for managing storm water quality or quantity on the Hood River Alternative project site. The Tribe proposes storm water treatment facilities capable of treating 100 percent of the precipitation that has a statistical probability of recurring in a 24 hour period every two years (i.e., the 2-year, 24-hour storm). This level of volume collection is similar to, or better than, requirements put forth by many municipalities with design standards for storm water management (e.g., City of Portland). The storm water treatment system would be designed to retain up to the 25-year storm event. Therefore, there would be no discharge of storm water to groundwater during the water quality event.

Storm water from the building and related facilities would be directed into storm drains located along the curbs, roadways, and parking lots. Larger objects would be prevented from entering the system by grates and catch basins. A piped collection system would convey the storm water to an 11-cubic-foot per second master pump station (with full emergency backup). This pump station would pump water to a 1.4-acre pond located upslope and southeast of the casino building, which would serve as a primary settling basin. Water then would be conveyed into a storm water filter/treatment vault (i.e., StormFilter™) system. From the storm water filter, water would be conveyed into a second 1.4-acre pond for additional treatment and detention before being discharged into the groundwater injection system. In combination, the two 1.4-acre ponds are capable of detaining up to the 25-year event. Because these ponds can hold storm water volume up to the 25-year event, there would be no pollutants discharged to the groundwater injection system during the water quality storm event.

The ponds would remove 67 percent of TSS, 48 percent of total phosphorous, and 25 percent of both copper and zinc (EPA, 2006). Typical configurations of the storm water filter canisters could remove up to 80 percent of sediments and 46 percent of metals. The combined treatment process is estimated to remove 70 to 90 percent of pollutants from storm water.

The groundwater injection system would be sized to handle injection of 5,000 gallons per minute, which is far greater than the runoff generated from a 100-year storm event. Geotechnical surveys of the receiving aquifer would be conducted prior to the development of the groundwater injection system to ensure appropriate sizing of the system.

Storm water from the proposed new access road would be treated in roadside ditches, where it would infiltrate into the ground. Green street practices would be used to treat storm water runoff and the roadway would not have standard curb and gutter design.

Hood River Alternative: Option B

Storm water for the Hood River Alternative Option B would be managed through a series of storm drains, filters, and water quality ponds. Storm water runoff in excess of the 25-year event would be discharged into the Columbia River via a series of existing wetlands and ponds located downslope of the proposed casino building (see Figure 3). Precipitation runoff generated from the undeveloped area of the property would be routed around the casino site and would continue to flow through natural drainageways.

There is no requirement or standard for managing storm water quality or quantity on the Hood River Alternative project site. The Tribe proposes storm water treatment facilities capable of treating 100 percent of the precipitation that has a statistical probability of recurring in a 24 hour period every two years (i.e., the 2-year, 24-hour storm). This level of volume collection is similar to, or better than, requirements put forth by many municipalities with design standards for storm water management (e.g., City of Portland). The storm water treatment system would be designed to detain up to the 25-year storm event. Therefore, there would be no discharge of storm water to surface water during the water quality event.

Storm water from the building and associated facilities would be conveyed into storm drains located along the curbs, roadways, and parking lots. Larger objects would be prevented from entering the system through the use of grates and catch basins. Storm water would then be conveyed through pipes into a constructed 1.4-acre water quality treatment pond, which would provide primary settling. The water would be routed to a storm water filter/treatment vault (i.e., StormFilter[tm]), then to a second 1.4-acre water quality treatment pond. In combination, the two 1.4-acre ponds are capable of detaining up to the 25-year event. Because these ponds can hold storm water volume up to the 25-year event, there would be no pollutants discharged during the water quality storm event.

The ponds would remove 67 percent of TSS, 48 percent of total phosphorous, and 25 percent of both copper and zinc (EPA, 2006). Typical configurations of the storm water filter canisters could remove up to 80 percent of sediments and 46 percent of metals. The combined treatment process is estimated to remove 70 to 90 percent of pollutants.

