CULTURAL RESOURCES ASSESSMENT SHORT REPORT

CULTURAL RESOURCES ASSESSMENT OF THE MANCE PLAT DEVELOPMENT, NISQUALLY, THURSTON COUNTY, WASHINGTON

Report Prepared for

Mance & Son Residential Developers, Inc.
5448 78th Avenue NE
Olympia, WA 98516

By

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Project No. 33406
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SWCA ENVIRONMENTAL CONSULTANTS
Short Report

A. INTRODUCTION

1. Proposed project activities and elements:

Mance & Son Residential Developers, Inc. (Mance) plans to develop 20 one-acre plots on 100 acres of land in Section 27, Township 19 North, Range 1 West, Willamette Meridian (Figure 1). The Nisqually Tribe requested a cultural resources assessment of this development project after review of Mance's State Environmental Policy Act (SEPA) checklist. As a result, Mance retained SWCA Environmental Consultants (SWCA) to complete background research and an archaeological field study for the project. The assessment results are presented in this report.

2. Study Area vertical and horizontal depth of disturbance:

The project is 100 acres and consists of two connected parcels (Figure 1). The west tract is 80 acres and the east tract is 20 acres. Mance only plans to develop the eastern 20 acres at this time, but requested the project background research include both pieces of land. Subsurface field investigations occurred in the eastern 20 acres that will be directly affected by ground-disturbing development (Figure 2). Planned development includes construction of 20 homes and associated access roads, driveways, utilities, retaining walls, grading, and landscaping. Detailed plans for development of the individual lots are not yet available, but disturbance of the entire soil profile to 2 feet (60 cm) below the surface is expected. No ground-disturbing activities are currently planned for the west tract. Additional archaeological investigations may be necessary if plans change to include development of unsurveyed portions of the project area.

3. Project Background Key Information

Location:	Section 27 of T. 19 N., R. 1 W., between Nisqually and Olympia, Washington
Acres Surveyed:	20 acres surveyed (east tract) and 100 acres desktop review; western 80 acres not surveyed.
Project Proponent:	Mance & Son Residential Developers, Inc.
Regulatory Setting:	Cultural resources assessment requested by Nisqually Tribe; State Environmental Protection Act
Survey Personnel:	Field supervisor Kate Shantry and archaeologists Emily Peterson, Alicia Statler, Eric Delander, and Don Tatum
Survey Date:	May 27 through May 29, 2015
Report Author:	Rinck, Brandy A.
Report Date:	June 12, 2015
Other individuals/ organizations:	Jackie Wall, Nisqually Tribe Tribal Historic Preservation Officer, and Tribal cultural resources staff (Carol and John)

B. NATURAL AND CULTURAL SETTING

1. Natural Setting

Geology

The project is within the south Puget Lowland, a structural trough that developed as a fore-arc basin during early subduction of the Juan de Fuca tectonic plate beneath the North America Plate (Orr and Orr 1996). The Puget Lowland separates the Coast and Cascade Mountain ranges and is underlain by Eocene to Miocene volcanic and sedimentary rocks (Fenneman 1931; Tabor and Haugerud 1999; Yount and Gower 1991). Although these rocks outcrop where uplifted, folded, and faulted, they are generally buried under thick Pleistocene glacial sediment in the project vicinity (Booth et al. 2004; Johnson et al. 2004; Pratt et al. 1997). The Puget Lowland is influenced by shallow faults that align perpendicular to the Pacific–North American plate boundary, forming structural basins and arches. The project area is south of the Tacoma Fault Zone (TFZ) in the Tacoma Basin. Vertical offset on the TFZ occurred about 1,000 years ago, evidenced by 3 m of uplift north of the TFZ, tsunami deposits, and 1.5 to 4 m of subsidence south of the TFZ in the basin (Brocher et al. 2001; Sherrod et al. 2003, 2004).

The modern topography and surficial geology of the Puget Lowland is the result of multiple continental glaciations that extended south from British Columbia during the Pleistocene. The last glacial maximum, known regionally as the Vashon Stade of the Fraser Glaciation, began with advance of the Cordilleran Ice Sheet from what is now British Columbia before 18,750 calibrated years before present (cal B.P.) (Easterbrook 2003; Porter and Swanson 1998). The ice sheet reached its maximum extent about 17.5 miles (28 km) south of the project area by about 16,950 cal B.P. (Clague et al. 1980; Porter and Swanson 1998; Thorson 1989). Incision occurred when the ice sheet overrode the land and glacial meltwater carved wide channels (Haugerud 2006). As a result, the Puget Lowland is now dominated by well-defined, north-south trending ridges and troughs that are separated by extensive rolling uplands.

