



Ethan Berkowitz, Mayor

2019 Evaluate Two Watershed Plans APDES Permit No. AKS-052558

**MUNICIPALITY OF ANCHORAGE
WATERSHED MANAGEMENT PROGRAM**

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Prepared for: Municipality of Anchorage
Watershed Management Services

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Introduction

Anchorage Waterways Council (AWC) is responsible for the following task under Part 2.7 of the APDES AKS-05258 2015-2020 permit for the Municipality of Anchorage (MOA) and Alaska Department of Transportation and Public Facilities (AKDOT): parts 2.7.1 & 2.7.2—*Evaluate at least two watershed plans* – under “General Requirements” by fourth year.

Between 2015 and 2019, Anchorage Waterways Council (AWC) has been updating the action items on the Municipality’s two watershed plans, one for Chester Creek and the other for Little Campbell Creek. Following is the final report on progress made between 2015 and 2019.

Chester Creek Watershed Plan – 2014

The Chester Creek Watershed Plan¹ Appendix includes “Table 1. Restoration Priorities for Chester Creek Watershed Plan”. It is divided into 6 sections:

1. All Chester watershed drainages
2. Westchester/Eastchester drainage
3. Middle Fork Chester drainage
4. South Fork Chester drainage
5. Chester Reflection Lake drainage
6. North Fork Chester drainage

Next, there are 7 goals listed:

1. Water quality
2. Water quantity
3. Wildlife habitat
4. Fish habitat
5. Social and economic opportunities
6. Communication and coordination
7. Data acquisition

The goals are listed in each action item along with other information, e.g. the “Lead” agency, “Cost” estimate based on 2014 figures, “Priority”, and whether or not there is a mandate for the action. A map follows with locations of the 75 action items.

The action items vary widely and cover such things as: education campaigns, property mapping and acquisition, habitat assessment, culvert (fish passage) replacement, wetland restoration, and channel modifications.

¹ anchoragestormwater.com/Documents/ChCrkWshdPln062015.pdf

All Chester Watershed Drainage (C) Action Items

For action items C-1 to C-10, four were addressed. C-1 “Conduct update to flood mapping for watershed”. The Municipality of Anchorage’s (MOA) Watershed Management Services (WMS) created an interactive map for floodplain mapping. It is found at: moawms.maps.arcgis.com/apps/webappviewer/index.html?id=70f21047826c4f6c8eb6598d03b4e33a, and should be easily used by the public.

C-4, “Implement an LID/OGS strategy watershed-wide” has been approved by the Anchorage Assembly and can be found in the Anchorage Stormwater Manual, 2017, at http://anchoragestormwater.com/Documents/DCM/ASM_Volume1_Final_December2017.pdf.

C-6, “Place signage at all creek crossings identifying creek” resulted in a report by AWC in 2019 that assesses the major creek crossings that already have or need signage to identify the creek. The report is included in Appendix A, and it is hoped that the signage suggestions will follow.

C-9, “Conduct educational campaign on tossing household/greenhouse plants into the creek and riparian area on Ambergate St.” is the result of a creek survey by the Watershed Task Force that provided input into the Chester Creek Watershed Plan. AWC send a letter to residents on Ambergate on June 12, 2017, which is included in Appendix A.

Westchester/Eastchester Drainage (CW) Action Items

The Westchester/Eastchester Area had 15 action items of which four have been addressed—two were remedied. CW-1, “Active street sediment source removal in stormwater system to reduce rate of accumulation by reducing sediment input by streets upstream” was addressed in 2016. Eric Miyashiro of the Alaska Department of Transportation (AKDOT) reported on 11/4/16 to AWC that AKDOT has instituted a program that sweeps the streets to remove sediment and keep it from entering the water systems. Also, there is a program that cleans the sediment, debris and pollutants from the storm drain system, which keeps the system functioning properly with sediments and contaminants out of waterways. The new regime results in 4 sweepings of arterials and 3 sweepings of residential areas between May and October every year.

CW-4, “Streambank trampling along Chester Creek at Valley of the Moon after revegetation and access stairs being replaced in 2013”. AWC reviewed the area on 10/3/17 and reported that the stairs need repair and people are still using and trampling long stretches of the bank on the west (park) side. Photos follow.

CW-5, “Rock lined banks and lawns to water’s edge of houses along bike path and creek” was reviewed and it has not been remedied. Photos follow.

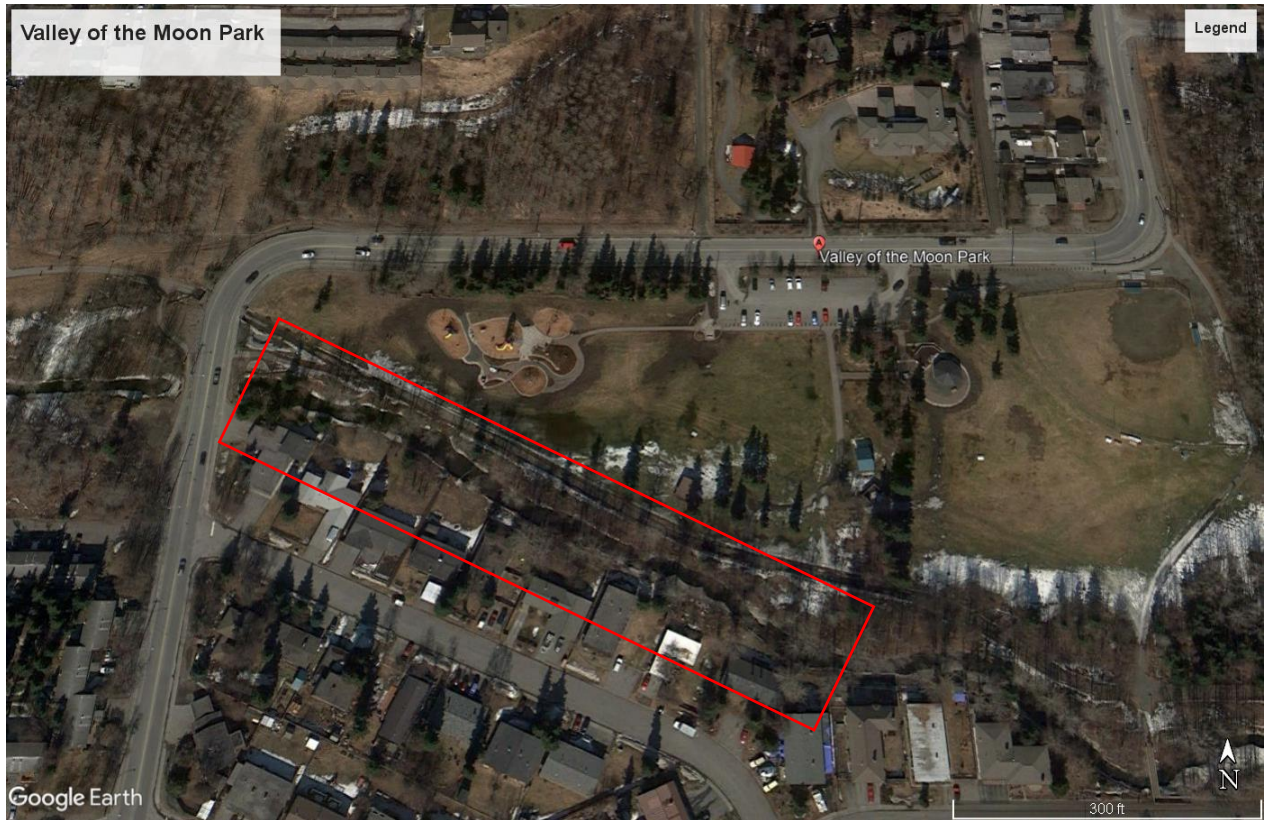


Fig. 1 Approximate area of bank trampling (CW-4) and properties needing vegetation buffer (CW-5)



Fig. 2 West bank of Chester Creek showing eroded bank and east bank with lawn up to the water's edge in 2011 (CW-4 and CW-5)



Fig. 3 West bank of Chester Creek showing eroded bank in 2011 (CW-4)



Fig. 4 West bank of Chester Creek in 2013 after YEP (Youth Employment in Parks) revegetation project (CW-4)



Fig. 5 Stone steps to Chester Creek along west bank in 2013 after YEP project (CW-4)



Fig. 6 Fencing to direct people towards stone steps along west bank of Chester in 2013 (CW-4)



Fig. 7 Close-up of stone steps at Chester Creek along west bank in 2013 (CW-4)



Fig. 8 Area near stone steps at Chester Creek along west bank in October 2017 (CW-4)



Fig. 9 West bank of Chester Creek in October 2017 showing persistent bank trampling (CW-4)



Fig. 10 East bank of Chester Creek showing lawn, fence, and yard furniture up to creek edge in 2017 (CW-5)

CW-11, “Work with utility to bury utility line below streambed” refers to the Karluk Street bike trail bridge over Chester Creek in Eastchester Park. Field survey in 2016 showed that the utility line was no longer there.



Fig. 11 Exposed utility line in Chester Creek at Karluk (CW-11) during field survey in 2012

Middle Fork Chester Drainage (CMF) Action Items

The Middle Fork of Chester Creek has 17 action items. There appear to be none addressed which may be due to the higher cost of most of these items.

South Fork Chester Drainage (CSF) Action Items

South Fork of Chester Creek (CSF) has 26 action items--the highest number of recommendations for the five drainage areas, but it is also the longest reach. The proposed action items include significant changes to the creek in several areas, culvert replacements for fish passage, sediment removal at source, daylighting sections, educational kiosks and campaigns, reconnecting stormwater flow to Baxter Bog, and cleanup of creeks and invasive removal.

CSF-4, “Create directed access to University Lake and maintain vegetated buffer outside of access areas and restore vegetated buffer in impacted locations”. This is obviously a difficult one. The University Lake Dog Park use is one of the highest in Anchorage according to the University Lake Master Plan². This has resulted in areas where the vegetation has been removed and creek banks are eroding. There are 3 areas of

² The plan was approved by the Planning and Zoning Commission in 2107 and can be found at www.muni.org/Departments/parks/Documents/UniversityLakePark_MasterPlanFINAL.pdf

concern which need some intervention, however as of 2019 only one has been restored. This occurred in 2014, and AWC was a partner in the project³. This area is at the outflow of University Lake towards Elmore.

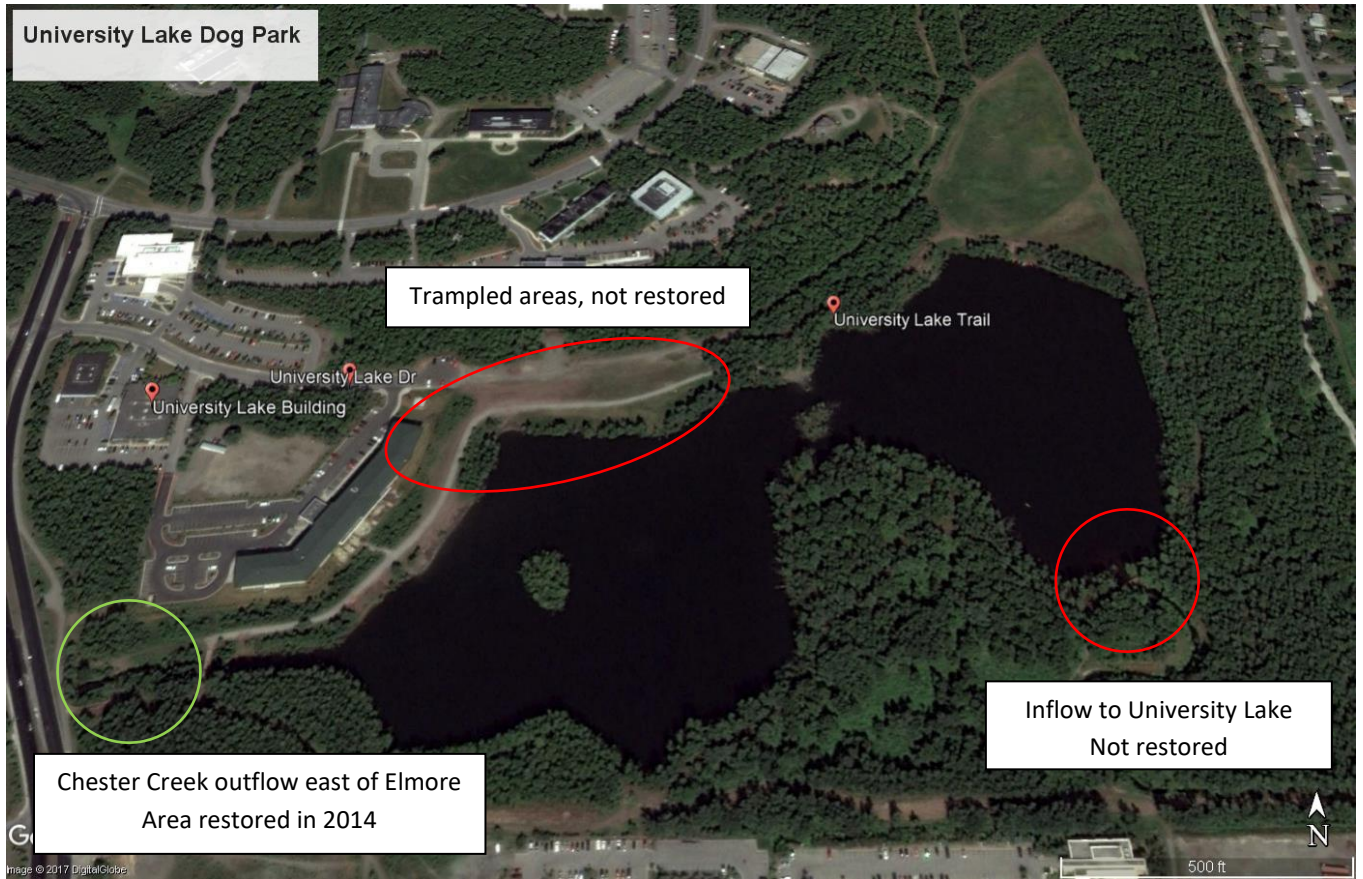


Fig. 12 Areas subject to erosion around University Lake and South Fork of Chester Creek from bank trampling (CSF-4)

³ westernnativetrout.org/media/small-grants-final-reports/final-report-2013-wnti-small-grant-project-chester-creek_alaska.pdf



Fig. 13 North bank of S. Fork Chester Creek at University Lake at outflow under Elmore 2013, CSF-4



Fig. 14 North bank of S. Fork Chester Creek at University Lake outflow under Elmore in 2017 after 2014 bank restoration, CSF-4



Fig. 15 South bank of S. Fork Chester Creek at University Lake at outflow under Elmore 2013, CSF-4



Fig. 16 South bank of S. Fork Chester Creek at University Lake outflow under Elmore in 2017 after 2014 bank restoration, CSF-4



Fig. 17 Bank erosion in 2016 near foot bridge at S. Fork Chester Creek inflow to University Lake, CSF-4



Fig. 18 Bank erosion in 2016 near foot bridge at S. Fork Chester Creek inflow to University Lake, CSF-4

CSF-18, “Perform invasive removal and design/construct small bridges for children to cross creek at Begich Middle School/Grass Creek Village” evolved into a project where AWC did an experimental tarping of Reed canary grass (RCG) in 2012. The RCG was kept covered until May 2016 when the tarps were removed because the plants were dead, and the area was then seeded. In 2017, the site was visited to confirm that the planted areas had succeeded.



Fig. 19 Area covered with tarping near S. Fork Chester Creek near Begich Middle School in September 2013



Fig. 20 Area still covered with tarping near S. Fork Chester Creek in June 2015



Fig. 21 Tarp removal by AWC in May 2016



Fig. 22 Revegetated area in August 2017

The most ambitious undertaking on the South Fork as well as in the entire Chester Creek drainage was to alter the South Fork of Chester Creek at Muldoon Rd. A large new culvert was placed under Muldoon Rd. and the creek was rerouted through it. This satisfied CSF-19, “Replace culvert, evaluate 2012 design to move creek to new location and crossing under Muldoon Rd.”; CSF-20, “Create more natural creek on South Fork east of Muldoon Rd., and align to hill with a 100’ corridor”; and CSF-21, “Take debris out of creek”. This was completed in 2016.

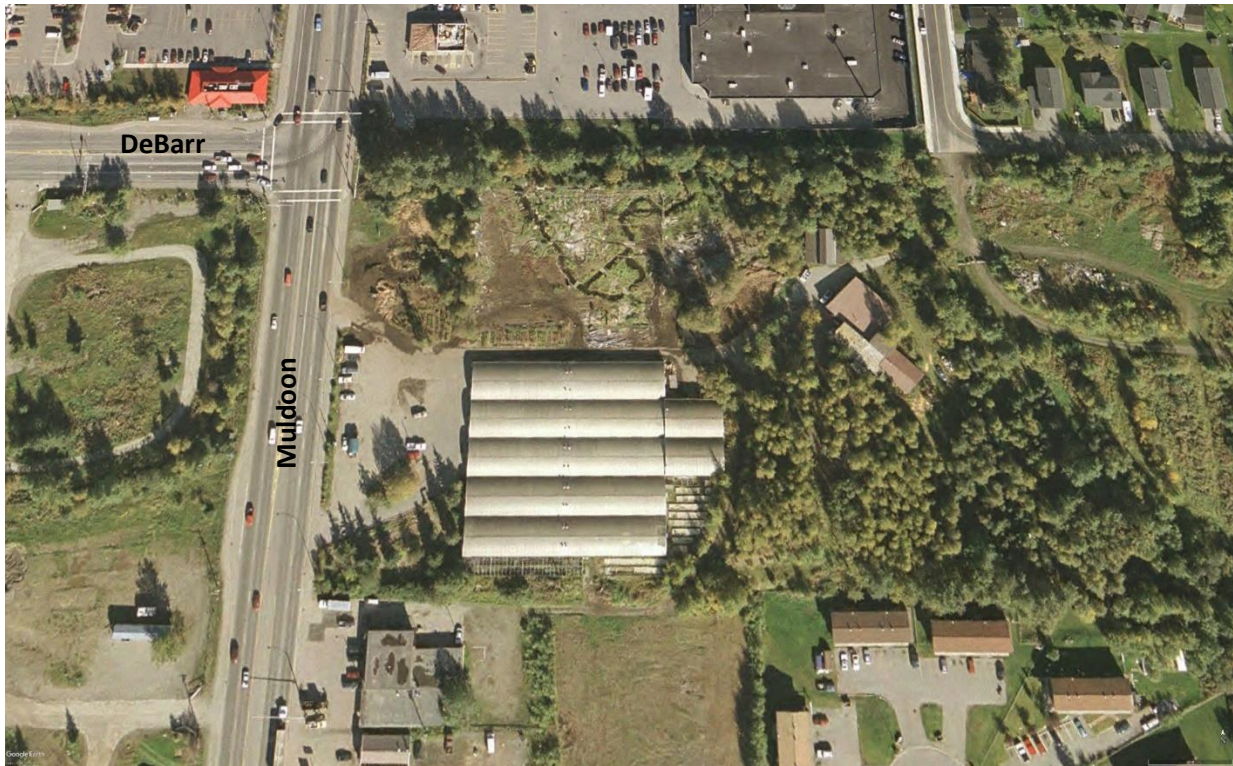


Fig. 23 S. Fork Chester Creek at Muldoon and DeBarr (2002) showing the old Greenhouse property which was purchased by the Municipality in 2006



Fig. 24 S. Fork Chester Creek at Muldoon and DeBarr with greenhouses removed (~ 2015)

The above image shows the beginning of the creek realignment on the east side of Muldoon with the new creek meanders visible in the red rectangle. Creek realignment on the west side of Muldoon is underway. The blue line is a MOA GIS shapefile showing the original channel of the S. Fork Chester Creek.