After this treatment, water would flow to an existing pond located on the property just south of the UPRR tracks. This pond is connected by pipes to another, larger pond, which is located between the UPRR railroad tracks and I-84. Drainage from this larger pond flows through a culvert (under I-84) to the Columbia River.

The existing pond just south of the UPRR tracks is approximately 4.3 acre-feet (186,000 cubic feet) in size. The 25-year storm event would add an additional volume of 37,250 cubic feet (approximately a 20 percent increase), resulting in a water surface elevation increase of 2.5 feet. The pond is hydraulically connected to a larger pond, via an outlet pipe. From there, during larger storm events, water would flow to the larger pond and then to the Columbia River.

Storm water from the proposed new access road would be treated in roadside ditches where it would infiltrate the ground. Green street practices would be used to treat storm water runoff and the roadway would not have standard curb and gutter design.

Warm Springs Alternative

Storm water at the Warm Springs Alternative project site would be managed through a series of treatment systems, including swales, filters, treatment ponds, and velocity reduction basins. Figure 4 shows the proposed storm water treatment methods and approximate locations.

There is no requirement or standard for managing storm water quality or quantity on the Warm Springs Alternative project site. The Tribe proposes storm water treatment facilities capable of treating 100 percent of the precipitation that has a statistical probability of recurring in a 24 hour period every two years (i.e., the 2-year, 24-hour storm). This level of volume collection is similar to, or better than, requirements put forth by many municipalities with design standards for storm water management (e.g., City of Portland) and is consistent with the Tribe's Integrated Resources Management Plan.

Treatment Facilities

Casino Building

Storm water runoff from the casino building roof would drain to a rain garden located south of the building. The rain gardens would remove grit and dust from the storm water. Storm water from the rain garden would either infiltrate into the roof garden soil or evapotransporate through plant materials. Use of rain harvest cisterns to collect and store rain for later use in irrigation is being considered as part of the storm water management system at the casino building. If a cistern storage system were implemented, flows in excess of the rain garden capacity would be routed into a cistern. Once the cisterns become full, water would be conveyed to one of the two constructed water quality ponds south of the building. If the cisterns were not used, excess flows from the rain gardens would be routed directly into the constructed water quality ponds.

The constructed water quality ponds would provide water storage and water quality treatment. They would be designed to retain up to the 25-year storm event. When the water surface elevation exceeds this design standard, water would then flow over the pond via pipes to a velocity reduction basin. The velocity reduction basin would release water to Shitike Creek at a rate of 1 to 2 cubic feet per second for storms greater than the 25-year return event. Rip-rap or other channel protection would be installed. Typical pollutant removal efficiencies for constructed water quality ponds are up to 80 percent of TSS (EPA, 2006).

Parking Areas and Interchange Area

Storm water from the parking lots and interchange area would be routed into landscape swales, followed by discharge to a storm water filter, which would be designed to treat the water quality storm event. Flows from the storm water filter would discharge to the constructed water quality ponds, which would provide detention up to the 25-year event. Flows in excess of the 25-year event would be discharged directly to the constructed velocity reduction basin and then down gradient to Shitike Creek.

In a 25-year event, storm water would discharge to Shitike Creek at a rate of approximately 1.5 cubic feet per second. The outfall would likely be armored with a rip-rap pad approximately 4 feet wide by 5 feet long, located 3 to 5 feet above the ordinary high water level. If any riparian vegetation were removed for this armoring, it would be replanted along the streambank.

Because the storm water treatment system would be designed to detain up to the 25-year storm event, there would be no discharge of storm water to surface water during the water quality event.