The ice sheet retreated rapidly from the Puget Lowland at the end of the Pleistocene, exposing the project vicinity from below the ice by about 16,300 cal B.P., or 12,000 years ago if expressed as an uncalibrated date (Porter and Swanson 1998; Thorson 1989). During retreat, large glacial lakes formed south of the ice front in what is now the Puget Sound because meltwater was dammed in the Puget Lowland by the ice to the north (Bretz 1913). These former lakebeds are presently the southernmost inlets of Puget Sound. Initially, the glacial lakes drained south through a series of spillways in the Black Hills into the Chehalis River and out to the Pacific Ocean. Drainage shifted north after the ice sheet receded beyond Whidbey Island, allowing the glacial lakes to drain and marine water from the Strait of Juan de Fuca to flood the Puget Lowland (Easterbrook 2003; Haugerud 2006; Thorson 1989). Eventually, the newly deglaciated surfaces were exposed and available for human use and occupation.

Glacial deposits compose most of the surficial sediment in the project area (Logan et al. 2003). Glacial deposits in the vicinity include Vashon till, ice-contact sediment, glaciomarine deposits, glaciolacustrine sediment, drift, and outwash (Booth 1994; Logan et al. 2003; Washington Division of Geology and Earth Resources 2015). Ice-contact deposits in the project area are a mix of deposits from dynamic ice (lodgment till, drumlins, and advance outwash) and dead-ice (ablation till and subglacial water flow deposits). Recessional outwash and stratified proglacial sand and gravel are also found in the project area. A small peat deposit is found in the west tract. The peat

deposit represents a depression on the glacial upland and water drained from this wetland-filled depression northeast to Puget Sound.

Geomorphology

Soils mapped across the project area reflect the glacial history of the area, including Alderwood and Everett soils (Pringle 1990). Alderwood gravelly, sandy loam in Thurston County forms on upland hills and terrace landforms in glacial drift and outwash that overlies glaciomarine sediment. Everett very gravelly sandy loam forms on glacial outwash terrace landforms and can contain ash in the upper soil horizons. The west tract also includes Bellingham silty clay loam, which forms in depressions in alluvium and lacustrine sediment, and Mukilteo muck, which forms in depressions in peat. The Bellingham and Mukilteo soil units are found around the wetland in the west tract.

Understanding the soils in the project area is important because cultural materials identified on the glacial upland would likely be confined to the soil A, B, and uppermost C horizons that do not extend beyond 30 to 90 cm (12 to 36 inches) below the surface. Cultural materials could be buried more deeply around the wetland where thicker Bellingham and Mukilteo soils are mapped. In general, the glacial sediment that composes the soil parent material across most of the project area predates the arrival of humans to the region. The project area is relatively undeveloped and has been logged in the past, most recently in 1999 (John Mance, personal communication, 2015).

Climate, Flora, and Fauna

Climate in the Puget Lowland at the end of the Pleistocene was much cooler and drier than today (Barnosky 1984; Barnosky et al. 1987; Brubaker 1991; Whitlock 1992). This influenced the species of plants that would inhabit the newly deglaciated surfaces across the Puget Lowland, such as lodgepole pine and bracken fern with scattered Douglas-fir, white pine, spruce, and alder. Many species of animals have used and continue to inhabit the project vicinity. Soon after the land emerged from beneath the glacial ice at the end of the Pleistocene, terrestrial megafauna, black-tailed deer, and elk would have browsed on grasses, shrubs, and herbs in the emerging forest parkland.

The climate warmed at the onset of the Holocene (Barnosky et al. 1987; Brubaker 1991; Whitlock 1992). As the climate continued to dry during the warmer early Holocene, species like grasses, fir, alder, and oak replaced those that preferred a colder, wetter climate. By about 6,000 years ago, the regional climate shifted to the cool and moist conditions that are comparable to the modern maritime regime, producing the western hemlock vegetation zone (Franklin and Dyrness 1988). The western hemlock zone is historically characterized by a high proportion of western hemlock and western red cedar, relative to the once dominant Douglas-fir, red alder, and various grasses. Climate and vegetation have remained generally stable in western Washington since the mid-Holocene (Whitlock 1992).

