3 NATURAL ENVIRONMENT AFFECTED ENVIRONMENT AND IMPACTS

3.1 Earth 463-60-302

(1) The applicant shall provide detailed descriptions of the existing environment, project impacts, and mitigation measures for the following:

(a) Geology. The application shall include the results of a comprehensive geologic survey showing conditions at the site, the nature of foundation materials, and potential seismic activities.

3.1.1 Affected Environment for Geology

3.1.1.1 General County

Kittitas Valley is at the eastern margin of the Yakima River Valley in a structural basin between the Cascade Mountains and the Columbia Plateau (Alt and Hyndman 1995; McKee 1972). In April 2017 TUUSSO Energy, LLC (TUUSSO), conducted a comprehensive geologic survey showing conditions at the Columbia Solar Project sites, the nature of foundation materials, and potential seismic activities. The reports summarizing this study are included in Appendices G through K (Swiftwater Environmental & Geotechnical [Swiftwater] 2017a, 2017b, 2017c, 2017d, 2017e). Two test borings were drilled at each project site to a maximum depth of 16.5 feet below existing grade. The boring locations were selected to attempt to be representative of each project site. A general description of soils and groundwater conditions is included below in Sections 3.1.4 and 3.3.11, respectively.

According to Waitt (1979), the Columbia Solar Project sites and surrounding area are underlain by Qs (Quaternary Alluvium, Sidestream Facies) soil which is characterized as downstream aggradation deposits with their source being upstream glacial moraines located in the west and northwest areas of the Kittitas Valley. These deposits consist primarily of basaltic gravels and sands with varying amounts of silt and clay minerals. The gravel varies from fine to coarse. These undifferentiated sandy gravel deposits are overlain by varying thicknesses of topsoil, weathered sandy gravel horizons, and loessal (wind) deposits that comprise silty sand and sandy silt units observed from the surface down to the relatively un-weathered, partially cemented gravel. The gravel deposits consistently displayed some level of cementation that is most likely caused by breakdown of the basaltic rock to silt and clay minerals and then subsequent relithification under normal loading. The soils observed in the borings at the sites were consistent with this mapping.

In the second borings at each project site, Swiftwater encountered a fine-grained, reddish brown to tan silty clay to clayey silt unit underlying the sandy gravel deposits. Swiftwater contacted Dr. Nick Zentner, Professor of Geological Sciences at Central Washington University about this unit. Dr. Zentner indicated that this layer is probably an alluvial deposit that develops in slow-water areas and ox-bows proximate to streams and to the Yakima River. He stated that these deposits are horizontally discontinuous and are found throughout the valley. The deposit on each project site is thus likely limited in lateral extent, especially given that it was not encountered in the first borings at any of the sites.

3.1.1.2 Solar Project Sites

Camas Solar Project Site

Surface geology in the Camas Solar Project site vicinity consists of Holocene river and creek alluvium and windblown loess of the Palouse Formation overlying Pleistocene Thorp Gravels. Recent alluvium deposited by Naneum and Wilson Creeks covers most of the project area, except the northeast corner where an older alluvial terrace of the ancestral Yakima River is present.

Fumaria Solar Project Site

The Fumaria Solar Project site is within the Kittitas Valley on the east side of the river on a Pliocene epoch gravel deposit called the Thorp Gravels.

Fumaria Solar Project Generation Tie Line

The Fumaria Solar Project generation tie line crosses several adjacent landforms, including ridges of Pleistocene epoch alpine glacial sediment of the Kittitas Drift (Swauk Prairie and Indian John subdrifts) and the Lakedale Drift (Bullfrog subdrift). Quaternary creek alluvium is mapped in the swales between the glacial ridges and at the point of intersection of the generation tie line with the existing grid (Baker et al. 1991).

Penstemon Solar Project Site

Surface geology in the Penstemon Solar Project site vicinity consists of Holocene creek alluvium and wind-blown loess of the Palouse Formation overlying Pleistocene Thorp Gravels. Alluvium deposited by Coleman Creek covers most of the project site.

Typha Solar Project Site

Surface geology in the Typha Solar Project site vicinity consists of Holocene river alluvium and wind-blown loess overlying older Pleistocene gravels. Recent alluvium deposited by the Yakima River and its major local tributary Robinson Creek covers most of the project site, and Thorp Highway South follows an older alluvial terrace southwest of the project.

Urtica Solar Project Site

Surface geology in the Urtica Solar Project site vicinity consists of Pleistocene-aged wind-blown loess and ash on top of Holocene-aged, water-lain alluvium, both overlying older glacial and pre-glacial gravels (Baker et al. 1991). Quaternary terraced sediments that include glacial sediment, older alluvium, and uplifted, partially lithified coastal marine and estuarine deposits form the substrate of the project site. Flows of the Middle Miocene Grande Ronde Basalt make up the hills just south of the project site and younger alluvium is in the valley floor to the north.

3.1.2 Impacts to Geology

3.1.2.1 General County

Detailed plans and specifications for the Columbia Solar Projects were not available prior to completion of the geologic survey, nor was a grading plan. However, based on Swiftwater's review of similar projects, they believed that very little grading would be required to construct the solar panel racks (Swiftwater 2017). Standard H-beam penetration for this type of installation is 6 to 8 feet below grade, and based on their survey, Swiftwater determined that from a geotechnical standpoint construction of the proposed solar projects would be feasible provided that strong enough vertical H-beam supports are installed. Once the loading for the piles has been determined, final bearing capacities and embedment lengths would be computed. The density of the soil matrix combined with the weight of the hammer might possibly damage the pile, leading to less than satisfactory bearing capacity values. In this case, it would be prudent to complete several test borings to determine whether the piles could be placed without damage. The purpose of this testing is two-fold: 1) it is necessary to determine that the piles can be driven into the bearing soils to the required embedment depth without damaging the pile and 2) it is required to load test the resulting piles to determine that adequate bearing capacity is being developed.

Wind Loading

The Kittitas Valley, particularly the Ellensburg area, is known for year-round windy conditions. This analysis assumed that solar panels that would be used for the Columbia Solar Projects would be 8 feet long by 4 feet wide, i.e., 32-square-foot panels. Ultimately, the panels would be 6.5 feet long by 3.5 feet wide, i.e., approximately 23-square-foot panels. The wind pressure loads in Table 3.1-1 were calculated using maximum wind speeds on vertically-oriented panels (Swiftwater 2017a).

Table 3.1-1. Estimated Wind Pressure Loads on Solar Panels Calculated Using Maximum Wind Speeds

Site-specific Wind Speed Value	Wind Speed (miles per hour)	Wind Pressure (lbs)
American Society of Civil Engineers (ASCE) 7-93 Wind speed (fastest mile)	70	593
ASCE 7-05 Wind speed (3-second peak gust)	85	878
ASCE 7-10 100-year Mean Recurrence Interval	91	1006
ASCE 7-10 Risk Category II	110	1470

Because the panels' current design is smaller than the dimensions used in the analysis, and the panels typically would not be oriented vertically and could be shifted horizontally before or during a high-wind event, the pressure on the panels (and therefore the H-beams) is likely to be less than these estimates. As a result, potential impacts to geology would be permanent, but minimal.

Seismic Activities

No seismic activities are planned as part of the Columbia Solar Projects.

3.1.2.2 Solar Project Sites

Camas Solar Project Site

The zone of appropriate embedment depth for the H-beams on the Camas Solar Project site is about 3 to 4 feet below grade to 16 feet below grade (Swiftwater 2017a).

Fumaria Solar Project Site

From the surface, drilling was difficult in both of the Fumaria Solar Project borings, indicating that embedment soils were present from grade down to 16 feet (Swiftwater 2017b).

Penstemon Solar Project Site

In both of the Penstemon Solar Project borings, drilling became more difficult with depth, indicating increasing density, increasing cementation, or both. Embedment depths were present from 3 feet below grade (Swiftwater 2017c).

Typha Solar Project Site

In both of the Typha Solar Project borings, drilling was difficult beginning at about 1.5 to 2 feet below grade, indicating that adequate embedment soils were present from about 2 feet below grade (Swiftwater 2017d).

Urtica Solar Project Site

In both of the Urtica Solar Project borings, drilling was difficult beginning at about 3.5 to 4 feet below grade, indicating that adequate embedment soils were present from about 3 to 4 feet below grade (Swiftwater 2017e).

3.1.3 Mitigation Measures for Geology

Complete several test borings to determine if the piles can be placed without damage. The purpose of this testing is two-fold: 1) it is necessary to determine that the piles can be driven into the bearing soils to the required embedment depth without damaging the pile, and 2) it is required in order to load test the resulting piles to determine that adequate bearing capacity is being developed.

(b) Soils. The application shall describe all procedures to be utilized to minimize erosion and other adverse consequences during the removal of vegetation, excavation of borrow pits, foundations and trenches, disposal of surplus materials, and construction of earth fills. The location of such activities shall be described and the quantities of material shall be indicated.

3.1.4 Affected Environment for Soils

3.1.4.1 General County

Most soils in the vicinity of the Columbia Solar Project sites have a cemented zone at depth, commonly called caliche, and a blanket of loess and volcanic ash across the surface (Gentry 2010). In April 2017 TUUSSO conducted a comprehensive geologic survey showing conditions at the solar project sites. The reports summarizing this study are included in Appendices G through K (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). Two test borings were drilled at each project site to a maximum depth of 16.5 feet below existing grade. The boring locations were selected to be representative of each project site as possible. The soil profiles in all of the borings were very consistent and based on the depositional environment in available mapping and also on the locally flat topography, the soil profile across each site is likely similar to those observed in the boring profiles. The boring logs contain detailed descriptions of soils at each project site (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e).

3.1.4.2 Solar Project Sites

Camas Solar Project Site

Soils mapped on the Camas Solar Project site include Mitta ashy silt loam, Nosal ashy silt loam, and Opnish ashy loam that form on floodplains and alluvial fan landforms within alluvium mixed with volcanic ash (Gentry 2010). Hydrologic Soil Group D was used in the hydrologic modeling because Nosal ashy silt loam is classified as Group D for undrained areas (detailed in Section 3.3.5).

Boring C-1 was completed in the north-northwest quadrant of the Camas Solar Project site, immediately to the south and west of the barn and staging area and Boring C-2 was located in the southeast quadrant of the site west of Little Naneum Creek (Figure 3.1.-1) (Swiftwater 2017a).

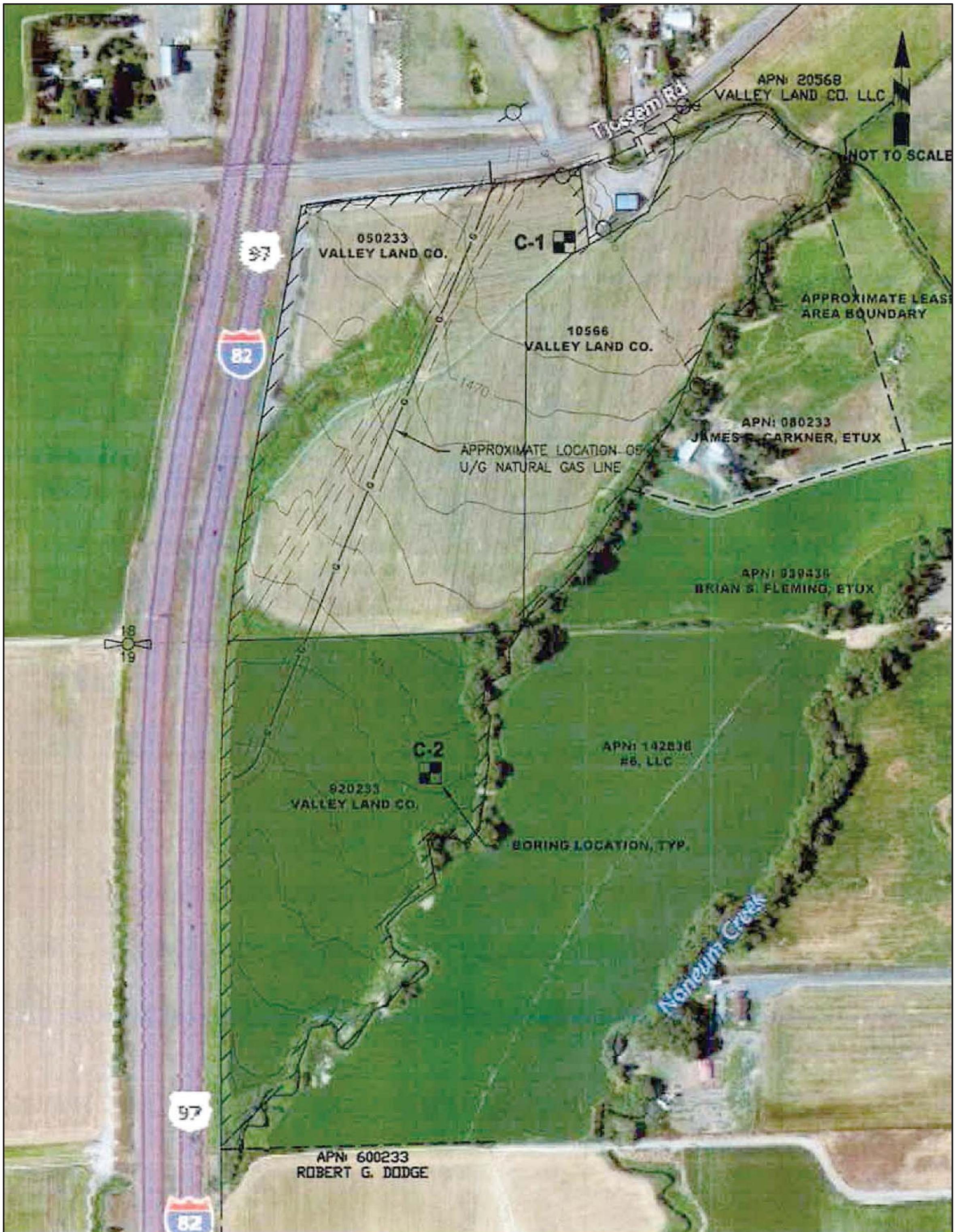

FIG. 2
CAMAS SITE
TEST BORING LOCATIONS

Swiftwater
Environmental & Geotechnical
Western Washington Division
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Figure 3.1-1. Boring locations at the Camas Solar Project site.

In Boring C-1, Swiftwater observed less than 6 inches of very dark brown highly organic sod underlain by a brown, moist medium dense topsoil-like loam soil with varying amounts of fine gravel. Swiftwater encountered this material to a depth of about 4 feet below grade. Drilling became very hard at about 4.5 to 5 feet below grade and the Standard Penetration Test (SPT) sample at 5.0 feet revealed a gray to dark gray, silty, sandy, partially cemented gravel with thin (<1-inch) fine sand seams that contained perched groundwater. N-values in this material was in excess of 40 and remained above that until termination of the hole. In Boring C-2, Swiftwater observed a soil profile that was nearly identical to that found in Boring C-1. A 6-inch-thick, wet sand seam was observed at 10.0 to 11.0 feet below grade. The entire soil profile of the site is moisture sensitive.

In both borings, Swiftwater observed that drilling grew difficult with depth beginning at about 3.5 to 4 feet below grade, indicating that adequate embedment soils are present from about 3 to 4 feet below grade down to the depth of the test borings.

Fumaria Solar Project Site

Soils mapped on the Fumaria Solar Project site include the Reeser-Reelow-Sketter complex, which form in alluvium and glacial drift with an influence of loess and volcanic ash on remnant alluvial fan landforms and typically extend to 1.8 feet below the surface. Hydrologic Soil Group D was used in the hydrologic modeling (detailed in Section 3.3.5).

Boring F-1 was completed in the north-northwestern quadrant of the Fumaria Solar Project site and Boring F-2 was located in the southeastern quadrant of the solar project site (Figure 3.1.-2) (Swiftwater 2017b). From the surface, drilling was difficult in both borings, indicating that embedment soils are present from the start of installation of the piles.

In Boring F-1, less than 6 inches to 1 to 1.5 feet of dark brown topsoil-like material was observed. It was a moist, very loose to loose, silty sand to sandy silt with varying amounts of gravel. Immediately underlying the very thin topsoil unit with a SPT (N-value) of 88, a dark gray to light gray, slightly moist to moist, very dense and partially cemented sandy gravel with varying amounts of silt was observed. N-values observed below 13 feet were about 28. This is on the high end of dense, but should not cause problems for pile installation because of the depth of the material.

In Boring F-2, a soil profile nearly identical to that found in F-1 was observed; the only differences being a thin (2- to 3-inch) unit of poorly developed topsoil and a slight reduction in density below 13 feet. Minor seepage was observed in Boring F-2 at 6.0 to 7.0 in a reddish sand seam. The entire soil profile of the site is moisture sensitive. Similar to F-1, there should not be any problems for pile installation because the dense material depth is below that of the planned pile installation depth.

Fumaria Solar Project Generation Tie Line

Soils mapped along the proposed Fumaria Solar Project generation tie line include Nanum, Manastash, Durtash, Metmill, and Brysill soils that form in alluvium mixed with ash on remnant alluvial fan and old terrace landforms. Soils mapped at the Reecer and Dry Creek crossings include Ackna, Brickmill, Manastash, Metmill, Nanum, Nosal, and Reeser soils that form in alluvium mixed with loess and ash on alluvial fan and terrace landforms, as well as soils of the Weirman-Kayak-Zillhah complex that form in alluvium on floodplains. The alluvial soils extend from 1.3 to 3.7 feet below the modern surface.

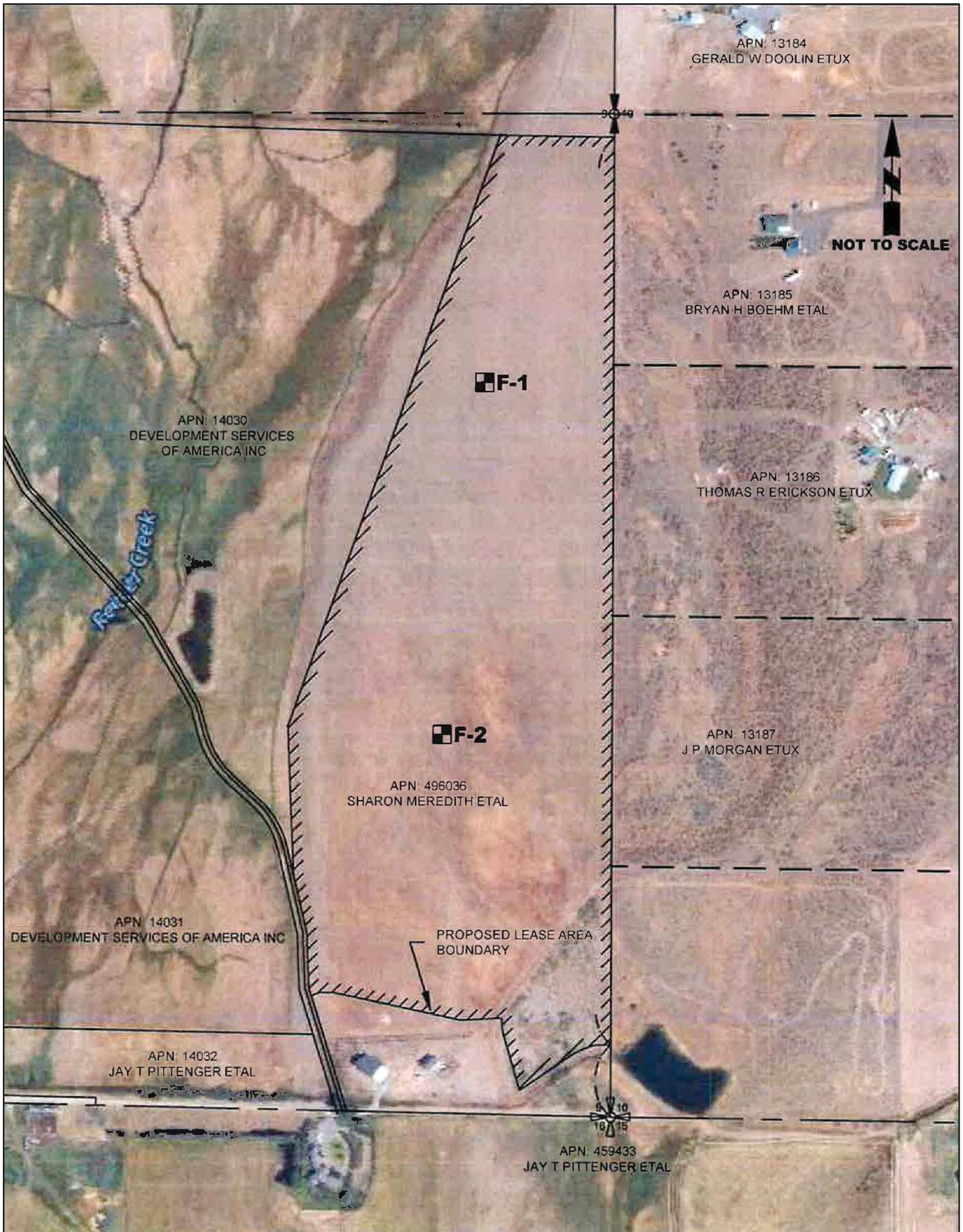

FIG. 2
FUMARIA SITE
TEST BORING LOCATIONS

Swiftwater
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Figure 3.1-2. Boring locations at the Fumaria Solar Project site.

Penstemon Solar Project Site

Soils in the west third of the Penstemon Solar Project site is mapped as the Nack-Brickmill complex. Soil in the middle of project area is mapped as Mitta ashy silt loam. Soil in the east third of project area is mapped as Deedale clay loam. These soils form in alluvium mixed with volcanic ash on alluvial fan landforms and floodplain landforms (Gentry 2010). Hydrologic Soil Group D was used in the hydrologic modeling because some of these soils are either classified as Group D or are Group D when undrained (detailed in Section 3.3.5).

Boring P-1 was completed in the northwestern quadrant of the Penstemon Solar Project site and Boring P-2 was located in the southeastern quadrant of the site (Figure 3.1-3) (Swiftwater 2017c).

In Boring P-1, 1.5 feet of dark brown topsoil-like material consisting of a moist, very loose to loose silty sand to sandy silt with varying amounts of gravel was observed. Immediately underlying the topsoil unit a dark gray to light gray, slightly moist to moist, very dense and partially cemented sandy gravel with varying amounts of silt was observed. Below about 10 feet, thin (less than 6 inches) reddish-brown fine sand seams with minor amounts of perched groundwater were observed. This boring was terminated in the sandy gravel unit. The soil profile in P-1 was nearly identical to that found in P-2, the only difference being a reddish-brown, stiff to very stiff, silty clay to clayey silt unit below about 12.5 feet.

In both borings, drilling became more difficult with depth indicating increasing density, increasing cementation, or both. The upper topsoil unit is moisture sensitive.

Typha Solar Project Site

Soils mapped on the Typha Solar Project site include Nosal ashy silt loam, Weirman gravelly sandy loam, and soils of the Weirman-Kayak-Zillah complex that form in alluvium on flood plain landforms (Gentry 2010). Hydrologic Soil Group D was used in the hydrologic modeling because some of these soils are classified as Group D when undrained (detailed in Section 3.3.5).

Boring T-1 was completed in the south-central area of the Typha Solar Project site, and Boring T-2 was located in the northeast quadrant of the site, west of the Yakima River (Figure 3.1-4) (Swiftwater 2017d).

In Boring T-1, less than 6 inches of very dark brown, highly organic sod underlain by a brown, moist medium dense gravelly sand to sandy gravel with a trace to some silt and scattered fine organics (e.g., fine roots) was observed. Drilling was very hard below about 1.5 feet with a color change to gray. The surficial SPT N-value was 40. There was cementation in the sandy gravel to gravelly sand, and the same material was observed to the final depth of the boring. All N-values equaled or exceeded 50. At 6.5 feet below grade, there was a 6-inch silty sand seam with perched groundwater seepage. The seepage was not continuous.

A soil profile that was nearly identical to that found in T-1 was observed in Boring T-2, including the 6-inch silty sand seam with perched groundwater seepage. T-2 was terminated in the gray to dark gray silty sand to sandy silt unit. SPT N-values were consistent at 50.

In both borings, drilling was difficult beginning at about 1.5 to 2 feet below grade indicating that adequate embedment soils are present from about 2 feet below grade.

FIG. 2
PENSTEMON SITE
TEST BORING LOCATIONS

Swiftwater
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Eastern Washington Division
407 Swiftwater Blvd., Suite A • Cle Elum, WA 98922 • Phone: (425) 321-0787

Figure 3.1-3. Boring locations at the Penstemon Solar Project site.

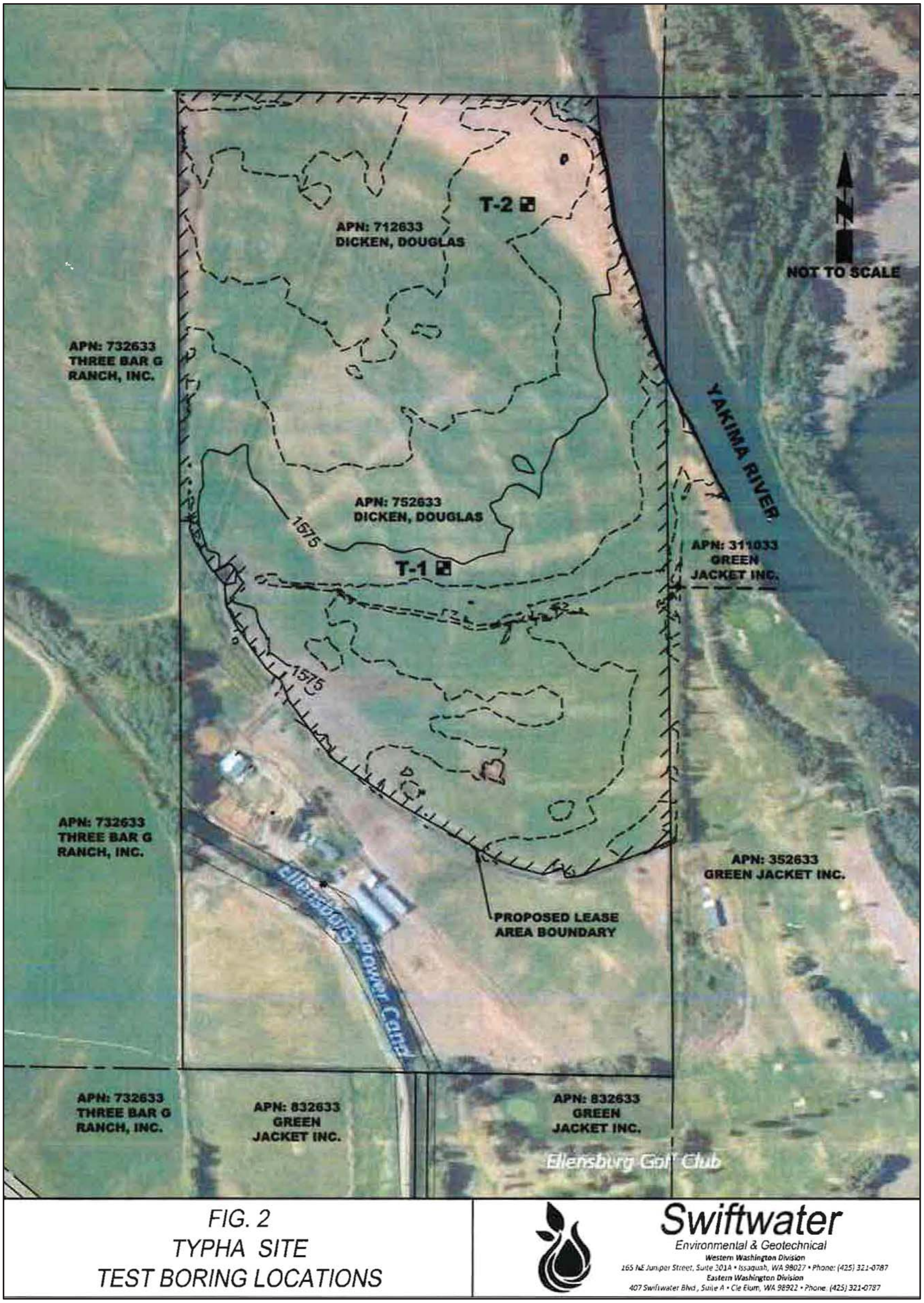

Figure 3.1-4. Boring locations at the Typha Solar Project site.

Urtica Solar Project Site

The Urtica Solar Project site is composed of Nanum ashy loam, Brickmill gravelly ashy loam, Ackna Ashy loam, and Brysill cobbly ashy loam (Natural Resources Conservation Service [NRCS] 2017a). Hydrologic Soil Group D was used in the hydrologic modeling because Nanum ashy loam is classified as Group D for undrained areas (detailed in Section 3.3.5)

Boring U-1 was completed in the northwest quadrant of the Urtica Solar Project site, northwest of the ponds and Boring U-2 was located in the south central quadrant of the site (Figure 3.1-5) (Swiftwater 2017e).

In each boring, there was a thin topsoil layer consisting of a brown silty fine sand with scattered organics that extended to a depth of about 1.5 to 4 feet below grade and consisted of a topsoil-like loamy material. This material would not be suitable for embedment or for lateral force. At about 4.5 to 5 feet below grade drilling became very hard and the SPT sample at 5 feet revealed a gray to dark gray silty sandy, partially cemented gravel. N-values in this material were in excess of 40 and remained there until termination of the hole. The soil profile in Boring U-2 was nearly identical to that found in U-1.

In both borings, drilling was difficult beginning at about 3.5 to 4 feet below grade indicating that adequate embedment soils are present from about 3 to 4 feet below grade.

3.1.5 Impacts to Soils

The following sections describe all procedures to be utilized to minimize erosion and other adverse consequences during the removal of vegetation, excavation of foundations and trenches (no borrow pits are planned), disposal of surplus materials, and construction of earth fills. The Columbia Solar Project would result in temporary minor impacts to soils. For each Columbia Solar Project site, the location of such activities is described in detail and shown in map figures in Appendix L.

3.1.5.1 Infiltration and Temporary Erosion and Sedimentation Control

TUUSSO would implement applicable stormwater guidelines and best management practices (BMPs) for eastern Washington to reduce or eliminate concentrated stormwater runoff and erosion on the Columbia Solar Projects. These BMPs would also help limit the introduction of pollutants/contamination into the arid-land and rangeland soils present at the solar project sites. Additional details regarding BMPs can be found in Section 3.1.6 and would be part of the SWPPP.

Construction of the Columbia Solar Project arrays could create a minor increase in the total and effective impervious area of each site that would be equivalent to the area of the solar panel footings and associated infrastructure. There would also be an increase in less pervious area because of the proposed gravel access roads on each solar project site.

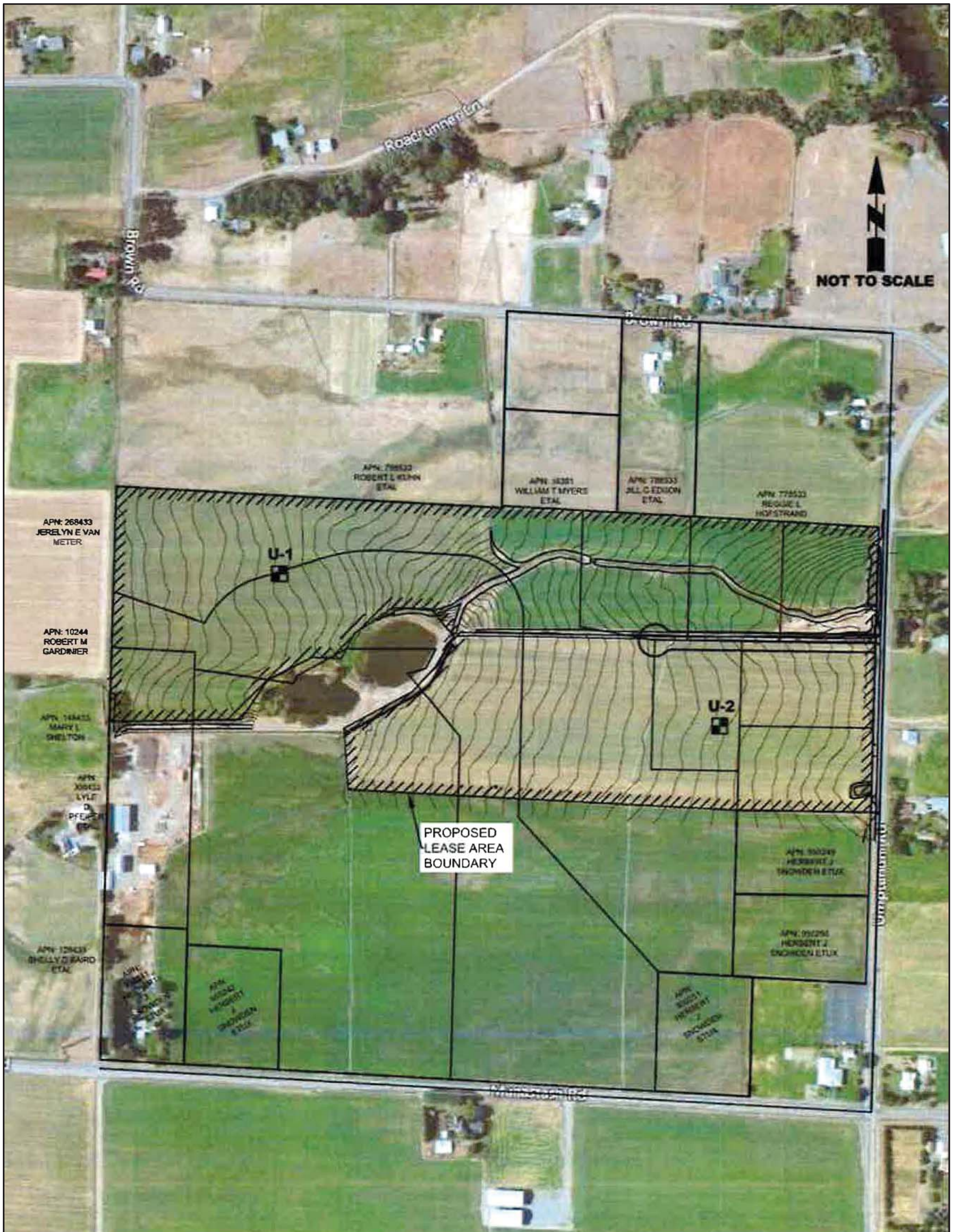

FIG. 2
URTICA SITE
TEST BORING LOCATIONS

Swiftwater
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Western Washington Division
165 NE Juniper Street, Suite 201A • Issaquah, WA 98027 • Phone: (425) 321-0787
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Figure 3.1-5. Boring locations at the Urtica Solar Project site.

Based on the results of the geotechnical studies, infiltration into the upper, topsoil-like silty sand/sandy silt soils at the Columbia Solar Project sites is feasible and ongoing (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). The solar project sites have been cultivated using flood irrigation methods, and the irrigation water percolates into the soil and is stored above the underlying relatively impervious layer found throughout the valley. The soils are capable of allowing stormwater to infiltrate during an average year (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). The solar project sites are located in Climate Region 2 – Central Basin and receive an average of about 8 inches of precipitation per year, some of it in the form of snow. Given the relatively low precipitation in the area, combined with the natural permeability of the upper soil horizon, infiltration of normal stormwater amounts would occur, and normal levels of stormwater would not be concentrated to a significant extent on the solar project sites (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). As a result, there would be permanent minor impacts to soils.

3.1.5.2 Stripping

No well-developed sod or heavily organic topsoil layers were observed at the Columbia Solar Project sites because of ongoing cultivation, thus stripping should not be required (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). If a topsoil horizon is observed in areas where maintenance roads are proposed, the topsoil would be removed down to mineral soil and replaced with crushed rock or structural fill. Topsoil strippings could be stockpiled for use in non-structural areas, as desired, but would not be allowed to mix with soils that would be used for structural fill.

3.1.5.3 Native Soils and Imported Soils

At least the upper units of the soil profile at each Columbia Solar Project site, and for some sites the entire soil profile, are moisture-sensitive and those soils would be difficult to use as structural fill during the rainy winter and spring months. The underlying partially cemented sandy gravel soils would be less moisture sensitive, but natural variability of the fine-grained fraction (e.g., silts and clay minerals) might cause these soils to be moisture sensitive as well (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). However, if moisture content is near optimum, the soil could be used as compacted structural fill. Excavated site soils would be stockpiled and covered immediately if they are to be saved and used as structural fill. If the soils are above optimum moisture content, it may be possible to aerate them to reduce moisture content. This is possible during the warmer summer months, but it is difficult to achieve uniform moisture content. It may also be possible to use Portland cement as an admixture to reduce moisture content. If the site soils cannot be adequately compacted, it may be necessary to use imported soil for structural fill. Imported soil would be a well-graded granular mineral soil with fines content below 5% and should be at or slightly above the optimum moisture content. If construction of the Columbia Solar Projects is scheduled to occur during periods where precipitation is expected, a contingency would be built into the solar projects for imported soil/crushed rock base (CRB) or other imported structural fill.

3.1.5.4 Subgrade Preparation

Disturbed native soil would not be used in structural areas (e.g., maintenance road prism or inverter foundations). The fill would be compacted in accordance with the structural fill specifications to reach design grade. CRB can also be placed and compacted. If necessary, a local materials testing firm would sample soils to be used as structural fill, collect samples for Proctor testing, and provide compaction testing as structural fill is placed.

3.1.5.5 Structural Fill

Structural fill on the Columbia Solar Projects would be placed in thin lifts and compacted to design specifications, to support overlying structures with little or no post-construction movement. It is typically used under foundations, slabs, and roads; in utility trenches; behind retaining walls; and in constructed slopes. Compaction specifications may vary, especially in utility trenches under public or private roads, as specified by the local jurisdiction. Moisture content is critical to achieving adequate densification (compaction) and the upper units of all the Columbia Solar Project sites' soils is very moisture sensitive, i.e., a small change in moisture content can make them unusable as structural fill. If the soils are stockpiled and not covered, precipitation would make them difficult or impossible to use as structural fill (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e).

3.1.5.6 Foundations

The Columbia Solar Project inverter foundations would be supported on undisturbed, competent, native sandy gravel soils found below the upper topsoil-like horizon, on re-compacted native soils, structural fill, or CRB (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). Where loose or unsuitable soils are encountered at design subgrade, it would be necessary to re-compact the native soils to structural fill specifications, or to over-excavate down to competent native soils and then place structural fill or CRB up to design subgrade. The following parameters may be used for solar project design:

- Allowable soil bearing capacity: 1,500 pounds per square foot (psf)
- Passive earth pressure: 300 pound force per cubic foot (pcf) (equivalent fluid)
- Coefficient of friction: 0.35

A one-third increase in the allowable soil bearing capacity would be assumed for short-term wind and seismic loading conditions. The passive pressure and friction values above include a factor of safety of at least 1.5. With anticipated structural loads, total settlement of 1 inch and differential settlement of 0.5 inch would be anticipated. Most settlement would occur during construction, as dead loads are applied.

3.1.5.7 Seismic Design

The groundwater and native soil conditions (upper native silty sand soils and the underlying partially cemented sandy gravels) at the Columbia Solar Project sites have very low susceptibility to liquefaction (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). Liquefaction is a phenomenon wherein loose, saturated soils suddenly lose shear strength and begin to behave as a fluid. Liquefaction typically occurs under seismic loading conditions and if structures are supported on soils that liquefy, structural damage can occur.

3.1.5.8 Excavations/Slopes

Soils observed in the upper 1.5 to 2 feet of the test borings at all of the Columbia Solar Project sites would be classified as Occupational Safety and Health Administration/Washington Industrial Safety and Health Act (OSHA/WISHA) Type C. Temporary excavations like utility excavations and foundation excavations with heights in excess of 4 feet would be sloped to no steeper than 1.5H:1V. If seepage is observed in these excavations, they may need to be sloped at 2H:1V to prevent sloughing due to seepage pressure. The dense native sandy gravel soil observed below about 2 feet would be considered OSHA/WISHA Type B soils and would be laid back at 1H:1V.

3.1.5.9 Utility Support, Trenches, and Trench Backfill

Columbia Solar Project site soils would be suitable for support of solar panel infrastructure and utilities (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). In shallower trenches, particularly shallower than about 2 feet, it may be necessary to over-excavate loose or wet soil down to suitable, stable soils, and then replace it with compacted structural fill or CRB. Groundwater seepage may be encountered in trench walls, particularly if deeper than 2 to 3 feet. Seepage may cause caving of the trench walls and temporary shoring may be required. Dewatering measures may also be needed to control seepage.

Site soils may be suitable for use as backfill, provided the moisture content is optimal (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e), as determined in the laboratory. Trench backfill would be placed and compacted in accordance with the structural fill specifications (described above). CRB would be placed in 6- to 8-inch lifts and compacted with a plate compactor or other compaction device.

3.1.6 Mitigation Measures for Soils

The following mitigation measures would be used:

- Planned BMPs include those from stormwater management guidelines applicable to eastern Washington.
- If excavated site soils are to be used as structural fill, they would be protected from moisture while stockpiled.
- Stockpiled topsoil would not be mixed with structural fill, if it is planned for use in non-structural areas.
- Temporary excavations like utility excavations and foundation excavations with heights in excess of 4 feet would be sloped no steeper than 1.5H:1V. If seepage is observed in these excavations, they may need to be sloped at 2H:1V to prevent sloughing due to seepage pressure. Dewatering measures may also be needed to control seepage.
- Temporary construction ingress and egress would be completed prior to the start of ongoing construction traffic at the solar project sites. A temporary construction entrance would be constructed of 8 to 12 inches of quarry spalls. If the soils in the entrance locations are soft, a layer of geotextile fabric would be laid down as a barrier prior to placement of quarry spalls. The quarry spalls would provide a stable entrance/exit to the sites and would limit tracking of mud onto the existing public and private roads during and after wet weather. Infiltration and Temporary Erosion and Sedimentation Control (TESC) measures would consist of installation of silt fencing as needed around the site entrances, around the perimeter of the low side of the sites, and at discharge points where sediment-laden surface water might enter off-site drainage features. Because the solar project sites are flat and slope very gently to the south, silt fencing would probably not be necessary at the southern perimeters.

(c) Topography. The application shall include contour maps showing the original topography and any changes likely to occur as a result of energy facility construction and related activities. Contour maps showing proposed shoreline or channel changes shall also be furnished.

3.1.7 Affected Environment for Topography

The Columbia Solar Project sites are all relatively flat (see figures in Section 3.3.4.2).

3.1.7.1 Camas Solar Project Site

The Camas Solar Project site is sloped gently from north to south with an overall inclination of about 0.5%.

3.1.7.2 Fumaria Solar Project Site

The Fumaria Solar Project site is sloped gently north to south with an overall inclination of about 2%.

3.1.7.3 Fumaria Solar Project Generation Tie Line

The Fumaria Solar Project generation tie line would originate from the southwestern corner of the Fumaria Solar Project site and would connect to the existing Puget Sound Energy (PSE) distribution transmission lines (or the PSE substation) approximately 2.6 miles away to the southwest. The path is illustrated in Appendix L, and up to 0.9 mile of it would require new wooden poles or undergrounded conductor. The remaining length of the new generation tie line would be installed along existing electrical rights-of-way (ROWs).

3.1.7.4 Penstemon Solar Project Site

The Penstemon Solar Project site is flat with a very slight inclination from north to south.

3.1.7.5 Typha Solar Project Site

The Typha Solar Project site is irregularly shaped with the north and east site boundaries defined by the Yakima River. The site surface is irregular with an overall topography change of about 10 feet. This area appears to be ancient floodplain and old meanders and oxbows are visible across the project site.

3.1.7.6 Typha Solar Project Generation Tie Line

The generation tie line would originate from the southwestern corner of the Typha Solar Project site and share wooden poles with existing electric distribution lines that cross south along an existing access road, crossing the EP Canal three times, passing through the Ellensburg Golf and Country Club, to connect to the existing PSE distribution line along Thorp Highway South. The approximately 0.5-mile path is illustrated in Appendix L, and less than 0.1 mile would require new wooden poles and conductors. The remaining length of the new generation tie line would be installed along existing electrical ROWs.

3.1.7.7 Urtica Solar Project Site

The Urtica Solar Project site slopes gently from north to south.

3.1.8 Impacts to Topography

Minor topographical changes would occur as a result of Columbia Solar Project construction and operation activities; these include the proposed internal 12-foot access roads and inverter foundations (Appendix L). No other topographical changes are proposed. No changes would occur to shorelines or channels from the proposed solar project sites and their associated generation tie lines. As a result, potential impacts to topography would be permanent, but minimal.

(d) Unique physical features. The application shall list any unusual or unique geologic or physical features in the project area or areas potentially affected by the project.

3.1.9 Unique Physical Features

The Yakima River, located east of the Typha Solar Project site, is the only unusual or unique geologic or physical feature in the vicinity of the Columbia Solar Project sites and their associated generation tie lines. The river would not be affected by the proposed Typha Solar Project site because, at the closest, the project site boundary fence would be set back 146 feet from the river, and the solar panel arrays would be 158 feet from the river. As a result, there would be no potential impacts to unique physical features.

(e) Erosion/enlargement of land area (accretion). The application shall identify any potential for erosion, deposition, or change of any land surface, shoreline, beach, or submarine area due to construction activities, placement of permanent or temporary structures, or changes in drainage resulting from construction or placement of facilities associated with construction or operation of the proposed energy project.

3.1.10 Erosion/Enlargement of Land Area (Accretion)

As described in Section 3.1.7, the Columbia Solar Project sites are all relatively flat, and there is no potential for accretion impacts through erosion, deposition, or change of any land surface, shoreline, beach, or submarine area due to construction or operation of the proposed solar projects. Additional details regarding erosion control and drainage are included in Section 3.3.6.

(2) The application shall show that the proposed energy facility will comply with the state building code provisions for seismic hazards applicable at the proposed location.

3.1.11 Seismic Hazards

The Columbia Solar Project sites would be designed to seismic Site Class D in accordance with Table 20.3-1 of the American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures* manual, as recognized by the 2015 International Building Code (Swiftwater 2017a). As a result, there would be minimal potential for seismic impacts to occur.

3.2 Air 463-60-312

The application shall provide detailed descriptions of the affected environment, project impacts, and mitigation measures for the following:

(1) Air quality. The application shall identify all pertinent air pollution control standards. The application shall contain adequate data showing air quality and meteorological conditions at the site. Meteorological data shall include, at least, adequate information about wind direction patterns, air stability, wind velocity patterns, precipitation, humidity, and temperature. The applicant shall describe the means to be utilized to assure compliance with applicable local, state, and federal air quality and emission standards.

3.2.1 Affected Environment for Air Quality

3.2.1.1 Local Climate

Localized meteorology can influence air pollutant mixing and dispersion. The climate of the Columbia Solar Projects area has both continental and marine characteristics. The climate is mild for its latitude due to the terrain, the Pacific Ocean, and semipermanent high and low pressure regions over the North Pacific Ocean. The proposed Columbia Solar Projects area is in the Ellensburg Valley, just east of the Cascade Range. As air descends along the eastern slopes of the mountains, it warms and dries, creating a nearly desert climate. The proposed solar project area experiences a mean annual maximum temperature around 60°F. In the warmest month, July, the average maximum temperature is in the mid-80s°F and minimum temperatures average around 54°F. January is the coolest month with a maximum temperature of 32°F and minimum temperatures average around 16°F. In the winter, the average snowfall ranges from 5 to 13 inches. Snow tends to remain on the ground for periods varying from a few days to two months between mid-December and the end of February (Western Regional Climate Center [WRCC] 2017a).

Annual precipitation averages around 9 inches. It is common for 4 to 6 weeks to pass during July and August without rainfall. Representative, historical data from Ellensburg Bowers Field National Weather Service Co-op Station 452508 is summarized in Table 3.2-1.

Table 3.2-1. Representative Meteorological Conditions in the Proposed Action Area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (°F)	32.2	40.9	49.9	60.7	69.4	74.2	84.0	82.7	75.3	60.9	44.2	35.9	59.2
Average Min. Temperature (°F)	15.8	22.5	27.7	34.3	42.6	48.6	54.2	53.2	45.4	36.1	26.6	21.9	35.8
Average Total Precipitation (inches)	1.31	0.85	0.84	0.52	0.72	0.70	0.20	0.28	0.48	0.78	1.26	1.19	9.12
Average Total Snowfall (inches)	13.0	6.2	2.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	5.5	8.2	35.2

Note: Historical weather data for Ellensburg Bowers Field, Washington, National Weather Service Co-op Station 452508 (46.96917, -120.54) from 5/4/1940 to 6/7/2016. Annual averages are presented for minimum and maximum temperatures and annual totals for precipitation and snowfall.
max. = maximum
min. = minimum
Source: WRCC (2017b).

Wind conditions near the proposed solar project area can be characterized by Remote Automated Weather Stations (RAWS), which collect data used in numerous applications, including: fire weather, climatology, resource management, flood warning, noxious weed control, all-risk management, and air quality management (National Interagency Fire Center 2003). The RAWS closest to the proposed solar project sites is in Peoh Point, Washington. During the period from July 1, 2000, to July 5, 2017, the prevailing winds most frequently blew from the southwest (approximately 26% of the time). The average wind speed for the period was approximately 5.8 miles per hour (2.6 meters per second) (WRCC 2017c).

3.2.1.2 National Ambient Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has promulgated primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), two size categories of particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), sulfur dioxide (SO_2), and lead. The primary standards are concentration levels of pollutants in ambient air, averaged over a specific time interval, designed to protect public health with an adequate margin of safety. The secondary standards are concentration levels judged necessary to protect public welfare and other resources from known or anticipated adverse effects of air pollution. Although states may promulgate more stringent ambient standards, the State of Washington has adopted standards identical to the federal levels (see Washington Administrative Code (WAC) 173-476, Ambient Air Quality Standards).

Table 3.2-2 presents the NAAQS for six “criteria” pollutants, including both primary standards (pertaining to human health) and secondary standards (pertaining to human welfare, such as visibility, socioeconomics, and effects on flora and fauna). Lead is not measured, as it generally does not pose a problem since the removal of lead from gasoline.

Table 3.2-2. National Ambient Air Quality Standards

Pollutant	Averaging Period	Primary	Secondary
Nitrogen Dioxide (NO_2)	1-hour	100 ppb	–
	Annual	53 ppb	53 ppb
Sulfur Dioxide (SO_2)	1-hour	75 ppb	–
	3-hour	–	0.5 ppm
	24-hour*	0.14 ppm	–
	Annual*	0.02 ppm	–
Carbon Monoxide (CO)	1-hour	35 ppm	–
	8-hour	9 ppm	–
Ozone (O_3)	8-hour	0.07 ppm	0.07 ppm
Lead (Pb)	3-month Average	0.15 $\mu g/m^3$	0.15 $\mu g/m^3$
Particulates			
• $PM_{2.5}$	24-hour	35 $\mu g/m^3$	35 $\mu g/m^3$
	Annual	12 $\mu g/m^3$	15 $\mu g/m^3$
• PM_{10}	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$

*State standard only. SO_2 24-hour and Annual NAAQS were revoked in 2010.
Note: $\mu g/m^3$ = micrograms per cubic meter; ppm = parts per million; ppb = parts per billion.
Source: EPA (2017a), WAC 173-476-900.

3.2.1.3 General Conformity

The General Conformity Rule was established under the Clean Air Act (CAA) Section 176(c)(4) and serves to ensure that federal actions do not inhibit state's attainment plans for areas designated as non-attainment or maintenance. The term conformity (as it pertains to the rule), means "conformity to a SIP's [State Implementation Plan's] purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving expeditious attainment of such standards." The rule effectively applies to all federal actions that take place in areas designated as non-attainment or maintenance, except for actions covered under the transportation conformity rule, actions with associated emissions below specified de minimis levels, and other actions that are exempt or presumed to conform (EPA 2010).

De minimis levels for criteria pollutants are established under the General Conformity Rule. De minimis levels are based on the severity of an area's air quality problem and establish a threshold for determining if a general conformity determination must be performed. Activities below this threshold level are assumed to have no significant impact on air quality. De minimis levels for hazardous air pollutants (HAPs) and greenhouse gases (GHGs) are not yet defined.

Because the five proposed Columbia Solar Project sites would be located within an attainment area, the General Conformity Rule does not apply.

3.2.2 Impacts to Air Quality

The five proposed Columbia Solar Projects would only have minimal dust and vehicular air emissions during construction, and no air emissions during operation. In addition, no air permit authorizations are anticipated to be required for the proposed solar projects.

(2) Odor. The application shall describe for the area affected all odors caused by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

3.2.3 Affected Environment for Odor

Kittitas County consists substantially of rural agricultural, native rural lands, and forests. Thus, typical sources of odors include crops and associated operating agricultural machinery, cattle and other farm animals, and various species of trees and native shrubs and grasses.

3.2.4 Impacts to Odor

3.2.4.1 Construction Impacts

Typical odor nuisances include hydrogen sulfide, ammonia, chlorine, and other sulfide-related emissions. No significant sources of these pollutants would be used during construction of the five Columbia Solar Projects. An additional potential source of project-related odor is diesel engine emissions. The five proposed solar projects may generate odors from the construction equipment exhaust. Any odors from construction would be periodic and temporary in nature, since construction equipment would not be located in any one area for longer than 3 months.

3.2.4.2 Operation Impacts

Operation and maintenance activities for the five proposed Columbia Solar Projects would not cause detectable odors. Vehicles used for occasional maintenance might generate exhaust odors in the immediate vicinity, but this would be temporary and would not affect a substantial number of people.

(3) Climate. The application shall describe the extent to which facility operations may cause visible plumes, fogging, misting, icing, or impairment of visibility, and changes in ambient levels caused by all emitted pollutants.

3.2.5 Affected Environment for Climate

Emission inventories are useful in comparing emission source categories to determine which industries or practices are contributing to the general level of pollution in an area. Emission inventories provide an overview of the types of pollution sources in an area, as well as the amount of pollution being emitted on an annual basis by said sources. For the purposes of this assessment, the most recent National Emissions Inventory conducted in 2014 was used. The emission inventory data is summarized in Table 3.2-3.

