Mitigation Banks in Washington State: Case Study of Developing the Schold Farm Mitigation Bank

A Case Study in Natural Resource Sustainability

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ABSTRACT

Wetland habitats are disappearing at an alarming rate and research is finding that establishment and creation of wetland habitat is generally unsuccessful. Typical mitigation strategies in the past have created multiple small isolated wetlands with little functioning habitat. Within Washington State, guidance and research recommends utilizing mitigation banks to compensate for potential wetland impacts and losses. The overall goal of wetland mitigation banks is to create, restore and enhance wetland habitat before potential wetland impacts occur, thereby trying to ensure that bank habitat areas are a success with no net loss of wetland area or functions.

Kitsap County is developing a master plan for the Schold Farm site with the intention of creating a credited wetland mitigation bank. The Project site includes approximately 105 acres of land in north central Kitsap County within Silverdale, Washington. The Schold Farm Mitigation Bank project is a multi-year and multi-phased project being proposed by Kitsap County. The project was first initiated in 2018 because conflicts between recreation, wetland habitat, trail safety and maintenance were observed within the Schold Farm area. Currently, three alternatives have been developed and are focusing on wetland creation and increasing hydrologic connectivity over the entire site. Kitsap County is currently working with regulatory agencies, the public and internal staff to further refine the proposed alternatives that will accomplish the goals of the project. The bank site is expected to be completed in the next 5 years, but schedule will depend on agency support, funding, comments and public opinions.

This paper will review published data on mitigation banking and wetland losses and analyze an existing site in Kitsap County, Washington where a mitigation bank is being developed.

1.0 INTRODUCTION AND STUDY OBJECTIVES

According to the US Geological Survey (USGS), in the early 1600's, within the lower 48 states of the United States, there were approximately 221 million acres of wetlands (Dahl and Allord 1999). It has been estimated that more than half of wetland habitat in the United States was lost by 1984 (USDA-NRCS 2019) and from 2004 to 2009 it has been estimated that over 630,000 acres of forested wetlands were lost (Dahl 2011). State and federal regulations are supposed to protect and preserve wetland habitat, but wetland areas continue to be lost to development. Research is finding that establishment and creation of wetland habitat is generally unsuccessful (Kettlewell et. al 2008 and Turner et. al. 2001) and current practices should be evaluated and amended for successful wetland creation. Wetlands provide numerous functions and humans, wildlife and ecosystems will be impacted once wetland habitat and the services they provide are gone.

Within Washington State, wetland impacts need to be mitigated by ensuring no net loss of wetland area or functions (Washington Administrative Code [WAC] 365-196-830). Current guidance from the federal government states the preferred method to protect and preserve wetlands is to use a wetland mitigation bank (73 FR 19594). Wetland mitigation banks are generally developed on larger tracks of land and are areas where wetlands are "restored, created, enhanced, or in exceptional circumstances preserved," for the purposes of compensation for wetland impacts and losses (Washington State Department of Ecology [Ecology] 2019). Mitigation bank developers will work with local agencies to develop and enhance wetland habitat that will generate credits that can be sold to others who will be or have impacted wetland habitat (Ecology 2019). Those who purchase credits, are generally impacting wetland habitat within the same drainage basin as the mitigation bank and are therefore located in the service area of the bank (Ecology 2019). The overall goal and objective of wetland mitigation banks is that wetland habitat is created, restored, and enhanced before potential wetland impacts occur and therefore, mitigation success and no net loss of wetland area or functions is assured (Ecology 2019; 60 FR 58605; United States Environmental Protection Agency [EPA] 2019).

This paper reviews published data and examine an existing site that is in the process of becoming a mitigation bank. The existing site, collectively known as the Schold Farm project site, will be used as an

example of establishing a wetland mitigation bank. The intention of the Schold Farm mitigation bank project is to create successful wetland habitat and associated upland wetland buffer habitat that will:

- Bring a source of revenue into Kitsap County,
- Better connect the habitat and hydrology of the area, and
- Be able to offset potential wetland impacts and losses throughout the watershed of the proposed mitigation bank.

Kitsap County is developing a master plan for the Schold Farm site with the intention of creating a credited wetland mitigation bank. Properties included in the Schold Farm Project Site are composed of several parcels composed of three main areas: the Schold Farm site, Markwick Property and four (4) parcels south of Highway 303. These three main areas will herby be known as the "Schold Farm Mitigation Bank Site" or "Project site" (Parcel Numbers: 162501-1-049-2009, 162501-2-013-2009, 162501-2-023-2007, 162501-2-044-2002, 162501-2-008-2006, and 162501-1-005-2001, 092501-2-021-2008, 092501-2-023-2006, 092501-2-022-2007, 092501-3-018-2001, 092501-3-038-2007, and 092501-3-039-2006). The Schold Farm Mitigation Bank Project Site is located in Silverdale, Kitsap County, Washington (Vicinity Map, Figure 1).

1.1. Site Location and Setting

The Project site includes approximately 105 acres of land in the north central area of Kitsap County within and adjacent to the community of Silverdale, Washington (Figure 1 and Aerial View of Project Site, Figure 2). The site is located in Sections 09 and 16 of Township 25 North and Range 01 East of the Willamette Meridian and is located within Water Resources Inventory Area (WRIA) 15 (Kitsap). The site is located around the State Route (SR)-303 and Silverdale Way NW intersection and is to the east and west of Silverdale Way NW and north and south of SR-303.

The Schold Farm Mitigation Bank Site is heavily used for recreational purposes and includes undeveloped lands, trails (paved, dirt and timber boardwalk), and several outbuildings and structures for recreation, including picnic tables and shelters. Within the general vicinity of the project site parcels, there is a dog park, parking areas, roads, vault toilets, a skate park, picnic shelters and community

gardens. The project site is bordered by Highway 3 to the west, grazing, agriculture and residential development to the north, residential development and undeveloped land to the west and commercial businesses to the south.

Portions of the Project Site, between Silverdale Way NW and Highway 3, have been used for restoration and wetland mitigation purposes. As a result, approximately 15 small, randomly-located restoration and mitigation projects have been completed on the property and are patchworked throughout the site. The most recent restoration project occurred in 2016 and included the restoration of a portion of Clear Creek and an associated tributary, the West Fork Clear Creek at the south end of the Schold Farm property and a portion of the Markwick Property. The first mitigation project was constructed in 1999, however, no documentation has been identified for the project location or construction information (Kitsap County n.d.). There are two known mitigation sites on the property that are still under agency review. The remaining mitigation sites have been deemed successful by agencies and are no longer monitored. The Mitigation and Restoration Sites Figure located within Appendix A (Figures Prepared by GeoEngineers, Inc.), contains the known mitigation sites (deemed successful and still under review) along with the 2016 stream restoration project.

As stated above, there are several patchworked mitigation and restoration sites throughout the area. The first mitigation site with some documentation was constructed in the late 1990s (Wiltermood Associates, Inc. 1999) and the last site was constructed in 2016 (Kitsap County n.d.). Details on the creation and implementation of these sites are not readily available because of lack of documentation and lack of cooperation between project owners of the sites still under review. However, in general the mitigation and restoration sites included grading and excavation to lower elevations to reach groundwater and then the installation of native trees, shrubs and herbaceous vegetation.

2.0 METHODOLOGY

A literature review was conducted to examine available information on existing and historic sensitive fish, wildlife and plant species occurring in the vicinity of the project site. This file review included data from the U.S. Department of Interior- U.S. Fish and Wildlife Service (USDI-USFWS) species

list specifically for the project site (USDI-USFWS 2018), the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) species list for the Puget Sound (NOAA Fisheries 2018), the Washington Department of Natural Resources (DNR) Natural Heritage Program (NHP) (DNR 2018), the DNR forest practices application review system (FPARS) (DNR 2017), the Washington Department of Fish and Wildlife (WDFW) Priority Habitat and Species (PHS) maps and database (WDFW 2020) and the WDFW SalmonScape database (WDFW 2017). Other sources gathered to identify location and project boundaries for mitigation sites included the following: 1) "Wetland Mitigation Baseline Assessment and Year Zero Monitoring Report; 2) Central Kitsap County Community Campus Expansion Project (NWS-2009-644)" (Perteet 2011), 3) "State Route 3/303 Interchange (Waaga Way); Final Mitigation Plan" (WSDOT 2005). Several other supporting documents from Kitsap County were utilized, including a 2008 map that depicts mitigation sites and a PowerPoint file with chronological order of activities at Schold Farm.

Biological field reconnaissance was conducted on August 23 and 24, 2018 to document habitat conditions on the Project site and identify wetland habitat on the Markwick Property and the 4 parcels south of Highway 303. The biological field reconnaissance included observing and documenting stream and terrestrial habitat conditions within the project site. General habitat characteristics of the site were noted as well as direct observations of the physical habitat features such assnags, nests, beaver activity, burrows, trails, dens, streams, etc. Visual observations of wildlife, tracks and scat were also documented. Vegetation on the site was assessed for general species composition, tree size (approximate diameter at breast height [DBH]), and stand diversity both within the project area and across the surrounding landscape for context.

Ordinary high water marks (OHWM) of identified streams within the Markwick Property were delineated by examining breaks in topography, drift lines, shifts in vegetation and signs of water marks. The OHWM provides information on water levels and stream locations within the investigation areas. In-stream and riparian habitat was generally characterized throughout the project area. Potential wetland areas were evaluated on the properties using three criteria: (1) hydrophytic vegetation; (2) hydric soils; and (3) wetland hydrology. The presence of all three criteria may result in a jurisdictional wetland (USACE 2010).

3.0 SITE MANAGEMENT AND BACKGROUND

The Schold Farm site was purchased by Kitsap County in 1993 and 1994 (Kitsap County 2020; Kitsap County n.d.). The County created several trails on the site and created dog and skate parks with associated parking, adjacent to the Schold Farm site. Approximately 15 isolated mitigation areas were created on Schold Farm and were created by private developers, the County, and Washington State Department of Transportation (WSDOT). Non-profit volunteer groups, such as the Clear Creek Task Force, have also developed trails throughout the site; some were not approved by the County or other permitting agencies. As a result of human structures and the isolated manmade wetland mitigation sites, hydrologic functions of the Schold Farm Mitigation Bank Site are disconnected and pollution to wetland and stream systems have likely increased due to road and human use (Spellerberg 1998; Tilman and Lehman 2001). Trails are blocking natural drainage flow and ditches have directed water to new locations. The Silverdale region, where the project site is located, has also seen excessive flooding from stormwater due to increased development in the watershed (Harring 2000). There are several newspaper articles that mention flooding within Silverdale throughout the 1990s and 2000s (Dunagan 2002; Castaneda 1997; Dunagan 1999). In addition, the 2017 to 2022 Kitsap County stormwater program depicts five out of 10 of the County's stormwater improvement projects within Silverdale (Kitsap County Clean Water Kitsap 2017).

3.1. Current Land Ownership and Management Styles and Actions

Kitsap County currently owns the Schold Farm Mitigation Bank site and has owned it since the mid-1990s (Kitsap County 2020; Kitsap County n.d.). Previously the site was used for agricultural purposes and consisted of herbaceous vegetated fields (Google Earth Pro 1994). The first mitigation project was constructed in 1999 (Wiltermood 1999). Kitsap County and Clear Creek Task Force have constructed trails throughout the site with the first trail constructed in 1994 (Kitsap n.d.). Multiple groups within Kitsap County manage the trails and facilities and include, Kitsap County Parks Department, Kitsap County Public Works, Kitsap County Stormwater Division, and Kitsap County Planning and Development (Personal Communication with Angie Silva 2018).

As stated above, approximately 15 mitigation and restoration projects have been created on the site. One of the projects was completed in 2016 and was conducted by Kitsap County Stormwater Division and actions included restoring meanders to the West Fork Clear Creek, creating floodplain habitat and planting native vegetation (Natural Systems Design 2014). Some of the smaller mitigation and restoration sites are mapped by Kitsap County as being a mitigation and restoration site but no reports or other details have been found regarding construction or management (Personal communication with Angie Silva 2018 and Personal communication with Ecology 2019). Other mitigation and restoration sites were created by private companies who obtained permission from Kitsap County to develop mitigation projects on the property. As a result, the private companies are responsible for maintaining the mitigation and restoration sites and beyond removal of invasive species and replanting areas, it is not known what actions have taken place. Mitigation and restoration sites that have been completed are not currently maintained or inspected to verify site success. The sites are not examined for invasive species presence, native vegetation cover or hydrologic conditions.

As the owner of the property, Kitsap County is responsible for maintaining the park facilities including the picnic shelters, tables and the trail system. The County is not directly responsible for maintenance or invasive species removal at the completed mitigation sites on the property. The County has also worked with Clear Creek Task Force and other volunteers for invasive species removal activities; however, there is no documentation of actions that have occurred (Personal Communication with Angie Silva 2018).

4.0 CURRENT SITE CONDITIONS

The Clear Creek Subbasin includes 11.8 miles of streams and tributaries in the eastern part of WRIA 15 and Clear Creek is considered one of the larger drainages within this part of the WRIA (Haring 2000). The basin is low gradient and flows through a broad valley, that discharges into Dyes Inlet (Haring 2000). Within the Clear Creek watershed, there has been extensive conversion of rural, agricultural and forest land to urban residential and commercial areas (Haring 2000). According to the salmon-limiting-factors report for eastern part of WRIA 15 (Haring 2000), in 1989 land use adjacent to the Clear Creek

was 39 percent rural residential, 19 percent wood lots and 18 percent urban land. However, since 1989 significant development within the watershed has continued to occur. Riparian conditions within the Clear Creek sub-basin are considered to be poor and is "subjected to frequent extensive flooding resulting from stormwater runoff" (Haring 2000).

4.1. Published Data Review

Environmental maps of the project area were collected and reviewed as part of a published data review. The Kitsap County Community Development critical areas map (2017) shows multiple wetland areas within the project boundary (Appendix A. Figure 6). Hydric soils (wetland soils) and wetlands are mapped over much of the project site (Kitsap County Community Development 2017). The critical areas map (Kitsap County Community Development 2017) also depicts Clear Creek and the West Fork Clear Creek on the project site. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey indicates the following soil types within the project area (USDA-NRCS 2019a):

- Alderwood gravelly sandy loam, 0 to 8 percent slopes;
- Alderwood gravelly sandy loam, 8 to 15 percent slopes;
- Kapowsin gravelly ashy loam, 6 to 15 percent slopes;
- McKenna gravelly loam;
- Neilton gravelly loamy sand, 0 to 3 percent slopes;
- Norma fine sandy loam; and
- Shalcar muck.

Neilton gravelly loamy sand, 0 to 3 percent slopes soils are not hydric and do not contain hydric inclusions (USDA-NRCS 2019b). The other soil types are listed on the state hydric soils list (USDA-NRCS 2019b).

Additional information was obtained from the Washington State DNR FPARS and WDFW Priority Habitat and Species mapping application (DNR, 2017; WDFW, 2020). According to FPARS, all streams within the project area are mapped as fishbearing (Type F) waterbodies (DNR 2017). Within Clear Creek

and the West Fork Clear Creek, WDFW priority habitat and species data maps resident coastal cutthroat (*Oncorhynchus clarkii*), chinook salmon (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), and steelhead (*Oncorhynchus mykiss*) within the West Fork and Clear Creek streams (WDFW 2020)

4.2. Current Climate Conditions

Washington climate is largely influenced by interactions between seasonally varying atmospheric circulation patterns and the mountains within the region (USFWS 2011). Approximately two- thirds of precipitation occurs during half of the year (October to March) from the Pacific storm track, and much of the precipitation is captured in the mountains (USFWS 2011). Contrasts in Washington's climates are largely the result of the Cascade Mountain range that captures the maritime precipitation and creates a barrier between the maritime climate influences to the west and the continental climate influences to the east (USFWS 2011). West of the Cascade Mountains there are the low mountains of the coastal mountain regions and low- lying valleys which are known as the Puget Sound lowlands. The coastal mountains on average have an annual precipitation rate that can exceed 100 inches and the Puget Sound lowlands have an average annual precipitation rate of more than 30 inches (USFWS 2011).

4.3. Habitats of the Project Site

Habitats of the project site were identified from a variety of sources that include: the August site visit; aerial photographs and published data such as the WDFW priority and habitat species data. Vegetation types and hydrography are mapped on Figure 5 within Appendix A. This figure depicts the vegetation types and stream locations described below.

4.3.1. Grass Lands

The Schold Farm area and the Markwick Property appear to have historically been used for agriculture and remnants of the grasslands are still found on both sites. In addition, the four parcels, south of SR 303, were cleared in the earliest available aerial photographs (Google Earth Pro 1994) and agricultural grasses currently persist in the center. Today, areas of grass are patchworked throughout the

project site. Most of the grass dominated areas consist of reed canarygrass (*Phalaris arundinacea*). Approximately 25 percent of the site consists of grass dominated lands.

4.3.2. Young Forest/Shrub Lands

Due to the numerous mitigation and restoration sites on the Project site, as well as lack of land clearing by Kitsap County, following the County's acquisition, , young forest and shrub lands have recolonized within a majority of the project site. Since the mitigation and restoration sites included native species planting plans, species that were installed consist of a variety of native tree and shrub species. There are also several pockets of native willow (*Salix species*) shrub lands. Approximately 60 percent of the site consists of young forest and shrub lands.

4.3.3. Mature Forest

Pockets of more mature forest exist on the Project site. These pockets are generally found in the southeast part of the Schold Farm site, the south and east edges of the Markwick Property and the east edge of the four southern parcels, south of SR 303. Dominant forest cover generally consists of red alder (*Alnus rubra*) with some conifer species. Approximately 15 percent of the site consists of mature forest.