Currently, the project vicinity supports a forest canopy dominated by Douglas-fir and red alder, but also containing western red cedar, western hemlock, and big-leaf maple. Understory vegetation in the western hemlock zone typically includes a variety of ferns, including sword fern, deer fern, and bracken fern. Vine maple, trailing blackberry, red huckleberry, and salmonberry are also present (Brubaker 1991; Whitlock 1992). Salal is found across the upland and other undergrowth includes the indigenous Oregon grape, beaked hazelnut, and invasive species such as Himalayan blackberry and Scotch broom. Animals would have been hunted in the project area

forests, which also provided cedar wood and bark, as well as other natural resources. Wetlands and marshes typically supported plants such as cranberries, cattail, reeds, wapato, nettles, skunk cabbage, and other plant species that would have provided valuable resources to early inhabitants (Deur and Turner 2005; Franklin and Dyrness 1988). Although wetlands were not identified in the east tract where project ground disturbance is planned, a creek and wetland are present in the west tract.

Larger terrestrial mammals that would have lived in the project area throughout the Holocene include elk, deer, black bear, coyote, and cougar. Smaller mammals that would also have been available to the people occupying the region in the past include rabbit, squirrel, chipmunk, raccoon, weasel, beaver, red fox, muskrat, mink, and porcupine (Ingles 1965; Kruckeberg 1991; Larrison 1967). Ducks, geese, swans, loons, and other migratory waterfowl would have been plentiful along the shoreline north of the project area and at wetlands on the glacial upland (Angell and Balcomb 1982; Larrison and Sonnenberg 1968). People would have fished along the streams and rivers to the east and west of the upland, as well as gathered shellfish and other marine resources along the shorelines.

2. Cultural Setting

Pre-Contact Culture History

Archaeological evidence indicates that humans moved into the Pacific Northwest at the end of the Pleistocene, occupying western Washington by 12,500 cal B.P. (Gustafson and Manis 1984; Jenkins et al. 2012; Kirk and Daugherty 1978). The earliest cultural period in North America, the Paleoindian Period, is dated based on just a few archaeological sites where a small number of isolated fluted projectile points that are characteristic of the Paleoindian Period have been found (Avey n.d.; Carlson 1990; Kopperl et al. 2010; LeTourneau 2010; Meltzer and Dunnell 1987). Inferences about Paleoindian lifeways have been limited to presumptions of tool function based on the isolated stone tools and their rare association with peat layers or large extinct mammals, with few insights on subsistence economy or other aspects of culture. The projectile point styles of the Paleoindian Period did not persist past 10,000 years ago, when they were replaced by regional variants of lithic technology (Carlson and Dalla Bona 1996).

Human occupation during the early and middle Holocene is better understood than the Paleoindian Period because of several archaeological sites in the region. Archaeological sites that represent the Early Period from 8,000 to 5,000 years ago are locally termed “Olcott” (Butler 1961; Fladmark 1982; Kidd 1964; Mattson 1985). Typical Olcott artifacts are large stemmed or leaf-shaped points, scrapers, flake tools, and blade cores formed of basalt and dacite toolstone (Carlson 1990). Olcott sites are usually located on glacial terraces near the coast or along lakes on the glacial uplands (Wessen and Welch 1991). Many Olcott sites are classified as stone tool manufacturing sites and archaeological features such as hearths, structures, and faunal and plant remains, are usually absent (Blukis Onat et al. 2000; Morgan 1999). Age estimates of Olcott sites have been inferred based on their similarity to dated components of assemblages from archaeological sites in British Columbia, as well as projectile point cross-dating, obsidian hydration analysis, and luminescence dating of two archaeological sites near Granite Falls, Washington (Carlson and Dalla Bona 1996; Chatters et al. 2011).

Geomorphology in the Puget Lowland changed around 5,000 years ago as a result of sea level reaching equilibrium. Increased evidence of human occupation corresponds with landform stabilization between about 5,000 and 2,500 years ago, called the Middle Period. Socioeconomic

organization became more complex and population grew during the Middle Period (Matson and Coupland 1995). Subsistence gradually transitioned to a more marine resource base with a diminishing dependence on mammals (Ames and Maschner 1999). The exploitation of additional resources corresponded with a shift to seasonal economic strategies. The seasonality of subsistence is evidenced by a variety of archaeological sites, site distributions, and artifact types that date to the Middle period. For example, new artifacts types such as ground stone tools used for plant processing and toggling harpoons used for seasonal fishing appear at resource processing sites in the local archaeological record after 5000 B.P. (Ames and Maschner 1999; Matson and Coupland 1995). Evidence of specialized subsistence is more common in coastal Middle Period sites compared to interior or upland archaeological sites. The increased visibility of younger sites in the archaeological record is due, in part, to cultural shifts. Increased visibility may also relate to modern population density, as development-related site identification is concentrated along shorelines that were also preferred for occupation by the Middle Period people.