Table 3.2-3. Emissions Inventory in Tons per Year for Kittitas County, Washington

Source	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC	HAPs
Agriculture	0	0	208	42	0	0	0
Biogenics [1]	5,079	269	0	0	0	21,967	3,376
Dust	0	0	708	130	0	0	0
Fires	36,866	442	3,701	3,138	257	8,675	2,072
Fuel Combustion	909	61	122	120	8	153	28
Industrial Processes	0	0	106	13	0	3	0
Miscellaneous [2]	46	1	30	28	0	706	76
Mobile	13,852	3,811	162	125	12	1,434	419
Waste Disposal	688	32	139	121	7	54	16
Total	**57,441**	**4,616**	**5,176**	**3,717**	**285**	**32,993**	**5,988**

Note: Due to an incomplete data set, GHG emissions are not presented. Totals may not sum exactly due to rounding.
VOC = Volatile Organic Compound, HAPs = Hazardous Air Pollutants, NO_X = Nitrogen oxides, including nitrogen dioxide (NO_2).
1. Biogenic emissions are those emissions derived from natural processes (such as vegetation and soil).
2. Miscellaneous categories include bulk gasoline terminals, commercial cooking, gas stations, miscellaneous non-industrial (not elsewhere classified), and solvent use.
Source: EPA (2014).

3.2.6 Impacts to Climate

3.2.6.1 Construction Impacts

As shown in Table 3.2-4, the most abundant pollutants produced during the construction phase of the Columbia Solar Projects, in total tons, are CO_2e, NO_X, CO, and PM_{10}. The greatest contributors to these pollutants are the operation of off-road construction equipment (CO_2e, NO_X, and CO) and on-road vehicles commuting and deliveries (PM_{10}).

Table 3.2-4. Construction-Related Emissions in Tons Resulting from the Proposed Solar Project (Per Project Site)

Source	CO	NO_X	SO_X [1]	PM_{10}	$PM_{2.5}$	VOCs	HAPs	CO_2e [2]
Off-Road Construction Equipment	3.42	5.53	0.01	0.25	0.23	0.76	0.08	744
Commuting/On-Road Equipment/Material Delivery	0.39	0.11	0.00	1.20	0.14	0.05	0.00	84
Fugitive Dust From Construction Operations	–	–	–	0.03	0.00	–	–	–
Total	**3.81**	**5.63**	**0.01**	**1.48**	**0.37**	**0.81**	**0.08**	**828**
Percent of Total Kittitas County Emissions	***0.01%***	***0.12%***	***< 0.01%***	***0.03%***	***0.01%***	***< 0.01%***	***< 0.01%***	***N/A*** [3]

Note: CO_2e = Carbon dioxide equivalent.
1. All oxides of sulfur (including SO_2). For purposes of comparison, SO_2 emissions reported in the county inventory are assumed to be equal to SO_X.
2. CO_2e emissions are reported in metric tons.
3. CO_2e emissions are not reported for all sources in the county inventory. Therefore, CO_2e emissions are not compared to the county inventory.

Each pollutant is at most 0.12% of Kittitas County's emissions inventory. These construction emissions would be temporary and transient in nature. Therefore, significant impacts to air resources are not likely to occur from the construction of the Columbia Solar Projects.

3.2.6.2 Operation Impacts

Climate concerns, similar to air quality concerns, would be very minimal once the five proposed Columbia Solar Projects are in operation. Operational-related emissions for the proposed solar projects would consist of a monthly maintenance inspections by workers in a single pick-up truck. Thus, the operational emissions would be minimal. There would be no impacts on climate from the operation of the five proposed solar projects.

(4) Climate change. The application shall describe impacts caused by greenhouse gases emissions and the mitigation measures proposed.

3.2.7 Affected Environment for Climate Change

Gases that trap heat in the atmosphere are called GHGs. Adverse health effects and other impacts caused by elevated atmospheric concentrations of GHGs occur via climate change. Climate impacts are not attributable to any single action but are exacerbated by diverse individual sources of emissions that each make relatively small additions to GHG concentrations.

GHGs absorb heat and slow the rate at which energy escapes to space. Some GHGs are more effective at absorbing energy and stay in the atmosphere longer than others. Equivalent carbon dioxide (CO_2e) is the amount of carbon dioxide (CO_2) that would cause the same level of warming as a unit of one of the other GHGs. The principal GHGs that enter the atmosphere because of oil and gas exploration and production include CO_2, methane (CH_4), and nitrous oxide (N_2O) (EPA 2015). For example, 1 ton of CH_4 has a CO_2e of 25 tons; therefore, 25 tons of CO_2 would cause the same level of warming as 1 ton of CH_4. N_2O has a CO_2e value of 298 (40 Code of Federal Regulations [CFR] 98).

The 2013 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report states that the atmospheric concentrations of well-mixed, long-lived GHGs, including CO_2, CH_4, and N_2O, have increased to levels unprecedented in at least the last 800,000 years. Further human influence has been detected in warming of the atmosphere and the ocean, changes in the global water cycle, reductions in snow and ice, global mean sea-level rise, and changes in some climate extremes. It is extremely likely (95%–100% probability) that human influence has been the dominant cause of the observed warming since the mid-twentieth century (IPCC 2013).

Global mean surface temperatures have already increased 1.5°F (from 1880 to 2012). Additional near-term warming is inevitable due to the thermal inertia of the oceans and ongoing GHG emissions. However, climate change would impact regions differently and warming would not be equally distributed. Both observations and computer model predictions indicate that increases in temperature are likely to be greater at higher latitudes, where the temperature increase may be more than double the global average. Models also predict increases in duration, intensity, and extent of extreme weather events. Warming of surface air temperature over land would very likely be greater than over oceans (IPCC 2013).

3.2.8 Impacts to Climate Change

The five proposed Columbia Solar Projects would produce energy with minimal air emissions due to construction and maintenance equipment exhaust. Because no fuel is burned, no air emissions are produced in the process of generating electricity from photovoltaic sources. Furthermore, this fossil fuel–less project means there are also no GHG emissions due to the extraction of fossil fuel. In addition, equipment (e.g., switches and reclosers) containing sulfur hexafluoride (SF_6) are not planned for the solar projects.

The “total fuel cycle” of the Columbia Solar Projects includes the emissions from manufacturing processes, transporting parts and equipment, construction, operation, and maintenance of the solar projects. According to the IPCC, the total fuel cycle CO_2e emissions of solar power are 90% less than the total fuel cycle CO_2e emissions of natural gas and 94% less than the total fuel cycle CO_2e emissions of coal per unit of electricity generated (IPCC 2014).

(5) Dust. The application shall describe for any area affected all dust sources created by construction or operation of the facility, and shall describe how these are to be minimized or eliminated.

3.2.9 Affected Environment for Dust

Typical existing sources of dust in the Columbia Solar Project areas include agricultural activities (e.g., from plowing, planting, and harvesting fields) and from travel along gravel and dirt roads. Current emissions of particulate matter for Kittitas County are shown in Table 3.2-3.

3.2.10 Impacts to Dust

Dust generated by excavation and grading on the five Columbia Solar Projects would be short term. Dust from access roads would be controlled by applying gravel or watering, as necessary.

Once operational, the only source of dust emissions from the five Columbia Solar Projects would be due to occasional maintenance vehicle traffic on the access roads.

3.3 Water 463-60-322

(1) The application shall provide detailed descriptions of the affected natural water environment, project impacts and proposed mitigation measures, and shall demonstrate that facility construction and/or operational discharges will be compatible with and meet state water quality standards.

3.3.1 Affected Environment for Water Resources

3.3.1.1 General County

Streams identified within the five Columbia Solar Project sites were classified according to the WAC water typing system (WAC 222-16-030). Criteria for this typing system are described in Table 3.3-1. The streams were categorized based on the stream reaches within each of the five solar project sites; reaches downstream of the solar project sites may be rated higher.

Table 3.3-1. Summary of the WAC Water Typing System

Stream Type	Definition[1]
S	All waters, within their bankfull width, as inventoried as "shorelines of the state" under RCW 90.58 and the rules promulgated pursuant to RCW 90.58 including periodically inundated areas of their associated wetlands.
F	All segments of natural waters that are not Type S waters, and that contain fish or fish habitat, including: 1) waters diverted for domestic use by more than 10 residential or camping units or by a public accommodation facility; 2) waters diverted for use by a federal, state, or Tribal fish hatchery from the point of diversion for 1,500 feet or the entire tributary if the tributary is highly significant for protection of downstream water quality; 3) waters that are within a federal, state, local, or private campground having more than 10 camping units; or 4) riverine ponds, wall-based channels, and other channel features that are used by fish for off-channel habitat.
Np	All segments of natural waters within the bankfull width of defined channels that are perennial non–fish habitat streams. Perennial streams are flowing waters that do not go dry any time of a year of normal rainfall and include the intermittent dry portions of the perennial channel below the uppermost point of perennial flow.
Ns	All segments of natural waters within the bankfull width of the defined channels that are not Type S, F, or Np waters. These are seasonal, non–fish habitat streams in which surface flow is not present for at least some portion of a year of normal rainfall and the stream is not located downstream from any stream reach that is a Type Np water. Ns waters must be physically connected by an above-ground channel system to Type S, F, or Np waters.

1. Definitions are summarized from WAC 222-16-030.

Each of the five Columbia Solar Project sites was investigated for the presence of non-wetland waters and used a global positioning system (GPS) device capable of submeter accuracy to delineate the ordinary high water marks (OHWMs) of streams per the definitions in WAC 173-22-030 (Figures 3.3-1 to 3.3-15). The OHWMs of streams and rivers outside of each of the five project sites, but that occur within 200 feet of the project site boundary, were approximated using field observations and aerial imagery to determine the extent of potential on-site stream buffers. Water features delineated within and adjacent to each of the solar project sites included rivers, streams, canals, and ditches.

A total of one river, the Yakima River (Typha Solar Project site); five streams, including Little Naneum Creek (Camas Solar Project site), Reecer Creek (Fumaria Solar Project generation tie line), an unnamed stream (Fumaria Solar Project generation tie line), Coleman Creek (Penstemon Solar Project site), and McCarl Creek (Urtica Solar Project site); four canals, including Bull Ditch (Camas Solar Project site), the Cascade Irrigation District Canal (Fumaria Solar Project generation tie line), Town Ditch (Fumaria Solar Project generation tie line), and the Ellensburg Power (EP) Canal (Typha Solar Project generation tie line); one pond (Urtica Solar Project site); and various ditches were delineated throughout all of the five project sites.

Table 3.3-2 summarizes the water type, average width, and size within each of the five Columbia Solar Project sites. Most delineated waters would fall under the jurisdiction of the U.S. Army Corps of Engineers (USACE), Washington State Department of Ecology (Ecology), and Kittitas County. Some ditches and canals may not be considered jurisdictional based on their connectivity to jurisdictional features; however, this is determined on a case-by-case basis and can only be determined by the applicable regulatory agency. Detailed descriptions of each water feature within the solar project sites are provided in the Critical Areas Wetland and Waters Delineation Reports for each site (Appendices G–K), which also include a list of vegetation observed along each water feature and ground-level site photographs.

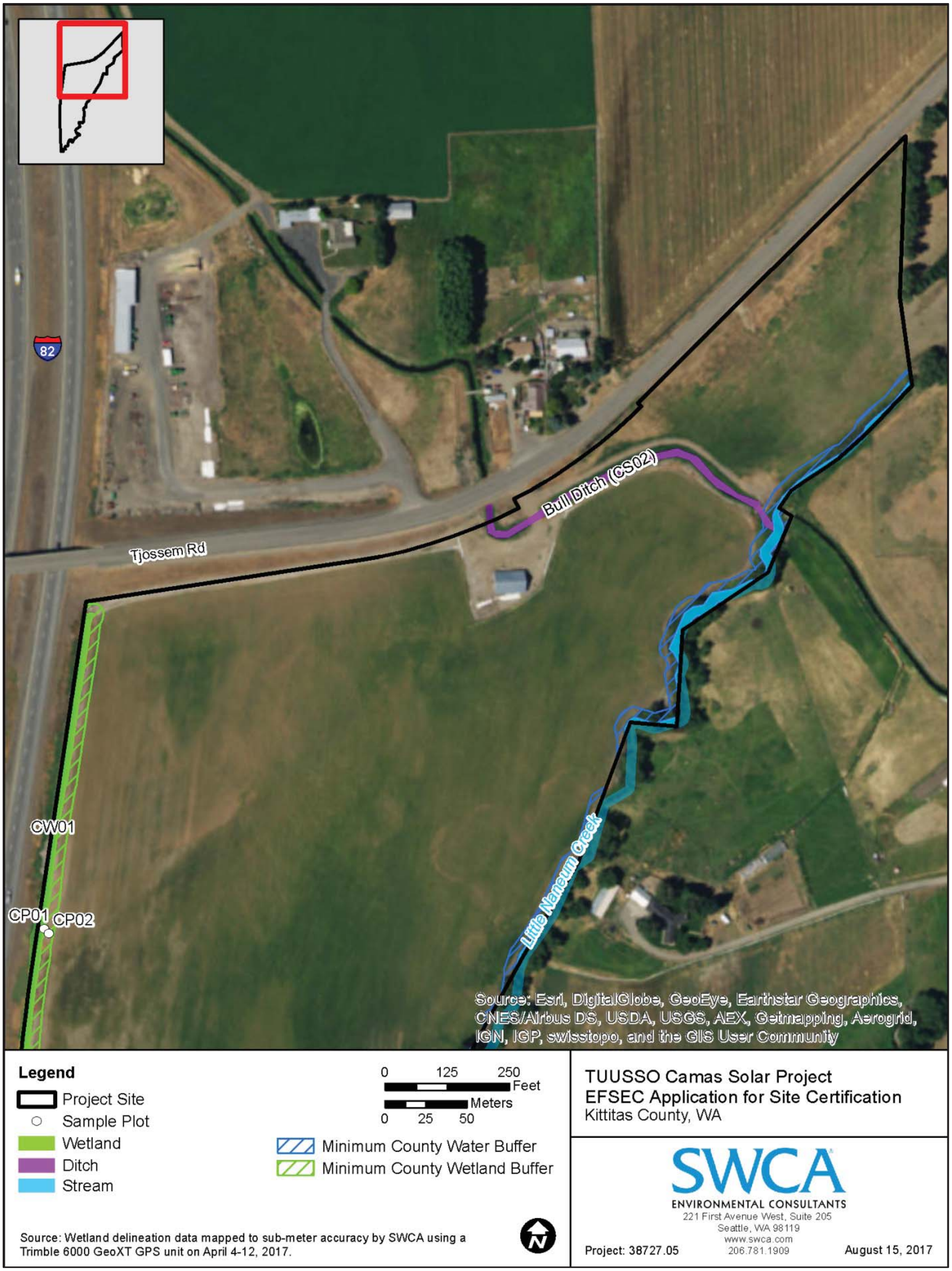

Figure 3.3-1. Camas Solar Project site map showing water resources, north portion.

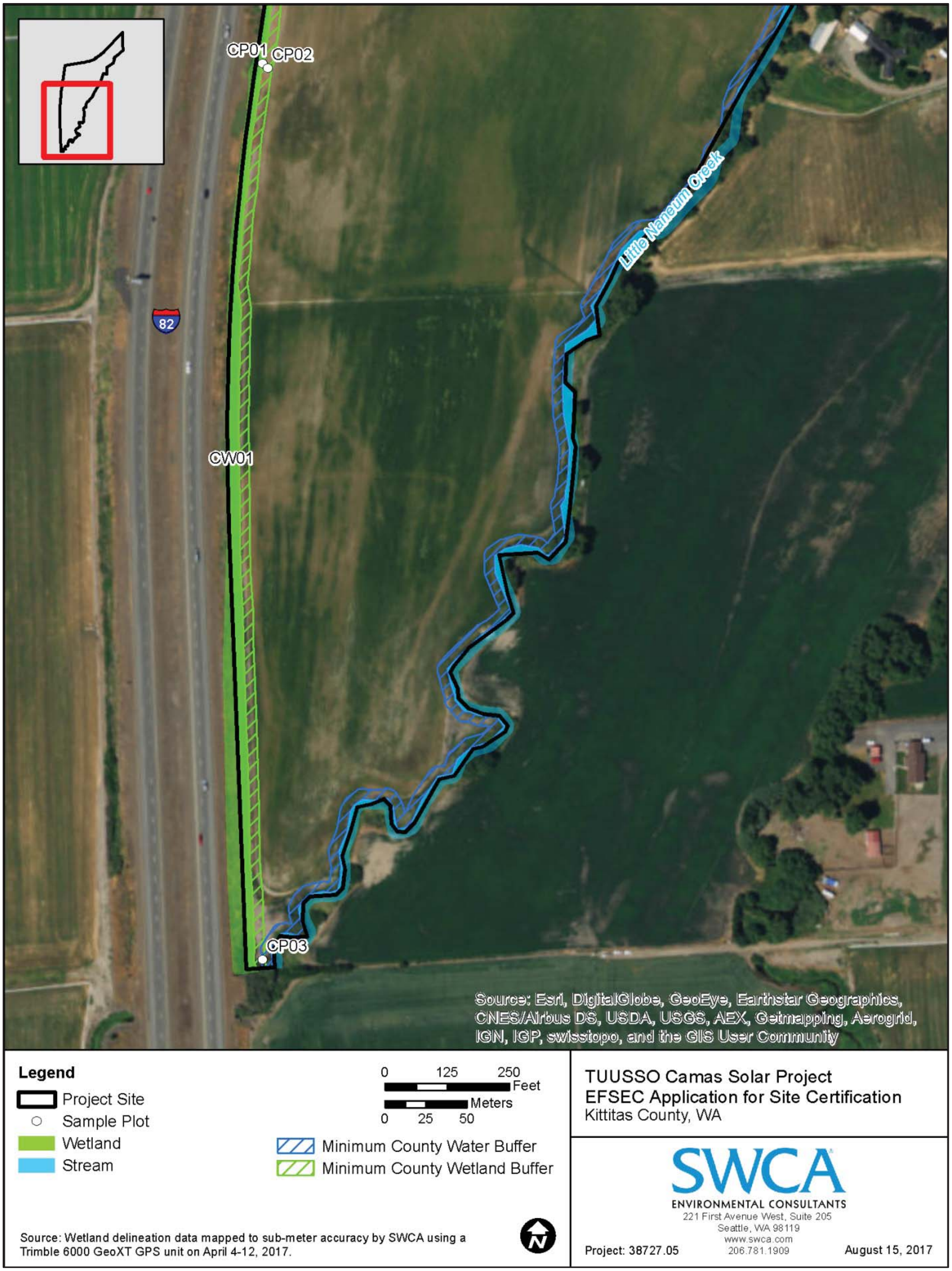

Figure 3.3-2. Camas Solar Project site map showing water resources, south portion.

Figure 3.3-3. Fumaria Solar Project site map showing water resources, Map 1 of 8.

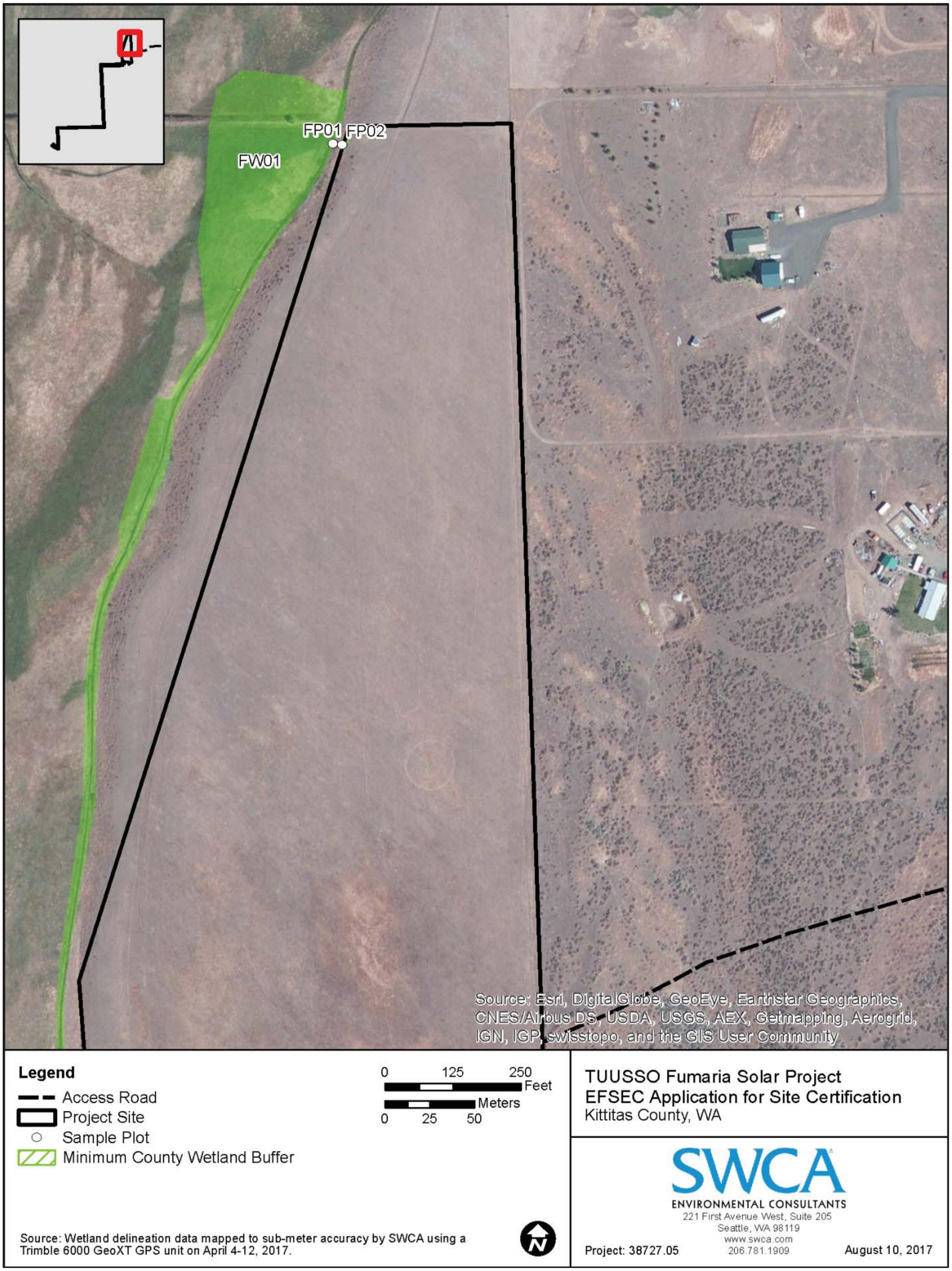

Figure 3.3-4. Fumaria Solar Project site map showing water resources, Map 2 of 8.

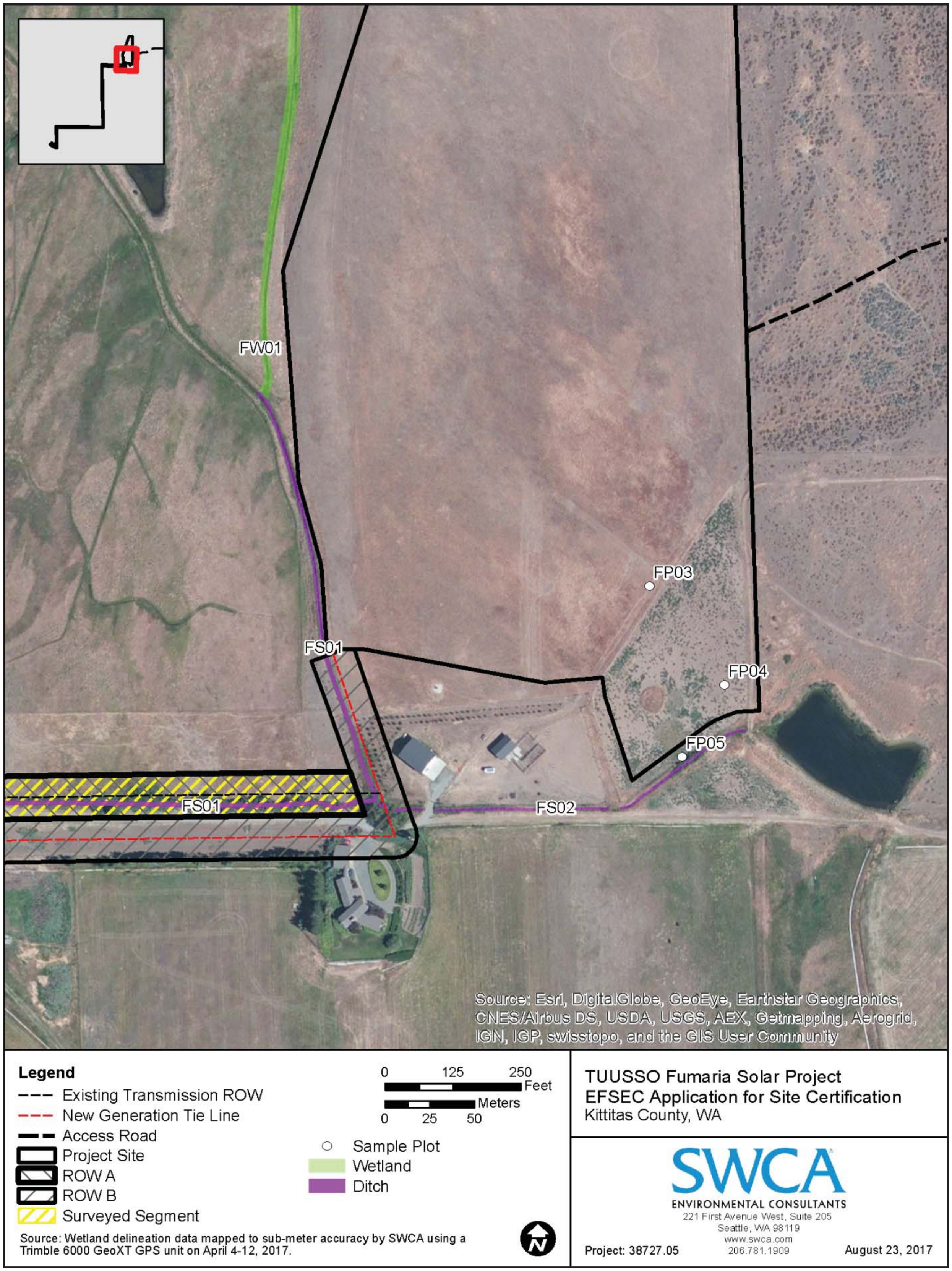

Figure 3.3-5. Fumaria Solar Project site map showing water resources, Map 3 of 8.

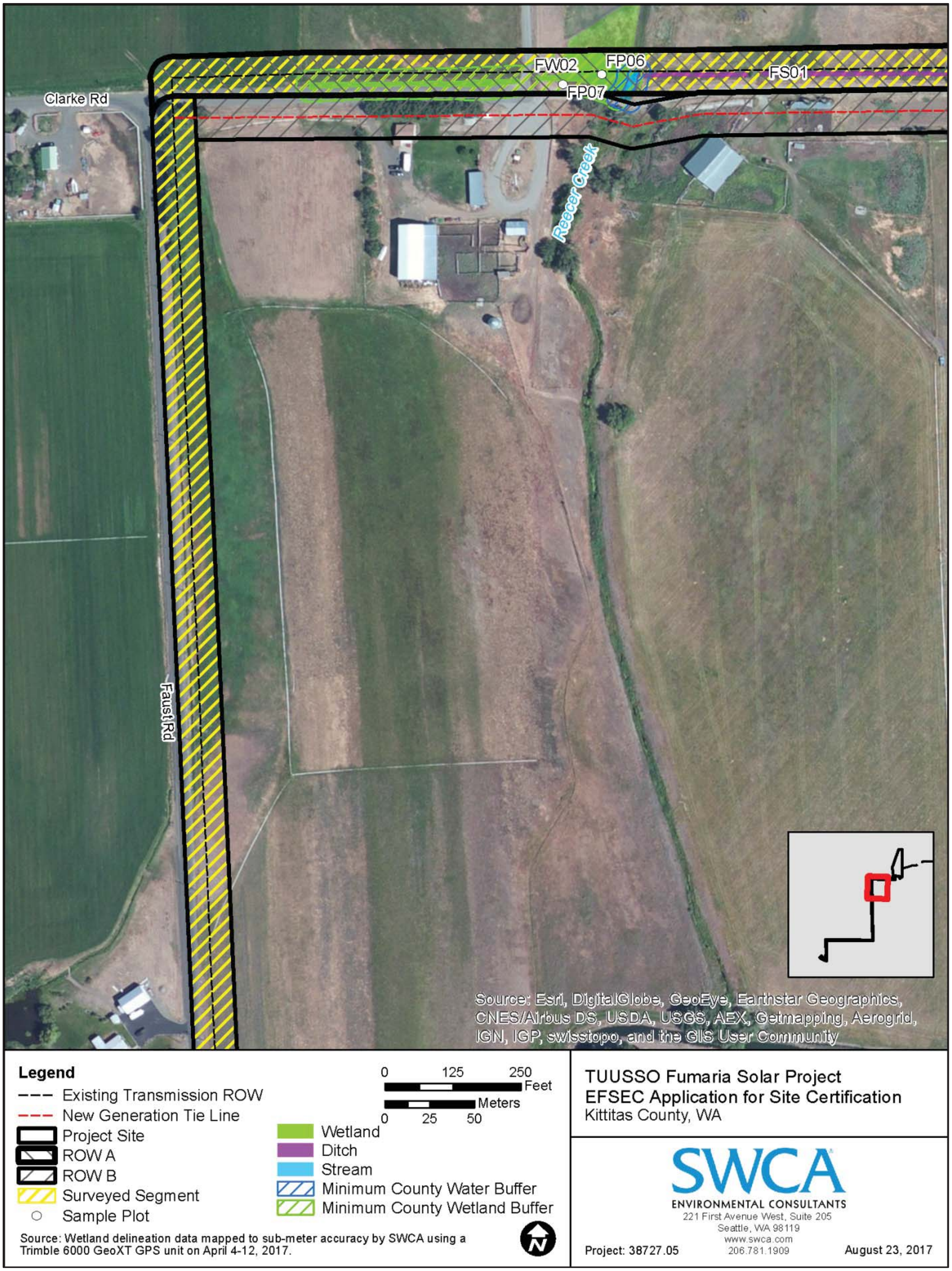

Figure 3.3-6. Fumaria Solar Project site map showing water resources, Map 4 of 8.

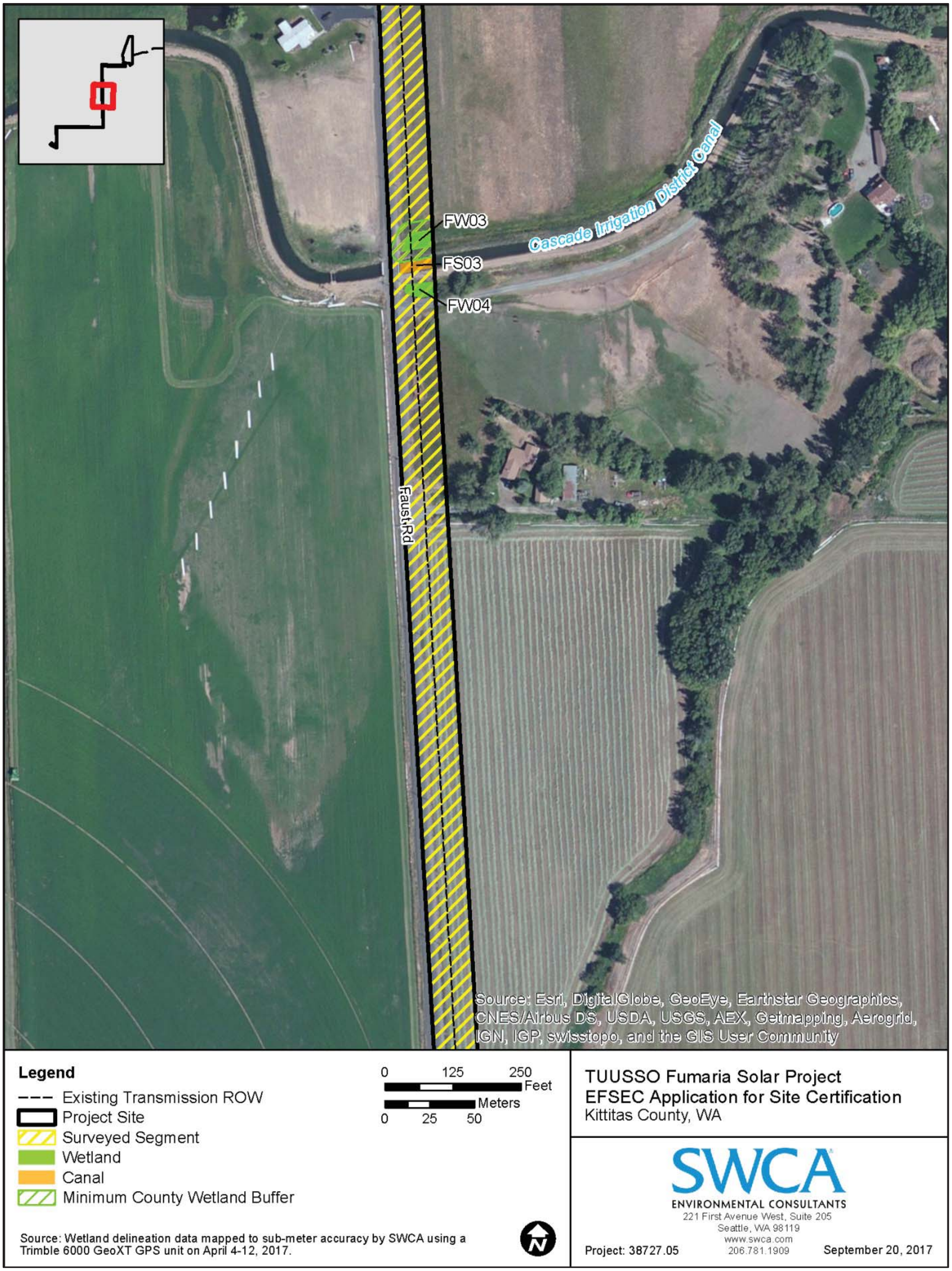

Figure 3.3-7. Fumaria Solar Project site map showing water resources, Map 5 of 8.

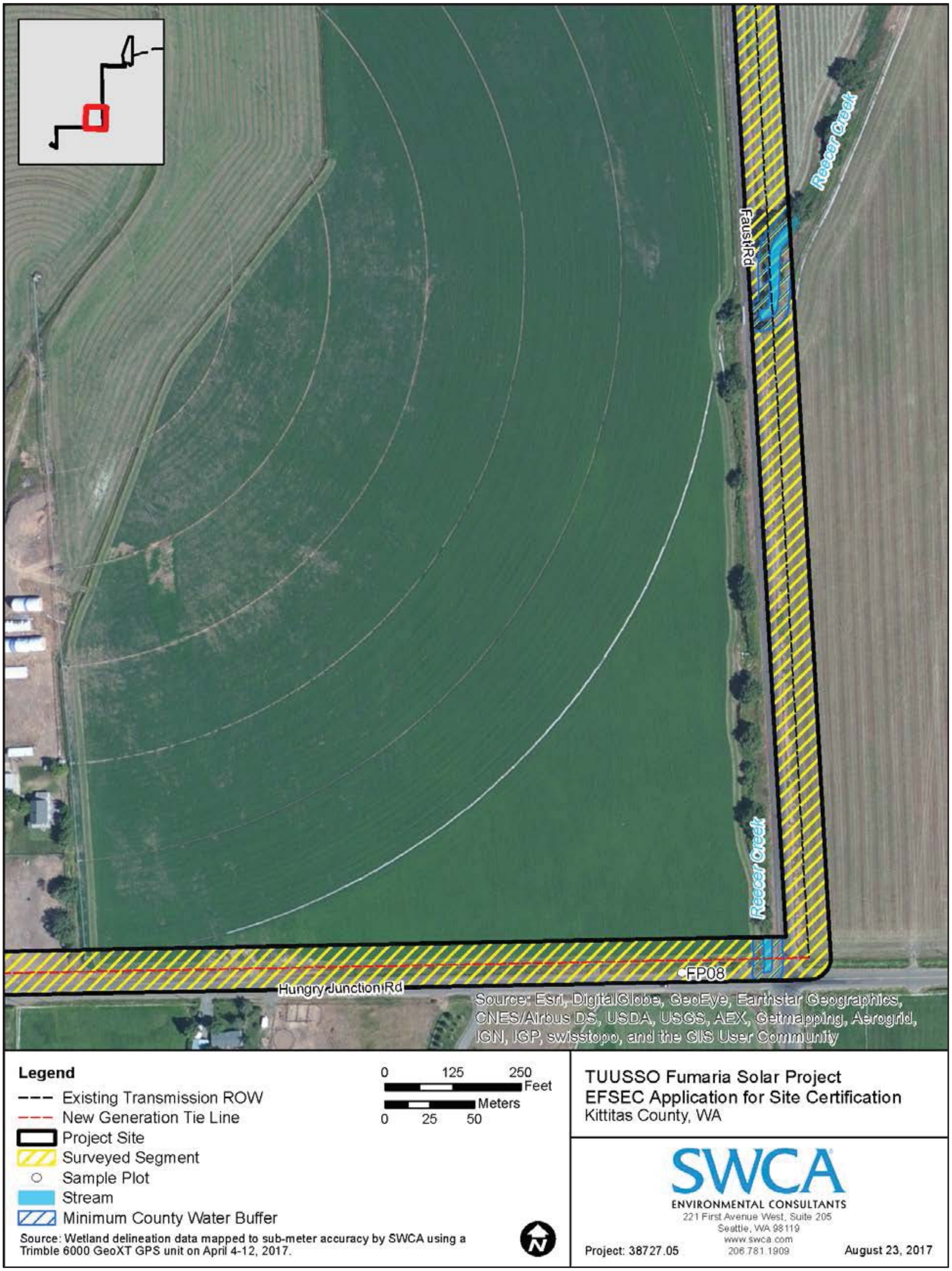

Figure 3.3-8. Fumaria Solar Project site map showing water resources, Map 6 of 8.

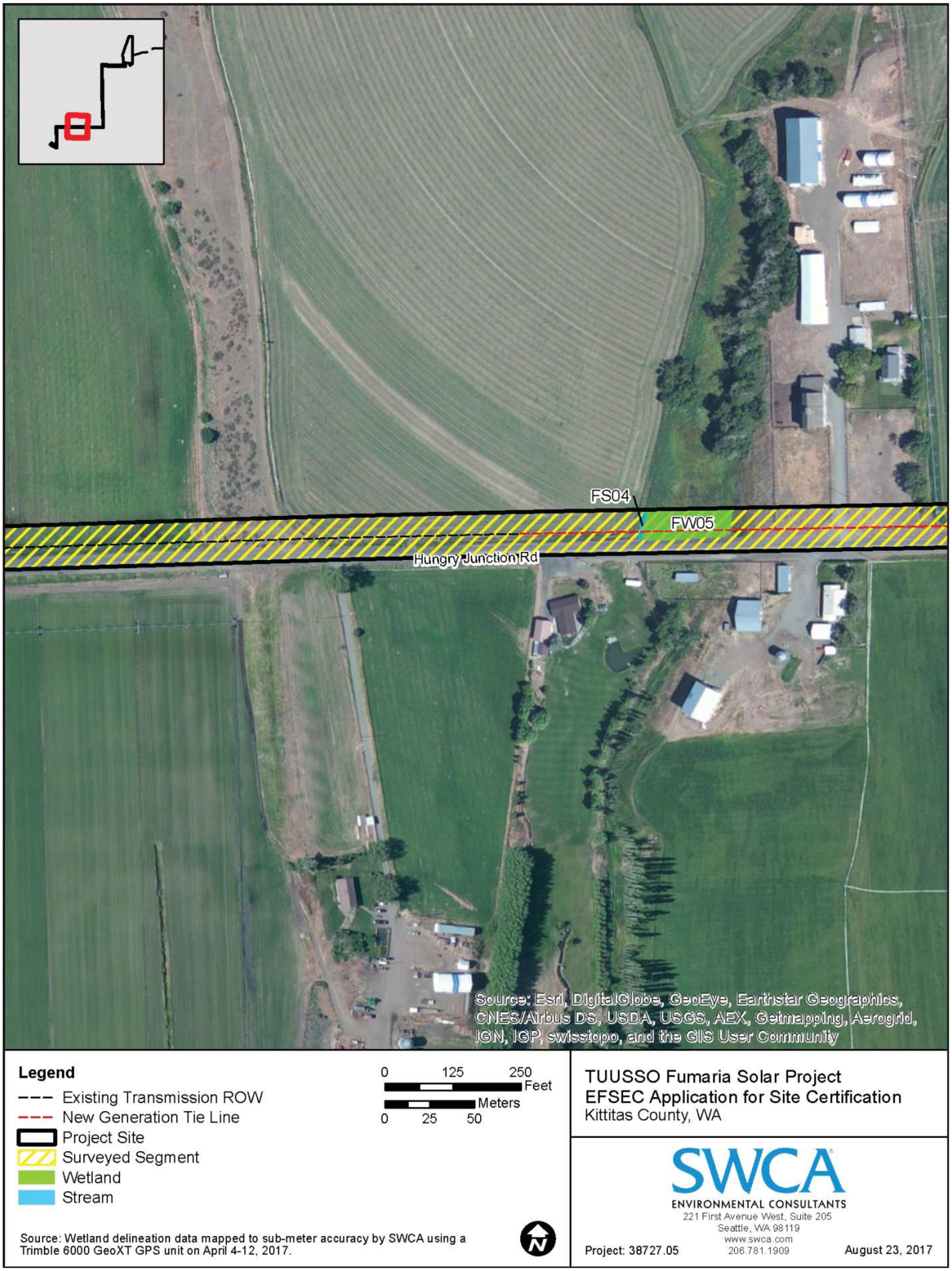

Figure 3.3-9. Fumaria Solar Project site map showing water resources, Map 7 of 8.

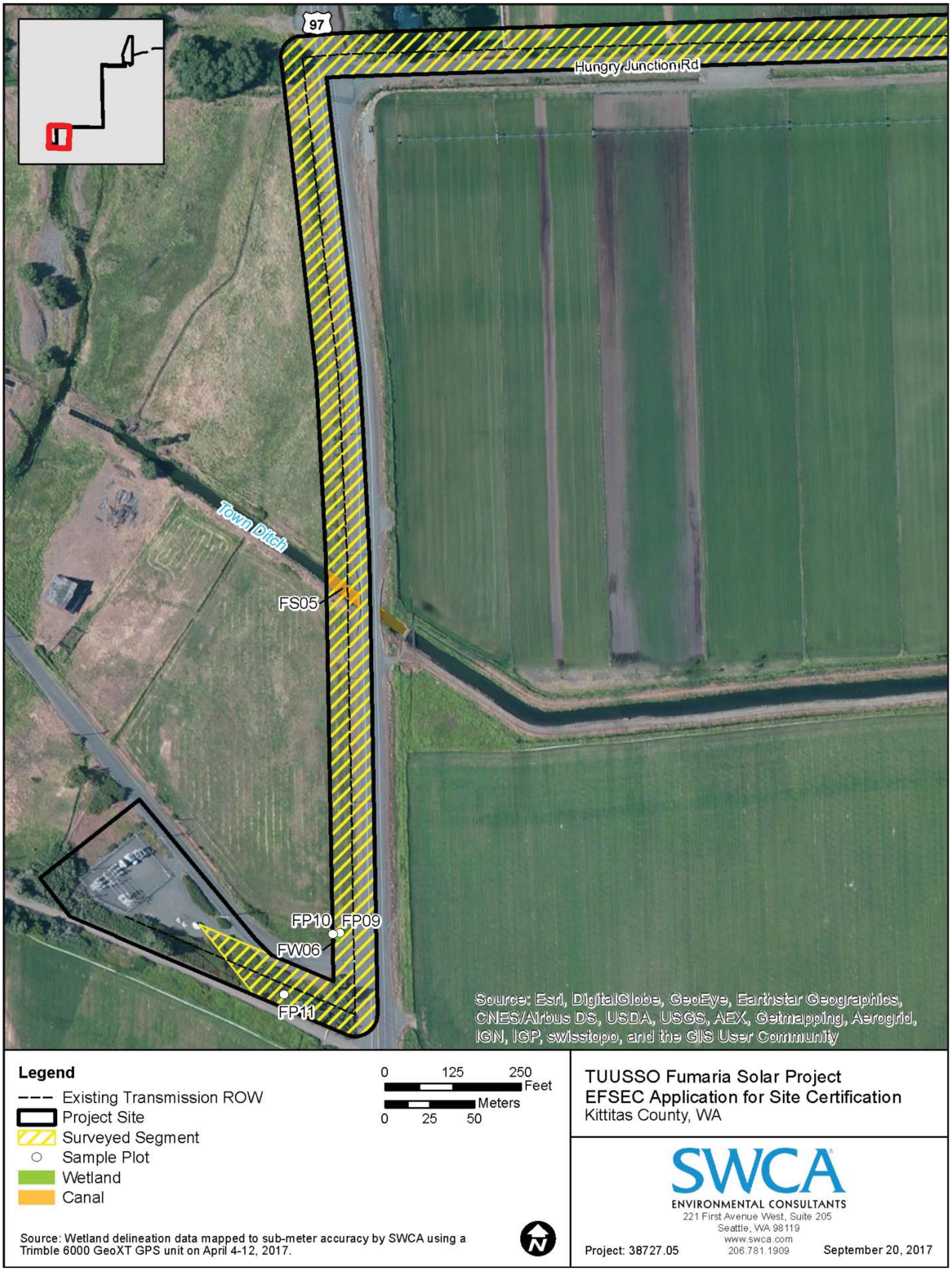

Figure 3.3-10. Fumaria Solar Project site map showing water resources, Map 8 of 8.

Figure 3.3-11. Penstemon Solar Project site map showing water resources.

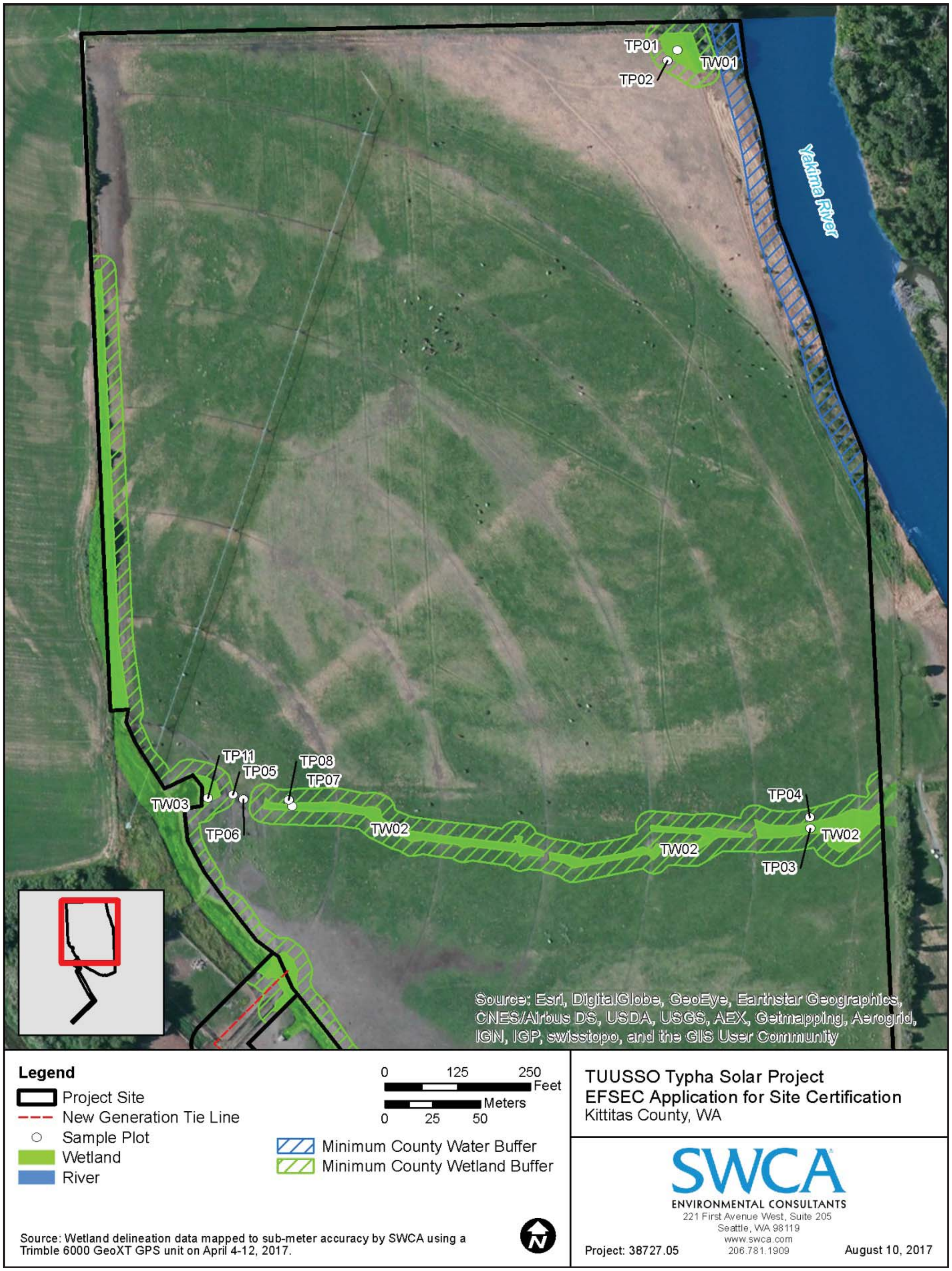

Figure 3.3-12. Typha Solar Project site map showing water resources, north portion.

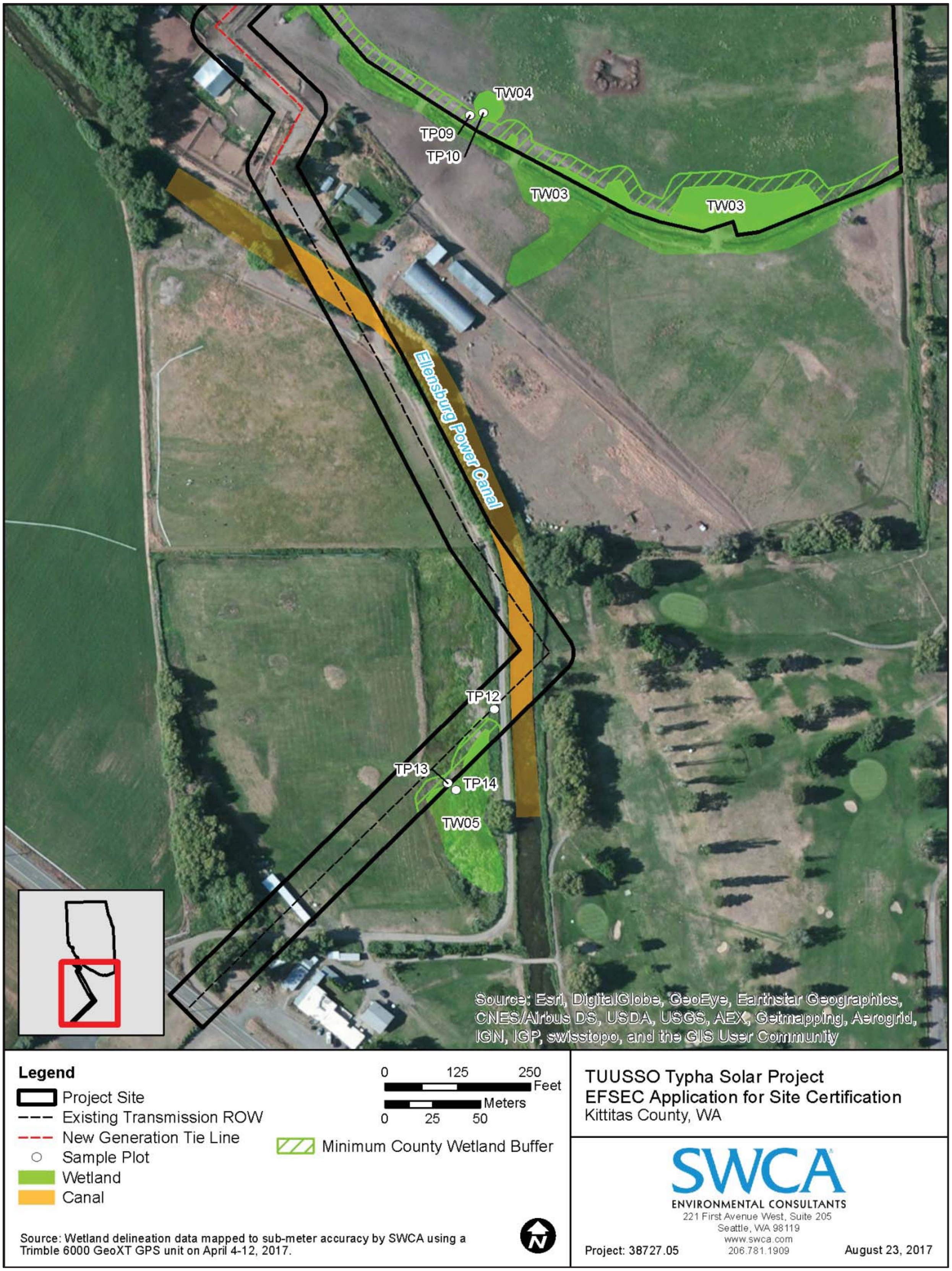

Figure 3.3-13. Typha Solar Project site map showing water resources, south portion.

