CHAPTER 5.2 Ecosystems

The project will temporarily disturb approximately 1.6 acres of wetlands and 0.9 acre of wetland buffer, and permanently fill approximately 7.0 acres of wetlands and 1.7 acres of wetland buffer. Construction will temporarily disturb approximately 14 acres of wildlife habitat and 3.0 acres of riparian buffer. Approximately 65 acres of wildlife habitat and 1.7 acres of riparian buffer will be permanently disturbed. There will be 0.24 acre of permanent stream channel impact. Channel realignments and culvert removals and replacements will result in a gain of approximately 980 linear feet of open channel habitat within fish-bearing streams, including opening up approximately 860 linear feet of stream channel currently confined to culverts.

WSDOT will provide mitigation to compensate for any adverse effects on ecosystems. Once completed, the project will improve fish passage and stream alignments, resulting in long-term benefits to habitat quality and quantity for fish and aquatic species.

Please refer to the Ecosystems Discipline Report in Appendix L for additional information about the ecosystems analysis.

Why are ecosystems considered in this EA?

An ecosystem is a biological community interacting with its physical and chemical environment as an integrated, dynamic unit. Ecosystems are made up of living organisms, including humans, and the environment they inhabit. Understanding the relationship between living organisms and their environment is integral to the environmental review process. Various federal, state, and local regulations including the National Environmental Policy Act (NEPA) and State Environmental Policy Act (SEPA) require evaluation of the effects of a proposed project on ecosystem structure, function, and process.

This chapter describes the analysis of three important resources—wetlands, wildlife and habitat, and fish and aquatic habitat.

How did WSDOT identify and evaluate ecosystems in the study area?

Wetlands

The project team consulted numerous digital and paper maps to determine the location of known and potential wetlands in the project vicinity, including aerial photographs and local and federal wetland inventories. The team supplemented existing information with data collected in the field. The team examined an area approximately 200 feet wide on either side of the proposed project footprint to verify the location of previously-mapped wetlands and to locate wetlands not appearing on existing inventories. In addition, the team investigated wetlands in the Cozy Cove and Yarrow Bay areas because the project could affect these areas. The team supplemented data collected in the field with aerial photographs to interpret and map wetland boundaries beyond the project footprint. The team also qualitatively characterized wetland functions.

A **buffer** is a designated area along and adjacent to a stream or wetland that may be regulated to control the negative effects of adjacent development on the aquatic resource.

The team evaluated potential effects to wetlands by overlaying the project footprint onto wetland and wetland buffer maps to determine the extent of permanent and temporary effects to wetlands and wetland buffers. In addition, the team used these data and other information to evaluate project effects on wetland functions and values.

Wildlife and Habitat

The team reviewed reports from local and state agencies to identify wildlife habitat and distribution of wildlife in the study area. Project team members also conversed with federal, state, and local biologists to obtain information on wildlife species' occurrence in the study area. To supplement the existing information, the team conducted field surveys within one-quarter mile of the project footprint to identify wildlife habitat and wildlife.

A **geographic information system** (GIS) is a digital computer mapping system that can overlay a wide variety of data such as land use, utilities, and vegetative cover, and provide a spatial analysis.

The team evaluated potential effects on wildlife and wildlife habitat by determining the type, location, and acreage of habitat affected by the project using data collected in the field and geographic information system (GIS) data. Additionally, the team reviewed literature on the effects of construction and highway traffic on sensitive habitats and species. The team

also reviewed literature on the effects of road construction and operation on wildlife and wildlife habitat.

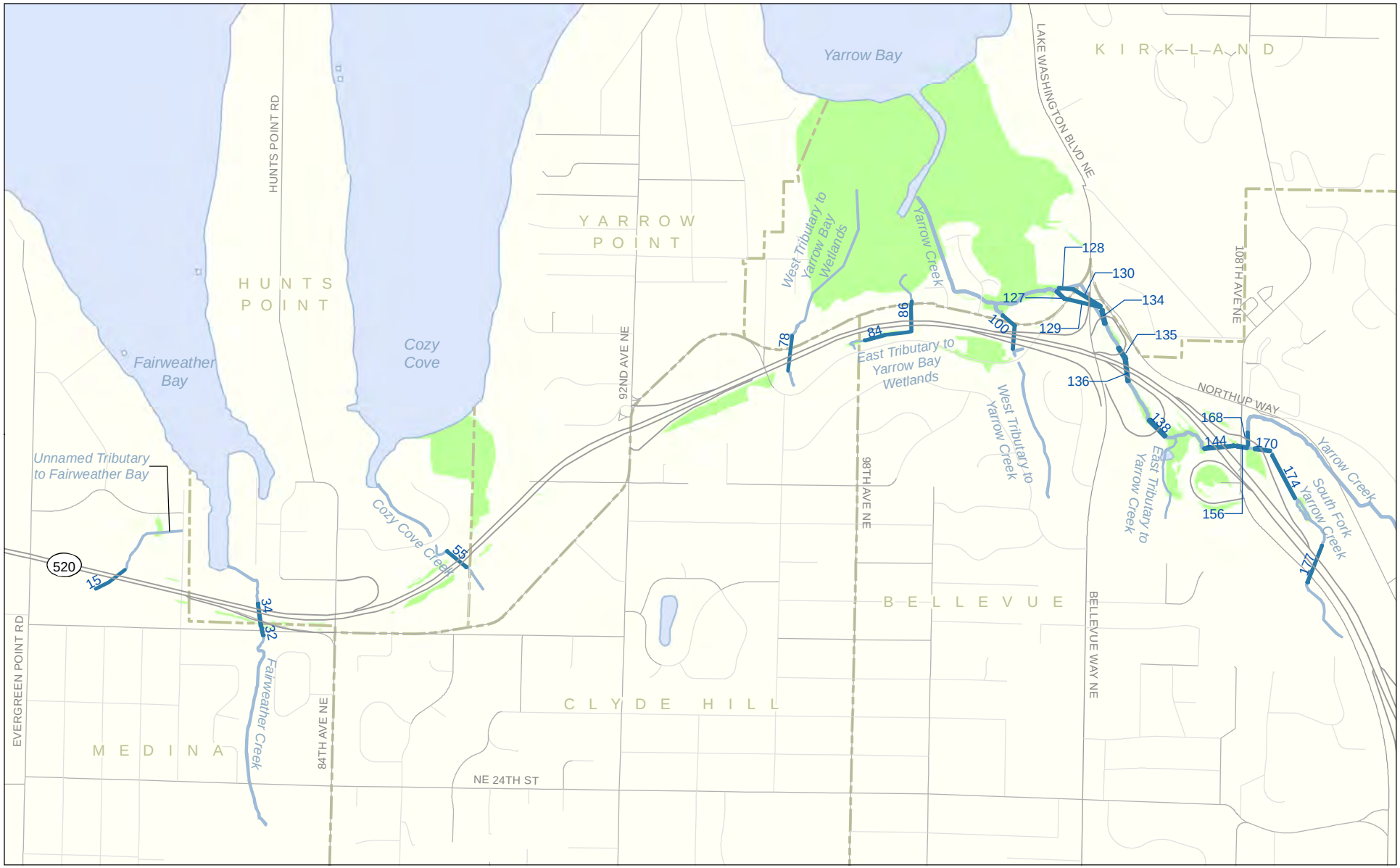
Fish and Aquatic Habitat

The team collected documented information on fish species and their distribution and habitat within the area by reviewing literature such as peer-reviewed articles in scientific journals, technical reports, and data from various state, county, and city agencies. Project team members also conversed with tribal, federal, state, and local biologists to obtain information on fish use and aquatic habitat. The team surveyed and characterized the in-stream habitats of the following Lake Washington tributary streams within and adjacent to the project right of way: Unnamed Tributary to Fairweather Bay, Fairweather Creek, Cozy Cove Creek, Yarrow Creek, South Fork Yarrow Creek, West Tributary to Yarrow Creek, West Tributary to Yarrow Bay wetlands, and East Tributary to Yarrow Bay wetlands (see Exhibit 5-6). The team used stream habitat survey procedures consistent with the current King County Level I (Basic) stream survey methods and guidelines (King County 1991), except that pools were measured using methods to account for residual pool size (Pleus et al. 1999).