Native American culture shows further differentiation based on subsistence strategy between 2,500 years ago and Euroamerican contact, during the Late Period. The Late Period is characterized by a marine-oriented culture on the Pacific Coast, a mixed marine and terrestrial economy on the Puget Sound, and a terrestrial mammal and riverine fishing culture inland (Ames and Maschner 1999; Blukis Onat 1987). Large semi-sedentary populations occupied cedar plank houses on protected tidal shorelines and at river confluences. Seasonal camps were used for hunting, fishing, or resource gathering during the spring, summer, and fall (Ames and Maschner 1999). Archaeological evidence for these settlement and subsistence patterns can be seen in the greater diversity of hunting, fishing, plant processing, and woodworking tools made of local and imported materials found in Late Period sites. Wealth-status objects, status differentiation in burials, art objects, and ornaments are also represented (Ames and Maschner 1999; Blukis Onat 1987; Fladmark 1982; Matson and Coupland 1995).

Ethnography and Ethnohistory

Henderson Inlet is at the south end of Southern Coast Salish territory within the traditional areas of the Nisqually and Squaxin Island Tribes (Haeberlin and Gunther 1930; Suttles and Lane 1990). The Nisqually, or the Sqwalia'bsh, are the people of ^{tu}*sqwE'le*, their main ethnographic village at the mouth of the Nisqually River (Waterman 1920). This word has been translated to mean "tops of wild carrots" and "late" for the late runs of salmon up the Nisqually River (Elmendorf 1992; Smith 1940; Waterman 1920). The Nisqually inhabited villages in the Nisqually River watershed and were associated with the Stehchass group at Budd Inlet, the Nusehchatl band on Henderson Inlet, and the Sahehwamish on Budd, Hammersley, Totten, Eld, and Henderson Inlets (Carpenter 1993; Lane 1972). The Squaxin are the people of a village called ^{Tu}*sqwa'ksûd*, or "split apart," at the north end of Case Inlet (Waterman 1920). Groups associated with the Squaxin Island Tribe included the Squawksin, Stehchass, T'Peeksin, Squiaitl, and Sahehwamish (Lane 1972). The vicinity was also used by the Upper Chehalis people, who were neighbors residing along the Black River to the south (Hajda 1990).

An ethnographic village near Woodard Bay at the head of Henderson Inlet was called ^{Tux}*tc!atcaa'L*, or "little channels dug out" (Carpenter 2002; Gibbs et al. 1877; Smith 1940; Waterman 1920). A similar word is used for the tidal trap built to catch flounder fish. Other named places on Henderson Inlet include *Su'pEks*, or "blowing promontory," for the narrow elongated outcrop on the west shoreline of the inlet and *TsEIE'xgw1L*, or "squeezing one's canoe," for the head of the

inlet below *Su'pEks* (Waterman 1920). *Qola'stubus*, or "serviceberry bushes cliff," is named on the east shore of Henderson Inlet, west of the project area (Waterman 1920). *Sqwa'tsqs*, or "crooked promontory," is named at what is now Johnson Point on the east side of the mouth of Henderson Inlet (Waterman 1920). McAllister Creek was called *Sxuda'dap*, which means "place where they get a form of spirit power" and refers to a place that enables a shaman to visit the underworld and recover lost souls (Waterman 1920).

The ancestors of the Nisqually and Squaxin Tribes organized themselves along extended family lines that were directly related to their permanent winter villages. Often, these villages were located at the confluences of major rivers and streams or at the mouth of large streams on the shoreline of Puget Sound. Groups were associated with watersheds and resource use areas based on the salmon, game, and wild plant foods that they collected during their annual rounds within the varied habitats found in their territories (Spier 1936; Suttles 1987; Suttles and Lane 1990). The village groups made use of the shorelines, upland forests, prairies, and wetlands. The number of archaeological shell middens found in the region demonstrates the importance of shellfish during the ethnographic period. Fishing also occurred along saltwater shorelines, creeks, and riverbanks, while hunting, foraging for seasonal food, and materials gathering occurred in the forested interior and uplands. The uplands were an important source of cedar, which was used to make clothing, basketry, tools, and weapons. Within the villages, shed-roof style houses constructed from cedar were the most common style of longhouse, but gable-roofed homes were also built during the ethnographic period (Suttles and Lane 1990). Canoe burials in cedar trees were also common practice among southern Puget Sound groups (Castile 1985).