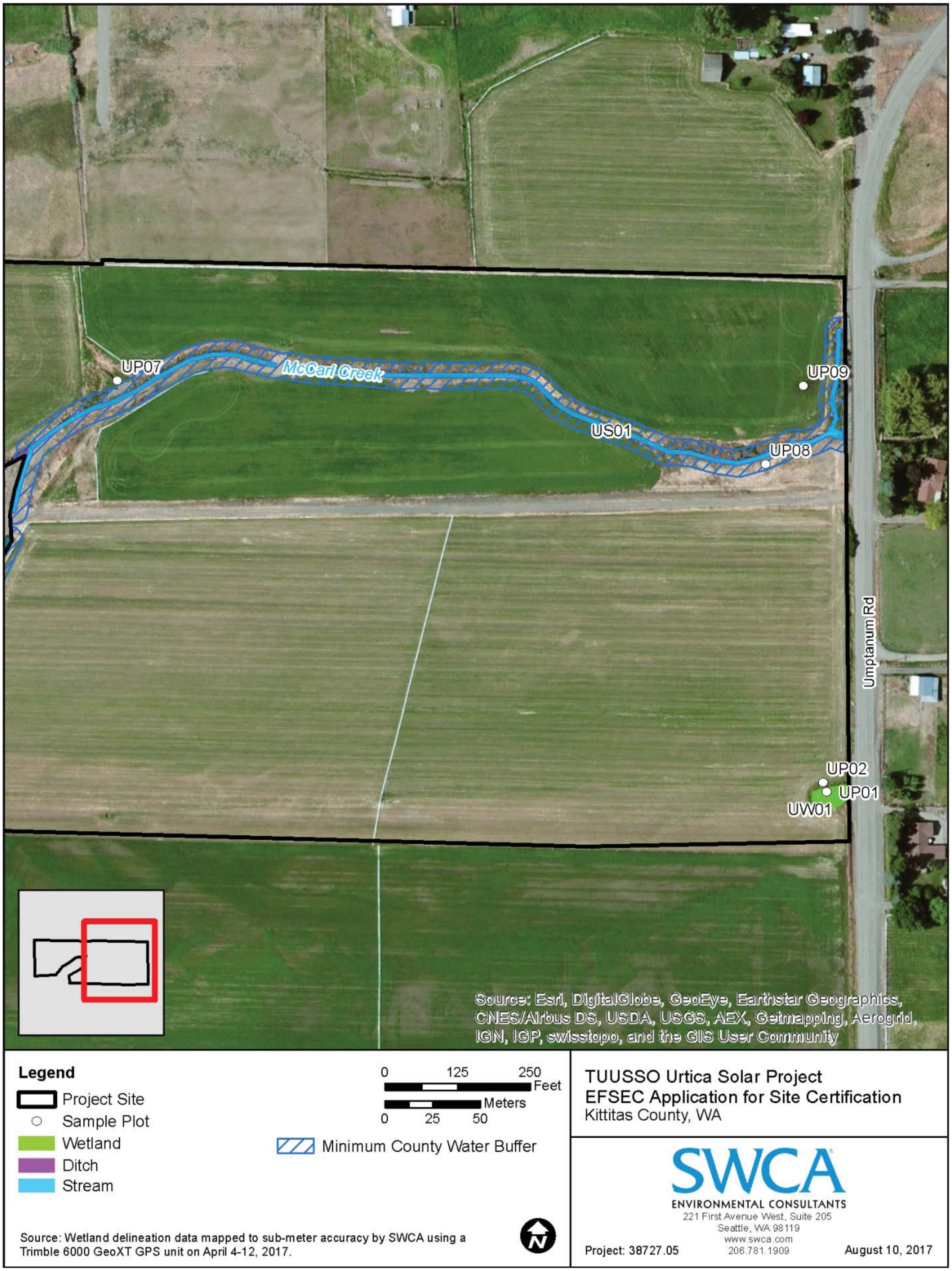

Figure 3.3-14. Urtica Solar Project site map showing water resources, east portion.

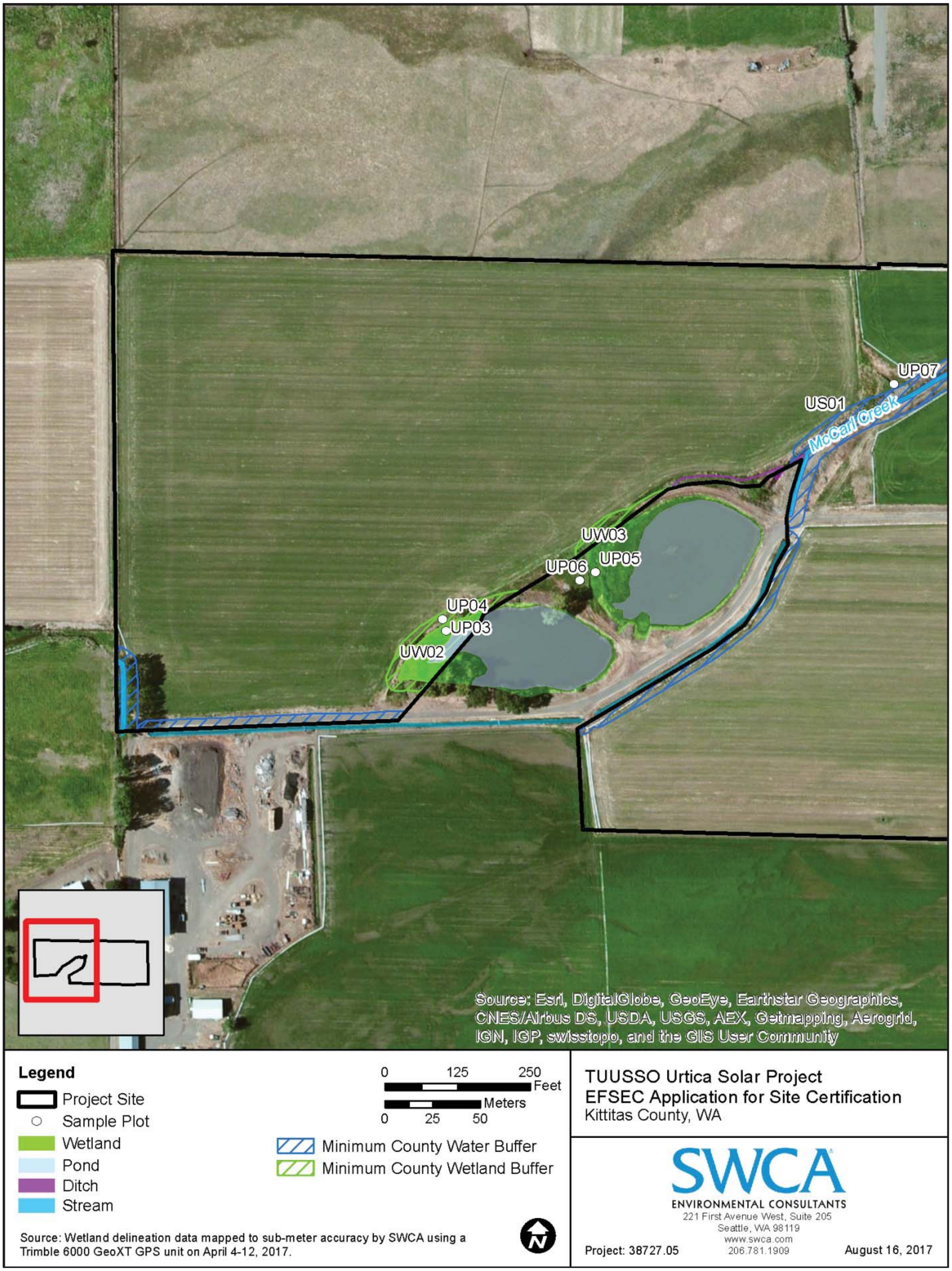

Figure 3.3-15. Urtica Solar Project site map showing water resources, west portion.

Table 3.3-2. Summary of Water Features within and near the Columbia Solar Project Sites

Stream Name	Tributary to	Stream Type[1]	USACE Jurisdiction[2]	Average Width in Project Site (feet)[3]	Approximate Length in Project Site (feet)[3]
Camas Solar Project Site					
Little Naneum Creek	Naneum Creek	F	RPW	19	2,050
Bull Ditch (CS02)	N/A	N/A	N/A	14	690
Fumaria Solar Project Site					
Ephemeral ditch (FS01)	Reecer Creek	N/A	N/A	8	710
Ephemeral ditch (FS02)	FS01	N/A	N/A	5	680
Fumaria Solar Project Generation Tie Line					
Reecer Creek	Yakima River	F	RPW	14	290
Ephemeral ditch (FS01)	Reecer Creek	N/A	N/A	8	1,087
Cascade Irrigation District Canal (FS03)	Yakima River	N/A	N/A	15	63
Unnamed stream (FS04)	Town Ditch	Ns	NRPW	6	57
Town Ditch (FS05)	Yakima River	N/A	N/A	16	74
Roadside ditches	Varies	N/A	N/A	3	1,920
Penstemon Solar Project Site					
Coleman Creek	Naneum Creek	F	RPW	19	1,005
Unnamed Ephemeral Ditch	Coleman Creek	N/A	NRPW	3	0
Typha Solar Project Site					
Yakima River	Columbia River	S	RPW	158	0
Typha Solar Project Generation Tie Line					
EP Canal (TS01)	Naneum Creek	F	RPW	19	2,050
Unnamed Ephemeral Ditch 1	Yakima River	N/A	RPW	45	540
Unnamed Ephemeral Ditch 2	EP Canal	N/A	NRPW	4	115
Urtica Solar Project Site					
McCarl Creek (US01)	Yakima River	F	RPW	7	2,108
UOW01 (western pond)	McCarl Creek	F	RPW	20	100
Unnamed Ephemeral Ditch	McCarl Creek	N/A	NRPW	3	269

1. S = shoreline of the state (WAC 222-16-030), F = fish-bearing stream (WAC 222-16-030), Ns = non-fish-bearing (WAC 222-16-030), N/A = not applicable, due to ditches and canals being excluded from the WAC typing system.

2. RPW = relatively permanent water, NRPW = non-relatively permanent water, N/A = not applicable, due to exclusion from jurisdiction.

3. Average widths and approximate lengths were determined based on SWCA survey data and field observations.

A summary of all non-wetland waters and their buffers documented within the Columbia Solar Project sites is provided in Table 3.3-3. Kittitas County Code (KCC) guidance (Chapter 17A.07.010) defines minimum protection buffers of 40 feet for Type S waters and 20 feet for Type F waters. KCC guidance does not define protection buffers for irrigation canals and ditches, because they do not qualify as streams. In addition, KCC guidance specifies that no protection buffer is needed for Type Ns waters.

Table 3.3-3. Water Typing and Minimum Buffer Distance Summary for each Columbia Solar Project Site

Water Features	Water Typing[1]	Kittitas County Minimum Buffer Distance (feet)[2]	Total Size of Water Feature Within the Project Site (acres)[3]
Camas Solar Project Site			
Little Naneum Creek	F	20	0.69
Bull Ditch (CS02)	N/A	None	0.22
Fumaria Solar Project Site			
Ephemeral ditch (FS01)	N/A	None	0.00
Ephemeral ditch (FS02)	N/A	None	0.00
Fumaria Solar Project Generation Tie Line			
Reecer Creek	F	20	0.12
Ephemeral ditch (FS01)	N/A	None	0.25
Ephemeral ditch (FS02)	N/A	None	0.01
Cascade Irrigation District Canal (FS03)	N/A	None	0.03
Unnamed stream (FS04)	Ns	None	0.01
Town Ditch (FS05)	N/A	None	0.04
Roadside ditches	N/A	None	0.18
Penstemon Solar Project Site			
Coleman Creek	F	20	0.47
Ditch	N/A	None	0.00
Typha Solar Project Site			
Yakima River	S	40	0.05
Typha Solar Project Generation Tie Line			
EP Canal (TS01)	N/A	None	0.44
Ditches	N/A	None	0.02
Urtica Solar Project Site			
McCarl Creek (US01)	F	20	0.27
UOW01 (western pond)	N/A	None	0.05
Ditch	N/A	None	0.02

1. F = fish-bearing water (WAC 22-16-030); N/A = not applicable, due to exclusion from water typing system.
2. Only minimum buffer distances are depicted on maps.
3. Does not include buffer areas.

3.3.1.2 Solar Project Sites

See Figures 3.3-1 through 3.3-15 for the locations of delineated water features throughout each of the five Columbia Solar Project sites. Detailed descriptions of each non-wetland water within the solar project sites are provided in the Critical Areas Wetland and Waters Delineation Reports for each site (Appendices G–K).

3.3.2 Impacts to Water Resources

3.3.2.1 General County

TUUSSO has made every effort to avoid impacts to water resources throughout all of the Columbia Solar Project sites, which would be achieved through avoidance measures in project design and utilization of BMPs. Table 3.3-4 shows the project impacts to each of the water resources delineated within each of the solar project sites.

Table 3.3-4. Proposed Water Resources Impact Summary for each Columbia Solar Project Site

Water Name	Total Size of Water Resources Within the Project (acres)[1]	Total Impacts to Water Resources Within the Project (acres)
Camas Solar Project Site		
Little Naneum Creek	0.69	0.00
Bull Ditch (CS02)	0.22	0.00
Fumaria Solar Project Site		
Ephemeral ditch (FS01)	0.00	0.00
Ephemeral ditch (FS02)	0.00	0.00
Fumaria Solar Project Generation Tie Line		
Reecer Creek	0.12	0.00[2]
Ephemeral ditch (FS01)	0.25	0.00
Ephemeral ditch (FS02)	0.01	0.00
Cascade Irrigation District Canal (FS03)	0.03	0.00
Unnamed stream (FS04)	0.01	0.00
Town Ditch (FS05)	0.04	0.00
Roadside ditches	0.18	0.00
Penstemon Solar Project Site		
Coleman Creek	0.47	0.00
Ditch	0.00	0.00
Typha Solar Project Site		
Yakima River	0.05	0.00
Typha Solar Project Generation Tie Line		
EP Canal (TS01)	0.44	0.00[2]
Ditches	0.02	0.00
Urtica Solar Project Site		
McCarl Creek (US01)	0.27	0.00
UOW01 (western pond)	0.05	0.00
Ditch	0.02	0.00

1. Does not include buffer areas.
2. TUUSSO plans to span this water resource, which would result in no impacts by the project.

In addition, the Columbia Solar Projects do not propose to discharge any water or contaminants into water resources on-site or downstream of the solar project sites, during or after construction. This would be achieved through avoidance measures in the project designs and through utilization of BMPs. No ditches or outfall pipes would be installed as part of the proposed projects. Therefore, all water in the solar project sites would either be absorbed on-site through infiltration or runoff through overland flow at very low velocities that are unlikely to cause excessive erosion.

Impacts to water resources at each solar project site and along each generation tie line are described below.

3.3.2.2 Solar Project Sites

Camas Solar Project Site

No impacts are proposed to any water resources within the Camas Solar Project site. The access road crossing of Bull Ditch depicted on the proposed site plan would utilize the existing road crossing and would not modify or impact this crossing of Bull Ditch. No impacts are proposed to Little Naneum Creek. Therefore, all impacts to water resources would be avoided through project design.

Fumaria Solar Project Site

No impacts are proposed to any water resources within the Fumaria Solar Project site. Internal access roads and site access would be located in upland areas or on existing access roads. All impacts to water resources would be avoided through project design.

For Western site access: Proposed site access would be from the west via Clarke Road and would cross Reecer Creek. The current road edge is eroding on the southern side of the road. TUUSSO would either install spanning structures to avoid impacts to the Reecer Creek crossing (such as using road plates and gravel) or improve and reinforce the current bridge infrastructure, which could result in minor impacts to Reecer Creek. If impacts to Reecer Creek are proposed, then TUUSSO would prepare and submit a Joint Aquatic Resource Permit Application (JARPA) for review by USACE and Ecology.

Fumaria Solar Project Generation Tie Line

No impacts are proposed to any water resources along the Fumaria Solar Project generation tie line. All water resources would be spanned by power poles, and existing roads adjacent to the proposed line would be utilized for installation of new lines or power poles. All impacts to water resources would be avoided through project design.

Penstemon Solar Project Site

No impacts are proposed to any water resources within the Penstemon Solar Project site. Internal access roads and site access would be located in upland areas or on existing access roads. All impacts to water resources would be avoided through project design.

Typha Solar Project Site

No impacts are proposed to any water resources within the Typha Solar Project site. Internal access roads would be located in upland areas or on existing access roads. For site access, existing roads would be utilized as much as possible; however, the existing bridge crossing of the Ellensburg Power Canal would need to be improved in one of three ways: 1) reinforce, improve, and/or replace existing bridge supports to accommodate the truck traffic to the project site; 2) completely remove and replace the existing bridge with a new bridge; or 3) install a temporary bridge over the existing bridge during the construction period to accommodate the truck traffic. Based on the current project design, all impacts to jurisdictional water resources would be avoided through project design. If TUUSSO alters the project design to where the EP Canal would be impacted, then TUUSSO would coordinate with EFSEC, USACE, Ecology, and Kittitas County to comply with all new permitting requirements.

Typha Solar Project Generation Tie Line

No impacts are proposed to any water resources along the Typha Solar Project generation tie line. All water resources would be spanned by power poles, and existing roads adjacent to the proposed line would be utilized for installation of new lines or power poles. All impacts to water resources would be avoided through project design.

Urtica Solar Project Site

No impacts are proposed to any water resources within the Urtica Solar Project site. Internal access roads and site access would be located in upland areas or on existing access roads. All impacts to water resources would be avoided through project design.

3.3.3 Mitigation Measures for Water Resources

3.3.3.1 General County

A total of one river, five streams, four canals, and various ditches were delineated throughout all of the five Columbia Solar Project sites and their associated generation tie lines. These waters were rated using the WAC water typing system (WAC 222-16-030), defined in Table 3.3-1, and minimum protection buffers were defined using KCC guidance (Chapter 17A.07.010). Of the delineated water resources, only five of them require protection buffers under KCC guidance: Little Naneum Creek (Camas Solar Project site), Reecer Creek (Fumaria Solar Project generation tie line), Coleman Creek (Penstemon Solar Project site), Yakima River (Typha Solar Project site), and McCarl Creek (Urtica Solar Project site). TUUSSO utilized avoidance measures during the project design to avoid, reduce, or eliminate impacts to water resources.

No water resources would be impacted by the proposed Columbia Solar Projects; however, minor encroachment into the minimum protection buffers would be unavoidable based on the current project designs and would occur over a total of 0.39 acre across all five of the solar project sites. Refer to Table 3.3-5 for the water type, minimum protection buffer distances, total area of buffers within the solar project sites, average distance from the edge of the minimum buffer to the nearest project disturbance, and total buffer area encroachment for water resources within each of the solar project sites.

See Figures 3.3-1 through 3.3-15 for the locations of delineated water resources and their buffers for each of the five Columbia Solar Project sites. See Appendix L for site plans for each of the Columbia Solar Project sites.

Table 3.3-5. Water Protection Buffers and Project Encroachment within Each Columbia Solar Project Site

Water Name	Water Type[1]	Kittitas County Minimum Buffer Distance (feet)[2]	Total Area of Buffer within Project (acres)	Average Distance from Buffer Edge to Project Disturbance (feet)	Total Buffer Encroachment (square feet)
Camas Solar Project Site					
Little Naneum Creek	F	20	1.80	20	0
Fumaria Solar Project Generation Tie Line					
Reecer Creek	F	20	0.35	No power poles would be replaced within the water protection buffer	
Penstemon Solar Project Site					
Coleman Creek	F	20	0.68	36	7
Typha Solar Project Site					
Yakima River	S	40	0.77	205	0
Urtica Solar Project Site					
McCarl Creek (US01)	F	20	2.06	0	16,796

1. S = shoreline of the state (WAC 222-16-030), F = fish-bearing stream (WAC 222-16-030); all other water resources were excluded from this table because no protection buffers were defined by KCC guidance for those features.
2. Minimum buffer distances are depicted on maps.

3.3.3.2 Solar Project Sites

Camas Solar Project Site

No impacts are proposed to the KCC-defined minimum protection buffer around Little Naneum Creek within the Camas Solar Project site. The nearest project impact area (the planned perimeter fence) would be 1 to 100 feet from the edge of the minimum protection buffer for Little Naneum Creek. No KCC-defined minimum protection buffer is defined for Bull Ditch because ditches and canals are excluded from the WAC water typing system. All impacts to water protection buffers would be avoided through project design.

Fumaria Solar Project Site

No KCC-defined protection buffers are defined for the two on-site ditches because ditches are excluded from the WAC water typing system. Therefore, no impacts are proposed to any KCC-defined minimum water protection buffers within the Fumaria Solar Project site. All impacts to water protection buffers would be avoided through project design.

Fumaria Solar Project Generation Tie Line

No impacts are proposed to the KCC-defined minimum protection buffers around Reecer Creek along the Fumaria Solar Project generation tie line. Power poles near Reecer Creek that are within its minimum protection buffer would not be replaced. No KCC-defined minimum water protection buffer is defined for unnamed stream FS04 because KCC guidance specifies that no protection buffer is needed for Type Ns water resources, and no KCC-defined minimum water protection buffers are defined for Cascade Irrigation District Canal, Town Ditch, and the ditches along the Fumaria Solar Project generation tie line because ditches and canals are excluded from the WAC water typing system. All impacts to water protection buffers would be avoided through project design.

If new power poles need to be installed, then TUUSSO would install them in upland areas outside of the KCC-defined minimum protection buffers for all water resources along the Fumaria Solar Project generation tie line.

Penstemon Solar Project Site

The Penstemon Solar Project would have very minor encroachment on the KCC-defined minimum protection buffer around Coleman Creek within the project site. The proposed perimeter fence would impact approximately 7 square feet along the western edge of Coleman Creek's minimum protection buffer (Figure 3.3-16). Along the remainder of the buffer, the project impact area would be 0 to 82 feet from the edge of the minimum protection buffer for Coleman Creek, with an average distance of 36 feet from the edge of the minimum protection buffer. No KCC-defined minimum protection buffer is defined for the on-site ditch because ditches and canals are excluded from the WAC water typing system. Impacts to water protection buffers on the Penstemon Solar Project site would be negligible and would not require mitigation.

Typha Solar Project Site

No impacts are proposed to the KCC-defined minimum protection buffer around the Yakima River within the Typha Solar Project site. The nearest project impact area would be 104 to 335 feet from the edge of the minimum protection buffer for the Yakima River, with an average distance of 205 feet. All impacts to water protection buffers would be avoided through project design.

Typha Solar Project Generation Tie Line

No KCC-defined protection buffers are defined for the EP Canal and on-site ditches because ditches and canals are excluded from the WAC water typing system. Therefore, no impacts are proposed to any KCC-defined minimum water protection buffers along the Typha Solar Project generation tie line. All impacts to water protection buffers would be avoided through project design.

Urtica Solar Project Site

The Urtica Solar Project would impact the KCC-defined minimum protection buffer around McCarl Creek within the project site (Figure 3.3-17). No impacts to McCarl Creek or its buffer would occur because the proposed fence posts would be installed within the existing access road prism. Although 16,796 square feet of encroachment into the KCC-defined minimum protection buffer for McCarl Creek is depicted in Figure 3.3-17, no activities are planned within this area, other than adding a fence outside of it. The existing road is not considered a part of the water protection buffer because it cannot act as a buffer for surrounding resources; therefore, its area was excluded from the buffer area calculation. Improvements to this road could extend outside of the existing road footprint; however, this is not proposed at this time. If plans are altered, then coordination with Kittitas County would occur for the buffer impacts associated with that design change. All impacts to water protection buffers would be avoided or would have negligible impacts on water protection buffers based on the current project design.

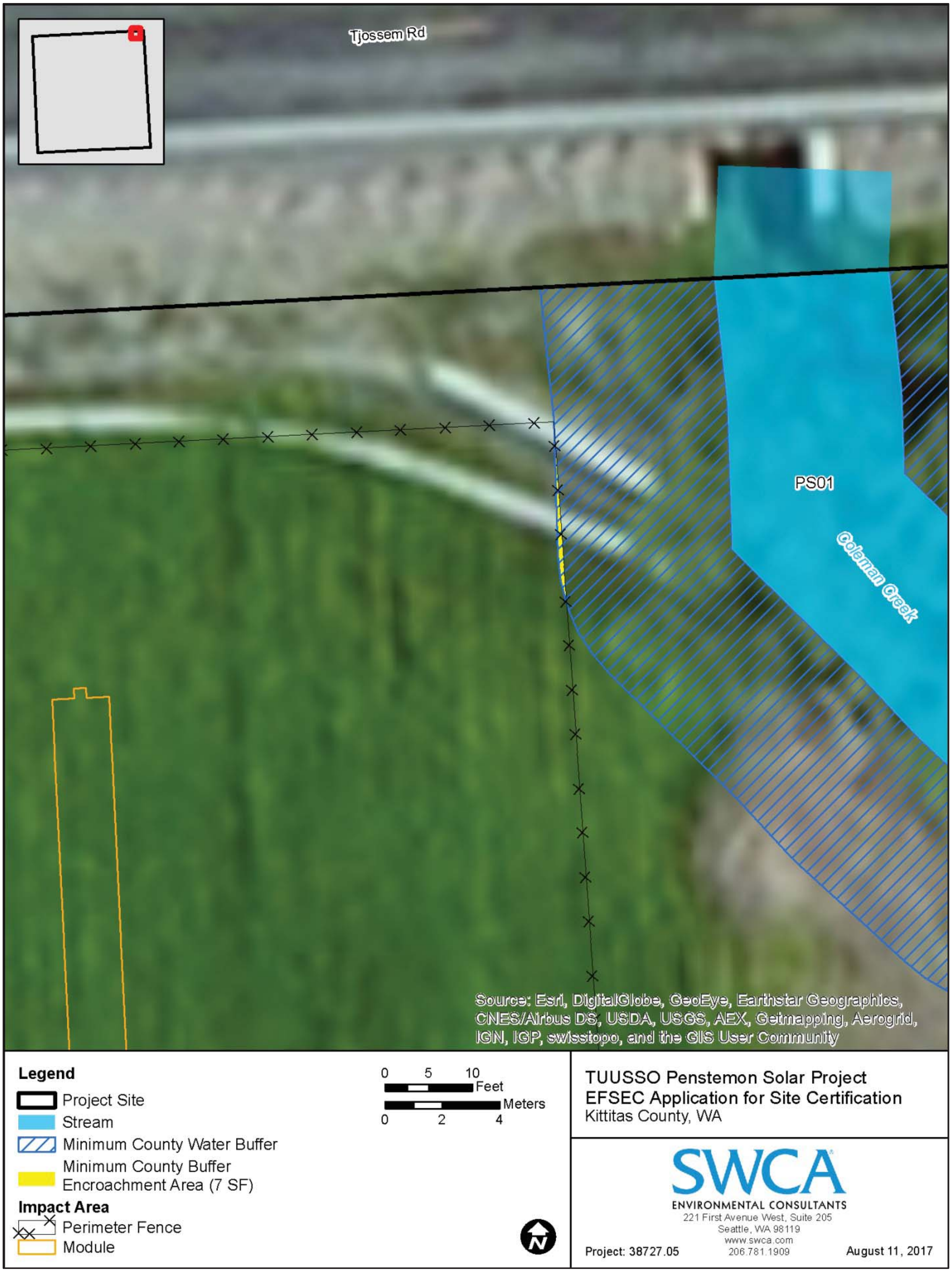

Figure 3.3-16. Penstemon Solar Project water buffer encroachment.

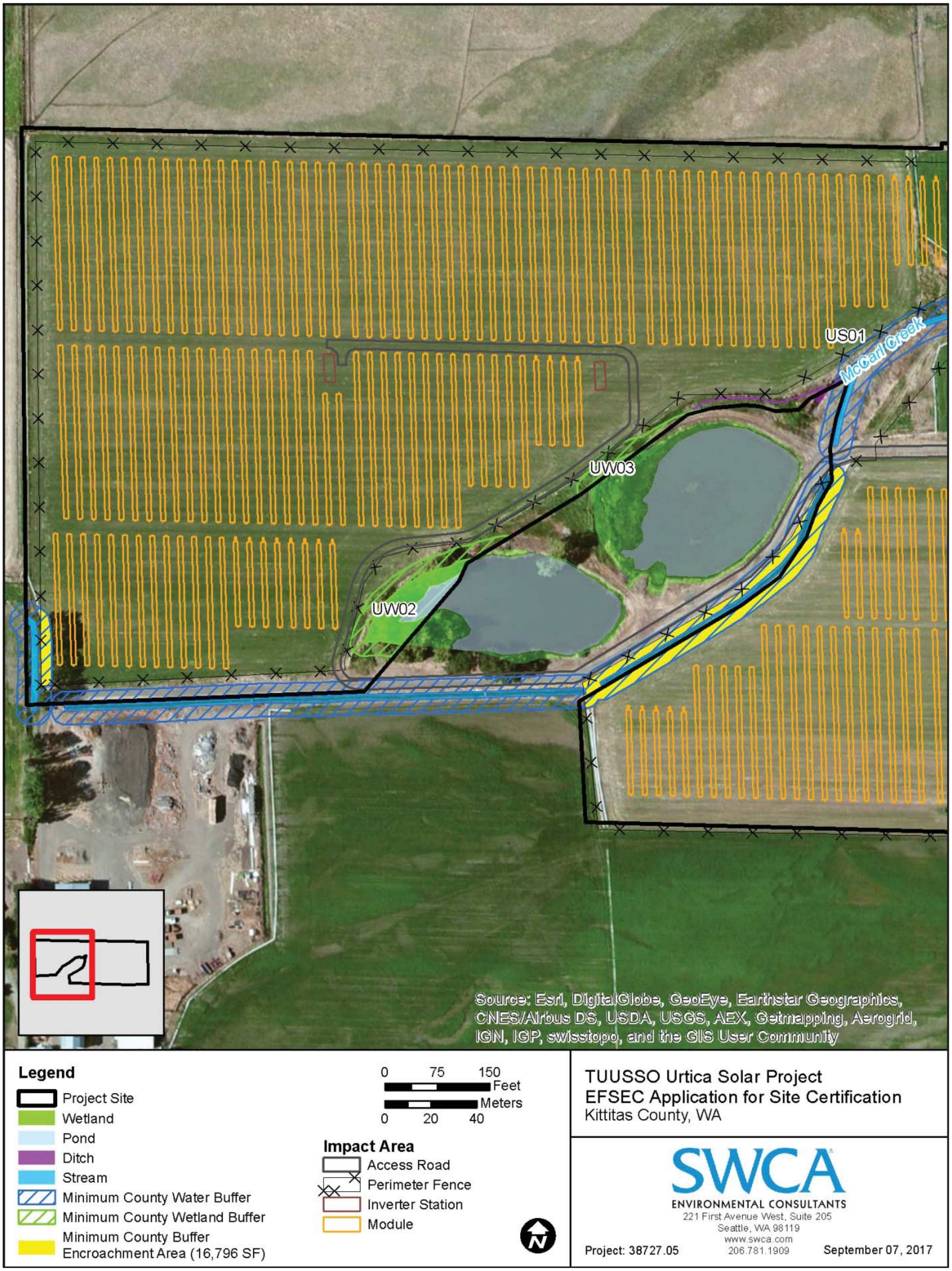

Figure 3.3-17. Urtica Solar Project wetland and water buffer encroachment.

(2) Surface water movement/quality/quantity. The application shall set forth all background water quality data pertinent to the site, and hydrographic study data and analysis of the receiving waters within one-half mile of any proposed discharge location with regard to: Bottom configuration; minimum, average, and maximum water depths and velocities; water temperature and salinity profiles; anticipated effluent distribution, dilution, and plume characteristics under all discharge conditions; and other relevant characteristics which could influence the impact of any wastes discharged thereto.

3.3.4 Affected Environment for Surface Water

3.3.4.1 General County

TUUSSO prepared drainage reports for the Columbia Solar Project sites (Encompass Engineering & Surveying [Encompass] 2017a, 2017b, 2017c, 2017d, 2017e). See also the Drainage Design and Current and Proposed Hydrology sections in Section 2.3.3.1. All of the sites are all relatively flat. All of the sites generally slope from north to south.

3.3.4.2 Solar Project Sites

Camas Solar Project Site

The Camas Solar Project site is currently an open field used to make hay using flood irrigation methods. The overall topography of the site gently slopes to the south (Figure 3.3-18). The surface water that does not infiltrate flows to the south. The western edge of the site is bordered by an irrigation ditch (CW01) flowing to the south, while Little Naneum Creek flows southwest along the southeastern edge of the site. These surface waters meet at the southwest corner of the site before crossing under Interstate 82 (I-82) in existing irrigation infrastructure. Bull Ditch runs southeast through the northern portion of the site. These ditches are maintained by the landowner.

Drainage Basins

As shown in Figure 3.3-18, the Camas Solar Project site is made up of two drainage basins (Encompass 2017a). Drainage Basin 1 captures the majority of the site, and it includes everything that is south and west. Drainage Basin 2 is the small, northeast portion of the site that is separated from the rest of the site by Bull Ditch. All of the runoff is either infiltrated on-site or flows to the south/southwest. The existing drainage currently has a barn on it which results in 0.06 acre of impervious area on the site, while the remaining 51.15 acres are pervious.

Downstream Analysis

As noted above, all runoff from the Camas Solar Project site flows into Little Naneum Creek that leaves the site at the southwest corner of the site and flows under I-82. Little Naneum Creek and Bull Ditch are part of a larger irrigation network that serves the rural areas south of Ellensburg. The flow rates are controlled as needed. Little Naneum Creek flows south from the site for approximately 0.5 mile before discharging into Naneum Creek and then Wilson Creek. No issues have been brought up in relation to the existing irrigation infrastructure downstream of the project site.

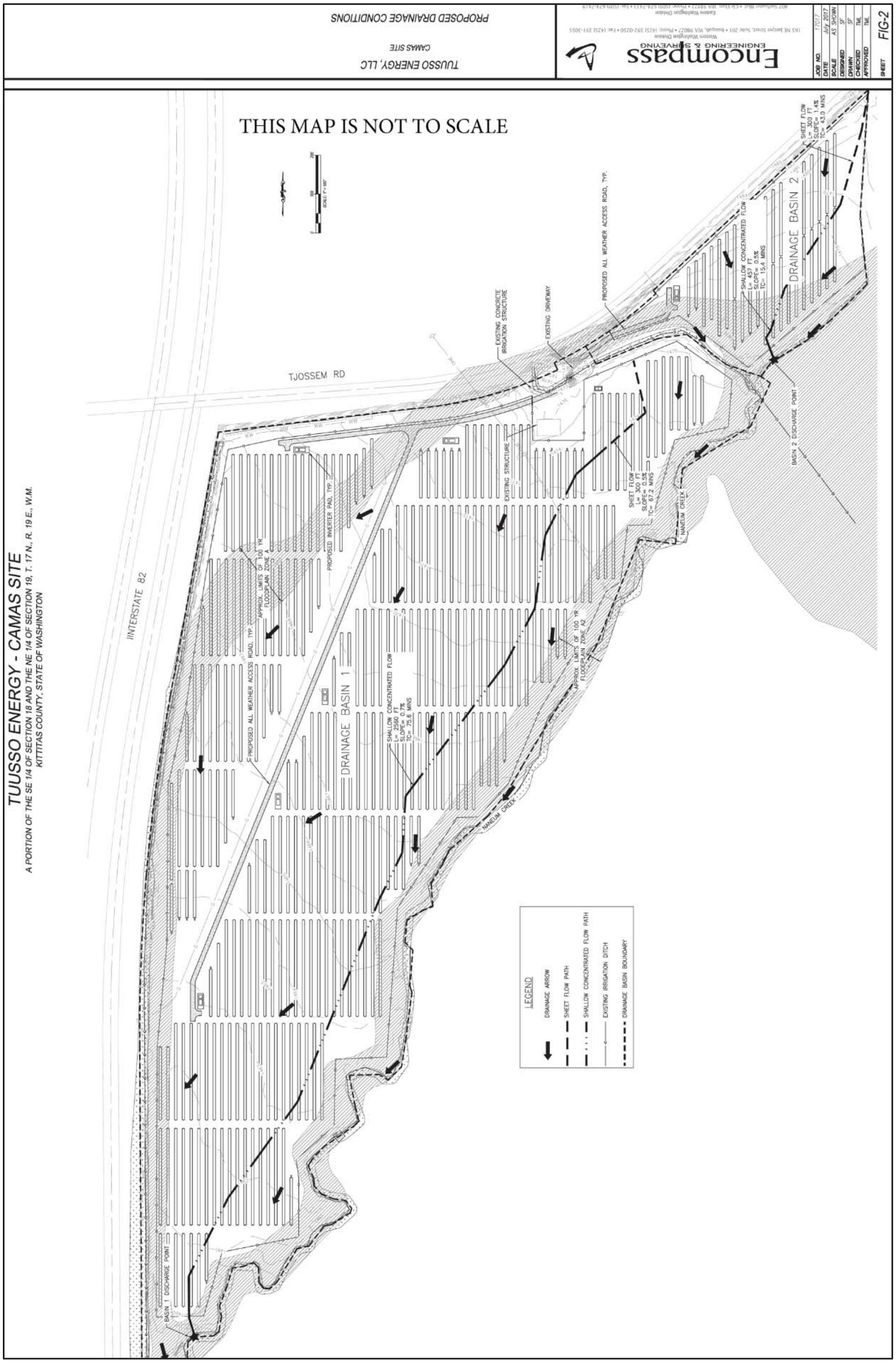

Figure 3.3-18. Proposed drainage conditions for the Camas Solar Project site.

Fumaria Solar Project Site

The overall topography of the Fumaria Solar Project site gently slopes to the south (Figure 3.3-19). The surface water that does not infiltrate flows to the south. Runoff to the west is captured by an existing irrigation ditch that flows south along the western border of the site (FS01). Runoff to the south is captured in the southern portion of the ditch where it discharges to an existing detention pond just off the southeast corner of the property.

Drainage Basins

As shown in Figure 3.3-19, since all runoff is either infiltrated on-site or captured in the existing irrigation pond, the Fumaria Solar Project site is a single drainage basin represented by two sub-basins: Basin 1A and Basin 1B (Encompass 2017b). Basin 1A makes up the majority of the site and flows generally to the south. Basin 1B makes up a small portion of the site that sheet flows off the site to the west. Runoff from Basins 1A and 1B meet in an existing irrigation ditch (FS01). The existing drainage basin contains no impervious surfaces, meaning the entire 35.24 acres is pervious.

Downstream Analysis

As noted above, all runoff from the Fumaria Solar Project site flows into the existing irrigation ditch at the southern end of the site. The ditch discharges into an existing irrigation pond immediately to the southeast of the project site. The ditch and pond are currently maintained by the landowner. The irrigation ditch, and ditches downstream of the project site, are part of a larger irrigation network that serves the rural areas north of Ellensburg. The pond outlets via a culvert to the south, where it then splits into two ditches, one to the south and one to the east. As these are irrigation facilities, the flow rates are controlled as needed. No issues have been brought up in relation to the existing irrigation infrastructure downstream of the project site.

Penstemon Solar Project Site

The overall topography of the Penstemon Solar Project site gently slopes to the south (Figure 3.3-20). The surface water that does not infiltrate flows to the south. This runoff is captured in an irrigation ditch along the southern property line. The ditch flows to the east and into Coleman Creek at the southeast corner of the site.

Drainage Basins

As shown in Figure 3.3-20, since all runoff is either infiltrated or captured in the existing irrigation ditch at the southern border of the Penstemon Solar Project site, the site is a single drainage basin (Encompass 2017c). The existing drainage basin contains no impervious surfaces, meaning the entire 39.38 acres is pervious.

Downstream Analysis

As noted above, all runoff from the Penstemon Solar Project site flows into the existing irrigation ditch at the southern end of the site. This ditch is currently maintained by the landowner. The irrigation ditch is part of a larger irrigation network that serves the rural areas south of Ellensburg, and the flow rates are controlled as needed. The ditch discharges into Coleman Creek, immediately to the southeast of the project site. Coleman Creek is well defined, with thick vegetation on its edges, and flows south along Moe Road for 0.5 mile. It then flows southeast, ultimately joining Wilson Creek, before discharging into the Yakima River. No issues have been brought up in relation to the existing irrigation infrastructure downstream of the solar project site.

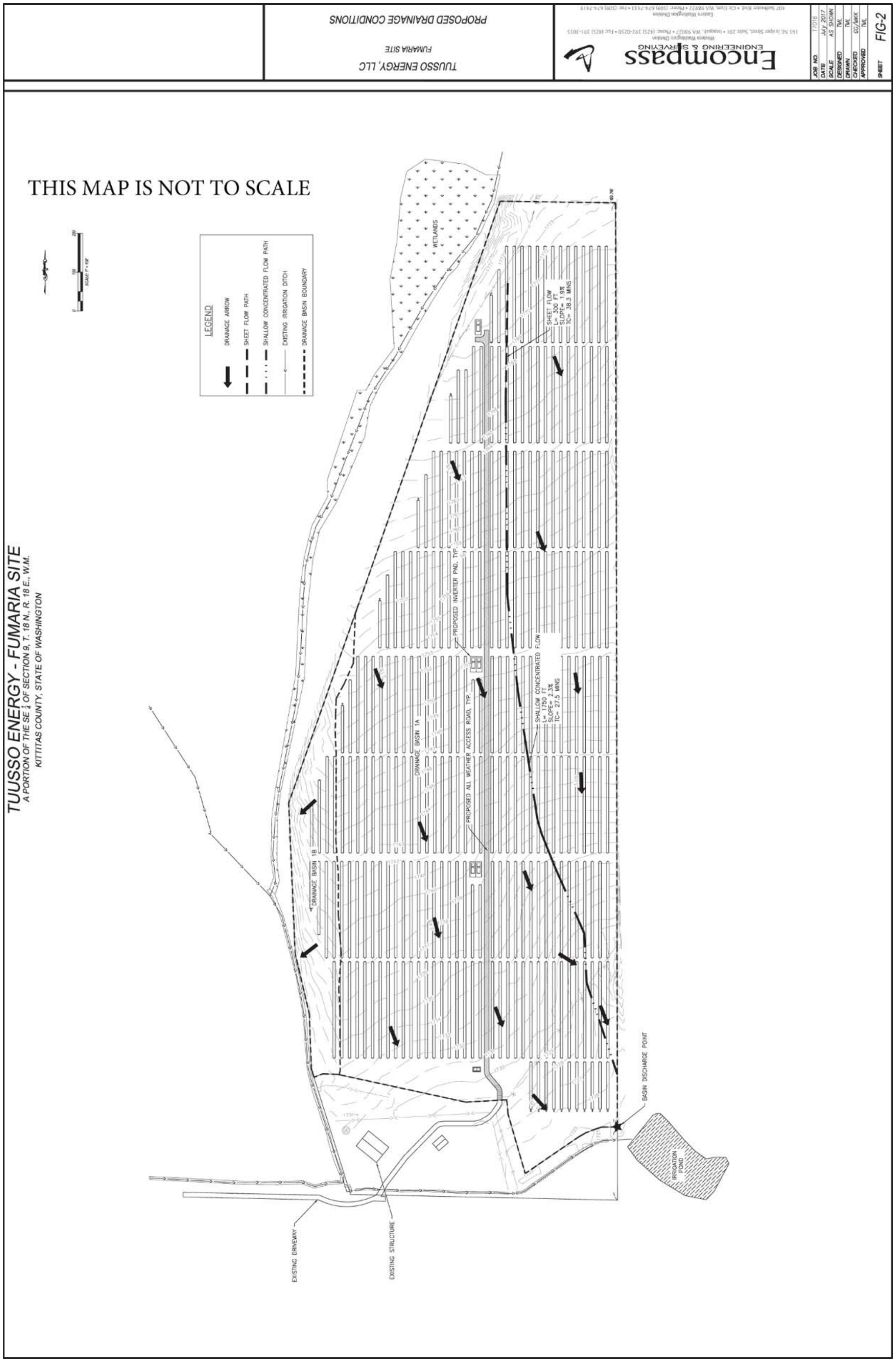

Figure 3.3-19. Proposed drainage conditions for the Fumaria Solar Project site.

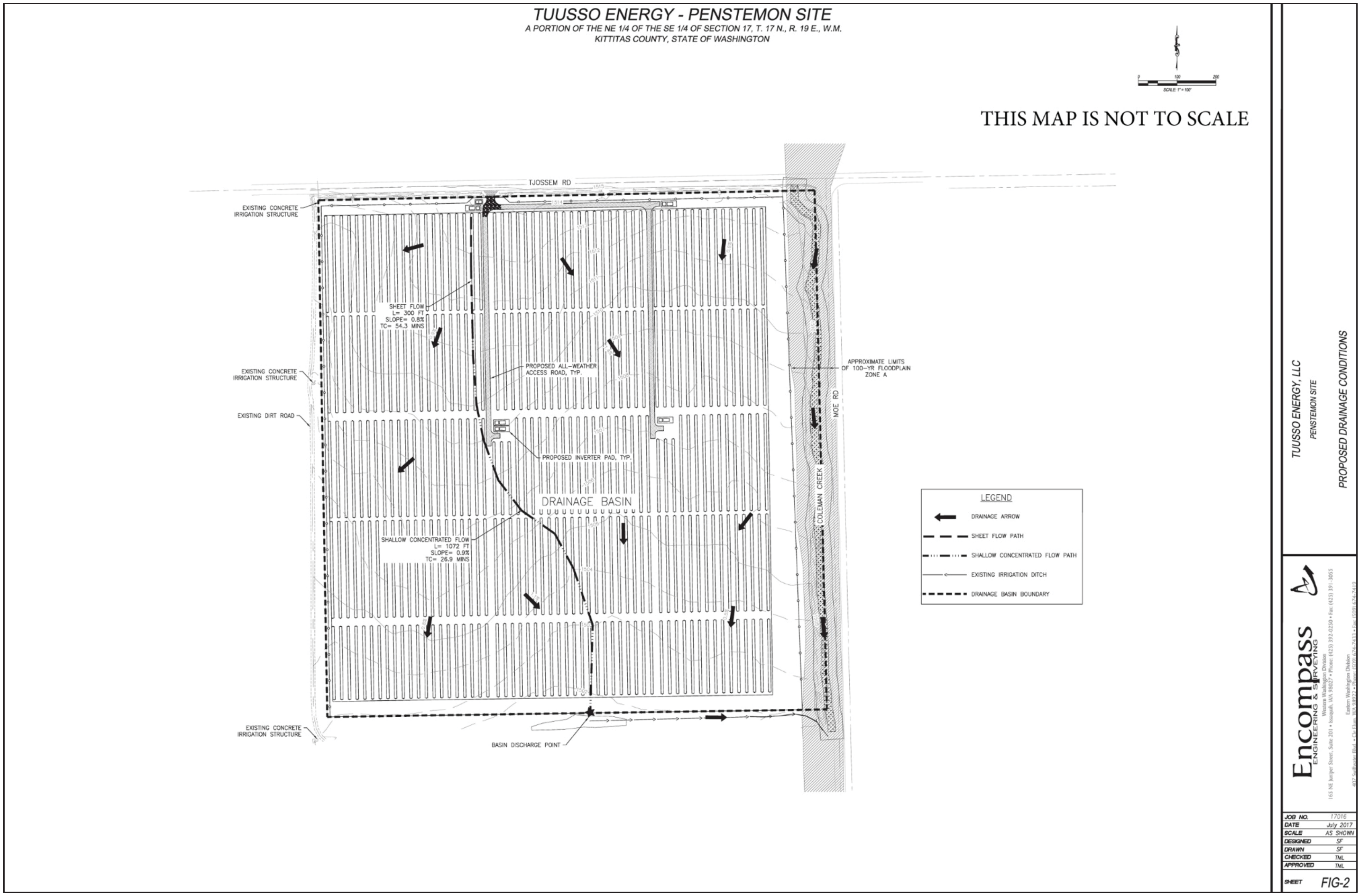

Figure 3.3-20. Proposed drainage conditions for the Penstemon Solar Project site.

Typha Solar Project Site

The overall topography of the Typha Solar Project site gently slopes to the south (Figure 3.3-21). The surface water that does not infiltrate flows to the south. There are two narrow wetlands that run west to east through the site and capture surface runoff and slowly discharge it to the east.

Drainage Basins

As shown in Figure 3.3-21, the Typha Solar Project site is made up of three drainage basins (Encompass 2017d). Drainage Basin 1 is made up of the northwest portion of the site. Drainage from this area flows south and into the northern wetland (TW01) on the site. Drainage Basin 2 is the largest drainage basin on the site and encompasses the northeast portion of the site. Drainage from Basin 2 flows south into the existing northern wetland (TW02), which then carries the flow to the east. Drainage from Basin 3 flows south into the wetland (TW03) which borders the southern portion of the site and is the more major wetland of the two on site. The runoff slowly flows to the east via the wetland. There are no impervious surfaces, meaning the entire 56.12 acres is pervious.

Downstream Analysis

The Typha Solar Project site drains into two wetlands (TW02 and TW03), both of which make their way to the east. The southern wetland becomes a more defined irrigation channel after leaving the site and continues to convey water to the east for approximately 0.75 mile before discharging into the Yakima River. This irrigation channel is currently maintained by the Kittitas Reclamation District (KRD). It is part of a larger irrigation network that serves the rural areas west of Ellensburg. As this channel is part of the irrigation facilities, the flow rate is controlled as needed. No issues have been brought up in relation to the existing irrigation infrastructure downstream of the project site.

Urtica Solar Project Site

The overall topography of the Urtica Solar Project site gently slopes to the east (Figure 3.3-22). The surface water that does not infiltrate flows to the east. Two ponds are located near the middle of the site and discharge into an existing irrigation ditch that runs west to east through the site.

Drainage Basins

As shown in Figure 3.3-22, the Urtica Solar Project site is made up of two drainage basins (Encompass 2017e). Drainage Basin 1 is the smaller of the two and encompasses the southern portion of the site. Drainage from this area flows east, to the southeast corner of the site, where it enters a culvert and crosses under Umptanum Road. Drainage Basin 2 is the larger drainage basin that encompasses the northern portion of the site. Drainage from Basin 2 flows into the existing irrigation pond and ditch (US01, McCarl Creek) that flows through the site to the east. There are no structures on the existing site, however there is an existing gravel road, which results in 0.33 acre of the site being impervious. The remaining 51.16 acres are pervious.

Downstream Analysis

The majority of the Urtica Solar Project site (Basin 2) drains to the east into the irrigation ponds and/or irrigation ditch (US01, McCarl Creek) that flows west to east through the site. The pond and ditch are currently maintained by the current landowner. The irrigation pond and ditch are part of a larger irrigation network that serves the rural areas southwest of Ellensburg. As this pond and ditch are irrigation facilities, the flow rates are controlled as needed. Both Basins drain into culverts that cross under Umptanum Road, and then continue on to the southeast as part of the larger existing irrigation network that serves the whole area. No issues have been brought up in relation to the existing irrigation infrastructure downstream of the project site.

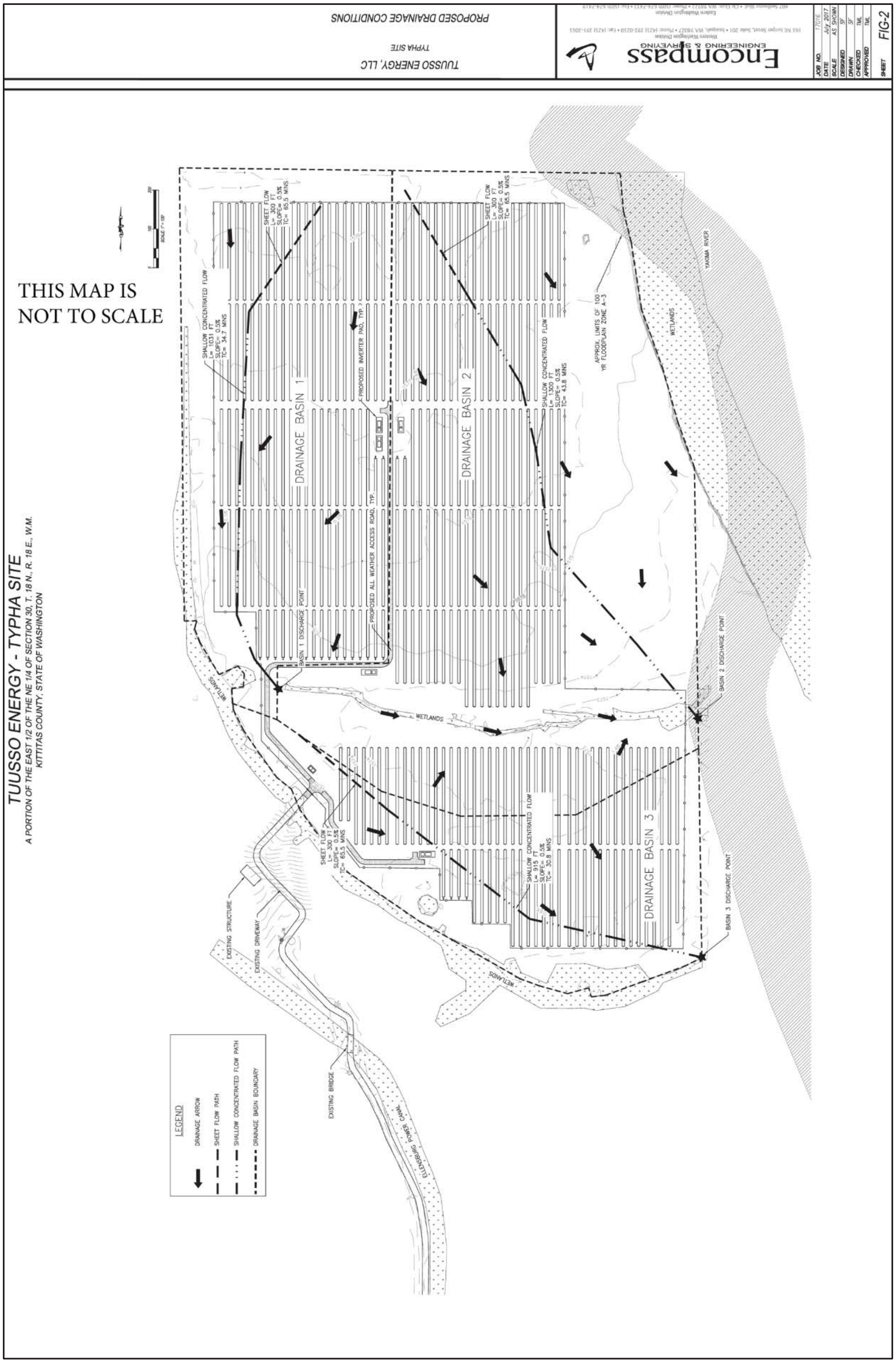

Figure 3.3-21. Proposed drainage conditions for the Typha Solar Project site.