Fairweather Creek

The team analyzed the potential effects of the project on fish and aquatic habitat resources by assessing project design data and WSDOT construction practices to identify changes to fish habitat likely to occur during and following construction of the Build Alternative. This assessment included GIS analysis of stream channel (including culverts) and riparian buffer effects and quantitative analyses of the effects of project stormwater on pollutant loading. The team worked collaboratively with the project designers to minimize effects on aquatic resources and to design channel relocations and fish passage structures that will provide benefits to aquatic species and habitat.

A **culvert** is a pipe or concrete box structure that drains open channels, swales, or ditches under a roadway or embankment. Typically, a culvert is not connected to a catch basin or manhole along its length.



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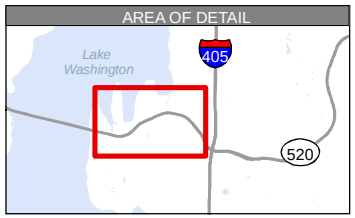


15 Existing Culvert (Structure ID)

Stream

Wetland

Jurisdictional Boundary

N

0 500 1,000 2,000 Feet

Source: Parametrix (2009) GIS Data (Wetalands and Culverts), King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 5-6. **Existing Stream Alignment and Culvert Locations**

Medina to SR 202: Eastside Transit and HOV Project

\\SIMBA\PROJ\PARAMETRIX\180171\GIS\MAPFILES\EA\EA\CH5\EA_CH5_EXISTINGSTREAM_8X11.MXD 10/6/2009

What ecosystems are located in the study area?

Wetlands

Wetlands are regulated by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act. The project team has been coordinating with USACE for permits related to project effects to wetlands and in developing a wetland mitigation plan that will result in a reduction of effects on wetlands to achieve a no net loss of wetland functions. Refer to Chapter 6 for a discussion of proposed wetland mitigation.

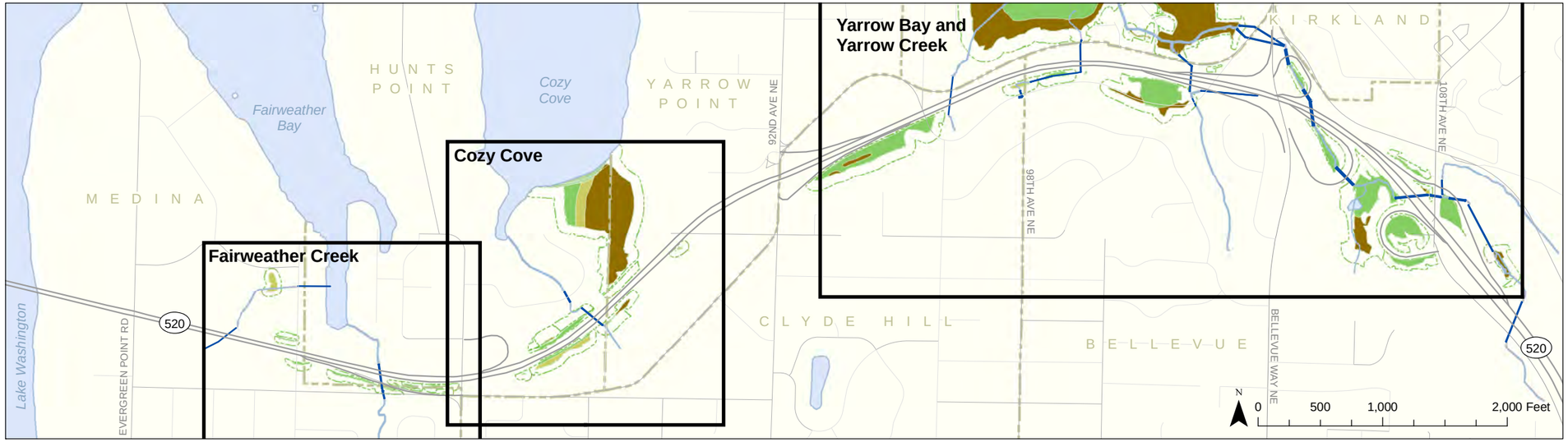
The **study area** for wetlands was a 200-foot-wide area on either side of the project footprint. For wildlife and wildlife habitat, the study area extended one-quarter mile from the project footprint.

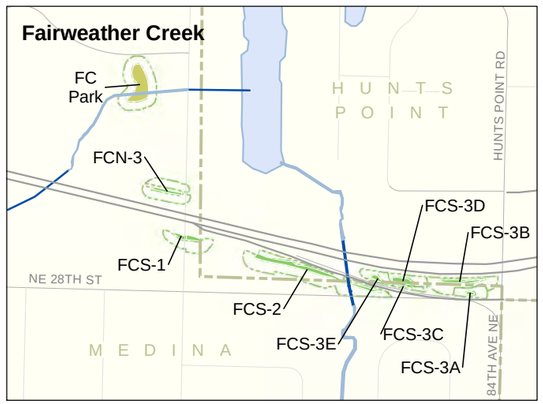
The study area contains 40 wetlands totaling approximately 97 acres. Wetlands in the study area are generally associated with streams, hillside seeps, or runoff from SR 520. Wetlands in the study area are representative of all four hydrogeomorphic (HGM) classifications: depressional, riverine, lake-fringe, and slope.

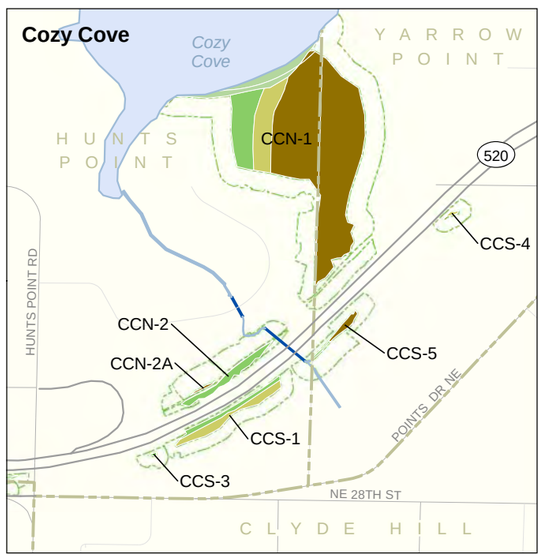
A **hydrogeomorphic** (HGM) classification of wetlands groups wetlands based on physical characteristics and the kinds of functions that wetlands may develop based on their characteristics. Characteristics that control the functions a wetland may provide include a wetland's physical properties and source of water, geologic setting, and the ways water moves through the environment. This classification system places less emphasis on the composition of the plant community in a wetland.