Fig. 25 The red rectangle is the area shown in the photos in figures 26, 27 and 28



Fig. 26 S. Fork Chester Creek in 2009 in its original channel (looking east from Muldoon)



Fig. 27 Same view in 2017 after creek was moved south to new channel



Fig. 28 Old culverts on S. Fork Chester original channel going west under Muldoon (2009)



Fig. 29 New culvert on realigned S. Fork Chester going west under Muldoon about 550' from old culvert (2017)

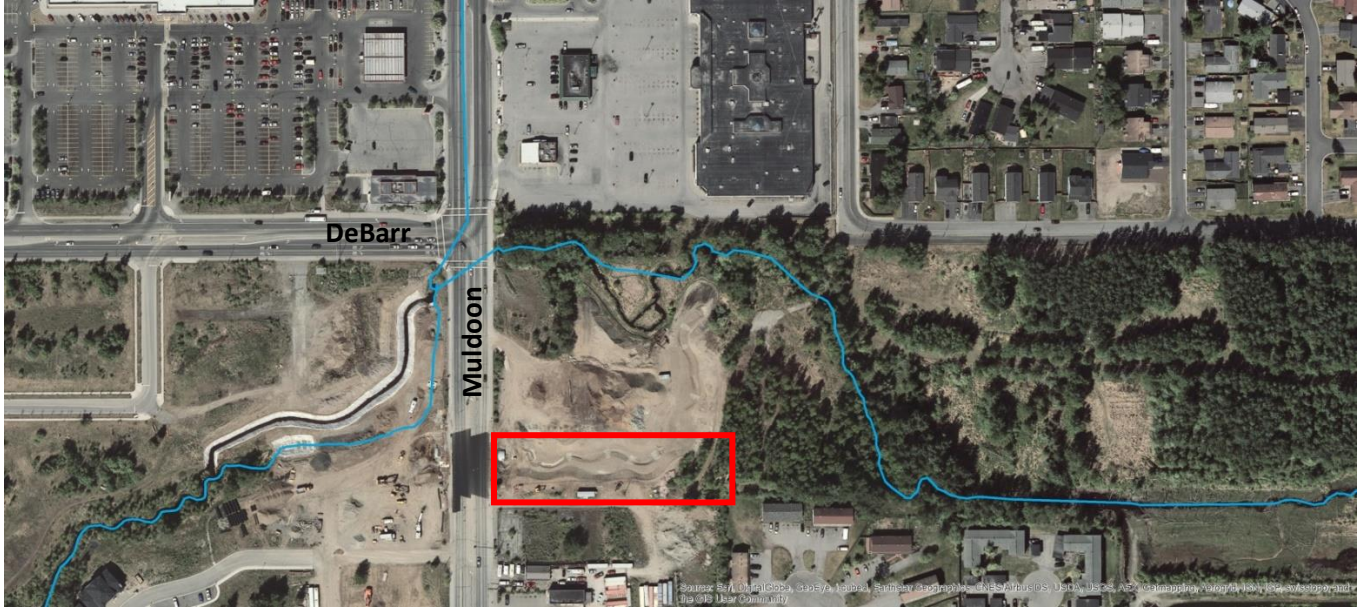


Fig. 30 Red rectangle is the area for figures 29, 31, 32 and 33



Fig. 31 Looking east from Muldoon at the former Greenhouse property before creek alignment (2012)



Fig. 32 Looking east from Muldoon at the former Greenhouse property after creek alignment (August 2015)



Fig. 33 Looking east from Muldoon after creek alignment (August 2017). Vegetation has begun to fill in.

Chester Reflection Lake Drainage (CRL) Action Items

In the Chester Reflection Lake (CRL) drainage, there are 4 action items of which 3 have been completed. CRL-1, “Replace culvert at Sapien Ave”, CRL-2, “Replace culvert at Image Drive”, and CRL-3, “Replace culvert at Reflection Drive”, were completed in 2012. All culverts connect to Reflection Lake.

Chester North Fork Drainage (CNF) Action Items

The drainage area is North Fork Chester (CNF) which had 3 action items, and none have been accomplished.

Summary

The ~30 sq. mile Chester Creek watershed is one of the early areas developed when the city of Anchorage was settled in 1914. In the 100+ years since the birth of Anchorage, a growing population has transformed the Chester Creek watershed into the most developed watershed in the Municipality with the highest human population (~37%) of Anchorage’s urban watersheds. Accordingly, the watershed has been significantly impacted.

The action items laid out in the Chester Creek Watershed Plan address many of the issues that are associated with quick development. Much of the infrastructure that carries Chester Creek and stormwater are old and under capacity. The need for upgrading culverts and restoring creek areas is readily apparent. Just this year there have been two major culvert failures in the U-Med area where Chester Creek runs under Providence Dr. (March 2019) and under Northern Lights (December 2019) which also disrupts traffic in addition to the great amount of time and expense to repair them.

Chester Creek also remains on the State of Alaska Impaired Waters List⁴ from high fecal coliform thought to be from stormwater runoff and industrialization. Several of the action items involve stormwater issues that, if completed, might help reduce the fecal coliform impairment. However, since Chester Creek runs through one of the highest use dog parks in Anchorage this might not be attainable.

Settlement along Chester Creek is extremely close to the creek in many areas which means a high potential for flood problems. Additionally, properties with lawns and gardens bracket the creek closely which contributes to much of the pollution runoff.

In boiling down many of the action items, it is clear that “end of pipe” treatments, pre-treatments, storm drain disconnects, and storm drain reconnects are all needed in various areas. A comprehensive look at these suggestions would seem to be very important to deal with the watershed in totality. Hopefully this can be achieved rather than the more common way of upgrading things because they have failed. But, as in all cases, this takes money.

⁴ dec.alaska.gov/water/water-quality/impaired-waters/

Finally, education kiosks and outreach to residents are less costly and a good way to (hopefully) change behaviors. As AWC has found with pet waste, compliance is very difficult to achieve, but it doesn't hurt to keep reminding people. Some are bound to learn and/or change.

Little Campbell Creek Watershed Management Plan – 2007

The Little Campbell Creek Watershed Management Plan⁵ action items are presented by category as opposed to by drainage basin as the Chester Creek plan is. They fall under the following 8 categories:

1. Water Quality – Improve overall water quality and prevent further degradation,
2. Water Quantity – Reduce flood hazards and prevent habitat degradation,
3. Terrestrial Habitat – Evaluate and maintain wildlife corridors and expand where appropriate for the benefit of wildlife and people,
4. Aquatic Habitat – Improve fish passage, channel habitat maintain flows to support fish and creek function,
5. Recreational and Economic Opportunities - Promote recreational and economic benefits of healthy watersheds,
6. Communication and Coordination – Promote watershed awareness and community stewardship,
7. Open Space – Protect and maintain lands that support healthy watershed functions and services, and
8. Data Acquisition – Identify significant gaps in data and create programs to acquire data.

There are 26 action items which are prioritized under each category, and include an anticipated start/end date, cost estimate, and an evaluation of methods/milestones.

Water Quality

In regard to water quality, one of the four items was addressed.

1.3 “Incorporate BMPs into existing and future drainage projects.” Drainage improvements at 64th, 72nd, and 88th have been finished, and, an LID plan has been completed by the consultant and provided to the MOA.

Water Quantity

For water quantity, two of the three action items were addressed. As was reported for the Chester Creek Watershed Plan, the action item for floodplain data and mapping was completed – 2.2 “Update floodplain data and mapping”. It can be found at:

moawms.maps.arcgis.com/apps/webappviewer/index.html?id=70f21047826c4f6c8eb6598d03b4e33a .

2.3 “Remove restrictions to flood flows”. This was a huge project, similar to the culvert replacement on Chester Creek at Muldoon, as it involved placing box culverts in the North and South Forks of Little Campbell Creek which run under the New Seward Hwy. The work was completed by 2017. Photos follow.

⁵ anchoragestormwater.com/Documents/Final%20LCC%20WMP-3.pdf



Fig. 34 N. Fork Little Campbell Creek, New Seward Highway Culvert Replacement Update on Brayton, 2017



Fig. 35 N. Fork Little Campbell Creek inflow on the east under the New Seward at Brayton between 68th and 72nd looking west (2019)



Fig. 36 N. Fork Little Campbell Creek, New Seward Highway Culvert Replacement at 70th and Homer (2017)



Fig. 37 N. Fork Little Campbell Creek outflow looking east under the New Seward at 70th and Homer (2010)



Fig. 38 New box culverts at N. Fork Little Campbell Creek outflow looking east under the New Seward at 70th and Homer (2017)

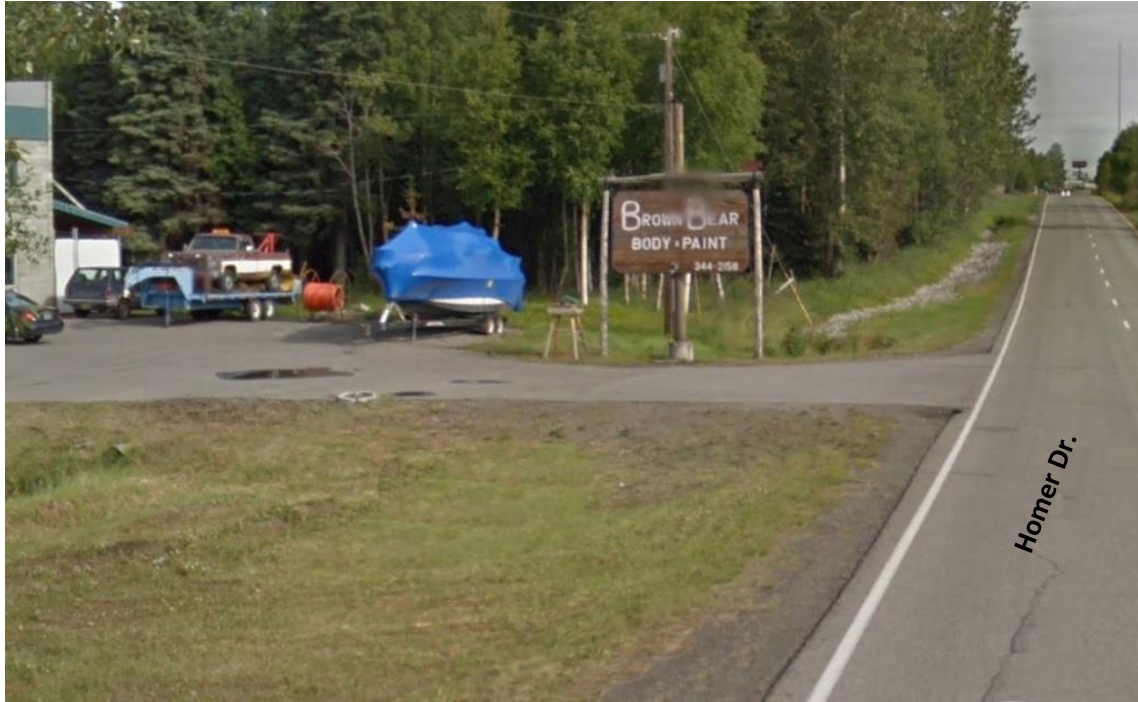


Fig. 39 View of the old driveway at 70th and Homer over N. Fork Little Campbell Creek looking north (2012)



Fig. 40 View of the new driveway and large culvert at 70th and Homer over N. Fork Little Campbell Creek looking north (2017)



Fig. 41 S. Fork Little Campbell Creek, New Seward Highway culvert replacements at 80th and Homer and on Brayton (2017)



Fig. 42 S. Fork Little Campbell Creek, New Seward Highway culvert replacement at 80th and Homer looking east (2019)



Fig. 43 S. Fork Little Campbell Creek, New Seward Highway culvert replacement at Brayton looking north as the culvert makes a turn to the west under the driveway over the creek (2019)

Terrestrial Habitat

This category has four main action items of which three have been addressed in some form. For 3.1, “Identify and prioritize lands for inclusion in LCC riparian corridor” there are new online tools to help. The MOA WMS has an app for Wetlands Mapping at moapw.maps.arcgis.com/apps/View/index.html?appid=3cf0dec81fcf4837bf9b45af5f4264bc.

Additionally, in 2018 the MOA adopted changes to the stream setback provisions of Title 21 such that Little Campbell Creek and all of its tributaries will have a 50’ setback. The setbacks are on an app at moapw.maps.arcgis.com/apps/webappviewer/index.html?id=01e28d745f17433493d6e1d2770264e9.

For 3.3, “Create a pamphlet for landowners that explains the benefits of riparian buffers and suggested plants for distribution through local nurseries”. AWC developed a rack card with “dos and don’ts” that has been distributed throughout many of the watersheds. A copy is in Appendix B.

Aquatic Habitat

There are three action items for aquatic habitat which show quite a bit of progress. 4.1 “Upgrade (top ten prioritized) culverts identified in ADF&G culvert survey that impede fish passage”. Several culverts on the list have been replaced. These include:

1. #105-South Fork (Atkins/near 85th)
2. #150-North Fork (Lake Otis Pwy/72nd)
3. #99-South Fork (E. Dimond Blvd)
4. #107 – South Fork (Pacer)
5. Culverts 145, 146, and 248 along new Elmore Rd

6. Culverts #127, 3472 and 3473 (Alaska Zoo access road and private driveway)
7. New Seward Highway culverts (see Water Quantity section above) and #098 (Sandlewood) that was done with the highway project

Fish passage through the Alaska Zoo was completed in 2015, but there is a perched culvert on S. Fork of Little Campbell Creek along Our Road just upstream of the zoo that does not allow fish passage at all.



Fig. 44 Perched culvert on S. Fork Little Campbell Creek just east of the Alaska Zoo’s boundary (2017)

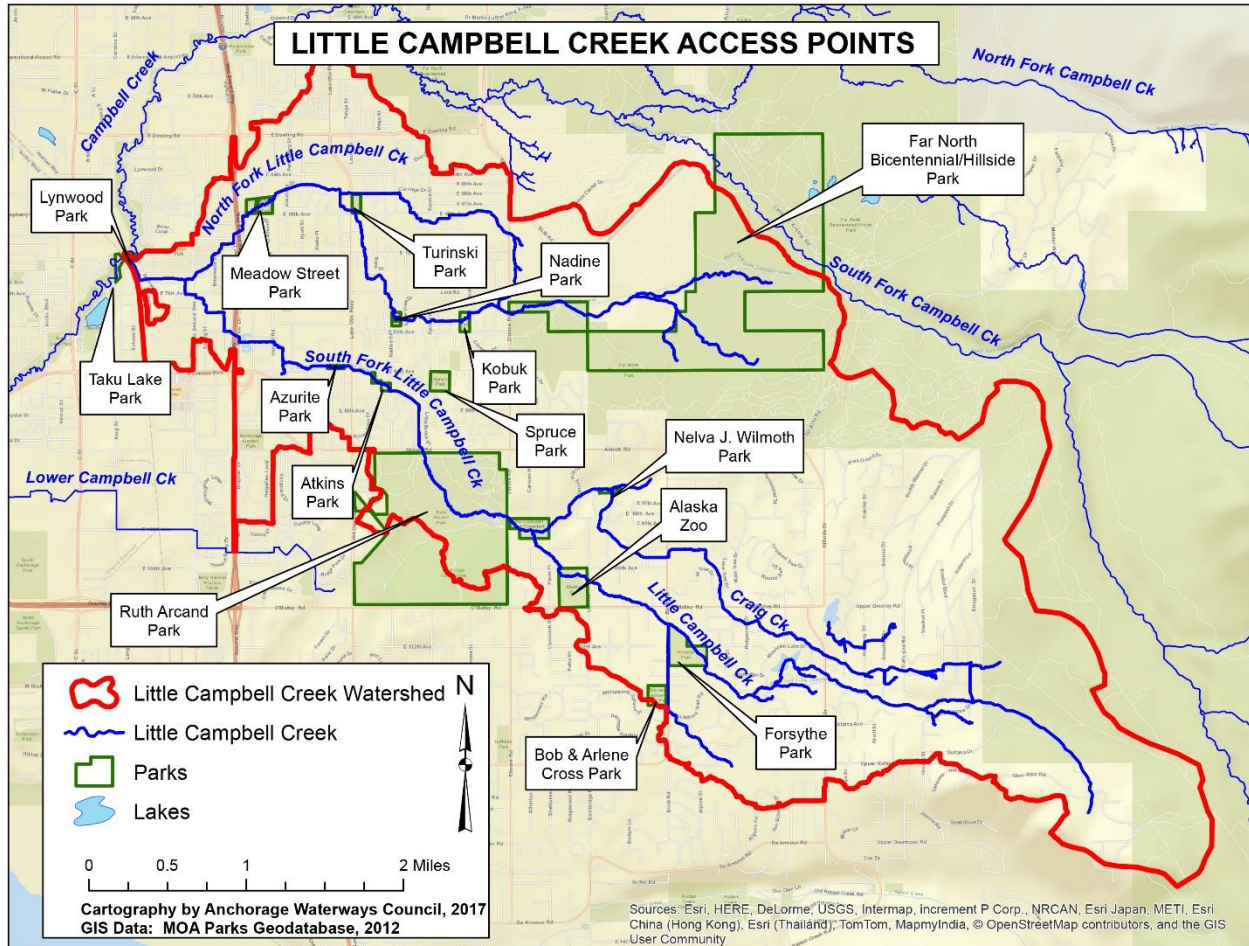
Culverts #103, #124, #125, and #126 have not been identified so far because ADF&G culvert numbers change over time and their status is unknown.