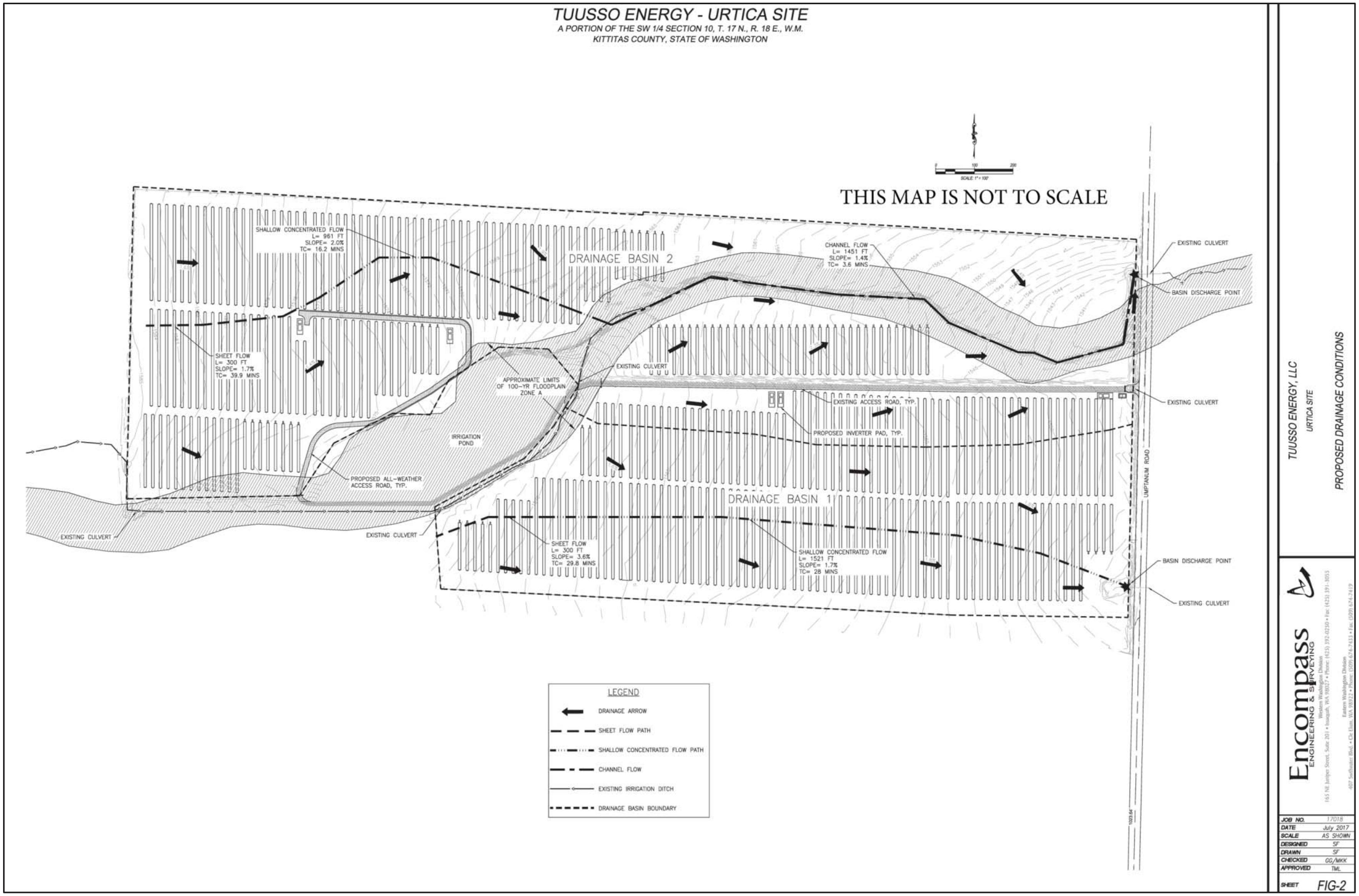

Figure 3.3-22. Proposed drainage conditions for the Urtica Solar Project site.

3.3.5 Impacts to Surface Water

3.3.5.1 General County

Minimal grading and ground disturbance would occur as part of the proposed Columbia Solar Projects. The proposed projects include at least 20-foot setbacks from wetlands, streams, and the Yakima River. Additionally, sediment and erosion control measures would be implemented to avoid water quality impacts to adjacent wetlands, streams, and the Yakima River. As a result, there would be no impacts to water quality. The access roads, concrete pads for the electrical infrastructure, and solar tracker posts are the only impervious surfaces proposed for the site. The portion of the solar panel array installations that actually disturb the ground is also very minimal. Because of this, existing topography and drainage patterns would remain relatively undisturbed, and the proposed drainage basins would encompass the same area as the existing drainage basins (see Figures 3.3-18 through 3.3-22).

See also Sections 2.11, 3.3.7, and 3.3.8. No discharge of water or contaminants is proposed for any of the five Columbia Solar Project sites; therefore, no hydrographic study data and analysis of the receiving waters within 0.5 mile of the solar project sites would be necessary. However, because impervious surfaces would be added to each project site, hydrologic modeling was conducted. All site and location factors were taken into account to perform the hydrologic modelling. These results are further summarized below for each site; the detailed analyses can be found in Appendices G through K (Encompass 2017a, 2017b, 2017c, 2017d, 2017e). The modeled increased runoff can be handled by full dispersion throughout each project site, as a majority of the existing vegetation at the sites would be protected. See detailed discussion of this in Appendices G through K (Encompass 2017a, 2017b, 2017c, 2017d, 2017e). The increased runoff is also considered negligible, due to the reduction of flood irrigation that would accompany each of the Columbia Solar Projects.

The Columbia Solar Projects would not impact the surface water quality and there would be minor permanent impacts to the surface water movement and quantity. However, no impacts are expected to occur in waters downstream of the solar project sites.

3.3.5.2 Solar Project Sites

Camas Solar Project Site

The Camas Solar Project would convert 2.00 acres into impervious surfaces. The modelling calculations showed that the runoff generated from a 2-year storm increased by 0.02 cubic feet per second (cfs) for Basin 1 while it did not increase for Basin 2. Runoff generated from a 25-year storm increased 0.07 cfs for Basin 1 and 0.01 cfs for Basin 2.

Fumaria Solar Project Site

Basin 1B would remain undisturbed throughout the Fumaria Solar Project, with no appreciable impervious surface added. The project would convert 1.71 acres into impervious surfaces in Basin 1A. The modelling calculations showed that the runoff generated from a 2-year storm increased 0.04 cfs. Runoff generated from a 25-year storm increased 0.11 cfs.

Penstemon Solar Project Site

The Penstemon Solar Project would convert 1.31 acres into impervious surfaces. The modelling calculations showed that the runoff generated from 2-year and 25-year storms would remain the same as under the existing condition.

Typha Solar Project Site

The Typha Solar Project would convert 1.40 acres into impervious surfaces. The modelling calculations showed that the runoff generated from a 2-year storm would increase 0.01 cfs for Basin 1 and remain the same as under the existing condition for Basins 2 and 3. Runoff generated from a 25-year storm increased 0.02 cfs for Basin 1 and 0.01 cfs for Basin 3, while Basin 2 remained unchanged.

Urtica Solar Project Site

The Urtica Solar Project would convert 1.65 acres into impervious surfaces. The modelling calculations showed that the runoff generated from a 2-year storm increased 0.02 cfs for Basin 1 while it did not increase for Basin 2. Runoff generated from the 25-year storm increased 0.01 cfs for Basin 1 and 0.02 cfs for Basin 2.

(3) Runoff/absorption. The application shall describe how surface water runoff and erosion are to be controlled during construction and operation, how runoff can be reintroduced to the ground for return to the groundwater supply, and to assure compliance with state water quality standards.

3.3.6 Affected Environment for Runoff/Absorption

The estimated infiltration rates for the Columbia Solar Project sites are 1.02 inches/hour for the upper, silty sand unit and 0.27 inch/hour for the underlying sandy gravel (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). The rate for the sandy gravel unit is assumed to be low because of the presence of fine-grained silt and clay minerals in the interstitial spaces and fractures of this partially cemented unit.

Site-specific seepage and perched groundwater observations are included below in Section 3.3.11.

3.3.7 Impacts to Runoff/Absorption

3.3.7.1 General County

See also the Drainage Design and Current and Proposed Hydrology sections in Section 2.3.3.1, as well as Section 3.3.5.

No export of soil is anticipated for any of the five Columbia Solar Project sites. During site construction, open soil exposure would be minimized through minimization of grading activities, and erosion from runoff would be reduced or eliminated by the utilization of BMPs, including but not limited to installation of silt fences and tarps where appropriate. At the conclusion of construction, all disturbed areas surrounding graded areas would be remediated through reseeding with native low cover vegetation. No ditches or outfall pipes would be installed as part of the proposed solar projects. Therefore, all water in the project impact areas would either be absorbed through infiltration or runoff through overland flow at very low velocities that are unlikely to cause excessive erosion. No discharges to water resources are proposed for the construction and operation of the solar project sites. As a result, the temporary runoff/absorption impacts would be minor.

Infiltration and Temporary Erosion and Sedimentation Control

TUUSSO would implement BMPs based on applicable stormwater guidelines for eastern Washington to reduce or eliminate concentrated stormwater runoff and erosion. Additional details regarding BMPs can be found in Section 3.1.6.

Construction of the solar arrays at the Columbia Solar Project sites could create a minor increase in the total and effective impervious area of the sites that is equivalent to the area of the solar panel footings and associated infrastructure. There would also be an increase in less pervious areas because of the proposed gravel access roads.

Based on the results of the geotechnical study, infiltration into the upper, topsoil-like silty sand/sandy silt soils at the Columbia Solar Project sites is feasible and ongoing (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). The solar project sites have been cultivated using flood irrigation methods, and the irrigation water percolates into the soil and is stored above the underlying relatively impervious layer found throughout the valley. The soils are capable of infiltrating stormwater during an average year (Swiftwater 2017). The solar project sites are located in Climate Region 2 – Central Basin and receive an average of about 8 inches of precipitation per year, some of it in the form of snow (Ecology 2013). Given the relatively low precipitation in the area, combined with the natural permeability of the upper soil horizon, infiltration of normal stormwater amounts would occur on the solar project sites and normal levels of stormwater would not be concentrated to a significant extent (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). As a result, there would be permanent minor runoff/absorption impacts.

Drainage

Appreciable amounts of seepage are not anticipated during excavation of the Columbia Solar Project sites; however, during the rainy winter months, it is prudent to anticipate seepage in excavations and groundwater control measures would be on-site or readily available. These would include trash pumps, sumps, and discharge ditches. Seepage may create instability in the excavation walls. The solar project sites would be graded such that surface water would be directed away from structures and slopes and not allowed to pond near the tops or toes of slopes. Given the relatively low precipitation in the solar project areas, combined with the natural permeability of the upper soil horizon, infiltration of normal stormwater amounts would occur on the project sites and normal levels of stormwater would not be concentrated to a significant extent (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). Stormwater discharge BMPs would be implemented on the project sites to control runoff from the sites and ensure that state water quality standards are achieved.

3.3.8 Mitigation for Runoff/Absorption

The following mitigation measures would be used:

- Off-site flows have been calculated for the Columbia Solar Project sites, and would bypass the sites via the existing flow paths, which run throughout the sites in poorly defined flow paths. The solar project sites have been laid out to minimize the area that would encroach into the flow paths. Any grading of the solar project sites would direct surface water away from structures and slopes.
- Surface water would not be allowed to pond near the tops or toes of slopes of the solar project sites.
- Stormwater discharge BMPs would be implemented to control runoff from each of the solar project sites.
- Sediment-laden surface water would be treated such that water discharged from each of the solar project sites meets all water quality standards.
- Stormwater would not be discharged over the project site slopes to the north of each solar project site.

(4) Floods. The application shall describe potential for flooding, identify the five, fifty, and one hundred-year flood boundaries, and describe possible flood impacts at the site, as well as possible flood-related impacts both upstream and downstream of the proposed facility as a result of construction and operation of the facility and all protective measures to prevent possible flood damage to the site and facility.

3.3.9 Affected Environment for Floodplains

3.3.9.1 General County

The Flood Emergency Management Agency (FEMA) maps floodplains throughout the country. FEMA-mapped floodplains are found at every Columbia Solar Project site, except for the Fumaria Solar Project site. The FEMA-mapped 100-year floodplain is depicted on the site plans for each of the project sites in Appendix L (FEMA 1981a). The 50-year floodplain is not depicted on FEMA Flood Insurance Rate Maps (FIRMs) for Kittitas County; however, it is described in the FEMA Flood Insurance Study (FIS) for the city of Ellensburg. An FIS is a compilation and presentation of flood risk data for specific watercourses, lakes, and coastal flood hazard areas within a community and contains detailed flood elevation data in flood profiles and data tables (FEMA 1981b). The 5-year floodplain is not included in the FIS or depicted on FIRMs. This Application for Site Certification (ASC) assumes that because the 100-year floodplain boundary occurs at a higher elevation than the 5- and 50-year floodplains, that analysis of impacts within the 100-year floodplain boundary are representative of those to the 5- and 50-year floodplains, with fewer impacts occurring within the 5- and 50-year floodplains.

3.3.10 Impacts to Floodplains

3.3.10.1 General County

TUUSSO utilized avoidance measures during design of the Columbia Solar Projects to avoid, reduce, or eliminate impacts to the 100-year floodplain. Minor encroachment into the FEMA-mapped 100-year floodplain would be unavoidable based on the current project designs and would occur over a total of 7.94 acres across all of the solar project sites. However, actual fill in the solar project sites would be limited to solar panel footings, inverters, and access road installation, with all other areas remaining at the current site elevation. Impacts to the FEMA-mapped 100-year floodplain would be limited to 0.57 acre across all of the solar project sites. All inverters would be located outside of the FEMA-mapped 100-year floodplain.

Refer to Table 3.3-6 for the total area of FEMA-mapped 100-year floodplain within the solar project sites, average distance from the edge of the floodplain boundary to the nearest project disturbance, total 100-year floodplain encroachment, and total impacts to the 100-year floodplain within each of the solar project sites. Impacts to the FEMA-mapped 100-year floodplain along the Fumaria and Typha Solar Project generation tie lines would be avoided by using existing power poles and spanning all floodplain areas; therefore, the generation tie lines are excluded from Table 3.3-6.

Table 3.3-6. FEMA-Mapped 100-year Floodplain Project Encroachment and Impacts within Each Columbia Solar Project Site

Project Site	Total Area of 100-year Floodplain within Project (acres)[1]	Average Distance from Floodplain Boundary Edge to Project Disturbance (feet)	Total 100-year Floodplain Encroachment (acres)	Total Impacts to 100-year Floodplain (acres)
Camas Solar Project Site				
100-year Floodplain	12.41	10	6.78	0.19
Fumaria Solar Project Site				
100-year Floodplain	0.00	626	0.00	0.00
Penstemon Solar Project Site				
100-year Floodplain	1.96	9	0.00	0.00
Typha Solar Project Site				
100-year Floodplain	0.53	60	0.00	0.00
Urtica Solar Project Site				
100-year Floodplain	6.09	30	1.16	0.38

1. 100-year floodplain mapping is based on the FEMA-mapped floodplains depicted on FIRMs (FEMA 1981a).

See Appendix L for site plans for each of the Columbia Solar Project sites. Encroachment and impacts to the FEMA-mapped 100-year floodplain and discussion of the 50-year floodplain are described below for each solar project site.

3.3.10.2 Solar Project Sites

Camas Solar Project Site

The FEMA-mapped 100-year floodplain associated with Little Naneum Creek encompasses approximately 12.41 acres of the Camas Solar Project site. The northernmost 100-year floodplain appears to have been a former overflow channel of Little Naneum Creek. This area of the 100-year floodplain enters the study area in the north, heads west slightly, makes a gradual curve to the south, and follows the edge of the highway, encompassing wetland CW01, to its confluence with Little Naneum Creek in the southwestern corner of the site. The 100-year floodplain is described on the FIRM as ranging from 1,454 to 1,470 feet above mean sea level (amsl) within the “limit of detailed study,” which does not extend north of the intersection of Bull Ditch and Little Naneum Creek (FEMA 1981a). The 50-year floodplain for Little Naneum Creek was described in the FEMA FIS, depicted as Naneum Creek in the FIS, as being 0.2 feet lower in elevation than the 100-year floodplain boundary (FEMA 1981b).

Encroachment of the Camas Solar Project area into the FEMA-mapped 100-year floodplain would be approximately 6.78 acres based on the current design plans. Proposed impacts to the FEMA-mapped 100-year floodplain were avoided to the extent possible through project design to reduce possible fill in these areas. The total proposed project impacts to the FEMA-mapped 100-year floodplain would be approximately 0.19 acre, which includes less than 0.01 acre of fill from the solar panel footings and 0.18 acre of fill from access road installation. The number and placement of panel footings have not been determined in the project design but would not be expected to exceed 0.01 acre within the FEMA-mapped 100-year floodplain. Therefore, the project would result in minimal impacts to floodplains.

Based on observations during Camas Solar Project site visits, the FEMA-mapped 100-year floodplain area does not appear to match the current site conditions and may be smaller than what is depicted on the FIRM.

Fumaria Solar Project Site

No FEMA-mapped 100-year floodplains are depicted within the Fumaria Solar Project site. Therefore, no impacts are proposed to any FEMA-mapped 5-, 50-, or 100-year floodplains within the project site. The nearest 100-year floodplain is along Reecer Creek, over 600 feet from the site. All impacts to FEMA-mapped floodplains would be avoided through project design.

Fumaria Solar Project Generation Tie Line

The FEMA-mapped 100-year floodplain, associated with Reecer Creek, encompasses approximately 1.91 acres along the Fumaria Solar Project generation tie line. The FEMA-mapped 100-year floodplain for Reecer Creek would cross the generation tie line three times. The 100-year floodplain is depicted on the FIRM but does not include elevation ranges (FEMA 1981a). The 50-year floodplain for the portion of Reecer Creek along the generation tie line was not described in the FEMA FIS but can be assumed to be lower in elevation than the 100-year floodplain boundary (FEMA 1981b).

The FEMA-mapped 100-year floodplain would be avoided by spanning the Reecer Creek floodplain using existing power poles. If new power poles need to be installed, then TUUSSO would install them in upland areas outside of the FEMA-mapped 100-year floodplain along the Fumaria Solar Project generation tie line. Impacts to the FEMA-mapped 100-year floodplain would be avoided through project design.

Penstemon Solar Project Site

The FEMA-mapped 100-year floodplain associated with Coleman Creek encompasses approximately 1.96 acres within the Penstemon Solar Project site. The FEMA-mapped 100-year floodplain for Coleman Creek runs along the eastern project site boundary and appears to flood Moe Road regularly. The 100-year floodplain is depicted on the FIRM but does not include elevation ranges (FEMA 1981a). The 50-year floodplain for the portion of Coleman Creek within the project site was not described in the FEMA FIS but can be assumed to be lower in elevation than the 100-year floodplain boundary (FEMA 1981b).

Encroachment into and impacts to the FEMA-mapped 100-year floodplain from the Penstemon Solar Project would be avoided through project design.

Typha Solar Project Site

The FEMA-mapped 100-year floodplain associated with the Yakima River encompasses approximately 0.53 acre within the Typha Solar Project site. The FEMA-mapped 100-year floodplain for the Yakima River runs along the eastern project site boundary, entering the site near where wetland TW02 leaves the site and in the northeastern corner of the site. The 100-year floodplain is described on the FIRM as ranging from 1,567 to 1,572 feet amsl within and directly adjacent to the project site (FEMA 1981a). The 50-year floodplain for this portion of the Yakima River was described in the FEMA FIS as being 0.7 feet lower in elevation than the 100-year floodplain boundary (FEMA 1981b).

Encroachment into and impacts to the FEMA-mapped 100-year floodplain from the Typha Solar Project would be avoided through project design.

Typha Solar Project Generation Tie Line

No FEMA-mapped 100-year floodplains are depicted along the Typha Solar Project generation tie line. Therefore, no impacts are proposed to any FEMA-mapped 5-, 50-, or 100-year floodplains along the Typha Solar Project generation tie line.

Urtica Solar Project Site

The FEMA-mapped 100-year floodplain associated with McCarl Creek encompasses approximately 6.09 acres of the Urtica Solar Project site. The FEMA-mapped 100-year floodplain depicted on the FIRM crosses the site along McCarl Creek (described as Distributary to Manastash Creek on the FIRM) and encompasses the two on-site ponds and their surrounding wetlands, UW02 and UW03. The 100-year floodplain is depicted on the FIRM but does not include elevation ranges (FEMA 1981a). The 50-year floodplain for the portion of Coleman Creek within the project site was not described in the FEMA FIS but can be assumed to be lower in elevation than the 100-year floodplain boundary (FEMA 1981b).

Encroachment of the Urtica Solar Project area into the FEMA-mapped 100-year floodplain would be approximately 1.16 acres based on the current design plans. Proposed impacts to the FEMA-mapped 100-year floodplain were avoided to the extent possible through project design, to reduce possible fill in these areas. The total proposed project impacts to the FEMA-mapped 100-year floodplain would be 0.38 acre, which includes less than 0.01 acre of fill from the solar panel modules and 0.37 acre of fill from access road installation. The number and placement of panel footings have not been determined in the project design but would not be expected to exceed 0.01 acre within the FEMA-mapped 100-year floodplain. Therefore, the project would result in minimal impacts to floodplains.

(5) Groundwater movement/quantity/quality. The application shall describe the existing groundwater movement, quality, and quantity on and near the site, and in the vicinity of any points of water withdrawal associated with water supply to the project. The application shall describe any changes in surface and groundwater movement, quantity, quality or supply uses which might result from project construction or operation and from groundwater withdrawals associated with water supply for the project, and shall provide mitigation for adverse impacts that have been identified.

3.3.11 Affected Environment for Groundwater

3.3.11.1 General County

The Columbia Solar Project sites are located within the Upper Yakima sub-basin of the Yakima groundwater basin. Basaltic rocks beneath most of the Yakima River basin are part of the larger Columbia River Basalt Group (CRBG). The CRBG comprises more than 300 individual basalt flows, and multiple aquifers reside within them (U.S. Bureau of Reclamation [Reclamation] 2012). Reported "depth to water" levels are as shallow as 10 feet below ground surface (bgs) near river valley bottoms, to more than 200 feet bgs. Well yields are generally less than 100 gallons per minute. Groundwater flows in the basin converge toward the Yakima River.

Groundwater quality in the Yakima basin is generally good; most issues are related to the impacts of agricultural operations on drinking water wells (Reclamation 2012). Water quality issues involve excess nitrate levels and bacterial contamination, particularly in the lower portions of the Yakima basin.

Results from Swiftwater's April 2017 geotechnical survey are discussed above in Section 3.1 and the detailed reports are included as Appendices G through K (Swiftwater 2017a, 2017b, 2017c, 2017d, 2017e). The following site-specific discussions include groundwater observations.

3.3.11.2 Solar Project Sites

Camas Solar Project Site

Regarding existing water quality issues, there is a short segment of the Yakima River mapped as impaired (EPA 2017b). The impaired segment intersects with Wilson Creek, of which the Camas Solar Project's primary drainage is a tributary. There are also short impaired segments up-gradient of the project site, on Cooke Creek. These are located cross-gradient or up-gradient on different local drainage systems not connected to the site.

Well registry data (Washington State Department of Ecology [Ecology] 2017a) identified no wells on the Camas Solar Project site. Two wells were located approximately 400 feet east of the project site. The wells had depths of 80 and 120 feet, but no depth to water or pump capacity was listed in the data files. Other wells in the vicinity had depths of 45 to 180 feet.

A 6-inch-thick, wet sand seam was observed at 10.0 to 11.0 feet below grade on the Camas Solar Project site. This water was encountered in thin, relatively clean sand seams and appears to have been perched within the seams, as additional groundwater was not noted below these depths. Additional groundwater flow may be observed during the wetter winter months.

Fumaria Solar Project Site

Regarding existing water quality issues, there are no impaired reaches in, adjacent to, or up-gradient of the Fumaria Solar Project site (EPA 2017b).

Well registry data (Ecology 2017a) identified one well on the Fumaria Solar Project site (Well Log ID 339775), which had a recorded depth of 120 feet bgs. No depth to water or pump capacity data were available. Other wells within 1 mile of the project site had depths of 80 to 170 feet bgs.

Minor seepage was observed at Boring F-2 on the Fumaria Solar Project site. Groundwater may be present during wetter parts of the year.

Penstemon Solar Project Site

Regarding existing water quality issues, there is a short segment of the Yakima River mapped as impaired (EPA 2017b). The impaired segment intersects with Wilson Creek, of which the Penstemon Solar Project's primary drainage is a tributary. There are also short impaired segments up-gradient of the project site, on Cooke Creek. These are located cross-gradient or up-gradient on a different local drainage system not connected to the project site.

Well registry data (Ecology 2017a) identified no wells on the Penstemon Solar Project site. Two wells were mapped approximately 700 feet east and north of the project site. The wells had depths of 125 to 150 feet bgs, but no depth to water or pump capacity was listed in the data files. Other wells within 1 mile of the project site had depths of 12 to 335 feet bgs.

Below about 10 feet, fine sand seams with minor amounts of perched groundwater were observed on the Penstemon Solar Project site. It is possible, though not likely, that groundwater seepage might be encountered elsewhere on the site.

Typha Solar Project Site

Regarding existing water quality issues, there are no impaired reaches in, adjacent to, or up-gradient of the Typha Solar Project site (EPA 2017b).

Well registry data (Ecology 2017a) identified one well on the Typha Solar Project site (Well Log ID 339775), which had a recorded depth of 120 feet bgs. No depth to water or pump capacity data were available. Other wells within 1 mile of the project site had recorded water depths of 80 to 170 feet bgs.

At 4.5 to 5 feet below grade, there was a 6-inch silty sand seam with perched groundwater seepage on the Typha Solar Project site. The seepage was not continuous. Additional groundwater flow may be observed during the wetter winter months.

Urtica Solar Project Site

Regarding existing water quality issues, there are no impaired reaches in, adjacent to, or up-gradient of the Urtica Solar Project site (EPA 2017b).

Well registry data (Ecology 2017a) identified one well on the Urtica Solar Project site (Well Log ID 339775), which had a recorded depth of 172 feet below bgs. No depth to water or pump capacity data were available. Other wells within 1 mile of the project site had depths of 15 to 290 feet bgs.

No seepage was observed in either boring at the Urtica Solar Project site.

3.3.12 Impacts to Groundwater

No points of groundwater withdrawal, associated with water supplies to the Columbia Solar Projects, are planned. No impacts to groundwater movement, quantity, quality, or supply uses would result from project construction or operation of the solar projects. If grading and/or construction is carried out during the winter or spring months, groundwater seepage might be present. Appreciable amounts of seepage are not anticipated during excavation. However, during the rainy winter months, seepage in excavations at any of the Columbia Solar Project sites could occur and groundwater control measures would be on-site or readily available, including trash pumps, sumps, and discharge ditches.

3.3.13 Mitigation for Groundwater

Groundwater control measures for the Columbia Solar Projects would be on-site or readily available, including trash pumps, sumps, and discharge ditches.

(6) Public water supplies. The application shall provide a detailed description of any public water supplies which may be used or affected by the project during construction or operation of the facility.

3.3.14 Public Water Supply

The Columbia Solar Projects will utilize either municipal water sources (such as from the city of Ellensburg) or on-site existing water allocations to provide the water for construction and ongoing operational needs.

For each of the Columbia Solar Project sites, TUUSSO has conservatively estimated that approximately 10 acre-feet of water would be needed for construction, and 20,000 acre-feet of water would be needed per site per year during the first 3 years of operation for irrigation. Irrigation water for all but the Fumaria Solar Project will very likely be supplied by on-site existing water allocations. After the initial 3 years of operation, TUUSSO would require less than 1 acre-foot of water per site per year for panel washing and dust suppression. The construction needs are likely to be supplied by municipal water sources, as are the panel washing and dust suppression needs. However, the irrigation needs are very likely to be supplied by the on-site existing water allocations.

None of the five Columbia Solar Projects would require or use water intake or conveyance structures. If the solar projects use existing on-site water resources, they would be conveyed using existing piping systems or would be trucked from such systems. TUUSSO has incorporated water conservation methods into its operational water plan as well. Where feasible, TUUSSO would work with the current landowners to incorporate more efficient irrigation systems to water the trees and shrubs forming the visual buffers.

In summary, the Columbia Solar Projects would likely use up to 10 acre-feet of water per site from municipal water sources during construction, and then less than 1 acre-foot of water per site per year from municipal water sources. Further details of the proposed construction and operational water uses are described in Sections 2.6.1 and 2.6.2 of this application.

3.4 Habitat, Vegetation, Fish, and Wildlife 463-60-332

The application shall describe all existing habitat types, vegetation, wetlands, fish, wildlife, and in-stream flows on and near the project site which might reasonably be affected by construction, operation, decommissioning, or abandonment of the energy facility and any associated facilities. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors, if applicable. The application shall contain the following information:

(1) Assessment of existing habitats and their use. The application shall include a habitat assessment report prepared by a qualified professional. The report shall contain, but not be limited to, the following information:

(a) A detailed description of habitats and species present on and adjacent to the project site, including identification of habitats and species present, relative cover, density, distribution, and health and vigor;

3.4.1 Affected Environment for Habitat and Species

3.4.1.1 General County

Analysis Areas

The solar project sites are defined as the footprint of each of the five proposed Columbia Solar Project sites, and the generation tie line corridors associated with two of the sites (Figure 3.4-1). To provide a baseline for analysis of potential impacts to biological resources from the proposed solar projects, two analysis areas are evaluated, a project-scale and a landscape-scale analysis area. These areas are further described below.

Project-scale Analysis Area

The project-scale analysis areas include each Columbia Solar Project site and an associated surrounding 500-meter buffer (Figure 3.4-1). These analysis areas include the habitat that would be directly impacted from construction and operation of each project, through ground disturbance, noise, and habitat alteration. A project-scale analysis area is appropriate for evaluating the potential impacts on species with small home ranges or territories, such as small birds, rodents, mammals, and amphibians.

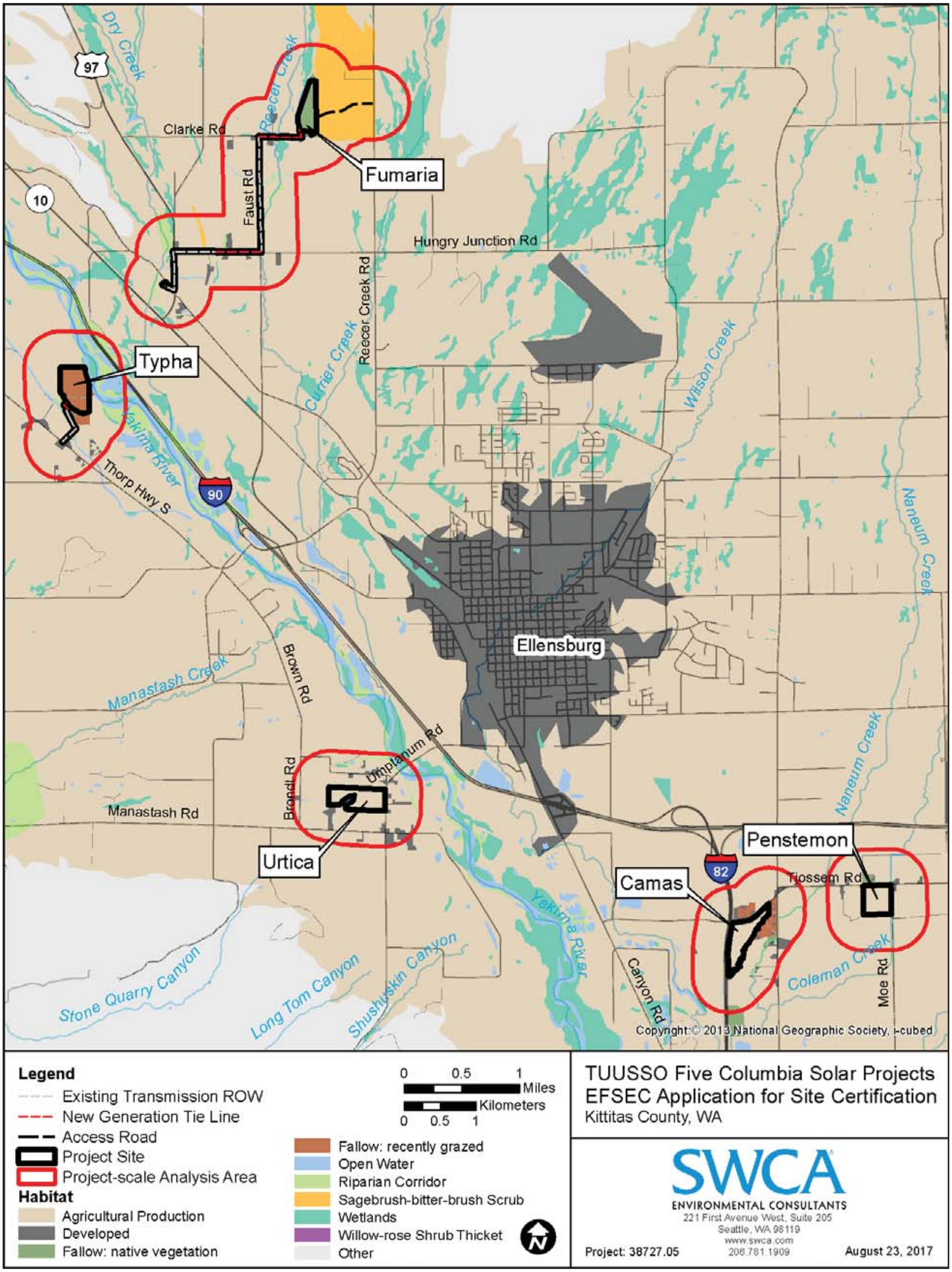

Figure 3.4-1. Columbia Solar Projects project-scale analysis areas.

Landscape-scale Analysis Area

The landscape-scale analysis area includes all five of the project-scale analysis areas, as well as the surrounding sub-watersheds (Figure 3.4-2). This analysis area is intended to evaluate the indirect impacts of Columbia Solar Project construction and operation on habitat in the region, and is appropriate for evaluating the potential impacts on migratory species or those species with larger home ranges such as raptors and large mammals. Although biotic effects could occur outside of the selected sub-watersheds, they become more difficult to accurately predict with increased distance from the source of the impact.

As shown in Figure 3.4-2 and Table 3.4-1, the five Columbia Solar Project sites are all within approximately 2.5 miles of the Yakima River and 3.5 miles of the nearest areas only minimally inhabited by humans (for example foothills, draws, canyons, and mountains). Migratory species are known to occupy and travel through all of these sites.

Habitats and Vegetation

Available habitats within the analysis areas were mapped based on dominant vegetation type as well as past and present land use, and habitat mapping was used to determine the potential impacts from the proposed Columbia Solar Projects’ activities. Site-specific descriptions of habitat and vegetation species documented during the April 3 to 12, 2017, field survey are provided to characterize the general habitat, and are considered representative of similar habitats found throughout the landscape-scale analysis area. Areas not surveyed were characterized using vegetation data from the Gap Analysis Project (GAP) (University of Washington, Washington Cooperative Fish and Wildlife Research Unit [WCFWRU] 1997).

The majority of the Columbia Solar Projects project-scale analysis areas are made up of productive agricultural areas, fallow fields, recently grazed areas, and natural vegetation with several riparian, wetland, and open-water areas present. Wetlands and open-water areas are described in detail in Sections 3.3 and 3.5, as well as in the five Critical Areas Reports (Appendices G–K). These aquatic habitats are not anticipated to be affected by the proposed solar projects. Developed areas are mostly located outside or adjacent to the solar project sites, but are common in the landscape-scale analysis area.

Other habitats not observed during the field visits are found in the landscape-scale analysis area, but are not heavily represented in the project-scale analysis areas, and do not provide habitat that is similar to areas potentially impacted by the projects. The habitat types grouped into the “other” category in this report are located within the landscape-scale analysis area, but were not observed during the field surveys. These types include: 1) conifer forest; 2) areas that are non-forested, but are apparently natural, parkland meadows with scattered trees; and 3) areas that are non-forested due to having been logged, and are in various stages of regrowth to herbs or small shrubs. Some of this habitat category is likely sagebrush-bitter-brush, fallow (native vegetation and recently grazed), and willow-rose shrub thicket scrub, but because field surveys were not performed in these areas, their mapping was not altered from the original base mapping (WCFWRU 1997).

The *Habitat, Vegetation, Fish, and Wildlife Assessment Report for Five Proposed TUUSSO Solar Project Sites* provides representative photographs of the vegetation and habitat types found in the Columbia Solar Project project-scale analysis areas (Appendix C). The following sections provide detailed descriptions of the habitat types found in the project-scale analysis areas (Figures 3.4-3 to 3.4-10).

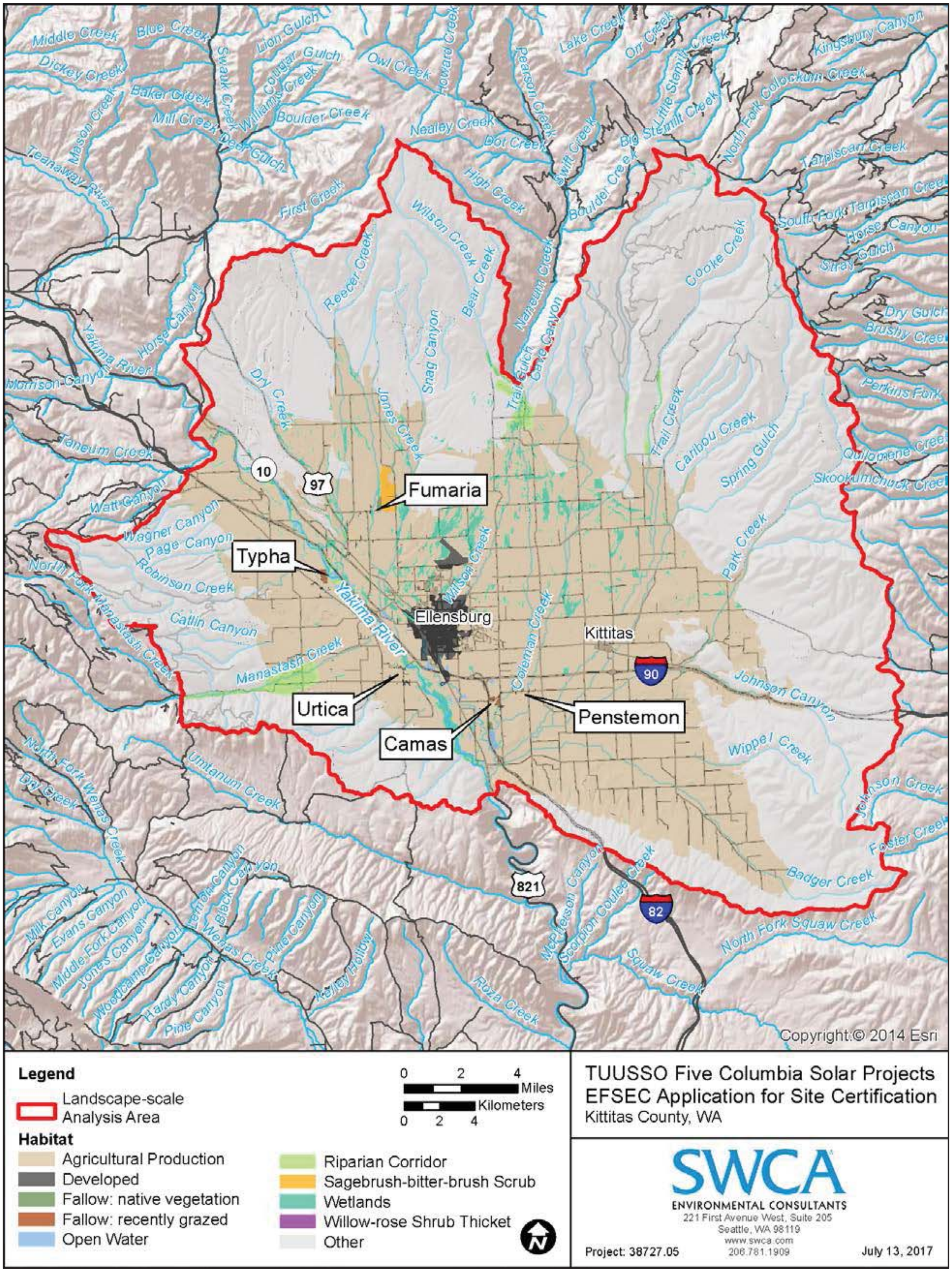

Figure 3.4-2. Columbia Solar Projects landscape-scale analysis area.

Table 3.4-1. Available Habitat Types within the Columbia Solar Project Analysis Areas

Habitat Type	Landscape-scale Analysis Area		Project-scale Analysis Areas (500-meter buffer surrounding each solar project site)									
			Camas		Fumaria (Site with Access Road and Generation Tie Line)		Penstemon		Typha (Site and Generation Tie Line)		Urtica	
	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total	Acres	% of Total
Agricultural Production	115,057	36%	462	82%	1,155 (289 & 1,004)	72% (46% & 65%)	401	93%	352 (249 & 248)	59% (52% & 37%)	433	84%
Developed	4,805	1%	50	9%	58 (14 &55)	4% (2% & 25%)	19	4%	33 (22 & 25)	6% (5% & 39%)	47	9%
Fallow: vegetated	72	<1%	6	1%	41 (41 & 32)	3% (7% & 1%)	5	1%	–	–	–	–
Fallow: recently grazed	94	<1%	29	5%	–	–	–	–	64 (64 & 64)	11% (11% & 4%)	–	–
Open Water	1,247	<1%	4	1%	12 (3 & 12)	1% (<1% & 2%)	2	<1%	70 (69 & 16)	12% (14% & 10%)	13	3%
Riparian Corridor	2,801	1%	13	2%	40 (0 & 41)	2% (0% & 2%)	3	1%	56 (56 & 9)	9% (12% & 6%)	13	3%
Sagebrush-bitter-brush Scrub	442	<1%	–	–	233 (228 & 36)	14% (36% & 1%)	–	–	–	–	–	–
Wetlands	5,315	2%	2	<1%	67 (49 & 27)	4% (5% & 2%)	<1	<1%	19 (19 & 5)	4% (4% & 2%)	9	2%
Willow-rose Shrub Thicket	4	<1%	–	–	3 (2 & 3)	<1% (<1% & 4%)	–	–	<1 (<1 & 0)	<1% (<1% & 2%)	–	–
Other	193,188	60%	–	–	–	–	–	–	–	–	–	–
Total Acres	**323,025**		**566**		**1,609** (626 & 1,210)		**430**		**594** (479 & 366)		**515**	
Distance from project site to: Yakima River			**1.32 miles west**		**Site: 2.12 miles west Generation Tie Line: 0.86 mile west**		**2.54 miles west**		**Site: 0 mile east Generation Tie Line: 0.25 mile east**		**0.19 mile northeast**	
Distance from project site to: nearest area minimally-inhabited by humans			**2.1 miles south**		**Site: 1.07 miles east Generation Tie Line: 1.19 mile east**		**3.31 miles south**		**Site: 2.57 miles southwest Generation Tie Line: 2.35 miles southwest**		**1.02 miles southwest**	

Note: the area calculated for the generation tie line overlaps each of the Fumaria and Typha Solar Project project-scale analysis areas by a 500-meter buffer.

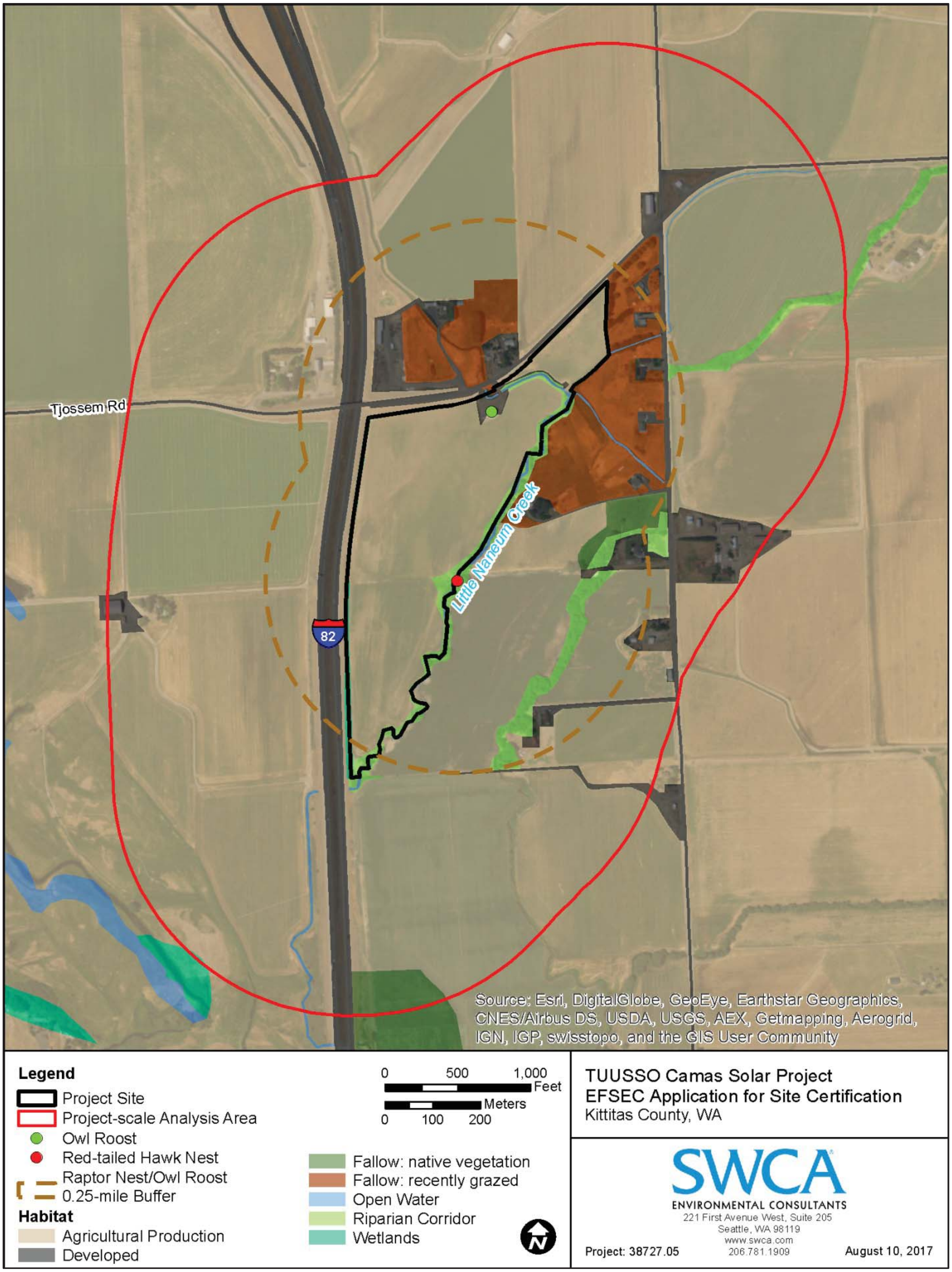

Figure 3.4-3. Habitat types within the project-scale analysis area for the Camas Solar Project site.

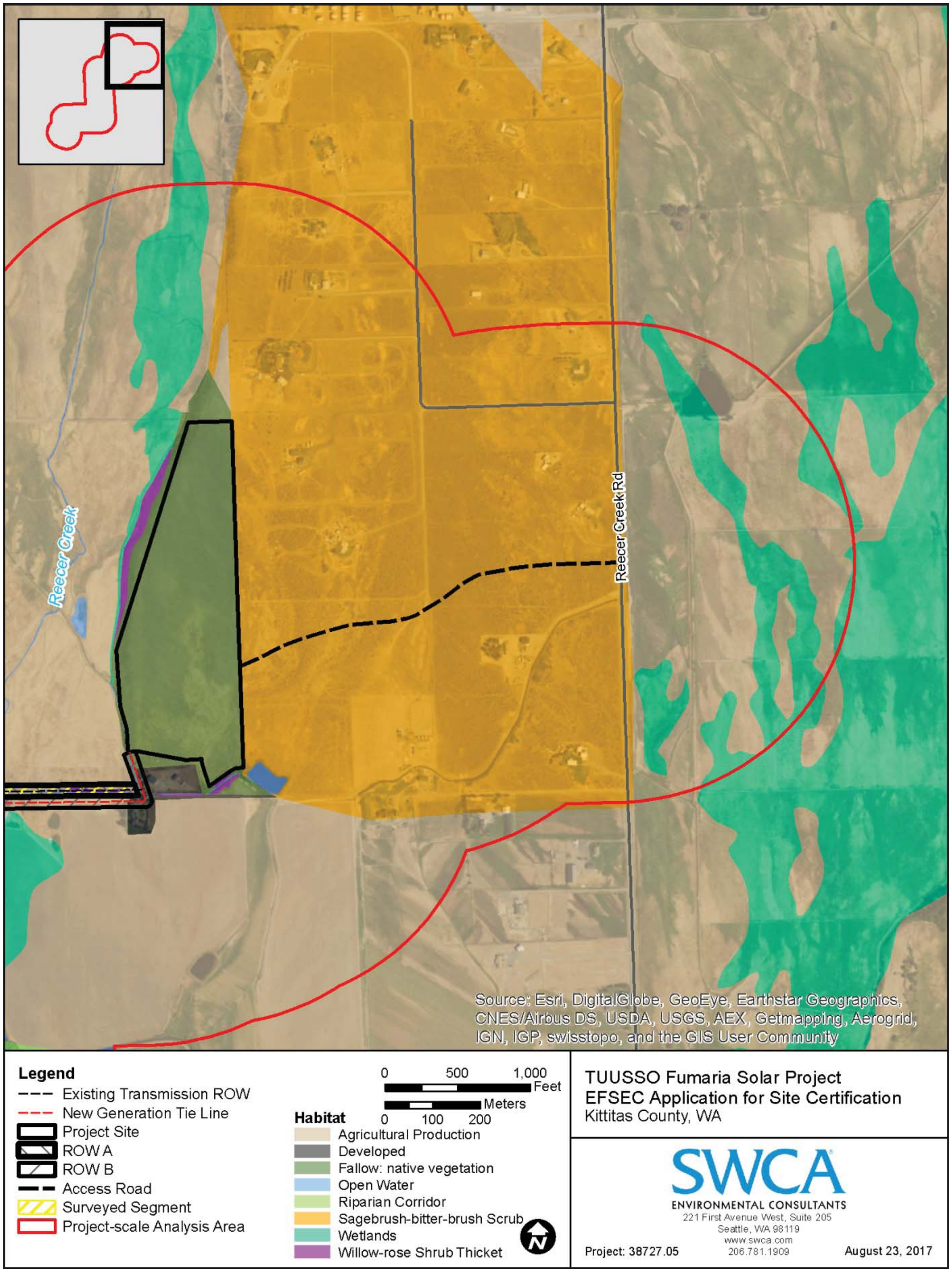

Figure 3.4-4. Habitat types within the project-scale analysis area for the Fumaria Solar Project, Map 1 of 4.

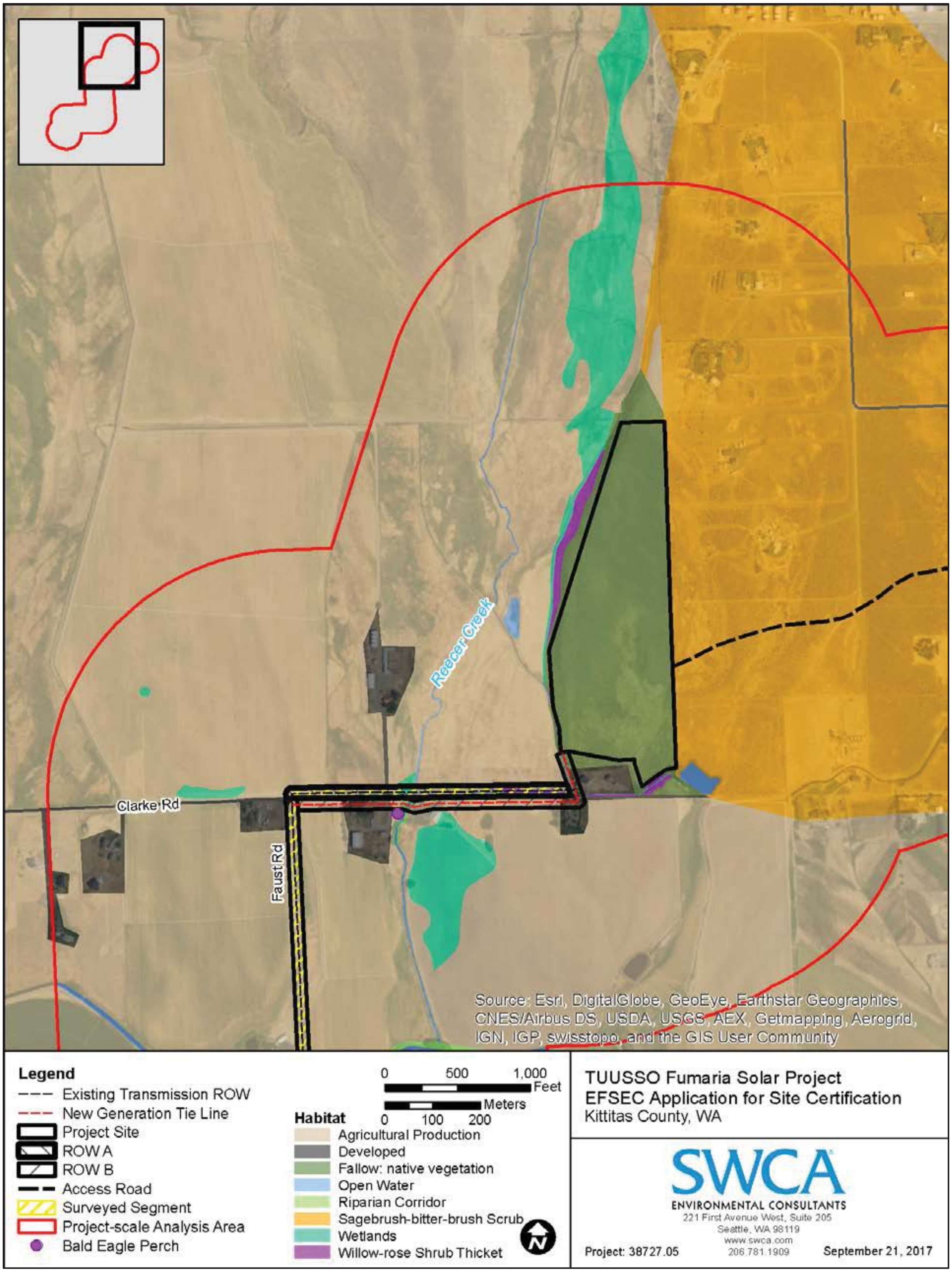

Figure 3.4-5. Habitat types within the project-scale analysis area for the Fumaria Solar Project, Map 2 of 4.