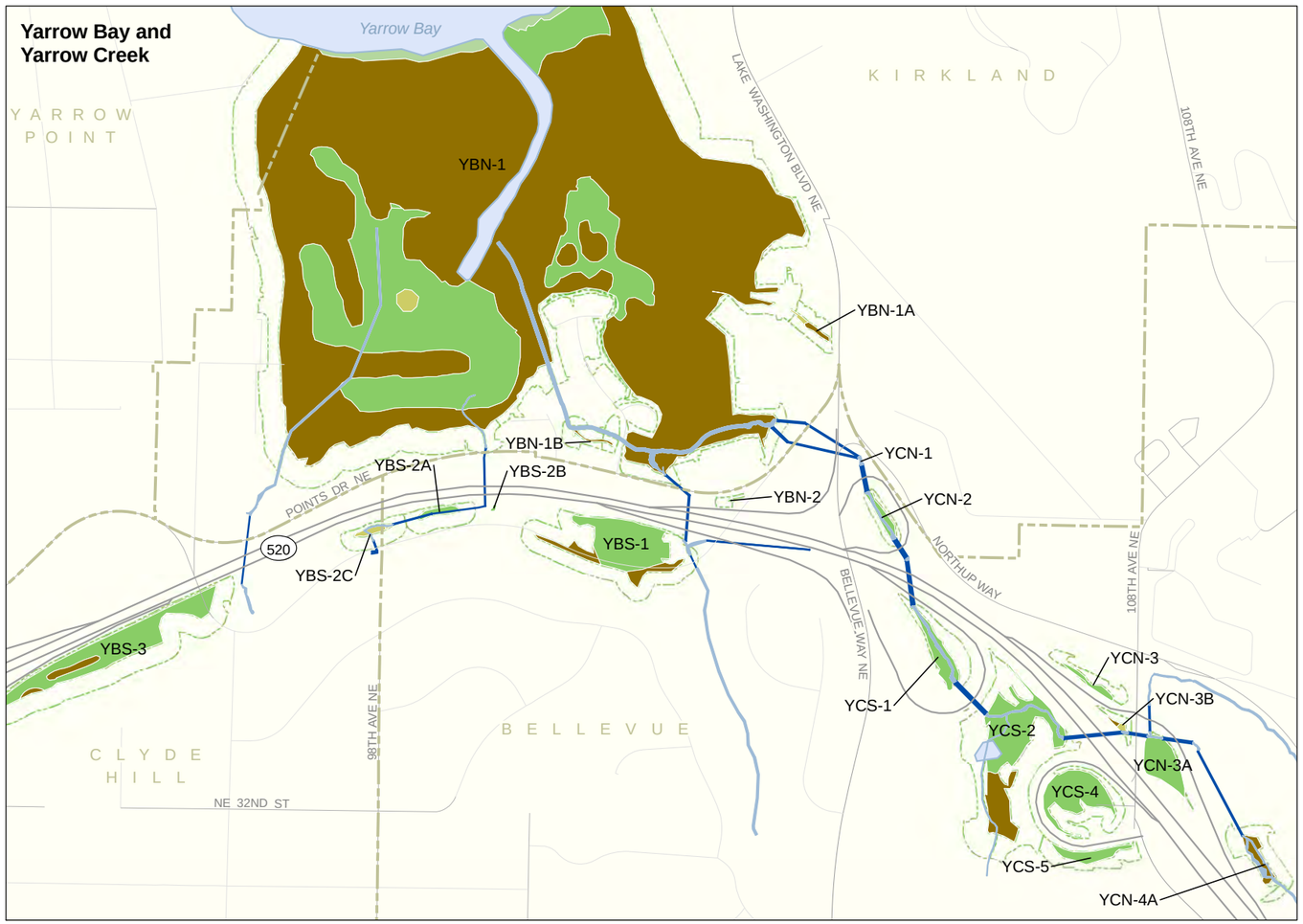
Wetlands in the study area perform a variety of functions, to varying degrees, including improving water quality, reducing flooding and erosion, providing habitat for aquatic and terrestrial species, and providing recreational and educational opportunities to the public.

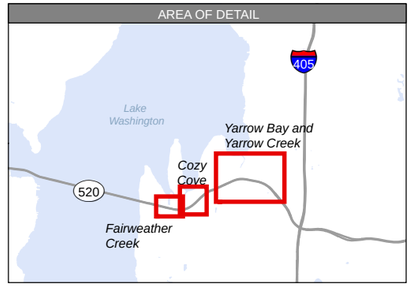
Exhibit 5-7 shows the locations of these wetlands. Each wetland is identified using a unique designation consisting of a two-letter abbreviation of the watershed location: a single letter for direction (north or south of SR 520) and a number.











Stream

Culvert

Wetland Vegetation Class

- L2AB (Aquatic Bed)
- PFO (Palustrine Forested)
- PSS (Palustrine Scrub-shrub)
- PEM (Palustrine Emergent)
- Wetland Buffer
- Jurisdictional Boundary

N 0 250 500 1,000 Feet

Source: Parametrix (2009) GIS Data (Culverts), King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 5-7. **Existing Wetlands**

Medina to SR 202: Eastside Transit and HOV Project

Wildlife and Habitat

The team evaluated wildlife and wildlife habitat within one-quarter mile of the project footprint. The team categorized the study area into three cover types based on similarities in landscape features (for example, presence of vegetation, buildings, and roads) and expected wildlife occurrence and use. The three cover types in the study area are Urban Matrix, Open Water, and Parks and Other Protected Areas. Land cover in the study area totals approximately 1,167 acres.

Exhibit 5-8 lists the associated acreages and percentages of land cover types in the study area.

Exhibit 5-8. Land Cover Types in the Study Area

Cover Type	Land Cover in Study Area (acres)	Percentage of Land Cover in Study Area (percent)
Urban Matrix	971	83
Open Water	93	8
Parks and Other Protected Areas	103	9
Total	**1,167**	100

Urban Matrix – Commercial and residential areas with buildings, asphalt, ornamental gardens, lawns, and scattered trees. Urban Matrix provides limited habitat for common birds, small mammals, and amphibians.

Open Water – Fairweather Bay, Cozy Cove, Yarrow Bay, and Lake Washington. Open water provides habitat for freshwater-associated wildlife, including waterfowl, amphibians, river otters, and beavers.

Parks and Other Protected Areas – Includes Fairweather Park, Wetherill Nature Preserve, and Yarrow Bay wetlands. This land cover type provides habitat for a variety of birds. Wetlands and riparian areas provide habitat for birds and small mammals, and provide potential nesting, roosting, and perching sites for great blue herons, bald eagles, and other bird species.

No federally-listed endangered, threatened, or candidate terrestrial species are known to occur in the study area. The U.S. Fish and Wildlife Service (USFWS) identifies several Endangered Species Act (ESA) listed species, including Canada lynx, gray wolf, grizzly bear, marbled murrelet, northern spotted owl, golden paintbrush, Oregon spotted frog, and yellow-billed cuckoo as potentially occurring in King County (USFWS 2007). However, no suitable habitat or historical sightings of any of these species have been documented within the study area.

Two federal species of concern, the bald eagle and peregrine falcon, may occur in the study area. One bald eagle breeding territory, Hunts Point, extends into the study area. Two nests have been identified in the territory; nests are between 900 and 2,400 feet from the project. The closest nest was active in 2009, while the other nest was last recorded active in 2006 (WDFW 2008). Peregrine falcons and/or their nests have not been observed or recorded within 1 mile of the study area (WDFW

2008); however, wetland and open water habitats in the study area may provide suitable foraging habitat for this species.