The arrival of Euroamerican settlers in the region changed Native American lifeways dramatically (Boyd 1999). Smallpox and other epidemic diseases often affected native populations before direct contact (Campbell 1989). Logging, settlement, and development of communities throughout the region removed tracts of resource lands from the Tribes, altering their traditional settlement patterns and subsistence activities. Fort Nisqually was established in 1845 and soon after, settlers moved into the region (Carpenter 1986). Indians traded meat, camas root, salal cakes, and skunk cabbage root with early settlers (Stevenson 1977, 1986; Trosper 1985). In 1854, Washington territorial governor Isaac Stevens concluded the Treaty of Medicine Creek that established reservations on Squaxin Island and up the Nisqually River (Ruby and Brown 1992). After the treaty, Indians often worked as wage laborers in local sawmills (Carpenter 2002). Those who did not relocate to the reservations remained in traditional areas where they also continued to fish and hunt; however, official access to traditional resources was not restored until the Boldt decision in 1974.

History

Resources and landforms that were preferred by Native Americans were also favorable for Euroamerican use and settlement. Euroamericans explored the Puget Sound beginning in 1792 when Captain George Vancouver of the British Royal Army led expeditions around the shorelines. Fort Nisqually was later established for fur trading in 1832 near what is now the city of Dupont (Gibson 1985). Additional exploration of the project vicinity was undertaken by Captain Charles Wilkes of the United States Exploring Expedition around 1841 (Meany 1923). Henderson Inlet was named by Wilkes after his ship's quartermaster James Henderson (Phillips 1971). Settlement began in the mid-1800s following exploration. At first, Euroamerican settlement concentrated along major waterways as small communities grew up around mill towns and other industrial

pursuits. After the shorelines were logged, settlement expanded up into the surrounding forested uplands.

The glacial uplands were heavily forested when logging in the project vicinity and clearing for farming began in the 1850s and 1860s. Notations on the General Land Office (GLO) map of the project vicinity state the land is rolling, the soils are second rate clay, sand, and gravel, and the timber consisted of fir, cedar, and hemlock trees (GLO 1873; United States Surveyor General 1854). The wetland in the west tract is also shown on the GLO (Figure 3). The project area was primarily used for timber harvesting, as it was not a preferred location for early settlement. The project area left the public domain as Cash Entry patents to William W. Miller in 1869 and George Cook in 1859 and 1871 (Bureau of Land Management 2015a, 2015b). Land surrounding the study area was patented around the same time, with most land being purchased in 1869. It is interesting that most land in the project vicinity was bought rather than homesteaded, because purchased land did not require the owner to live on the property the same way that land patented under the Homestead Act had to be lived on and improved. Therefore, large timber companies likely obtained forest land through buyers that did not retain ownership. Prairies found south of the project area were homesteaded and they provided important grazing land where farmers raised poultry and cattle for meat and milk. Crops commonly grown in the area included grains, fruits, vegetables, and hops (Stevenson 1996).

Towns began to grow as more settlers arrived in the region. Tumwater was founded as the town of New Market in 1845, Olympia was incorporated in 1859, and Lacey opened its first post office under the name of Woodland in the early 1890s. At this time, Henderson Inlet became a source of shellfish for these growing communities and commercial cultivation of oysters and geoducks began. Unimproved roads reached the project vicinity by 1934 and by 1959 Marvin Road was paved east and north of the project area. The west tract was still owned by the Miller family in 1962, by which time they had also obtained the east tract (Metsker Map Company 1962) (Figure 4). Housing developments, including those in the Foxhall Divisions to the south and the Deerfield Park and Marvin Gardens Divisions to the east, have grown up around the project area since.

3. Previous Studies

Eight previous cultural resources investigations have been conducted near the project (Table 1). Most of the previous investigations were completed along the southern Puget Sound shoreline. The previous investigations were carried out for Thurston County road and utility projects (Jolivette et al. 2014; Luttrell 2007b), seismometer installation (Boersema and Thompson 2007), residential development (Gilpin et al. 2008; Kaehler 2007), commercial goeduck cultivation (Major 2014), installation of a marine cable (Piper 2009), and development of a County inventory of historical cultural resources (Stevenson and Costantini 1985). Two previous studies were presented as sensitivity models that did not include field investigation (Boersema and Thompson 2007; Piper 2009). Other previous investigations included fieldwork, but did not identify archaeological resources (Gilpin et al. 2008; Jolivette et al. 2014; Kaehler 2007; Major 2014). Three of the previous investigations did identify cultural resources. Historical cultural resources that are part of the built environment, including site 45TN349, buildings, and structures were identified in the area (Gilpin et al. 2008; Luttrell 2007b; Stevenson and Costantini 1985). Luttrell (2007b) also identified a pre-contact archaeological shell midden and recorded it as site 45TN341.

Table 1. Previous Cultural Resource Investigations Within Approximately 1.5 Mile of the Project Area.