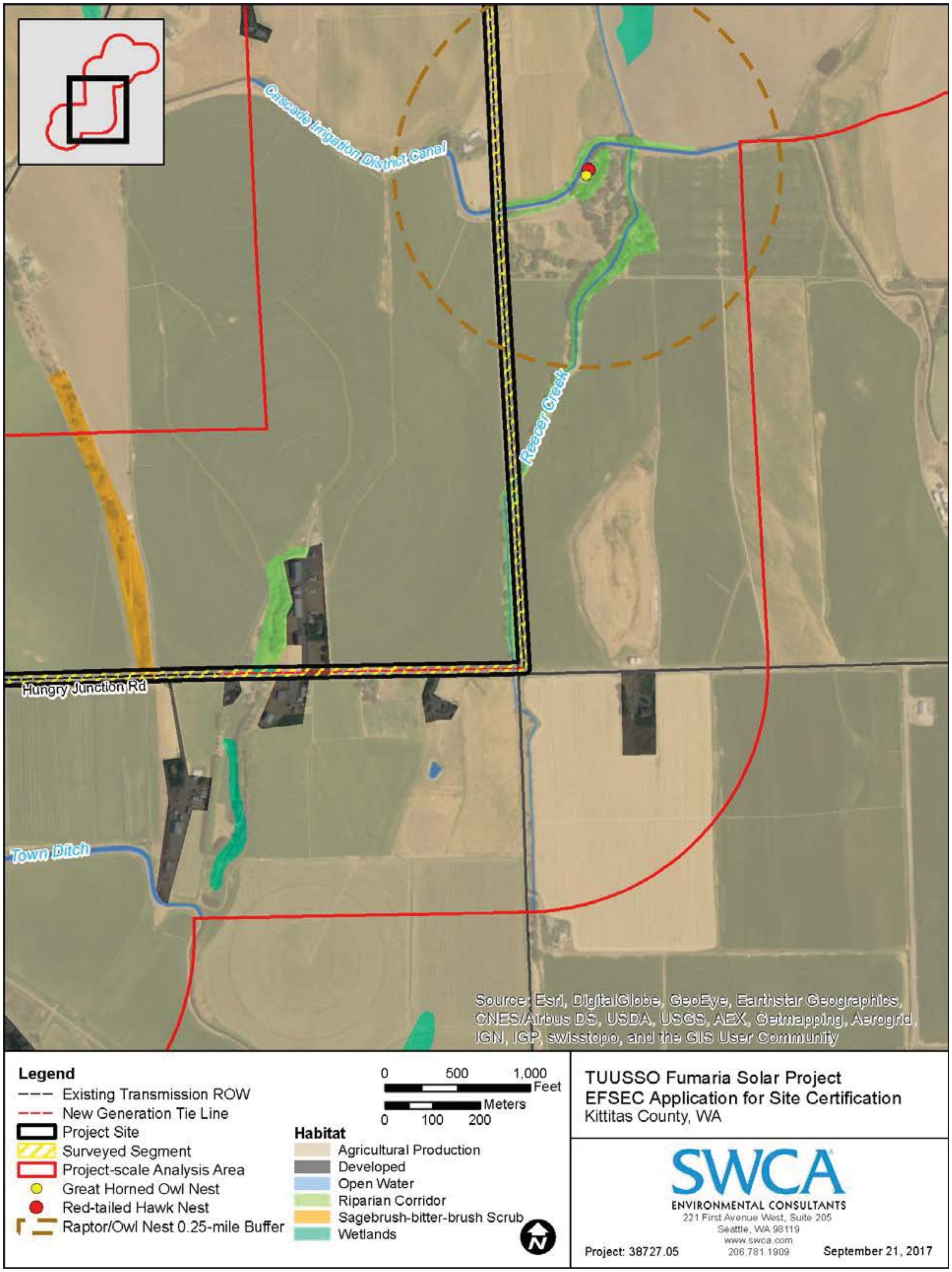

Figure 3.4-6. Habitat types within the project-scale analysis area for the Fumaria Solar Project, Map 3 of 4.

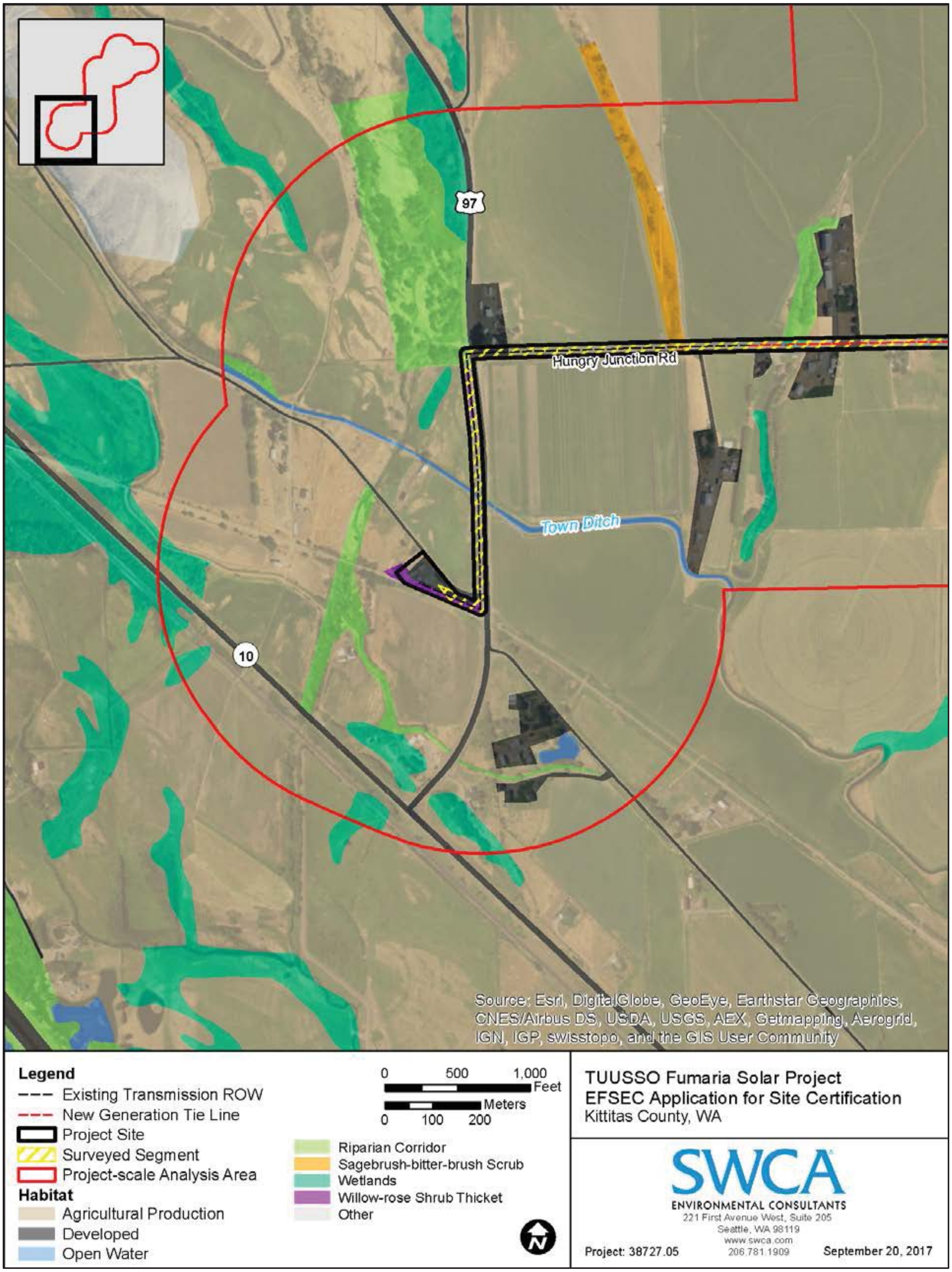

Figure 3.4-7. Habitat types within the project-scale analysis area for the Fumaria Solar Project, Map 4 of 4.

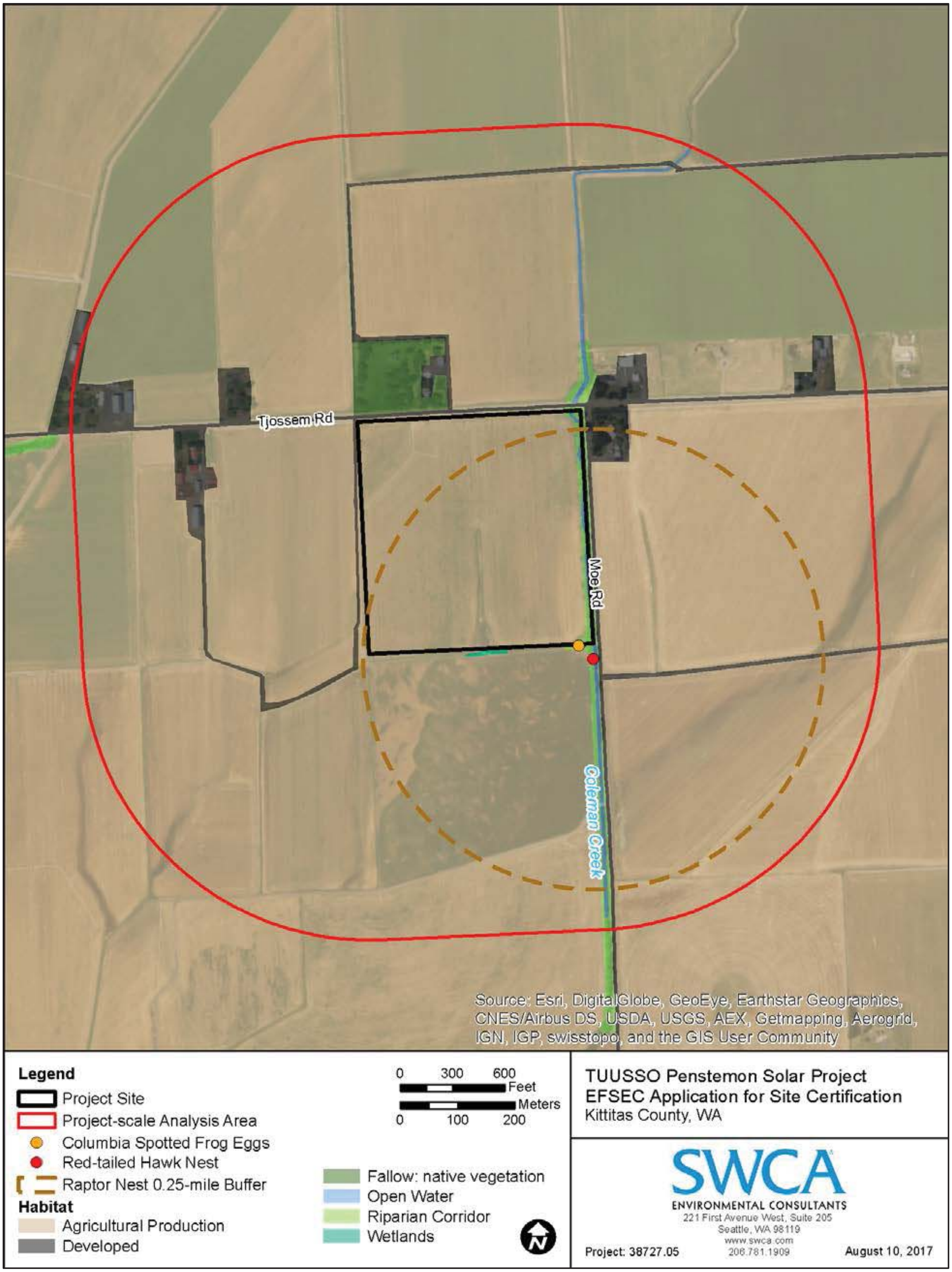

Figure 3.4-8. Habitat types within the project-scale analysis area for the Penstemon Solar Project.

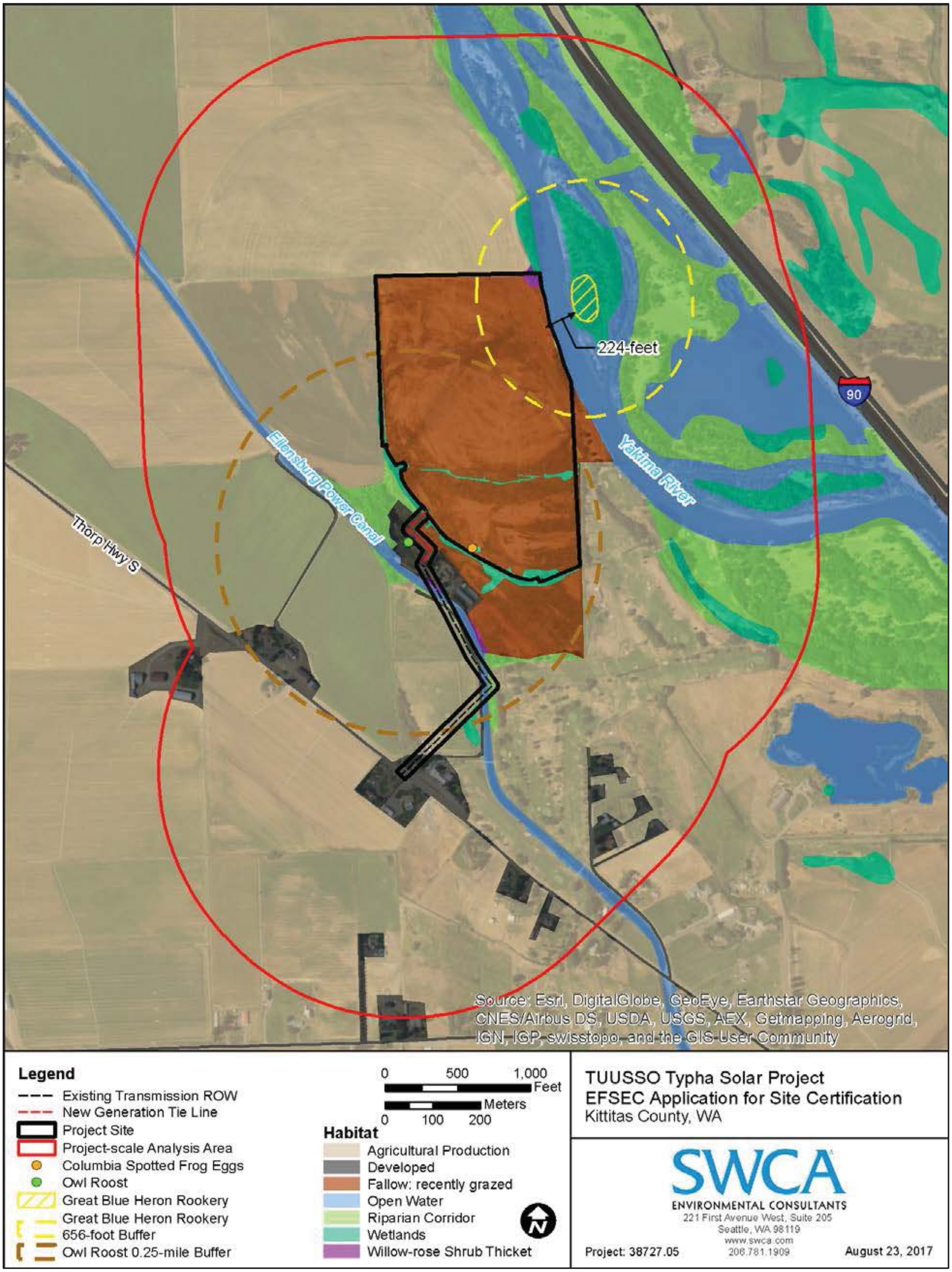

Figure 3.4-9. Habitat types within the project-scale analysis area for the Typha Solar Project.

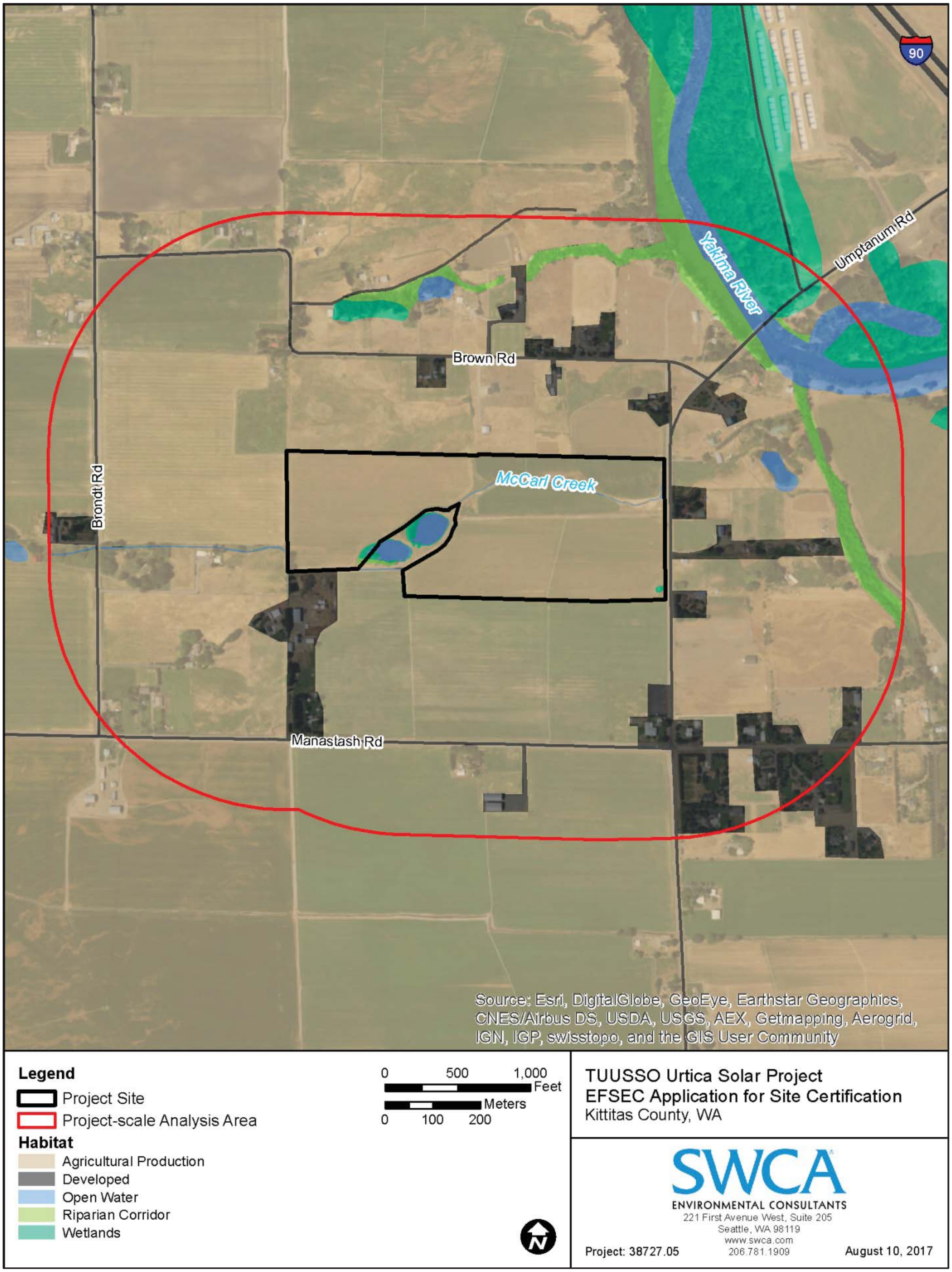

Figure 3.4-10. Habitat types within the project-scale analysis area for the Urtica Solar Project.

Agricultural Production

Three of five of the proposed Columbia Solar Project sites are primarily used for agricultural production (see Figure 3.4-1), including the production of alfalfa (*Medicago sativa*) on the Camas Solar Project site, Sudangrass (*Sorghum bicolor* ssp. *drummondii*) on the Penstemon Solar Project site, and the production of common timothy (*Phleum pratense*) for hay on the Urtica Solar Project site. These sites are dominated by the crops being produced, but often have other species encroaching into the crops in the space between plantings, which usually include bluegrass (*Poa* spp.), tall fescue (*Schedonorus arundinaceus*), hairy cat's-ear (*Hypochaeris radicata*), and common dandelion (*Taraxacum officinale*). In addition, these areas may go through periods during the production lifecycle in which they are unvegetated with exposed soil. Along the edges of these areas, more weedy species usually dominate, including garden yellow-rocket (*Barbarea vulgaris*), downy cheat grass (*Bromus tectorum*), sticky-willy (*Galium aparine*), prickly lettuce (*Lactuca serriola*), great mullein (*Verbascum thapsus*), and Canadian thistle (*Cirsium arvense*).

Developed

This habitat type occurs throughout the Columbia Solar Projects project-scale analysis areas, borders most of the solar project sites, and consists of buildings, roads, and driveways (see Figure 3.4-1). Vegetation in this habitat consists mostly of ruderal species (species that colonize and thrive in disturbed areas), such as the noxious weeds documented below.

Many areas near the proposed Columbia Solar Project sites are partially developed or heavily manicured. The vegetation communities in these areas are either planted ornamental trees and shrubs or routinely mowed grass, and include rural residential landscaping, road ROWs, and manicured golf course areas. Planted trees observed near the proposed sites include quaking aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), and grand fir (*Abies grandis*). The maintained lawns and golf course areas are dominated by a mix of grass species likely to include tall fescue, bluegrass, and creeping wild rye (*Elymus repens*). In addition, various weeds and non-native species can dominate roadside areas.

Fallow

Fallow fields are areas that were previously under agricultural production that have been left unsown for a period of time, long enough to allow other non-native, invasive, and native species to become dominant. Areas that are irrigated and used as pasture were included as fallow habitats in this assessment. This habitat type is dominant at the Fumaria and Typha Solar Project sites.

Fallow – Vegetated

At the Fumaria Solar Project site (see Figure 3.4-5), the vegetation community has returning some native species, including common spring-gold (*Crocidium multicaule*), spring draba (*Draba verna*), Gorman's desert-parsley (*Lomatium gormanii*), and bitter-brush (*Purshia tridentata*). It is principally dominated by weedy and non-native plant species, including downy cheat grass, garden yellow-rocket, shepherd's-purse (*Capsella bursa-pastoris*), chicory (*Cichorium intybus*), common dandelion, prickly lettuce, and yellow salsify (*Tragopogon dubius*).

Fallow – Recently Grazed

At the Typha Solar Project site (see Figure 3.4-9), the vegetation community is dominated by mostly low-growing weedy species, including tall fescue, remnant common timothy, hairy cat's-ear, common dandelion, and bluegrass, with patches of Canadian thistle and scotch thistle (*Onopordum acanthium*) scattered throughout the site, as well as Baltic rush (*Juncus balticus*), curly dock (*Rumex crispus*), and Rocky Mountain iris (*Iris missouriensis*) in the lower elevation areas.

Open Water

The open water habitats found in the Columbia Solar Projects project-scale analysis areas are the Yakima River, streams, canals or ditches, and ponds. For more information about the open-water areas documented during the April 3 to 12, 2017, field surveys, refer to each project site's Critical Areas Report (Appendices G–K).

Riparian Corridor

Riparian corridors generally occur along every river, stream, and some ditches and canals, in and adjacent to the proposed Columbia Solar Project sites. Some of these areas are lacking mature trees, but where present the dominant trees typically include crack willow (*Salix* X *fragilis*), quaking aspen, balsam poplar (*Populus balsamifera*), and occasionally ponderosa pine. The herbaceous species that often accompany these riparian corridors include reed canary grass (*Phalaris arundinacea*), Fuller's teasel (*Dipsacus fullonum*), Canadian thistle, stinging nettle (*Urtica dioica*), tall scouring-rush (*Equisetum hyemale*), true forget-me-not (*Myosotis scorpioides*), curly dock, and great mullein.

Sagebrush-bitter-brush Scrub

The upland sagebrush-bitter-brush scrub community is dominant to the east of the Fumaria Solar Project site and is beginning to return to that area (see Figure 3.4-4). This community is characterized by the dominance of native shrubs, including bitter-brush and big sagebrush (*Artemisia tridentata*), and a low-growing herbaceous community, including common spring-gold, spring draba, yellow bell (*Fritillaria pudica*), and various small bunchgrasses.

Wetlands

Wetlands surveyed within the Columbia Solar Projects project-scale analysis areas ranged from <0.01 to 8.45 acres. The wetlands inventoried were depressional, riverine, and slope. Wetland ratings, based on the *Washington State Wetland Rating System for Eastern Washington – Revised*, were typically II, III, or IV (Hruby 2014). For more information about the wetlands documented during the April 3 to 12, 2017, field surveys, refer to the each project site's Critical Areas Report (Appendices G–K).

Willow-rose Shrub Thicket

Shrub thickets are often found along smaller drainages (i.e., small streams and ditches) and are dominated by narrow-leaf willow (*Salix exigua*) and rose (*Rosa* spp.), with occasional inclusions of red osier dogwood (*Cornus alba*) and black hawthorn (*Crataegus douglasii*). This vegetation community often lacks an herbaceous layer because the shrubs are too thick to allow adequate light penetration to the understory. Willow-rose shrub thickets occur in the southeast corner of the Fumaria Solar Project site, as well as along this site's northwest boundary (see Figures 3.4-4 to 3.4-7), and just outside of the northeast corner of the Typha Solar Project site and along the EP Canal.

Available Habitat within the Analysis Areas

The acreage for each habitat type and the percent of the total available habitat has been calculated for both the Columbia Solar Project landscape-scale and project-scale analysis areas (see Table 3.4-1). The majority of the landscape-scale analysis area contains the "other" habitat category (60%) and agricultural production (36%). The majority of the project-scale analysis areas are a mix of agricultural production and developed areas, interspersed with a variety of the remaining habitat types. Available habitat types in the project-scale analysis areas are shown in Figures 3.4-3 through 3.4-10.

Special-status Plants

No sensitive or special-status plant species occur on any of the Columbia Solar Project sites. TUUSSO prepared a Vegetation Management Plan (Appendix B) through coordination with the landowners, the Washington Department of Fish and Wildlife (WDFW), and Kittitas County.

The Washington State Noxious Weed Control Board has produced a noxious weed list for the state that categorizes weeds into three classes: A, B, and C (Washington State Noxious Weed Control Board 2017). A-Listed species are non-native species whose distribution in Washington State is still limited. B-Listed species are non-native species whose distribution is limited to portions of Washington State. C-Listed noxious weeds are widespread in Washington or are of special interest to the agricultural industry. Eleven noxious weeds have been identified in the Columbia Solar Projects project-scale analysis areas, all B- or C-Listed species. A list of noxious weeds identified in the project-scale analysis areas, and a ranking of their relative prevalence at each site, is provided in Table 3.4-2.

Table 3.4-2. Noxious Weeds Documented in the Columbia Solar Projects Project-scale Analysis Areas

Common Name	Scientific Name	Status[1]	Weed Class[2]	Habitat Type Where Observed[3]	Weed Relative Prevalence at Each Solar Project Site (1 = low, 5 = high)				
					Camas	Fumaria	Penstemon	Typha	Urtica
Canadian thistle	*Cirsium arvense*	Invasive, noxious	C	AP, FG, FV, RIP	2	1	2	3	1
Chufa (yellow nutsedge)	*Cyperus esculentus*	Native, noxious	B	WET		1		1	
False mayweed	*Tripleurospermum maritimum*	Non-native, noxious	C	AP, FG	1			1	
Field sow-thistle	*Sonchus arvensis*	Non-native, noxious	C	FV, RIP		1			
Fuller's teasel	*Dipsacus fullonum*	Invasive, noxious	C	RIP, WET	1	1	1	1	2
Hairy cat's-ear	*Hypochaeris radicata*	Non-native, noxious	C	AP, FG, FV	3	3	1	3	3
Pale-yellow iris	*Iris pseudacorus*	Noxious	C	WET	2				
Queen Anne's lace	*Daucus carota*	Non-native	C	AP					1
Reed canary grass	*Phalaris arundinacea*	Invasive, noxious	C	RIP, WET	3	1	2	2	3
Scotch thistle	*Onopordum acanthium*	Noxious	B	FG, RIP	1			3	1
Spotted knapweed	*Centaurea stoebe*	Noxious	B	AP, FV		1			1

1. Native per Hitchcock and Cronquist (1973) and NRCS (2017b); Noxious per Washington State Noxious Weed Control Board (2017).
2. Washington State Noxious Weed Control Board (2017).
3. AP = Agricultural production; DEV = Developed; FG = Fallow, recently grazed; FV = Fallow, vegetated; RIP = Riparian corridor; SBB = Sagebrush-bitter-brush shrub; WRS = Willow–rose shrub thicket; OW = Open water; WET = Wetlands; OTH = Other.

Fish and Wildlife

In all, 39 bird species were documented in the Columbia Solar Project project-scale analysis areas during field surveys conducted from April 3 to 12, 2017, including raptors, passerines, near-passerines, and water birds (Appendix C). The list of documented bird species is not comprehensive and only includes those that were readily identifiable. Of the 39 bird species documented in the project-scale analysis areas, 35 are protected under the Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703-711). Habitats within the analysis areas provide nesting and foraging habitat for these MBTA-protected species. These species include ground-nesters, birds that nest in tall grass or shrubs, cavity nesters, and birds that build nests in trees.

Non-listed fish species were observed in some irrigation ditches and wetlands during the April 2017 field surveys. Fish species listed under the federal Endangered Species Act (ESA) of 1973 (as amended) also occur in streams and the Yakima River adjacent to the Columbia Solar Project sites and are briefly listed in Table 3.4-3. The ESA-listed species are further discussed in Section 3.4.2, below.

Columbia spotted frog (*Rana lutreveinus*) egg masses and Pacific tree frogs (*Pseudacris regilla*) were documented in the Columbia Solar Projects project-scale analysis areas.

Signs of several mammals, including of mule deer (*Odocoileus hemionus*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and Virginia opossum (*Didelphis virginiana*), were observed throughout the Columbia Solar Projects project-scale analysis areas. Several burrows likely associated with American badger (*Taxidea taxus*) were observed at the Camas and Fumaria Solar Project sites, but the exact source of the burrows could not be identified. When vegetated, the habitats at all of the solar project sites and generation tie line corridors support small rodents (e.g., mice and voles) that are a prey source for raptors, great blue herons (*Ardea herodias*), and coyotes (*Canis latrans*). As shown in Figure 3.4-1 and Table 3.4-1, the sites are all within approximately 2.5 miles of the Yakima River and 3.5 miles of the nearest areas only minimally inhabited by humans (for example foothills, draws, canyons, and mountains). Migratory species, such as mule deer and coyote, are known to occupy and travel through all of these sites. Some were directly observed during the April 2017 field surveys, sign (i.e., tracks and scat) was observed, and landowners confirmed that these species occur at the solar project sites.

To evaluate the potential Columbia Solar Projects impacts on fish and wildlife habitat, a list of representative species known or suspected to occur in the analysis areas was compiled and their preferred habitat was compared to the habitat types available in the analysis areas. The results of this evaluation are shown in Table 3.4-3. Of the bird species documented in the project-scale analysis areas, four are currently being monitored by the State of Washington: great blue heron, prairie falcon (*Falco mexicanus*), osprey (*Pandion haliaetus*), and turkey vulture (*Cathartes aura*). The Columbia spotted frog is a state candidate for listing, and the American badger is also being monitored by the State of Washington.

Table 3.4-3. Representative Species Observed or Likely to Occur in the Columbia Solar Project Analysis Areas

Common Name	Scientific Name	Management Category	Habitat Description	Habitat Types Used[1] AP	DEV	FG	FV	RIP	SBB	WRS	OW	WET	OTH	Acres Available in LSAA[2]
Birds														
Bald eagle	*Haliaeetus leucocephalus*	MBTA, BGEPA, and Federal Species of Concern	Habitat generalist, associated with most aquatic habitats. Prefer rivers, lakes, and reservoirs with lots of fish and surrounding forests.					X				X	X	8,116
Canada goose	*Branta canadensis*	MBTA	Habitat generalist that occurs near water, grassy fields, and grain fields. Always nests near water and winters where feeding areas are within short distances of water.	X	X	X	X	X		X	X	X	X	129,395
Great blue heron	*Ardea herodias*	MBTA, State Monitored	Found in a wide variety of habitats, including sheltered, shallow bays and inlets, sloughs, marshes, wet meadows, shores of lakes, and rivers. Nesting colonies are typically found in mature forests, on islands, or near mudflats, and do best when they are free of human disturbance and have foraging areas close by.	X		X	X	X			X	X	X	124,586
Great horned owl	*Bubo virginianus*	MBTA	Prefers secondary-growth woodlands, swamps, orchards, and agricultural areas, but are found in a wide variety of deciduous, coniferous, or mixed forests. Home range usually includes some open habitats, such as fields, wetlands, pastures, or croplands, in addition to forested areas.	X		X	X	X				X	X	123,339
Killdeer	*Charadrius vociferus*	MBTA	Inhabits open areas such as sandbars, mudflats, and grazed fields with vegetation generally no taller than 1 inch. Often found near water, but also common in dry areas.	X	X	X	X	X	X		X	X	X	129,833
Northern Harrier	*Circus cyaneus*	MBTA	Breeds in freshwater and brackish marshes, lightly grazed meadows, old fields, tundra, dry upland prairies, drained marshlands, high-desert shrub-steppe, and riverside woodlands. Winter habitat includes areas with low vegetation, including deserts, coastal sand dunes, pasturelands, croplands, dry plains, grasslands, old fields, estuaries, open floodplains, and marshes.	X		X	X	X	X			X	X	123,781

Common Name	Scientific Name	Management Category	Habitat Description	Habitat Types Used[1]										Acres Available in LSAA[2]
				AP	DEV	FG	FV	RIP	SBB	WRS	OW	WET	OTH	
Red-tailed hawk	*Buteo jamaicensis*	MBTA	Occupies most open habitat, including desert, scrublands, grasslands, roadsides, fields and pastures, parks, broken woodland, and (in Mexico) tropical rainforest.	X	X	X	X		X				X	120,470
Sandhill Crane	*Grus canadensis*	MBTA, State Endangered	Prefers open shallow waters along river channels, on alluvial islands of braided rivers, or in natural basin wetlands, but can sometimes occur in fields and agricultural lands during feeding and resting. They typically avoid visual obstructions, such as houses and bridges, and paved or gravel roads.	X		X	X	X			X	X		124,586
Fish														
Bull trout	*Salvelinus confluentus*	Federal Threatened; State Candidate	Both resident or migratory varieties, with migratory bull trout spawning in tributary streams where juvenile fish rear for 1 to 4 years before migrating to either a larger river (fluvial) or lake (adfluvial) as adults. Successful egg incubation and survival requires very cold, clear, well-oxygenated waters, as found in pristine headwater stream habitats.								X			1,247
Dace species	*Rhinichthys* spp.	None	Occurs in many types of aquatic habitats, ranging from cool to warm waters. Typically young are observed in shallow edges.								X	X		6,562
Spring chinook (Upper Columbia River)	*Oncorhynchus tshawytscha*	Federal Endangered; State Candidate	Requires sufficient invertebrate organisms for food; cool, flowing waters free of pollutants; high dissolved oxygen concentrations in rearing and incubation habitats; water of low sediment content during the growing season (for visual feeding); clean gravel substrate for reproduction; and unimpeded migratory access to and from spawning and rearing areas.								X			1,247

Common Name	Scientific Name	Management Category	Habitat Description	Habitat Types Used[1]										Acres Available in LSAA[2]
				AP	DEV	FG	FV	RIP	SBB	WRS	OW	WET	OTH	
Steelhead (Middle Columbia River)	*Oncorhynchus mykiss*	Federal Threatened; State Candidate	Requires sufficient invertebrate organisms for food; cool, flowing waters free of pollutants; high dissolved oxygen concentrations in rearing and incubation habitats; water of low sediment content during the growing season (for visual feeding); clean gravel substrate for reproduction; and unimpeded migratory access to and from spawning and rearing areas.								X			1,247
Summer steelhead (Upper Columbia River)	*Oncorhynchus mykiss*	Federal Threatened; State Candidate	Requires sufficient invertebrate organisms for food; cool, flowing waters free of pollutants; high dissolved oxygen concentrations in rearing and incubation habitats; water of low sediment content during the growing season (for visual feeding); clean gravel substrate for reproduction; and unimpeded migratory access to and from spawning and rearing areas.								X			1,247
Herptiles														
Columbia spotted frog	*Rana luteiventris*	State Candidate	Occurs in a variety of still-water habitats, as well as in some streams and creeks. Breeding habitat includes seasonally flooded margins of wetlands, ponds, and lakes, and even some flooded pools and still-water edges of creeks. Most often found in association with wetland plant communities consisting primarily of non-woody plants, such as sedges, rushes, and grasses.					X			X	X		9,363
Pacific treefrog	*Pseudacris regilla*	None	Found in wetlands, meadows, woodlands, and brushy areas. Breeds in shallow ponds, slow moving streams, seasonal pools, watering tanks, and roadside ditches, and spends the rest of the year in surrounding upland areas.	X			X	X		X	X	X		124,496
Sharp-tailed snake	*Contia tenuis*	State Candidate	Prefers forest openings dominated by Garry oak, particularly with rock accumulations, and riparian deciduous woodlands with accumulations of decaying down woody logs within ponderosa pine, oak, or shrub-steppe.					X				X	X	8,116

Common Name	Scientific Name	Management Category	Habitat Description	Habitat Types Used[1]										Acres Available in LSAA[2]
				AP	DEV	FG	FV	RIP	SBB	WRS	OW	WET	OTH	
Mammals														
American badger	*Taxidea taxus*	State Monitored	Found in open habitats including semi-desert, sagebrush, grasslands, and meadows. Also found in forested areas with grassy cover.	X		X	X		X				X	115,665
Coyote	*Canis latrans*	None	Habitat generalists found in desert, scrub, grassland, foothills, populated neighborhoods, and urban environments.	X	X	X	X	X	X				X	123,271
Mule deer	*Odocoileus hemionus*	Big game	Uses dense conifer forests with sufficient cover for thermal regulation and resting. Also may be found in pockets of dense brush or trees and rugged, broken terrain. Seasonal migration occurs.	X		X	X	X		X			X	118,028
Raccoon	*Procyon lotor*	None	Habitat generalist that traditionally prefers heavily wooded areas with access to trees, water, and vegetation. Often found in urban and suburban environments.		X			X		X		X	X	129,925
Small rodents (mice, voles, etc.)	Various	None	Large group of small mammals that are habitat generalists and provide prey for other species such as raptors, great blue heron, and badger.	X	X	X	X	X	X	X		X	X	128,590
Striped skunk	*Mephitis mephitis*	None	Habitat generalists, particularly associated with open areas with a mix of habitats such as wooded areas, grasslands, or meadows. Usually in close proximity to a source of water.		X		X	X		X			X	7,682
Virginia opossum	*Didelphis virginiana*	None	Habitat generalist, ranging from wooded areas to open fields. Prefers environments near streams or wetlands. Shelters in burrows of other animals, tree cavities, brush piles, or other cover.		X			X		X		X	X	12,925

1. AP = Agricultural production; DEV = Developed; FG = Fallow, recently grazed; FV = Fallow, vegetated; RIP = Riparian corridor; SBB = Sagebrush-bitter-brush shrub; WRS = Willow–rose shrub thicket; OW = Open water; WET = Wetlands; OTH = Other
2. LSAA = Landscape-scale analysis area. Not including “Other.” The Other habitat category was removed from the species habitats because it includes such a wide range of habitats that it is not valuable for the analysis.

3.4.1.2 Solar Project Sites

Camas Solar Project Site

Habitats and Vegetation

The Camas Solar Project project-scale analysis area is 82% (462 acres) alfalfa agriculture, but has other species encroaching into the crops in the space between plantings. In addition, the analysis area may go through periods during the production lifecycle in which it is unvegetated, with exposed soil. Along the edges of the area being farmed, more weedy species dominate. The other major habitats are developed and fallow – recently grazed, representing 9% and 5%, respectively, of the analysis area. There are 6 acres of fallow – vegetated in the analysis area. The southeastern border of the project site is Little Naneum Creek, providing 4 acres of open water and 13 acres of riparian corridor within the analysis area. Two acres of wetlands habitat are available along the western border of the project site. Despite their smaller acreages, these are important fish and wildlife habitats in the analysis area, as demonstrated below by the species occupying these habitats.

Special-status Plants

As indicated in Table 3.4-2, the most prevalent noxious weed species and their associated habitats at the Camas Solar Project site were:

- Canadian thistle along the edges of the agricultural production, within the fallow areas, and along the riparian corridor
- hairy cat's-ear within the agricultural production and fallow areas
- reed canary grass along the riparian corridor and in the wetland (CW01)
- pale-yellow iris in the wetland (CW01)

Other less prevalent noxious weed species observed included Fuller's teasel, scotch thistle, and false mayweed (*Tripleurospermum maritimum*).

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Camas Solar Project project-scale analysis area is provided below in Section 3.4.2.

Fourteen bird species were observed at the Camas Solar Project site during the April 2017 field survey. The majority of the species were observed in the open water, riparian corridor, and wetland habitats. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys. During the field survey, an active red-tailed hawk (*Buteo jamaicensis*) nest was observed in a large willow along Little Naneum Creek (see Figure 3.4-3). Additionally, the floor of the barn in the northeast part of the site was littered with owl pellets and the rafters contained whitewash (see Figure 3.4-3).

During the April 2017 field survey of the Camas Solar Project site, dace, likely speckled dace (*Rinichthys osculus*), were observed in the wetland (CW01) that flows north to south along the west side of the solar project site, into Little Naneum Creek. A Pacific treefrog was also observed in CW01.

There was evidence of beaver (*Castor canadensis*) activity along Little Naneum Creek. A burrow, which could potentially have been created by an American badger, was observed in the Little Naneum riparian corridor, in the northeast portion of the Camas Solar Project site, south of the Bull Ditch. The Yakima River is located 1.32 miles west of the project site, and the nearest area that is only minimally inhabited by humans is 2.10 miles south of the project site (see Figure 3.4-1 and Table 3.4-1). Because of the site's proximity to these less-inhabited areas, migratory species (e.g., deer and coyote) forage or hunt on and travel through the project site.

Fumaria Solar Project Site

Habitats and Vegetation

With eight habitat types represented in its project-scale analysis area, the Fumaria Solar Project site has the most wildlife habitat diversity of the five proposed Columbia Solar Project sites (see Figures 3.4-4 and 3.4-5). The most prevalent habitat type is the surrounding agricultural production, occupying 46% of the analysis area. The surrounding sagebrush-bitter-brush scrub habitat represents 36% of the analysis area, and 2% of the analysis area is developed. The project site is principally fallow – vegetated (some native vegetation, but mostly non-native plant species; 41 acres, 7% of the analysis area). National Wetland Inventory (NWI)-mapped wetlands are present in the Reecer Creek floodplain (northwest and southwest of the proposed solar project site) and within 500 meters of the substation. These NWI-mapped wetlands total 8% of the available habitat in the analysis area. Open water habitat (3 acres) is present southeast of the project site. Willow-rose shrub thicket habitat (2 acres) occurs along the project site borders.

Special-status Plants

As indicated in Table 3.4-2, the most prevalent noxious weed and its associated habitat on the Fumaria Solar Project site is hairy cat’s-ear within the fallow – vegetated habitat. Other less prevalent noxious weed species observed included Canadian thistle, chufa (yellow nutsedge) (*Cyperus esculentus*), field sow-thistle (*Sonchus arvensis*), Fuller’s teasel, reed canary grass, and spotted knapweed (*Centaurea stoebe*).

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Fumaria Solar Project project-scale analysis area is provided below in Section 3.4.2.

The diversity of habitats at the Fumaria Solar Project site supports at least 21 bird species, all observed during the April 2017 field survey. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys.

Dace were observed in the irrigation ditches south of the Fumaria Solar Project site during the April 2017 field survey. Reecer Creek is known to be fish bearing, containing rainbow trout (*Oncorhynchus mykiss*), a non-anadromous form of steelhead. In the past, the landowner has stocked the ponds southeast of the site with triploid rainbow trout. Pacific treefrogs were observed throughout the site in the fallow – vegetated habitat, as well as the open water in the irrigation ditches.

A burrow, which could potentially have been created by an American badger, was observed near the southwestern access entrance to the Fumaria Solar Project site. The Yakima River is located 0.86 mile southwest of the project site, and the nearest area that is only minimally-inhabited by humans is 1.07 miles east of the project site (see Figure 3.4-1 and Table 3.4-1). Because of the site’s proximity to these less-inhabited areas, migratory species (e.g., deer and coyote) forage or hunt on and travel through the project site.

Fumaria Solar Project Generation Tie Line

Habitats and Vegetation

The most prevalent habitat type in the Fumaria Solar Project generation tie line project-scale analysis area is agricultural production, occupying 88% of the analysis area (see Figures 3.4-6 and 3.4-7). Developed and riparian corridor habitats each comprise 4% of the analysis area. The riparian corridor habitat is located along Reecer Creek and within 500 meters of the substation. NWI-mapped wetlands, open water, and sagebrush-bitter-brush scrub habitats comprise the remaining 4% of the analysis area. NWI-mapped wetlands are present within 500 meters of the substation. Open water habitat (9 acres) is present within the 500-meter buffer of the entire generation tie line corridor.

Special-status Plants

Noxious weeds observed along the Fumaria Solar Project generation tie line included Canadian thistle, Fuller's teasel, hairy cat's-ear, reed canary grass, and spotted knapweed.

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Fumaria Solar Project generation tie line project-scale analysis area is provided below in Section 3.4.2.

Twenty-one bird species were observed along the Fumaria Solar Project generation tie line during the April 2017 field survey. The majority of the species were observed in the open water, riparian corridor, sagebrush-bitter-brush scrub, and wetland habitats. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys.

East of the Fumaria Solar Project generation tie line, along North Faust Road, two active raptor nests were observed along the Reecer Creek riparian corridor, belonging to a red-tailed hawk and great horned owl (*Bubo virginianus*) (see Figure 3.4-6).

During the April 2017 field survey, dace were observed in the irrigation ditches that are south of the site and are connected to Reecer Creek. Reecer Creek is known to be fish bearing, containing rainbow trout.

The Yakima River is located 0.86 mile west of the western end of the Fumaria Solar Project generation tie line, and the nearest area that is only minimally inhabited by humans is 1.19 miles east of the eastern end of the generation tie line (see Figure 3.4-1 and Table 3.4-1).

Penstemon Solar Project Site

Habitats and Vegetation

The Penstemon Solar Project project-scale analysis area is 93% (401 acres) Sudangrass agricultural production. The other major habitat is developed, representing 4% of the analysis area. There are 5 acres of fallow – vegetated in the analysis area. The eastern border of the project site is Coleman Creek, providing 2 acres of open water and 3 acres of riparian corridor within the analysis area. A small wetland is located south of the project site. Despite their smaller acreages, these are important fish and wildlife habitats in the analysis area, as demonstrated below by the species occupying these habitats.

Special-status Plants

As indicated in Table 3.4-2, the most prevalent noxious weed species and their associated habitats at the Penstemon Solar Project site were:

- Canadian thistle along the edges of the agricultural production, within the adjacent fallow areas, and along the Coleman Creek riparian corridor
- reed canary grass along the riparian corridor

Other less prevalent noxious weed species observed included Fuller's teasel and hairy cat's-ear.

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Penstemon Solar Project project-scale analysis area is provided below in Section 3.4.2.

Twelve bird species were observed on the Penstemon Solar Project site during the April 2017 field survey. The majority of the species were observed in the riparian corridor habitat. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys. An active red-tailed hawk nest was observed southeast of the southeast site corner, in a cottonwood tree along Coleman Creek (Figure 3.4-8).

The Yakima River is located 2.54 miles west of the Penstemon Solar Project site, and the nearest area that is only minimally inhabited by humans is 3.31 miles south of the project site (see Figure 3.4-1 and Table 3.4-1). Of all the solar project sites, the Penstemon Solar Project site is furthest from less-inhabited areas, but migratory species (e.g., deer and coyote) still forage or hunt on and travel through the project site.

Typha Solar Project Site

Habitats and Vegetation

A review of the WDFW Priority Habitats and Species (PHS) database showed that no priority habitats or species are documented on the Typha Solar Project site. The portion of the Yakima River adjacent to the northeast corner of the site is designated as a shoreline of the state based on the Washington Water Typing Criteria (WAC 222-16-030), and the Shoreline Management Act’s list of streams and rivers constituting shorelines of the state for Kittitas County (WAC 173-18-230).

Because of the Typha Solar Project site’s proximity to the Yakima River, the habitat in the project-scale analysis area is important for fish and wildlife. The most prevalent habitat type is the surrounding agricultural production, occupying 52% of the analysis area; this includes the Ellensburg Golf Course east of the proposed solar project site. The other main habitats in the analysis area are open water (the Yakima River), fallow – recently grazed, and riparian corridor, occupying 14%, 14%, and 11% of the analysis area, respectively. Five percent of the analysis area is developed. Some wetlands were field-delineated, while along the Yakima River there are also NWI-mapped wetlands within 500 meters of the project site. Wetland habitat totals 4% of the analysis area. Some willow-rose shrub thicket habitat (almost 0.5 acre) occurs along the Yakima River (northeast of the project site) and the EP Canal (south of the project site).

Special-status Plants

As indicated in Table 3.4-2, the most prevalent noxious weed species and their associated habitats at the Typha Solar Project site were Canadian and scotch thistle and hairy cat’s-ear throughout the fallow areas. Reed canary grass was present adjacent to riparian corridor and wetland habitats. Other less prevalent noxious weed species observed included chufa (yellow nutsedge), Fuller’s teasel, and false mayweed.

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Typha Solar Project project-scale analysis area is provided below in Section 3.4.2.

Twenty-two bird species were observed at the Typha Solar Project site during the April 2017 field survey. The majority of the species were observed in the open water, riparian corridor, and wetland habitats. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys. A documented great blue heron breeding area is 224 feet east of the site, on a landform within the Yakima River (see Figure 3.4-9). The floor of the barn, located south of the southwest corner of the site, was littered with owl pellets and the rafters contained whitewash (see Figure 3.4-9).

The Yakima River, located adjacent to the northeast corner of the Typha Solar Project site, is a fish-bearing stream containing coho salmon (*Oncorhynchus kisutch*), mountain sucker (*Catostomus platyrhyncus*), rainbow trout, and Westslope cutthroat trout (*O. clarki lewisi*).

The Yakima River is located directly east of the Typha Solar Project site, and the nearest area that is only minimally inhabited by humans is 2.57 miles southwest of the project site (see Figure 3.4-1 and Table 3.4-1). Because of the site's proximity to these less-inhabited areas, migratory species (e.g., deer and coyote) forage or hunt on and travel through the project site.

Typha Solar Project Generation Tie Line

Habitats and Vegetation

The most prevalent habitat type in the Typha Solar Project generation tie line project-scale analysis area is the surrounding agricultural production, occupying 90% of the analysis area, and the Ellensburg Golf Course to the south. The other main habitat in the analysis area is developed, occupying another 10% of the analysis area. The EP Canal provides 1 more acre of open water habitat.

Special-status Plants

The same noxious weed species as observed at the Typha Solar Project site (see Table 3.4-2), were observed along the Typha Solar Project generation tie line corridor.

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Typha Solar Project generation tie line project-scale analysis area is provided below in Section 3.4.2.

The same bird species were observed along the Typha Solar Project generation tie line during the April 2017 field survey as were observed at the Typha Solar Project site. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys.

The Yakima River is located 0.25 mile east of the Typha Solar Project generation tie line, and the nearest area that is only minimally inhabited by humans is 2.35 miles southwest of the generation tie line (see Figure 3.4-1 and Table 3.4-1).

Urtica Solar Project Site

Habitats and Vegetation

A review of the PHS database showed that no priority habitats or species are known to occur on the Urtica Solar Project site. The project-scale analysis area is 84% (433 acres) timothy hay agricultural production (see Figure 3.4-10). The other major habitat is developed, representing 9% of the analysis area. McCarl Creek, which functions as an irrigation ditch and includes human-made ponds, flows through the center of the project site, making 6% of the analysis area open water and riparian corridor habitats. The analysis area provides 9 acres of wetlands habitat. These important fish and wildlife habitats are 8% of the analysis area, and fish and wildlife species are known to occupy them.

Special-status Plants

As indicated in Table 3.4-2, the most prevalent noxious weed species and their associated habitats at the Urtica Solar Project site were Fuller's teasel and reed canary grass, adjacent to riparian corridor and wetland habitats. Hairy cat's-ear was also prevalent adjacent to the agricultural production areas. Other less prevalent noxious weed species observed included Canadian and scotch thistle, Queen Anne's lace (*Daucus carota*), and spotted knapweed.

Fish and Wildlife

Evaluation of special-status species with the potential to occur in the Urtica Solar Project project-scale analysis area is provided below in Section 3.4.2.