In addition to the bald eagle and peregrine falcon, several other state-listed sensitive or priority wildlife species or species of interest may use habitat in the study area. Other wildlife species include western grebe, common loon, great blue heron, cavity-nesting ducks (for example, hooded merganser and wood duck), band-tailed pigeon, pileated woodpecker, and red-tailed hawk.

Fish and Aquatic Habitat

The Lake Washington watershed supports a diverse group of fish species, including several species of native salmon and trout. Many of these species are an integral part of the economy and culture of the Pacific Northwest. The study area includes both anadromous salmonids (fish that migrate to the ocean) produced in the Lake Washington watershed and resident salmonids (fish that spend their entire lives within a freshwater stream).

Fish Species in the Study Area

Exhibit 5-9 list the more common fish species likely to occur at least occasionally in the study area streams. Exhibit 5-9 also provides information about the general habitat used by the species of greatest concern in the study area.

Salmonids are members of the fish family *Salmonidae*, including salmon, trout, and char.

Lake Washington tributaries provide spawning and early rearing habitat for salmonids such as Chinook, coho, and sockeye salmon and cutthroat and steelhead trout. Rainbow trout were commonly planted in Lake Washington in the past and are still present in the lake. Several observers have reported sightings of individual bull trout in the watershed, but there is no evidence of a substantial population or of reproduction occurring within Lake Washington or the lake's tributaries.

Exhibit 5-9. Prevalent Fish Species in the Project Vicinity and Their Ecological Roles

Species Scientific Name	Federal and State Status [a]	Native or Nonnative Species	Ecological Role
Cutthroat trout *Oncorhynchus clarki*	None	Native	Young compete with other salmonids for prey. Adult cutthroat consume fish, including juvenile Chinook and sockeye salmon. Population likely smaller than some other potential predators.
Steelhead/rainbow trout *Oncorhynchus mykiss* (anadromous/resident)	FT	Native	Overlapping habitat with other salmonids; consume similar prey. Some predation on young salmonids probable.
Chinook salmon *Oncorhynchus tshawytscha*	FT, SC	Native	Wild and hatchery origin.
Coho salmon *Oncorhynchus kisutch*	FCo for Puget Sound	Native	Probably most abundant in north Lake Washington area; primarily hatchery origin.
Sockeye salmon/kokanee *Oncorhynchus nerka* (anadromous/resident)	None	Native[b]	Pelagic (living free) in open water areas.
Peamouth chub *Mylochelius caurinus*	None	Native	Large numbers. Some occupy shallow benthic (near the bottom) habitat; consume some of same prey as young salmonids.
Threespine stickleback *Gasterosteus aculeatus*	None	Native	Numerous, substrate-oriented, often near aquatic vegetation; provide prey for larger fish.
Smallmouth bass *Micropterus dolomieui*	None	Nonnative	Major fish predator that occupies salmonid lake habitat, resulting in some prey competition. Population size uncertain.
Brown bullhead *Ictalurus nebulosus*	None	Native	Competitor with young salmonids for similar prey.
Northern pikeminnow *Ptychocheilus oregonensis*	None	Native	Major fish predator that occupies salmonid fish habitat. Former common name was “northern squawfish.”
Pelagic sculpin *Cottus aleuticus*	None	Native	Pelagic in open water areas. Some overlap in prey with young salmonids. Sculpins represent 72 percent of Lake Washington biomass (the mass of biological organisms in an area).
Prickly sculpin *Cottus asper*	None	Native	Benthic habitat from shorelines to deep water. Prey competition with young salmonids. Sculpins represent 72 percent of Lake Washington biomass. Larger sculpins prey on small fish.

[a] FCo=Federal Species of Concern, FT=Federally Threatened, SC=State Candidate Species

[b] Introduced stock; uncertain whether there was originally a native stock inhabiting this watershed.

Federally Listed Fish Species and Fish Species of Concern

Lake Washington supports one or more life stages of Chinook salmon, steelhead, and bull trout, all of which are currently listed as threatened under the ESA. Lake Washington Chinook salmon are a part of the threatened Puget Sound evolutionarily significant unit (ESU) (NMFS 1999). The National Marine Fisheries Service (NMFS) (now the National Oceanic and Atmospheric Administration, National Marine Fisheries Service [NOAA Fisheries]) designated critical habitat for the Puget Sound ESU of Chinook salmon, which includes Lake Washington, as well as the Ship Canal and Lake Union between the Ballard Locks and Lake Washington (NMFS 2005). No critical habitat is designated for any streams crossed by the proposed project alignment.

Evolutionarily significant unit is a term used by the National Marine Fisheries Service (now NOAA Fisheries) for a fish species population protected by an ESA listing.

The Puget Sound steelhead distinct population segment (DPS) is listed as threatened under the ESA (NMFS 2007). As of October 2009, critical habitat had not been proposed or designated for this DPS.

A **distinct population segment** (DPS) is a subgroup of a vertebrate species that is treated as a species for purposes of listing under the ESA. The subgroup must be separable from the species as a whole yet significant to the species to which it belongs.

USFWS listed the Coastal–Puget Sound DPS of bull trout as threatened in King County, including the population in the Lake Washington watershed (USFWS 1999). Distribution of bull trout in the Lake Washington watershed is uncertain, but individuals have been observed recently near the Hiram M. Chittenden Locks (Ballard Locks) and at various other locations over a number of years. USFWS has designated bull trout critical habitat in Lake Washington and in the Ship Canal and Lake Union between the Ballard Locks and Lake Washington (USFWS 2005). USFWS has not proposed critical habitat for bull trout in any Lake Washington tributaries crossed by the alignment of the proposed project.

The Puget Sound/Strait of Georgia population of coho salmon is listed as a species of concern by NOAA Fisheries.

WSDOT also prepared a Biological Assessment for the project in compliance with the ESA. The Biological Assessment addressed potential effects to listed species. On July 30, 2009, WSDOT received concurrence with the determination from USFWS that "the project will have no measurable adverse effects to bull trout, their habitat, or prey base in either the short- or long-term." WSDOT received the Biological Opinion on October 22, 2009 and subsequent concurrence with the determination from NOAA Fisheries that the project "is not

likely to jeopardize the continued existence of Puget Sound Chinook salmon and Puget Sound steelhead" and "is not likely to destroy or adversely modify designated Puget Sound Chinook salmon critical habitat."

Habitat Characteristics of Study Area Streams

In the study area, the SR 520 roadway directly crosses seven streams and lies adjacent to one additional stream. Exhibit 5-10 summarizes the known and presumed fish use of study area streams based on existing data and observation of in-stream habitat conditions. Relatively few field observations are reported in technical reports or literature for study area streams.

Is the project within a recognized tribal fishing area?

The project site is within the "usual and accustomed" fishing area of the Muckleshoot Indian Tribe. The Muckleshoot Tribe's usual and accustomed fishing area includes Lake Washington. The Muckleshoot Tribe harvests adult salmon from Lake Washington pursuant to judicially recognized treaty rights, as interpreted by the Boldt Decision of 1974.

How will project construction affect ecosystems?

Project construction activities will occur in and adjacent to wetlands, streams, and their associated buffers. In addition, construction activities will occur in areas containing wildlife habitat. The team worked with project engineers to identify where improvements could affect the ecosystems. Prior to finalizing the project footprint, WSDOT modified the design, where feasible, to reduce or avoid effects to wetlands, streams, their associated buffers, and upland habitat. When one of the elements was located within the construction footprint, WSDOT changed the footprint to avoid the element or, if the element could not be avoided, WSDOT determined to what degree project construction will affect ecosystem elements. Based on this information, WSDOT incorporated measures into the project to minimize or avoid the identified effects. These measures are described in Chapter 6.