AUTHOR	DATE	PROJECT	RELATION TO PROJECT AREA	RESULTS*
Stevenson and Costantini	1985	Thurston County Cultural Resources Inventory	Encompasses	Historic properties
Boersema and Thompson	2007	Archaeological Plan of Action for the Earthscope-Usarray Washington Transportable Array Sites	0.1 mi N	Archaeological sensitivity
Kaehler	2007	Cultural Resource Assessment of the Proposed Hawks Prairie Project, City of Lacey, Thurston County, Washington	1 mi NW	45TN349
Luttrell	2007b	Cultural Resources Investigations for Thurston County's Hawks Prairie Road Project, Thurston County, Washington	1.2 mi S	45TN341, 6 historic properties
Gilpin et al.	2008	Addendum to Cultural Resource Assessment of the Proposed Hawks Prairie Project City of Lacey, Thurston County, Washington	0.8 mi NE	45TN349
Piper	2009	Phase 1 Anderson Island Marine Cable Alternatives	1.3 mi NE	Archaeological potential
Jolivette et al.	2014	Cultural Resources Survey for the Thurston County Swayne Drive Stormwater Retrofit Project, Olympia, Washington	1.4 mi NW	None
Major	2014	Cultural Resource Assessment for Geoduck Cultivation Tidelands adjacent to Sections 22 and 23 T19N/R1W, Thurston County	1.1 mi N	None

*Newly recorded cultural material identified within 1.5 mile of project area.

Table 2 is a summary of the six previously identified cultural resources within 1.5 miles of the project. As is typical of identified pre-contact sites in the region, most are along the Puget Sound shoreline.

Table 2. Previously Recorded Sites Within Approximately 1.5 Mile of the Project Area.

SITE NO.	COMPILER/DATE	AGE	DESCRIPTION	RELATION TO PROJECT AREA
45TN41	Solland and Stenholm 1963	Pre-contact	Shell midden	0.9 mi NE
45TN341	Luttrell 2007a	Pre-contact	Lithic scatter	1.4 mi SW
45TN349	Kaehler and Gilpin 2008	1942-1953	Atlas Powder Company Pier and Road	1.5 mi NE
45TN397	Stilson 2010	Pre-contact	Shell midden	1.1 mi NE
45TN462	Valentine 2003a	Pre-contact	Howe Site 1, shell midden	1 mi W
45TN463	Valentine 2003b	Pre-contact	Howe Site 2, shell midden	1 mi W

Four of the previously recorded sites were identified based on surface exposures of archaeological midden and no subsurface investigations were undertaken to verify the extent or content of the sites. Site 45TN41 is a shell midden associated with a marsh and sand spit complex at Jones Beach State park north of the project (Solland and Stenholm 1963). Site 45TN397 is the remnants of a shell midden identified north of the current project between Butterball Cove and Big Slough that contains fire-modified rock (FMR), littleneck and butter clams, cockle shells, mussel, and moon snail (Stilson 2010). Sites 45TN462 and 45TN463 are neighboring middens found west of the project at Woodland Creek on Dobbs Inlet in Henderson Inlet (Valentine 2003a, 2003b). The midden sites have not yet been evaluated for listing in the National Register of Historic Places (NRHP).

One pre-contact lithic scatter, 45TN341, was identified east of the current project along Woodland Creek near the head of Henderson Inlet (Luttrell 2007a). Located on an alluvial terrace, 45TN341 contains FMR, and the remains of stone tool making (debitage and a flaked cobble). One obsidian flake sources to Horse Mountain in Oregon. 45TN341 was presumed eligible for listing in the NRHP.

Finally, an historical road and pier were recorded at Butterball Cove as 45TN349 (Kaehler and Gilpin 2008). This road was used by the Atlas Powder Company, a subsidiary of the DuPont de Nemours Company, to transport explosives that were shipped to Bremerton for Navy use during World War II and the Korean War. Today the road is modified and is used as a trail. The site does not retain integrity, so it was recommended not eligible for listing in the NRHP.

C. EXPECTATIONS

There is relatively low potential for encountering significant pre-contact cultural resources in the east tract. The west tract has a slightly higher potential for cultural materials around the wetland, but the wetland area will not be disturbed by this project. Ancestors of Nisqually and Squaxin Island Tribal members may have hunted and gathered in the project vicinity in the past and there is some possibility that temporary hunting camps would have been in the project area. These activities would likely manifest themselves as low-density lithic scatters (the remains of stone tool production or maintenance) or campsites with features (hearths or post molds).

There is also low potential for encountering significant historical archaeological resources in the east and wet tracts because the project vicinity was forested, used for timber production, and did not host early settlers. Historical archaeological resources that could be within the project area would likely be associated with logging, including roads, skid trails, logging chains and cable, tools, machinery parts, and scatters of cans and other debris.