For 4.2a, “Assess, design and construct the top creek restoration projects – first five years” includes opening the 360’ culvert at DNS Concrete which was completed in 2012. The parcel at 72nd and Lake Otis was also completed in 2012. And, parcels on 72nd, Galatea Estates, and Turinski have been completed.

Recreational and Economic Opportunities

There are four action items in this category. Item 5.4 “Create public access awareness and access points as appropriate” has two completed items. A map of Campbell Creek and Little Campbell Creek titled “Nature Guide and Map of Campbell Creek Trail, Anchorage, Alaska” was created by AWC in 2009. The 11” x 17” map is printed on waterproof and tear-proof paper—images of the map are in Appendix B.

The map is mostly up-to-date with the exception of the completion of the bike trail under the New Seward—which could be easily updated. The map’s access points should be checked and compared with the Little Campbell Creek Access Points map (Map 1) that AWC prepared in 2017. Adding these access points to the existing map would be relatively easy—the merely the cost reprinting.



Map 1 Little Campbell Creek Access Points Map (2017)

And, in 2013, a kiosk (Fig. 46) with an interpretive sign and a case for information about the site and Polaris K-12 School was placed near the corner of 68th and Meadow where AWC restored the corner with a small wetland in 2008. It would be nice to have more signs of this type, similar to the many found in the Campbell Creek watershed, in the Little Campbell Creek watershed.



Fig. 45 Location of educational kiosk (red dot) and restored wetlands (yellow square) on North Fork Little Campbell Creek



Fig. 46 Kiosk at 68th and Meadow (2019)

Communication and Coordination

There are three action items in this category. For 6.1, “Promote LCC Watershed Management Plan implementation within the Municipality”, some of it was to be promoted by the now defunct Watershed Task Force. This group was active early on, but as agency assignments changed—it has slowly died. There is currently incentive by some people at the Anchorage Parks Foundation, ADF&G, USFWS, the MOA and AWC to revive it. A meeting has been scheduled for early January 2020.

For 6.2, “Increase community understanding of watershed problems and solutions within the watershed”, AWC has produced a variety of rack cards and informational letters and talking points that have been provided to residents and businesses that cover several topics regarding creeks and property management, DIY rentals, carpet cleaning companies and other mobile businesses, etc. This is part of our stormwater outreach for the APDES permit.

An Adopt-A-Stream program was begun by AWC in 2013 that lasted a couple of years. Funding for it was not ongoing, and several of the companies and teams that volunteered had turnovers so that the program is currently suspended. It was, however, a very popular program when in operation.

One ongoing educational program has been AWC’s “Creeks as Classrooms” that is entering its tenth year. Every year roughly 1,000 students come in direct contact with the hands-on program, and it will continue. This introduces youth from all ages to engage with creeks close to their schools or at other venues. These are the future creek stewards.

Additionally, in 2018 changes to the MOA’s Design Criteria Manual were adopted effective Jan. 1, 2019. As part of these changes, natural vegetation and wetlands retention are identified as a specific BMP available for control of stormwater runoff volume and quality. This change is intended to help incentivize preservation of wetlands and other riparian habitat during site development.

Action item 6.3, “Increase outreach and education program within the Municipality” is part of the MOA WMS website called Anchorage Watershed at anchoragestormwater.com/index.html. It holds links to a variety of documents and maps that provide information on Anchorage’s watersheds. The Chester Creek Watershed Plan and the Little Campbell Creek Watershed Management Plan can be found there as well as on the AWC website at www.anchoragecreeks.org.

Open Space

This category has been left in the hands of the MOA and the Great Land Trust (GLT). To date, there is nothing to report. In a recent communication with GLT, they are looking for projects.

Data Acquisition

The final category has three action items in 8.1, “Obtain data necessary to maintain health/Evaluate fecal coliform concentrations in LCC”.

Some fecal coliform studies (DNA) were done by ARRI (Aquatic and Restoration Research Institute) in 2010 titled, “Fecal Coliform Bacteria Source Assessment in the waters of Cottonwood Creek, Wasilla, and Little Campbell Creek, Anchorage”. The point was to assess the origin of fecal contamination, e.g. dogs, humans, etc., and was funded by the Department of Environmental Conservation (ADEC). Two sites on the North Fork of Little Campbell Creek and three on the South Fork of Little Campbell Creek were studied, and other data were collected in the report. Unfortunately, the report’s links are broken, although there are hard copies available.

AWC has had 4 water quality monitoring stations on LCC over the years. With an ACWA grant from ADEC in 2018 for “Evaluate Fecal Coliform for Two Anchorage Watersheds” resulted in one report available at: anchoragecreeks.org/media/publications/FC_for_Two_Anchorage_Watersheds_Final.pdf. A second ACWA grant, “Reduce Bacteria in Anchorage Bowl”, was awarded to AWC in 2019. Currently the data are being analyzed, and a final report will be out in 2021.

Summary

The Little Campbell Creek watershed encompasses about 19 sq. mi. and is important for fish and wildlife diversity. Coho and Chinook juveniles are the main salmon species using the watershed for rearing habitat which has been affected by multiple fish passage issues as well as straightened channels. The watershed is also impacted by the highly imperious areas in the lower watershed that have significant areas of residential, commercial, and industrial areas where stormwater runoff greatly affects stream health. Water quantity is also of concern because of the typical low flows in Little Campbell Creek which are exacerbated by water withdrawals, e.g. at the Anchorage Golf Course near the Alaska Zoo. This condition was particularly evident during summer 2019 with record breaking temperatures and lack of precipitation⁶.

Some significant upgrades—especially the large box culverts placed under the New Seward Highway in 2017—are positive steps as is the replacement of several regular road and driveway culverts. As was suggested for the Chester Creek Watershed Plan, looking holistically at the watershed with these improvements and changes over the 12 years since the Little Campbell Creek Watershed Management Plan was written would be a positive step for continuing the plan.

⁶ ktuu.com/content/news/Little-Campbell-Creek-ran-dry-this-summer---where-did-the-water-go--560083271.html

APPENDIX A

Creek Signage Placement

Municipality of Anchorage



Prepared by Thomas Eley, Ph.D.

Anchorage Waterways Council

February 1, 2019

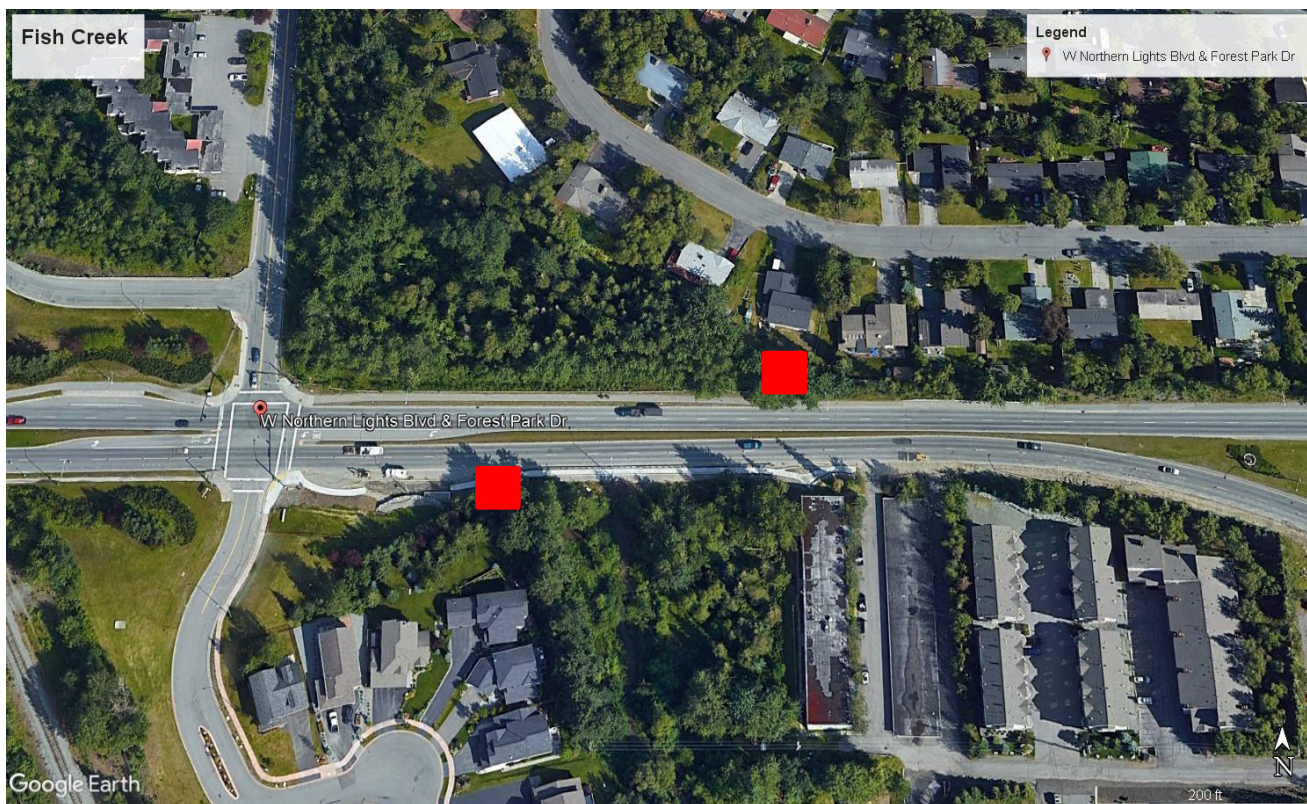


Placement of Creek Name Signs on Fish, Campbell, Little Campbell, Chester, and Ship Creeks

The purpose of this project is to locate appropriate sites for creek name signs that could be placed where a major or important road crosses a creek. This would increase the public's awareness of Anchorage's many urban streams, which would hopefully encourage stewardship towards them. The report fulfills Action Item C-6 from the Municipality of Anchorage's Chester Creek Watershed Plan (2014). In this survey, signage within the Anchorage bowl for Ship Creek, Fish Creek, Chester Creek, Campbell Creek, and Little Campbell Creek is addressed. Sites were located using ArcGIS with Municipality of Anchorage GIS datasets for roads and creeks, and Google Earth Pro was used to further analyze sites. Areas with signage or needing signage follow. Those with red dots ● indicate that a sign is currently at that location, and a red square ■ means it would be a good place to put one. These are only suggestions and some may not be feasible for a variety of reasons. Photos of many creek signs are included, however some are not due to the inability to safely photograph them.

Fish Creek:

1. A good location for signage on Fish Creek would be on Northern Lights Blvd by Forest Park Drive. The creek is obvious to the trained observer, but many people drive right over the creek with even knowing.

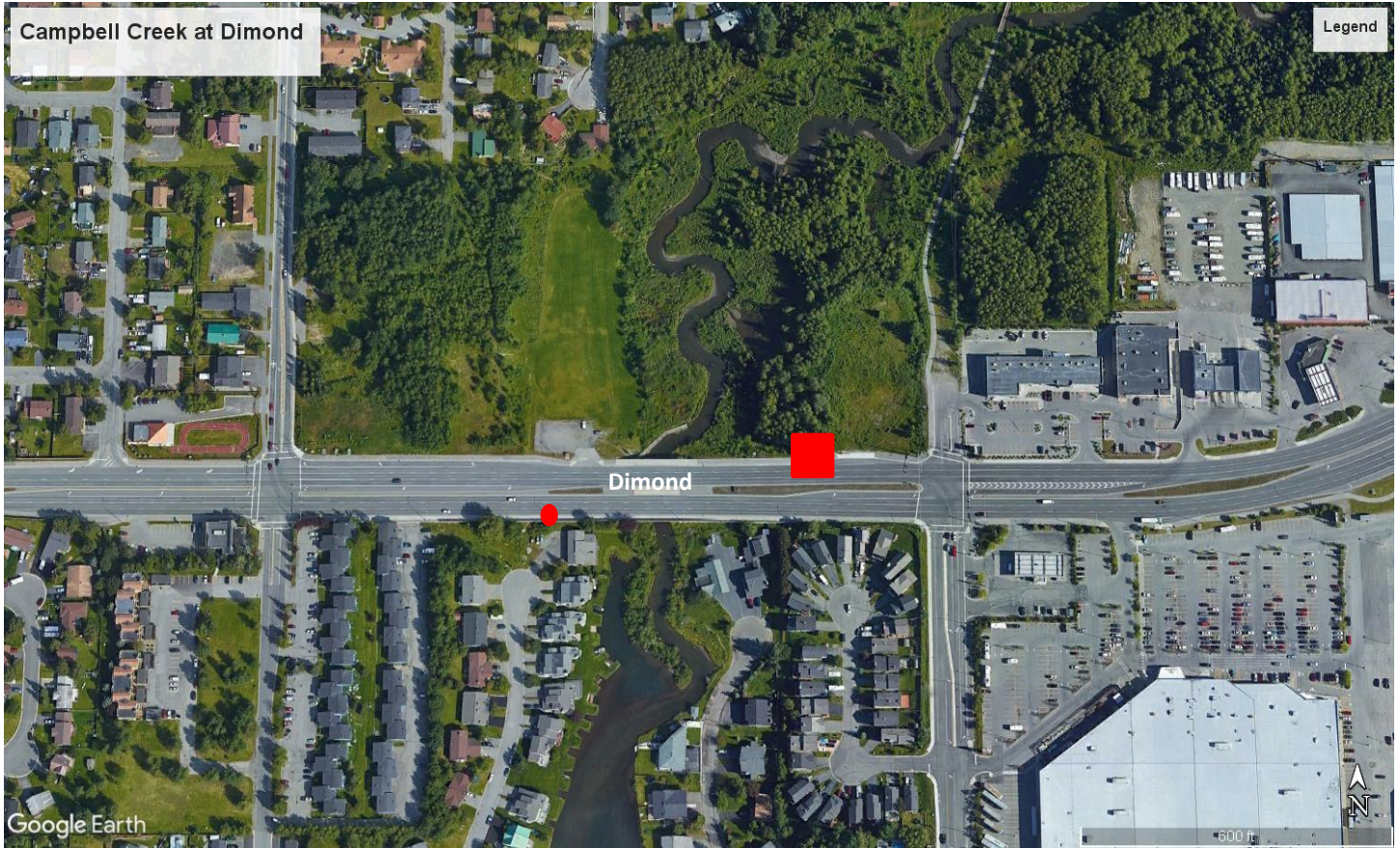


2. Fish Creek at Spenard has two small signs, which is important for Fish Creek which spends so much time underground.

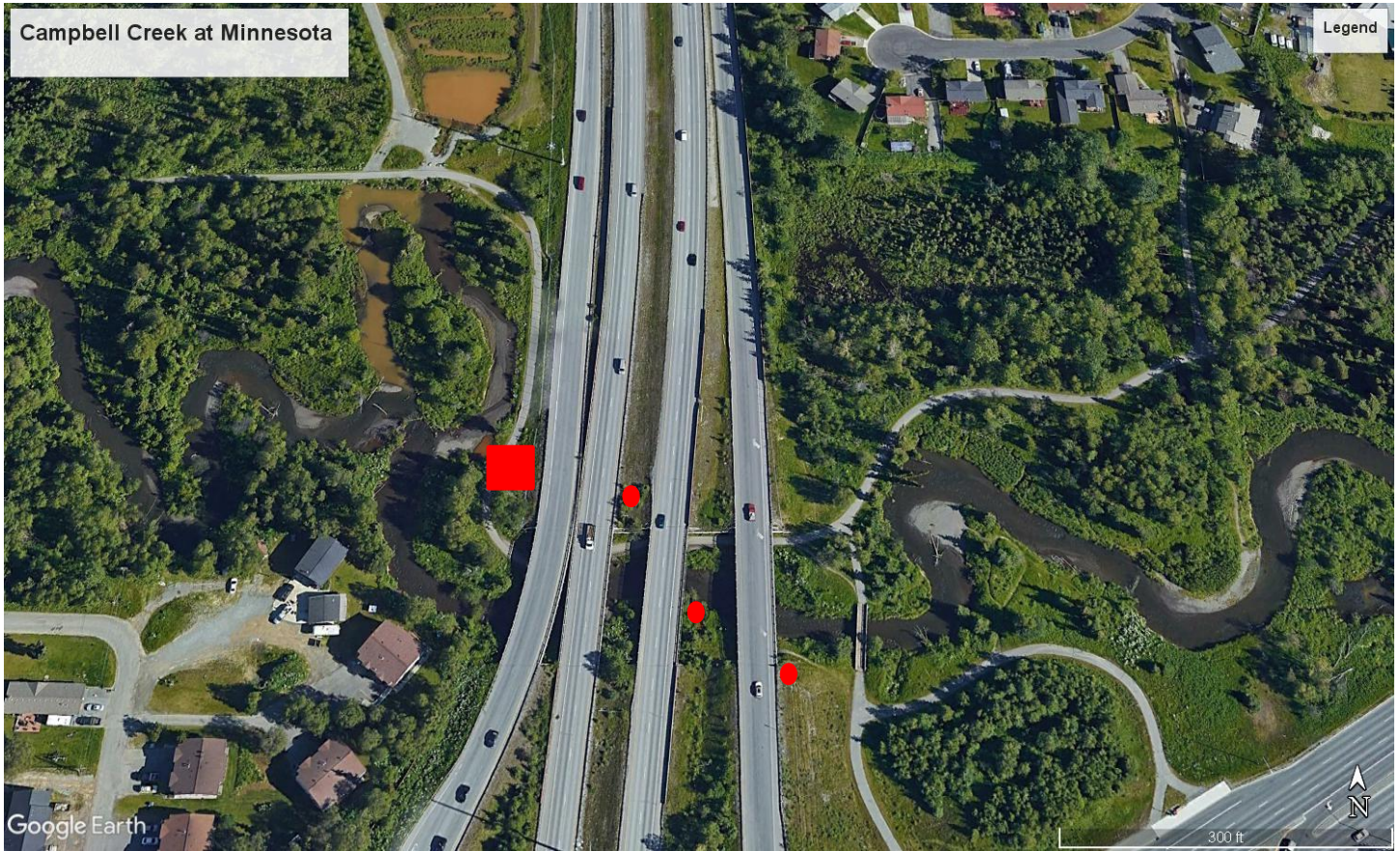


Campbell Creek:

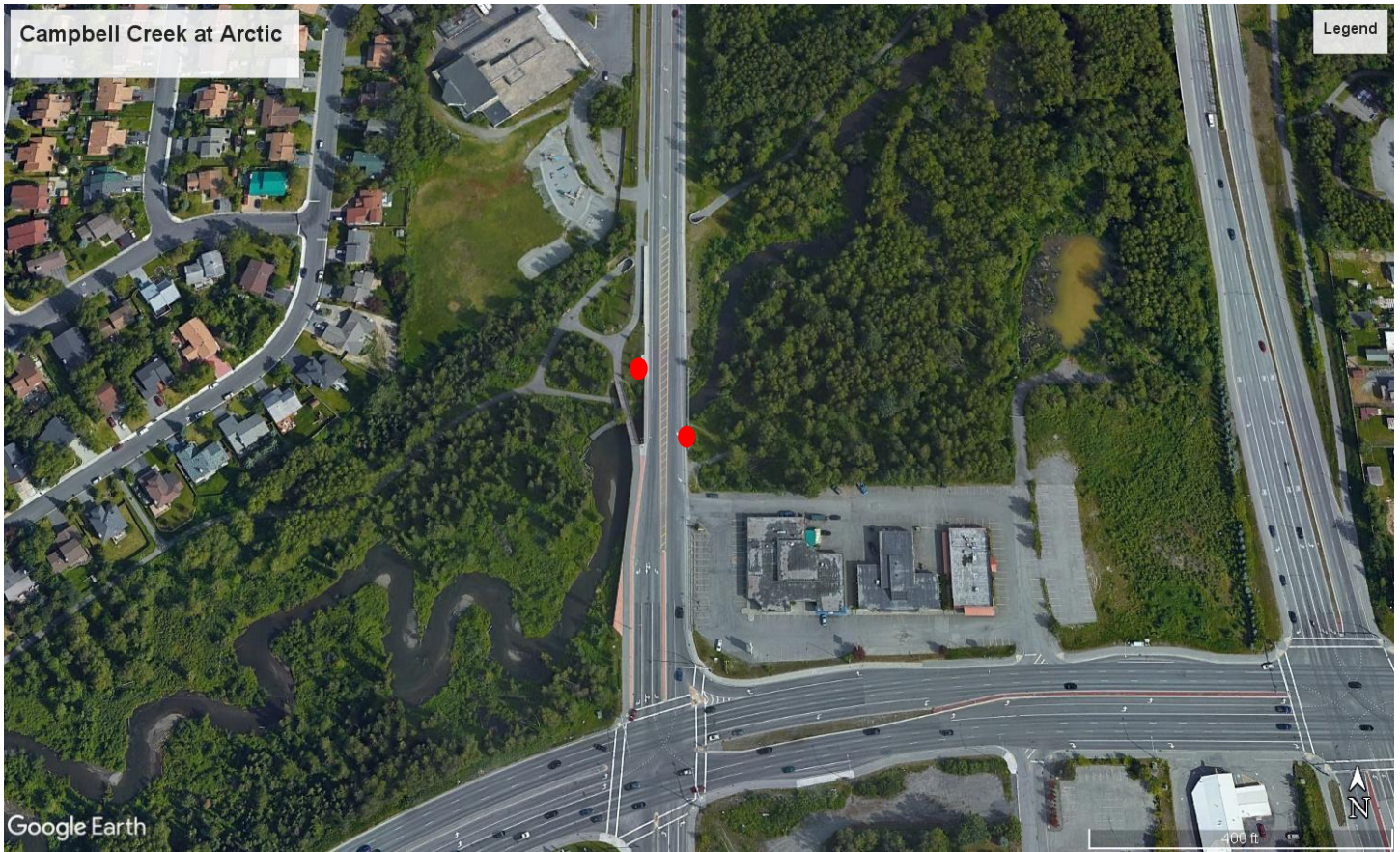
1. Campbell Creek at Dimond Blvd before it enters Campbell Lake. This is a high traffic area along with a fishing dock and greenbelt trails. There is already a small sign on the south side of Dimond, but it's not very apparent (maybe larger?). The red square denotes an area where a sign should be placed.



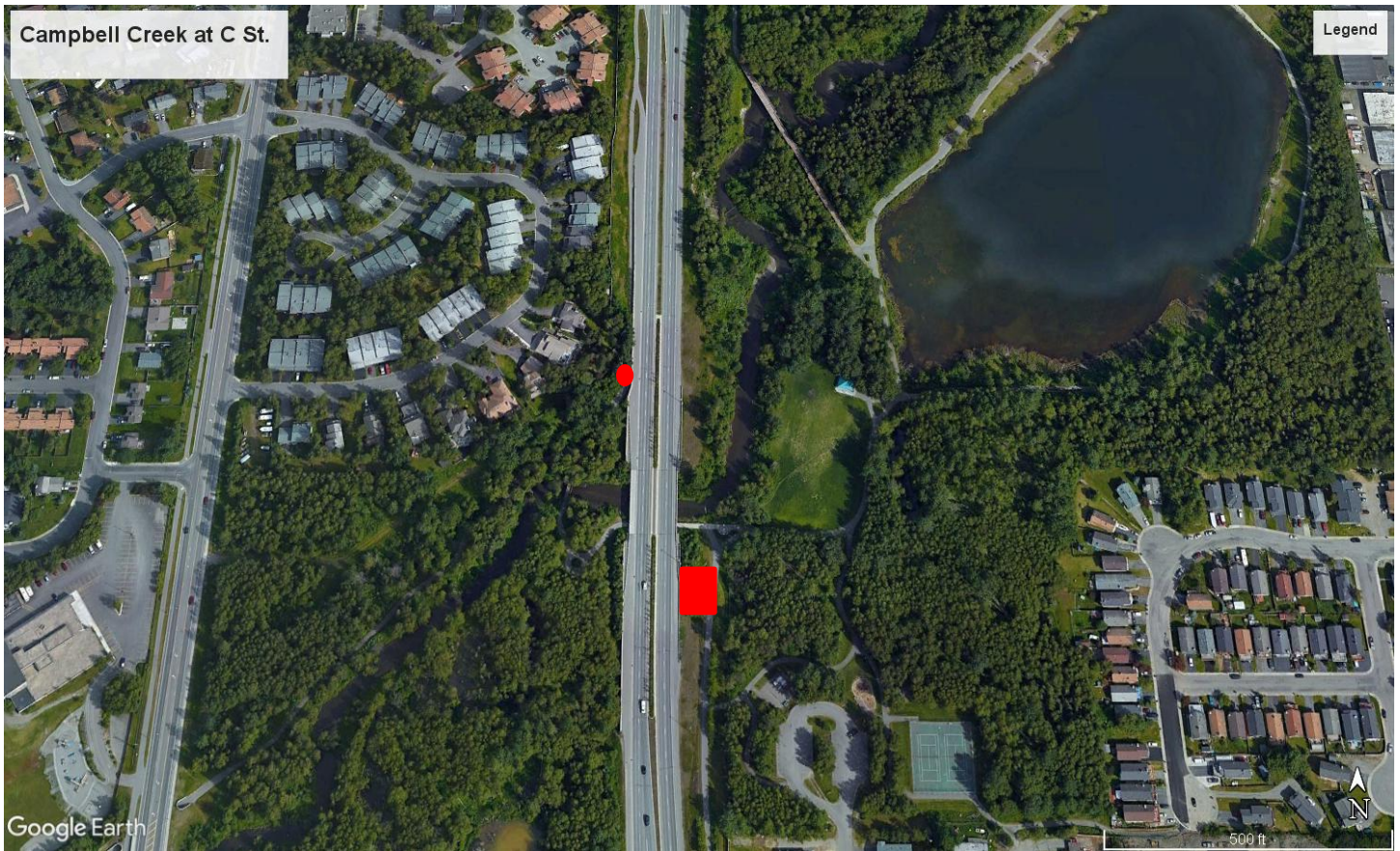
2. Campbell Creek at Minnesota Dr. Another high traffic area. There are 3 signs (two for northbound and one for southbound), but one by the offramp heading south to Dimond would be nice.



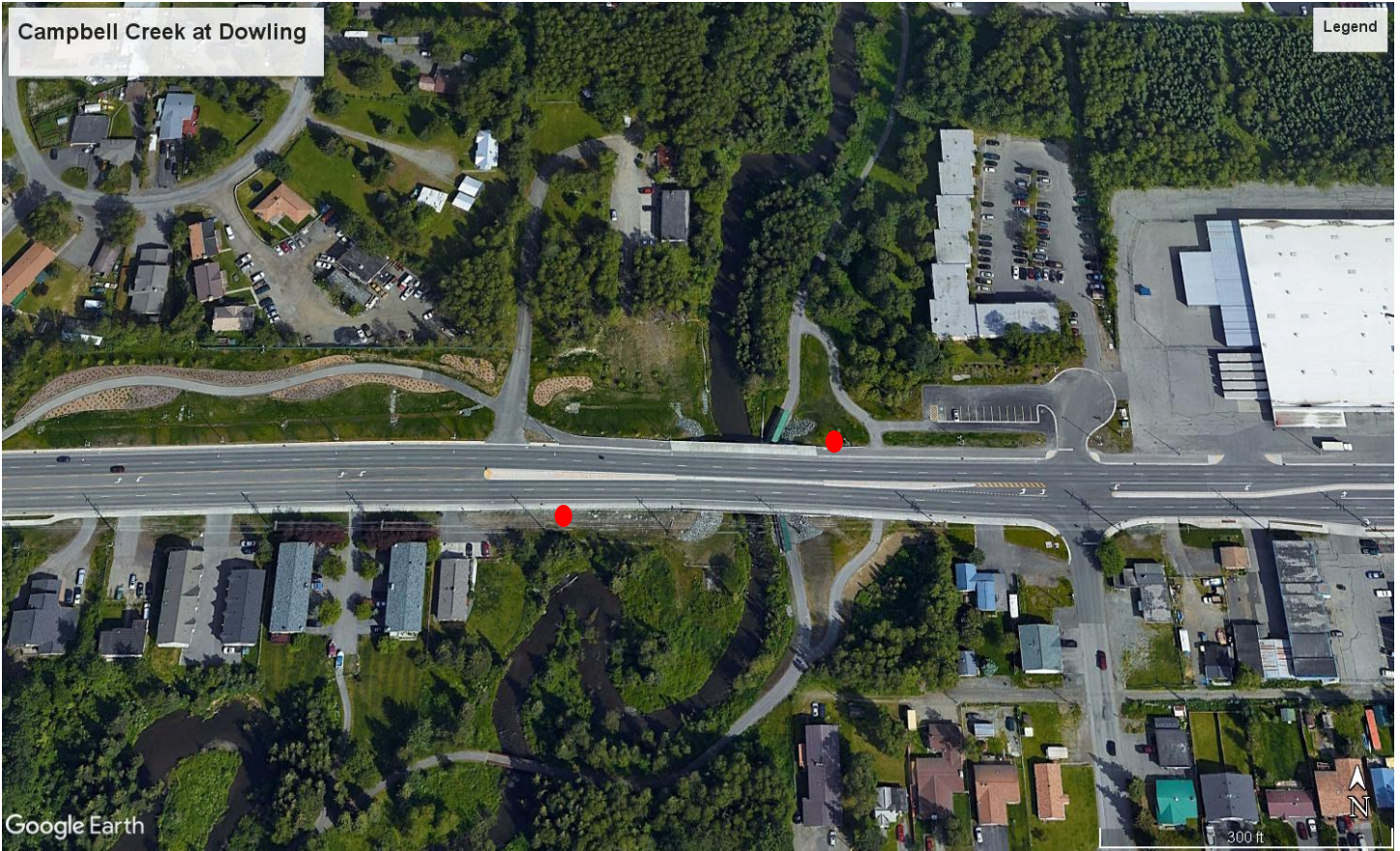
3. Campbell Creek at Arctic Blvd. This is a high traffic area along with a fishing dock and greenbelt trail access. There are signs on both the northbound and southbound sides of Campbell Creek.



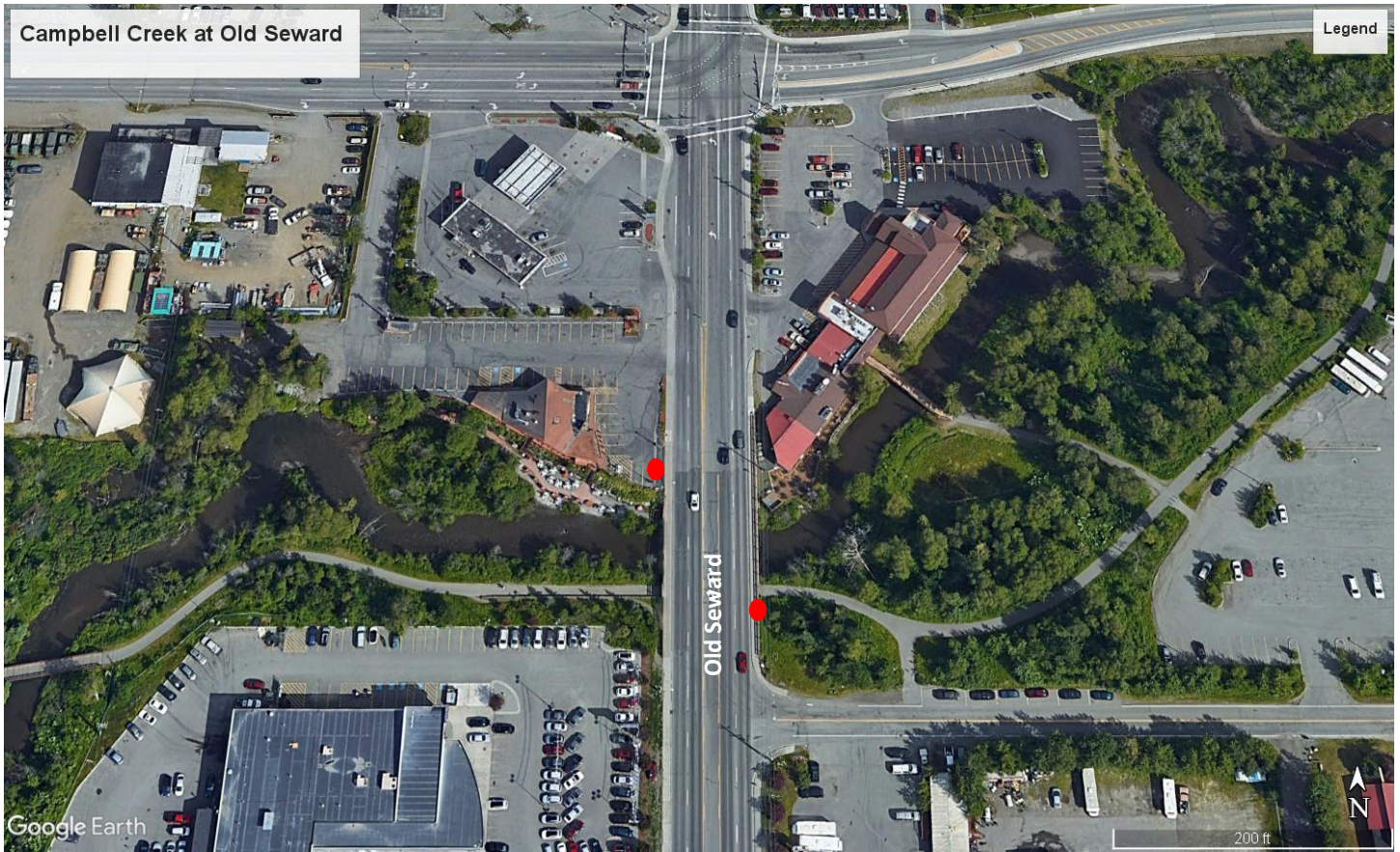
4. Campbell Creek at C Street north of Dimond. A heavy traffic area with access to Taku Lake. One sign by the southbound lane, none on northbound.



5. Campbell Creek at Dowling Road. This area was recently redone and has a parking area and access to the Campbell Creek Greenbelt trail system. Two new large signs are located there.



6. Campbell Creek at the Old Seward. A well-used route with local businesses along the creek. There are medium size signs on both the north and southbound lanes.