Exhibit 5-10. Habitat Conditions and Salmonid Distribution in Study Area Streams

Stream Name	Washington State Department of Natural Resources (WDNR) Stream Type	Confirmed Fish Use	Presumed Fish Use
Unnamed Tributary to Fairweather Bay	Type F	None	None
Fairweather Creek	Type F	Coho salmon downstream of SR 520[a,b] Cutthroat trout downstream of SR 520[a]	NA
Cozy Cove Creek	Type F	Cutthroat trout downstream of SR 520[c]	Coho salmon
West Tributary to Yarrow Bay wetlands	Type F (downstream of SR 520)	None	Coho salmon and cutthroat trout downstream of SR 520
East Tributary to Yarrow Bay wetlands	Type F (downstream of SR 520)	None	Coho salmon and cutthroat trout downstream of SR 520
West Tributary to Yarrow Creek	Type F	Cutthroat trout upstream of SR 520[c] Coho salmon downstream of SR 520[d]	NA
Yarrow Creek	Type F	Cutthroat trout to near headwaters[b,d,e] Coho downstream of SR 520[c,d,f]	NA
East Tributary to Yarrow Creek	Type F	None	Cutthroat trout
South Fork Yarrow Creek	Type F	None	Cutthroat trout downstream of SR 520

[a] Anderson and Ray et al. 2001
[b] StreamNet 2009
[c] 2002 electrofishing associated with SR 520 stream investigations
[d] City of Bellevue 2001
[e] WDFW 2009
[f] Williams et al.1975

Wetlands

Approximately 1.6 acres of wetland will be temporarily affected by construction of the project. Approximately 0.9 acre of wetland buffer will also be affected by construction-related activities. Temporary effects to wetlands and wetland buffers will result from installation of temporary structures, placement of temporary fill for roads or staging, and clearing activities in adjacent portions of the right of way. Wetlands and wetland buffers temporarily affected by construction activities will be restored and replanted with appropriate native vegetation.

Wildlife and Habitat

A total of approximately 14 acres of wildlife habitat will be temporarily affected by the project. Of the 14 acres affected, 13 acres are Urban Matrix and 1 acre is Parks and Other Protected Areas. The temporary effects to wildlife habitat will result from vegetation clearing associated with stream channel alteration and rehabilitation activities. It is not anticipated that temporary clearing of vegetation will result in long-term effects on wildlife habitat or wildlife populations.

Noise and associated construction activity can disturb wildlife. In general, most animals in areas adjacent to the study area are adapted to urban conditions and highway noise. However, loud construction activities could temporarily displace some animals or prevent them from using adjacent habitats. Noise levels will decrease with distance from the construction area. In most cases, noise levels at distances of 750 to 1,000 feet from areas of active construction will be similar to existing ambient noise levels. The likelihood of displacing or disturbing nesting activities of federally and state protected birds – principally bald eagles, great blue herons, and red-tailed hawks – is expected to be low because previously-recorded nests are located approximately 700 feet or more from the construction area.

Fish and Aquatic Habitat

The team evaluated construction effects on fish and aquatic species, as well as their habitat, by determining construction actions that might temporarily disturb in-water sediments and fish passage. The team also evaluated the potential for

accidental spills of hazardous materials that could reach project area streams.

Under the Build Alternative, water quality in streams could be affected by construction activities such as replacing or extending culverts and installing retaining walls or stormwater outfalls below the ordinary high water mark. Construction activities occurring within or directly adjacent to streams could increase the amount of soil and other particles suspended in the water. Streams that could be affected are those crossing or flowing adjacent to SR 520, where construction work must take place in the water (below the ordinary high water mark) or adjacent to or above water bodies in the study area.

The **ordinary high water mark** is the highest water level that is so common and maintained for a sufficient time in all ordinary years that it leaves evidence on the landscape, such as a clear and natural line impressed on the bank, changes in soil character, destruction of or change in vegetation, or the presence of litter and debris.

These effects will be avoided and minimized through the development and implementation of temporary erosion and sediment control (TESC) and spill prevention control and countermeasures (SPCC) plans.

In addition, construction will require substantial in-water work within project vicinity streams, including temporary stream bypasses and dewatering of stream reaches. The in-water work area will be separated from the existing stream with a cofferdam (constructed of sandbags or sheet piling) to minimize the introduction of runoff or sediment into the stream channel during installation and operation of the stream diversion. Prior to any in-water work associated with the diversion inlet, the diversion location will be screened-off with upstream and downstream block nets, and all fish will be removed within the work area. All fish exclusion and removal activities will follow NOAA Fisheries-approved WSDOT protocols for these activities (WSDOT 2009a). With these techniques and application of appropriate BMPs, minimal disturbance to fish populations is anticipated.

Project construction will require clearing of riparian buffers for construction access. During construction, about 3.0 acres of riparian vegetation will be cleared along several streams.

Temporary clearing of vegetation along affected stream corridors could result in a short-term reduction of in-stream cover, which would have adverse effects on fish. Temporary effects would occur until plants installed in the affected stream corridors are established. Growth rates differ among

vegetation types and depend on soil and other habitat conditions. Generally, emergent vegetation takes one year to establish, whereas woody vegetation (for example, shrubs) can take several years to become established. Although the existing riparian conditions along the streams vary, the majority of streams have riparian buffers that are already moderately to severely degraded. The existing buffers of streams with the greatest amount of project effects consist primarily of non-native vegetation such as reed canarygrass, and the affected areas are relatively small when compared with the amount of overall buffer for the individual streams. Based on these factors, many of the functions that riparian vegetation provides (such as large woody debris [LWD] recruitment, contribution of organic material, and regulation of stream temperatures) are already altered and will not be substantially affected compared with existing conditions.

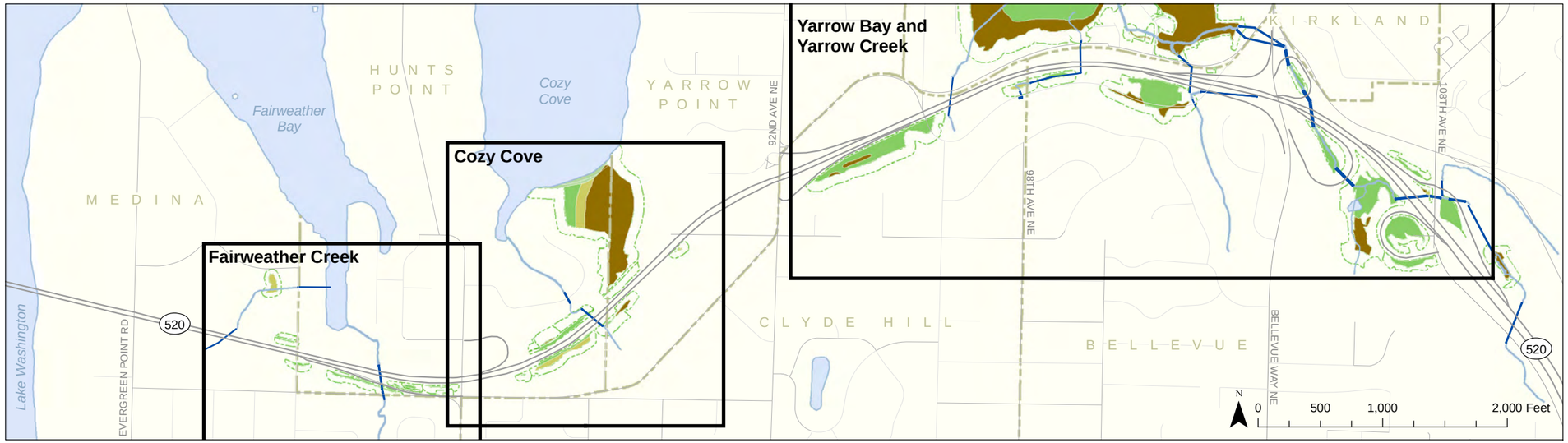
Furthermore, all riparian buffer areas that undergo temporary clearing for construction will be fully revegetated following completion of construction activities. Native trees and shrubs will be planted, and maintenance and monitoring procedures will be followed to ensure proper levels of plant survival and cover, ultimately resulting in an improved riparian zone condition with increased densities of native shrubs and trees.