D. METHODS

Prior to fieldwork, a check of records at the Washington State Department of Archaeology and Historic Preservation's (DAHP's) Washington Information System for Architectural and Archaeological Records Data (WISAARD) was conducted to find information about historic properties and cultural resources investigations completed in the project vicinity. Other research was conducted in SWCA's library in order to obtain ethnographic and historic accounts on land use, local and regional development, historical maps, and photographs. Online and internal sources were also reviewed for environmental, geological, and cultural setting literature.

Field work was completed in three days by SWCA field supervisor Kate Shantry and field archeologists Emily Peterson, Alicia Statler, Eric Delander, and Don Tatum. Sixty-three shovel probes were excavated at 30- to 45-m (98- to 148-foot) intervals in accessible areas that were likely to be affected by construction (Figure 5). Spoils from the 40-cm-diameter (1.3-foot-diameter) probes were screened through ¼-inch (6-mm) mesh in 20-cm (8-inch) levels up to 1 m (3.3 feet) below the surface. Notes about content and sediments encountered were kept on standard forms. Universal Transverse Mercator (UTM) coordinates of all the shovel probes were recorded with a Trimble hand-held global positioning system (GPS) unit. An important part of the survey fieldwork included documenting historic and modern disturbance in the project area.

E. RESULTS

1. Date(s) of all field work noting the field and weather conditions:

Fieldwork was conducted May 27, 28, and 29, 2015. The weather was clear and very warm, but the forest was shady. The brush across most of the east tract was extremely thick and the only access points were a few bulldozed trails (Figures 6 and 7). Pedestrian survey occurred between and around probes; however, dense vegetation obscured ground visibility to approximately 10%.

2. Summary of Shovel Probes

Sixty-three shovel probes were excavated in accessible portions of the east tract of the project area (Figure 8). A weakly developed A horizon consisting of dark brown, silty, gravelly fine sand was typically encountered between the surface and an average of 15 cm below the surface (cmbs) (0.5 feet below the surface [fbs]) (Figure 9). The gravels are common, sub-angular to sub-rounded, small to large pebbles and most probes included many small roots. In places, the soil is so weakly developed that the A horizon is mixed with the underlying soil B horizon. Elsewhere there is a clear separation and the B horizon consists of reddish brown, silty, very gravelly, fine to coarse sand (Figure 10). Glacial parent material, mainly composed of outwash and possibly some glaciolacustrine silt, is at the base of the soil sequence below an average of 47 cmbs (1.5 fbs). The C horizon normally consists of yellowish gray, sometimes silty, fine to coarse sandy, pebbles and cobbles (Figure 11). The lower boundary of the soil ranged from as shallow as 20 cmbs (0.7 fbs) to as deep as 68 cmbs (2.2 fbs).

No significant archaeological materials were identified in the east tract. Many cut stumps, which are indicative of past logging, were observed (Figure 12). Scattered FMR was in five probes, including SP 5 (20–40 cmbs [0.7–1.3 fbs]), SP 17 (20–40 cmbs [0.7–1.3 fbs]), SP 25 (0–60 cmbs [0–2 fbs]), SP 49 (0–20 cmbs [0–0.7 fbs]), and SP 63 (20–40 cmbs [0.7–1.3 fbs]). The FMR likely related to tree clearing and historical burning of the forest during logging rather than archaeological deposition. A metal nut was identified between 0 and 20 cmbs (0.7 fbs) in SP 62 and part of an old car was identified on the surface near SP 63 (Figure 13). No other cultural materials were observed. A summary of the shovel probe results is in Attachment A.

F. RECOMMENDATIONS

No significant cultural materials were identified during cultural resources assessment of the project area and no additional archaeological investigations are recommended prior to development of the 20 one-acre lots in the east tract. Ground-disturbing activities are not currently planned for the west tract where a wetland exists. Additional archaeological investigations may be necessary if plans change to include development of the unsurveyed portions of the project area.

Although cultural materials are not expected to be in the project area, it is possible that yet unidentified archaeological and/or human remains could be inadvertently discovered during construction. If potential historic properties, including structural remains, archaeological sites, and/or human bones or funerary items are encountered during construction, ground-disturbing activities should be halted immediately and DAHP and the Nisqually Tribe should be notified. A short plan outlining protocol to follow in case of inadvertent discovery is attached to this report as Attachment B.