Northbound Old Seward



Southbound Old Seward

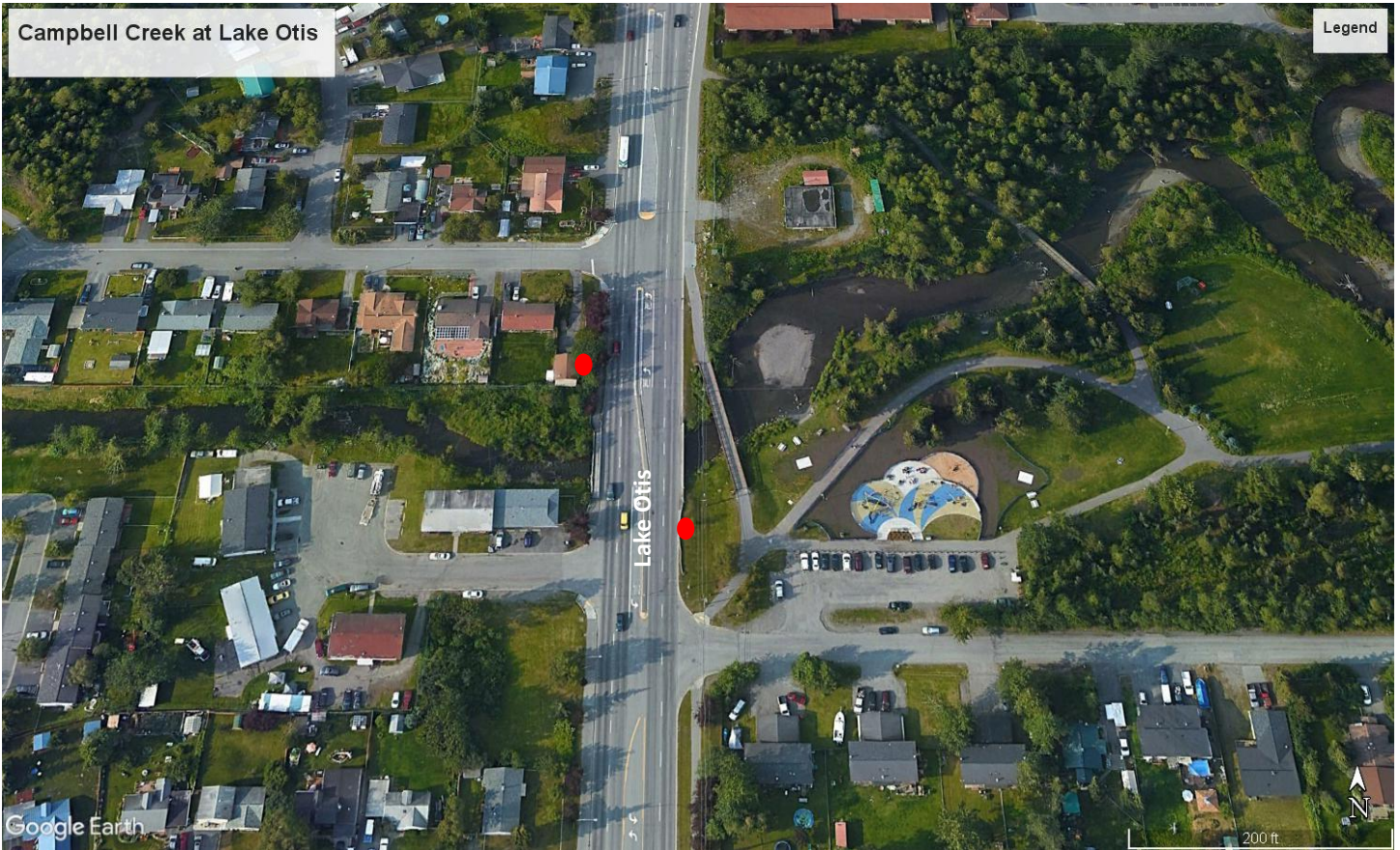
7. Campbell Creek at International Airport Rd. Two signs on the road here which is a common area for rafters. Also it's the location of the Alaska Wildberry Co., the former Sourdough Mining Co., and the Peanut Farm's parking lot.



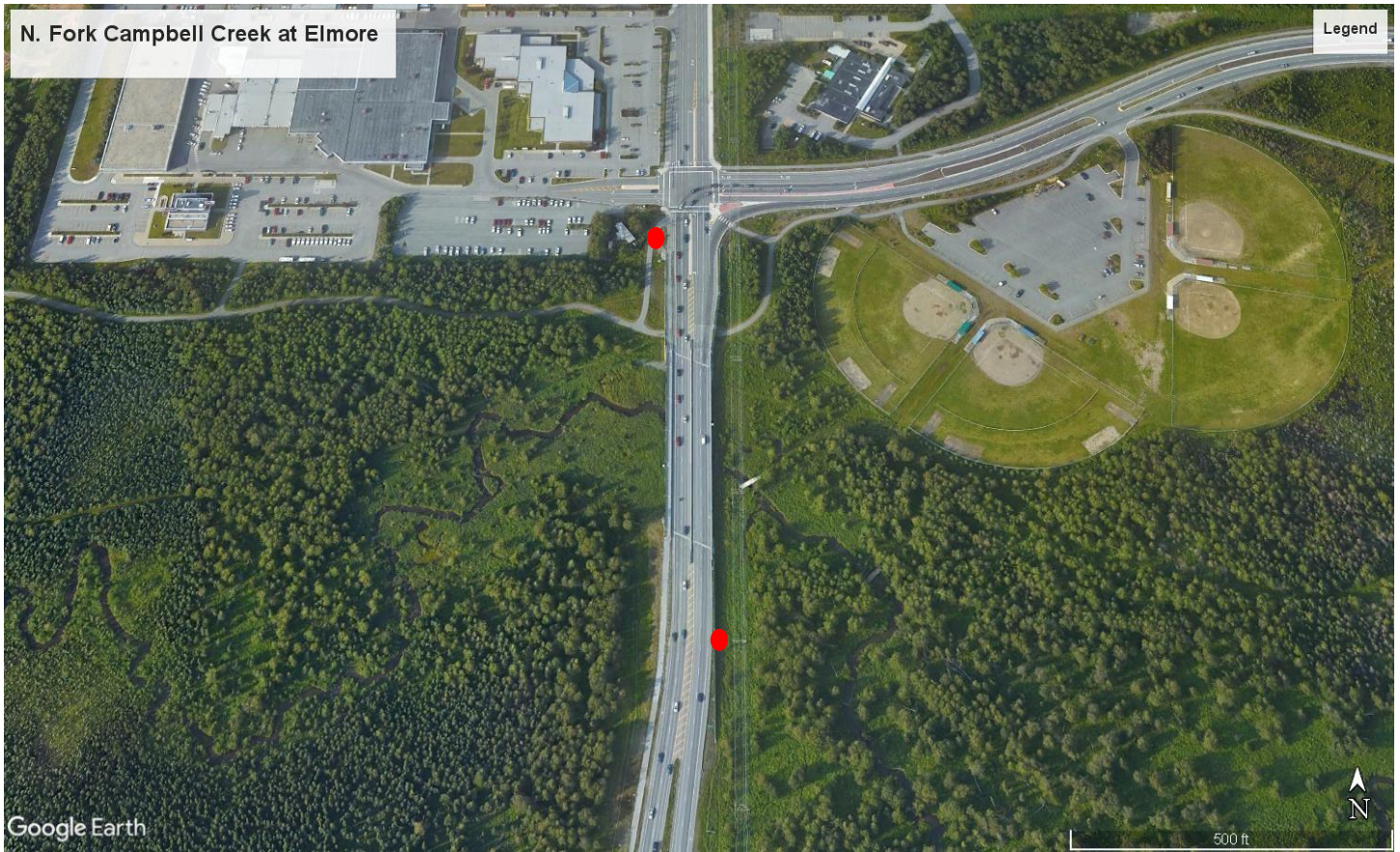
8. Campbell Creek at the New Seward. The New Seward's expansion shows two large signs for both north and southbound lanes.



9. Campbell Creek at Lake Otis. This is a high recreation use area with a popular park and trails. Additionally, Lake Otis has a high traffic flow. There is one sign at north and southbound lanes.



10. North Fork Campbell Creek at Elmore. Elmore is a busy thoroughfare that was upgraded in 2007. There are large creek signs for both north and south bound lanes.

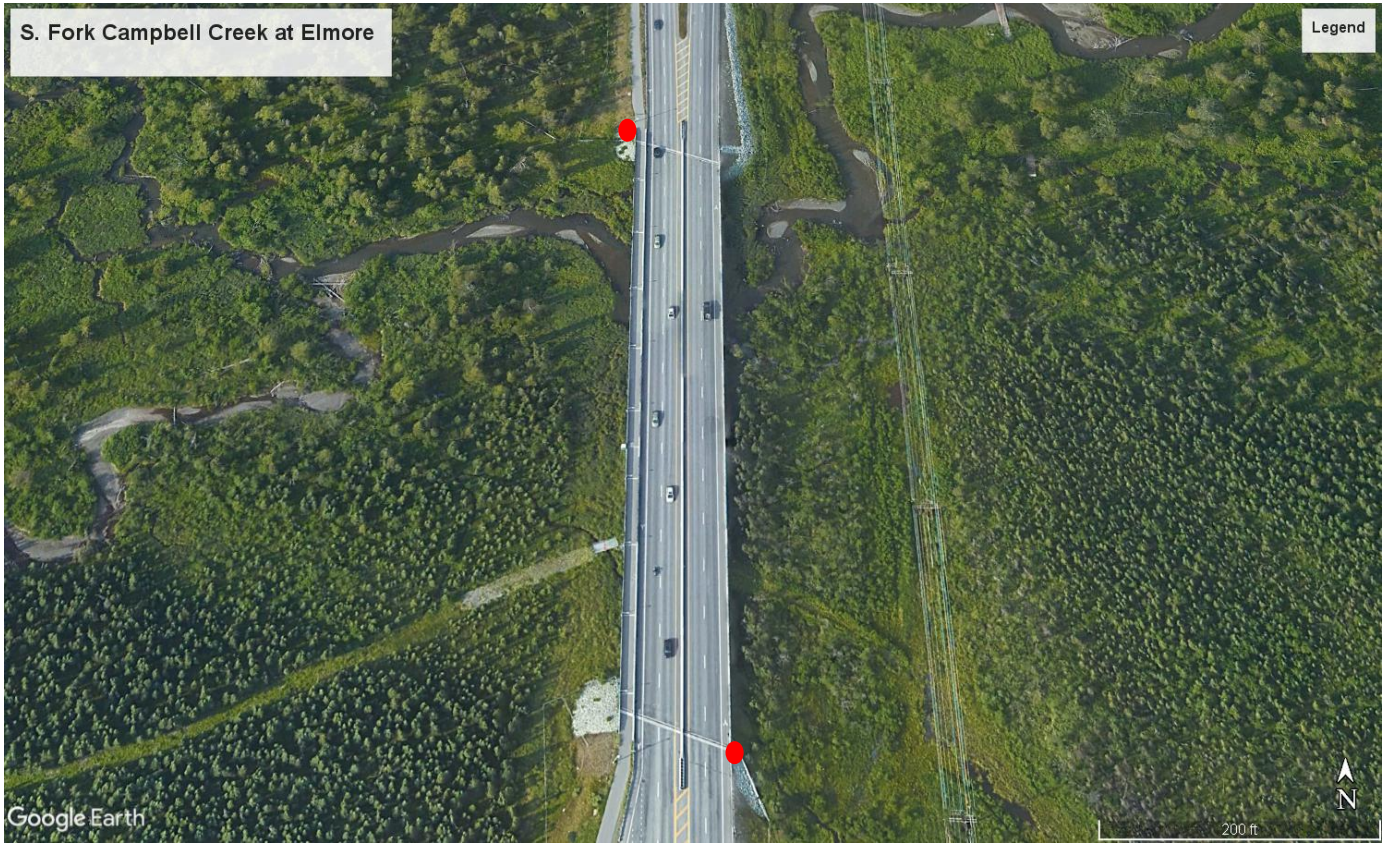


N. Fork Campbell at Elmore – northbound



N. Fork Campbell at Elmore - southbound

11. South Fork Campbell Creek at Elmore. Elmore is a busy thoroughfare that was upgraded in 2007. There are large creek signs for both north and south bound lanes.



S. Fork Campbell at Elmore – northbound



S. Fork Campbell at Elmore - southbound

12. North Fork Campbell Creek at Campbell Airstrip Road. Despite its size, the North Fork of Campbell Creek in this area has two small signs.



Northbound Campbell Airstrip Rd.



Southbound Campbell Airstrip Rd.

Little Campbell Creek

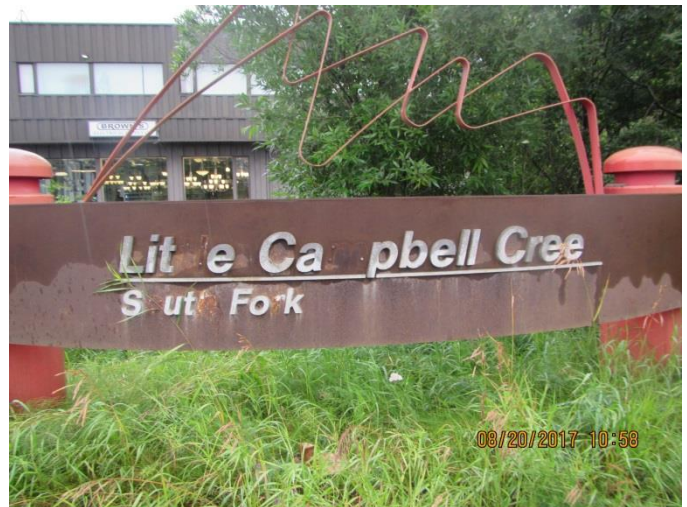
1. North Fork Little Campbell Creek at Old Seward. Signs present but are in dire need of repair and cleaning.



North Fork Little Campbell Creek east of Old Seward

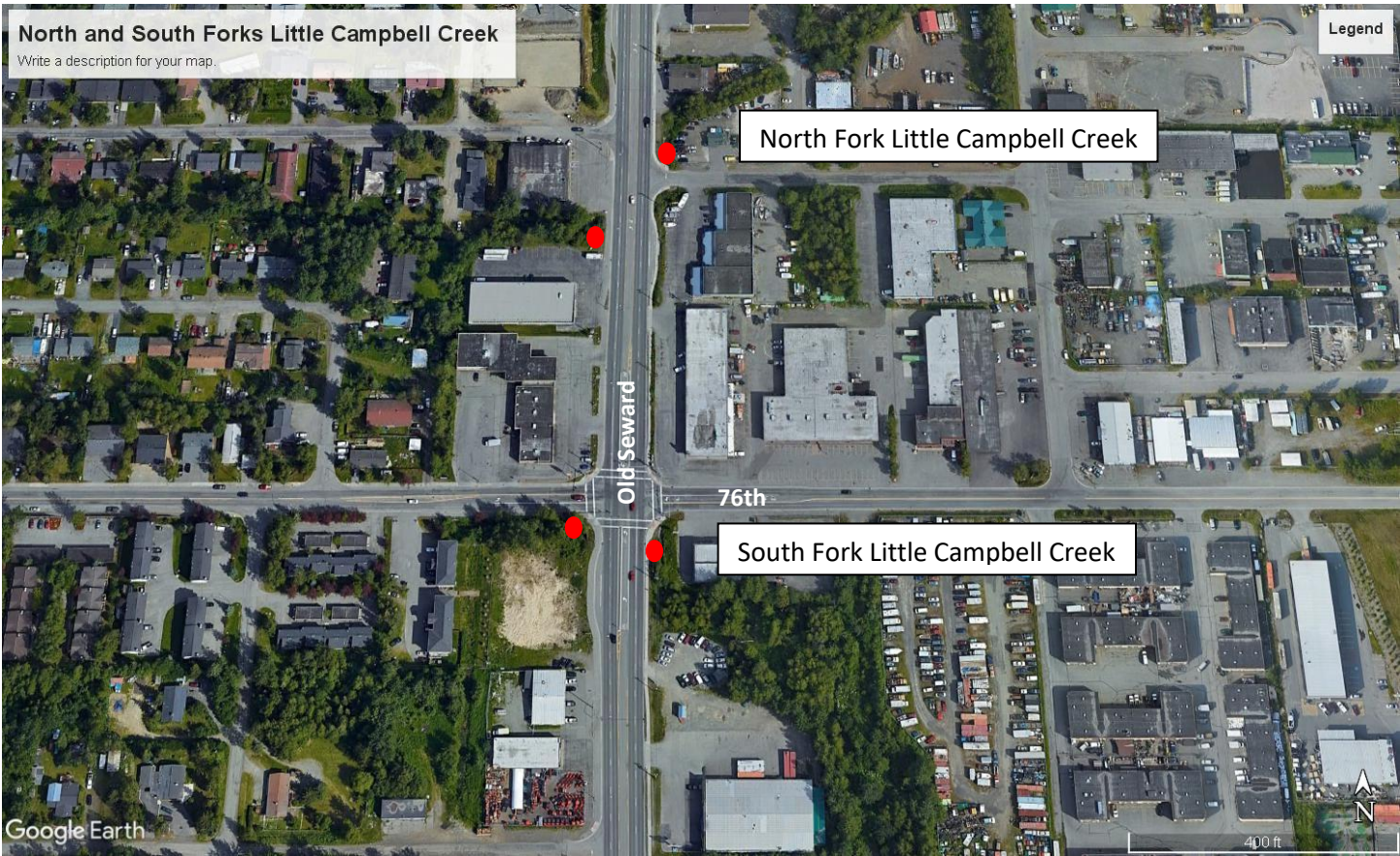
North Fork Little Campbell Creek west of Old Seward

2. South Fork Little Campbell Creek at Old Seward. Signs present but are in dire need of repair and cleaning.



South Fork Little Campbell Creek east of Old Seward

South Fork Little Campbell Creek west of Old Seward



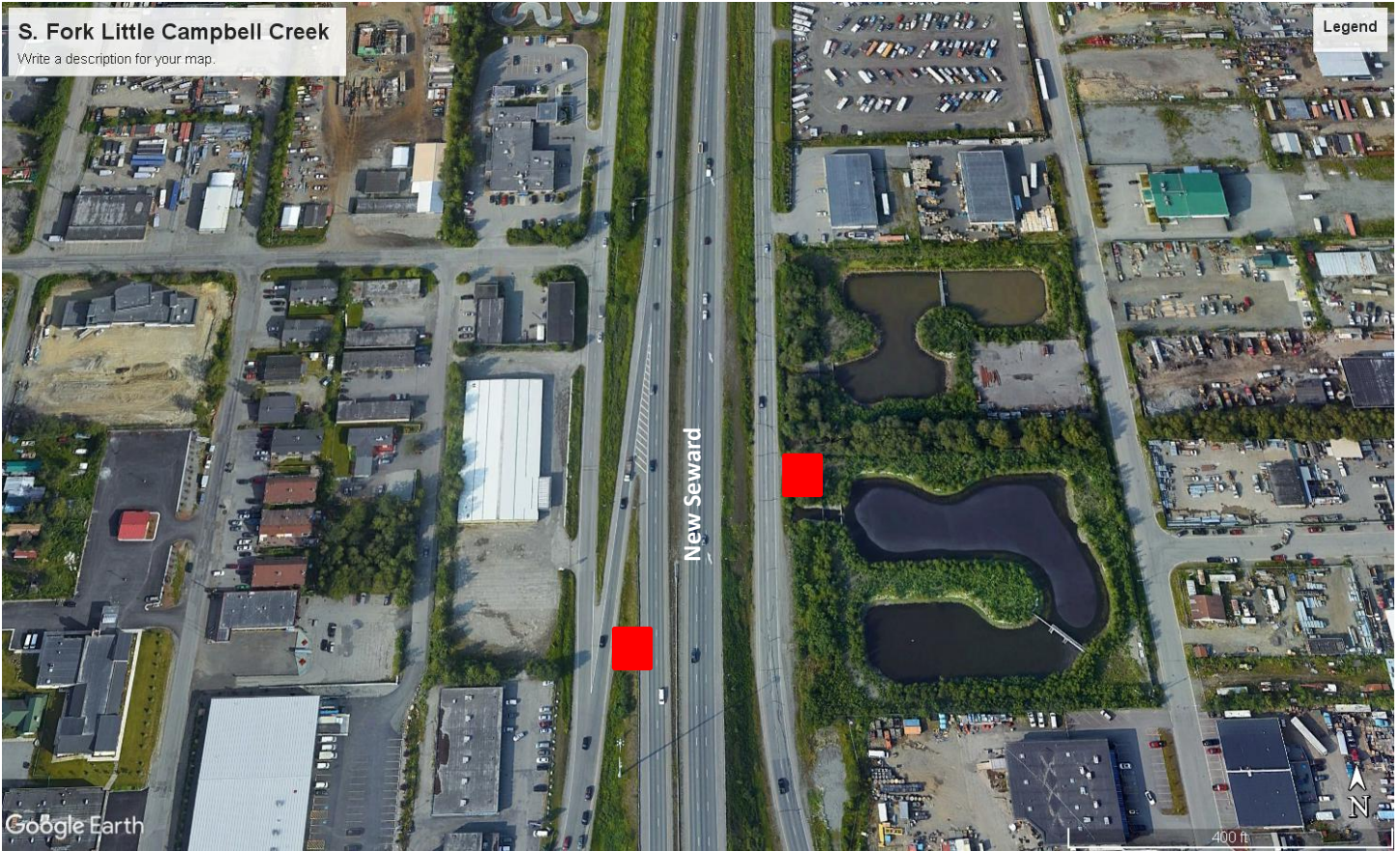
Location of Little Campbell Creek signs on Old Seward and 76th

Possible locations on Little Campbell Creek.