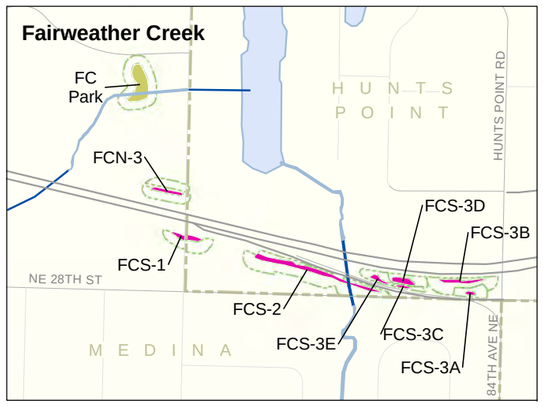
How will project operation affect ecosystems?

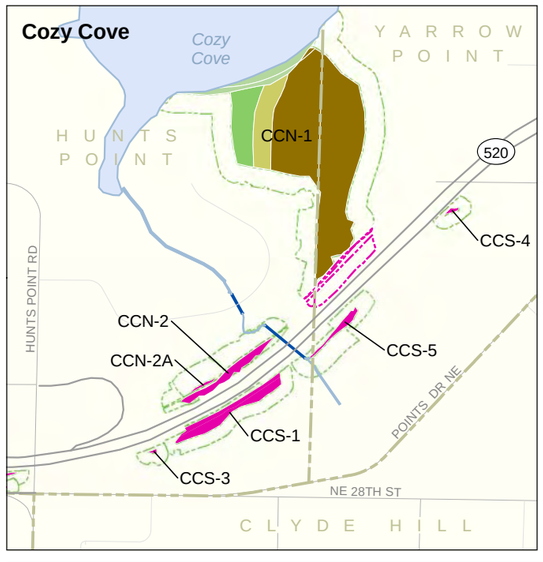
Operational effects refer to effects associated with the installation and operation of permanent facilities, such as the new roadway and stormwater facilities, in or adjacent to wetlands and wetland buffer, streams and riparian buffer, and wildlife habitat.

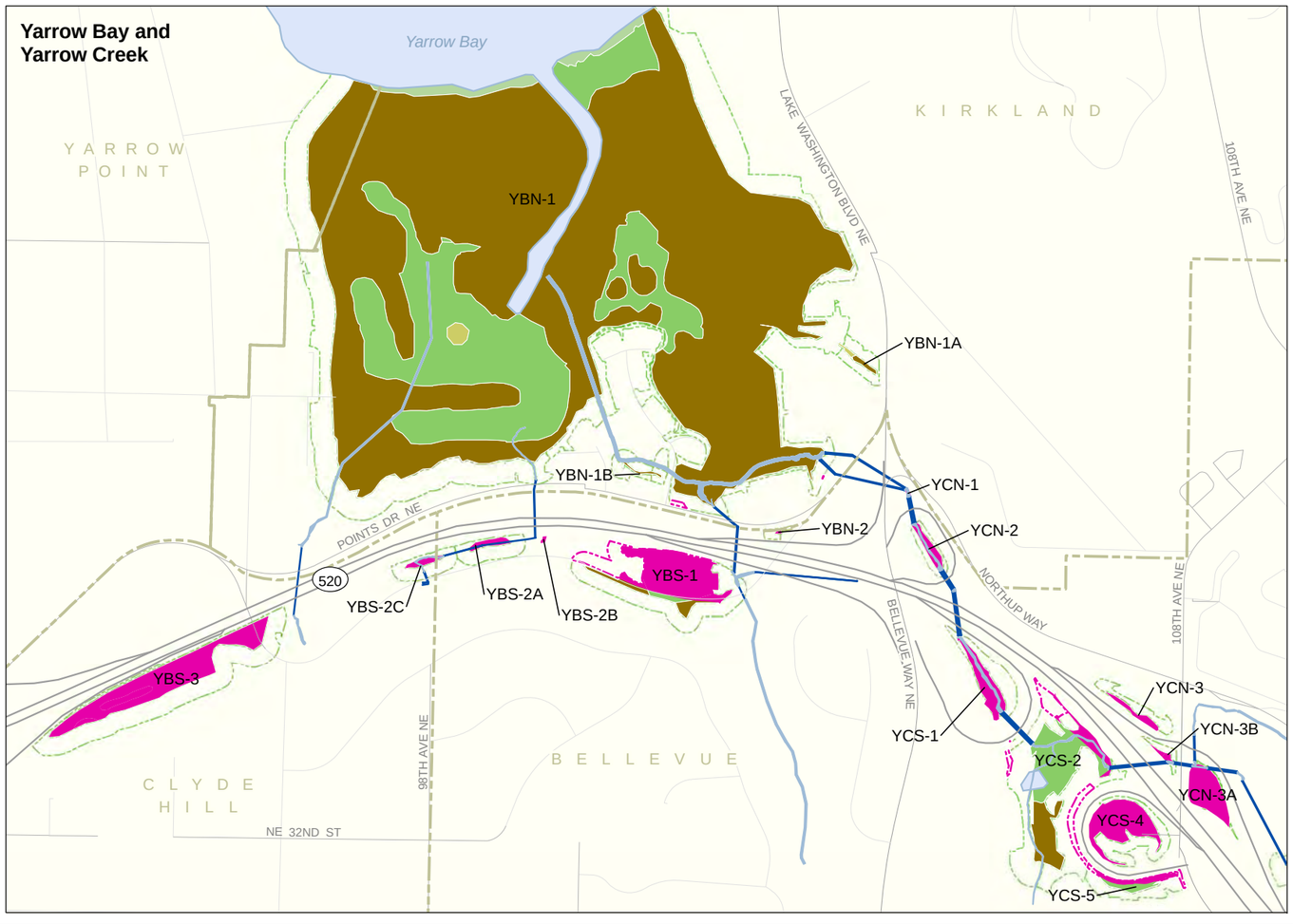
Wetlands

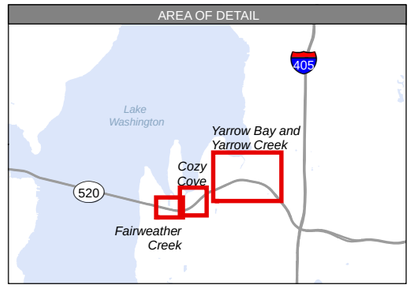
The project will permanently affect 30 wetlands (approximately 7.0 acres). Of the affected wetlands, 22 wetlands will be completely filled and 8 wetlands will be partially filled. Exhibit 5-11 shows the wetlands affected by the project.