4.3.4. Wetlands and Streams

GeoEngineers performed wetland and stream reconnaissance within the project site during the 2018 August site visits. Although hydric soil, wetland vegetation and wetland hydrology information were collected, a final wetland delineation was not completed. Wetland characteristics and wetland boundaries on the Markwick Property and the four parcels south of SR 303 were identified because previous delineations had not been conducted. A previous wetland delineation conducted in the early 2000s was used for the Schold Farm site. A total of nine wetlands, four streams and numerous ditches were identified during the 2018 field investigation (Appendix A, Wetland and Streams, Figure 6). Table 1 below is broken down by the location where the features are found, the name of the feature, wetland hydrogeomorphic (HGM) type or DNR Stream type, and notes for each feature. A HGM classification groups the wetlands into systems based on geomorphic (i.e. is the wetland on a sloped landscape or depression) and hydrologic characteristics (Ecology 2020). Stream Type is designated by DNR and is

based on the stream's potential to be fishbearing (identified by channel characteristics and documented fish use) and whether the stream is permanently or seasonally flowing (WAC 222-16-030).

TABLE 1. EXISTING WETLANDS AND STREAMS BY LOCATION AND WETLAND HGM AND STREAM TYPE

Location	Wetland / Stream Name	Wetland HGM / DNR Stream Type	Notes
Markwick Property	Wetland A	Sloping	Within the southern limits of the wetland, vegetation dominated by invasives. Forested areas consist of red alder, with thick shrub understory. Emergent areas are dominated by reed canarygrass. Hydrology discharges to several ditches and an unnamed stream.
Markwick Property	Wetland B	Sloping	Small wetland associated with a seep that originates from Wetland C. Red alder forested wetland with salmonberry, Himalayan blackberry and buttercup in understory.
Markwick Property	Wetland C	Depressional	Western red cedar, red alder and pacific willow forest with Himalayan blackberry, salmonberry, lady fern, sword fern. Depressional wetland with associated stream.
Markwick Property	Wetland D	Depressional	Forested wetland dominated by western red cedar, devils club, skunk cabbage and false lily of the valley. Hydrology appears to be from groundwater. No outlet observed.
Markwick Property	Wetland E	Riverine	Red alder dominated forest with salmonberry, and slough sedge in the understory. Hydrology is from groundwater and streams.
Markwick Property	Stream 1	Fishbearing (Type F)	Stream originates from offsite and flows through Wetlands C and A. Eventually discharges into Clear Creek.
Markwick Property	Stream 2	Fishbearing (Type F)	Stream originates from offsite to the east. Flows through Wetland E and eventually discharges into Clear Creek.
Markwick Property	Stream 3	Nonfishbearing, seasonal (Type Ns)	Stream appears to be from groundwater flow from Wetland C. Flows through Wetland B and discharges into Stream 1.
Markwick Property	Stream 4	Nonfishbearing, seasonal (Type Ns)	Stream flows from offsite to the south and is likely from stormwater runoff from SR 303. Stream discharges into Wetland E and becomes sheet flow with no identifiable bed and bank.
Four Parcels south of SR 303	Wetland F	Depressional	All four parcels consist of wetland habitat. Dominated by red alder, willow species and reed canarygrass. Hydrology appears to be from surface water runoff, and groundwater. Two ponds are located in the south end and were constructed in 2006. Wetlands discharge into Clear Creek.

Schold Farm Site	Wetland Habitat	Depressional and Riverine	The site was first delineated in early 2000s and since then numerous wetland mitigation sites have been established. These wetland areas consist of a mix of forested, shrub, and herbaceous vegetation communities. There is a large beaver influence within these wetland areas. These wetlands are associated with West Fork Clear Creek, Clear Creek and the NW Tributary to clear creek. There are also several constructed ditches throughout the site.
Schold Farm Site	West Fork Clear Creek	Fishbearing (Type F)	Flows from offsite to the west. Recently restored and replanted within the site. Areas dominated by emergent vegetation and forest and shrub plants have been installed within the restored reach as well. Discharges into Clear Creek within the site.
Schold Farm Site	Clear Creek	Fishbearing (Type F)	Flows from offsite to the north. The stream has been ditched and is experiencing changes from beaver activities. The southern portion of the creek has been restored. Portions of the creek are dominated by red alder forest, Himalayan blackberry, and relatively newly installed native plantings.
Schold Farm Site	NW Tributary	Not mapped, Connections to Fishbearing streams not known	Originates from Highway 3 runoff and portions of the channel has been restored through different projects conducted by WSDOT and Kitsap County. The channel flows into one of the numerous constructed ditches throughout the property. The stream discharges into Clear Creek, but it is not known what culverts or ditches are between the WSDOT restored area and Clear Creek.

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According to WDFW priority habitat and species data, resident coastal cutthroat (*Oncorhynchus clarkii*), chinook salmon (*Oncorhynchus tshawytscha*), coho (*Oncorhynchus kisutch*), chum salmon (*Oncorhynchus keta*), and steelhead (*Oncorhynchus mykiss*) are found in the West Fork and Clear Creek streams (WDFW 2020). The other streams are not mapped according to WDFW. It is assumed the fish-bearing streams mapped on the Markwick Property likely contain, or have the potential to contain, these same fish species.

4.4. Streams

Data was examined on stream benthic conditions collected by the Kitsap County Envvest Benthic Monitoring program (Puget Sound Stream Benthos 2018). Within Kitsap County, the program is run by Kitsap County Stormwater Division Clean Water Kitsap, and conducts sampling activities to assess stream health and success of restoration projects (Kitsap County Clean Water Kitsap 2020). Kitsap

County Stormwater Division has sampled several stream reaches in Clear Creek and the associated West Fork tributary (Kitsap County Public Works, Stormwater Division 2015). Streams were scored based on benthic organisms sampled (Kitsap County Public Works, Stormwater Division 2015). In 2014, Clear Creek scored between fair and good , but in 2017 Clear Creek scored between poor and very poor (Kitsap County Public Works, Stormwater Division 2015 and Puget Sound Stream Benthos 2018). The West Fork tributary scored fair in 2014 and fair in 2017 (Kitsap County Public Works, Stormwater Division 2015 and Puget Sound Stream Benthos 2018).

A fish and wildlife survey was not conducted during the 2018 field investigations. However, data from Kitsap County during construction along the West Fork on the Schold Farm property indicates the following species are in the West Fork (Personal Communication from Renee Scherdnik 2018) and are assumed to be within the mainstem of Clear Creek and associated tributaries: Coho salmon, steelhead, cutthroat trout, rainbow trout (*Oncorhynchus mykiss*), Sculpin (*Cottoidea species*), Crayfish (*Cambarus species*), lamprey (*Entosphenus tridentatus*), perch (*Perca species*) and freshwater mussels. The project site is expected to be used by a variety of resident and migratory birds, amphibians, reptiles and common mammals such as mice, squirrels, raccoon, beaver, and deer.

4.4.1. Field Observations of Streams

Field observations of stream conditions are listed below by stream. Only the major drainages (Clear Creek, West Fork of Clear Creek, Stream 1, and Stream 2) on the subject properties are discussed below. The remaining tributaries (Northwest Tributary, Streams 3 and 4) discussed in Table 1, flow into these major streams or other wetland habitat. Appendix A, Figure 6 - Wetlands and Streams depicts the stream locations. A site visit was conducted and measurements such as channel width, water depth, and stream gradient were taken. In addition, observations of habitat and characteristics were recorded.

4.4.1.1. Clear Creek

In-Stream Habitat Characteristics: A total of five instream areas were reviewed, starting at the north property line and working south, avoiding the areas flooded from beaver activity. Clear Creek channel at the north end of the project area is narrow and approximately 5 to 6 feet wide. The channel substrate is sand-dominated with some gravel and boulders. Water depths were approximately 1 to 1½

feet deep. The channel had low sinuosity and the stream gradient was estimated to be 1 to 2 percent. Approximately 200 feet downstream, the channel widened to approximately 30 feet due to beaver activity. Overbank flooding was observed in this section of the stream. At approximately 650 feet from the north property line the channel and area in the vicinity of the stream was flooded due to beaver activity. The last reach investigated was just north of the 2016 restoration project. The channel in this area was approximately 15 feet wide and dominated by fine gravel sediments. Numerous beaver dams were observed along Clear Creek in this reach and numerous pieces of large woody debris (LWD) were observed within the channel and along the stream banks.

Riparian Buffer: to the creek buffer is relatively disturbed with adjacent agriculture activities to the north, the trail system to the west and single-family homes to the east. There is a heavy presence of aggressive invasive plant species including reed canarygrass and Himalayan blackberry. The riparian buffer largely consists of grass dominated habitats with a Pacific willow and red alder overstory with some areas having willow and Himalayan blackberry in the shrub layer.

4.4.1.2. West Fork of Clear Creek

In-Stream Habitat Characteristics: Due to the relatively new construction of the stream channel, observations of in-stream habitat characteristics were general as the channel is still in flux. The channel planform has high sinuosity and the stream bankfull width varies from approximately 10 to 25 feet. Numerous key pieces of large woody debris were installed within the channel throughout the reach during the 2016 stream and floodplain restoration project. Substrate was dominated by gravels and cobbles.

Riparian Buffer: The riparian buffer is still immature since the restoration project was only recently completed. Most vegetation along the creek was installed in 2016 and consists of a mix of native tree, shrub and herbaceous species with some invasive reed canarygrass and Himalayan blackberry intermixed.

4.4.1.3. Stream 1 (Markwick Property)

In-Stream Habitat Characteristics: Stream 1 is located on the Markwick property and associated with Wetland C (Appendix A, Wetland and Streams Figure 6). Where the stream leaves Wetland C, a nearly

5½-foot vertical cascade over red alder roots was observed. The channel in this area is approximately 2 feet wide and consists of a gravel bottom. Approximately 400 feet downstream, the channel is approximately 4 feet wide and there is a step pool over debris just upstream of a culvert. The culvert in the downstream end of this section was hung approximately 4 inches, creating a plunge pool approximately 0.7 feet deep. The stream gradient at this location is between 3 and 4 percent. Approximately 900 feet downstream the channel is approximately 4 feet wide and the channel bottom was dominated by fine sediment and grasses. The gradient in this area is approximately 1 percent. There was no LWD observed within the active stream channel.

Riparian Buffer: The riparian buffer for this stream varies in quality. The upper end is undisturbed and consists of a forested area of western red cedar (*Thuja plicata*), devils club (*Oplopanax horridus*), skunk cabbage (*Lysichiton americanus*) and false lily of the valley (*Maianthemum dilatatum*). Near the center of the property, the stream is overhung by a young red alder canopy with a dominant shrub layer of Himalayan blackberry . The riparian buffer at the downstream end of the stream, at the west edge of the Markwick property, is dominated by reed canarygrass with no overhanging forested or shrub vegetation.

4.4.1.4. Stream 2 (Markwick Property)

In-Stream Habitat Characteristics: Stream 2 originates from offsite to the east, flows west through the property and eventually discharges into Clear Creek. The upstream end is composed of steep undercut banks and the channel bottom consists of fine sediments and gravels. The upstream channel is approximately 5 to 8 feet wide and is fed in part from seeps identified along the banks. Several pieces of LWD were identified within and adjacent to the channel. The stream flows under an open bottom culvert that was installed within the past five years. Just downstream of the culvert, the stream banks are nearly vertical and actively eroding from the channel to approximately 3 feet from the top of the bank. The stream in this area is estimated to have an approximate 5 percent gradient. Further downstream the channel is approximately five feet wide with low banks and has a semi-confined floodplain with surrounding wetland habitat. The stream channel has gravel and sand substrate with patches suitable for spawning. No key pieces of LWD were observed in the lower reach of the channel. The downstream end of the stream has an approximate 3 percent gradient with near continuous riffles broken by small pools.

Riparian Buffer: The riparian buffer for this stream varies in quality. The upper reach is undisturbed and consists of a western red cedar forest, when an understory of devils club, skunk cabbage and false lily of the valley. The portion of stream towards the center of the property is overhung by a young red alder, western red cedar and bigleaf maple canopy with a salmonberry and sword fern (*Polystichum munitum*) understory. The downstream end at the west side of the property is dominated by invasive Himalayan blackberry and reed canarygrass.

4.5. Plants

The Washington DNR lists known occurrences of rare plants by county. A search of the DNR Natural Heritage Program database for Kitsap County revealed no records of any listed plants, high quality ecosystems or other significant natural features within the vicinity of the project (DNR 2018).

4.5.1. Field Observations of Plant Presence

The project site is typical of old agricultural sites and is a mix of grass dominated lands, and young forests, with some mature forested habitats at the edges of the site. The site contains heavy dominance of invasive reed canarygrass and Himalayan blackberry. Plant assemblages in undeveloped forest and shrub lands within the site are described generally in the preceding sections.

4.6. Animals

Information on animals in the vicinity of the Project site is summarized from general field observations and the following documents: 1) list of threatened and endangered species that may occur in the proposed project location (USDI-USFWS 2018); 2) Species List for Pacific Salmon (NOAA Fisheries 2016); and Priority Habitats and Species data (WDFW 2020). Appendix B contains the list of threatened and endangered species potentially within the project location.

4.6.1. State-Listed and Priority Habitats and Species

WDFW lists state threatened and endangered (T&E) species, and the Priority Habitats and Species (PHS) data provides available locations of these species and priority habitats based on field observations. According to the WDFW PHS web mapper, there are no T&E species located immediately within the area assessed for this project (WDFW 2020). Priority habitats within the project area consist of

wetland habitat and streams. Because of the presence of federally - listed fish species in streams, these areas would likely be regulated as Class 1 Wildlife Habitat Conservation Areas according to Kitsap County Code (KCC) 19.300.310(B)(3). Wetland habitats are regulated separately from other Fish and Wildlife Habitats. Streams and disturbed (developed or cleared of native vegetation) habitats on the site, which do not contain documented threatened, endangered or sensitive species would not qualify as Wildlife Habitat Conservation Areas according to the KCC 19.300.310(B)(3). Neither coho salmon nor cutthroat trout are considered sensitive species.

4.6.2. Federal Threatened and Endangered Species

The USDI-USFWS lists species and critical habitat designated as threatened or endangered under the federal Endangered Species Act (ESA). The USDI-USFWS identifies four ESA animal species, no plant species, and no designated critical habitats as occurring in the project area (USDI-USFWS 2018). The four listed species include: Marbled Murrelet (*Brachyramphus marmoratus*), streaked horned Lark (*Eremophila alpestris strigata*), yellow-billed cuckoo (*Coccyzus americanus*) and bull trout (*Salvelinus confluentus*). Bull trout and marbled murrelet are not likely to be within the project area because they are found in marine waters within Kitsap County (USDI-USFWS, 2018). In addition, there is no mapped nesting habitat within the project vicinity for marbled murrelets (WDFW 2020). Yellow-billed cuckoo is not likely to be within the project area because they are typically associated with large deciduous forested or shrub riparian habitats (NatureServe 2020). Streaked horned Larks are not likely to be within the project area because they are typically associated with large open fields (United States Department of Fish and Wildlife Service n.d.). NOAA Fisheries identifies west coast fish species listed under the ESA (NOAA Fisheries 2018). NOAA Fisheries listed species that could be present within the streams of the project area include: chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*Oncorhynchus mykiss*). WDFW SalmonScape (2017) and PHS data (2020) does not identify the presence of bull trout, within Clear Creek or the associated tributaries. These databases do, however, map chinook salmon and steelhead within Clear Creek and the West Fork Clear Creek.

4.6.3. Field Observations of Animal Presence

The project site is expected to be used by a variety of resident and migratory birds, amphibians, reptiles and common mammals such as mice, squirrels, raccoon, beaver and deer. During the field investigation, GeoEngineers observed songbirds within terrestrial habitats and nests scattered throughout the properties. Evidence of beaver (*Castor canadensis*) was observed on the Schold Farm site with several observed dams and chewed stumps. Indirect evidence, which includes tracks and scat, of Columbian black-tailed deer (*Odocoileus hemionus columbianus*) was also observed and, based on habitat conditions, there appears to be high potential for other mammals such as coyotes (*Canis latrans*) to utilize the project area.

4.7. Wildlife Networks and Corridors

Wildlife corridors provide habitat, pathways for movement, extension of foraging ranges for large, wide-ranging species and escape routes from predators. The wildlife networks and corridors are important for listed, priority and other more common animal species. Within the Project site, wildlife corridors include large forested blocks, large wetland complexes and linear riparian zones. Movement along these corridors is currently easy for most animals; however, people and pets utilizing the trails within the Project site likely cause disturbances. According to WDFW, the West Fork Tributary and Clear Creek, provide corridors for salmonid species and other riparian species.

4.8. Disturbance Regimes

Currently there are no records of fire or disturbances such as insects and pathogens in the area. However, development and offsite invasive vegetation colonization are processes that affect the site. Development brings additional stormwater, pollution and more humans (Tilman and Lehman 2001). There have been direct observations of people walking their dogs pulling up installed native plants to throw for their dogs. Trash has been identified during most of the site visits and vandalism has been observed with people cutting limbs off native plants. Although not a true 'process,' colonization of invasive vegetation has the potential to change the plant community species (Washington State Noxious Weed Control Board n.d. and USDA-USFS 2018). Seed sources for these invasive plant species are from onsite and offsite adjacent areas.

Beaver have also caused some disturbance in the area by eating native plants and creating dams which has changed the hydrologic regime of the area. Beaver can affect vegetation on the site because they eat native willows and trees which alter sunlight conditions on the site; this can change the vegetation community from tree to shrub or emergent and allows more sunlight to reach the ground surface. In addition, changing hydrology floods out some species that are not flood tolerant. The WSDOT mitigation site on the Schold Farm Mitigation Bank site is an example of disturbances that can occur from beaver activity. When first created in 2007, the WSDOT site had a stream that flowed through the center with forest, emergent and scrub/shrub areas (WSDOT 2017). Beaver within the past 3 years have created dams along the stream and flooded the entire site. As a result, willows are the only vegetation growing in the site and adjacent trails have had to be closed due to being flooded.

5.0 SITE CONSTRAINTS

The Schold Farm Mitigation Bank site is composed of several small mitigation and restoration sites and used for recreational activities such as hiking and biking. When Kitsap County first began using the area for mitigation projects, a master plan was not developed and overall hydrologic cohesiveness, and wetland and upland habitat structure were not evaluated. As a result, several isolated habitat areas have been constructed and have changed natural functions of the larger mitigation bank site. This is a potential site constraint because each individual mitigation project that was constructed because of permitting requirements is protected and changes to these mitigation projects will need to be approved by the USACE and Ecology prior to creating the overall mitigation bank site.