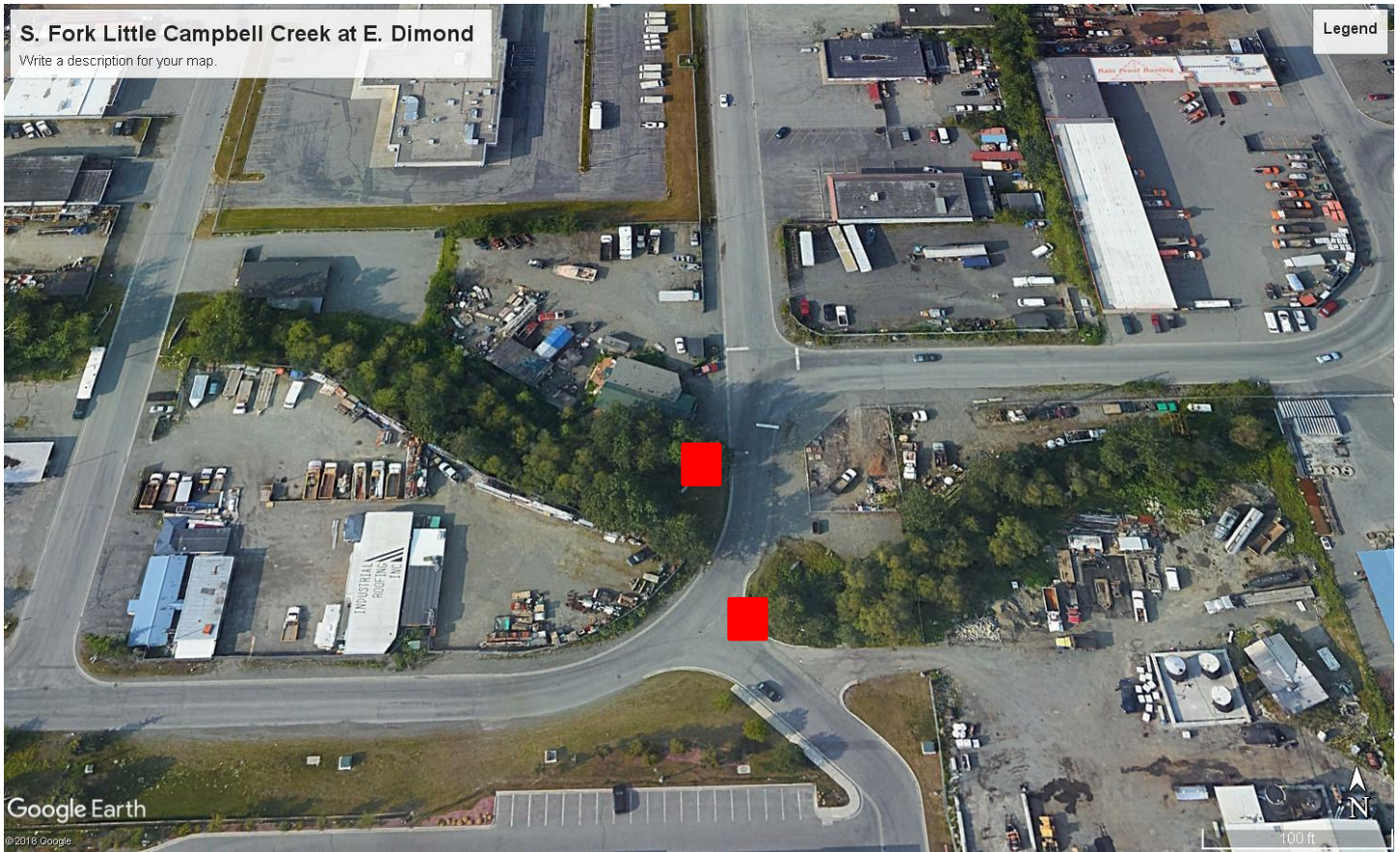
1. North Fork Little Campbell Creek at the New Seward. With the new box culverts under the New Seward, it would be nice to have signage between Brayton (northbound) and Homer (southbound).



2. South Fork Little Campbell Creek at the New Seward. This part of Little Campbell Creek is not very visible, although it might be good to put signage between the frontage roads, Homer and Brayton, to educate people on the creek's existence.

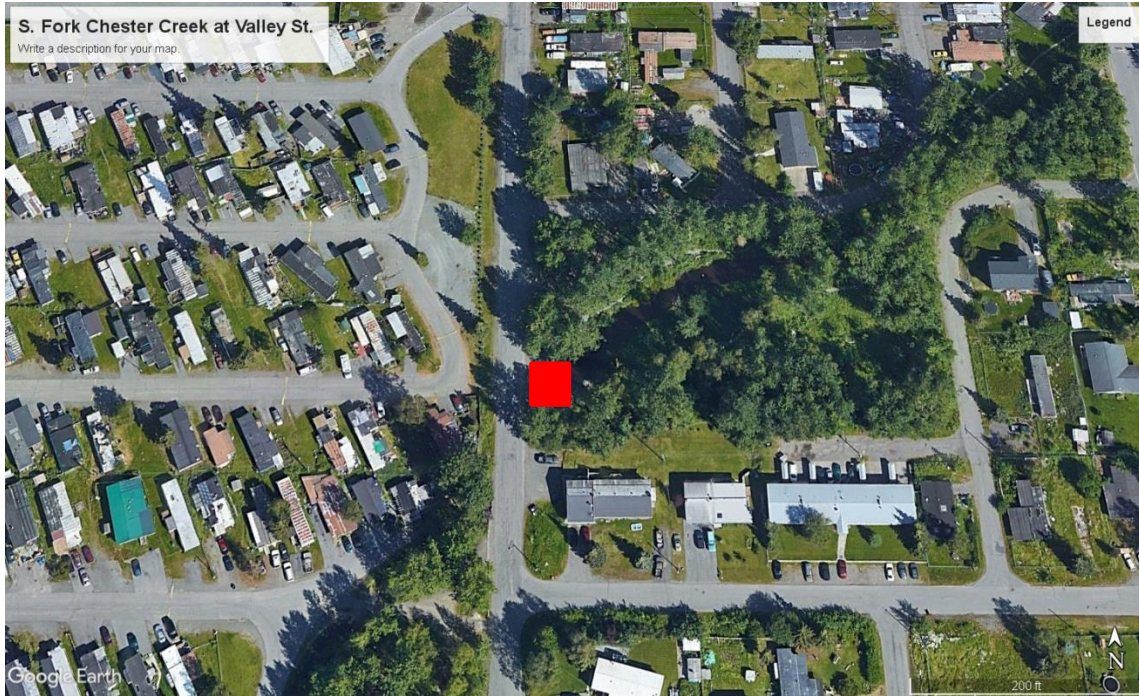


3. S. Fork Little Campbell Creek at E. Dimond. The culvert at this crossing was redone about 10 years ago. This is largely an industrial area, but the creek crossing is significant and labeling the creek would be beneficial.



Chester Creek

1. North Fork of the South Fork Chester Creek at Valley St. (Valley St. Park). The folks in this area have continually failed to recognize that this is a creek and not a ditch.

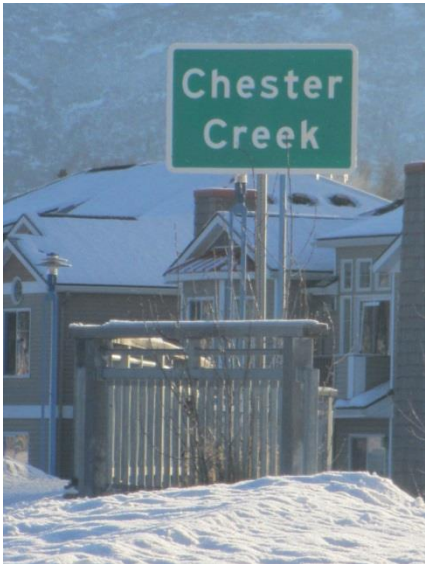


S. Fork Chester Creek at Valley Street Park (hardly a park and barely a creek)

2. South Fork Chester Creek at Muldoon. This is a busy area and the creek has been rerouted. This imagery does not show the new creek alignment which was finalized in 2016.



3. South Fork Chester Creek and Creekside Center Dr. This section of Chester Creek is subject to great abuse especially from kids. Shopping carts and stolen bikes are frequently pushed off the road over the creek. There are two signs there.



Creekside looking east



Creekside looking west

4. South Fork Chester Creek at Baxter Rd near the Baptist Temple. The creek in this area does not receive the recognition that it deserves, and there are continual problems with pushing snow into the creek as well as trash. Signage might help make a difference.



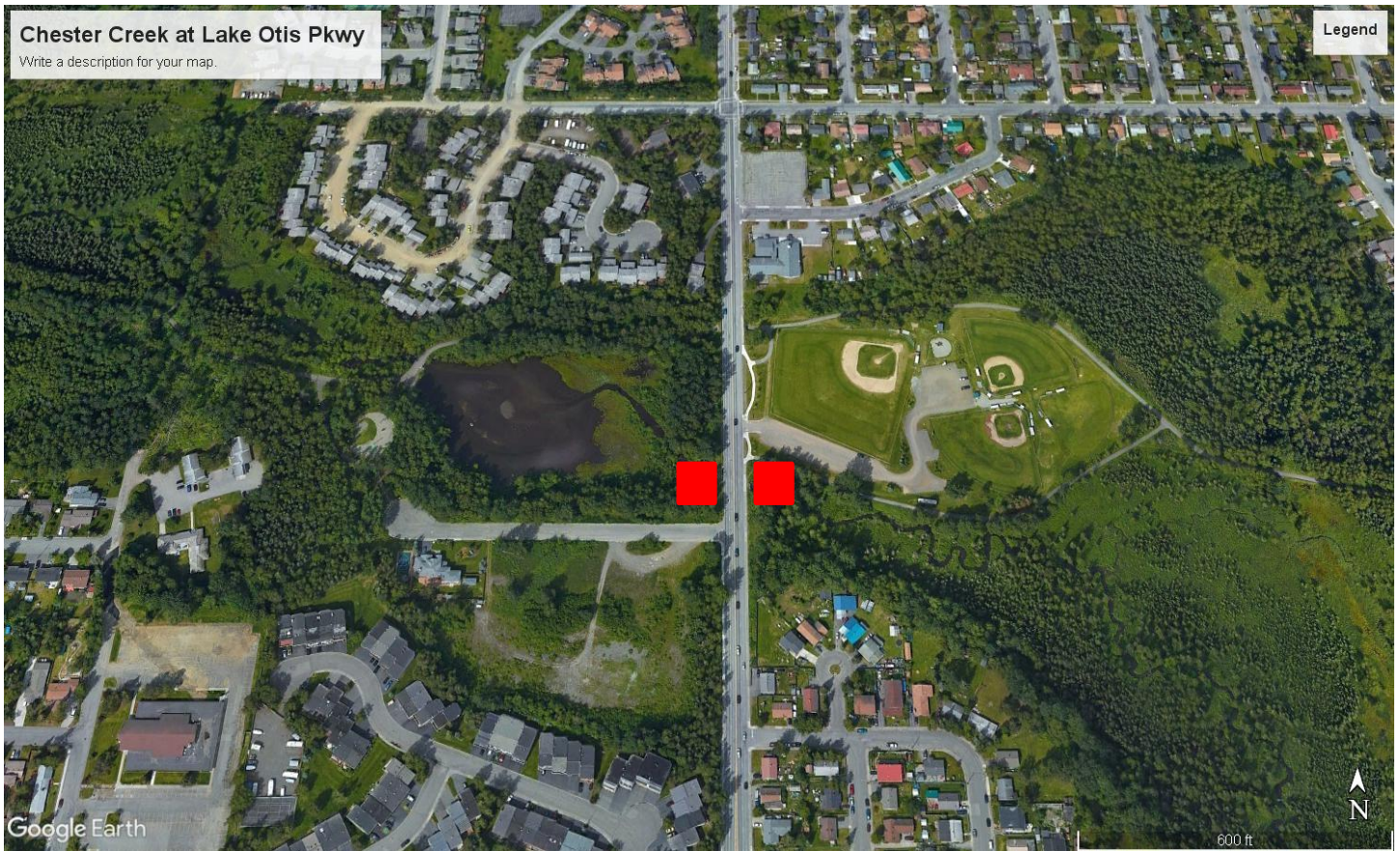
5. South Fork Chester Creek at Elmore Dr. UAA and University Lake. Signage on Elmore plus a sign where Chester Creek descends into University Lake would probably be educational particularly for the large number of pet owners at the dog park.



6. Chester Creek at Northern Lights. Northern Lights is a busy thoroughfare where Chester Creek might benefit from signage as people travel over it.



7. Chester Creek at Lake Otis Parkway. A narrow 4 lane thoroughfare that crosses Chester Creek at a low point. Medium size signage would help people to know where it is—especially since it is right out the car window.



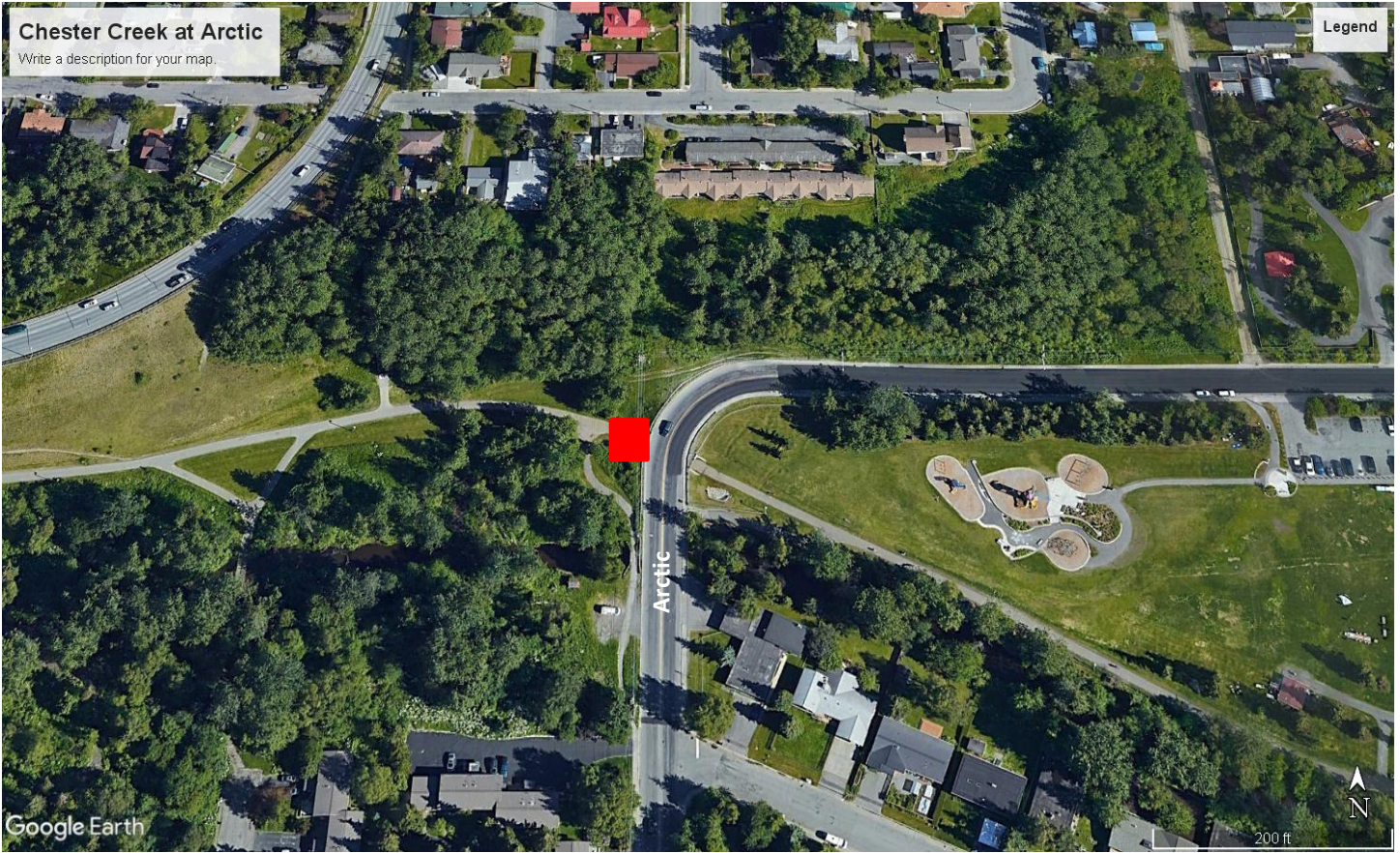
8. Main Stem Chester Creek at New Seward near 20th Ave and Kendall Ford. This is a major thoroughfare and should be marked.