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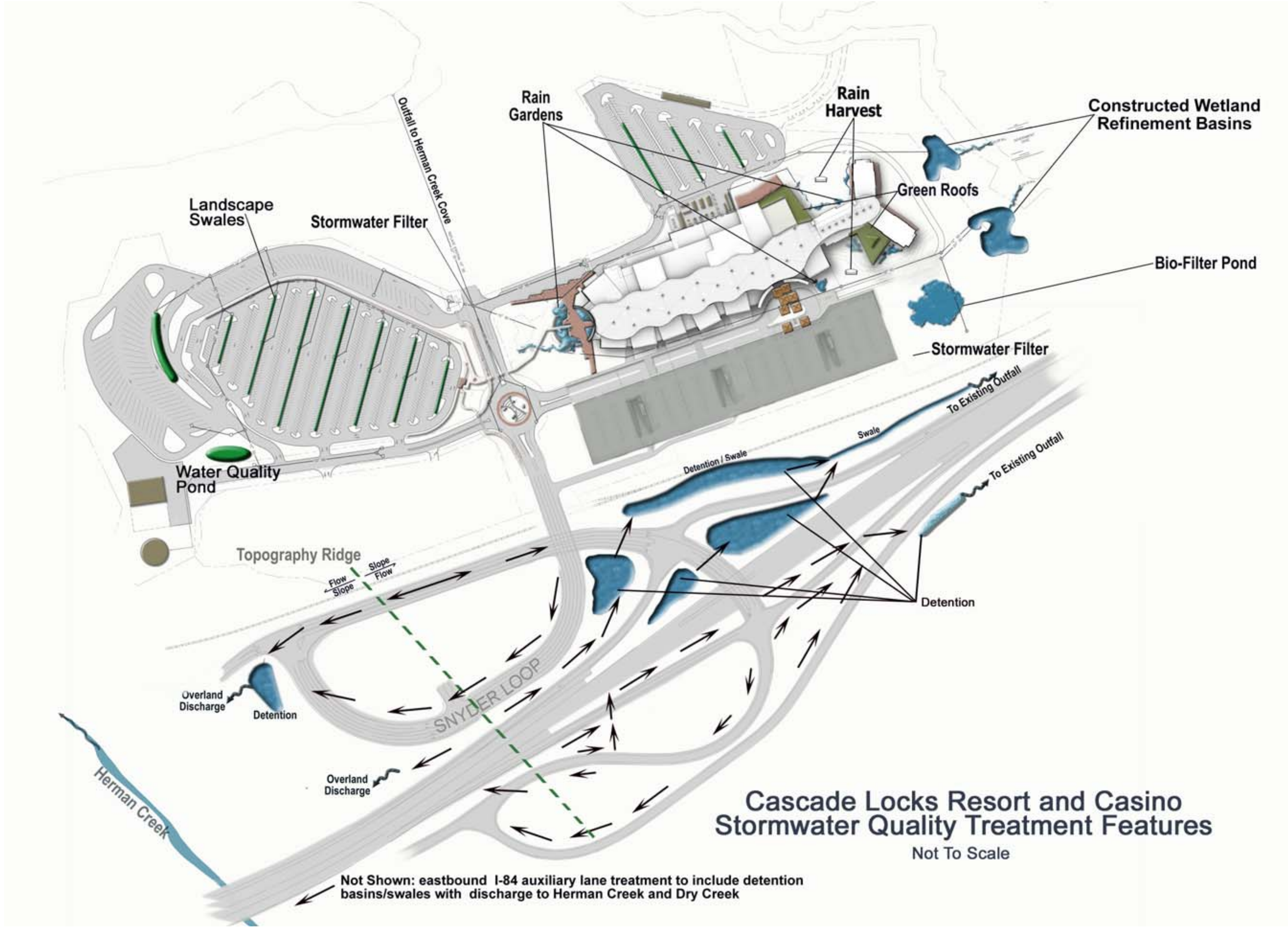

Figure 1. Cascade Locks Resort and Casino Storm Water Quality Treatment Features — Conceptual Design