Eighteen bird species were observed at the Urtica Solar Project site during the April 2017 field survey. The majority of the species were observed in the open water, riparian corridor, and wetland habitats. All of the species listed in Appendix C are likely to occur in the project-scale analysis area, in addition to species that were not observed during any of the field surveys.

During an April 12, 2017, site visit, WDFW biologists stated that McCarl Creek is likely fish bearing. In the past, the landowner has stocked the ponds with triploid rainbow trout. A Canada goose was observed nesting near the ponds.

The Yakima River is located 0.19 mile northeast of the Urtica Solar Project site, and the nearest area that is only minimally inhabited by humans is 1.02 miles southwest of the project site (see Figure 3.4-1 and Table 3.4-1). Because of the site's proximity to these less-inhabited areas, migratory species (e.g., deer and coyote) forage or hunt on and travel through the project site.

(b) Identification of any species of local importance, priority species, or endangered, threatened, or candidate species that have a primary association with habitat on or adjacent to the project site;

3.4.2 Affected Environment for Special-status Species

Federal and state online databases were accessed to obtain current lists of sensitive species that may occur in or near the Columbia Solar Projects project-scale analysis areas, including the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) system (Appendix C). The USFWS IPaC database provides county-level lists of ESA-listed species, including species proposed or candidates for listing, and designated critical habitat within a defined project area. No ESA-listed species are anticipated to be affected by the proposed solar projects.

The WDFW PHS mapper, which lists sensitive wildlife species and habitats within the five proposed Columbia Solar Project sites, was also accessed (Appendix C). Table 3.4-4 lists state-listed species that have the potential to occur on the proposed solar project sites, and is followed by a brief discussion of each one. As the PHS mapper is dependent on existing records of species, other sensitive species may occur in the vicinity of the solar project sites, if suitable habitat is present. Based on the existing conditions of the sites as developed agricultural lands, it is unlikely that other sensitive species occur in the project-scale analysis areas.

No state- or federally listed threatened or endangered species were observed in the Columbia Solar Projects project-scale analysis areas during the April 2017 field survey.

Table 3.4-4. Special-status Species with Potential to Occur in the Columbia Solar Project Project-scale Analysis Areas

Common Name	Scientific Name	Status	Sites with Potential Occurrence	Likelihood to Occur in Project-scale Analysis Areas
Birds				
Bald eagle	*Haliaeetus leucocephalus*	Federal Species of Concern; MBTA and BGEPA Protected	Fumaria	High
Greater sage-grouse	*Centrocercus urophasianus*	Federal Candidate, State Threatened	Camas, Penstemon	Low
Sandhill crane	*Grus canadensis*	State Endangered	Camas, Fumaria, Penstemon, Urtica	Low
Fish				
Bull trout	*Salvelinus confluentus*	Federal Threatened	Typha	None
Spring Chinook salmon (Upper Columbia River)	*Oncorhynchus tshawytscha*	Federal Endangered	Penstemon	None
Steelhead (Middle Columbia River)	*Oncorhynchus mykiss*	Federal Threatened	Typha	None
Summer Steelhead (Upper Columbia River)	*Oncorhynchus mykiss*	Federal Threatened	Penstemon	None
Herptiles				
Columbia spotted frog	*Rana luteiventris*	State Candidate	Camas, Penstemon	High
Sharp-tailed snake	*Contia tenuis*	State Candidate	Camas, Fumaria	Low
Invertebrates				
Giant Palouse earthworm	*Driloleirus americanus*	State Candidate		Low

Bald Eagle

The bald eagle is a Federal Species of Concern, in addition to being Bald and Golden Eagle Protection Act (BGEPA) and MBTA-protected. They are habitat generalists, typically associated with aquatic habitats, preferring forested areas that surround fish-bearing lakes and rivers.

The PHS mapper did not document any bald eagle occurrences in the Columbia Solar Project analysis areas, but eagles were observed during the field survey on the Fumaria and Penstemon Solar Project sites. Both sites are within 3 miles of the Yakima River (potential nesting habitat). Bald eagles are also scavengers, and calves were observed near both sites; it is likely that the observed eagles were scavenging afterbirth in the vicinity of these sites.

Greater Sage-grouse

The greater sage-grouse (*Centrocercus urophasianus*) is classified as a Federal Candidate by USFWS and a State Threatened species by WDFW. This species lives only on the sagebrush steppe of western North America, and uses several types of sagebrush habitat during different parts of year (Sage Grouse Initiative 2017). Leks, or breeding areas, are located in clear areas such as grassy swales or dry lakebeds. Nesting habitats are usually made up of areas with dense cover from big sagebrush, but can also occur in areas with rabbitbrush (*Chrysothamnus* spp.), greasewood (*Sarcobatus vermiculatus*), and grassy areas (Cornell Lab of Ornithology 2017).

According to the PHS mapper, an occurrence of this species was recorded within the township that includes the entire area of the proposed Camas and Penstemon Solar Project sites (WDFW 2017a). However, the proposed sites do not fit the description for this species' preferred habitat. Therefore, it is unlikely that this species occurs within these two sites.

Sandhill Crane

The sandhill crane (*Grus canadensis*) is classified as a State Endangered species by WDFW. Klickitat and Yakima Counties hold the primary breeding grounds within the State of Washington for sandhill cranes. This species prefers open shallow waters along river channels, on alluvial islands of braided rivers, or in natural basin wetlands, but can sometimes occur in fields and agricultural lands during feeding and resting (California Department of Fish and Game 1990). They typically avoid visual obstructions, such as houses, bridges, and paved or gravel roads (Norling et al. 1992).

Bull Trout

The bull trout (*Salvelinus confluentus*) is classified as a Federally Threatened species by USFWS. Bull trout exhibit a number of life history strategies. Stream-resident bull trout complete their entire life cycle in the tributary streams where they spawn and rear. Most bull trout are migratory, however, spawning in tributary streams where juvenile fish usually rear for 1 to 4 years before migrating to either a larger river (fluvial) or lake (adfluvial) where they spend their adult life, returning to the tributary stream to spawn (Fraley and Shepard 1989). Successful egg incubation and survival requires very cold, clear, well-oxygenated waters as found in pristine headwater stream habitats (Wydoski and Whitney 2003). Bull trout in fresh water feed primarily on whitefish, sculpins, and young salmonids, although they also consume insects, amphibians, crayfish, and other available food (Kraemer 1994). The bull trout has been documented in the Yakima River by PHS, SalmonScape, and StreamNet (Pacific States Marine Fisheries Commission 2016; WDFW 2017a, 2017b). In addition, the part of the Yakima River that is adjacent to the Typha Solar Project site contains designated critical habitat for bull trout (Appendix C).

Chinook Salmon and Steelhead

The Upper Columbia River Spring Chinook and Summer Steelhead are classified as Federally Endangered and Federally Threatened, respectively, by the National Marine Fisheries Service (NMFS). All salmonids require sufficient invertebrate organisms for food; cool, flowing waters free of pollutants; high dissolved oxygen concentrations in rearing and incubation habitats; water of low sediment content during the growing season (for visual feeding); clean gravel substrate for reproduction; and unimpeded migratory access to and from spawning and rearing areas (Spence et al. 1996). Both the Upper Columbia River Spring Chinook and Upper Columbia River Summer Steelhead have been documented in Coleman Creek along the eastern boundary of the Penstemon Solar Project site, by PHS, SalmonScape, and StreamNet (Pacific States Marine Fisheries Commission 2016; WDFW 2017a, 2017b). In addition, the part of Coleman Creek adjacent to the Penstemon Solar Project site contains designated critical habitat for the Upper Columbia River Steelhead (Appendix C). The Middle Columbia River Steelhead has been documented in the Yakima River by PHS, SalmonScape, and StreamNet (Pacific States Marine Fisheries

Commission 2016; WDFW 2017a, 2017b). In addition, the part of the Yakima River that is adjacent to the Typha Solar Project site contains designated critical habitat for Middle Columbia River Steelhead (Appendix C).

Columbia Spotted Frog

The Columbia spotted frog is classified as a State Candidate species by WDFW. This species is rarely found far from water and occurs in a variety of still-water habitats, as well as in some streams and creeks. Their breeding habitat includes seasonally flooded margins of wetlands, ponds, and lakes, and even some flooded pools and still-water edges of creeks. They are most often found in association with wetland plant communities, consisting primarily of non-woody plants such as sedges, rushes, and grasses (Leonard et al. 1993). The egg masses are typically laid in shallow water with little or no shading from vegetation. They are most active in lowland habitats from February through October and hibernate in muddy bottoms near their breeding site in the winter (Licht 1974). Spotted frog tadpoles have been shown to be very sensitive to chemical fertilizers, which may have contributed to the species' decline (Marco 1997).

According to the PHS mapper, an occurrence of this species was recorded within 300 feet of the proposed Camas Solar Project site in a waterway to the northeast, and within 1 mile of the proposed Penstemon Solar Project site in a waterway to the southeast (WDFW 2017a). Egg masses from this species were observed at the Typha and Penstemon Solar Project sites during the April 3 to 12, 2017, field surveys. A pre-construction clearance survey may be recommended by WDFW for developments in or near potential spotted frog habitat, but since current plans are to buffer and avoid water bodies, this is unlikely to be necessary.

Sharp-Tailed Snake

The sharp-tailed snake is classified as a State Candidate species by WDFW. This species prefers forest openings dominated by Garry oak (*Quercus garryana*), particularly with rock accumulations, and riparian deciduous woodlands with accumulations of decaying woody logs within ponderosa pine, oak, or shrub-steppe (Hallock 2009).

According to the PHS mapper, an occurrence of this species was recorded within the quarter-township that includes the entire area of the proposed Camas and Fumaria Solar Project sites (WDFW 2017a). However, the proposed sites do not fit the description for this species' preferred habitat. Therefore, it is unlikely that this species occurs within these two project sites.

Giant Palouse Earthworm

The only special-status invertebrate species known to occur in Kittitas County is the giant Palouse earthworm (*Driloleirus americanus*), a State Candidate species. Known habitats for this species include deep, loamy soils characteristic of the Palouse bunchgrass prairies, and gravelly sandy loam or other rocky soils in forested areas. They have been observed in open forest, shrub-steppe, and prairie habitats and are typically associated with native vegetation (WDFW 2015:Appendix A-5).

3.4.2.2 Solar Project Sites

Camas Solar Project Site

During a site visit to the Camas Solar Project site on April 12, 2017, WDFW biologists stated that Little Naneum Creek could provide anadromous salmon and steelhead habitat.

A review of the PHS database showed that the Camas Solar Project site is located within a township known to support greater sage-grouse, a State Threatened and Federal Candidate species. Greater sage-grouse are closely associated with large uninterrupted areas of sagebrush, native bunchgrasses, wildflowers, and wet meadows. Because the site does not provide this type of habitat, greater sage-grouse are unlikely to occur in this project-scale analysis area.

The Camas Solar Project site also has historic habitat for Columbia spotted frog, a State Candidate species.

Fumaria Solar Project Site

Also observed during the April 12 WDFW site visit, a bald eagle, a federal species of concern, was perched in the riparian habitat along Reecer Creek, within the 500-meter Fumaria Solar Project project-scale analysis area (at the generation tie line northernmost crossing of Reecer Creek, see Figure 3.4-5).

Reecer Creek is known to be fish bearing, containing rainbow trout.

A review of the PHS database showed that the Fumaria Solar Project site is located within a quarter-township known to support sharp-tailed snake, a State Candidate species. Sharp-tailed snake can occur in a wide variety of habitats, but are most commonly associated with wetter soils in coniferous or mixed woodland forests. Because this site does not provide this type of habitat, sharp-tailed snake are unlikely to occur in this project-scale analysis area.

Fumaria Solar Project Generation Tie Line

Reecer Creek, which is crossed several times by the Fumaria Solar Project generation tie line, is known to be fish bearing, containing rainbow trout.

Penstemon Solar Project Site

A review of the PHS database showed that the Penstemon Solar Project site is located within a township known to support greater sage-grouse, a State Threatened and Federal Candidate species. Greater sage-grouse are closely associated with large uninterrupted areas of sagebrush, native bunchgrasses, wildflowers, and wet meadows. Because the site does not provide adequate greater sage-grouse habitat, they are unlikely to occur in this project-scale analysis area. A bald eagle, a federal species of concern, flew over the project site during the April 2017 field survey, likely traveling to the Yakima River.

Coleman Creek is known to be fish bearing, containing anadromous steelhead and Chinook salmon, and resident rainbow trout.

Additionally, several egg masses, thought to be from Columbia spotted frog, were observed in an irrigation ditch that connects with Coleman Creek south of the southeast corner of the Penstemon Solar Project site (see Figure 3.4-8).

Typha Solar Project Site

The Yakima River contains four ESA-listed species: bull trout, Spring Chinook (Upper Columbia River), Steelhead (Middle Columbia River), and Summer Steelhead (Upper Columbia River).

Two egg masses, thought to be from Columbia spotted frog, were observed in TW04, a wetland located along the southern boundary of the Typha Solar Project site (see Figure 3.4-9).

Typha Solar Project Generation Tie Line

No special-status species occurrences, other than those discussed for the Typha Solar Project site, are known within the project-scale analysis area for the Typha Solar Project generation tie line.

Urtica Solar Project Site

During a site visit to the Urtica Solar Project site on April 12, 2017, WDFW biologists stated that McCarl Creek could provide anadromous salmon and steelhead habitat.

(c) A discussion of any federal, state, or local special management recommendations, including department of fish and wildlife habitat management recommendations, that have been developed for species or habitats located on or adjacent to the project area;

No special management recommendations have been made.

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on habitat, species present and their use of the habitat during construction, operation and decommissioning of the energy facility. Impacts shall be quantified in terms of habitat acreage affected, and numbers of individuals affected, threatened or removed. The discussion of impacts shall also include:

3.4.3 Impacts to Habitat

3.4.3.1 Construction Impacts

Landscape-Scale Analysis Area

Table 3.4-5 displays the area that would be impacted by construction of the Columbia Solar Projects. The solar projects would include a total of 223 fenced-in acres (not the entire 232 leased acres), a majority of which would be currently in agricultural production (138 acres). The area of each habitat type removed would be less than 1% of that available in the landscape-scale analysis area, except for three habitat types: fallow – vegetated (some native vegetation, but mostly non-native plant species), fallow (recently grazed), and willow-rose shrub thicket. The impacts to these areas relative to that available in the landscape-scale analysis area is large (49%, 41%, and 34%, respectively) because there is a small area of each of these habitat types available prior to project construction. These habitat types may be more prevalent outside of the project-scale analysis areas in the areas base-mapped as the “other” habitat type, but base mapping outside of the project-scale analysis areas was not altered for this analysis. This artificially makes the proportions of these three habitat types higher. See Table 3.4-1 for the area of each habitat type available in the landscape-scale analysis area. As a result, there would be minor temporary impacts to habitat, vegetation, and wildlife.

The nature of these impacts is described in detail in Sections 3.4.3 to 3.4.5.

Solar Project Sites

Camas Solar Project Site

The Camas Solar Project would primarily impact habitat that is currently under agricultural production. The project site has been designed to avoid impacts on Little Naneum Creek, and the facility incorporates a 40-foot setback from the edge of the creek for any electrical generation equipment. The solar project has also been designed to avoid impacts to the wetland habitat along the western boundary of the project site, with a 20-foot setback from the edge of the wetland to the electrical generation equipment.

Table 3.4-5. Construction and Operation Impacts: Acres of Habitat Types Potentially Affected by Construction Activities and from Fencing during Long-term Operation of the Columbia Solar Project

Habitat Type	Landscape-scale Analysis Area (LSAA)		Project-scale Analysis Areas (PSAA) (500-meter buffer surrounding each solar project site)									
			Camas		Fumaria Site with Access Road (Generation Tie Line)[1]		Penstemon		Typha Site (Generation Tie Line)[1]		Urtica	
	Acres	% of Habitat available in LSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]
Agricultural Production	138	<1%	42	9%	– (19)	– (2%)	36	9%	– (2)	– (2%)	40	9%
Developed	8	<1%	<1	<1%	– (7)	– (13%)	–	–	– (2)	– (15%)	–	–
Fallow: vegetated	35	49%	–	–	35 (<1)	85% (<1%)	–	–	–	–	–	–
Fallow: recently grazed	38	41%	<1	<1%	–	–	–	–	38 (<1)	60% (<1%)	–	–
Open Water	1	<1%	–	–	– (<1)	– (1%)	–	–	– (<1)	– (44%)	<1	1%
Riparian Corridor	1	<1%	1	4%	– (<1)	– (1%)	–	–	– (<1)	– (<1%)	<1	<1%
Sagebrush-bitter-brush Scrub	<1	<1%	–	–	<1 (<1)	<1% (<1%)	–	–	–	–	–	–
Wetlands	1	<1%	–	–	– (1)	– (4%)	–	–	<1 (<1)	8% (<1%)	<1	1%
Willow-rose Shrub Thicket	1	34%	–	–	<1 (1)	<1% (5%)	–	–	– (<1)	– (<1%)	–	–
Total Acres	**223**		**43**		**35 (30)**		**36**		**39** (4)		**41**	

1. The entries in each cell add up to the total for the site, including the access road and generation tie line.
2. Where the amount of each habitat type in the landscape-scale or project-scale analysis area equals 100%.

Fumaria Solar Project Site

The Fumaria Solar Project would primarily impact habitat that is currently fallow – vegetated with some native vegetation, but mostly non-native plant species. The associated generation tie line would primarily impact habitat that is currently under agricultural production. The Fumaria Solar Project site has been designed to avoid impacts on Reecer Creek. The solar project has also been designed to avoid impacts to the existing drainage ditch along the southwestern boundary of the project site, and the facility incorporates a 60-foot setback from the edge of the wetland on the site to the electrical generation equipment.

Penstemon Solar Project Site

The Penstemon Solar Project would primarily impact habitat that is currently under agricultural production. The project site has been designed to avoid impacts to Coleman Creek, and the facility incorporates a 60-foot minimum setback from the edge of the creek for any electrical generation equipment, and an average 115-foot setback along the majority of the creek.

Typha Solar Project Site

The Typha Solar Project would primarily impact habitat that is currently fallow but has been recently grazed. The associated generation tie line would primarily impact habitat that is currently under agricultural production and developed. The project site has been designed to avoid impacts to the Yakima River, including a greater than 100-foot setback from the Yakima River to any electrical generation equipment, and a 30-foot setback from the wetlands located within the site to any electrical generation equipment.

Urtica Solar Project Site

The Urtica Solar Project would primarily impact habitat that is currently under agricultural production. The project site has been designed to avoid impacts to McCarl Creek, and the facility incorporates a 40-foot minimum setback from the edge of the creek for any electrical generation equipment.

3.4.3.2 Operation Impacts

Table 3.4-6 shows the area of the Columbia Solar Projects that would be converted to an impervious surface, rendering it unusable for plants or wildlife for the life of the projects. A total of 11.86 acres of the five solar projects would be converted to impervious surfaces, a majority of which would be habitat currently under agricultural production (6.01 acres). The area of each habitat type removed would be less than 1% of that available in the landscape-scale analysis area, except for three habitat types: fallow (native vegetation), fallow (recently grazed), and willow-rose shrub thicket. The impacts to these areas relative to that available in the landscape-scale analysis area is 1% or greater (2%, 2%, and 1%, respectively), because there is a small area of each of these habitat types available prior to project construction. These habitat types may be more prevalent outside of the project-scale analysis areas in the areas base-mapped as the “other” habitat type, but base mapping outside of the project-scale analysis areas was not altered for this analysis. This artificially makes the proportions of these three habitat types higher. See Table 3.4-1 for the area of each habitat type available in the landscape-scale analysis area. As a result, there would be minor permanent impacts to habitat, vegetation, and wildlife.

Impacts due to human noise and activity during operation would be minimal, as there would be little human visitation to each site. Eventual decommissioning impacts would be similar to the Construction Impacts to Habitat (Section 3.4.3.1) with ground disturbance and subsequent revegetation.

Table 3.4-6. Acres of Habitat Types Potentially Affected by Impervious Areas from Long-term Operation of the Columbia Solar Projects

Habitat Type	Landscape-scale Analysis Area (LSAA)		Project-scale Analysis Areas (PSAA) (500-meter buffer surrounding each solar project site)									
			Camas		Fumaria Site; Access Road (Generation Tie Line)[1]		Penstemon		Typha Site (Generation Tie Line)[1]		Urtica	
	Acres (with Fumaria Access Road)	% of Habitat available in LSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]	Acres	% of Habitat available in PSAA[2]
Agricultural Production	6.01	<1%	2.00	<1%	– (0.97)	– (<1%)	1.31	<1%	– (0.08)	– (<1%)	1.65	<1%
Developed	0.45 (0.55)	<1%	–	–	–; 0.10 (0.37)	–; 1% (1%)	–	–	– (0.08)	– (1%)	–	–
Fallow: vegetated	1.72 (2.44)	3%	–	–	1.71 0.72 (0.01)	4% (<1%) (<1%)	–	–	–	–	–	–
Fallow: recently grazed	1.41	1%	–	–	–	–	–	–	1.40 (0.01)	2% (<1%)	–	–
Open Water	0.05	<1%	–	–	– (0.02)	– (<1%)	–	–	– (0.02)	– (2%)	–	–
Riparian Corridor	0.04	<1%	–	–	– (0.02)	– (<1%)	–	–	– (0.01)	– (<1%)	–	–
Sagebrush-bitter-brush Scrub	0.01 (1.27)	<1%	–	–	–; 1.26 (0.01)	–; 1% (<1%)	–	–	–	–	–	–
Wetlands	0.03	<1%	–	–	– (0.03)	– (<1%)	–	–	– (<0.01)	– (<1%)	–	–
Willow-rose Shrub Thicket	0.07	2%	–	–	– (0.07)	– (<1%)	–	–	– (<0.01)	– (<1%)	–	–
Total Acres	**9.78 (11.86)**	**<1%**	**2.00**	**<1%**	**1.71 Site; 2.08 Access Road (1.50)**		**1.31**	**<1%**	**1.40 (0.21)**		**1.65**	**<1%**

1. The entries in each cell add up to the total for the site, including the access road and generation tie line.
2. Where the amount of each habitat type in the landscape-scale or project-scale analysis area equals 100%.

3.4.3.3 Other Impacts to Habitat and Species

(a) Impacts to water quality, stream hydrology and in-stream flows;

As described in Sections 2.1 and 2.3, the Columbia Solar Project site designs include at least 20-foot setbacks from wetlands, streams, and the Yakima River; see Table 3.3-5 for the specific setback distances from each water body. Additionally, sediment and erosion control measures would be implemented to avoid water quality impacts to adjacent wetlands, streams, and the Yakima River (see Sections 3.1.6, 3.3.3, 3.3.8, and 3.5.5). As described in Section 3.3, no impacts to stream hydrology and in-stream flow would occur because of the setbacks included in the project site designs. Sections 2.6, 2.8, 2.9, 2.10, and 2.11 provide additional details regarding the lack of impacts to water quality and quantity from the proposed project.

(b) Impacts due to introduction, spread, and establishment of noxious or nonnative species;

As discussed in the Special-status Plants section above, noxious weeds and non-native plant species are present on all five of the proposed Columbia Solar Project sites. Table 3.4-2 indicates their relative prevalence on each site. Construction and operation activities have the potential to introduce and further spread or establish these species, as well as others that do not presently occur at the sites. To prevent introduction, spread, and establishment of noxious or non-native species, TUUSSO has prepared and would implement a Vegetation Management Plan through coordination with the landowners, WDFW, and Kittitas County (Appendix B).

(c) Impacts and changes to species communities adjacent to the project site;

As shown in Table 3.4-1, habitat similar to the types available in the Columbia Solar Project project-scale analysis areas is readily available in the landscape-scale analysis area. Long-term modification of vegetation communities would not result in a significant change to the overall habitat available to species in the analysis areas.

The proposed Columbia Solar Projects have the potential to remove and/or reduce the quality of the vegetation communities and plant species in the project-scale analysis areas where ground disturbance would occur. Vegetation clearing or grubbing activities could also increase or introduce noxious plant populations in undisturbed habitat, contribute to soil erosion, lead to slope destabilization, or result in movement of material beyond the grading activities. Soil erosion from ground-disturbing activities may result in a negative effect on streams in the project-scale analysis areas by increasing sedimentation into the streams.

Potential minor impacts to wildlife may result from temporary construction and permanent operation of the five Columbia Solar Projects. Ground disturbance, vegetation clearing, and noise could result in temporary displacement of wildlife species present in the project-scale analysis areas during construction. Long-term effects of the solar projects would be limited to the long-term modification of habitat in each project-scale analysis area (i.e., fencing or conversion of habitat to impervious substances). Some species, such as small rodents, snakes, and insects, could be affected by the ground-disturbing activities due to temporary habitat alteration and could suffer mortalities from direct contact with construction equipment. More commonly, wildlife would be displaced to adjacent habitat areas. The effects from ground disturbances during construction would be considered low, with respect to common wildlife species, all of which can be expected to have robust populations that would be minimally affected by the temporary and localized construction activities associated with the solar projects.

Section 3.4.6 below details the proposed Columbia Solar Projects' BMPs and mitigation measures that would reduce or minimize the potential for impacts to vegetation, fish, and wildlife.

(d) Impacts to fish and wildlife migration routes;

The five proposed Columbia Solar Projects would not affect any identified big game migratory corridors or migratory flyways.

The Columbia Solar Project sites are within 2.5 miles of the Yakima River and 3.5 miles of areas that are only minimally inhabited by humans (Figure 3.4-1 and Table 3.4-1). Because all of the sites are near these less-inhabited areas, migratory species (e.g., deer and coyote) forage or hunt on and travel through the sites. From initiation of construction (with its associated human activity and noise) through long-term operation (with the planned fencing of the sites), 223 acres comprising the fenced-in areas of the solar project sites (not the entire 232 leased acres) would no longer be available to migratory species such as deer (coyote may still use the sites). However, there are 317,997 acres within the landscape-scale analysis area that would still be available to these migratory species, so this would not be a significant impact.

The potential impacts to migratory species from the proposed Fumaria and Typha Solar Project generation tie lines would be the temporary disturbance and the species' avoidance of the human noise and activity during construction of the proposed lines. This would not be a significant impact because these species could use the remainder of the landscape-scale analysis area during this temporary construction season (estimated at 8 months). There would be no long-term impacts to migratory species from the presence of the proposed generation tie lines.

(e) Impacts to any species of local importance, priority species, or endangered, threatened, or candidate species;

3.4.4 Impacts to Special-status Species

3.4.4.1 Construction Impacts

No special-status plant species are known to occur within the construction areas. The proposed Columbia Solar Projects have the potential to minimally impact the following special-status wildlife species:

- Bald eagle (BGEPA- and MBTA-protected; Federal Species of Concern)
- Columbia spotted frog (Washington State Candidate)

No other species described in Section 3.4.2 has the potential to be impacted by the Columbia Solar Projects.

Bald eagles were incidentally observed during ground surveys near the Fumaria and Penstemon Solar Project sites, and are likely present throughout the project-scale analysis areas. No aerial nest surveys were conducted. If nests are present in the project vicinity, they have the potential to be affected by noise and visual disturbances during construction. No bald eagle nests have been identified near the solar project sites; if nests are identified near the sites, construction outside of the critical use period (January 1–May 31) is recommended. If construction near active bald eagle nests might occur during the critical use period, local USFWS biologists would be consulted.

Columbia spotted frog is known to occur near the Typha, Camas, and Penstemon Solar Project sites, and could be affected by construction and operation in and around ponds and canals that provide breeding habitat. To avoid impacts to aquatic and semi-aquatic species, setback distances from aquatic habitats would be incorporated into the site plans, and appropriate erosion and sediment control measures would be implemented to protect wetlands and streams from sediment and other contaminants.

Recommended mitigation measures for special-status species are described below in Section 3.4.6.

3.4.4.2 Operation Impacts

Table 3.4-7 displays the amount of special-status species habitat that would be impacted by the fenced and impervious areas from implementation of the Columbia Solar Projects (all sites combined). Approximately 2 acres of bald eagle habitat and 3 acres of Columbia spotted frog habitat would be fenced (a minor temporary impact, due to the construction activity that would occur within this habitat).

Table 3.4-7. Acres of Special-status Species Habitat Impacted by Fencing and Conversion to an Impervious Area of the Columbia Solar Projects

Representative Species	Habitat Available in Landscape Scale Analysis Area[1]	Fenced Area		Impervious Area	
		Acres	Percent of Available Habitat	Acres	Percent of Available Habitat
Bald eagle	8,116	2	<1%	0.07	<1%
Columbia spotted frog	9,363	3	<1%	0.11	<1%

1. The “other” habitat category was removed from the species habitats because it includes such a wide range of habitats that it is not valuable for the analysis.

Except for the 11.86 acres of impervious surfaces that would remove 0.07 acre and 0.11 acre of available bald eagle and Columbia spotted frog habitat (a minor permanent impact), respectively (see Table 3.4-7), no long-term operational impacts to special-status species would occur from the five Columbia Solar Projects. Eventual decommissioning impacts would be similar to the Construction Impacts to Special-status Species (Section 3.4.4.1) with human noise and activity and subsequent habitat revegetation.

(f) Impacts due to any activities that may otherwise confuse, deter, disrupt or threaten fish or wildlife;

3.4.5 Impacts to Fish and Wildlife

3.4.5.1 Construction Impacts

Landscape-Scale Analysis Area

As described in Section 3.4.6.1, to ensure compliance with MBTA, vegetation clearing for the Columbia Solar Projects would ideally be undertaken from August 1 through the end of February. If construction or vegetation clearing is required between March 1 and August 1, nest surveys would be conducted in the proposed area of disturbance. If active migratory bird nests are encountered during the surveys, land-disturbing construction activities would be avoided until the birds fledge. An appropriate species avoidance buffer, as determined in conjunction with WDFW and local agencies, would apply to all active nests for migratory bird species.

Setbacks from wetlands, streams, and the Yakima River have also been included in the design of each project site (see Section 2.3.3), so impacts to fish and aquatic species would be avoided.

Table 3.4-3 shows the types of habitats used by the representative species analyzed for the Columbia Solar Projects. Table 3.4-8 shows the amount of representative habitat used by these species (within the landscape-scale analysis area) that would be impacted by the fenced and impervious areas of the

Columbia Solar Projects (all sites combined). These species were chosen to represent wildlife that are likely to occur in the project-scale analysis areas. Not all species listed in Section 3.4.1 are listed here. For most species, less than 1% of the available habitat used by that species (within the landscape-scale analysis area) would be affected from solar project fencing or conversion to impervious areas, except for the spotted skunk, for which 1% of its habitat would be converted to impervious area. As a result, there would no impacts to fish (because of setbacks from water bodies), and there would be minor permanent impacts to habitat, vegetation, and wildlife.

Table 3.4-8. Acres of Representative Species Habitat (in the Landscape-scale Analysis Area) Impacted by Fencing and Conversion to an Impervious Area of the Columbia Solar Projects

Representative Species	Habitat Available in Landscape-scale Analysis Area[1]	Fenced Area		Impervious Area	
		Acres	Percent of Available Habitat	Acres	Percent of Available Habitat
Birds					
Canada goose	129,395	223	<1%	11	<1%
Great blue heron	124,586	214	<1%	10	<1%
Great horned owl	123,339	213	<1%	10	<1%
Killdeer	129,833	222	<1%	12	<1%
Northern Harrier	123,781	214	<1%	11	<1%
Red-tailed hawk	120,470	219	<1%	12	<1%
Sandhill Crane	124,586	214	<1%	10	<1%
Fish					
Bull trout	1,247	1	<1%	0	<1%
Dace species	6,562	2	<1%	0	<1%
Spring chinook (Upper Columbia River)	1,247	1	<1%	0	<1%
Steelhead (Middle Columbia River)	1,247	1	<1%	0	<1%
Summer steelhead (Upper Columbia River)	1,247	1	<1%	0	<1%
Herptiles					
Pacific treefrog	124,496	177	<1%	9	<1%
Sharp-tailed snake	8,116	2	<1%	0	<1%
Mammals					
American badger	115,665	212	<1%	11	<1%
Coyote	123,271	221	<1%	12	<1%
Mule deer	118,028	214	<1%	10	<1%
Raccoon	129,925	11	<1%	1	<1%
Small rodents (mice, voles, etc.)	128,590	223	<1%	12	<1%
Striped skunk	7,682	45	<1%	3	1%
Virginia opossum	12,925	11	<1%	1	<1%

1. The “other” habitat category was removed from the species habitats because it includes such a wide range of habitats that it is not valuable for the analysis.

Solar Project Sites

Camas Solar Project Site

During field surveys of the Camas Solar Project site, an active red-tailed hawk nest was observed in a large willow along Little Naneum Creek (see Figure 3.4-3). Additionally, the floor of the barn in the northeast part of the site was littered with owl pellets and the rafters contained whitewash (see Figure 3.4-

3). This barn would remain in place following solar project construction, based on current design plans. If nesting activity is observed at the nest and barn, then a 0.25-mile seasonal construction avoidance buffer may be requested by WDFW until the young have fledged (see Section 3.4.6 and Appendix C).

Fumaria Solar Project Generation Tie Line

East of the Fumaria Solar Project generation tie line, along North Faust Road, two active raptor nests were observed from a red-tailed hawk and a great horned owl (see Figure 3.4-6). If nesting activity is observed at the nests, then a 0.25-mile seasonal construction avoidance buffer may be requested by WDFW until the young have fledged (see Section 3.4.6 and Appendix C).

Penstemon Solar Project Site

An active red-tailed hawk nest was observed southeast of the southeast site corner of the Penstemon Solar Project site, in a cottonwood tree along Coleman Creek (see Figure 3.4-8). If nesting activity is observed at the nest, then a 0.25-mile seasonal construction avoidance buffer may be requested by WDFW until the young have fledged (see Section 3.4.6 and Appendix C).

Typha Solar Project Site

A documented great blue heron breeding area is 224 feet east of the Typha Solar Project site, on a landform within the Yakima River (see Figure 3.4-9). The great blue heron nesting season is February through September. WDFW may request a seasonal avoidance buffer during the first half of the season, i.e., February through May (Appendix C).

The floor of the barn, located south of the southwest corner of the Typha Solar Project site, was littered with owl pellets and the rafters contained whitewash (see Figure 3.4-9). Current project plans include leaving this barn in place. If nesting activity is observed at the barn, then a 0.25-mile seasonal construction avoidance buffer may be requested by WDFW until the young have fledged (see Section 3.4.6 and Appendix C).

Urtica Solar Project Site

No nests were observed in the Urtica Solar Project project-scale analysis area. Still, if construction occurs between March 1 and August 1, nest surveys would take place to ensure new nests have not been built.

3.4.5.2 Operation Impacts

Table 3.4-8 summarizes the acres of habitat for representative species that may be affected by the long-term operation of the Columbia Solar Projects (i.e., from fencing or conversion of habitat to impervious surfaces). Each site would be visited minimally by humans for maintenance, resulting in minimal permanent impacts due to human noise and activity. Eventual decommissioning impacts would be similar to the Construction Impacts to Fish and Wildlife (Section 3.4.5.1) with human noise and activity and subsequent habitat revegetation.

(g) An assessment of risk of collision of avian species with any project structures, during day and night, migration periods, and inclement weather;

Potential impacts to avian species on Columbia Solar Project sites can include traumatic impact with fencing, PV panels, and other solar structures, and predation due to collision-related injuries (Hernandez et al. 2014; Kagan et al. 2014).

Birds representing a broad range of body sizes, ecological types, resident and non-resident, and nocturnal and diurnal species can be impacted by solar facilities (Kagan et al. 2014). Passerines are the taxonomic group most frequently found dead or injured at solar facilities, ranging between 40% to nearly 63% of all avian fatalities at a site. The proportion of water-dependent species found at solar projects has ranged between less than 1% to approximately 45% (Kagan et al. 2014). In general, the proportion of water-dependent bird species found dead at PV facilities was higher than for other solar technologies, suggesting that there may be an attraction of water-dependent birds to PV facilities (e.g., lake effect hypothesis). However, no studies have been conducted to test this hypothesis.

In a study of avian mortality at utility-scale solar energy (USSE) facilities in the United States conducted in 2016, Walston et al. estimated that all USSE facilities currently in operation or under construction (totaling approximately 14 GW) would result in 37,800 to 138,600 bird mortalities per year. This estimate was based on the capacity-weighted average mortality rate, which ranged from 2.7 to 9.9 birds/MW/year, and included mortality from both known and unknown causes (Walston et al. 2016). Applying this to the Columbia Solar Project sites, it is estimated that operation of each 5-MW facility could result in between 13 and 50 avian deaths per year, or a total of 67 to 248 bird mortalities per year for all five Columbia Solar Project sites. For comparison, roadway vehicles are thought to cause 89 to 340 million avian deaths per year, and buildings and windows are thought to cause 365 to 988 million avian deaths per year (Walston et al. 2016).

Because the majority of avian mortalities at USSE facilities are the result of unknown causes, it is unclear how factors such as time of day, time of year, and weather can alter the risks of collision.

Avian Power Line Interaction Committee guidelines would be followed to reduce bird perching and collisions on the generation tie lines. These guidelines are intended to minimize the potential for avian fatalities due to electrocution or power line strikes.

(h) An assessment for the potential of impacts of hazardous or toxic materials spills on habitats and wildlife.

Potential impacts to habitats and wildlife from hazardous or toxic materials spills from the five Columbia Solar Projects are unlikely. The solar projects would have Spill Prevention and Control Plans for both the construction and operation phases (see Sections 2.10, 4.1.8, and 4.1.9 for details). There would be measures in place to prevent and contain any accidental spills resulting from construction fuel storage. Construction of the projects would not result in the generation of any hazardous wastes in quantities regulated by state or federal law.

There would not be any long-term fuel storage during operation of the five Columbia Solar Projects. The potential for accidental spills during operations would be minimal, as the sole source of potential spills on-site would be the small amounts of mineral oil contained within the transformers. The transformers would include containment tank welding and corrosion protection specifications.

(3) Mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation through compensation or preservation and restoration of existing habitats and species, proposed to compensate for the impacts that have been identified. The mitigation plan shall also:

3.4.6 Mitigation for Habitat and Species

Throughout this section, the term “mitigation” refers to avoidance and minimization measures. No compensatory mitigation is proposed for the Columbia Solar Projects, as impacts are not expected to be significant. Mitigation would remain consistent with the WDFW POL-M5002.

(a) Be based on sound science;

The proposed mitigation and BMPs included in this application are typical of the wind energy projects developed to date in Kittitas County, and were developed through coordination with landowners and WDFW. Additional research is required to determine the efficacy of measures intended to reduce avian and bat mortality at utility-scale solar facilities (Multiagency Avian-Solar Collaborative Working Group [CWG] 2016). The mitigation measures in this ASC include the most current and widely-accepted measures referenced by the CWG in their Final Avian-Solar Science Coordination Plan (CWG 2016, Kagan et al. 2014).The USFWS is currently developing programmatic guidance for Bird and Bat Conservation Strategies (BBCS) that will recommend BMPs and minimization and mitigation for utility-scale solar facilities (USFWS 2016a as cited in CWG 2016). When available, this guidance will be reviewed and applicable guidelines will be considered for implementation.

(b) Address all best management practices to be employed and setbacks to be established;

Waterbody setbacks are listed by Columbia Solar Project site in Section 3.4.3.1.

3.4.6.1 Buffers and Seasonal Timing

Migratory Birds and Bald and Golden Eagles

To ensure compliance with MBTA, vegetation clearing for the Columbia Solar Projects would ideally be undertaken from August 1 through the end of February. If construction or vegetation clearing is required between March 1 and August 1, nest surveys would be required in the proposed area of disturbance. If active migratory bird nests are encountered during the surveys, land-disturbing construction activities should be avoided while the birds are allowed to fledge. An appropriate species avoidance buffer, as determined in conjunction with WDFW and local agencies, would apply to all active nests for migratory bird species.

As discussed in Sections 3.4.1 and 3.4.2, the Columbia Solar Project project-scale analysis areas have the potential to provide nesting habitat to raptors and bald and golden eagles. All raptor species are protected under the MBTA, and bald and golden eagles are additionally protected under the BGEPA. If active raptor nests occur within 0.25 mile of the solar project construction activities, noise and construction activities could disturb nesting and fledgling raptors, potentially causing nest abandonment. Based on WDFW guidance (Appendix C), a nest survey within 0.25 mile of construction activities would be conducted within the same year that construction is scheduled, to determine whether nests could be occupied during construction. The nesting seasons vary by species, as shown in Table 3.4-9. WDFW's 0.25-mile buffer is inclusive of the distance recommended by the National Bald Eagle Management Guidelines (USFWS 2007), which specifies a 660-foot (0.125-mile) buffer from active eagle nests. If active raptor nests are observed, then TUUSSO would coordinate with WDFW to determine approaches to minimize disturbance to the nesting raptors. Buffer distances and timing restrictions would collaboratively be developed by WDFW and TUUSSO, dependent upon the sound levels produced by the construction equipment and the sensitivity of the nesting raptors.

Table 3.4-9. Nesting Seasons for Raptor Species Likely to Occur in the Analysis Areas

Species	Nesting Season
Bald eagle	January 1–August 31
Golden eagle	January 1–August 31
Red-tailed hawk	March 15–June 30
Great horned owl	February 1–May 15
Swainson's hawk	April 15–July 31

Source: Personal communication with Scott Downes, WDFW Habitat Biologist, 2017 (Appendix C).

Riparian Corridors

Rivers and streams in Kittitas County are classified according to the Washington State stream typing system, as defined in WAC 222-16-030. Ecology and the Washington Department of Natural Resources (DNR) recognize the WAC stream typing system. Kittitas County has established riparian habitat buffer ranges for each stream type to reflect the impact of certain intense land uses on riparian habitat functions and values. The performance standard buffers are defined in KCC 17A.070.010.

Table 3.4-10 shows the surface waters that were identified in the Columbia Solar Project project-scale analysis areas, their DNR stream type, and the applicable buffers. See also each project site's Critical Areas Report for recommended buffer and setback distances from the wetlands identified within the sites.

Table 3.4-10. Surface Waters in the Project-scale Analysis Areas and Applicable Buffers

Stream ID	Water Type	Flow Type	DNR Stream Type[1]	Kittitas County Buffers (feet)	
				Minimum	Maximum
Yakima River	River	Perennial	S	40	200
Ellensburg Power Canal (TS01)	Canal	Perennial	N/A	–	–
FS01	Ditch	Ephemeral	N/A	–	–
FS02	Ditch	Ephemeral	N/A	–	–
Reecer Creek	Stream	Perennial	F	20	100
Kittitas Reclamation District Canal (FS03)	Canal	Perennial	N/A	–	–
FS04	Stream	Intermittent	Ns	0	15
Town Ditch (FS05)	Canal	Perennial	N/A	–	–
McCarl Creek (US01)	Stream	Intermittent	F	20	100
Little Naneum Creek	Stream	Perennial	F	20	100
Bull Ditch (CS02)	Ditch	Perennial	N/A	–	–
Coleman Creek	Stream	Perennial	F	20	100

1. As defined in WAC 222-16-030: S = shoreline of the state, F = fish-bearing, Ns = non-fish-bearing. N/A = not applicable, due to ditches and canals being excluded from the WAC typing system.

To additionally protect riparian corridors and habitats, peak Columbia Solar Project construction activities would be conducted during the dry season as much as possible, to minimize erosion, sedimentation, and soil compaction. At this time, no in-water work is planned for construction of access roads. If these plans change, then TUUSSO would coordinate and permit their plans with WDFW and construction in fish-bearing streams would occur during agency-approved work windows.

3.4.6.2 Noise

Construction noise is exempt from regulation under the statewide noise standards, WAC 173-60, but most noise generating construction activities would be conducted between the hours of 7 a.m. and 10 p.m., in accordance local noise ordinances, including but not limited to KCC 9.45.010, Public Disturbance noises. These practices would avoid night-time noise disturbances to wildlife species.

3.4.6.3 Other Measures

Additional Columbia Solar Project mitigation measures and BMPs to protect fish and wildlife in the project-scale analysis areas could include the following:

Design and Construction Techniques

- Avoid, when possible, construction in sensitive areas such as riparian zones and wetlands.
- Flag sensitive habitat areas (e.g., raptor nests, wetlands, etc.) near proposed areas of construction activity, and designate such areas as off limits to all construction personnel.
- During the nesting season, monitor raptor nests within 0.25 mile of the sites for nesting activity; coordinate construction timing and activities with WDFW to avoid impacts to nesting raptors.
- Minimize new road construction by improving and using existing roads and trails, instead of constructing new roads.
- Develop and implement a Fire Control Plan, in coordination with local fire districts, to minimize the risk of accidental fires during construction, and respond effectively to any fire that does occur.
- Designate an environmental monitor during construction to monitor construction activities and ensure compliance with mitigation measures.
- Implement a trenching protocol during the installation of underground electrical facilities, to allow for conservation of surface soils.
- Require construction personnel to avoid driving over or otherwise disturbing areas outside of the designated construction areas.
- Properly store and manage all wastes generated during construction.
- Use certified weed-free straw bales during construction to avoid introduction of noxious or invasive weeds.
- There would be one straight row of barbed wire, not circular barbed wire, at the top of the perimeter fence. This would avoid birds becoming trapped in circular barbed wire.
- For poles installed by TUUSSO, when feasible:
    - equip overhead power lines with raptor perch guards to minimize risks to raptors and
    - space overhead power line conductors to minimize potential for raptor electrocution.
- Employ an adaptive management strategy to further minimize avian and bat mortality as new information and technology becomes available.

Erosion and Sediment Control

- Use BMPs to minimize construction-related surface water runoff and soil erosion.
- Implement temporary erosion and sediment control measures, as appropriate, both during and after construction.
- Flag sensitive habitat areas (e.g., riparian zones, wetlands, etc.) near proposed areas of construction activity, and designate such areas as off limits to all construction personnel.
- Limit disturbances to the minimum necessary when working in or near waterbodies and install stakes or flagging to restrict vehicles and equipment to designated routes and areas.
- Delineate construction limits within 200 feet of waterbodies, as specified in the Stormwater Pollution Prevention Plan (SWPPP), with a sediment fence, straw wattles, or similarly approved methods to eliminate sediment discharge into waterways and wetlands, minimize the size of construction disturbance areas, and minimize removal of vegetation, to the greatest extent possible.

Restoration and Noxious Weed Control

- Quickly revegetate habitats temporarily disturbed during construction with native plant species.
- Reseed all temporarily disturbed areas with an appropriate mix of native plant species as soon as possible after construction is completed, to accelerate the revegetation of these areas and to prevent the spread of noxious weeds.
- Consult with WDFW regarding the appropriate native seed mixes to include in the Vegetation Management Plan for revegetation of the solar project sites.
- As further detailed in the Vegetation Management Plan, implement noxious weed control measures.
- Develop a noxious weed control plan prior to construction, and implement the plan over the life of the project as mitigation. Herbicide application could be a noxious weed control method used.

(c) Address how cumulative impacts associated with the energy facility will be avoided or minimized;

Historically, Kittitas County land use has been dominated by agriculture. Renewable energy facilities (i.e., wind and solar) have recently been built and proposed. Currently there are two existing solar farms and four completed wind farms in the county. Three additional solar farms and one wind farm are in the proposal/approval process.

Impacts cumulative with other energy facilities include a landscape-scale pattern of habitat removal and fragmentation. This pattern displaces wildlife into other areas that may be of lesser quality, such as developed areas. Fragmentation can disrupt movement patterns, whether on a migratory or local scale.

Post-construction restoration and noxious weed control for the Columbia Solar Projects would replace a weedy vegetation cover type with native plant species in all temporarily disturbed areas (see Table 3.4-2 for noxious weed prevalence at each site; all sites currently are principally vegetated by noxious and non-native plant species). These areas would be reseeded with an appropriate mix of native plant species as soon as possible after construction is completed, minimizing the amount of habitat that is permanently removed and thereby reducing cumulative habitat removal.

Fragmentation to riparian corridors would be avoided by the designed inclusion of waterbody setback distances. Additional fragmentation would be minimized by constructing as few new access roads as possible for the Columbia Solar Projects. Instead, existing roads and trails would be improved and used.

(d) Demonstrate how the mitigation measures will achieve equivalent or greater habitat quality, value and function for those habitats being impacted, as well as for habitats being enhanced, created or protected through mitigation actions;

Application of the Columbia Solar Project mitigation measures and BMPs described above would avoid and minimize impacts such that equivalent habitat value and function would be maintained in each project-scale analysis area. Compensatory mitigation is not proposed because the impacts are not expected to be significant.

(e) Identify and quantify level of compensation for impacts to, or losses of, existing species due to project impacts and mitigation measures, including benefits that would occur to existing and new species due to implementation of the mitigation measures;

Losses of existing species are not anticipated from Columbia Solar Project impacts and mitigation measures. Impacts to species would be avoided and minimized to the greatest extent possible through coordination with WDFW and by following the BMPs described above. Currently, noxious weeds are present on each site. Wildlife could benefit from the post-restoration and noxious weed control planned for each project site. Post-construction restoration would reduce the weeds and increase the number of native plant species on each site, with the intent of increasing general habitat quality.

(f) Address how mitigation measures considered have taken into consideration the probability of success of full and adequate implementation of the mitigation plan;

The proposed Columbia Solar Project mitigation and BMPs included in this application are typical of the wind energy projects developed to date in Kittitas County, and were developed through coordination with landowners, Kittitas County, and WDFW. They are standard and typical for the project size and type. The probability of success and full and adequate implementation of these measures would be increased with oversight from WDFW. Additionally, employing an on-site biological monitor would ensure full and adequate implementation of the minimization and avoidance measures and also increase the probability of success.

(g) Identify future use of any manmade ponds or structures created through construction and operation of the facility or associated mitigation measures, and associated beneficial or detrimental impacts to habitats, fish and wildlife;

No manmade ponds or structures would be created by the Columbia Solar Projects or associated mitigation measures.

(h) Discuss the schedule for implementation of the mitigation plan, prior to, during, and post construction and operation;

Application of the Columbia Solar Project mitigation measures and BMPs described above (Section 3.4.6.3) would avoid and minimize impacts at each site's project-scale analysis area. The implementation schedule for these measures has already begun with site design, but most measures would be implemented during the construction phase. The Post-construction Restoration and Noxious Weed Control would continue according to the Vegetation Management Plan (Appendix B). Compensatory mitigation is not proposed because the impacts are not expected to be significant.

(i) Discuss ongoing management practices that will protect habitat and species, including proposed monitoring and maintenance programs;

3.4.6.4 General County

Ecology conducts water quality monitoring in the area. Through the Ecological Interactions Team, WDFW conducts fish monitoring and improves fish passage barriers through the Yakima Tributary Access and Habitat Program. Kittitas County Conservation District (KCCD) works with farmers regarding riparian habitat and stream issues in the Kittitas Valley. TUUSSO contacted KCCD regarding project specifics and received the details included per site below.

3.4.6.5 Solar Project Sites

Camas Solar Project Site

KCCD has no current projects in the Camas Solar Project area. Several years ago the Bull Ditch Project involved adding a siphon under the creek. There is a known fish passage barrier south of the project site.

Fumaria Solar Project Site and Generation Tie Line

There are several known fish passage barriers along Reecer Creek, for the Fumaria Solar Project or associated generation tie line.

Penstemon Solar Project Site

KCCD has a Salmon Recovery Funding Board Grant to install a fish screen on Brunson's Outtake, which is located on the property upstream from the Penstemon Solar Project site. KCCD has already installed a number of screens along Coleman Creek, and this is currently the most southerly fish barrier.

Typha Solar Project Site and Generation Tie Line

KCCD has no current projects in the vicinity of the Typha Solar Project site or associated generation tie line. Ecology has a sediment study further east on the Ellensburg Power Canal. The Bonneville Power Administration and the Confederated Tribes of the Yakama Nation are proposing to construct the Melvin R. Sampson Hatchery upriver from the project site. The Final EIS is expected to be released in Fall 2017 (Yakima Basin Coho Project, DOE/EIS-0522; Bonneville Power Administration 2017).

Urtica Solar Project Site

KCCD has no current projects in the Urtica Solar Project area.

(j) Mitigation plans should give priority to proven mitigation methods. Experimental mitigation techniques and mitigation banking may be considered by the council on a case-by-case basis. Proposals for experimental mitigation techniques and mitigation banking must be supported with analyses demonstrating that compensation will meet or exceed requirements giving consideration to the uncertainty of experimental techniques, and that banking credits meet all applicable state requirements.

All proposed Columbia Solar Project mitigation is proven; no experimental mitigation techniques are proposed.

(4) Guidelines review. The application shall give due consideration to any project-type specific guidelines established by state and federal agencies for assessment of existing habitat, assessment of impacts, and development of mitigation plans. The application shall describe how such guidelines are satisfied. For example, wind generation proposals shall consider Washington state department of fish and wildlife Wind Power Guidelines, August 2003, or as hereafter amended. Other types of energy facilities shall consider department of fish and wildlife Policy M-5002, dated January 18, 1999, or as hereafter amended.

The State of Washington regulates fish and wildlife with Title 77 of the Revised Code of Washington (RCW) and Title 220 of the Washington Administrative Code. State and protected species regulations are defined in WAC 220-610, which includes provisions for endangered, threatened, and sensitive wildlife species, ESA-listed fish, and bald eagle protection rules. Fish and aquatic habitats are protected under RCW 77.55, commonly referred to as the Hydraulic Code. Any environmental impacts that could occur in waters of the state below the OHWM would need to be addressed in a Hydraulic Project Approval process. Sections 3.4.3, 3.4.4, and 3.4.5 evaluate the potential for construction and operation impacts on habitats, fish, and wildlife. No significant impacts would occur from the proposed Columbia Solar Projects, therefore this project would comply with state habitat, fish, and wildlife guidelines.

Washington's *State Wildlife Action Plan* (SWAP) is a comprehensive plan for conserving the state's fish and wildlife and their habitats (WDFW 2015). The purposes of the SWAP are to inform conservation priorities and to guide conservation actions statewide.