Current human and dog use of the site has also created a site constraint for multiple reasons. There have been observations of people pulling out installed vegetation to throw for their dogs and portions of the site are being used as off leash pet areas which damages vegetation and restricts wildlife usage. Trails are also acting as a barrier to hydrologic functions and wildlife because they bisect the site and don't allow water to flow as it did historically. The Clear Creek Task Force has also installed (without Kitsap County permission) a beaver deceiver, which impacts wildlife and other conditions at the site. Other human activities include creation of informal trails and dumping of garbage. Human disturbance is

considered a threat to the mitigation site because if left unmanaged, vegetation could be impacted, wildlife habitat could be destroyed, and the mitigation sites might not be sustainable (Tilman and Lehman 2001).

Invasive plant species are located on and off the site, and although maintenance actions remove identified invasive species at the mitigation sites, there is potential that the invasive species will colonize areas. Kitsap County cannot remove invasive species offsite on properties that they do not own and these offsite invasive species are a seed source to the Schold Farm Mitigation Bank site. Scotch broom, Himalayan blackberry and reed canary grass are on the site and have spread in some areas despite removal efforts. These species are known to be aggressive and to regularly out-compete native plants and become monocultures (Washington State Noxious Weed Control Board 2019 and USDA-USFS 2018). Monocultures are when areas become dominated by only one species and these monocultures have the potential to restrict tree recruitment and growth and can cause a reduction in biodiversity (USFWS 2020). Loss of biodiversity and reductions or alternations to native vegetation growth can then affect wildlife and fish habitat on the project site (USFWS 2020).

Climate change has the potential to become a site constraint in the future. The site contains areas that pond, multiple types of vegetation communities and wetland and buffer habitats. In addition, site landscape patterns and native vegetation likely attract wildlife species to the site. The effects from climate change include increasing the potential risk for fires, increasing the amount of pathogen and insect outbreaks, changing the hydrologic conditions, and changing types and species of vegetation that will grow onsite. Changing the hydrologic regimes of the site, plant mortality, and changing species of plants may also change wildlife presence and use of the site.

A long-term source of funding to maintain the Schold Farm Mitigation Bank site is also a site and a social constraint. The site is more than 100 acres in size and consists of naturally vegetated habitats, regulatory protected areas and park facilities that include trails, picnic shelters and tables. The trails consist of a variety of materials including, wooden boardwalks, gravel and sediment and pavement. Due to human use, the site must be regularly maintained and patrolled for public safety and park enjoyment

and the County would like a permanent fund to be developed for the maintenance and operation of the area (Personal Communication with Angie Silva 2018). A mitigation bank on the Schold Farm mitigation bank site could provide permanent funding for the maintenance of the site, since the bank would develop credits for restoration and the credits would be sold for profit (Ecology 2019a).

6.0 SITE IMPORTANCE (SCOIAL, ECONOMIC AND ETHICAL DISCUSSION)

Wetland habitat has been altered and destroyed since the early 1600s and although wetland protection laws were first established in 1934, wetland habitat continues to be lost (Dahl and Alord 1999; Dahl 2011). From 2004 to 2009 it has been estimated that over 630,000 acres of forested wetland alone has been lost and this does not take into account other types of wetlands that include emergent and shrub wetlands (Dahl 2011). Although there are state and federal regulations that are designed to protect and preserve wetland habitat, wetland habitat is still being lost. Wetland habitat is disappearing both because wetlands continue to be filled or drained and because wetland habitat created to compensate for destroyed wetlands, is not successful (Brown and Veneman 2001; Kettlewell et. al 2008; Kozich and Halvorsen 2012; Turner et. al. 2001). Wetlands provide many functions and are an important group of habitat types that are disappearing at a rapid rate; humans, wildlife and the ecosystem will be impacted once wetland habitats and the services they provide are gone. More information about functions that wetlands provide are provided in the below sections.

6.1. Site Importance

Wetland mitigation banks are important ethically and to local ecosystems and communities because they provide habitat oases in a developed area (Wu 2014). Wildlife within the Schold Farm Mitigation Bank site depends on the mitigation area for survival because there are no other naturally vegetated areas in the general vicinity. In addition, there is human benefit and social value in having natural areas that are vegetated. There are also cultural and human wellbeing values with having vegetated areas in developed areas (Wu 2014).

6.2. Functions the site provides

The wetland mitigation bank site has the potential to provide several ecosystem services that include provisioning, regulating, cultural and supporting services (Millennium Ecosystem Assessment 2005). Wetlands provide many functions and values to humans and wildlife. These habitats can purify water and improve water quality (Michaud 2001). Wetlands also provide many hydrologic functions that include shoreline stabilization, groundwater recharge, and stream flow maintenance (Michaud 2001). Hydrologic functions are also provided by wetlands because they detain water and slowly release water to streams and groundwater. These hydrologic functions help to prevent downstream flooding events that could damage natural resources as well as human homes and roadways. Wetlands are also important for wildlife (Michaud 2001) because there are several species of amphibians and fish that depend on wetland habitat for parts or all of their life cycles. Without wetlands, these species would not survive.

6.3. Economic Values

It can be difficult to quantify the functions and values that wetlands provide. However, several studies have been conducted to place a value on the functions (Brouwer et al. 1999). Contingent valuation is a popular methodology to place economic value to wetland functions (Brouwer et al. 1999). Contingent valuation is the process of surveying individuals about how they feel about an environmental issue, such as wetland protection, and determining how much they would be willing to pay or receive for the wetland to be retained or lost, respectively (Brouwer et al. 1999).

There are economic values associated with wetlands and the functions they provide (Michaud 2001). If a flood occurs and causes damage or if water needs to be purified because wetland habitat was removed, then a cost will be incurred to complete the tasks the wetland could have accomplished. In addition, there could be indirect costs because a lack of wetland habitat could reduce the number of fish available for recreation, thus causing communities to be at risk of losing tourism and recreation revenue. A contingent valuation study has not been conducted for the Schold Farm Mitigation Bank Site. However, with identified flooding within the watershed basin and public use of the park, it is thought that economic value would be high.

7.0 DISCUSSION

Wetland habitats are disappearing at a rapid rate and historical and current wetland creation practices may not be able to adequately protect and ensure wetland habitat persistence (Brown and Veneman 2001; Kettlewell et. al 2008; Kozich and Halvorsen 2012; Turner et. al. 2001). Climate change effects and changing site conditions are potential impacts to the successful establishment and preservation of wetland habitat. Mitigation Banks are a potential solution to disappearing wetland habitat. The goal of the mitigation bank is to develop wetland habitat prior to wetland impacts. This ensures that wetland mitigation is adequately being constructed and provides large connected acreages for wildlife and native vegetation. Mitigation banking also can increase humans' sense of wellbeing by knowing these natural vegetated areas exist (Wu 2014).

Below is a discussion on potential site disturbances for wetland habitat, changing site conditions such as development, potential restoration actions, and mitigation banks in Washington State.

7.1. Potential Impacts to Wetland Habitat

The impacts discussed below are discussed in reference to the Schold Farm Mitigation Bank site; however, most of the impacts can be applied to other wetland habitat in the Pacific Northwest.

7.1.1. Changing Site Conditions

Human disturbance is considered a threat to the wetland mitigation bank site and other wetland sites because if left unmanaged, vegetation could be impacted, wildlife habitat could be destroyed, and the wetland areas might not be sustainable. Development and road construction is one of the biggest threats to wetland habitats and the functions they provide. Development and road construction causes wetlands to be filled and lead to a decrease of wetland functions. Currently the adjacent site north of the Schold Farm site is used for grazing cattle vegetation consists of grazed pasture. Developing the offsite area would likely increase impervious surfaces that would then direct stormwater runoff onto the project site would increase hydrology onto the Schold Farm site. This increased stormwater runoff could create additional flooding and erosion on the Schold Farm site, which would affect vegetation and wildlife habitat and use.

The site is surrounded by developed areas or areas where residential houses are being constructed. Future development will cause an increase in impervious surfaces, which increases stormwater runoff which can cause pollutants to wash into adjacent wetlands at the project site (Walsh et. al 2012). More development will also likely mean more traffic and more opportunities for pollution from vehicles to enter the project site. In addition, removal of vegetated wildlands may force wildlife to relocate to the proposed mitigation bank site and thus strain the wildlife sustainment capacity of the site.

7.1.2. Climate Change

Based on available climate change models there is high confidence that temperatures will rise 3 to 10 degrees Fahrenheit by the year 2080 (Ecology 2012; Mote and Salathe` 2010). For western Washington, precipitation is projected to change from current conditions, with the change ranging from 10 percent less rainfall to 20 percent more rainfall by the year 2080 (Ecology 2012). Summer months are expected to have a decrease in precipitation and winter months are anticipated to have increases in precipitation (Ecology 2012). There is low confidence about precipitation predictions because of the wide range of natural variability in the Pacific Northwest and because of the challenges of modeling precipitation globally (Ecology 2012). As temperatures rise and precipitation fluctuates it is possible that the stressed vegetation will be more susceptible to pathogens and insects and fire (McDowell, et al. 2011; Teskey et al. 2015; Westerling et al. 2006) which may lead to increased plant mortality.

Extreme weather events are also anticipated to increase in magnitude and frequency as a result of climate change. Climate models project an increased risk for more frequent extreme precipitation in the Pacific Northwest by the second half of the 21st century (Ecology 2012). Within the Seattle – Tacoma area (where the proposed mitigation bank site is located), the magnitude of a 24- hour storm is projected to increase 14 to 28 percent during the next 50 years (Ecology 2012). The extreme weather events have indirect effects of increased fire risks, reduced summer water supplies, increased water temperatures, increased frequency and intensity of floods and increased risk to cold water fish species (Ecology 2012). The extreme weather events have the potential to cause plant mortality directly or indirectly through changing precipitation events or temperatures.

7.1.3. Pathogens and Insects

Insects and pathogens can cause tree and forest damage, increase tree mortality and change in forest and landscape structure. Climate change will produce changes in weather patterns that will likely affect pathogens and insects because of changing temperatures and precipitation (Bentz et al. 2010). In the past, colder temperatures have limited mobility, range and annual survival of insects and pathogens (Bentz et al. 2010). Pathogens and insects are not dying or becoming dormant because of cold temperatures and as a result, warmer weather linked to climate change increases the range and amount of time insects and pathogens are active. According to Bentz et al. "in recent decades, billions of coniferous trees across millions of hectares have been killed by native bark beetles in forests ranging from Mexico to Alaska, and several of the current outbreaks are among the largest and most severe in recorded history" (2010). It is possible that as warmer temperatures increase and insect and pathogen ranges expand, the proposed wetland mitigation bank site could be negatively impacted.

7.1.4. Hydrologic Conditions

As the climate warms, there will likely be a change in precipitation; however, there are other hydrologic changes that will occur. One impact to water resources is a declining snowpack and loss of water storage. This impact has already led to other impacts within local watersheds. In Washington State many of the streams and rivers begin and/or are fed by snowpack and glaciers within the mountains. According to the Environmental Protection Agency (EPA), snowpack accounts for a majority of water supply in many parts of the west as it stores water that is slowly released as temperatures rise in the spring and summer (Kolian 2015). Snowpack keeps the ground and soil moist by covering it longer into spring and summer which influences the onset of the fire season as well as the prevalence and severity of wildfires (Kolian 2015). As the snow melts earlier in the spring, there is less water available to feed Washington streams, in the late summer, when demands for water are at the highest (Ecology 2012). Snowpack within the last decade has been observed to be melting one to four weeks earlier within much of the western United States, when compared to the 1950s (Ecology 2012).

Correlations have also been made between human development and wetland area shrinkage. A 2015 article reviewed a 20-year time period (from 1990 to 2010) over a known wetland area in India

(Rawat and Kumar 2015). This article found that as built up areas increased, the wetland size decreased; these findings were also verified by other researchers in other areas in India (Rawat and Kumar 2015). Other impacts from development include excess flooding from stormwater which changes the natural hydrologic regime of the wetland. Excessive flooding and changing hydrologic regimes can also lead to plant mortality and changing wildlife uses (Appleton Wetland Research Group of the Mississippi Valley Field Naturalists 2014).

Riparian conditions within the Clear Creek subbasin are considered to be poor and are "subjected to frequent extensive flooding resulting from stormwater runoff" (Haring 2000). Extensive flooding at the project site could change vegetated communities, cause plant mortality and alter wildlife usage. In addition, hydrologic conditions at the mitigation bank site could change as a result of either warmer temperatures or changing precipitation rates. This could impact the ponded areas of the site and vegetation mortality; changing the ponded areas and vegetation could also have indirect effects of changing wildlife occurrence on the site.

Within the entire Clear Creek Watershed, the average annual recharge from precipitation is between 10 and 20 inches per year (Welch 2014). Based on studies done for the entire Kitsap peninsula, it is expected that groundwater at the site is shallow and restricted to the discontinuous and unconfined Vashon recessional aquifer (GeoEngineers 2019). Three monitoring wells were installed in October 2019 and hydrologic conditions at the Schold Farm area are currently being monitored to evaluate the seasonal fluctuations of groundwater. The hydrologic and hydraulic modelling efforts for the project revealed that portions of trails are expected to be flooded during 2-year flow events and adjacent roadways (Silverdale Way) are expected to flood during 50 year flow events (Northwest Hydraulic Consultants [NHC] 2019).

7.1.5. Vegetation

Temperate zone forests in the Puget Sound lowlands are expected to experience growth enhancement due to increased temperatures and climate warming (Kaupi et al 2014; Hember et al. 2012). Within the surrounding Pacific Northwest, models indicate an overall increase in forest productivity resulting from future temperature increases, with lower elevations declining in productivity

and higher elevations increasing in productivity (Latta et. al. 2010). The site is located in the Puget Sound lowlands and the site has forest habitat at a lower elevation; therefore, vegetation productivity may increase or decrease depending on vegetation type and model predictions. For the project site, the ground has the potential to become drier and vegetation more stressed. Stressed vegetation could lead to more plant death (McDowell, et al. 2011; Teskey et al. 2015).

Invasive species and native opportunistic species could also impact the site by restricting native plant growth and colonizing entire areas. The definition of an invasive plant species is a "non-native to the ecosystem under consideration" and "whose introduction causes or is likely to cause economic or environmental harm or harm to human health" (USDA-USFS 2018). The definition of an opportunistic native plant is a native plant that is "able to take advantage of a disturbance to the soil or existing vegetation" and to "spread quickly and outcompete other plants" (USDA-NRCS 2020). Invasive and native opportunistic plant species: tend to grow rapidly; quickly take areas over; reproduce quickly; take over resources (water, sunlight, nutrients, etc.) of an area; are hard to remove from an area; and out compete native vegetation (USDA-USFS 2018). Invasive species have also been attributed to the decline of endangered and threatened species; increased soil erosion and degraded water quality (USDA-USFS 2018).

From the field surveys, reed canarygrass and Himalayan blackberry are the most common invasive species on the project site with more localized areas of Scotch broom (*Cytisus scoparius*). The Schold Farm Mitigation Bank site was previously used for grazing and is dominated by introduced grasses. Currently large areas, approximately 25 acres, consist of grasses primarily reed canarygrass. Himalayan blackberry is associated with young forested areas near the edges of the site. Scotch broom has been observed scattered throughout drier upland habitats. Invasive species on the project site are difficult to manage because of the large project area, lack of funding for active management of invasive species, and because offsite sources that are brought onsite by humans who unknowingly have invasive plant seeds stuck to shoes or clothing. Birds, mammals, wind and streams can also bring invasive plant seeds onto the mitigation bank site.

7.2. Mitigation Banks in Washington State

There are currently 18 wetland mitigation banks in Washington State with three additional sites under development (Ecology 2019b). The banks are spread over the state, but most occur east and south of the Puget Sound within western Washington (Ecology 2019b). There are currently no wetland mitigation banks in Kitsap County (Ecology 2019b). Benefits of mitigation banks are that they; are more successful than permittee responsible mitigation projects, offer more ecological functions and values than smaller permittee responsible mitigation sites because of the larger size, can include more scientific expertise in design and creation than permittee responsible mitigation sites, and can have a shorter permitting review time (Ecology 2019a; EPA 2019; 60 FR 58605).

Most guidance from Washington State and the federal government encourages mitigation bank development because it is thought to be more successful than individual projects. However, there have been some studies that have reviewed wetland mitigation banks in the United States and have found that mitigation banks fall short for providing habitat similar to that originally impacted (i.e. impacting a forested wetland and compensating with an emergent wetland) and have only been moderately successful (Burgin 2009). Because of economic incentives for developers to build wetland mitigation sites and banks, vegetation chosen are species that are more likely to survive and achieve designated goals (Burgin 2009). As a result, mitigation sites have typically lost diversity that was found in the impacted wetland area (Burgin 2009).

Developing a mitigation bank at the Schold Farm Mitigation site is important because there are no banks within Kitsap County. As a result, mitigation projects have been designated to small areas and have become isolated by increasing development and roadway construction. Another reason this mitigation bank is important is because Kitsap County would like a revenue stream to maintain and service the Schold Farm site which currently contains critical wetland and stream habitats as well as trails and park facilities.

7.3. Potential Restoration Actions at the Schold Farm Mitigation Bank

The final restoration and mitigation plan for the Schold Farm Mitigation Bank will be developed in coordination with regulatory agencies and Kitsap County. This plan will identify actions that will be taken to construct the wetland mitigation bank. However, there are some actions that will likely be taking place during construction for the purposes of maximizing functions that the site can produce and the restoring the site. These actions include utilizing beavers which are already at the site, choosing vegetation that will create structure within upland and wetland habitats, increasing the amount of interspersion of habitats, and ensuring that we provide vegetated corridors for wildlife migration and movement. Invasive species management techniques will also be applied to different areas of the site and will likely include different strategies.