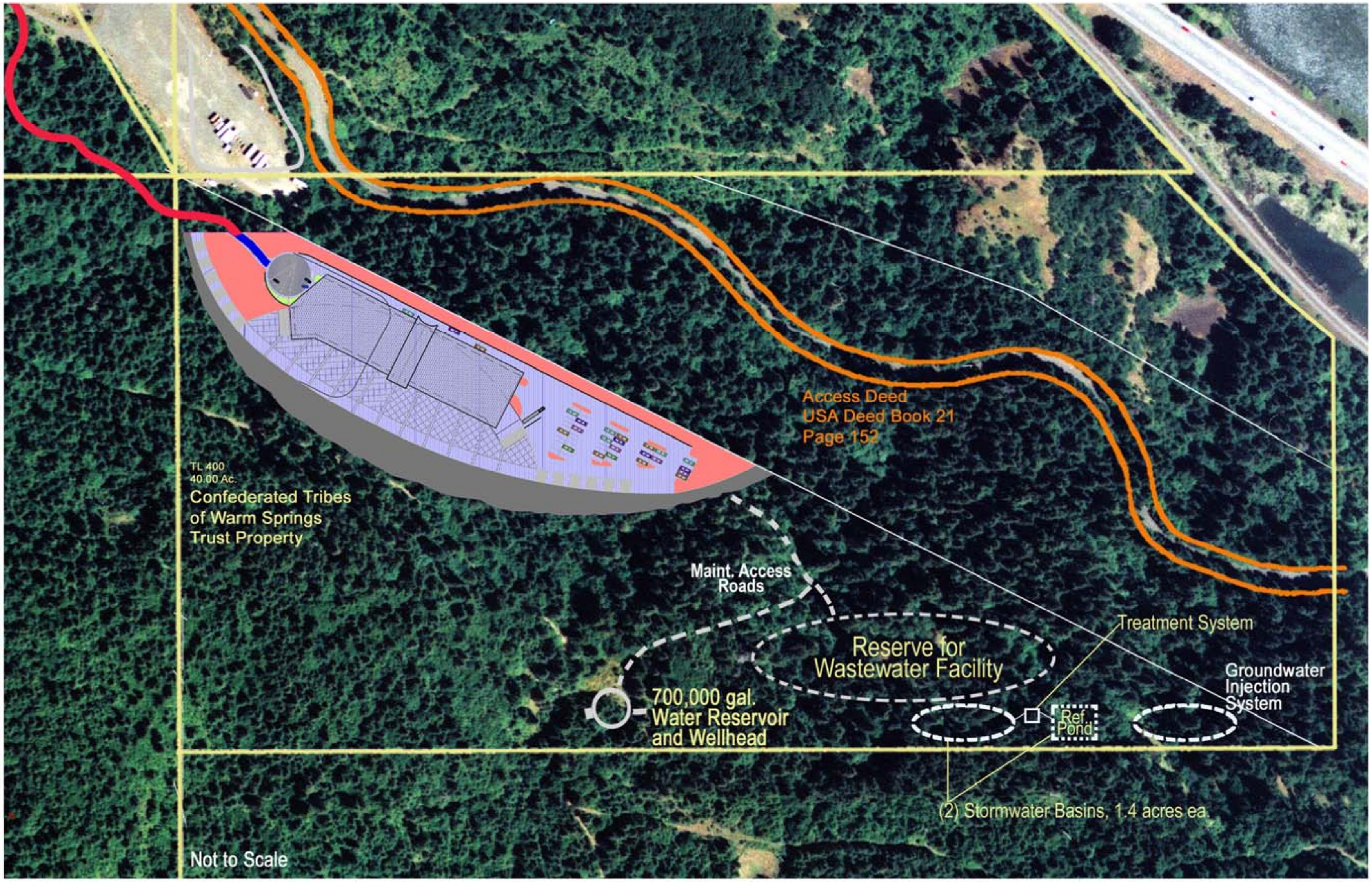

Figure 2: Hood River Alternative Option A Site Development Plan — Conceptual Design

Figure 3: Hood River Alternative Option B Site Development Plan — Conceptual Design