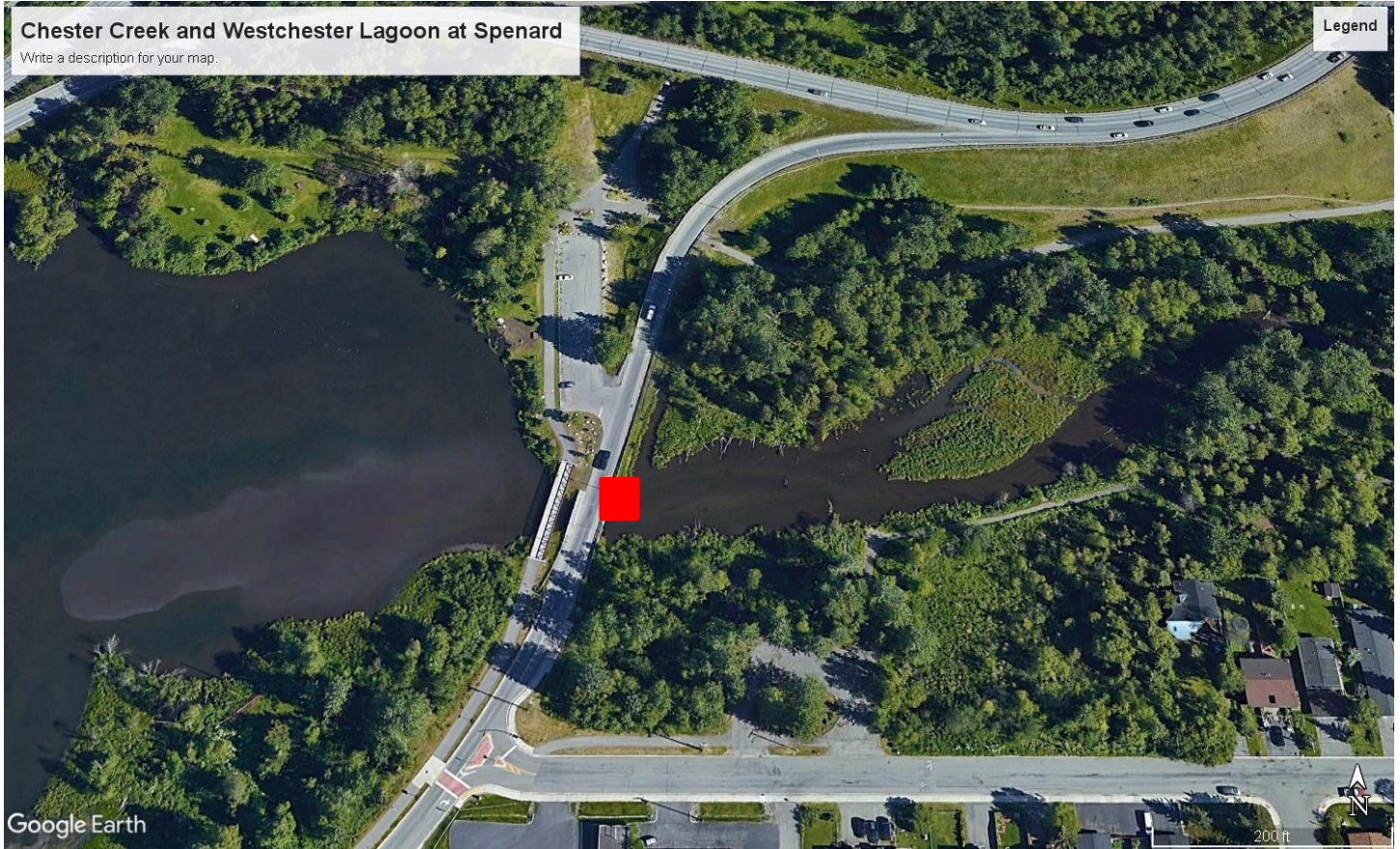
9. Chester Creek at A St. and C St. These are well-traveled routes with good creek signage.



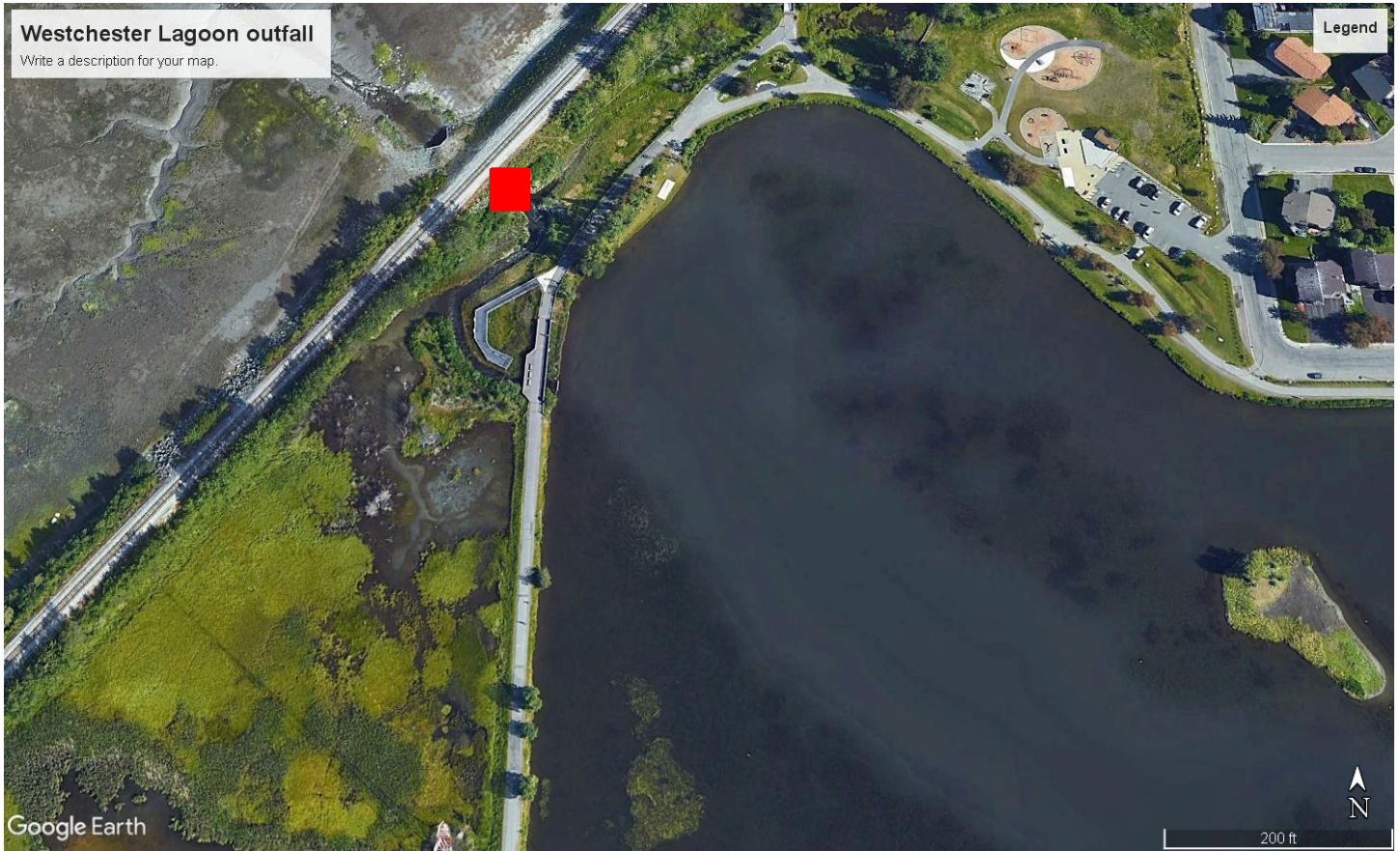
10. Main Stem Chester Creek at Valley of the Moon Park (17th and Arctic). This is an important area that is high usage, and creek awareness would be a good thing.



11. Chester Creek and Westchester Lagoon at Spenard Rd. This is a popular area for people to stop. To the west is Eastchester Lagoon a--a popular birding area.

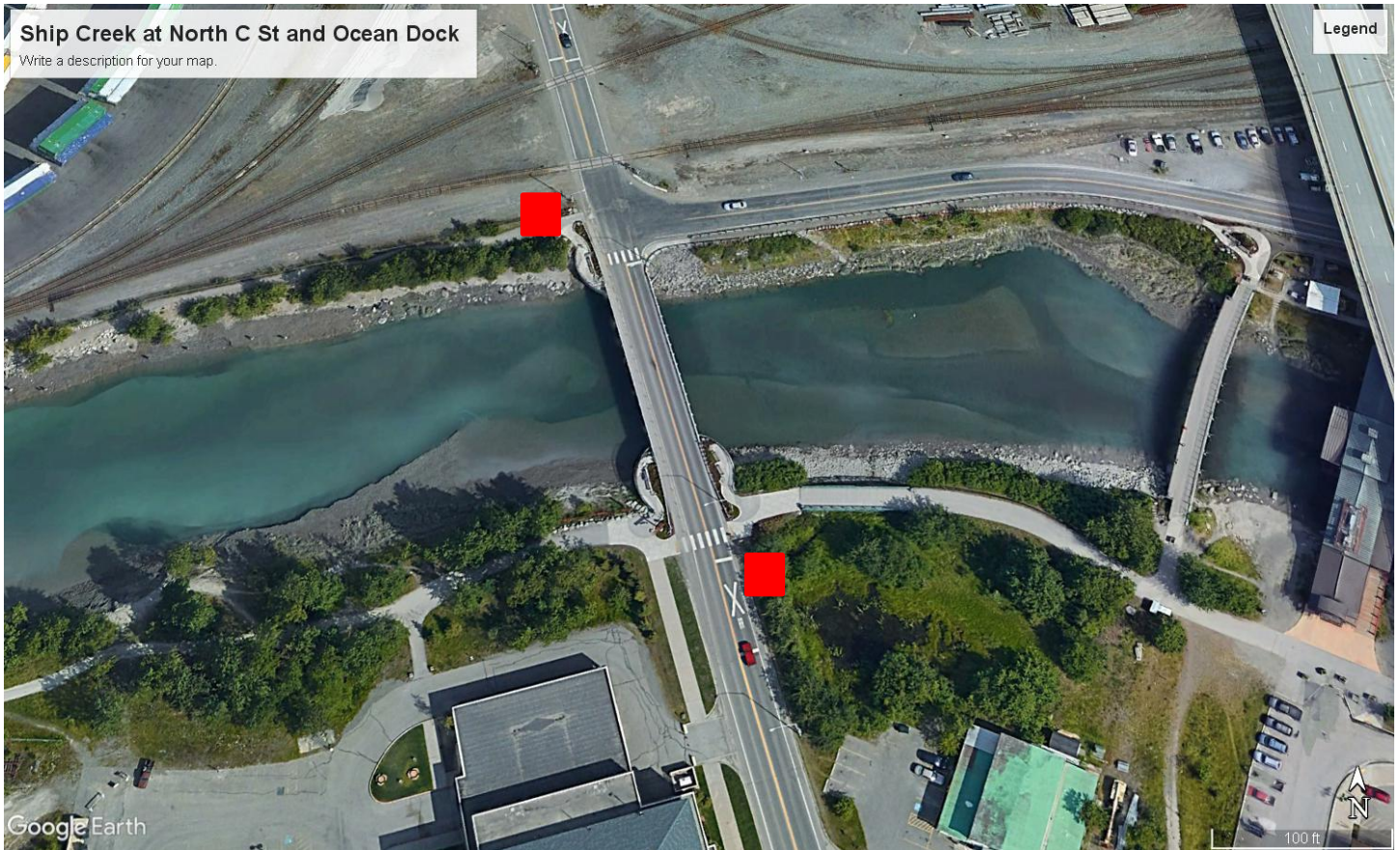


12. Chester Creek entering Knik Arm of Cook Inlet. The signs should be where Chester Creek flows under the Coastal Trail near the observation platform. There should be a sign that says Chester Creek on the observation platform.



Ship Creek

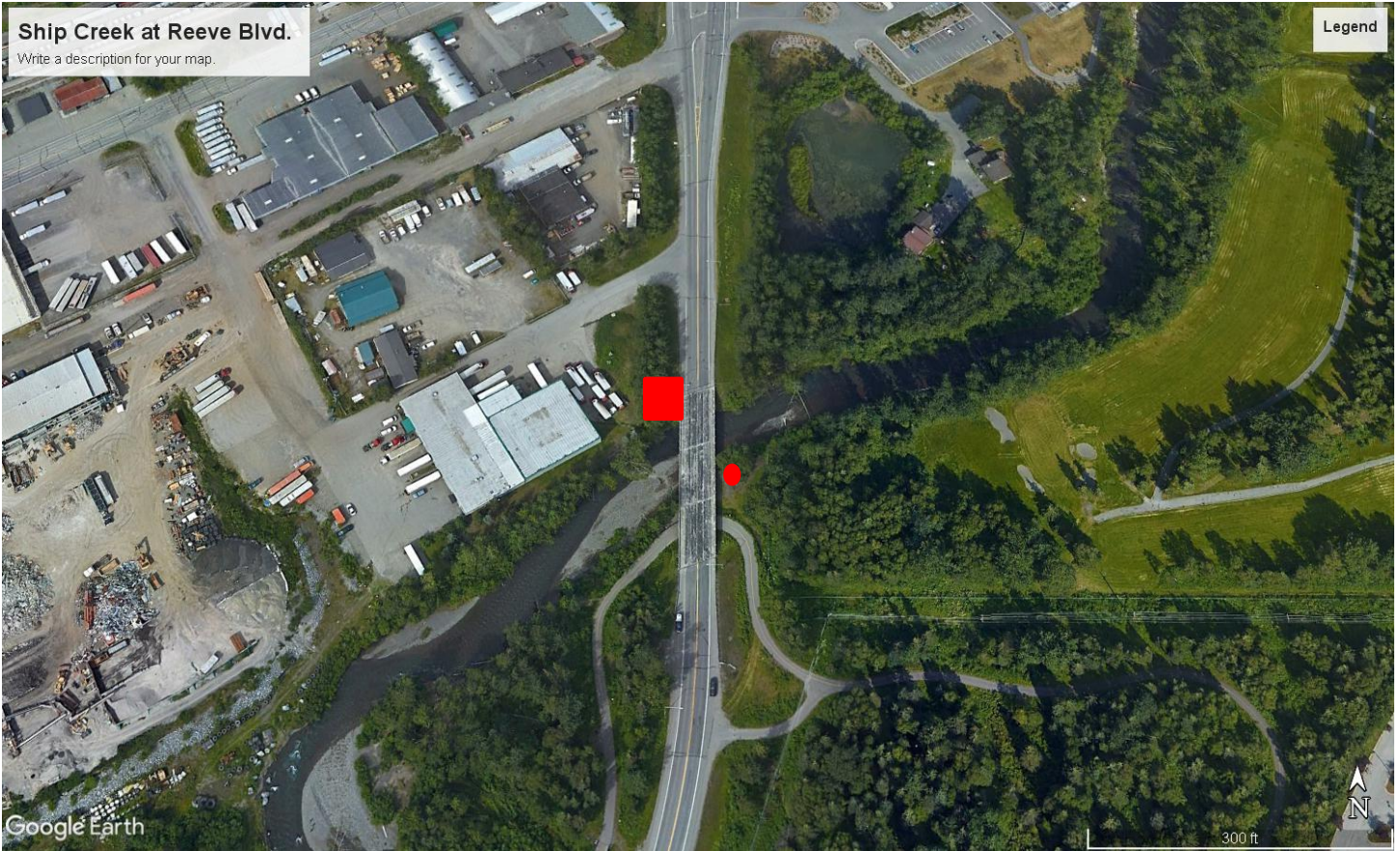
1. Ship Creek at N. C St. and Ocean Dock. This would be a great place for signage with all the fishing traffic. Most people know it's Ship Creek, but a sign would be nice.



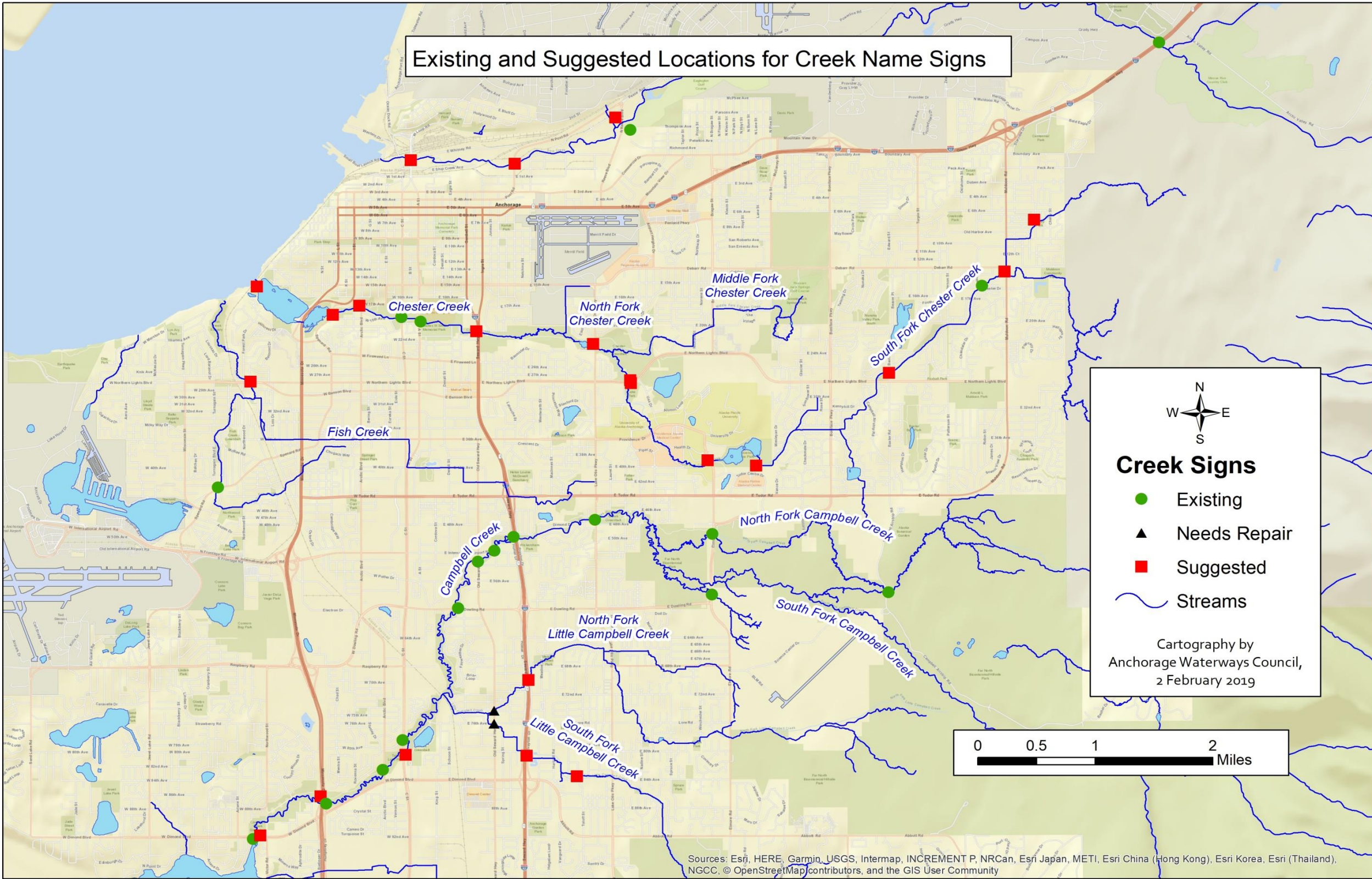
2. Ship Creek at Post Rd. Largely an industrial area, this is a popular bike trail as well.