Beaver are going to be an important part to the restoration plan in both the work beaver will do in support of the restoration, as well as in consideration for protecting infrastructure of the trail system and protecting vegetation in the restoration areas. As part of the mitigation and restoration plan developed for the mitigation bank, the regulatory agencies are likely going to identify acreages of certain types of vegetation communities (forested areas and emergent areas) that are required to be developed as well as different habitat types such as upland buffer and wetland habitat. It is expected that beaver are going to be vital in expanding wetland habitats because beaver will create dams that block water flow and extend areas of flooding. Beaver have already started this process within areas of the Schold Farm site and new dams and additional areas of flooding have been identified during recent site visits. Vegetation will likely need to be protected in such a way that still encourages the presence of beaver but will also allow for establishment of forested and shrub areas where required by the agencies. A potential solution is to use beaver fencing to protect portions of installed vegetation and once this vegetation matures, remove the fencing. Only a portion of the vegetation would be fenced to still provide food for beaver.

Vegetation chosen for the installation of the mitigation bank site will be native to the area and will be identified by conducting site visits to undisturbed adjacent vegetated areas to ascertain what species will be appropriate for the upland and wetland habitats created for the Schold Farm Mitigation Bank. As mentioned above, regulatory agencies will likely require certain habitat vegetation communities and

habitat types as part of this plan. The native species that are chosen will be placed to allow for increased structure and interspersion of different habitats. The increased structure will include different layers of vegetation such as forested, sub canopy, shrub and herbaceous. The habitat interspersion will include different habitat niches such as seasonally flooded areas, forested, emergent, and scrub/shrub areas. Large woody debris and standing snags will also be included within the proposed mitigation and restoration plan to increase habitat features.

The proposed mitigation and restoration plan will likely allow for vegetated corridors that have undisturbed vegetated areas. Undisturbed areas of natural vegetation and habitat corridors are important to wildlife currently using the site. Habitat corridors are needed to allow movement and subsequent flow of genes between wildlife populations in habitats that otherwise would be isolated by some of the existing trail and road systems. The two primary users of corridors are corridor travelers and corridor dwellers. Corridor travelers include large herbivores such as deer; medium to large carnivores like foxes and coyotes; and various migratory animals (Payne and Bryant, 1994). Corridor dwellers generally have limited dispersal ability and consist mostly of plants, insects, amphibians, reptiles, small mammals and birds. These vegetated areas will lesson impacts and allow wildlife that typically utilizes the site to continue to utilize the site. For the purposes of the Schold Farm Mitigation Bank site, efforts will likely be made to remove the trail system from the center of the properties to allow for undisturbed vegetated areas.

Invasive species have been identified on the mitigation bank site and include species such as reed canarygrass, Himalayan blackberry, and Scotch broom. It will be important to control invasive species populations throughout the construction and monitoring of the Schold Farm Mitigation bank site. After mitigation plans have been developed, the mitigation bank site should be inventoried and areas that are at risk from invasive species should be noted. Different strategies to control the invasive species can be applied to different areas depending on risk. Some invasive species management techniques that could be applied include removal of topsoil to remove seed banks and application of soil amendments. Another strategy is to use black paper or cardboard on the ground after invasive species have been initially mowed or removed and the paper or cardboard would be placed around installed native

vegetation. This strategy is intended to limit invasive species growth until a native vegetation community can be established and potentially out compete or shade out the invasive species. Other strategies could include use of chemicals and active mowing; however, these strategies need to be used with reserve to ensure other vegetation or wildlife is not impacted. The key to invasive species removal and management will be to actively monitor the sites to identify growth and needed actions early in the process.

8.0 DEVELOPMENT OF A MITIGATION BANK

Developing a wetland mitigation bank will vary depending on the jurisdiction and location of the proposed bank. Within Washington State, the Washington State Department of Ecology oversees wetland regulations and scientific guidance for wetlands, wetland mitigation bank development and bank operation (WAC 173-700). Washington State has also developed regulations and rules on wetland mitigation banks and these rules can be found in the Washington Administrative Code (WAC) chapter 173-700 (Wetland Mitigation Banks). Wetland mitigation banks are typically multi-phase and multi-year projects where large areas of land are needed to create wetland and buffer habitat. In general, the larger sized areas will create more credits and these additional credits can be sold for additional profits.

8.1. Washington State Guidance for Constructing Mitigation Banks

One of the first steps in developing a mitigation bank in Washington State is to develop goals and objectives for the site (Castelle et. al 1992). The goals and objectives can be to develop a specific acreage of a wetland type (i.e. forested or scrub/shrub), to develop habitat for certain wildlife or plant species, to improve stream habitat and to provide stormwater flood retention functions. Once the goals and objectives of the site are identified, it will make it easier to select a site for the development of the mitigation bank (Castelle et. al 1992).

When selecting a site for wetland mitigation banking there are several considerations. Developers should review projected growth and potential wetland impacts to see if there is a need for a wetland mitigation bank (Castelle et. al 1992). Developers should also look into regional goals for habitat restoration to ensure a mitigation bank would align with local regulations (Castelle et. al 1992).

Developers should also review the types of wetlands that are in the area to ensure that those same types of wetlands can be developed on site (Castelle et. al 1992). In addition, the goals and objectives previously identified should be reviewed to make sure they can be accomplished at the selected site. The site identified for the potential wetland mitigation bank should be investigated and current habitat types, hydrologic conditions, vegetation communities, and wildlife usage should be reviewed and inventoried to make sure goals and objectives can be achieved onsite.

To begin the regulatory process in developing a wetland mitigation bank, the developer should submit a prospectus to the USACE to initiate review of the project by appropriate regulatory agencies (60 FR 58605). Within Washington State, the agencies generally include the USACE, EPA, Ecology, and local Native American tribe/s, but additional agencies can be asked to participate (WAC 173-700-220). Once the prospectus has been submitted the USACE and agency review has been initiated, the developer will also need to create a Mitigation Banking Instrument (MBI) report which will include information such as the physical characteristics and legal description of the bank, how the bank will be constructed and operated, goals and objectives, methods for determining credits, habitat conditions before the bank project and proposed habitat conditions, performance standards to identify bank success, contingency actions and long term management strategies (60 FR 58605). The role of the IRT is to "facilitate the establishment of mitigation banks through development of mitigation banking instruments" (60 FR 58605). Once the mitigation banking instrument has been finalized, the public has the opportunity to review and comment.

The next steps for creating wetland mitigation banks in Washington State have to do with the operation of the bank. A bank operator, someone who will be responsible for managing the site, should be selected (Castelle et. al 1992). Use of credits will also need to be identified and can be based on wetland functions, wetland area, and cash value of the impacts or restoration or even habitat value (Castelle et. al 1992). Criteria for using the credits should also be developed to identify potential buyers of the credits (Castelle et. al 1992). Long term maintenance will also need to be planned for and will include maintenance, monitoring and implementation of remedial actions (Castelle et. al 1992). The sites will generally be monitored for multiple years and as the site progresses and meets performance

standards, additional credits will be released to the bank for sale (Castelle et. al 1992; WAC 173-700-335; Stockton 2008; 60 FR 58605).

One of the last steps in developing a wetland mitigation bank after the mitigation banking instrument is finalized, is the construction of the site. The developer should ensure that a successful site is developed and this is usually done by studying the site hydrology prior to construction, reviewing adjacent wetland habitat and plant types to know what species might be the most successful, identifying potential site constraints, such as invasive species, ahead of construction, and developing contingency plans for the site constraints.

The IRT, with input from the developer, identifies credits available at the site and is generally based on project design and how many acres of wetland are created, restored or enhanced (WAC 173-700-312). Credits are released gradually throughout the project. Within Washington State, up to 14 percent of the credits can be released prior to construction efforts beginning (WAC 173-700-331) and additional credits can be released post construction and after certain performance standards are met (WAC 173-700-332 and 333). Once the credits are released, they can be sold by the developer of the wetland mitigation bank.

8.2. Definition of Success

Wetland habitat that was created to compensate for destroyed wetlands, is not typically successful (Brown and Veneman 2001; Kettlewell et. al 2008; Kozich and Halvorsen 2012; Turner et. al. 2001). A study from Massachusetts (Brown and Veneman 2001) found that of 391 projects conducted between 1983 and 1994, approximately 54 percent were not in compliance with state regulations; approximately 22 percent of the projects did not get constructed; approximately 30 percent did not have sufficient hydrologic function, and approximately 65 percent of the sampled project wetlands had a smaller area than was required in permits. Similar results were identified in Michigan (Kozich and Halvorsen 2012), when projects that contained a wetland permit between 2003 and 2006 were examined; approximately 55 percent of the sites were out of compliance.

There are many ideas when it comes to identifying a successful wetland mitigation site. There are regulatory requirements that define the components of a wetland. These requirements include dominance of vegetation that likes to grow in wet areas (wetland vegetation), water present within 12 inches of the soil surface for 10 percent of the growing season and soils that have developed in wet conditions. There are other definitions of success that have to do with the reason the wetland area was preserved or created. Those reasons for creation could be establishing wildlife habitat, providing a feeling of human wellbeing or providing water quality and flood prevention benefits. It is important when talking about long term solutions and the success of wetland mitigation sites, to identify the success criteria of the wetland area.

For the Schold Farm Mitigation Bank, success will likely depend on native vegetation coverage, development of the three wetland criteria (soils, hydrology and vegetation), and providing flood prevention criteria. In addition, the success of the project will likely also involve trying to limit public use of the site to benefit habitat functions and encourage native wildlife use.

8.3. Schold Farm Mitigation Bank

The Schold Farm Mitigation Bank project is a multi-year and multi-phased project that Kitsap County is proposing to create. The project was first initiated in 2018 because conflicts between recreation, wetland habitat, trail safety and maintenance were observed within the Schold Farm area.

8.3.1. Phase 1

The goal of the project was established because Kitsap County and the public were experiencing conflicts between recreational users, protected wetland habitat and safety of the park facilities. Kitsap County's goal and objective for this project is to provide a more cohesive site for the benefit of ecological functions and human use at the site. The expectation is that the site could be transferred into a wetland mitigation bank and profits from the sale of credits could help fund the upgrades, maintenance and safety services for this area.

As described above, one of the initial steps after identifying project goals is to select the site and inventory the site and surrounding areas. A multi-disciplinary team was established, whose specialties

included: groundwater modeling, hydrologic and hydraulic services, wetland and stream delineation, surveing, and landscape architectural design. Combined, the team has experience with wetlands, hydrologic and stream modeling, trail development and planning, and permitting. Beginning in 2018 and extending into 2019, site conditions were inventoried, and data gaps were documented. This first phase produced a hydrogeologic (groundwater) monitoring report, a hydrologic and hydraulic modeling report, a habitat assessment report and a site survey of streams and topographic conditions. Site specific data for the groundwater report was not available at the time of the study. However, based on other reports prepared for the larger County and watershed area, groundwater is expected to be close to the surface (GeoEngineers 2019). The hydrologic and hydraulic modelling report estimated projected flooding at certain flow events; portions of the trails are expected to flood during 2-year occurrences and surrounding roadways are expected to flood during 50-year occurrences (NHC 2019). The habitat assessment report described observed habitat conditions such as vegetation coverage, wetland and stream presence and wildlife (described in other areas of this report). These reports and efforts were designed to document baseline conditions of the site and area.

Long term funding has been a constraint and the project team is working with Kitsap County on solutions. For example, a full wetland delineation and investigation were not conducted over the entire more than 100-acre site and instead only a small area was investigated and previous delineations from multiple years and sources were utilized. The survey is another example of minimizing costs with the site survey consisting of LiDAR and three other survey efforts that were completed at different times by different companies. Other constraints of the project have been a lack of information regarding groundwater, stormwater and previously conducted mitigation sites. Some of this information has been pieced together from PDFs that were created from the 1990's to early 2000's.Other information was assumed for modeling purposes and is expected to be more fully defined in later years (i.e. groundwater monitoring wells will be established to document the groundwater).

Another result of the initial project phase was to identify mitigation and restoration projects that have taken place on the Schold Farm site. As stated previously, Kitsap County did not have accurate representation of previous mitigation site locations. This may be a concern for the project, because these

mitigation sites are protected areas that were created to compensate for past wetland destruction. Credit cannot be taken for creating wetland areas where previous wetlands were created, even if no wetland habitat actually exists, and we have to continue to protect the sites. As part of that effort, any proposed changes have to ensure that the hydrology of these existing mitigation sites are not altered.

From work conducted in the first phase of the project, it was estimated that there would be approximately 25 acres of wetland creation potential and an additional 40 acres for wetland enhancement. This estimation was not based on actual groundwater levels or placement of potential buffers, but it served as a check to see if it would be monetarily feasible and beneficial for Kitsap County to proceed in developing a wetland mitigation bank. Based on rough estimates for creation costs, permitting costs and other necessary administrative work, the potential 25 acres of wetland creation indicated that it could be beneficial to create a wetland mitigation bank at the Schold Farm site.

8.3.2. Phase 2

The project is currently in Phase 2, whichbegan in 2019 and will conclude by the end of 2020. The intent of this phase is to develop three design concepts for the site and initiate regulatory agency correspondence. With agency correspondence and input from Kitsap County, the multiple design concepts will be narrowed to one overall project design concept. Another aspect of this phase is to receive initial public comments regarding the plan. This will help to further redesign the chosen initial project design.

To construct initial alternative designs, the project team reviewed the initial project goal which was to provide a more cohesive site for the benefit of ecological functions and human use at the site. The Schold Farm site was likely historically composed of floodplain habitat for Clear Creek and the West Fork Clear Creek but as a result of agricultural practices and other human land use, vegetation was largely removed from the site, several ditches were installed to direct water flow away from the site, and trails were later installed that further create hydrologic barriers. In addition, Clear Creek was channelized, which means the stream meander was removed and it was directed into a straight channel alongthe property edge. Over the years, some native vegetation has been replaced due to mitigation and

restoration projects and in 2016 a stormwater project restored a portion of the West Fork Clear Creek channel by adding meanders back to the channel, as well as installing large woody debris and native vegetation within the buffer. However, large areas of grass dominated land still exist on site and trails and ditches are still modifying natural hydrologic regimes.

To further aid design development, this current phase included construction and installation of three groundwater monitoring wells within the main Schold Farm site. The wells were installed in October 2019 and will stay in the ground for at least one year to document lowest and highest water conditions. This information will be used to identify whether wetland creation is monetarily and permitting feasible; if groundwater was too deep, it would be too expensive to excavate and potentially difficult to permit with regulatory agencies. Data collected to this point has revealed that groundwater at the beginning of the wet season (October) is within 6 feet of the ground surface, from the highest elevation point at the site, thus indicating that wetland creation is feasible.

The project team identified six key areas over the entire proposed bank site where restoration and wetland creation would add additional biological functions. Since wetland creation will give the project the most credits, wetland creation was prioritized in the designs. Three alternatives were developed and have been based on level of effort with Alternative 1 requiring the least effort to construct and the less expensive to construct and Alternative 3 requiring the most effort and most expensive. It is expected that Kitsap County, with input from regulatory agencies and the public, will select different options from all three alternatives to create the final design. Some of the alternatives include removing portions of existing trails and creating wetland where these trails once were, and some include constructing a boardwalk or installing a bridge where these trails are located to allow for hydrologic conductivity. Some options avoid all existing mitigation sites which simplifies permitting efforts. Other options include redesigning and grading of existing mitigation sites because some mitigation sites are not functioning as expected and could be made better. Appendix C (Site Alternatives prepared by GeoEngineers) contains figures that depict the proposed alternatives.

Current project actions include engagement of the regulatory agencies to include early comments into the design. A meeting was held at the project site at the end of January 2020 and included representatives from WDFW, Ecology, Kitsap County and the Suquamish Tribe. The USACE declined invitations to this initial meeting. The goal of the meeting was to get agency comments included early in the design process, but a formal prospectus to the USACE has not been submitted and a formal IRT group has not been established. During the meeting, concerns regarding beaver activity at the site were expressed by WDFW and the Suquamish Tribe and these agencies would like to ensure that beaver are protected and encouraged to be at the site. Ecology is also concerned about potential effects to existing mitigation areas from the proposed project. Overall, however, the agency representatives expressed appreciation for the plan and agreed the alternatives would provide beneficial ecological affects to the project site.

Future activities that will take place under this phase include additional survey work, additional groundwater collection efforts, and further redesign efforts. Current groundwater and surface water modeling efforts are largely based on LiDAR, historic surveys and educated assumptions based on current knowledge of the site. Additional survey efforts are needed to further define water models of the site and ensure that alternatives being proposed can be successfully created. Additional groundwater data will be collected to identify water levels during annual periods of drought when water levels are the lowest. This will serve to identify target elevations for wetland creation areas which need water to be within 12 inches of the soil surface for 10 percent of the growing season. In addition, several meetings with Kitsap County and the public will likely generate more considerations for the final design alternative. Therefore, future activities under this current phase will further define the proposed alternative.

8.3.3. Future Phases and Projected Schedule

There will likely be approximately three more phases of the project which could extend more than 5 years. Exact timeframe and phases are difficult to identify and will be based on additional comments received from the stakeholders and public, the IRT and actual construction timeframe. The below descriptions are the anticipated next steps of the project.

Phase 3 of the project will be to reach out to the public and stakeholders of the site in more depth and gather and respond to comments. There will likely also be need for the hydrologic and hydraulic model for the site to be even further defined based on the chosen project alternative. After additional comments have been received and the models further defined, a master plan report will be developed that will document the plan and reasons why the final alternative was developed and chosen.

Phase 4 of the project will likely be conducted once a final alternative has been designed and agreed upon by stakeholders and Kitsap County. This phase will include submittal of the application to the USACE, development of the mitigation bank prospectus, mitigation banking instrument and site maintenance plan. In addition, the IRT group will be established and their involvement will include meetings, revisions to the mitigation bank instrument and legal team involvement. In addition, typical permitting documents will need to be prepared such as biological assessments, the joint aquatic resources permit application form and the cultural resource assessment.

Once the permitting requirements have been completed in Phase 4, construction of the site can begin. Kitsap County will choose the contractor to develop and follow the mitigation bank plan. Once the site has been constructed, an as-built will need to be prepared; this report documents construction and changes that differed from the original plan. Long term monitoring will also need to be conducted and will last for multiple years until the regulatory agencies release the site. Credits will be released gradually throughout site development and completion of the monitoring program.