Affected Wetlands and Buffers

- Affected Wetland
- Affected Wetland Buffer

Wetland Vegetation Class

- L2AB (Aquatic Bed)
- PFO (Palustrine Forested)
- PSS (Palustrine Scrub-shrub)
- PEM (Palustrine Emergent)
- Wetland Buffer
- Jurisdictional Boundary
- Stream
- Culvert

N 0 250 500 1,000 Feet

Source: King County (2005) GIS Data (Street), King County (2007) GIS Data (Waterbody), CH2M HILL (2008) GIS Data (Stream and Park), Parametrix (2008 and 2009) GIS Data (Wetland and Culvert), and City of Bellevue (1999) GIS Data (City Limits). Horizontal datum for all layers is NAD83(91); vertical datum for layers is NAVD88.

Exhibit 5-11. **Effects of the Build Alternative on Wetlands**

Medina to SR 202: Eastside Transit and HOV Project

Wetlands that will be completely filled are riverine, depressional, and slope wetlands that contain emergent, scrub-shrub, and forested plant communities. The eight wetlands that will be partially filled are riverine, lake-fringe, and depressional wetlands. The filling of most of these wetlands will be a result of widening SR 520. Approximately 1.7 acres of wetland buffer will be permanently disturbed.

Detention and treatment of stormwater runoff from new and existing roads will affect wetland functions to varying degrees. Hydrologic functions (for example, reducing flooding and erosion) will likely not be affected because the Build Alternative will be designed according to the *Highway Runoff Manual* (WSDOT 2008a). The amount of wetland area available to provide water quality functions will be reduced; however, stormwater facilities constructed and treatment of stormwater runoff that is currently not treated will partially offset the loss of water quality functions provided by wetlands in the study area.

Habitat functions (for example, cover, foraging, breeding, and/or nesting habitat) provided by wetlands in the study area, especially depressional and riverine wetlands, will be affected. The amount of cover and foraging, breeding, and/or nesting habitat for invertebrates, amphibians, some (non-wetland) birds, and mammals that occasionally use these wetlands could be affected.

However, WSDOT will provide mitigation to compensate for wetlands and their functions including adverse effects on water quality, hydrologic, and habitat functions in the study area. Mitigation will result in no net loss of wetland functions.

Wildlife and Habitat

A total of 65 acres of wildlife habitat will be permanently affected by the project through the conversion of pervious surfaces to impervious surfaces. Of the 65 acres, 61 acres is Urban Matrix, representing 6 percent of this existing habitat type. In addition, 4 acres, or 4 percent of existing Parks and Other Protected Areas habitat type, will be affected. The amount of habitat affected will be relatively small compared with the total amount available within and adjacent to the study area. Effects on wildlife from the loss of upland trees and shrubs may include a loss of forage and cover for urban-

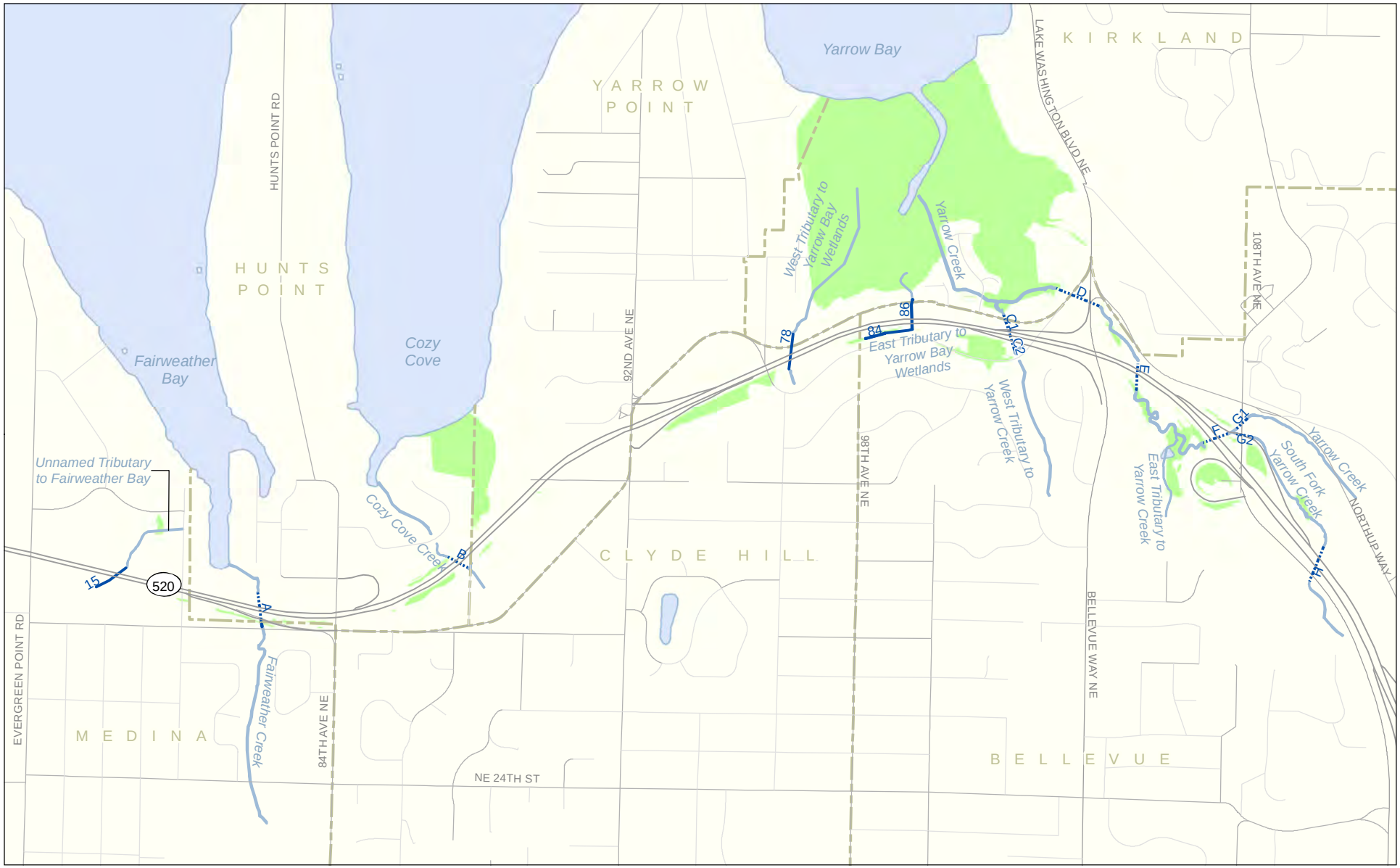
adapted species as well as a reduction in intact vegetated corridors connecting wildlife habitats in the study area. Affected animals may find adequate habitat adjacent to the affected area or may be displaced to areas away from the roadway. Affected species are common and abundant in the study area, and adverse effects on the larger populations of these animals in the project vicinity are not anticipated.

Noise walls constructed as part of the project will reduce noise disturbance to urban-adapted species in the study area, especially birds. Construction of larger culverts will provide enhanced opportunities for wildlife to move under the freeway without direct interaction with traffic. Operation of the highway will not likely affect the habitat or behaviors (for example, foraging, breeding, or nesting) of federal, state, or local sensitive wildlife species.