(5) Federal approvals. The application shall list any federal approvals required for habitat, vegetation, fish and wildlife impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

Section 7 of the ESA requires an analysis of the effects of major construction projects on any federally listed or proposed threatened or endangered species that may use the Columbia Solar Project sites, if there is a federal nexus. Consultation with the USFWS and National Oceanic and Atmospheric Administration (NOAA) NMFS is necessary if any threatened or endangered species would be affected by a project. Applicable regulations are found in 50 CFR 17. In cases where a project does not require the approval, funding, or conduct of a federal agency, Section 10 of the ESA provides a parallel process whereby non-federal entities may consult with the USFWS or NMFS and acquire a take statement for incidental adverse effects or take of listed species by the project. Because the project does not have a federal nexus and also would not affect any federally-listed threatened or endangered species, ESA Section 7 and Section 10 consultation were not conducted for the proposed solar projects.

The MBTA (16 USC 703–711) prohibits the taking, killing, or possession of migratory birds, except as allowed by the Secretary of the Interior. The list of migratory birds is found in 50 CFR 10, and permit regulations are found in 50 CFR 21.

The federal BGEPA (16 CFR 668-668c) prohibits the taking, possession, purchase, sale, barter, transport, export, or import of any bald or golden eagle or any part, nest, or egg of a bald or golden eagle, except for certain scientific, exhibition, and religious purposes. Eagle permit regulations are found in 50 CFR 22.

3.5 Wetlands 463-60-333

The application shall include a report for wetlands prepared by a qualified professional wetland scientist. For purposes of this section, the term "project site" refers to the site for which site certification is being requested, and the location of any associated facilities or their right of way corridors if applicable. The report shall include, but not be limited to, the following information:

(1) Assessment of existing wetlands present and their quality. The assessment of the presence and quality of existing wetlands shall include:

(a) A wetland delineation performed by a qualified professional according to the Washington State Wetlands Delineation and Identification Manual, 1997, and associated data sheets, site maps with data plots and delineated wetlands areas, photographs, and topographic and aerial site maps.

3.5.1 Affected Environment for Wetland Delineations

3.5.1.1 General County

Wetlands are defined as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and which under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. The methods used to delineate wetlands within the Columbia Solar Project sites conform to guidance in the *Washington State Wetland Identification and Delineation Manual* (Ecology 1997), the *Corps of Engineers Wetland Delineation*

Manual (Environmental Laboratory 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)* (USACE 2008).

To be considered a wetland by the USACE, an area must express hydrophytic vegetation, hydric soils, and wetland hydrology. During the five Columbia Solar Project site surveys conducted from April 3 through 12, 2017, site conditions were documented for these parameters in areas representative of each project site and in areas most likely to exhibit wetland features. Staff collected additional data in associated uplands, as needed, to confirm wetland boundaries. Wetland boundaries, stream boundaries, and wetland data plot locations within each of the five project sites were recorded with a Trimble Geo XT GPS unit with submeter accuracy. All delineated wetlands and streams were processed and projected onto existing base maps using ArcGIS software.

A total of 16 wetlands were delineated within the Columbia Solar Project sites, one on the Camas Solar Project site, six on the Fumaria Solar Project site (one on the solar project site and five along the generation tie line), one on the Penstemon Solar Project site, five on the Typha Solar Project site (three only on the solar project site, one only on the generation tie line, and one on both), and three on the Urtica Solar Project site. Wetlands were distinguished from adjoining uplands by the presence or absence of indicators for wetland hydrology, hydric soils, and hydrophytic vegetation.

All of the wetlands within the five Columbia Solar Project sites are classified as either Palustrine Emergent (PEM) or Palustrine Scrub-shrub (PSS) wetlands based on the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). The Palustrine system includes all non-tidal wetlands dominated by trees, shrubs, persistent emergent species, and/or emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand (Cowardin et al. 1979). The following two sub-classes occur within the five project sites: 1) Emergent wetlands, which are dominated by species that normally remain standing at least until the beginning of the next growing season and 2) Scrub-shrub wetlands, which are dominated by woody vegetation less than 6 meters tall, which includes true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions (Cowardin et al. 1979).

In addition, wetlands within the five Columbia Solar Project sites were classified as either Riverine, Slope, or Depressional based on *Hydrogeomorphic Wetland Classification System: An Overview and Modification to Better Meet the Needs of the Natural Resources Conservation Service* (NRCS 2008). Definitions for these classifications can be found in Section 3.5.2.

Table 3.5-1 summarizes the size, rating, and classification of wetlands found within each of five Columbia Solar Project sites. All delineated wetlands would fall under the jurisdiction of the USACE, Ecology, and Kittitas County. Detailed descriptions of each wetland within the solar project sites are provided in the Critical Areas Wetland and Waters Delineation Reports for each site, which also include a list of vegetation observed within each project site, wetland delineation data sheets, ground-level site photographs, and wetland rating forms.

Table 3.5-1. Wetland Size, Rating, and Classification for Wetlands within the Study Areas for Each Columbia Solar Project Site

Wetland Name	Delineated Area within the Project (Wetland Rating Unit Size)[1] (acres)	Wetland Rating[2]	Hydrogeomorphic Classification[3]	Cowardin Classification[4]	Dominant Species Observed within Wetland
Camas Solar Project Site					
CW01	0.97 (1.72)	III	Riverine	PEM	Reed canary grass, broad-leaf cat-tail, pale-yellow iris
Fumaria Solar Project Site					
FW01	0.00 (estimated 5.57)	III	Slope	PEM	Reed canary grass, Fuller's teasel, sedge species
Fumaria Solar Project Generation Tie Line					
FW02	0.24 (estimated 2.15)	II	Riverine	PEM	Creeping wild rye, dock-leaf smartweed, yellow nutsedge, curly dock
FW03	0.03 (estimated 0.58)	III	Depressional	PEM	Reed canary grass, broad-leaf cat-tail
FW04	0.03 (estimated 0.23)	III	Riverine	PEM/PSS	Reed canary grass, broad-leaf cat-tail, crack willow
FW05	0.20 (estimated 1.67)	IV	Riverine	PEM	Reed canary grass
FW06	0.005 (0.005)	IV	Depressional	PEM	Broad-leaf cat-tail
Penstemon Solar Project Site					
PW01	0.00 (0.14)	III	Depressional	PEM	Remnant cattail along southern property boundary
Typha Solar Project Site					
TW01	0.07 (estimated 0.33)	II	Riverine	PEM/PSS	Narrow-leaf willow, Nootka rose, red osier dogwood, common panic grass, hairy cat's-ear
TW02	0.42 (estimated 0.68)	II	Riverine	PEM	Baltic rush, tall fescue, common timothy, reed canary grass, Fuller's teasel
TW03	0.80 (estimated 8.45)	II	Riverine	PEM/PSS	Reed canary grass, common duckweed, Rocky Mountain iris, bluegrass
TW04	0.05 (0.05)	III	Depressional	PEM	Broad-leaf cat-tail, reed canary grass, tall fescue
Typha Solar Project Generation Tie Line					
TW03	0.06 (estimated 8.45)	II	Riverine	PEM/PSS	Reed canary grass, common duckweed, Rocky Mountain iris, and bluegrass
TW05	0.03 (estimated 0.47)	III	Riverine	PEM	Broad-leaf cat-tail, reed canary grass, Baltic rush
Urtica Solar Project Site					
UW01	0.05 (0.05)	III	Depressional	PEM	Reed canary grass, broad-leaf cat-tail, common duckweed
UW02	0.13 (0.97)	III	Depressional	PEM	Reed canary grass, curly dock, lamp rush, broad-leaf cat-tail
UW03	0.01 (1.19)	III	Depressional	PEM	Reed canary grass, broad-leaf cat-tail, colonial bent grass, curly dock, lamp rush

1. Wetland rating unit size is the total area of wetland delineated or estimated based on aerial photograph interpretation and field reconnaissance. Area of delineated portions of the wetlands is based on SWCA survey data.
2. Wetland ratings are based on Hruby (2014).
3. NRCS (2008).
4. Cowardin et al. (1979).

3.5.1.2 Solar Project Sites

See Figures 3.5-1 through 3.5-15 for the locations of delineated wetland and water features and data plots throughout each of the five Columbia Solar Project sites.

(b) A description of wetland categories found on the site according to the Washington state wetland rating system found in Western Washington, Ecology Publication #93-74 and Eastern Washington, Ecology Publication 391-58, or as revised by the department of ecology.

3.5.2 Affected Environment for Wetland Categories

3.5.2.1 General County

Wetlands within each of the five Columbia Solar Project sites were rated using the *Washington State Wetland Rating System for Eastern Washington, 2014 Update* (Hruby 2014). Table 3.5-2 defines criteria for each wetland rating category.

Table 3.5-2. Washington State Department of Ecology Wetland Rating System Categories

Category I	Category II	Category III	Category IV
Category I wetlands: Represent a unique or rare wetland type; are more sensitive to disturbance than most wetlands; are relatively undisturbed and contain ecological attributes that are impossible to replace within a human lifetime; or provide a high level of functions. Specific wetlands that meet the Category I criteria include: 1. alkali wetlands, characterized by the presence of shallow saline water with a high pH; 2. natural heritage wetlands, specifically, wetlands identified by the Washington Natural Heritage Program/DNR as high quality relatively undisturbed wetlands; and wetlands that support state-listed threatened or endangered plants; 3. bogs and calcareous fens; 4. mature and old-growth forested wetlands with slow growing trees that are over 0.25 acre in size; and 5. wetlands that perform many functions very well, as indicated by a score of 22 or more points out of 27 on the wetland rating form.	Category II wetlands: Wetlands that are difficult, though not impossible, to replace, and provide high levels of some functions. Specific wetlands that meet the Category II criteria include: 1. forested wetlands in the floodplains of rivers; 2. mature and old-growth forested wetlands with fast growing trees that are over 0.25 acre in size; 3. vernal pool that are located in a landscape with other wetlands and that are relatively undisturbed during the early spring; and 4. wetlands scoring between 19 and 21 points, out of 27, on the wetland rating form.	Category III wetlands: Wetlands that provide a moderate level of functions. Specific wetlands that meet the Category III criteria include: 1. wetlands scoring between 16 and 18 points, out of 27, on the wetland rating form.	Category IV wetlands: Wetlands that have the lowest levels of functions and are heavily disturbed. Specific wetlands that meet the Category IV criteria include: 1. wetlands scoring less than 16 points out of 27 on the wetland rating form.

Source: Hruby (2014).

A total of 16 wetlands were delineated within the Columbia Solar Project sites and rated using field observations and desktop analysis to determine the wetland rating category for each wetland area. Refer to Table 3.5-3 for the wetland rating categories, minimum wetland protection buffers (according to guidance in KCC 17A.04.020, and total size for wetlands within each of the solar project sites.

Figure 3.5-1. Camas Solar Project site map showing water resources, north portion.

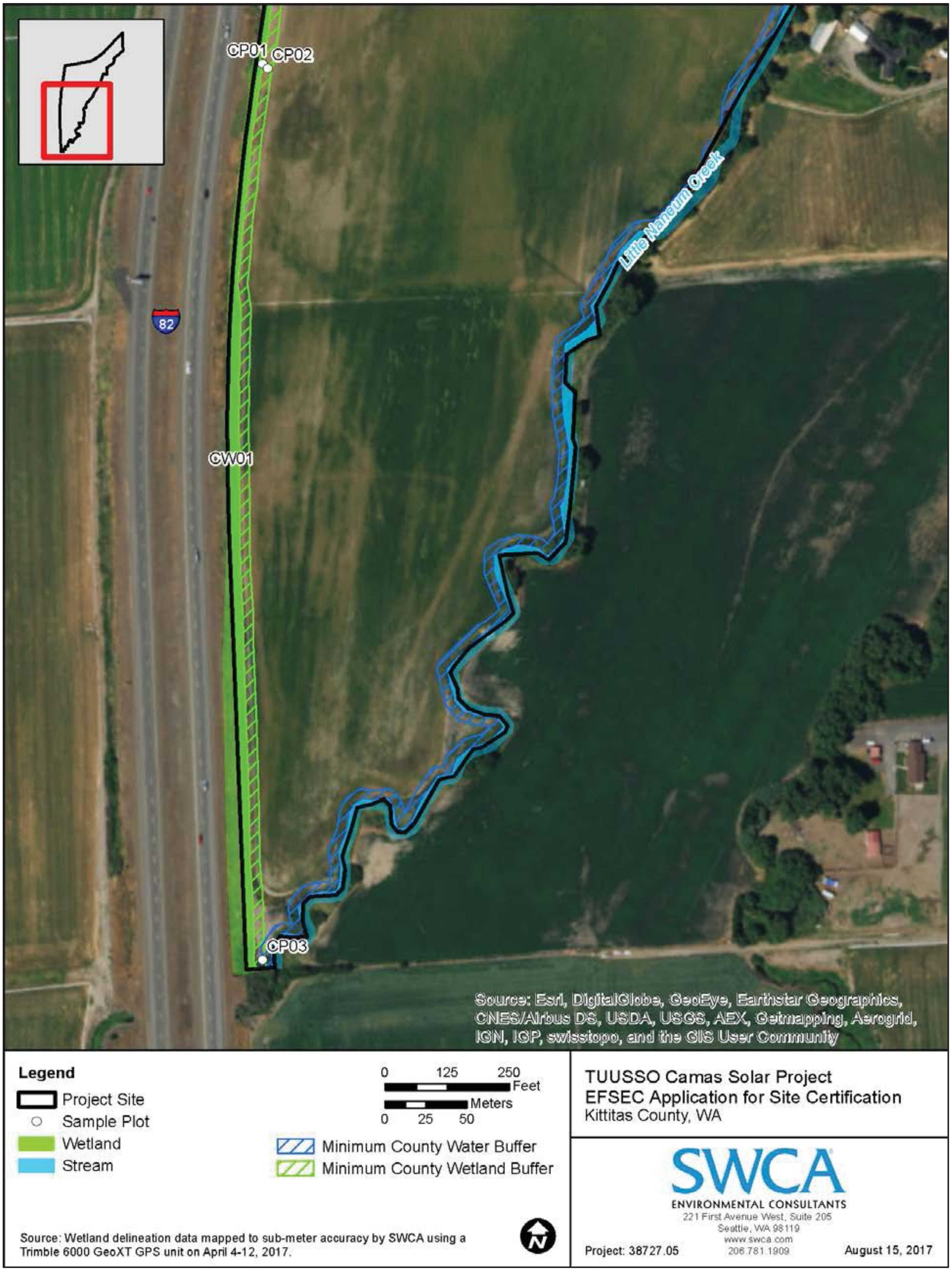

Figure 3.5-2. Camas Solar Project site map showing water resources, south portion.

Figure 3.5-3. Fumaria Solar Project site map showing water resources, Map 1 of 8.

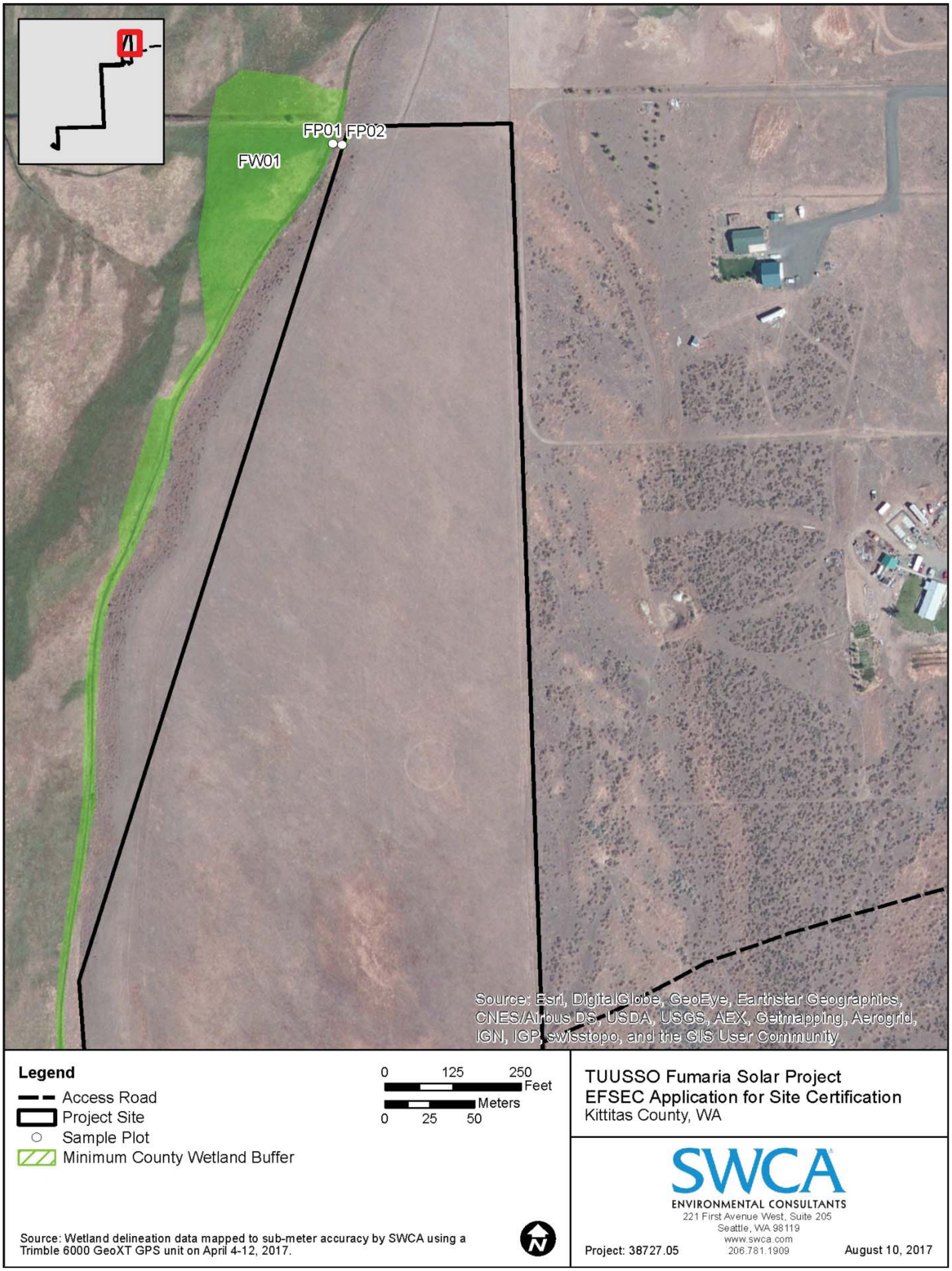

Figure 3.5-4. Fumaria Solar Project site map showing water resources, Map 2 of 8.

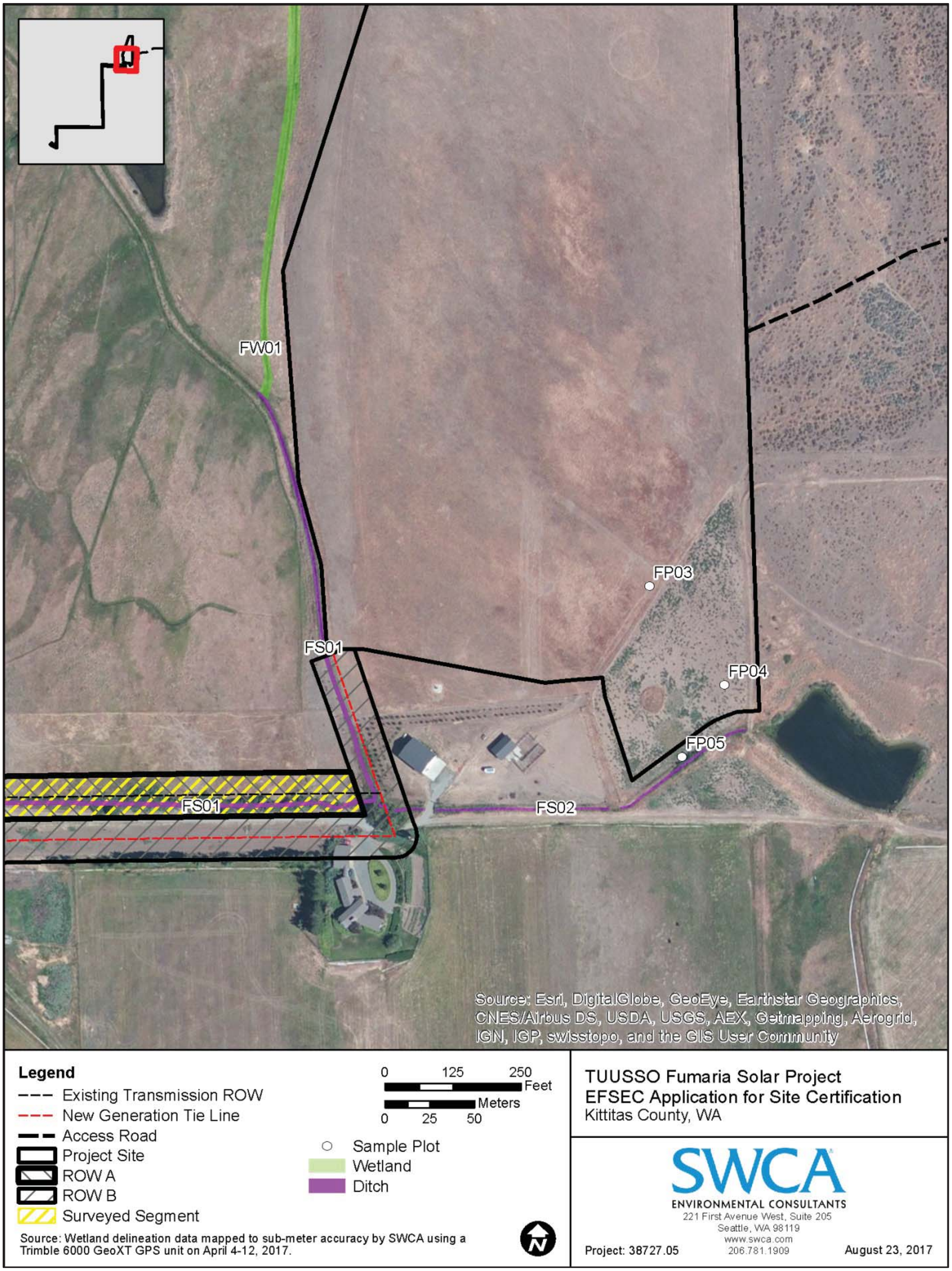

Figure 3.5-5. Fumaria Solar Project site map showing water resources, Map 3 of 8.

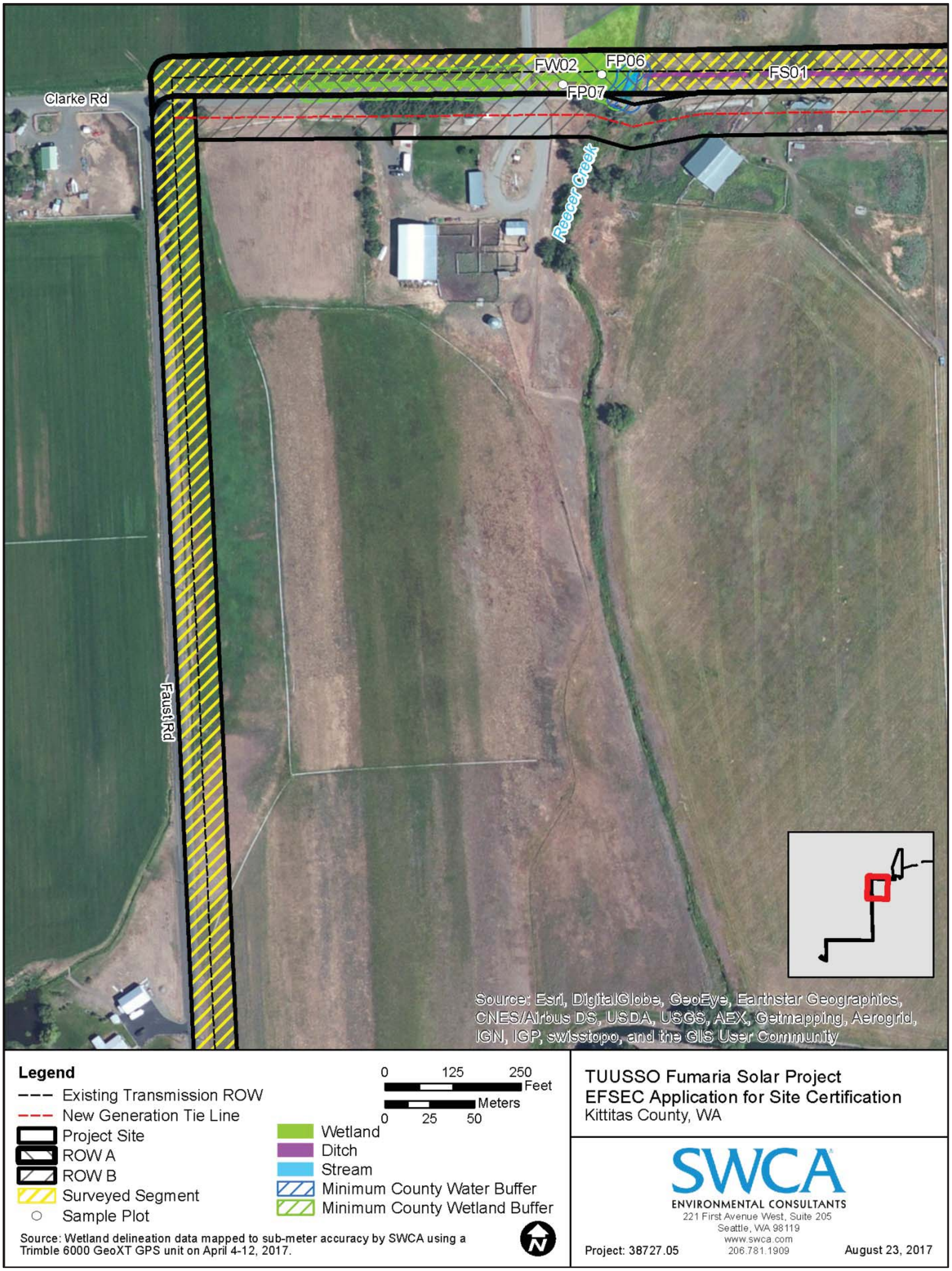

Figure 3.5-6. Fumaria Solar Project site map showing water resources, Map 4 of 8.

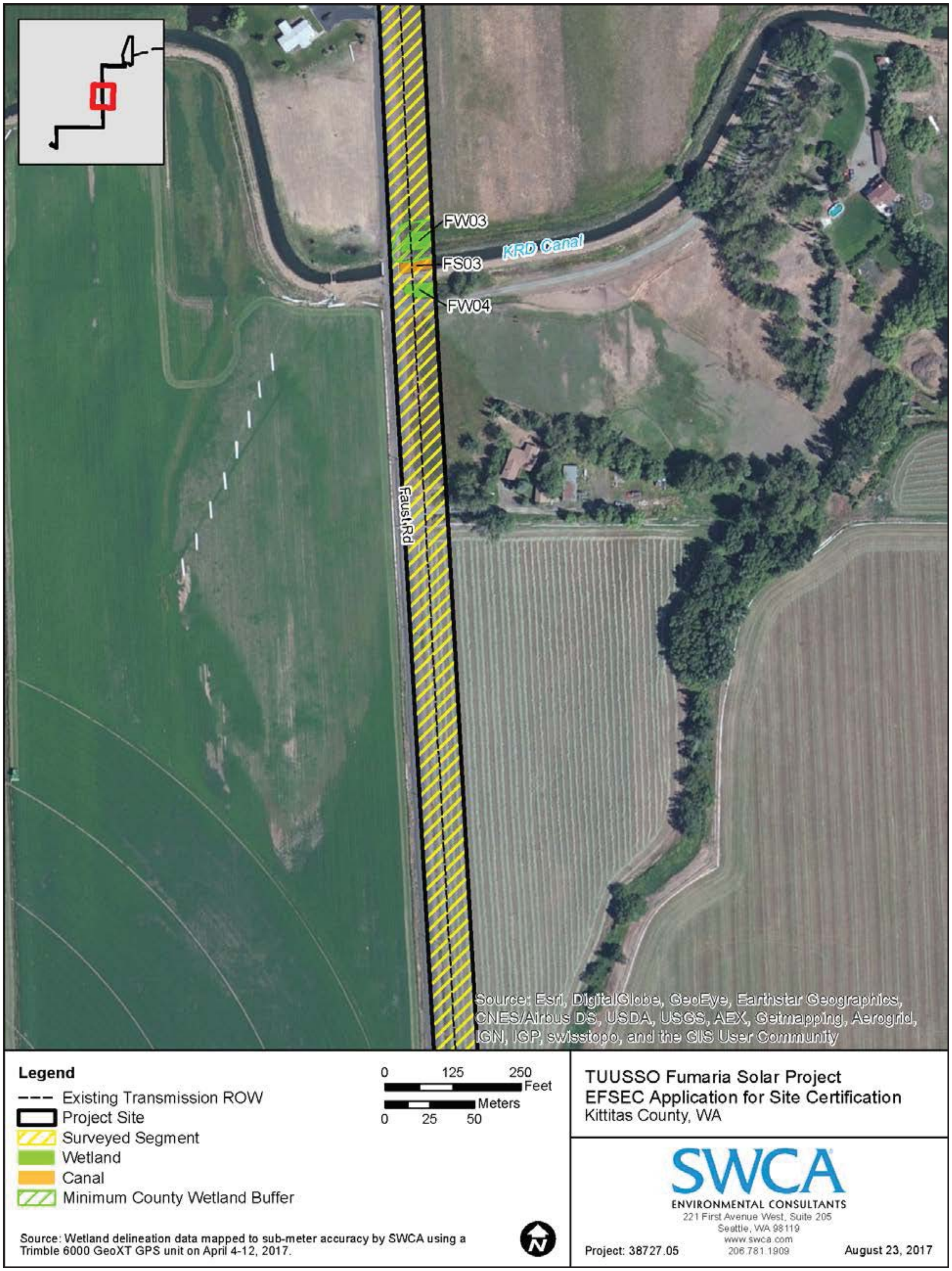

Figure 3.5-7. Fumaria Solar Project site map showing water resources, Map 5 of 8.

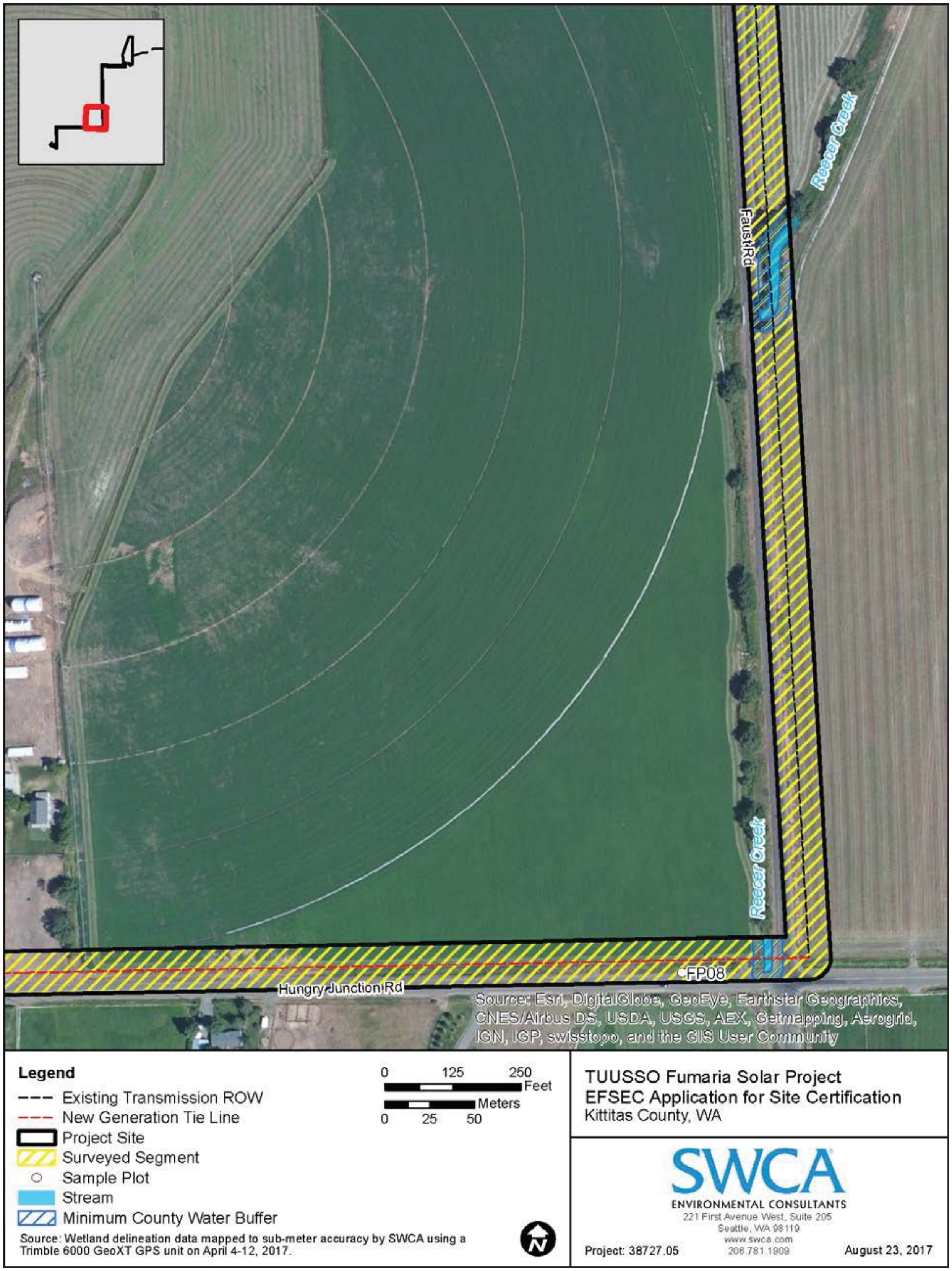

Figure 3.5-8. Fumaria Solar Project site map showing water resources, Map 6 of 8.

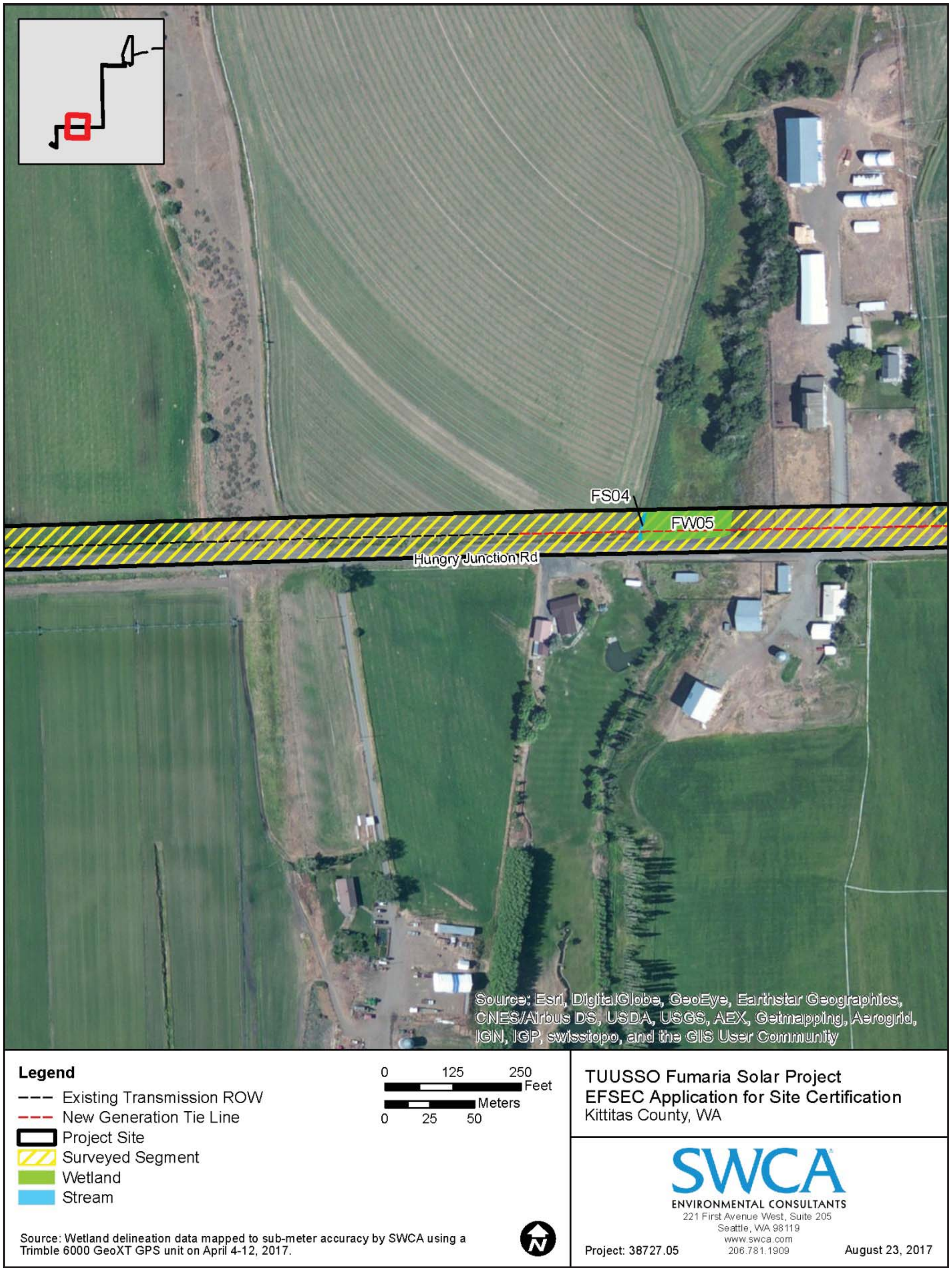

Figure 3.5-9. Fumaria Solar Project site map showing water resources, Map 7 of 8.

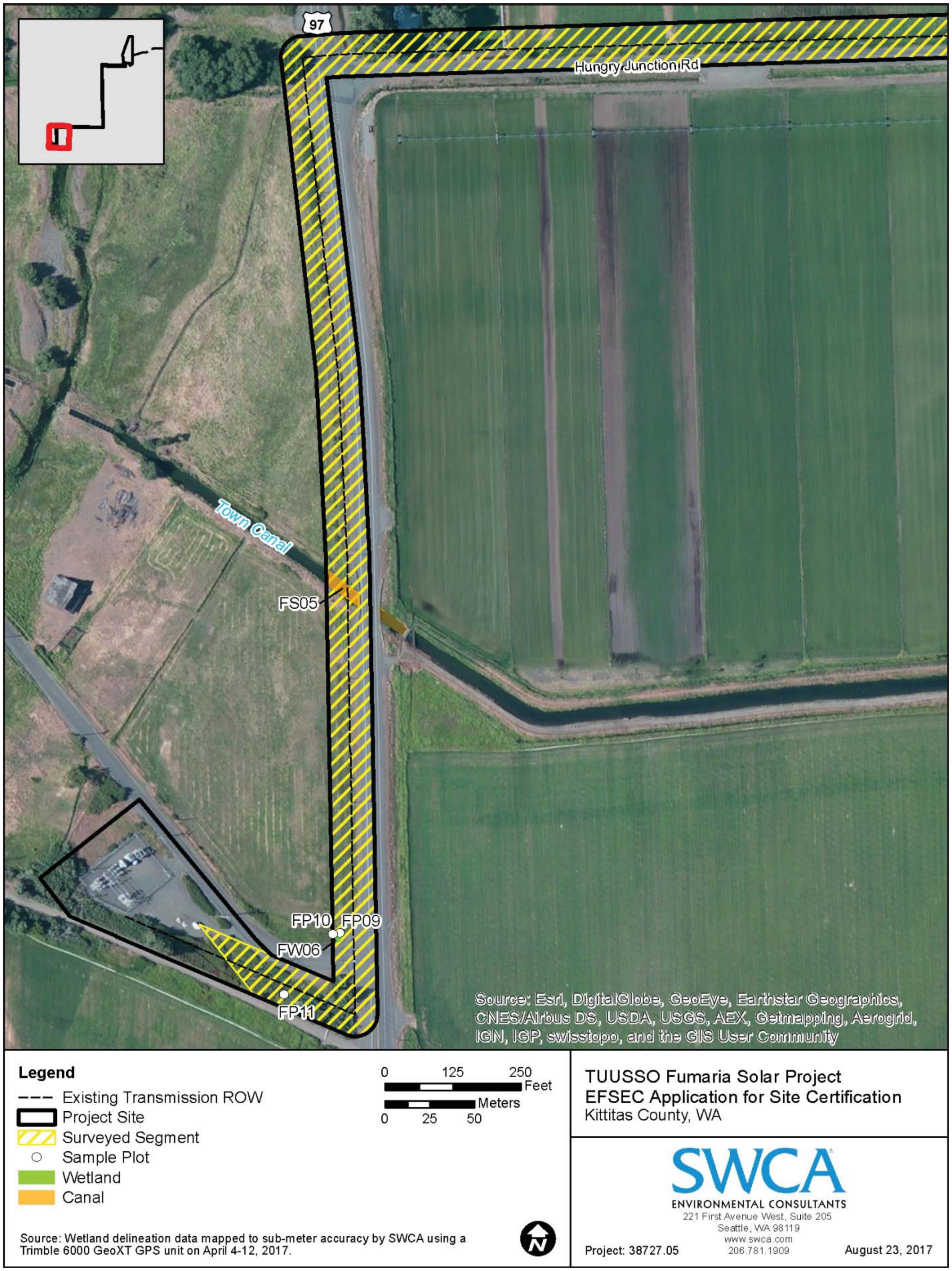

Figure 3.5-10. Fumaria Solar Project site map showing water resources, Map 8 of 8.

Figure 3.5-11. Penstemon Solar Project site map showing water resources.

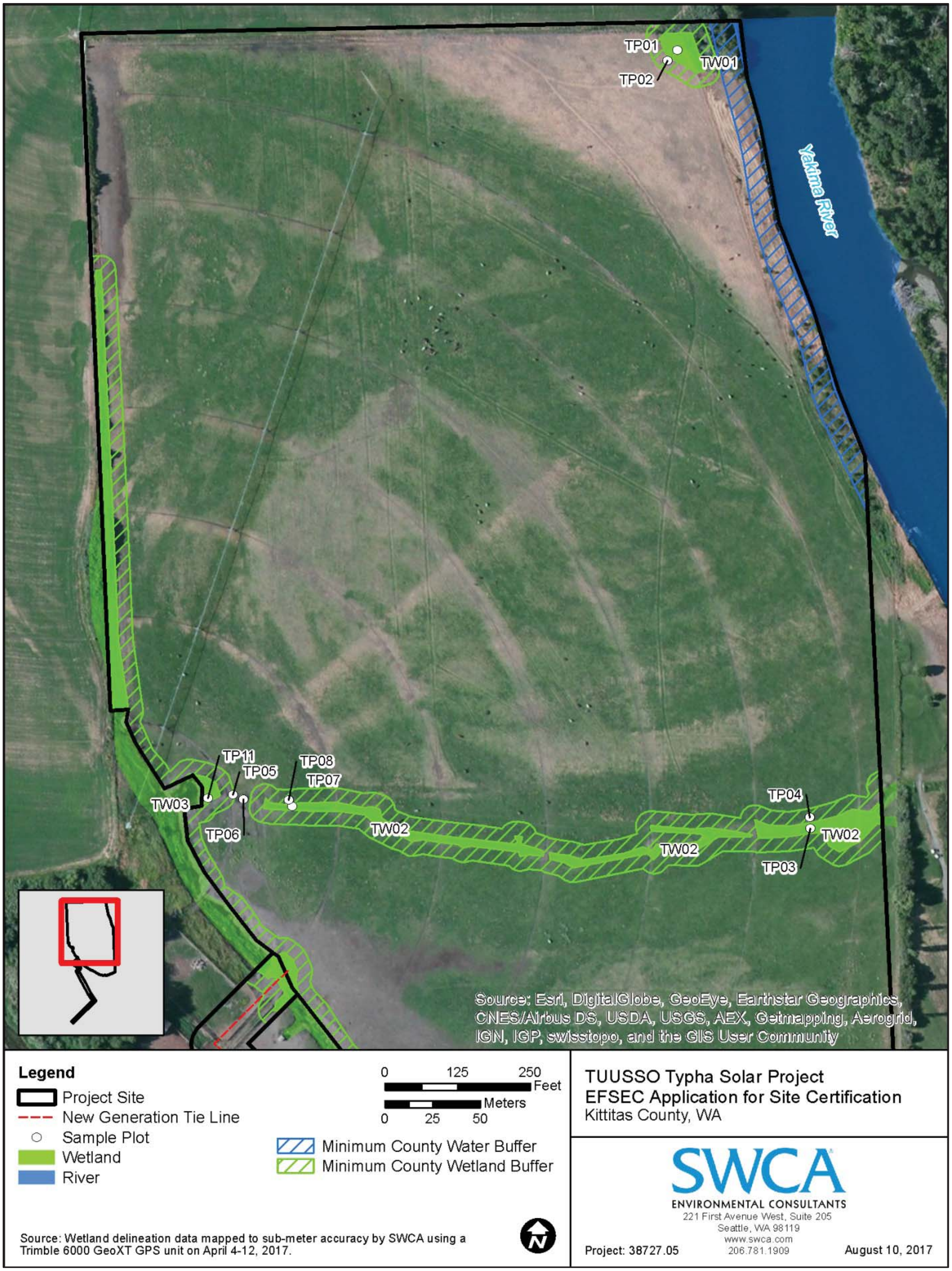

Figure 3.5-12. Typha Solar Project site map showing water resources, north portion.

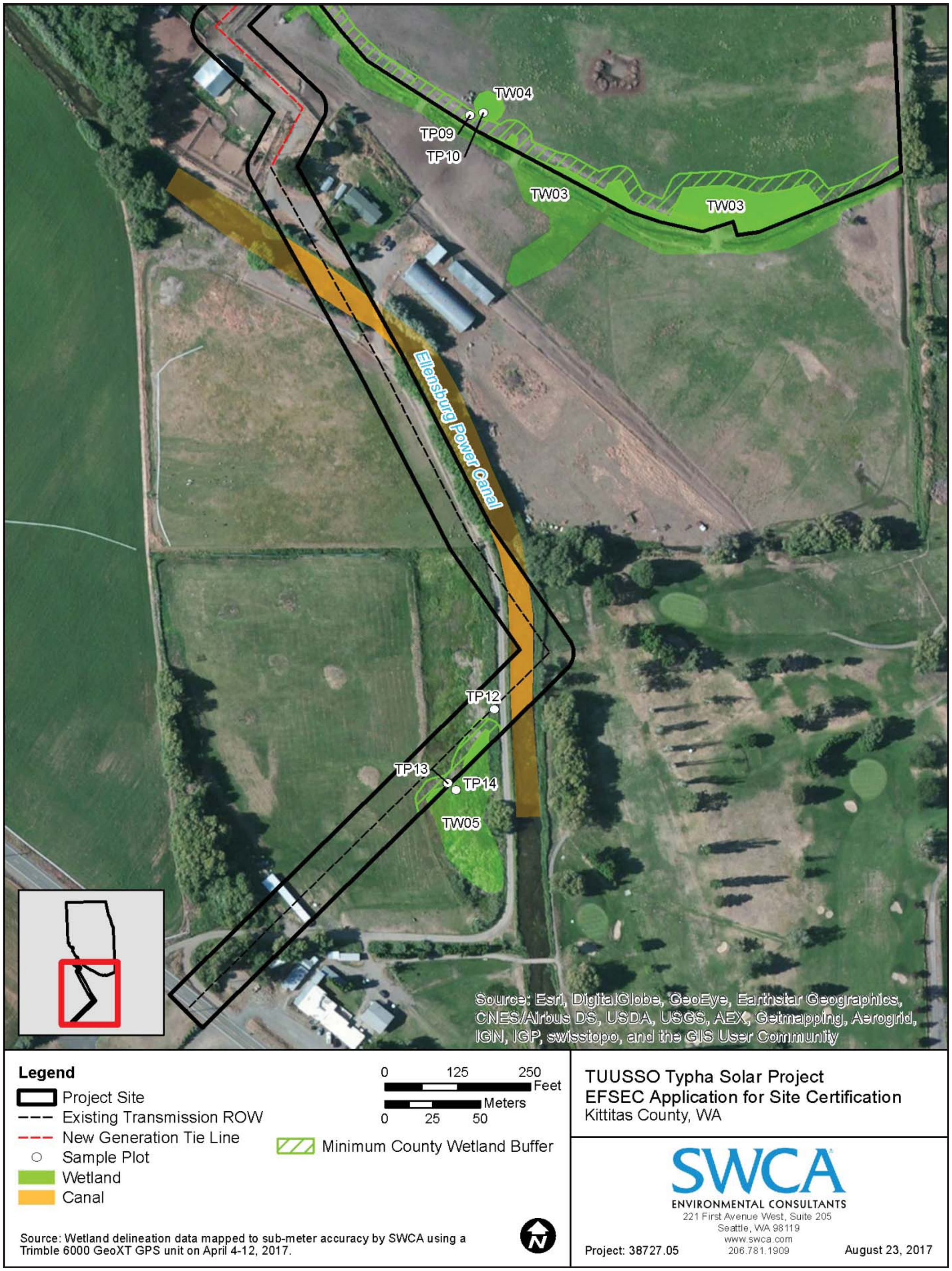

Figure 3.5-13. Typha Solar Project site map showing water resources, south portion.

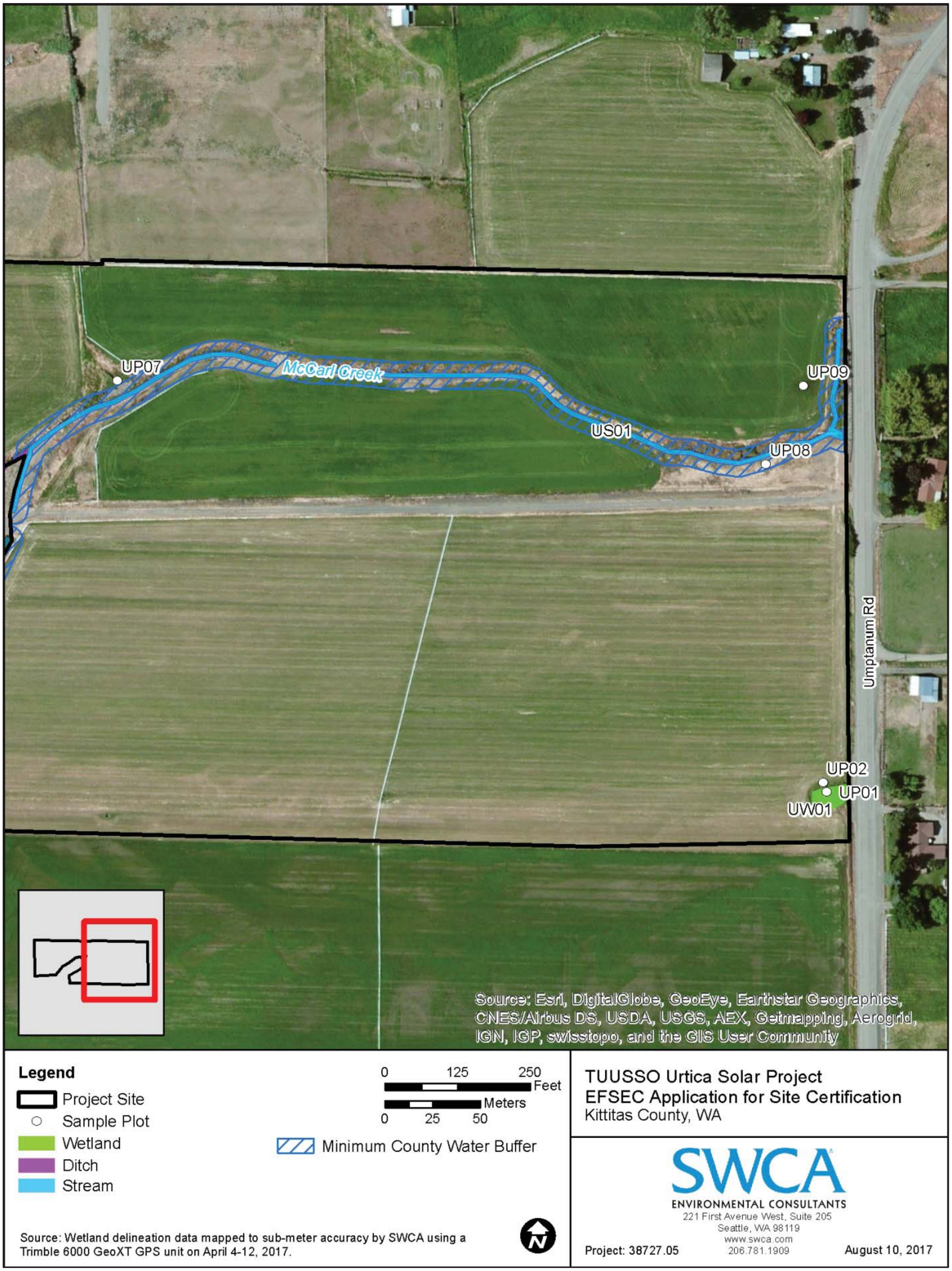

Figure 3.5-14. Urtica Solar Project site map showing water resources, east portion.