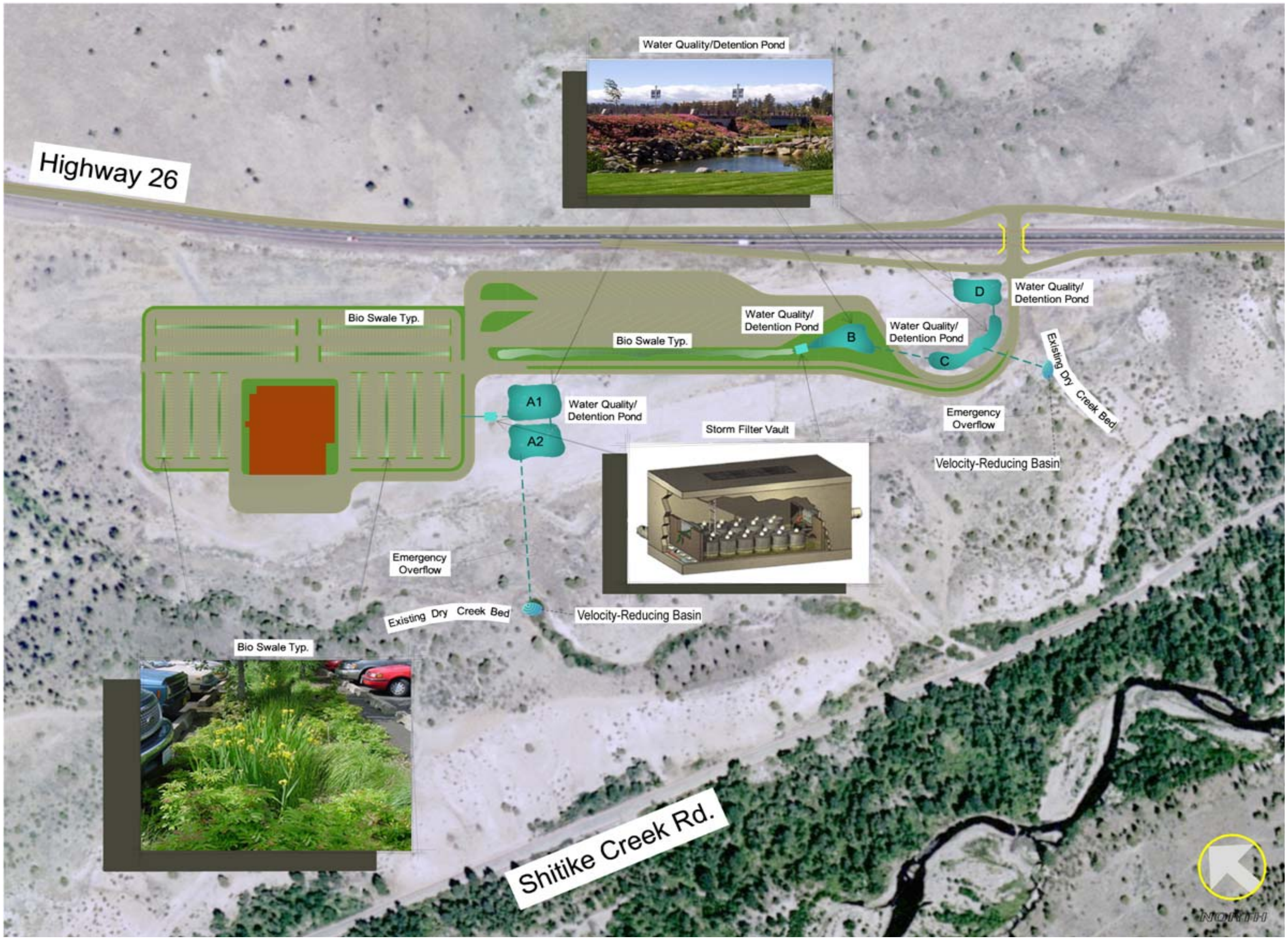

Figure 4: Warm Springs Alternative Storm Water Treatment Features — Conceptual Design