8.3.4. Future Outlook

Kitsap County is projecting population growth and development growth within the next 20 years (Kitsap County 2016). It is expected that some of this proposed development will impact wetland habitat within the County and WRIA. Since, USACE guidance recommends mitigation banks be used to compensate for wetland impacts (73 FR 19594), it is expected that credits from the Schold Farm Mitigation Bank will be sold. Mitigation banks are easier for developers to use rather than create their own wetland mitigation area because they can have a onetime fee to be paid instead of having to pay

someone to develop a mitigation plan, construct the mitigation area, and then monitor the site for 10 years.

9.0 CONCLUSIONS

Typical mitigation strategies in the past have created small wetlands throughout different areas which has created isolated wetlands with little functioning habitat. Within Washington State, new guidance and research recommends utilizing mitigation banks to compensate for potential wetland impacts and losses. However, only a few mitigation banks have been established within Washington State. Benefits of mitigation banks are that they are: more successful than permittee responsible mitigation projects; offer more ecological functions and values than smaller permittee responsible mitigation sites because of the larger sized areas; can include more scientific expertise in design and creation than permittee responsible mitigation sites; and can have a shorter permitting review time (Ecology 2019 and EPA 2019).

The Schold Farm Mitigation Bank project is a multi-year and phased project that Kitsap County is proposing to create. The project was first initiated in 2018 because conflicts between recreation, wetland habitat, trail safety and maintenance were observed within the Schold Farm area. Currently, three alternatives have been developed and are focusing on wetland creation and increasing hydrologic connectivity over the entire site. The County is currently working with regulatory agencies, the public and internal staff to refine the proposed designs that will accomplish the goals of the project. The bank site is expected to be completed in the next 5 years, but schedule will depend on agency support, comments and public opinions.

Final designs for the mitigation bank site will depend on funding and input from federal, state and local agencies as well as comments from the public. However, to maximize habitat function at the site, a combination of the three proposed alternatives will likely provide the best alternative. Trail sections need to be removed to allow for more natural hydrologic flow and Clear Creek should be re-meandered through floodplain on the project site, currently the creek is restricted to a ditch along the south property line. Wetland creation would provide the most benefit if it can be combined with existing mitigation sites.

Beaver within the area should also be encouraged through design to help create offsite floodplain habitat and expand wetland areas where possible. Regardless of the design chosen, creating wetland habitat and creating a more natural hydrologic flow pattern through the site will provide additional benefit for fish, wildlife, and humans.

This mitigation bank will be important because there are currently no mitigation banks in Kitsap County or the WRIA (WRIA 15 – Kitsap). With development projected to increase over the next 20 years, potential wetland degradation and destruction are also expected. Because isolated wetland mitigation projects are not typically effective or successful, mitigation banks are going to become more important to ensure there is no net loss of wetland area or functions.

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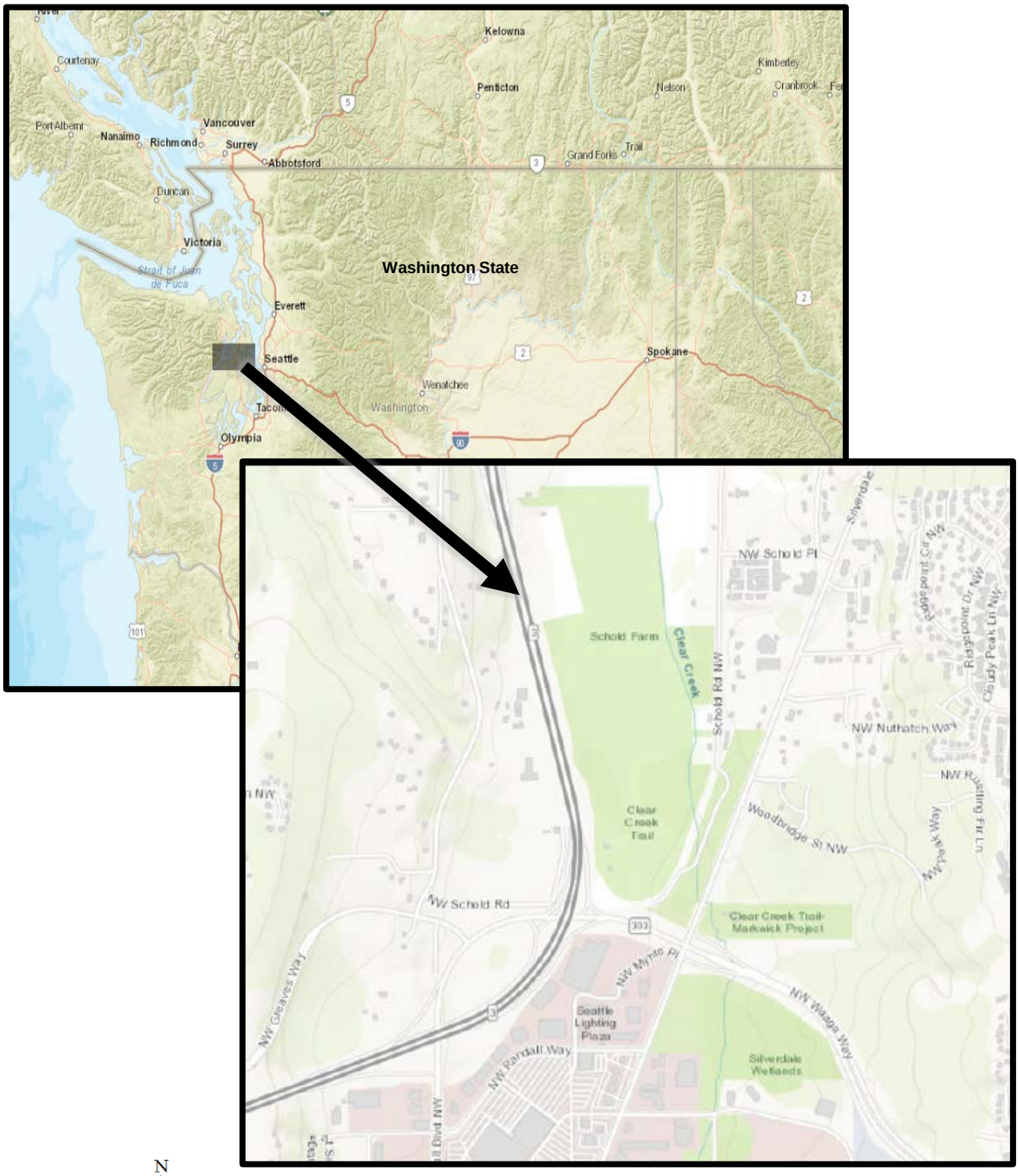


N
W E
S

Not to Scale

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
3. Imagery from: http://thelogicsystem.maps.arcgis.com/apps/webappviewer/index.html?id=e53e7597c44c487bb452098ed6c10a15

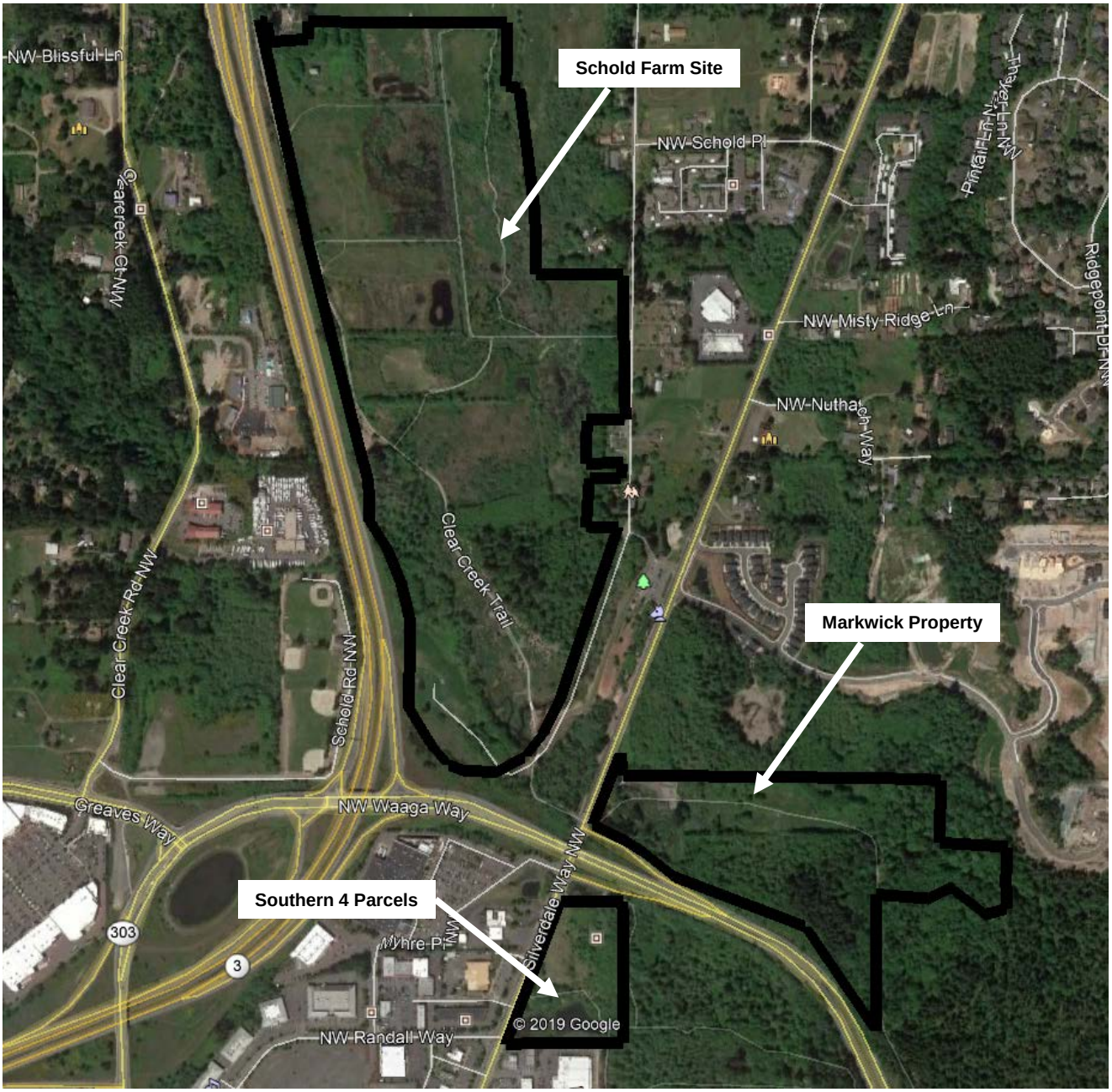
Data Source:

XXXX-XXX-XX Date Exported: 04/09/15

Vicinity Map

Schold Farm Mitigation Bank Project
Kitsap County, Washington

Figure 1



N
W E
S

Not to Scale

Project Site Boundary

Aerial View of Project Site

Schold Farm Mitigation Bank Project
Kitsap County, Washington

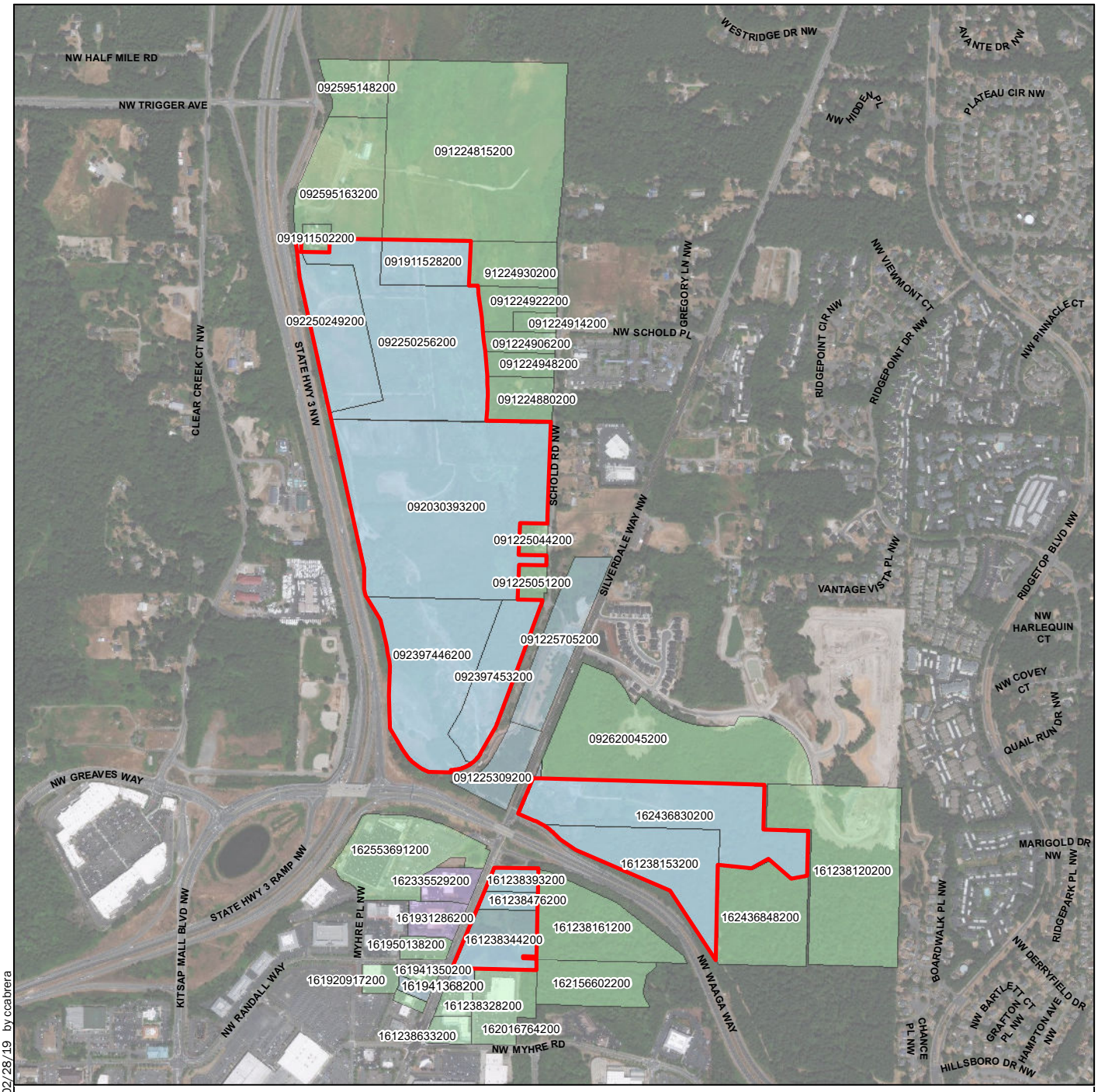
Figure 2

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document.
3. Aerial Image from Google Earth 2019.

Data Source:

XXXX-XXX-XX Date Exported: 04/09/15

APPENDIX A
Figures Prepared by GeoEngineers



Legend

- Project Site
- Kitsap County Parcel Ownership
- Federal Parcel Ownership
- Private Parcel Ownership

1,000 0 1,000
Feet

N W E S

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI. Roads from Kitsap County GIS, https://www.kitsapgov.com.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Parcel Ownership

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 2

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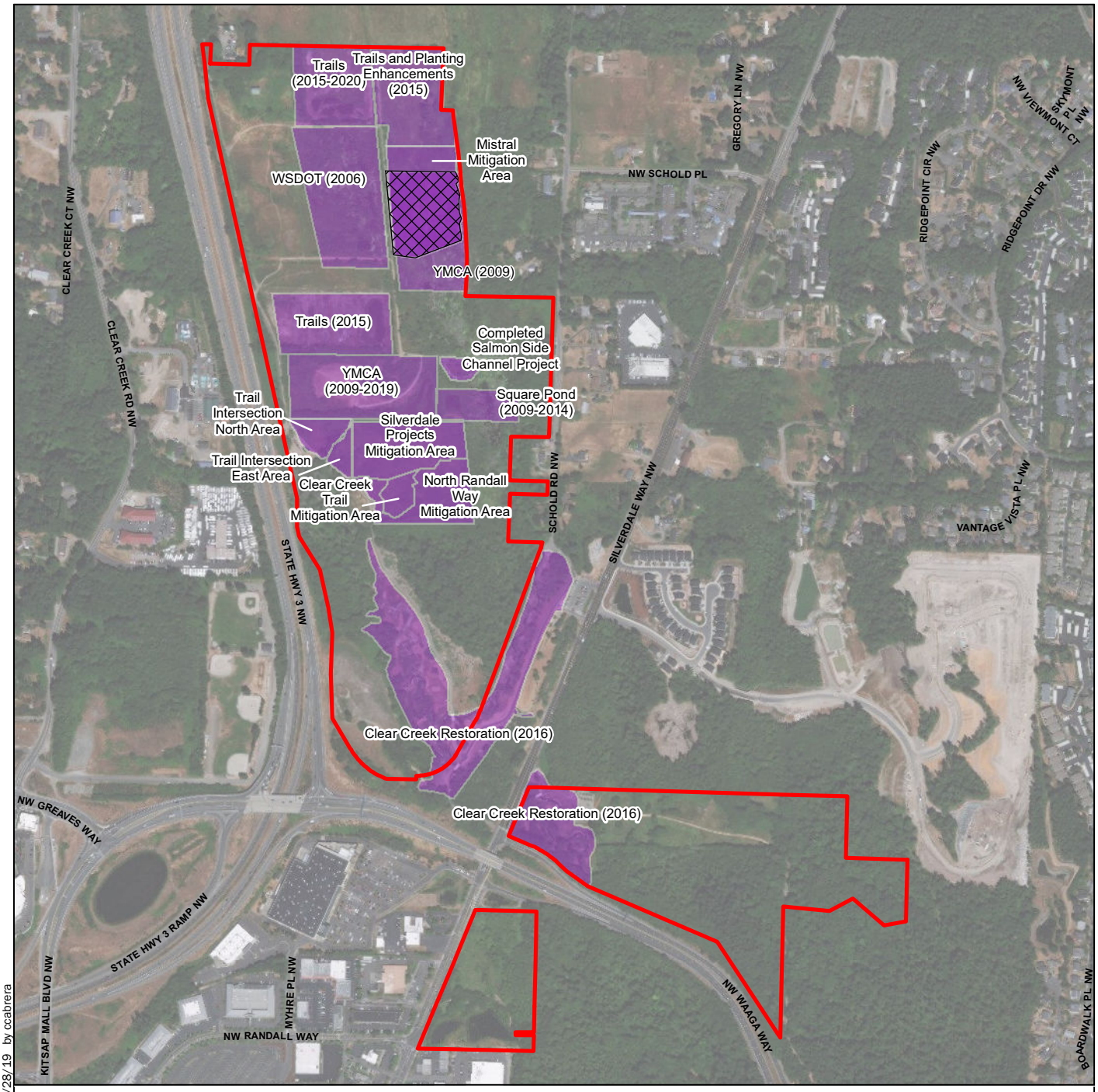