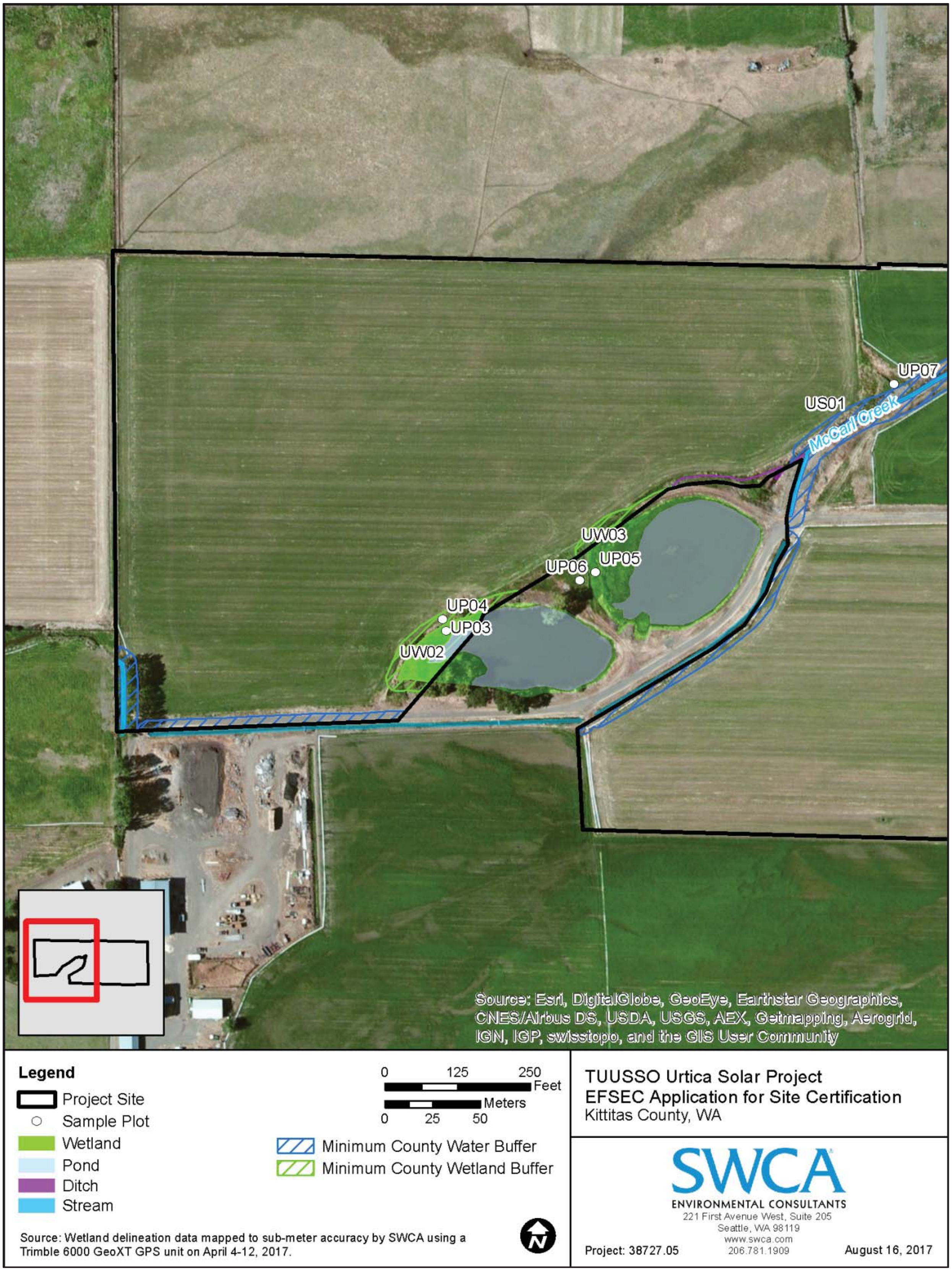

Figure 3.5-15. Urtica Solar Project site map showing water resources, west portion.

Table 3.5-3. Wetland Rating and Minimum Buffer Distance Summary for each Columbia Solar Project Site

Wetlands	Wetland Rating[1]	Kittitas County Minimum Buffer Distance (feet)[2]	Total Size of Wetland Within the Project (acres)[3]
Camas Solar Project Site			
CW01	III	20	0.97
Fumaria Solar Project Site			
FW01	III	20	0.00
Fumaria Solar Project Generation Tie Line			
FW02	II	25	0.24
FW03	III	20	0.03
FW04	III	0[4]	0.03
FW05	IV	0[4]	0.20
FW06	IV	0[4]	0.005
Penstemon Solar Project Site			
PW01	III	0[4]	0.00
Typha Solar Project Site			
TW01	II	25	0.07
TW02	II	25	0.42
TW03	II	25	0.80
TW04	III	0[4]	0.05
Typha Solar Project Generation Tie Line			
TW03	II	25	0.06
TW05	III	20	0.03
Urtica Solar Project Site			
UW01	III	0[4]	0.05
UW02	III	20	0.13
UW03	III	20	0.01

1. II = Category II, III = Category III, IV = Category IV (Hruby 2014).
2. Minimum buffer distances are depicted on maps.
3. Does not include buffer areas.
4. No Kittitas County buffer is defined because the wetland area is below the minimum size threshold for protection or is rated as a Category IV; however, building setbacks may be required based on zoning lot line setbacks, but would not exceed 25 feet.

3.5.2.2 Solar Project Sites

Detailed descriptions of each wetland within the Columbia Solar Project sites and their wetland rating forms are provided in the Critical Areas Wetland and Waters Delineation Reports for each site. Below are descriptions of the wetland rating for wetlands within each solar project site.

Camas Solar Project Site

CW01

Camas Wetland CW01 is rated as a Category III wetland in the Ecology rating system (see Figures 3.5-1 and 3.5-2), with a moderately low score for water quality improvement (5/9 points) and moderate scores for hydrologic function and habitat function (6/9 points). Wetland CW01 has moderate potential to provide water quality function and hydrologic function because it has ungrazed herbaceous vegetation, has a floodplain wider than its channel, is located in an area with intensive land use that generates pollutants, and discharges to a fork of Naneum Creek with water quality and flooding issues. Wetland CW01 has moderate potential to provide habitat function because it contains some vegetation structure diversity and open water, and is adjacent to three priority habitats including biodiversity areas and corridors, riparian, and instream habitat in Little Naneum Creek.

Fumaria Solar Project Site

FW01

Fumaria Wetland FW01 is rated as a Category III wetland in the Ecology rating system (see Figures 3.5-4 and 3.4-5), with moderately low scores for water quality improvement (5/9 points) and habitat function (5/9 points), and a moderate score for hydrologic function (6/9 points). Wetland FW01 has low potential to provide water quality improvement because slope wetlands do not retain water or excess nutrients. Wetland FW01 has moderate hydrologic function because the surrounding landscape is pasture land and is situated in the Reecer Creek basin where flooding problems occur.

Fumaria Solar Project Generation Tie Line

FW02

Fumaria Wetland FW02 is rated as a Category II wetland in the Ecology rating system (see Figure 3.5-6), with a moderate score for water quality improvement (6/9 points), a high score for hydrologic function (8/9 points), and a moderately low score for habitat function (5/9 points). Wetland FW02 has a moderately high potential to provide hydrologic functions because it is more than twice the width of the adjacent Reecer Creek channel and it has the potential to slow down water movement to help reduce flooding issues directly downstream in Reecer Creek.

FW03

Fumaria Wetland FW03 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-7), with a moderately high score for water quality improvement (7/9 points) and moderately low scores for hydrologic and habitat functions (5/9 points). Wetland FW03 has a moderately high potential to provide water quality improvements because it is dominated by ungrazed vegetation, has seasonal ponding over half of the wetland area, and is located in a basin where there are total maximum daily loads (TMDLs) defined (Cascade Irrigation District Canal).

FW04

Fumaria Wetland FW04 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-7), with moderately high scores for water quality improvement and hydrologic function (7/9 points) and a low score for habitat function (4/9 points). Wetland FW04 has moderately high potential to provide water quality improvement and hydrologic function because the majority of it is a depression, all of it is ungrazed, there are TMDLs defined in the same basin (Cascade Irrigation District Canal), the ratio of the wetland width to the adjacent channel width is greater than one, and there are flooding problems in the basin immediately down-gradient (Reecer Creek).

FW05

Fumaria Wetland FW05 is rated as a Category IV wetland in the Ecology rating system (see Figure 3.5-9), with a moderately high score for hydrologic function (7/9 points) and low scores for water quality improvement and habitat function (4/9 points). Wetland FW05 has a moderately high potential to provide hydrologic functions because it has a width greater than two times the width of the stream channel, ungrazed vegetation dominates the wetland, and there are flooding problems down-gradient of the wetland (Yakima River).

FW06

Fumaria Wetland FW06 is rated as a Category IV wetland in the Ecology rating system (see Figure 3.5-10), with a moderately high score for water quality improvement (7/9 points), low score for hydrologic function (4/9 points), and a very low score for habitat function (3/9 points). Wetland FW06 has a moderately high potential to provide water quality improvements because it is dominated by ungrazed vegetation, has a relatively constrained outlet, and eventually discharges into a stream on the Clean Water Act (CWA) 303(d) List that also has defined TMDLs (Dry Creek).

Penstemon Solar Project Site

PW01

Penstemon Wetland PW01 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-11), with moderate scores for hydrologic function and water quality improvement (6/9 points) and a moderately low score for habitat function (5/9 points). Wetland PW01 has a moderate potential to provide water quality function and hydrologic function because it has an intermittently flowing surface water outlet, it is located in an area with intensive land use that generates pollutants, and it discharges to Coleman Creek, which has water quality and flooding issues.

Typha Solar Project Site

TW01

Typha Wetland TW01 is rated as a Category II wetland in the Ecology rating system (see Figure 3.5-12), with a moderately high score for water quality improvement (7/9 points) and moderate scores for hydrologic function (6/9 points) and habitat function (5/9 points). Wetland TW01 has moderately high potential to provide water quality improvements because of its position within the Yakima River floodplain, which is a CWA 303(d) listed water, has TMDL limits, and has flooding problems within its watershed.

TW02

Typha Wetland TW02 is rated as a Category II wetland in the Ecology rating system (see Figure 3.5-12), with a moderately high score for hydrologic function (7/9 points) and moderate scores for habitat function (6/9 points) and water quality improvement (6/9 points). Wetland TW02 has moderately high potential to provide hydrologic functions because of its potential to slow down water movement and help reduce flooding issues directly downstream in the Yakima River.

TW03

Typha Wetland TW03 is rated as a Category II wetland in the Ecology rating system (see Figures 3.5-12 and 3.5-13), with a high score for hydrologic function (8/9 points) and moderate scores for habitat function (6/9 points) and water quality improvement (6/9 points). Wetland TW03 has high potential to provide hydrologic functions because of its large wetland to channel width ratio and its potential to help reduce flooding issues directly downstream in the Yakima River.

TW04

Typha Wetland TW04 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-13), with moderate scores for water quality improvement (6/9 points), hydrologic function (6/9 points), and habitat function (6/9 points). Wetland TW04 has moderate potential to provide water quality improvement and hydrologic function because of its lack of a surface water outlet, and it provides moderate habitat function because it provides amphibian egg laying habitat, as positively observed in the field.

Typha Solar Project Generation Tie Line

TW03

See the description of wetland TW03 under Typha Solar Project site, above.

TW05

Typha Wetland TW05 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-13), with a moderately high score for hydrologic function (7/9 points), a moderately low score for water quality improvement (5/9 points), and a low score for habitat function (4/9 points). Wetland TW05 has moderately high potential to provide hydrologic functions because of its potential to store floodwaters and help reduce flooding issues directly downstream in the Yakima River, and it has a low score for habitat function because it does not provide adequate habitat structure and is isolated from habitat in the surrounding area.

Urtica Solar Project Site

UW01

Urtica Wetland UW01 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-14), with a moderately high score for hydrologic function (8/9 points), a moderate score for water quality improvement (6/9 points), and a low score for habitat function (4/9 points). Wetland UW01 has a moderately high potential to provide hydrologic function because it does not have a surface water outlet, has high storage during seasonal ponding, and receives stormwater from the adjacent roadside ditch.

UW02

Urtica Wetland UW02 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-15), with a moderately high score for hydrologic function (7/9 points) and moderately low scores for water quality improvement and habitat function (5/9 points). Wetland UW02 has a moderately high potential to provide hydrologic functions because of its high storage during seasonal ponding and highly constricted outlet feeding into the eastern pond.

UW03

Urtica Wetland UW03 is rated as a Category III wetland in the Ecology rating system (see Figure 3.5-15), with a moderately high score for hydrologic function (7/9 points) and moderately low scores for water quality improvement and habitat function (5/9 points). Wetland UW02 has a moderately high potential to provide hydrologic functions because of its high storage during seasonal ponding and highly constricted outlet feeding into the McCarl Creek.

(c) A discussion of water sources supplying wetlands and documentation of hydrologic regime encountered.

3.5.3 Affected Environment for Water Sources

3.5.3.1 General County

The Columbia Solar Project sites contain wetlands with a variety of water sources and hydrologic drivers. Refer to Table 3.5-1 for the hydrogeomorphic (HGM) classification based on *Hydrogeomorphic Wetland Classification System: An Overview and Modification to Better Meet the Needs of the Natural Resources Conservation Service* (NRCS 2008) for each wetland within the five project sites. The following HGM classifications were identified within the solar project sites:

Riverine

Riverine wetlands occur in valleys and are associated with active floodplains around stream or river channels. Water in these wetlands is surface-water driven and has an active interchange between stream or river systems (Hruby 2014; NRCS 2008). According to the *Washington State Wetland Rating System for Eastern Washington, 2014 Update*, wetlands of this classification are flooded by overbank flow from a stream or river at least once every 10 years (Hruby 2014).

Slope

Slope wetlands occur on hill or valley slopes where there are breaks in the slope that intercept groundwater. Water in these wetlands is groundwater-fed and becomes surface or subsurface water that flows only in one direction without being impounded. These wetlands are not associated with stream flow and lack a defined streambed with banks (Hruby 2014; NRCS 2008).

Depressional

Depressional wetlands include such landforms as kettles, portholes, vernal pools, Carolina bays, and other wetlands in a topographic depression where the elevation of surface within the wetland is lower than in the surrounding landscape. These wetlands can vary greatly but are typically fed by precipitation and overland flow with movement of surface or shallow subsurface water toward the lowest point in the depression. The depression may or may not have an outlet, but, if present, the outlet must not be the lowest point in the wetland to meet the definition of a depressional wetland (Hruby 2014; NRCS 2008).

3.5.3.2 Solar Project Sites

The five Columbia Solar Project sites contain 16 wetlands, which include eight Riverine, one Slope, and seven Depressional HGM classifications. Further details regarding these wetlands and their water sources can be found in the Critical Areas Wetland and Waters Delineation Reports for each project site.

(d) A function assessment report prepared according to the Washington State Wetland Function Assessment Method to assess wetlands functions for those wetland types covered by the method, and including a description of type and degree of wetland functions that are provided.

The Washington State Wetland Function Assessment Method is no longer supported by Ecology (personal communication with Amy Yahnke at Ecology on May 10, 2017) and is not required by the Washington Energy Facility Site Evaluation Council (EFSEC) (personal communication with Stephen Posner at EFSEC on May 17, 2017). The functional assessment of wetlands is now predominantly based on the *Washington State Wetland Rating System for Eastern Washington, 2014 Update* (Hruby 2014), referenced in Section 3.5.2, which was used to rate wetlands within the five Columbia Solar Project sites. Refer to the Critical Areas Wetland and Waters Delineation Reports for wetland rating forms for each wetland within each project site.

(2) Identification of energy facility impacts. The application shall include a detailed discussion of temporary, permanent, direct and indirect impacts on wetlands, their functions and values, and associated water quality and hydrologic regime during construction, operation and decommissioning of the energy facility. The discussion of impacts shall also include impacts to wetlands due to proposed mitigation measures.

3.5.4 Impacts to Wetlands

3.5.4.1 General County

TUUSSO has made every effort to avoid impacts to wetlands throughout all of the Columbia Solar Project sites, which would be achieved through avoidance measures in project design and utilization of BMPs. Table 3.5-4 shows the project impacts to each of the wetlands delineated within each of the solar project sites. There are minimal proposed impacts to any wetlands within the solar project sites.

Table 3.5-4. Proposed Wetland Impact Summary for each Columbia Solar Project Site

Wetlands	Total Size of Wetland Within the Project (acres)[1]	Total Impacts to Wetland Within the Project (acres)
Camas Solar Project Site		
CW01	0.97	0.00
Fumaria Solar Project Site		
FW01	0.00	0.00
Fumaria Solar Project Generation Tie Line		
FW02	0.24	0.00
FW03	0.03	0.00
FW04	0.03	0.00
FW05	0.20	0.00
FW06	0.005	0.00
Penstemon Solar Project Site		
PW01	0.00	0.00
Typha Solar Project Site		
TW01	0.07	0.00
TW02	0.42	0.00
TW03	0.80	0.01
TW04	0.05	0.00
Typha Solar Project Generation Tie Line		
TW03	0.06	0.00
TW05	0.03	0.00
Urtica Solar Project Site		
UW01	0.05	0.00
UW02	0.13	0.00
UW03	0.01	0.00

1. Does not include buffer areas

Solar Project Sites

Camas Solar Project Site

No impacts are proposed to any wetlands within the Camas Solar Project site. All impacts to wetlands would be avoided through project design.

Fumaria Solar Project Site

No impacts are proposed to any wetlands within the Fumaria Solar Project site. All impacts to wetlands would be avoided through project design.

Fumaria Solar Project Generation Tie Line

No impacts are proposed to any wetlands along the Fumaria Solar Project generation tie line. All impacts to wetlands would be avoided through project design.

Penstemon Solar Project Site

No impacts are proposed to any wetlands within the Penstemon Solar Project site. All impacts to wetlands would be avoided through project design.

Typha Solar Project Site

The Typha Solar Project site has one proposed wetland crossing (see Figure 3.5-12). This crossing is for an internal access road that enters the site at the southern site boundary at an existing land bridge. The land bridge is periodically flooded by wetland TW03, due to a clogged or crushed culvert that prevents adequate flow through, which has resulted in wetland characteristics developing in the road crossing. TUUSSO is proposing either: 1) an improvement of the existing land bridge (e.g., by excavation of 8 to 12 inches of topsoil, placement of geotextile fabric in the excavation, and filling the excavation with quarry spalls) or 2) construction of a small culvert at the location of the existing land bridge. This would result in a minimal impact to TW03 of less than 0.01 acre. A JARPA for this proposed wetland impact has been started (see Appendix J-3) and would be updated with final engineering drawings when completed, prior to submission to USACE and Ecology. Additional coordination with EFSEC, USACE, Ecology, and Kittitas County would occur as needed if the proposed wetland crossing is altered during project design.

Typha Solar Project Generation Tie Line

No impacts are proposed to any wetlands along the Typha Solar Project generation tie line. All impacts to wetlands would be avoided through project design.

Urtica Solar Project Site

No impacts are proposed to any wetlands within the Urtica Solar Project site. All impacts to wetlands would be avoided through project design.

(3) Wetlands mitigation plan. The application shall include a detailed discussion of mitigation measures, including avoidance, minimization of impacts, and mitigation through compensation or preservation and restoration of existing wetlands, proposed to compensate for the direct and indirect impacts that have been identified. The mitigation plan shall be prepared consistent with the Department of Ecology Guidelines for Developing Freshwater Wetlands Mitigation Plans and Proposals, 1994, as revised. The application shall also include, but not be limited to:

(a) A discussion of how standard buffer widths have been incorporated into the mitigation proposal. Variances from standard buffer widths must be supported with professional analyses demonstrating that smaller or averaged buffer widths protect the wetland functions and values based on site-specific characteristics;

3.5.5 Impacts to Wetland Buffers

3.5.5.1 General County

A total of 16 wetlands were delineated within the Columbia Solar Project sites. KCC 17A.04.020 defines minimum wetland protection buffers based on the wetland ratings determined using the *Washington State Wetland Rating System for Eastern Washington, 2014 Update* (Hruby 2014), referenced in Section 3.5.2.

TUUSSO utilized avoidance measures during the project design to avoid, reduce, or eliminate impacts to wetlands. A very minor impact to wetlands would be introduced by the proposed Typha Solar Project. However, minor encroachment into the minimum wetland protection buffers would be unavoidable based on the current project designs and would occur over a total of 1.52 acres for all of the solar project sites. Refer to Table 3.5-5 for the wetland rating category, minimum wetland protection buffer distances, total area of buffers within the solar project sites, average distance from the edge of the minimum buffer to the nearest project disturbance, and total buffer area encroachment for wetlands within each of the solar project sites. Impacts to wetland protection buffers along the Fumaria and Typha Solar Project generation tie lines would be avoided by utilizing existing power poles and spanning wetlands and their buffers; therefore, those wetlands are excluded from Table 3.5-5.

Table 3.5-5. Wetland Buffers and Project Encroachment within Each Columbia Solar Project Site

Wetland Name	Wetland Rating [1]	Kittitas County Minimum Buffer Distance (feet) [2]	Total Area of Buffer within Project (acres)	Average Distance from Buffer Edge to Project Disturbance (feet)	Total Buffer Encroachment (acres)
Camas Solar Project Site					
CW01	III	20	1.15	10	0.02
Fumaria Solar Project Site					
FW01	III	20	0.01	4	0.00
Fumaria Solar Project Generation Tie Line					
FW02	II	25	0.69	No power poles would be replaced within the wetland protection buffer	
FW03	II	20	0.08	No power poles would be replaced within the wetland protection buffer	
Penstemon Solar Project Site					
PW01	III	0 [3]	–	–	–
Typha Solar Project Site					
TW01	II	25	0.17	23	0.00
TW02	II	25	1.42	N/A	1.36
TW03	II	25	1.61	70	0.02
TW04	III	0 [3]	–	–	–
Typha Solar Project Generation Tie Line					
TW03	II	25	0.07	No power poles would be replaced within the wetland protection buffer	
TW05	III	20	0.11	No power poles would be replaced within the wetland protection buffer	
Urtica Solar Project Site					
UW01	III	0 [3]	–	–	–
UW02	III	20	0.20	15	0.11
UW03	III	20	0.07	10	0.01

1. Wetland ratings are based Hruby (2014).
2. Minimum buffer distances are depicted on maps.
3. No Kittitas County buffer is defined because the wetland area is below the minimum size threshold for protection or is rated as a Category IV; however, building setbacks may be required based on zoning lot line setbacks, but would not exceed 25 feet.

See Figures 3.5-1 through 3.5-15 for the locations of delineated wetlands and their buffers for each of the five Columbia Solar Project sites. See Appendix L for site plans for each of the Columbia Solar Project sites.

3.5.5.2 Solar Project Sites

Camas Solar Project Site

The Columbia Solar Project would impact 0.02 acre of the KCC-defined minimum wetland protection buffer around wetland CW01 within the project site (Figure 3.5-16). The nearest project impact area (the perimeter fence) is 0 to 22 feet from the edge of the minimum protection buffer for the on-site wetland. During fence installation, there would be temporary fence installation surface disturbance within this 0.02 acre of KCC-defined minimum wetland protection buffer. All other impacts to wetland protection buffers would be avoided through project design.

Fumaria Solar Project Site

No impacts are proposed to the KCC-defined minimum wetland protection buffer around wetland FW01 within the Fumaria Solar Project site. The nearest project impact area is 3 to 15 feet from the edge of the minimum protection buffer for the on-site wetland. All impacts to wetland protection buffers would be avoided through project design.

Fumaria Solar Project Generation Tie Line

No impacts are proposed to the KCC-defined minimum wetland protection buffer around wetlands FW02 and FW03 along the Fumaria Solar Project generation tie line. TUUSSO plans on utilizing the existing power poles and would not cause impacts to wetlands or their buffers along the proposed generation tie line. No KCC-defined minimum wetland protection buffer is defined for FW04 because the wetland area is below the minimum size threshold for a Category III wetland, or for FW05 and FW06 because they are Category IV wetlands. All impacts to wetland protection buffers would be avoided through project design.

If new power poles need to be installed, TUUSSO would install them in upland areas outside of the KCC-defined minimum protection buffers for all wetlands along the Fumaria Solar Project generation tie line.

Penstemon Solar Project Site

No KCC-defined minimum wetland protection buffer is defined for PW01 because the wetland area is below the minimum size threshold for a Category III wetland. Therefore, no impacts are proposed to any KCC-defined minimum wetland protection buffers within the Penstemon Solar Project site. All impacts to wetland protection buffers would be avoided through project design.

Typha Solar Project Site

The proposed Typha Solar Project site design would encroach into the KCC-defined minimum wetland protection buffer around wetland TW03. Approximately 0.02 acre of this protection buffer is within the proposed perimeter fence for the site, with 376 square feet impacted by the proposed access road crossing wetland TW03 (Figure 3.5-17). Wetland TW02 is almost entirely within the site; however, no encroachment activities are proposed in the KCC-defined minimum wetland protection buffer (1.36 acres) at this time. No impacts are proposed to the KCC-defined minimum wetland protection buffer for wetlands TW01 and TW02 within the site. No KCC-defined minimum wetland protection buffer is defined for TW04 because the wetland area is below the minimum size threshold for a Category III wetland.

Typha Solar Project Generation Tie Line

No impacts are proposed to the KCC-defined minimum wetland protection buffer around wetlands TW03 and TW05 along the Typha Solar Project generation tie line. TUUSSO plans on utilizing the existing power poles as much as possible and would not cause impacts to wetlands or their buffers along the proposed generation tie line. All impacts to wetland protection buffers would be avoided through project design.

Figure 3.5-16. Camas Solar Project wetland buffer encroachment.

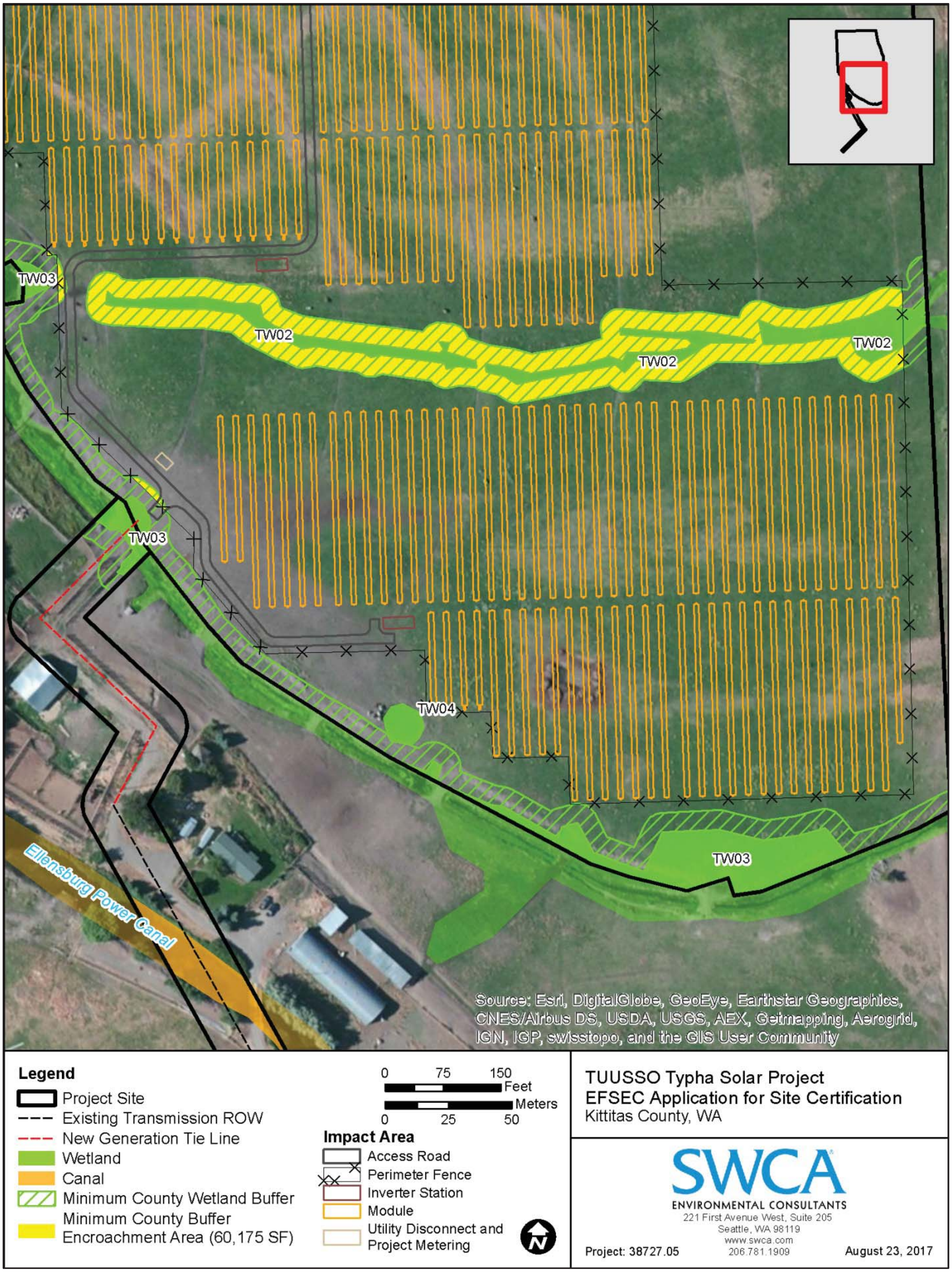

Figure 3.5-17. Typha Solar Project wetland buffer encroachment.

If new power poles need to be installed, then TUUSSO would install them in upland areas outside of the KCC-defined minimum protection buffers for all wetlands along the Fumaria Solar Project generation tie line.

Urtica Solar Project Site

Within the proposed Urtica Solar Project site fence, 0.12 acre of the KCC-defined minimum wetland protection buffer occurs around wetlands UW02 and UW03 (Figure 3.5-18). There is an existing road within these buffers to the east of UW02 and UW03. Improvements to this road could extend outside of the existing road footprint; however, this is not proposed at this time. If the project design is altered, then coordination with Kittitas County would occur for the buffer impacts associated with that design change. During fence installation, there could be temporary fence installation surface disturbance within the KCC-defined minimum wetland protection buffers west and north of wetlands UW02 and UW03. This minor encroachment would likely not exceed 0.01 acre. No KCC-defined minimum wetland protection buffer is defined for UW01 because the wetland area is below the minimum size threshold for a Category III wetland. Minimal impacts to wetland protection buffers would occur based on the current project design.

(b) A demonstration of how enhancement, restoration or compensatory mitigation actions will achieve equivalent or greater hydrologic and biological functions at the impact site, and whether any existing wetland functions would be reduced by the mitigation measures;

No impacts are proposed to wetlands within the Columbia Solar Project sites. All possible impacts to wetlands were avoided through project design. Therefore, no mitigation would be required to implement the proposed solar projects.

(c) A discussion of how standard mitigation ratios have been incorporated into the mitigation proposal. Variances from standard mitigation ratios must be supported with professional analyses demonstrating that equivalent or greater hydrologic and biological functions will be achieved;

No mitigation would be required to implement the Columbia Solar Projects. Therefore, mitigation ratios are not applicable to the proposed solar projects.

(d) A demonstration that the mitigation actions are being conducted in an appropriate location, and that consideration was given in order of preference to: On-site opportunities; opportunities within the same subbasin or watershed assessment unit; opportunities within the same Water Resources Inventory Area (WRIA); opportunities in another WRIA;

No mitigation would be required to implement the Columbia Solar Projects. Therefore, mitigation actions would not be taken as part of the proposed solar projects.

(e) A discussion of the timing and schedule for implementation of the mitigation plan;

No mitigation would be required to implement the Columbia Solar Projects. Therefore, mitigation timing and schedule are not applicable to the proposed solar projects.

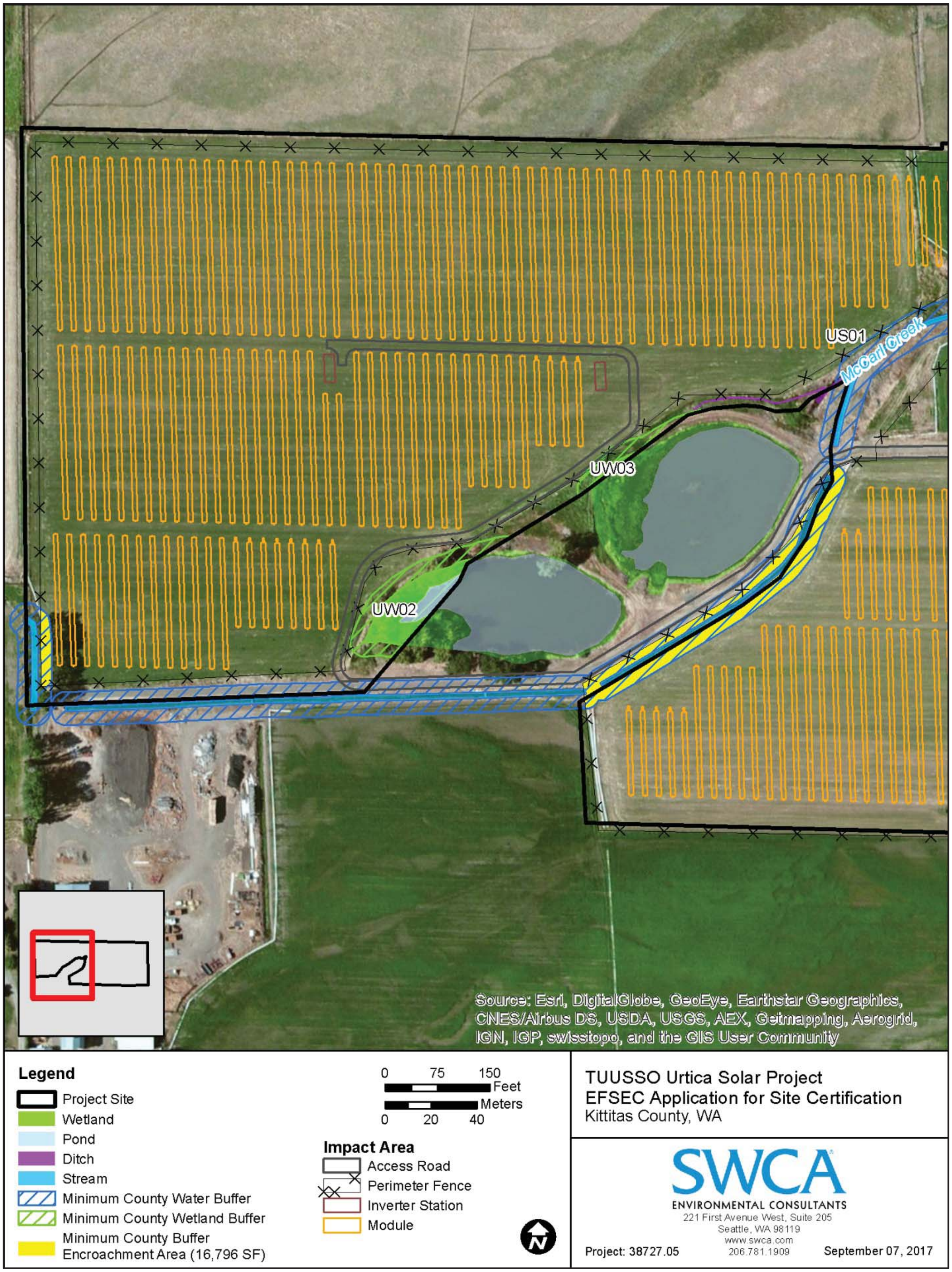

Figure 3.5-18. Urtica Solar Project wetland buffer encroachment.

(f) A discussion of ongoing management practices that will protect wetlands, including proposed monitoring and maintenance programs;

Impacts to wetlands would be avoided through project design and wetland mitigation would not be required for the Columbia Solar Projects. Therefore, no ongoing management of wetlands would be required to implement the proposed solar projects. In addition, the wetlands within the five solar project sites would not require any ongoing management or monitoring, nor are there any ongoing management or monitoring activities currently being conducted within the solar project sites by outside parties.

(g) Mitigation plans should give priority to proven mitigation methods. Experimental mitigation techniques and mitigation banking may be considered by the council on a case-by-case basis. Proposals for experimental mitigation techniques and mitigation banking must be supported with analyses demonstrating that compensation will meet or exceed requirements giving consideration to the uncertainty of experimental techniques, and that banking credits meet all applicable state requirements.

No mitigation would be required to implement the Columbia Solar Projects. Therefore, no experimental mitigation measures would be taken associated with the proposed solar projects.

(4) Federal approvals. The application shall list any federal approvals required for wetlands impacts and mitigation, status of such approvals, and federal agency contacts responsible for review.

A very small portion (<400 square feet) of one wetland, TW03, would be impacted by the improvement of the existing land bridge near the entrance to the Typha Solar Project site. Therefore, a JARPA has been started (see Appendix J-3) and would be submitted to the USACE and Ecology for review, as required.

3.6 Energy and Natural Resources 463-60-342

(1) Amount required/rate of use/efficiency. The application shall describe the rate of use and efficiency of consumption of energy and natural resources during both construction and operation of the proposed facility.

The sources and amounts of energy and natural resources uses, and their potential impacts are described below, in Section 3.6.1 and 3.6.2.

(2) Source/availability. The application shall describe the sources of supply, locations of use, types, amounts, and availability of energy or resources to be used or consumed during construction and operation of the facility.

3.6.1 Affected Environment for Energy and Natural Resources

This section provides a summary of the sources of energy and natural resources available for construction and operation of the five Columbia Solar Projects. The amounts needed and availability of those resources is described in Section 3.6.2, below.

3.6.1.1 Energy

Electricity in the area is available from PSE, Kittitas County Public Utility District (PUD), and the City of Ellensburg (see Section 4.4 for details). Puget Sound Energy provides natural gas in Kittitas County.

Natural gas for residential and commercial uses is available from the City of Ellensburg Natural Gas Utility Division (see Section 4.4 for details). Propane and natural gas are also available from private businesses, including AmeriGas Propane at N Ruby Street, A-1 Petroleum at S Main Street, Midstate Cooperative at W 3rd Avenue, and Northern Energy at S Industrial Way, all in Ellensburg.

3.6.1.2 Natural Resources

Natural resources availability summarized here include concrete, sand, soil, and gravel; lumber and other wood products; and water.

Concrete, Sand, Soil, and Gravel

Ready-mix concrete is available from Carol Ready-dompier, located on Riverbottom Road south of Ellensburg, south of Manastash Road, west of the Yakima River, and southwest of the intersection of I-90 and I-82.

Riverbottom Rock is also located on Riverbottom Road, south of Ellensburg, south of Manastash Road, west of the Yakima River, and southwest of the intersection of I-90 and I-82. They provide sand and gravel.

Ellensburg Cement Products Inc. (ECP) is located on U.S. Route 97, north of I-90 and west of Ellensburg. They provide ready-mix concrete, rock/gravel, fill dirt, sand, and other products (ECP 2017).

Dfm7 Services is located Mcmanamy Road, east of the Yakima River, northwest of Ellensburg, and southeast of Thorp. They also provide sand and gravel.

Lumber/Wood

Several sources of lumber for concrete-form construction and other construction supplies are available in Ellensburg. Knudson Lumber is located at 1791 Vantage Highway in northeast Ellensburg. Matheus Lumber Company is located at 1433 West University Way in northwest Ellensburg also provides lumber and construction supplies.

Water

TUUSSO has considered a number of water supply alternatives for construction purposes. Each of the solar project sites, except for the Fumaria Solar Project site, has on-site existing water allocations that TUUSSO may be able to use during construction. TUUSSO has also explored the use of greywater sources (including those in the Kittitas Valley) for construction, as water for construction activities can be of non-potable quality. However, greywater availability is limited in Kittitas County. Finally, TUUSSO has discussed with the City of Ellensburg the availability of municipal water for construction purposes. Based on this array of possible water sources, TUUSSO intends to use either on-site water or trucked in water from municipal water sources for all projects except the Fumaria Solar Project, and intends to truck in water for the Fumaria Solar Project from a municipal water source.

3.6.2 Impacts to Energy and Natural Resources

3.6.2.1 General County

The following potential impacts are common to all of the proposed Columbia Solar Projects and to the general surrounding area.

Construction Impacts

Energy

Minimal electricity would be required during the construction period, to operate power tools, welders, and other small equipment. This electricity would be available from existing nearby buildings or temporary extensions from nearby distribution lines.

The minimal quantities of natural gas or propane that might be used during construction would be purchased from local distributors and would be readily available. Similarly, gasoline and diesel fuel used for construction vehicles would be purchased from local gas stations. Lubricating oils, grease, and hydraulic fluids would be purchased from distributors of such materials. In all cases, quantities are not anticipated to be large and would be readily available from existing commercial businesses in the Ellensburg area.

Because minimal amounts of electricity, natural gas or propane, and gasoline or diesel fuel would be used during construction, no impacts are anticipated to the demand on or supplies of those energy sources in the Ellensburg area.

Natural Resources

Little or no soil, sand, or gravel is anticipated to be hauled to or away from the five Columbia Solar Project sites, and thus there would be no impacts on those natural resources in the area. In addition, minimal quantities of lumber and wood products would be required during construction, and could easily be provided by the two lumber yards in Ellensburg. Thus, because minimal quantities would be required and would be readily available in the Ellensburg area, there would be no impacts to the availability of lumber or wood products.

Quantities of concrete and potential impacts to available sources are described in detail for each solar project site, below.

During construction, water would be used to suppress fugitive dust during grubbing, clearing, grading, trenching, and soil compaction. In addition, non-toxic soil binding agents may be employed to help with soil stabilization during construction. Construction activities for the five proposed Columbia Solar Projects are conservatively estimated to generate an average water demand of 100,000 gallons per day. That daily water demand estimate assumes that on an average construction day, 20 acres of the project sites are in active construction, requiring 10 continuous hours of water using five water trucks, assuming 4,000-gallon-capacity trucks. Construction time for the Columbia Solar Projects would require approximately 6 months, or 156 work days (Monday–Saturday), to complete. Based upon these parameters, the construction water demand for the proposed Columbia Solar Projects is very conservatively estimated to total 15.6 million gallons, or 47.87 acre-feet (one acre-foot is equal to 325,851 gallons), or approximately 10 acre-feet per project. Because water would be available from existing on-site sources for all but the Fumaria Solar Project site, which would have water trucked in from Ellensburg, there would be no impacts to water sources and supplies.

Operation Impacts

Energy

None of the solar projects would require electric power during operation, because they would be generating electricity, so there would be no negative impacts on energy use. Each of the five Columbia Solar Projects would have the capacity to generate up to 5 MW of electricity, for a total of up to 25 MW. TUUSSO modeled the design and associated energy output using PVSyst v6.21. The energy output simulated by PVSyst is based on the meteorological data at the project site, models of the system equipment such as the inverters and solar panels, and project design specifications. PVSyst v6.21 was used to simulate the predicted energy output from each of the five Columbia Solar Projects, resulting in a total estimate of approximately 11,500 megawatt hours (MWh) generated in the first full year of project operation. The production of this clean, renewable electricity would have a minimal positive impact on electricity in the Ellensburg and the PSE service areas.

Similar to that used for construction, gasoline and diesel fuel used for operational vehicles would be purchased from local gas stations. Lubricating oils, grease, and hydraulic fluids used for maintenance would be purchased from distributors of such materials. In all cases, quantities would be minimal and readily available from existing commercial businesses in the Ellensburg area so there would be no impacts on the availability of these resources.

Natural Resources

No soil, sand, gravel, lumber, or wood products are anticipated to be hauled to or away from the five Columbia Solar Project sites during operation, and thus there would be no impacts on those natural resources in the Ellensburg area.

On an ongoing basis, water would be used for cleaning PV panels and controlling dust (less than 1 acre-foot per year per project site). Water would also be necessary to establish the tree/shrub visual buffers along portions of the five Columbia Solar Projects, as described above, as well as the native plant species throughout the five project sites. Project landscaping would consist of native and drought tolerant species. Once established, the species would not require ongoing irrigation. The irrigation needs for landscaping establishment are assumed to last for 3 consecutive years following installation.

Based on feedback from farmers familiar with growing conditions in Kittitas Valley (including landowners familiar with the conditions on the five Columbia Solar Project sites), assuming periodic irrigation for establishment purposes over a 3-year period, it is estimated that approximately 400 acre-feet of water per acre per year would be needed over this period to ensure plant establishment on the project sites. These water needs are the same as the current water needs on the actively farmed project sites, and thus there would be no impacts to water supplies as a result of construction of the five Columbia Solar Project sites.

3.6.2.2 Solar Project Sites

Below are descriptions of the potential specific natural resources impacts for each of the proposed solar project sites.

Camas Solar Project Site

Construction Impacts

The inverter pads and switchyard pads may be delivered to the site precast. However, they may also use poured concrete slab foundations. There would be approximately six inverter pads throughout the project site, where the direct current from the arrays would be converted to alternating current and then transmitted by the electric grid. Each inverter pad would include one or two inverter enclosures and one alternating current (AC) transformer. Each inverter pad would be approximately 15 by 30 feet and 1 to 2 feet thick, requiring about 16.75 to 33.50 cubic yards of concrete to construct. Thus, all six inverter pads would require a total of about 100.5 to 201.0 cubic yards of concrete.

There would also be one switchyard pad, measuring roughly 20 by 30 feet and 1 to 2 feet thick, requiring about 22.25 to 44.50 cubic yards of concrete to construct.

In total, the six inverter pads and single switchyard pad would require a total of about 122.75 to 245.5 cubic yards of concrete, or about 12 to 25 truckloads if poured in place (assuming 10 cubic yards/truckload). This ready-mix concrete would be purchased from commercial suppliers in the Ellensburg area and hauled to the site during the primary April to November construction period, would be readily available from those suppliers, and would have no impacts on concrete sources or availability.

If construction of the all-weather access roads calls for aggregate, up to 619 cubic yards could be used to cover the roads with 6 inches of gravel. This would require up to 62 truckloads (assuming 10 cubic yards/truckload). Once final design is completed and a final decision is made about the need for gravel, TUUSSO would work with EFSEC to address any potential impacts, mitigation, and permitting that might be required.

Operation Impacts

No additional gravels, soils, concrete, lumber/wood, or other materials (beyond those mentioned for the general area) would be required during operation of the Camas Solar Project. Thus, no impacts would occur to those natural resources in Kittitas County or the nearby Ellensburg area.

Fumaria Solar Project Site

Construction Impacts

The inverter pads and switchyard pads may be delivered to the site precast. However, they may also use poured concrete slab foundations. There would be approximately five inverter pads throughout the project site, where the direct current from the arrays would be converted to alternating current and then transmitted by the electric grid. Each inverter pad would include one or two inverter enclosures and one AC transformer. Each inverter pad would be approximately 15 by 30 feet and 1 to 2 feet thick, requiring about 16.75 to 33.50 cubic yards of concrete to construct. Thus, all five inverter pads would require a total of about 83.75 to 167.5 cubic yards of concrete.

There would also be one switchyard pad, measuring roughly 20 by 30 feet and 1 to 2 feet thick, requiring about 22.25 to 44.50 cubic yards of concrete to construct.

In total, the five inverter pads and single switchyard pad would require a total of about 106.0 to 212.0 cubic yards of concrete, or about 11 to 21 truckloads if poured in place (assuming 10 cubic yards/truckload). This ready-mix concrete would be purchased from commercial suppliers in the Ellensburg area and hauled to the site during the primary April to November construction period, would be readily available from those suppliers, and would have no impacts on concrete sources or availability.

If construction of the all-weather access roads calls for aggregate, up to 449 cubic yards could be used to cover the roads with 6 inches of gravel. This would require up to 45 truckloads (assuming 10 cubic yards/truckload). Once final design is completed and a final decision is made about the need for gravel, TUUSSO would work with EFSEC to address any potential impacts, mitigation, and permitting that might be required.

Operation Impacts

No additional gravels, soils, concrete, lumber/wood, or other materials (beyond those mentioned for the general area) would be required during operation of the Fumaria Solar Project. Thus, no impacts would occur to those natural resources in Kittitas County or the nearby Ellensburg area.

Penstemon Solar Project Site

Construction Impacts

The inverter pads and switchyard pads may be delivered to the site precast. However, they may also use poured concrete slab foundations. There would be approximately five inverter pads throughout the project site, where the direct current from the arrays would be converted to alternating current and then transmitted by the electric grid. Each inverter pad would include one or two inverter enclosures and one AC transformer. Each inverter pad would be approximately 15 by 30 feet and 1 to 2 feet thick, requiring about 16.75 to 33.50 cubic yards of concrete to construct. Thus, all five inverter pads would require a total of about 83.75 to 167.5 cubic yards of concrete.

There would also be one switchyard pad, measuring roughly 20 by 30 feet and 1 to 2 feet thick, requiring about 22.25 to 44.50 cubic yards of concrete to construct.

In total, the five inverter pads and single switchyard pad would require a total of about 106.0 to 212.0 cubic yards of concrete, or about 11 to 21 truckloads if poured in place (assuming 10 cubic yards/truckload). This ready-mix concrete would be purchased from commercial suppliers in the Ellensburg area and hauled to the site during the primary April to November construction period, would be readily available from those suppliers, and would have no impacts on concrete sources or availability.

If construction of the all-weather access roads calls for aggregate, up to 380 cubic yards could be used to cover the roads with 6 inches of gravel. This would require up to 38 truckloads (assuming 10 cubic yards/truckload). Once final design is completed and a final decision is made about the need for gravel, TUUSSO would work with EFSEC to address any potential impacts, mitigation, and permitting that might be required.

Operation Impacts

No additional gravels, soils, concrete, lumber/wood, or other materials (above those mentioned for the General Area) would be required during operation of the Penstemon Solar Project. Thus, no impacts would occur to those natural resources in Kittitas County or the nearby Ellensburg area.

Typha Solar Project Site

Construction Impacts

The inverter pads and switchyard pads may be delivered to the site precast. However, they may also use poured concrete slab foundations. There would be approximately five inverter pads throughout the project site, where the direct current from the arrays would be converted to alternating current and then transmitted by the electric grid. Each inverter pad would include one or two inverter enclosures and one AC transformer. Each inverter pad would be approximately 15 by 30 feet and 1 to 2 feet thick, requiring about 16.75 to 33.50 cubic yards of concrete to construct. Thus, all five inverter pads would require a total of about 83.75 to 167.5 cubic yards of concrete.

There would also be one switchyard pad, measuring roughly 20 by 30 feet and 1 to 2 feet thick, requiring about 22.25 to 44.50 cubic yards of concrete to construct.

In total, the five inverter pads and single switchyard pad would require a total of about 106.0 to 212.0 cubic yards of concrete, or about 11 to 21 truckloads if poured in place (assuming 10 cubic yards/truckload). This ready-mix concrete would be purchased from commercial suppliers in the Ellensburg area and hauled to the site during the primary April to November construction period, would be readily available from those suppliers, and would have no impacts on concrete sources or availability.

If construction of the all-weather access roads calls for aggregate, up to 401 cubic yards could be used to cover the roads with 6 inches of gravel. This would require up to 40 truckloads (assuming 10 cubic yards/truckload). Once final design is completed and a final decision is made about the need for gravel, TUUSSO would work with EFSEC to address any potential impacts, mitigation, and permitting that might be required.

Operation Impacts

No additional gravels, soils, concrete, lumber/wood, or other materials (above those mentioned for the General Area) would be required during operation of the Typha Solar Project. Thus, no impacts would occur those natural resources in Kittitas County or the nearby Ellensburg area.

Urtica Solar Project Site

Construction Impacts

The inverter pads and switchyard pads may be delivered to the site precast. However, they may also use poured concrete slab foundations. There would be approximately five inverter pads throughout the project site, where the direct current from the arrays would be converted to alternating current and then transmitted by the electric grid. Each inverter pad would include one or two inverter enclosures and one AC transformer. Each inverter pad would be approximately 15 by 30 feet and 1 to 2 feet thick, requiring about 16.75 to 33.50 cubic yards of concrete to construct. Thus, all five inverter pads would require a total of about 83.75 to 167.5 cubic yards of concrete.

There would also be one switchyard pad, measuring roughly 20 by 30 feet and 1 to 2 feet thick, requiring about 22.25 to 44.50 cubic yards of concrete to construct.

In total, the five inverter pads and single switchyard pad would require a total of about 106.0 to 212.0 cubic yards of concrete, or about 11 to 21 truckloads if poured in place (assuming 10 cubic yards/truckload). This ready-mix concrete would be purchased from commercial suppliers in the Ellensburg area and hauled to the site during the primary April to November construction period, would be readily available from those suppliers, and would have no impacts on concrete sources or availability.

If construction of the all-weather access roads calls for aggregate, up to 267 cubic yards could be used to cover the roads with 6 inches of gravel. This would require up to 27 truckloads (assuming 10 cubic yards/truckload). Once final design is completed and a final decision is made about the need for gravel, TUUSSO would work with EFSEC to address any potential impacts, mitigation, and permitting that might be required.

Operation Impacts

No additional gravels, soils, concrete, lumber/wood, or other materials (beyond those mentioned for the general area) would be required during operation of the Urtica Solar Project. Thus, no impacts would occur to those natural resources in Kittitas County or the nearby Ellensburg area.

(3) Nonrenewable resources. The application shall describe all nonrenewable resources that will be used, made inaccessible or unusable by construction and operation of the facility.

Beyond the natural resources listed above, little or no additional nonrenewable resources would be used during construction or operation of the five Columbia Solar Projects.

(4) Conservation and renewable resources. The application shall describe conservation measures and/or renewable resources which will or could be used during construction and operation of the facility.

Beyond the natural resources listed above, little or no additional renewable resources would be used during construction or operation of the five Columbia Solar Projects.

However, during construction, TUUSSO would incorporate water conservation methods wherever possible. For example, water would not be used for concrete hydration on-site because the concrete is expected to be delivered to the site already hydrated. Less water-intensive methods of dust suppression are also under review, including use of soil stabilizers, tightly phasing construction activities, staging grading and other dust-creating activities, and/or compressing the entire construction schedule to reduce the time period over which dust-suppression measures would be required.

TUUSSO has incorporated water conservation methods into its operational water plan as well. Where feasible, TUUSSO would work with the current landowners to incorporate more efficient irrigation systems to water the trees and shrubs forming the visual buffers. TUUSSO has used native and drought tolerant species to ensure that the landscaping can be established quickly with minimal water needs, and once established, would not require any further watering except in extreme drought conditions. TUUSSO would also investigate using sprinkler systems on the Columbia Solar Project sites to irrigate the native ground cover (instead of the current flood irrigation methods used on the project sites).

(5) Scenic resources. The application shall describe any scenic resources which may be affected by the facility or discharges from the facility.

Existing visual and scenic resources, visual simulations, and potential impacts are described in detail in Section 4.2.4.

3.7 References – Chapter 3

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