3. Ship Creek at Reeve Blvd. One sign heading north is there (below), one going south would be a good addition. The condition of the northbound sign is poor and could use replacing.



Existing and Suggested Locations for Creek Name Signs



Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



ANCHORAGE WATERWAYS COUNCIL

P.O. Box 241774 • Anchorage, Alaska 99524-1774 • 907 272-7335 • anchoragecreeks.org

June 12, 2017

Dear Chester Creek Neighbor,

Thank you for reading this important information about the great creek that runs by your property. In Anchorage we are fortunate to have so many waterways that provide a variety of activities for recreation and getting close to nature. Nearly every waterway in the Anchorage “bowl” is anadromous, which means they have fish that hatch and eventually head to the ocean only to return again and spawn in their home waters. There are certain requirements for this process:

- clear water (free from sediment and other particles that impact the amount of light that can be absorbed);
- cool water temperatures which occur with intact overhead vegetation;
- high levels of dissolved oxygen which are helped by fast-running waters;
- a good range of pH readings; and
- a nice substrate of cobbles, rocks, gravel and sand with meanders that help provide the right habitat for fish and the aquatic insects that are their food.

More than 30 years ago, there were a lot of changes made to Anchorage as the city developed, and many of the creeks were actually moved, channelized, put into culverts, made into lakes (University Lake is an example), or worse. Fortunately, scientists and others see that a healthy and vibrant city should have waterways that are also healthy, and some of these changes are being undone.

The reason for this letter is to ask you all to be good creek stewards. There are several things that you can do near your property to help bring Chester Creek back to a nice healthy state. Probably one of the biggest positive effect you can have is, if you own pets, to clean up after them as dog poop washes down into the creek and raises its fecal coliform level. Water with high fecal coliform is not something you want to drink or get splashed into your mouth or eyes. Another is to not put anything on the creek bank or into the water, such as green waste and plant cuttings, because these break down and remove oxygen in the water.

There are many other actions you can take which are listed on the enclosed card, “How to live with a creek”. Please take a moment to read it, maybe post it on your refrigerator, discuss it with your family or housemates. We can make a positive difference in this area and other parts of Anchorage. It takes everyone helping in some capacity. Please consider the creek as part of the ambiance and value of your neighborhood and treat it well. This will benefit you, your neighbors, the people who live downstream, and the critters that live in and use the creek. And, by all means, contact us with concerns or questions at awc@anchoragecreeks.org.

Thank you,

Cherie Northon, Ph.D., Executive Director

APPENDIX B

How to Live With a Creek

The Municipality of Anchorage is about 2,000 mi² and has approximately 2,250 miles of creeks and rivers. These waterways are often listed as some of Anchorage's premier amenities. This handout endeavors to provide information on how to be a good neighbor to our creeks.

- ◆ **Be a steward for your local creek and keep an eye on it.** Report any issues online at anchoragecreeks.org and clean up any trash.
- ◆ **Don't alter the course of a creek.** Creeks have a mind of their own about where they want to go, which is protected by local, state, and federal law.
- ◆ **Stormwater and yard runoff, cigarette butts, pet waste, other pollutants and debris run directly into storm drains which lead to our creeks--NOT to the sewage plant.**
- ◆ **Don't water your driveway and paved areas, and don't overwater your yard.** Your yard only needs about 1" of water. Put an empty tuna can on the area you are watering, and when it is full--you have about 1" of water.
- ◆ **Sweep your driveway rather than power washing or hosing it.**
- ◆ **Direct your downspouts onto your yard and off of impermeable surfaces.** Also consider rain barrels and rain gardens to reduce yard runoff.
- ◆ **Use automatic car washes as their waste water is usually recycled and is directed into the sewage system--not our creeks.** If you wash at home, park your vehicle on grass or gravel, and use non-phosphate soap.
- ◆ **Ensure that storm drains and culverts are not clogged.** Obstructed culverts and storm drains can cause flooding and block fish passage.
- ◆ **Keep dogs and horses out of creeks and off of creek banks ESPECIALLY when salmon are spawning.** Bank trampling causes erosion and sediment to run off into waterways, which disturbs gravel beds where fish spawn and little ones grow.
- ◆ **Clean up pet waste because the fecal coliform bacteria found in it runs off into our creeks.** All the creeks in Anchorage (except Rabbit and Little Rabbit) are considered "impaired waters" due to fecal coliform contamination. Do your part to reduce this problem. **SCOOP-the-POOP!**



◆ **Protect and preserve shoreline vegetation and don't cut trees or remove vegetation within 25' of the creek.** This vegetation provides habitat, shade to keep the water cooler, protection from prey, and stabilization of the streambank. It also reduces bank erosion. Naturally fallen wood produces in-stream habitat and nutrients for fish and other aquatic organisms. Leave NATURAL vegetation in the creek.

◆ **Do not dump yard wastes into the creek or cut your lawn up to the creek's edge.** Yard waste contains chemical additives and high nitrogen and phosphorus. Rather than bag your grass clippings, leave them on the lawn as a source of fertilizing mulch. Yard waste that decomposes in streams and lakes will use up dissolved oxygen in the water that is essential for fish habitat. Leave native vegetation buffers creekside.

◆ **Don't disturb instream rocks or build dams and footbridges.** The undersides of rocks are habitat for macroinvertebrates, which are the food for fish, birds, and other aquatic organisms. Dams can block fish passage, and during high water events, dams and footbridges can catch debris and increase the likelihood of flooding in your yard.

◆ **Participate in the Anchorage Waterways Council's Annual Creek Cleanup (every spring), and become a member of the organization.** Memberships help support a variety of programs.

BE THE GUARDIAN OF YOUR CREEKS!



Anchorage Waterways Council is a non-profit 501 (c) (3) corporation that is funded by memberships, donations, and grants.

anchoragecreeks.org

907 272-7335

Follow us on Facebook at Anchorage Waterways Council



© 2009 Anchorage Waterways Council

The headwaters of Campbell Creek begin in a relatively pristine environment near an elevation of 5,000 ft. in the Chugach Mountains, and drain an approximately 78 sq. mile watershed into Turnagain Arm. Tributaries include the North and South Forks of Campbell Creek and the North and South Forks of Little Campbell Creek (including Craig Creek) for an overall length of about 112 miles. Campbell Creek itself is the longest and least disturbed stream in the Anchorage bowl. The lower reaches run through residential and industrial areas, yet the creek still supports natural runs of coho, pink, sockeye, chum, and chinook salmon. The Alaska Department of Fish and Game also stocks the creek with chinook and rainbow trout. Dolly Varden, slimy sculpin, stickleback, and blackfish are found in Campbell Creek as well.

The indigenous name for Campbell Creek is *Qin Cheghitnu* or "Crying Ridge Creek" from the Denai'na, the area's pre-European settlers. *Qin Cheghi* or "Crying Ridge" refers to Tanaina Peak in the Chugach Mountains, and it is thought to be a place of mourning (from Kan and Fall's 2003 *Shem Pete's Alaska*). In 1778 Captain James Cook, exploring in Turnagain Arm, claimed the area for King George III before he continued on his search for the Northwest Passage. Joseph Whidbey, sailing with Captain George Vancouver in 1794, named a western point of what is now modern-day Anchorage "Campbell Point". And, it is thought that Campbell Creek got its English name from this nomenclature.

Initially Campbell Creek was surrounded by an abundance of wetlands and ran unrestricted into Turnagain Arm. Since the settlement of Anchorage in 1915, many of its wetlands have been filled in and built upon, and the creek was dammed near its mouth in 1959 to create the 125-acre Campbell Lake. Wetlands are important for many reasons. They act as a sponge to absorb flood waters, provide important fish and wildlife habitat, serve as a breeding ground/nursery for many species, and improve water quality. For development purposes, the Municipality of Anchorage classifies wetlands as A (highest value), B (a combination of higher and lower values), and C (moderate value with development potential). Anchorage's website, www.muni.org, has more detailed information on these designations.



Wetland area in the Campbell Creek watershed

Nature Guide and Map of Campbell Creek Trail, Anchorage, Alaska



North Fork Campbell Creek



Fly Agaric Mushroom (*Amanita muscaria*)
Water and Tear-Resistant Paper - Perfect for Outdoors

There are other human alterations along Campbell and Little Campbell Creeks. Parts have been put into culverts and channels. At several locations stormwater empties directly (untreated) into the creeks as well as through some constructed sedimentation ponds that were built to help settle large amounts of silt before runoff enters the creek. Their designs have not always worked well, and they can contribute more sediment and other runoff pollution into our urban creeks. Increased incidents of juvenile fish mortality have been associated with higher levels of turbid water. The Minnesota Dr. sedimentation basin has been redesigned to better filter runoff before it goes into Campbell Creek.



Dead fish collected after high water events in Little Campbell Creek (USFWS photo)

Take a walk, run, or bike ride along the Campbell Creek trail and enjoy this wonderful gem of nature right in the midst of Anchorage. Interpretive signs are placed in several places along the trail to provide you with lots of information about the creek and its habitat. Enjoy!



Red-necked Grebe (*Podiceps grisegena*)
Waldron Lake



Black-billed Magpie (*Pica hudsonia*)



Belted Kingfisher (*Megasceryle alcyon*)



Minnesota Sedimentation basin



Lesser Yellowlegs (*Tringa flavipes*)



Black-billed Magpie nests (colony)



Three-spine Stickleback (*Gasterosteus aculeatus*)



Mallards (*Anas platyrhynchos*) Little Campbell Creek Fish Alcove



Canada Geese (*Branta canadensis*)



Common Redpoll (*Carduelis flammea*)



Red-breasted Nuthatch (*Sitta canadensis*)



Little Campbell Creek stream bank vegetation (note juvenile fish near branches)



Coho salmon (fry) (*Oncorhynchus kisutch*)



Spawning Coho salmon in Campbell Creek



Coho salmon in Campbell Creek after spawning (contributing to nutrients)



Macro-invertebrates collected from Little Campbell Creek
These stream insects are good indicators of a waterway's health as some can only survive in less polluted water. The bugs are collected in nets and then sorted and identified, which leads to a relatively inexpensive yet reliable characterization of water quality. They are also important as food for juvenile fish.



AWC Fish Refuge - 2007



AWC Fish Refuge - 2008

As part of the Little Campbell Creek Rescue, Anchorage Waterways Council constructed a fish refuge in 2007 on the North Fork of Little Campbell Creek in an area prone to large die-offs of juvenile salmonids. The goal is to provide a place for fish to escape the highly turbid and polluted waters that occur during heavy rain events and spring breakup. Please feel free to visit the alcove, which is located at 58th near Brayton in Meadow Park. There is plenty of wildlife to view in that area, such as moose, beaver, muskrat, geese, ducks, and fish.

What you can do to help our creeks!

1. Clean up after your pet (Scoop the Poop)!
2. Only clean water down storm drains.
3. Become a **Waterway Watcher** and report any concerns to the Anchorage Waterways Council at 907 272-7335 or on our website.



Prickly Rose (*Rosa acicularis*)



Northern Yarrow (*Achillea borealis*)



Common Fireweed (*Epiobium angustifolium*)



Cow parsnip (*Heraclium lanatum*)



Alder (*Alnus incana*)

This guide provides information on some of the common plants, animal, and fish in and around Campbell Creek. It is not considered all inclusive. Photo credits: All photos are by Dr. Cherie Northon with the exception of the Belted Kingfisher, courtesy of Tom Munson, and the Orange Hawkweed, courtesy of L.M. Landry. Funding was provided by the U.S. Fish and Wildlife Field Office, Anchorage, Alaska. Produced by Anchorage Waterways Council, Anchorage, Alaska. www.anchoragerecreeks.org



Marsh Violet (*Viola epipsila*)



Wild Geranium (*Geranium erianthum*)



Shaggy Mane (*Coprinus comatus*)



High Bush Cranberry (*Viburnum edule*)



Devil's Club bud (*Echinopanax horridum*)



Devil's Club and Horsetail (*Equisetum arvense*)



Common Toadflax, Butter & Eggs (*Linaria vulgaris*)



Bird Vetch (*Vicia cracca*)

Some introduced plants or "invasives" pose a serious threat to Alaska's agriculture, tourism, wildlife, fisheries, and subsistence resources. Please do your part in keeping them from spreading and in helping to eradicate them. For more information:

www.fs.fed.us/r10/spl/thp



Orange Hawkweed (*Hieracium aurantiacum*)



Dandelion (*Taraxacum officinale*)



Oxeye Daisy (*Leucanthemum vulgare*)



Moose (*Alces alces*)



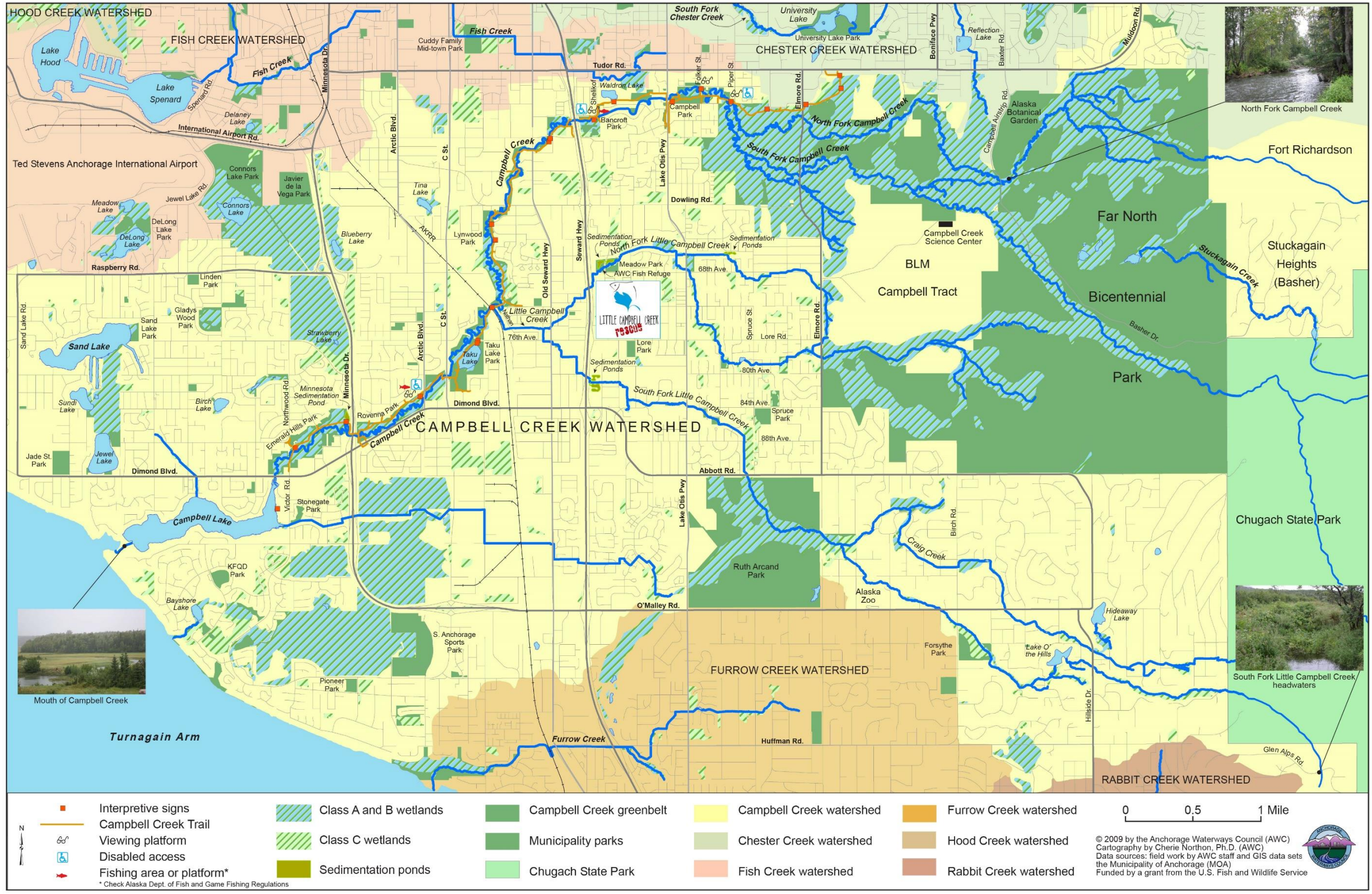
Beaver (*Castor canadensis*)



Brown bear (*Ursus arctos*)



Black Bear (*Ursus americanus*)



Nature Guide and Map of Campbell Creek Trail, side 1