Legend

- Project Site
- Mitigation and Restoration Sites
- Overlapping Mitigation Sites

800 0 800

Feet

N W E S

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: ESRI. Roads from Kitsap County GIS, https://www.kitsapgov.com.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

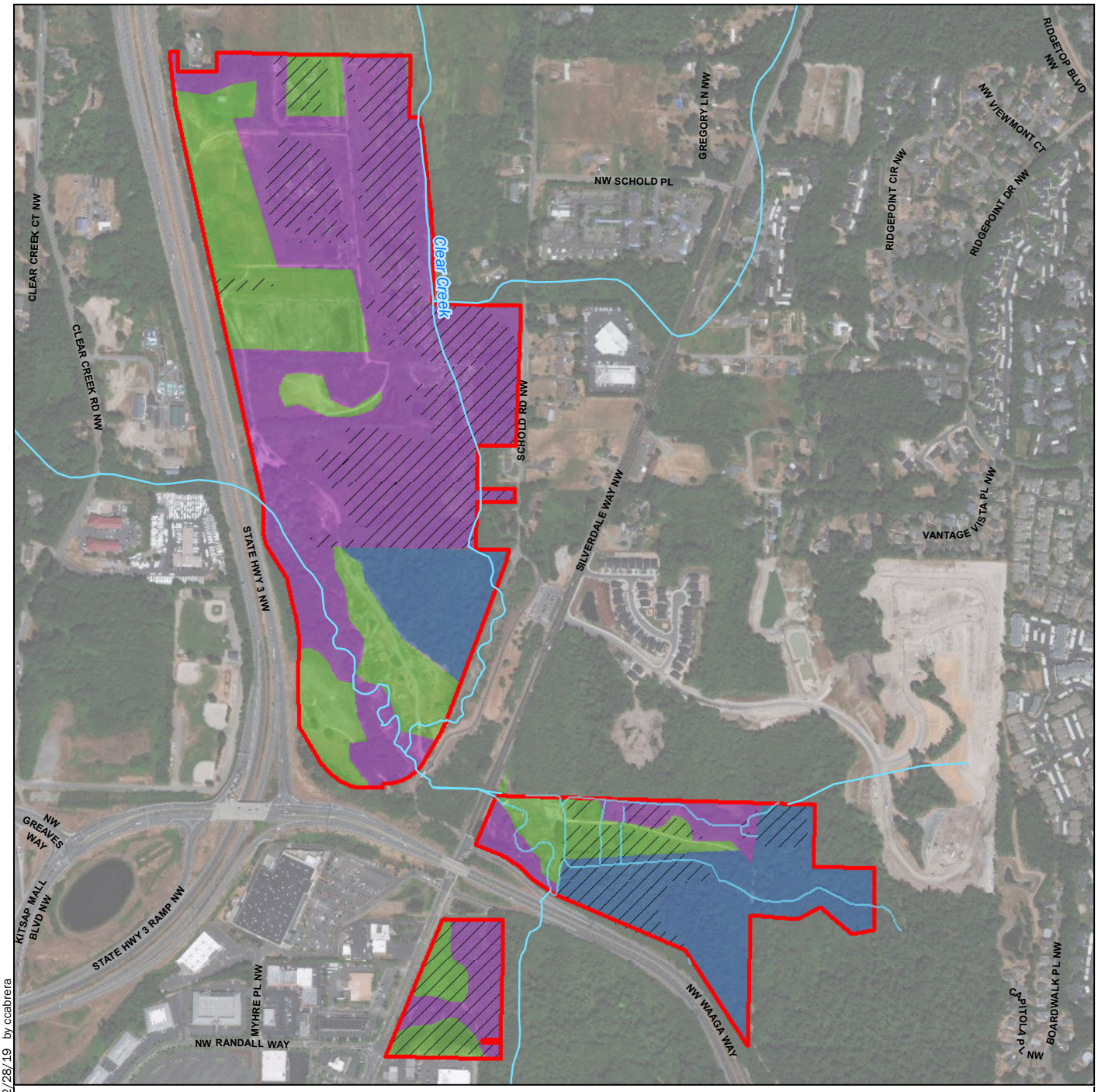
Mitigation and Restoration Sites

Schold Farm Mitigation Bank
Kitsap County, Washington

GeoEngineers

Figure 4

P:\5_5819008\GIS\MXDs\5819008_F04_MitSites.mxd Date Exported: 02/28/19 by ccabrera



Legend

- Wetland
- Mapped Streams
- Grassland
- Mature Forest
- Young Forest/Shrubland
- Project Site

800 0 800

Feet

N W E S

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Stream data from National Hydrography Dataset
Roads from Kitsap County GIS, https://www.kitsapgov.com.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

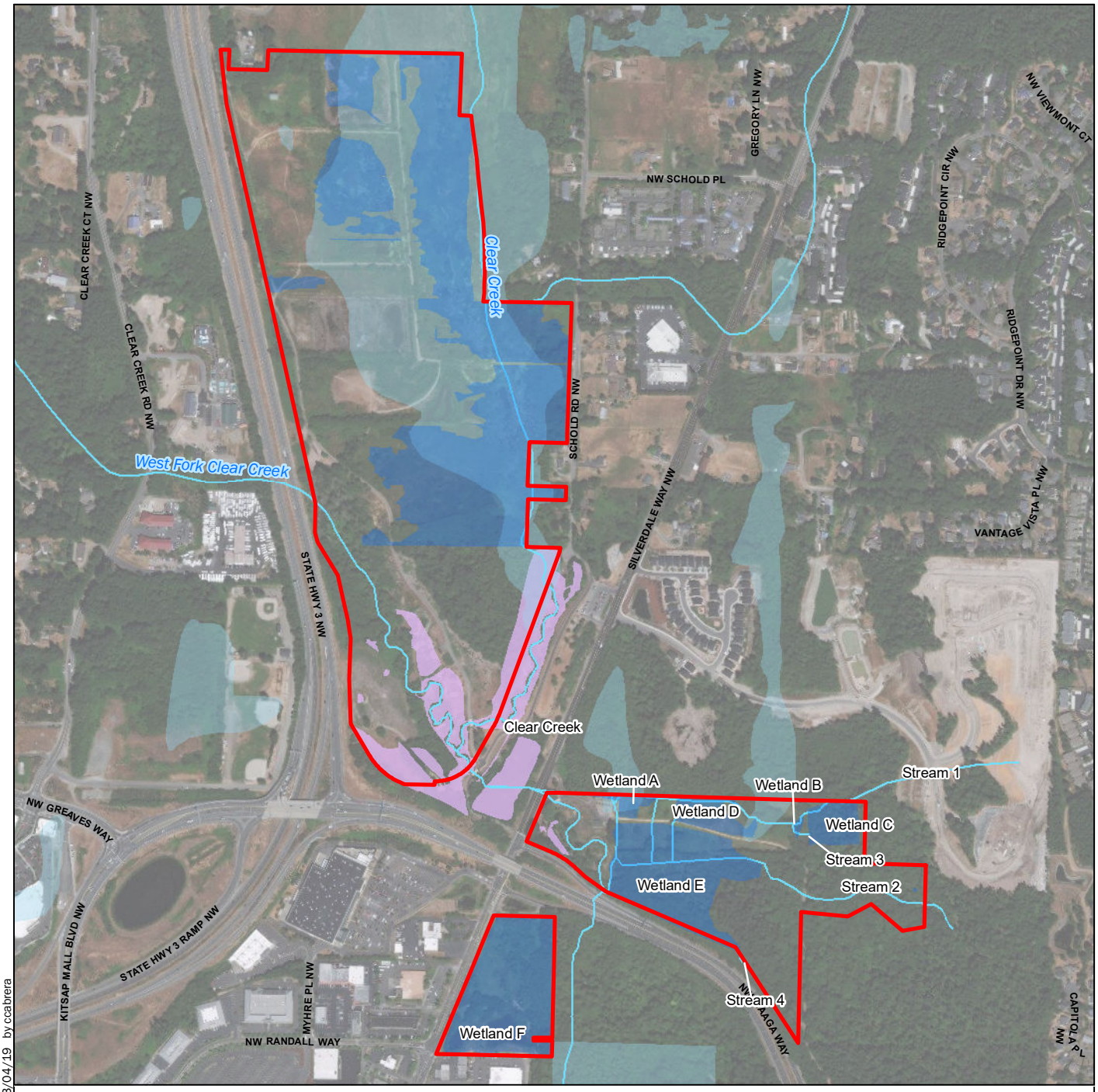
P:\5_5819008\GIS\MXDs\5819008_F05_Vegtypes.mxd Date Exported: 02/28/19 by ccabrera

Vegetation Types and Hydrography

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 5



Legend

- Delineated Wetlands
- Kitsap County Mapped Wetlands
- NSD Mapped Wetlands
- Mapped Streams
- Project Site

800 0 800

Feet

N W E S

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Data Source: Mapped stream data from National Hydrography Dataset.
'Clear Creek Floodplain Restoration' 100% design by Natural Systems Design (NSD) dated 2/26/2015.
Roads and mapped wetlands from Kitsap County GIS, https://www.kitsapgov.com.
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Wetlands and Streams

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 6

P:\5\5819008\GIS\MXDs\5819008_F06_Wetlands.mxd Date Exported: 03/04/19 by ccabrera

APPENDIX B
Threatened and endangered species Lists

IPaC Information for Planning and Consultation **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

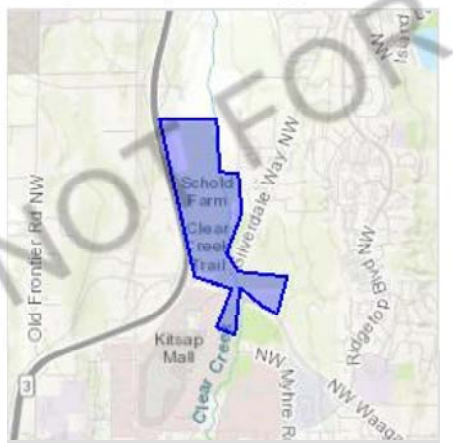
Project information

NAME

Schold Farm Wetland Mitigation Bank

LOCATION

Kitsap County, Washington



DESCRIPTION

Kitsap
County is looking to create a credited mitigation bank at this site and is in the beginning stages of information gathering.

Local office

Washington Fish And Wildlife Office

(360) 753-9440
(360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

http://www.fws.gov/wafwo/

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Log in to IPaC.
2. Go to your My Projects list.
3. Click PROJECT HOME for this project.
4. Click REQUEST SPECIES LIST.

Listed species

[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Birds

NAME	STATUS
Marbled Murrelet Brachyramphus marmoratus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/4467	Threatened
Streaked Horned Lark Eremophila alpestris strigata There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7268	Threatened
Yellow-billed Cuckoo Coccyzus americanus There is **proposed** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS
Bull Trout Salvelinus confluentus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act

[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Jan 1 to Sep 30

Black Turnstone Arenaria melanocephala — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Great Blue Heron Ardea herodias fannini — Breeds Mar 15 to Aug 15
This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lesser Yellowlegs Tringa flavipes — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9679

Olive-sided Flycatcher Contopus cooperi — Breeds May 20 to Aug 31
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3914

Red-throated Loon Gavia stellata — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Rufous Hummingbird selasphorus rufus — Breeds Apr 15 to Jul 15
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Semipalmated Sandpiper Calidris pusilla — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Whimbrel Numenius phaeopus — Breeds elsewhere
This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

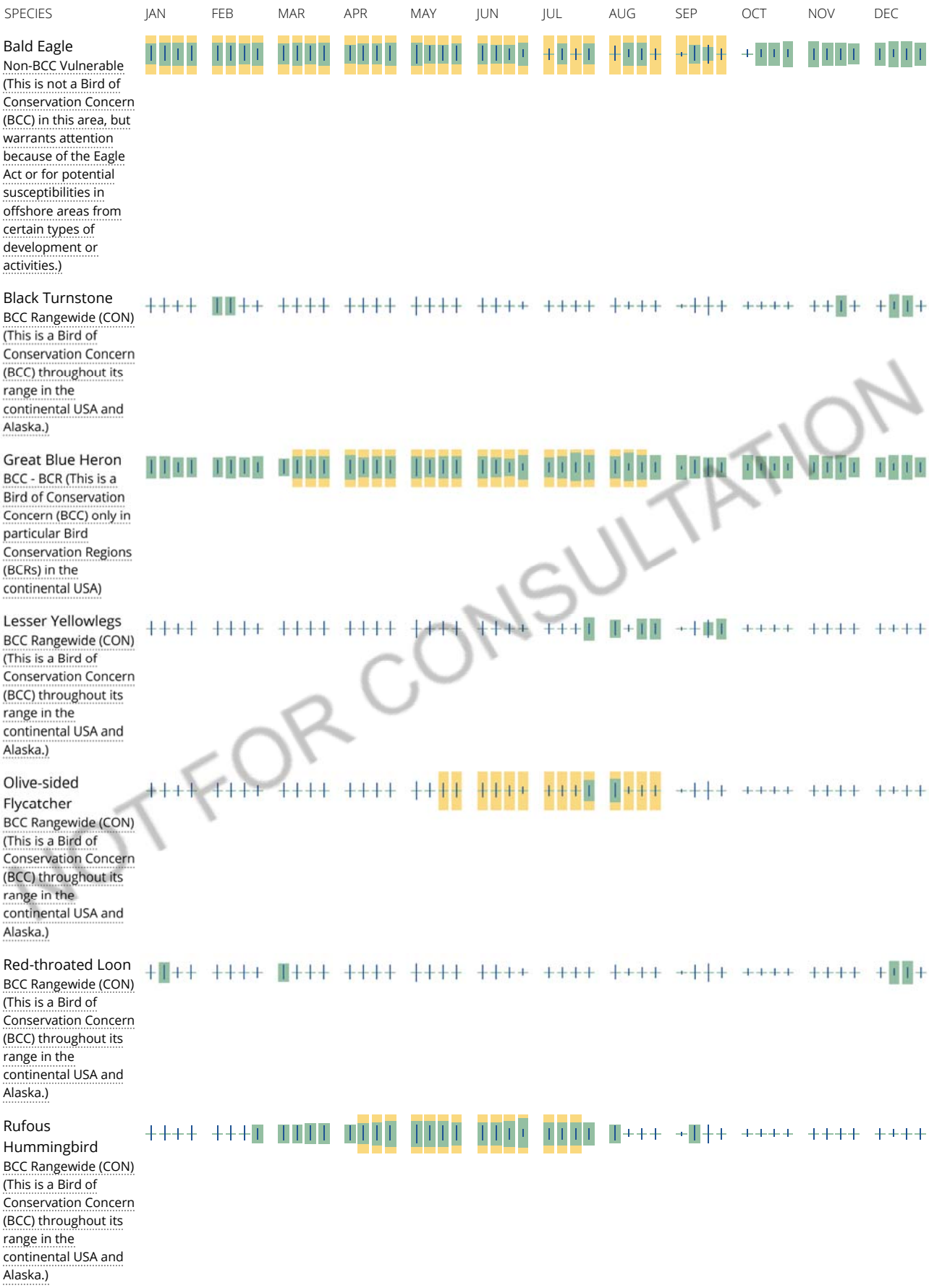
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort – no data



Semipalmated Sandpiper
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the E-bird Explore Data Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey

effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1Ad
- PEM1Cd

FRESHWATER FORESTED/SHRUB WETLAND

PSSC
PFOC
PSS/EM1C
PSSCx

FRESHWATER POND
PUBHh
PUBHx

RIVERINE
R4SBC
R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

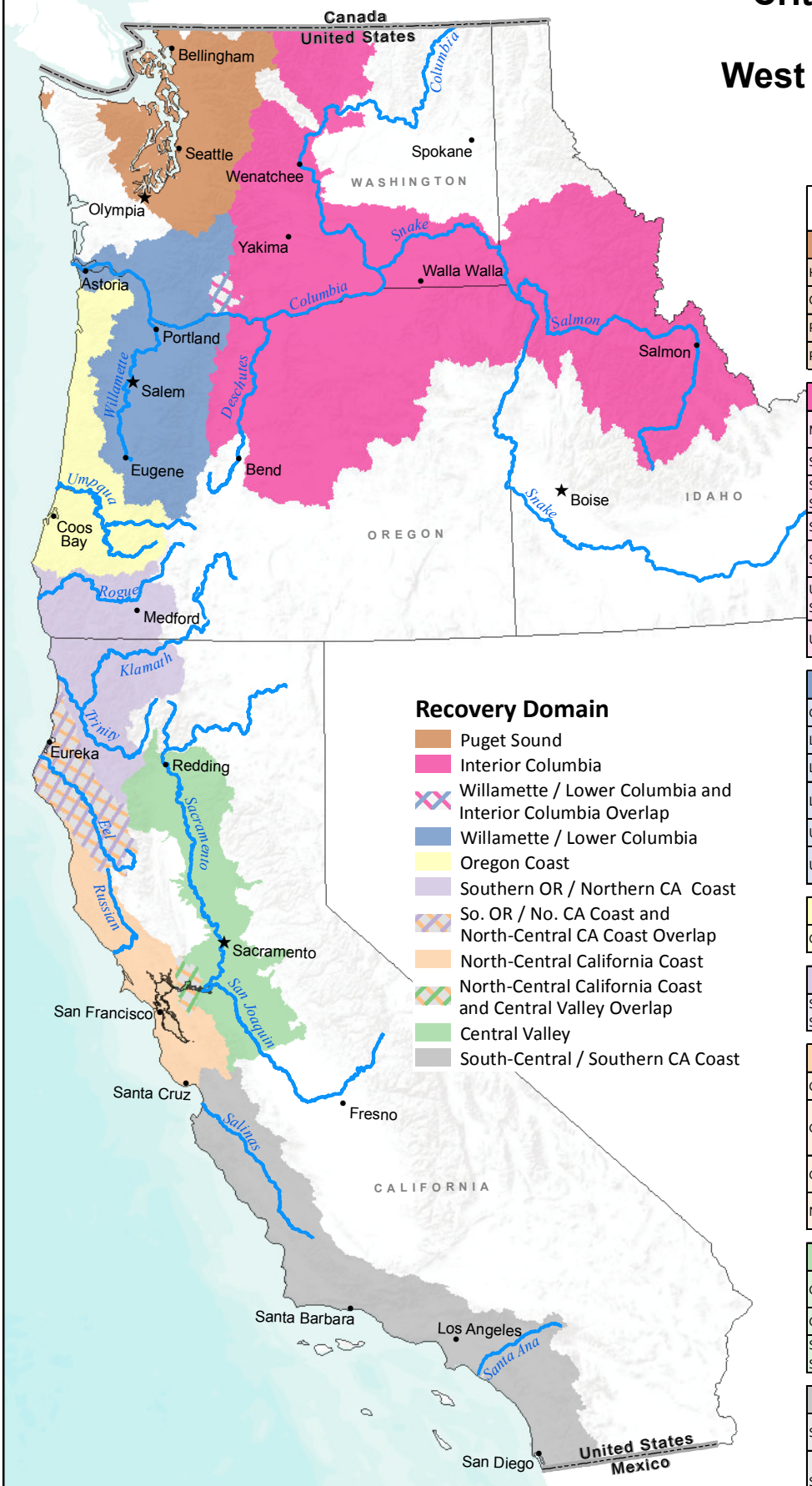
Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Status of ESA Listings & Critical Habitat Designations for West Coast Salmon & Steelhead