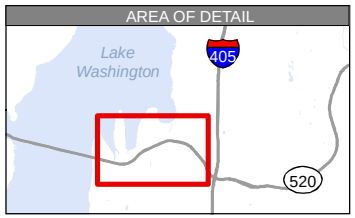
Fish and Aquatic Habitat

The Build Alternative will remove and replace culverts on study area streams to accommodate widening of the roadway. In addition, stream channels will be realigned and buffers will be revegetated.

A total of 17 culverts will be affected under the Build Alternative. See Exhibit 5-12 for streams where culverts will be removed and replaced. Six existing culverts will be completely removed and open channel restored. Nine other structures, which are existing fish passage barrier culverts, will be replaced with fully fish-passable structures. Two existing fish passage barriers will be extended, but not upgraded to provide fish passage per a memorandum of agreement between WSDOT and the Washington Department of Fish and Wildlife (WSDOT and WDFW 2008). For one of these, road widening will eliminate upstream areas south of SR 520 associated with the East Tributary to the Yarrow Bay Wetland. The other structure connects segments of the West Tributary to the Yarrow Bay Wetland, however improving this structure to fish passable status would provide minimal gain for fish because only a small amount of habitat exists south of SR 520 and would be complicated by the steep gradient between the stream segments south and north of SR 520.



AREA OF DETAIL



Proposed Culvert (Structure ID)

Existing Culvert (Structure ID)

Proposed Stream

Wetland

Jurisdictional Boundary

N

0 500 1,000 2,000 Feet

Source: Parametrix (2009) GIS Data (Wetlands and Culverts), King County (2008) GIS Data (Streams, Streets, Water Bodies), CH2M HILL (2008) GIS Data (Parks). Horizontal datum for all layers is NAD83(91), vertical datum for layers is NAVD88.

Exhibit 5-12. **Proposed Stream Alignments and Culvert Locations**

Medina to SR 202: Eastside Transit and HOV Project

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A third culvert conveying water to the headwaters of the Unnamed Tributary to Fairweather Bay will also be extended to accommodate road widening. Since no upstream habitat currently exists, the culvert will not be upgraded to provide fish passage.

Culverts and Stream Realignments

Daylighting refers to the restoration of a natural or artificial channel to a stream segment that was previously confined to a culvert.

To the extent possible, project design will avoid and minimize loss of open stream channel, as well as upgrade fish passage structures within the right of way that convey fish-bearing streams. Overall, fish passage conditions will improve on five streams; whereas today, SR 520 acts as a barrier to fish. Project-wide, channel realignments and culvert removals and replacements will result in a gain of 980 linear feet of open channel habitat within fish-bearing streams, including daylighting approximately 860 linear feet of stream channel currently confined in culverts (see Exhibit 5-13). The overall results of the stream crossing improvements and the channel realignments will be a substantial net increase in both instream habitat quality and quantity within the study area.

To the extent possible, project design will avoid and minimize loss of open stream channel, as well as upgrade fish passage structures within the right of way that convey fish-bearing streams. However, two fish passage barrier culverts will be extended or replaced, but not upgraded to fish passage status due to limited low quality habitat upstream of SR 520 which would provide extremely minimal gains for fish. Outlet protection will be provided to minimize erosion at the outlet. One of the existing culverts is perched and creating downstream channel instability. Improvements associated with that culvert outlet will reduce erosion and downstream sedimentation, and will improve downstream substrate conditions.

Culverts extended, but not upgraded to fish passage status currently connect non-fish habitat upstream of SR 520 with fish habitat downstream of SR 520. While some stream functions will be affected by the filling of these stream segments and confining them to culverts, these stream functions will be offset (1) by stream enhancements, including daylighted stream channel and increased stream length resulting from restored meanders to previously-straightened stream segments; (2) by adding large woody debris to streams

that currently lack habitat complexity; and (3) by improving stream buffers. Furthermore, fish passage improvements will provide fish with access to considerably more stream habitat following completion of the project. These improvements will result in higher quality stream habitat and greater fish access as a result of the project.

The Build Alternative will result in a long-term improvement in fish passage and in in-stream habitat conditions. These improvements will benefit fish and aquatic resources by creating additional rearing and migration habitat and by improving access to this area. All native fish species present in the study area will benefit, including salmonids such as cutthroat trout.

Exhibit 5-13. Effects of the Build Alternative on Eastside Culvert Crossings

Stream[a]	Is Affected Stream Fish-Bearing? (Yes/No)	Net Change in Number of Culverts within Stream	Net Change in Length of Stream Confined in Culvert (linear feet)[b]	Net Change in Open Channel Length of Stream (linear feet)
Fairweather Creek	Yes	-1	-50	44
Cozy Cove Creek	Yes	0	-17	-31
Tributary to Cozy Cove Creek	No	0	0	-10
West Tributary to Yarrow Bay wetlands	Yes	0	+67	-67
East Tributary to Yarrow Bay wetlands	No	1	+125	-195
West Tributary to Yarrow Creek	Yes	1	-12	-76
Tributary of West Tributary to Yarrow Creek	No	1	0	-84
Main Stem Yarrow Creek	Yes	-4	-470	690
East Tributary to Yarrow Creek	Yes	0	0	0
South Fork Yarrow Creek	Yes	-1	-500	709
Totals		**-3**	**-857**	**980**

[a]Unnamed Tributary to Fairweather Bay does not have a culvert crossed by SR 520.
[b]Negative numbers indicate that the channel length confined to a culvert will decrease.

Riparian Vegetation

Removing streamside vegetation to construct the expanded roadway will reduce the amount and quality of LWD recruited to streams, reduce stream shade that in turn could increase stream temperatures, and destabilize stream banks, thus adding to stream bank erosion. Effects due to project operation on regulated riparian buffers will occur along three streams in the study area, totaling approximately 1.7 acres.

Depending on the stream, the amount of permanent buffer that will be removed because of placement of fill will range from less than 0.1 acre to 0.6 acre under the Build Alternative. Clearing of vegetative material along affected stream corridors could temporarily reduce in-stream cover, which could have adverse effects on fish. Temporary effects would occur until plants installed in the affected stream corridors are established. Growth rates differ among vegetation types and depend on soil and other habitat conditions. Generally, emergent vegetation takes one year to establish, whereas woody vegetation (for example, shrubs) can take several years to become established.

What will happen to ecosystems if WSDOT does not build this project?

Wetlands

No wetland or wetland buffers will be filled or cleared under the No Build Alternative. Wetlands will likely continue to be maintained (mowed) within the SR 520 right of way, which decreases the habitat quality. The No Build Alternative will not change the amount of impervious surface in the study area, and no changes to hydrologic functions are expected. Currently, water runs off SR 520 directly into streams and wetlands. The No Build Alternative will continue to not treat runoff from the roadway, which has a continuing negative effect on water quality and habitat downstream from SR 520.

Wildlife and Habitat

No vegetation will be removed under the No Build Alternative. No changes to wildlife habitat will occur under the No Build Alternative since no vegetation will be removed. No changes in disturbance to wildlife species will occur, except for increases in noise from increased roadway traffic

over time. Wildlife movement under the freeway will continue to be impeded by existing barriers, for example, undersized culverts.

Fish and Aquatic Habitat

No physical changes to streams or Lake Washington will occur under the No Build Alternative. The amount of untreated stormwater runoff from SR 520 will remain unchanged and existing fish passage barriers within the stream will likely persist. However, traffic volume is expected to increase in the future, which could result in a corresponding increase in the release of stormwater pollutants into the aquatic environment. This could have a negative effect on water quality. In-stream fish habitat conditions are not expected to change substantially under the No Build Alternative.