Updated July 2016

Evolutionarily Significant Unit / Distinct Population Segment	ESA Status	Date of ESA Listing	Date of CH Designation
Puget Sound Recovery Domain			
Hood Canal Summer-run Chum Salmon	T	3/25/1999	9/2/2005
Ozette Lake Sockeye Salmon	T	3/25/1999	9/2/2005
Puget Sound Chinook Salmon	T	3/24/1999	9/2/2005
Puget Sound Steelhead	T	5/11/2007	2/24/2016
Interior Columbia Recovery Domain			
Middle Columbia River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Snake River Fall-run Chinook Salmon	T	4/22/1992	12/28/1993
Snake River Spring / Summer-run Chinook Salmon	T	4/22/1992	10/25/1999
Snake River Sockeye Salmon	E	11/20/1991	12/28/1993
Snake River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Upper Columbia River Spring-run Chinook Salmon	E	3/24/1999	9/2/2005
Upper Columbia River Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Willamette / Lower Columbia Recovery Domain			
Columbia River Chum Salmon	T	3/25/1999	9/2/2005
Lower Columbia River Chinook Salmon	T	3/24/1999	9/2/2005
Lower Columbia River Coho Salmon	T	6/28/2005	2/24/2016
Lower Columbia River Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Upper Willamette River Chinook Salmon	T	3/24/1999	9/2/2005
Upper Willamette River Steelhead	T	3/25/1999 1/5/2006	9/2/2005
Oregon Coast Recovery Domain			
Oregon Coast Coho Salmon	T	2/11/2008	2/11/2008
Southern Oregon / Northern California Coast Recovery Domain			
Southern OR / Northern CA Coasts Coho Salmon	T	5/6/1997	5/5/1999
North-Central California Coast Recovery Domain			
California Coastal Chinook Salmon	T	9/16/1999	9/2/2005
Central California Coast Coho Salmon	E	10/31/1996 (T) 6/28/2005 (E) 4/2/2012 (RE)	5/5/1999
Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Northern California Steelhead	T	6/7/2000 1/5/2006	9/2/2005
Central Valley Recovery Domain			
California Central Valley Steelhead	T	3/19/1998 1/5/2006	9/2/2005
Central Valley Spring-run Chinook Salmon	T	9/16/1999	9/2/2005
Sacramento River Winter-run Chinook Salmon	E	11/5/1990 (T) 1/4/1994 (E)	6/16/1993
South-Central / Southern California Coast Recovery Domain			
South-Central California Coast Steelhead	T	8/18/1997 1/5/2006	9/2/2005
Southern California Steelhead	E	8/18/1997 5/1/2002 (RE) 1/5/2006	9/2/2005

ESA = Endangered Species Act, CH = Critical Habitat, RE = Range Extension
E = Endangered, T = Threatened,

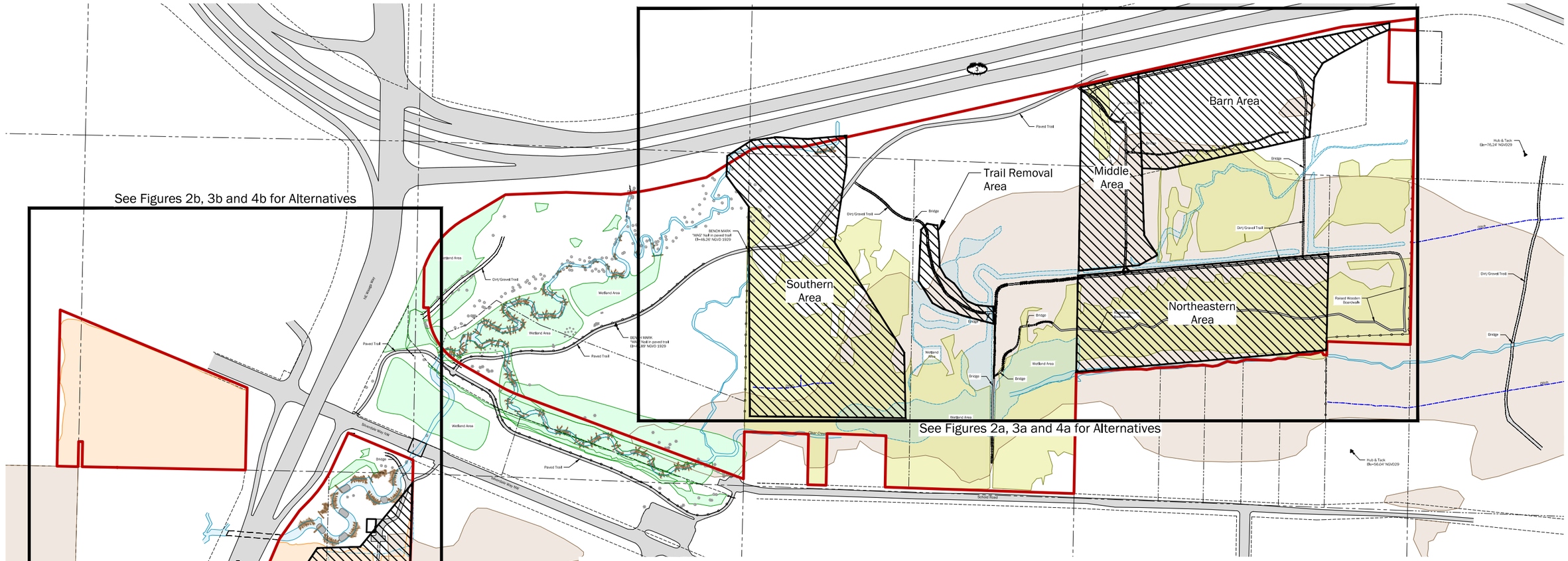
Critical Habitat Rules Cited

- 2/24/2016 (81 FR 9252) Final Critical Habitat Designation for Puget Sound Steelhead and Lower Columbia River Coho Salmon
- 2/11/2008 (73 FR 7816) Final Critical Habitat Designation for Oregon Coast Coho Salmon
- 9/2/2005 (70 FR 52630) Final Critical Habitat Designation for 12 ESU's of Salmon and Steelhead in WA, OR, and ID
- 9/2/2005 (70 FR 52488) Final Critical Habitat Designation for 7 ESU's of Salmon and Steelhead in CA
- 10/25/1999 (64 FR 57399) Revised Critical Habitat Designation for Snake River Spring/Summer-run Chinook Salmon
- 5/5/1999 (64 FR 24049) Final Critical Habitat Designation for Central CA Coast and Southern OR/Northern CA Coast Coho Salmon
- 12/28/1993 (58 FR 68543) Final Critical Habitat Designation for Snake River Chinook and Sockeye Salmon
- 6/16/1993 (58 FR 33212) Final Critical Habitat Designation for Sacramento River Winter-run Chinook Salmon

ESA Listing Rules Cited

- 4/2/2012 (77 FR 19552) Final Range Extension for Endangered Central California Coast Coho Salmon
- 2/11/2008 (73 FR 7816) Final ESA Listing for Oregon Coast Coho Salmon
- 5/11/2007 (72 FR 26722) Final ESA Listing for Puget Sound Steelhead
- 1/5/2006 (71 FR 5248) Final Listing Determinations for 10 Distinct Population Segments of West Coast Steelhead
- 6/28/2005 (70 FR 37160) Final ESA Listing for 16 ESU's of West Coast Salmon
- 5/1/2002 (67 FR 21586) Range Extension for Endangered Steelhead in Southern California
- 6/7/2000 (65 FR 36074) Final ESA Listing for Northern California Steelhead
- 9/16/1999 (64 FR 50394) Final ESA Listing for Two Chinook Salmon ESUs in California
- 3/25/1999 (64 FR 14508) Final ESA Listing for Hood River Canal Summer-run and Columbia River Chum Salmon
- 3/25/1999 (64 FR 14517) Final ESA Listing for Middle Columbia River and Upper Willamette River Steelhead
- 3/25/1999 (64 FR 14528) Final ESA Listing for Ozette Lake Sockeye Salmon
- 3/24/1999 (64 FR 14308) Final ESA Listing for 4 ESU's of Chinook Salmon
- 3/19/1998 (63 FR 13347) Final ESA Listing for Lower Columbia River and Central Valley Steelhead
- 8/18/1997 (62 FR 43937) Final ESA Listing for 5 ESU's of Steelhead
- 5/6/1997 (62 FR 24588) Final ESA Listing for Southern Oregon / Northern California Coast Coho Salmon
- 10/31/1996 (61 FR 56138) Final ESA Listing for Central California Coast Coho Salmon
- 1/4/1994 (59 FR 222) Final ESA Listing for Sacramento River Winter-run Chinook Salmon
- 4/22/1992 (57 FR 14653) Final ESA Listing for Snake River Spring/summer-run and Snake River Fall Chinook Salmon
- 11/20/1991 (56 FR 58619) Final ESA Listing for Snake River Sockeye Salmon
- 11/5/1990 (55 FR 46515) Final ESA Listing for Sacramento River Winter-run Chinook Salmon

APPENDIX C
Site Alternative Figures Prepared by GeoEngineers, Inc.



Notes:

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Data Sources:

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- Survey from N.L. Olson and Associates, Inc dated 12/7/2018

Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

Project Site

Wetlands

Delineated Wetlands (2018)

NSD Mapped Wetlands

Previously Delineated Wetlands

Kitsap County Mapped Wetlands

W S N E

400 0 400

Feet

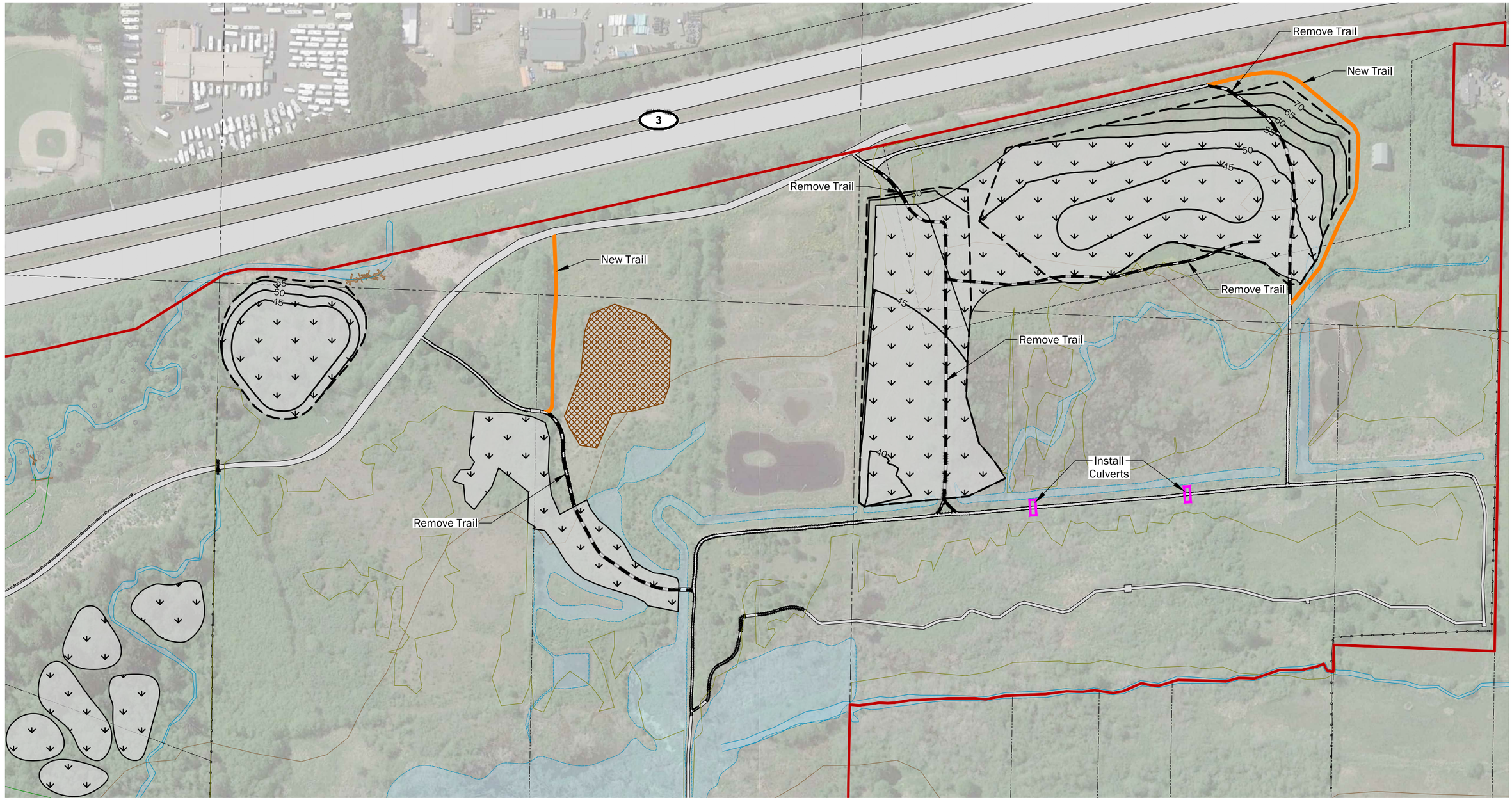
Sheet Index
Overall View

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 1

P:\5\5819008\CAD\01\Master Plan Alternatives\5819008801_F01_Overall View.dwg TAB:F01 Date Exported: 01/20/20 - 20:07 by hmara



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Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

- Remove Trail
- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Planting Berm

W S E N

200 0 200
Feet

Barn, Middle, Trail Removal, Southern and Northeastern Area - Alternative 1

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 2a

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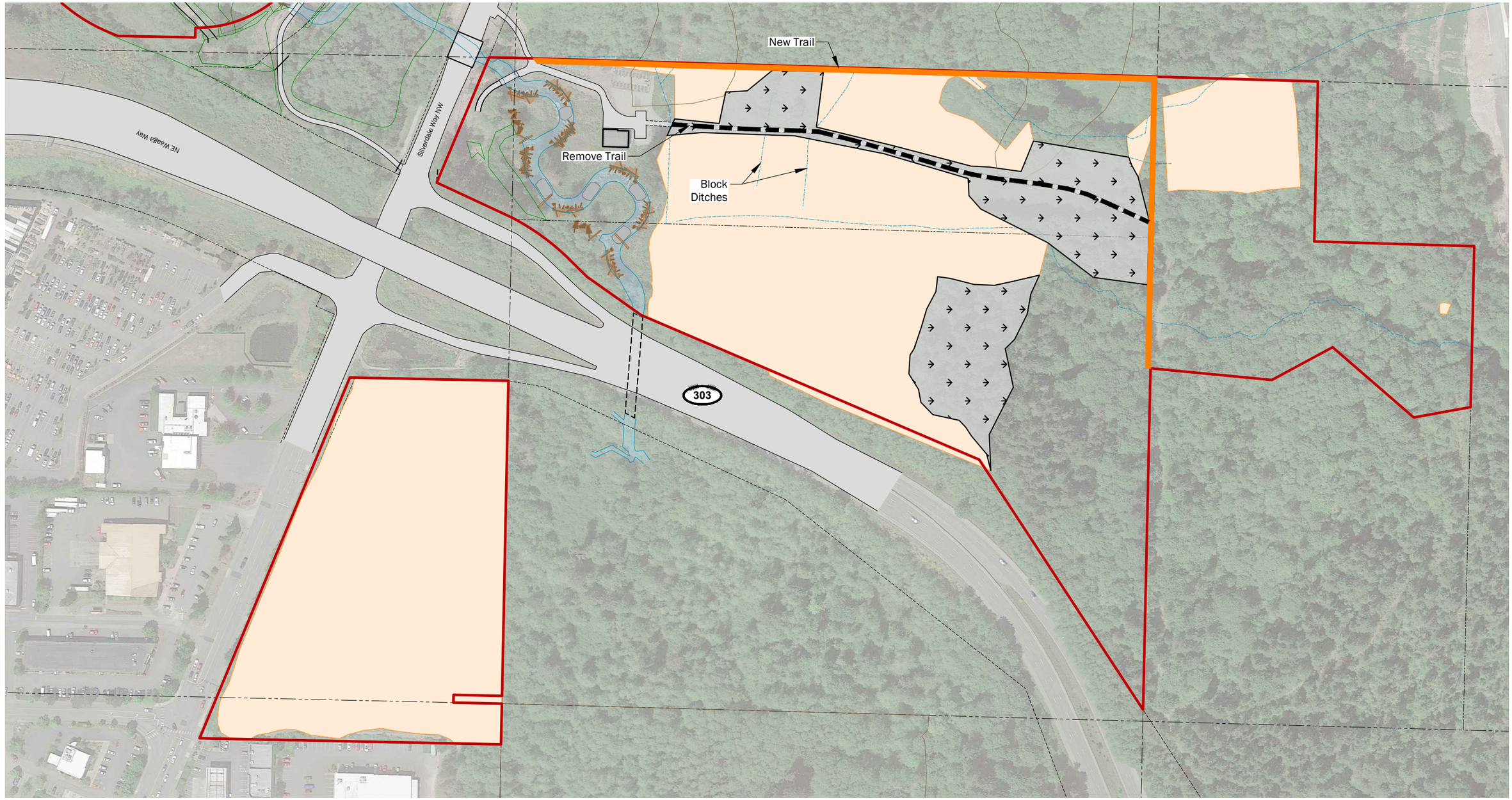

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Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

- Remove Trail
- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Wetland Enhancement

N W E S

200 0 200
Feet

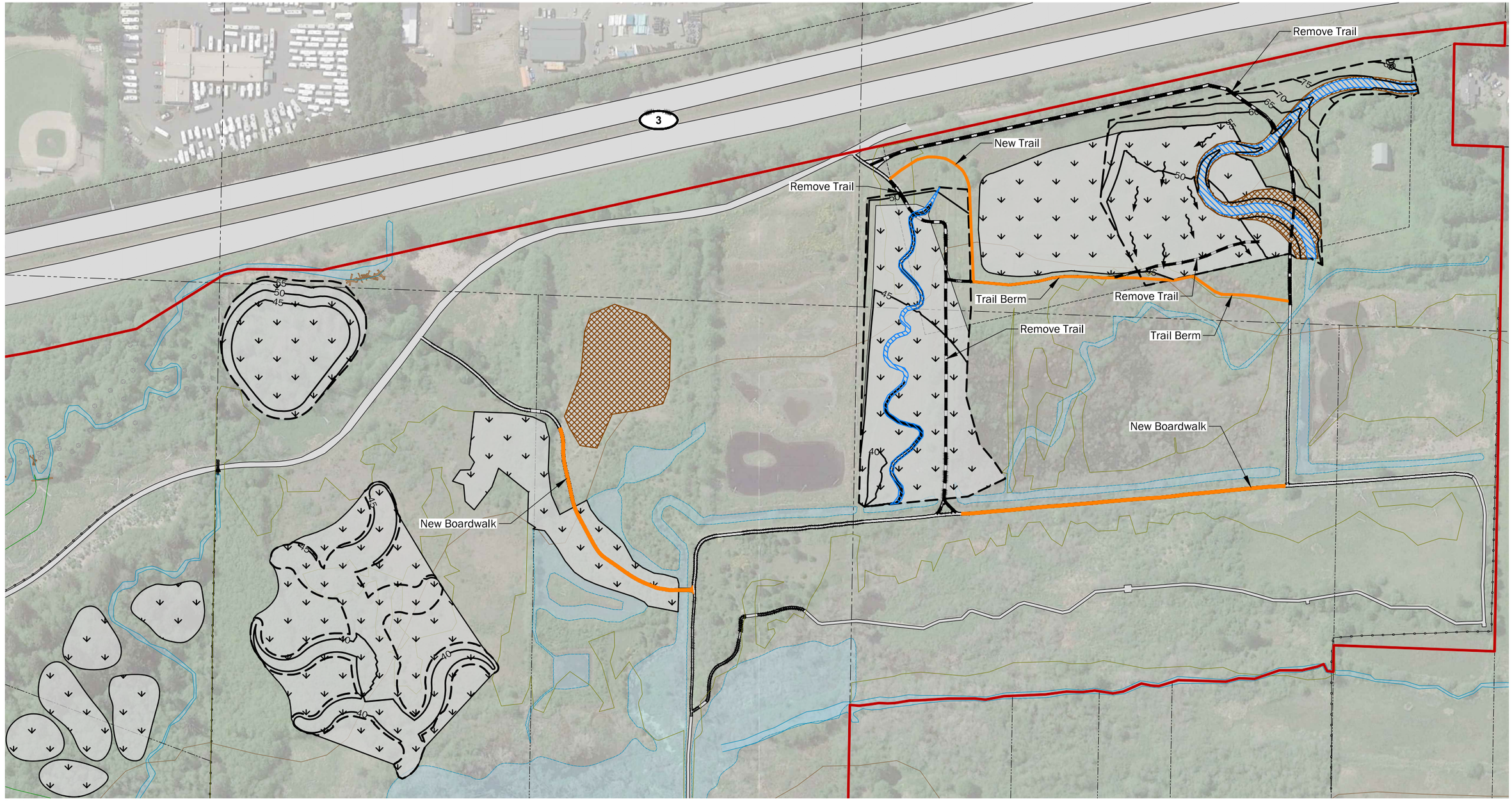
Markwick Property - Alternative 1

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 2b

P:\5\5819008\CAD\01\Master Plan Alternatives\5819008_F02ab_All Sites Alt 1.dwg TAB:F02b Date Exported: 01/20/20 - 19:36 by hmara



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Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

- Remove Trail
- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Stream
- Planting Berm

W S N E

200 0 200
Feet

Barn, Middle, Trail Removal, Southern and Northeastern Area - Alternative 2

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 3a

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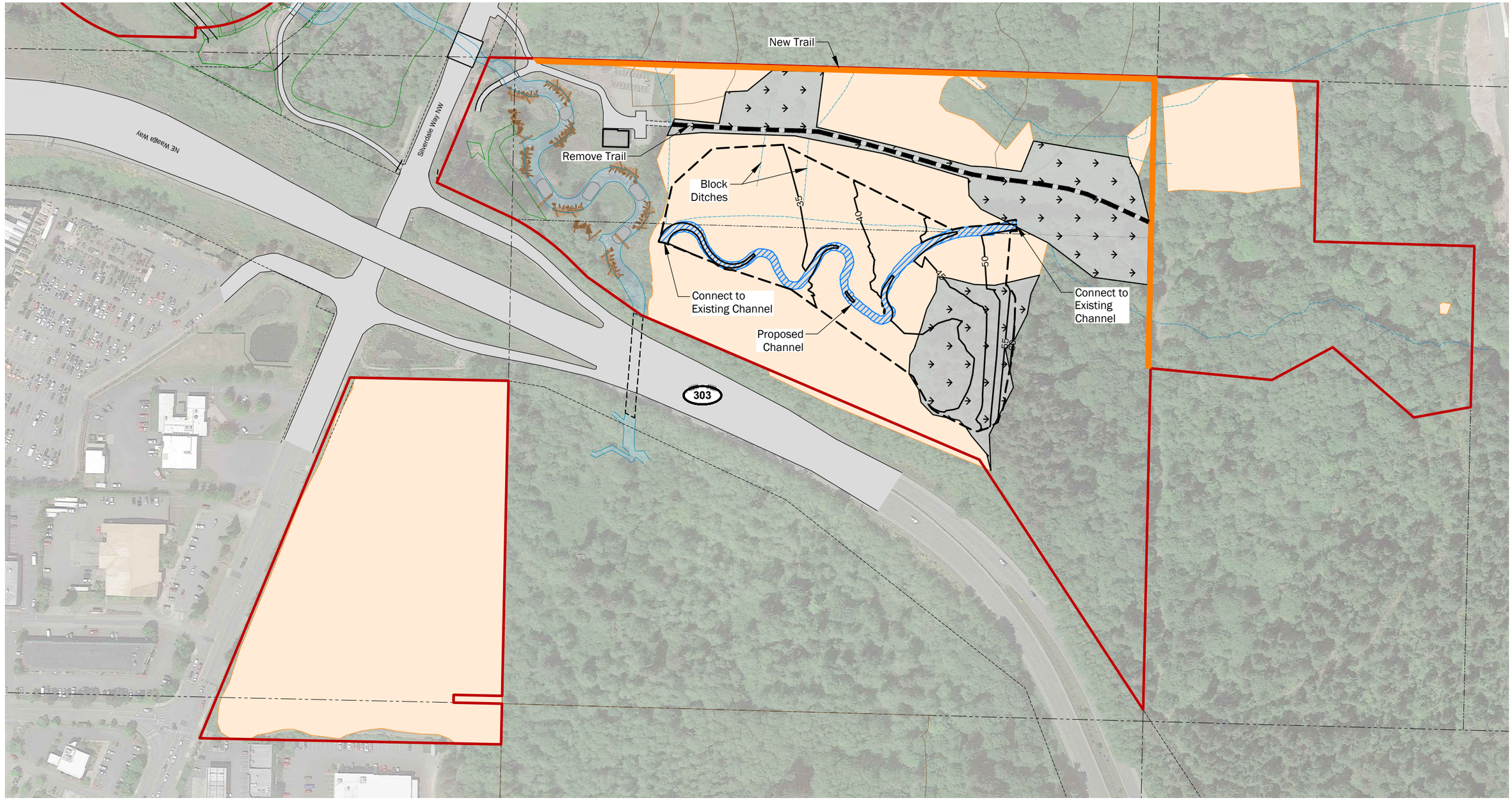

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Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

- Remove Trail
- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Stream
- Wetland Enhancement

N W E S

200 0 200
Feet

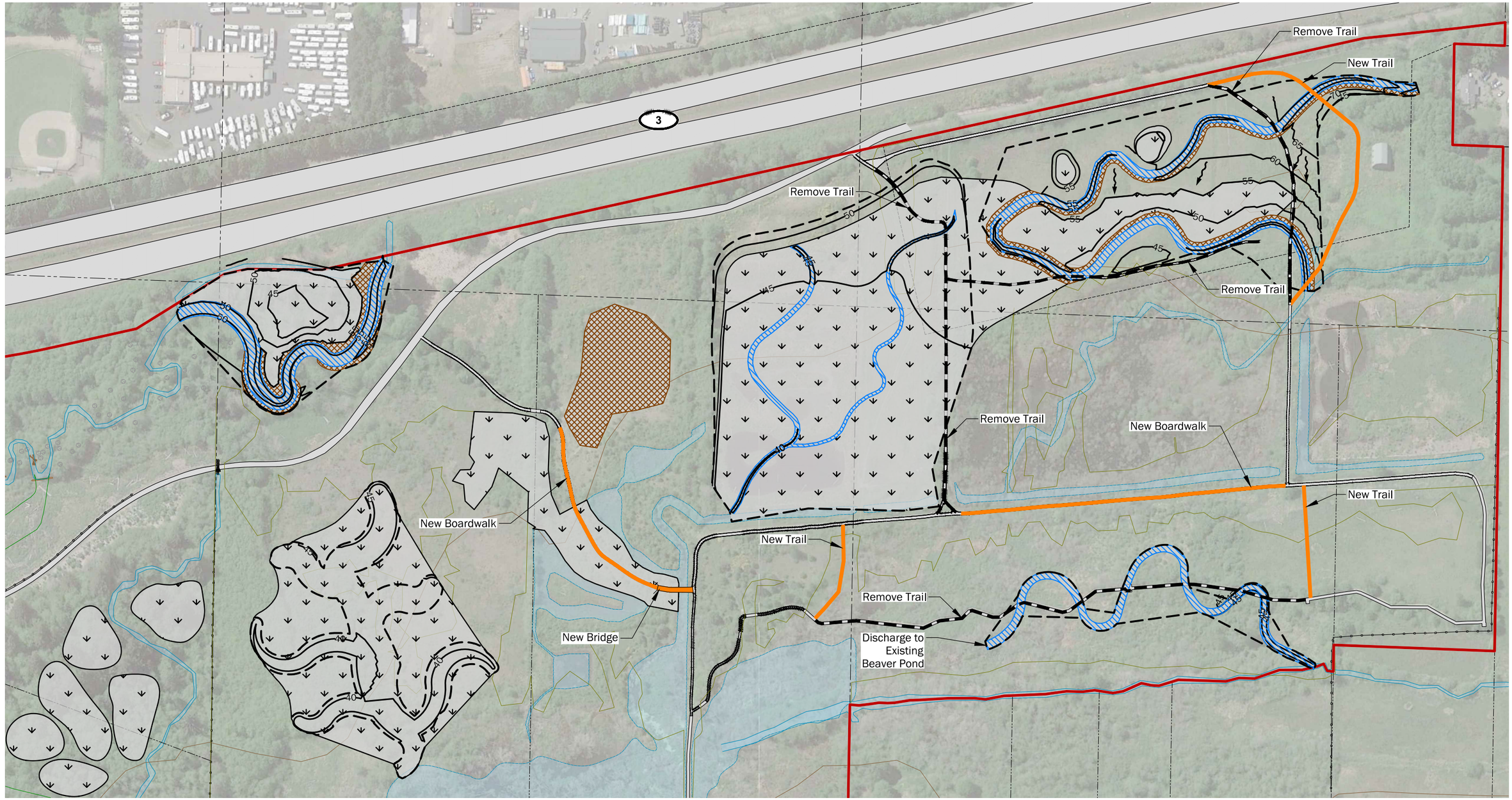
Markwick Property - Alternative 2

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 3b

P:\5\5819008\CAD\01\Master Plan Alternatives\5819008801_F03ab_All Sites Alt 2.dwg TAB:F03b Date Exported: 01/20/20 - 21:08 by hmara



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Projection: WA State Plane, North Zone, NAD83, US Foot

Legend

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- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Stream
- Planting Berm

W S N E

200 0 200
Feet

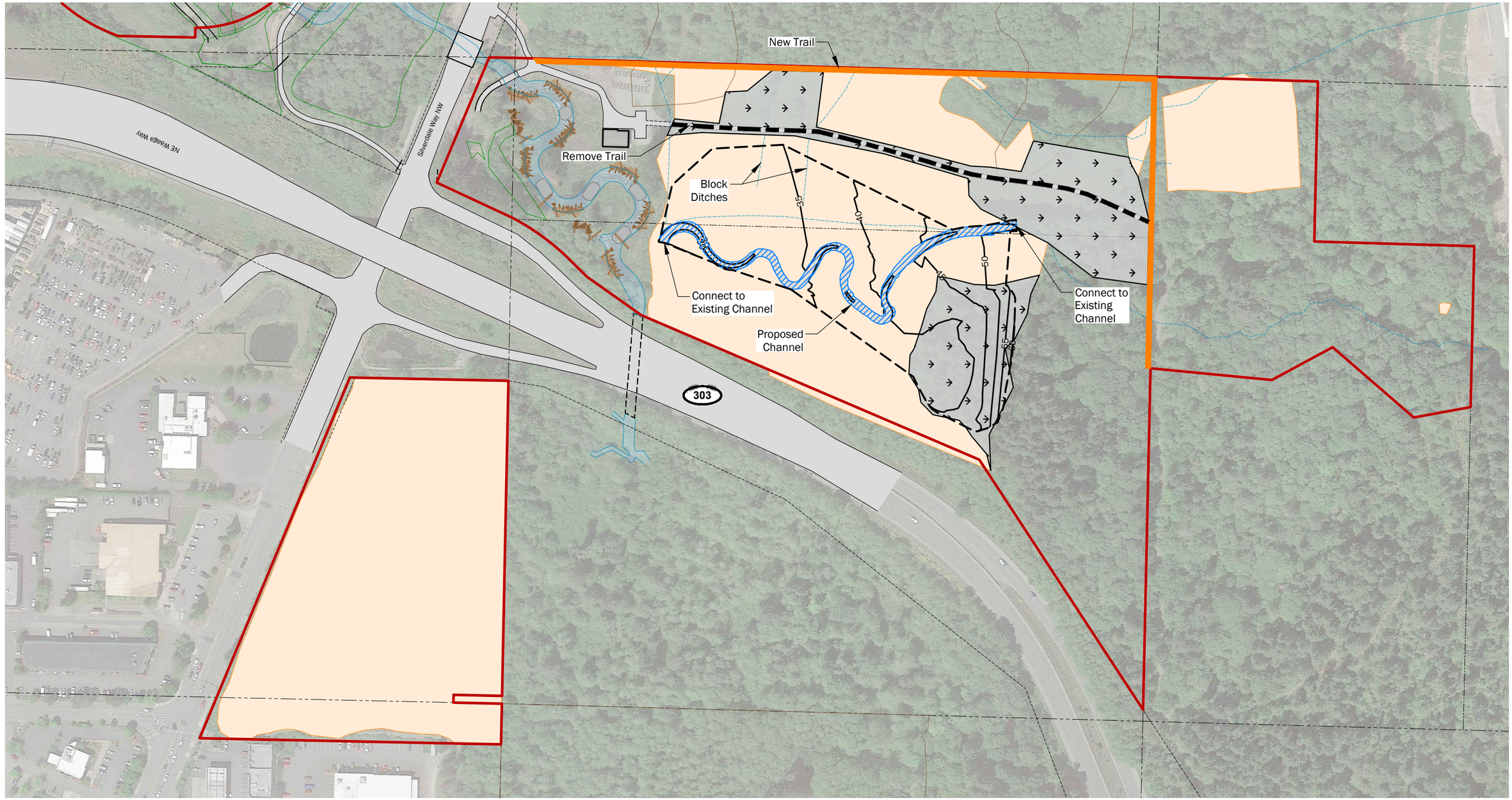
Barn, Middle, Trail Removal, Southern and Northeastern Area - Alternative 3

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 4a

P:\5\581900801\CAD\01\Master Plan Alternatives\581900801_F04ab_All Sites Alt 3.dwg TAB:F04a Date Exported: 01/20/20 - 21:11 by hmara



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Legend

- Remove Trail
- New Trail
- 50' Proposed 5' Contours
- Grading Limits
- Wetland Creation
- Stream
- Wetland Enhancement

N W E S

200 0 200
Feet

Markwick Property - Alternative 3

Schold Farm Mitigation Bank Project
Kitsap County, Washington

GeoEngineers

Figure 4b

P:\5\5819008\CAD\01\Master Plan Alternatives\5819008801_F04ab_All Sites Alt 3.dwg TAB:F04b Date Exported: 01/20/20 - 21:08 by hmara