G. CONSULTATION

1. Provide evidence of consultation with concerned Native American tribes, SHPO, local preservation personnel, other government agencies:

Prior to field work, SWCA contacted the Nisqually Tribal Historic Preservation Officer, Jackie Wall, and Nisqually tribal member Annette Bullchild by letter and e-mail, to solicit concerns and information about cultural resources in the project area (Attachment C). This request does not constitute formal consultation. Jackie Wall and two cultural resources tribal staff joined the archaeology field crew during the survey of the east tract on May 28 and 29, 2015.

H. ATTACHMENTS

1. Appropriate forms attached for each site?	[ ] Yes [ ] No [X] N/A
2. Maps attached?	[X] Yes (Figures 1 through 5)
3. Photograph attached?	[X] Yes (Figures 6 through 13)
4. Other attachments?	[X] Yes (Shovel Probe Summary and Tribal Correspondence)

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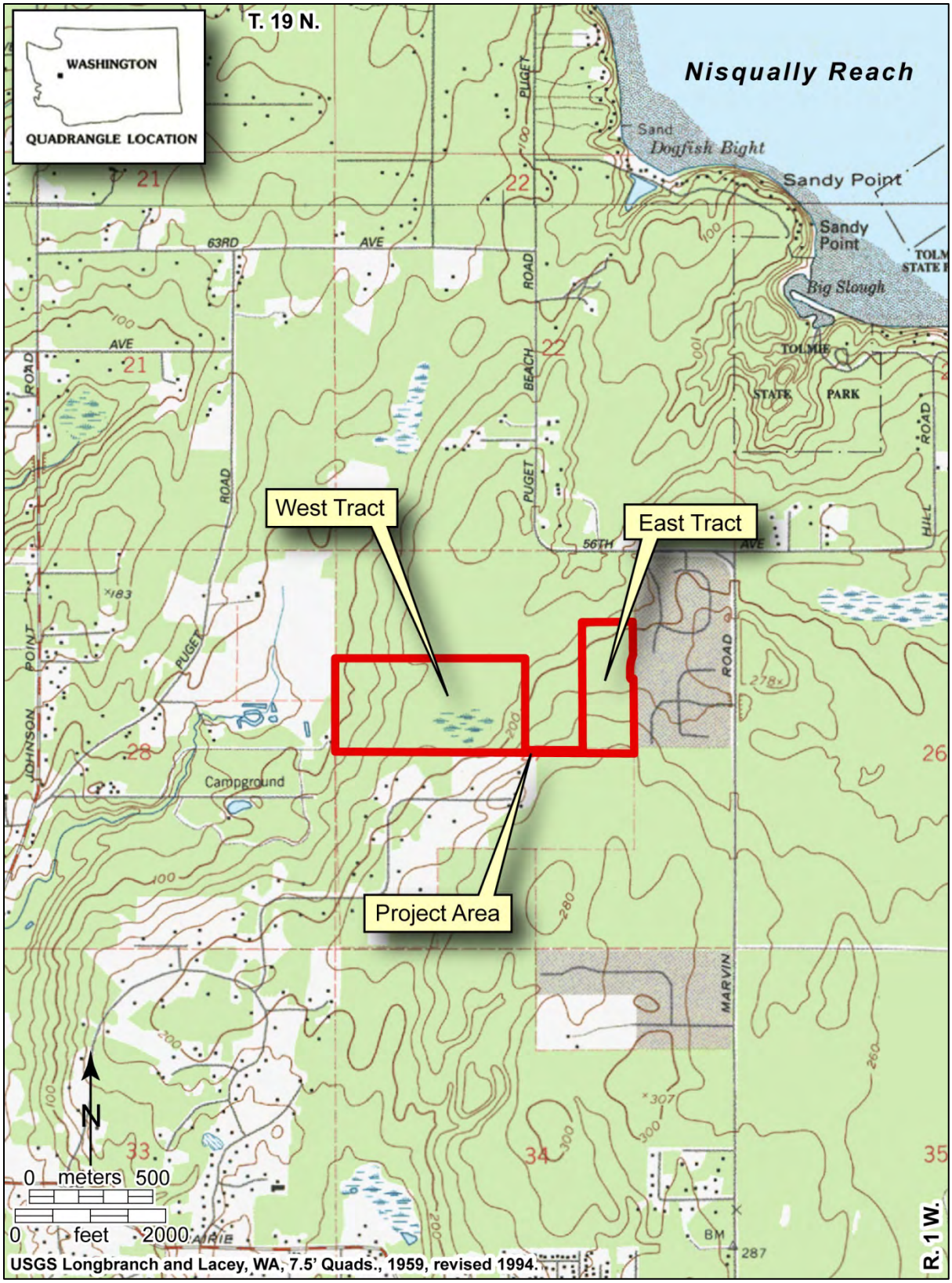

Figure 1. Project area.

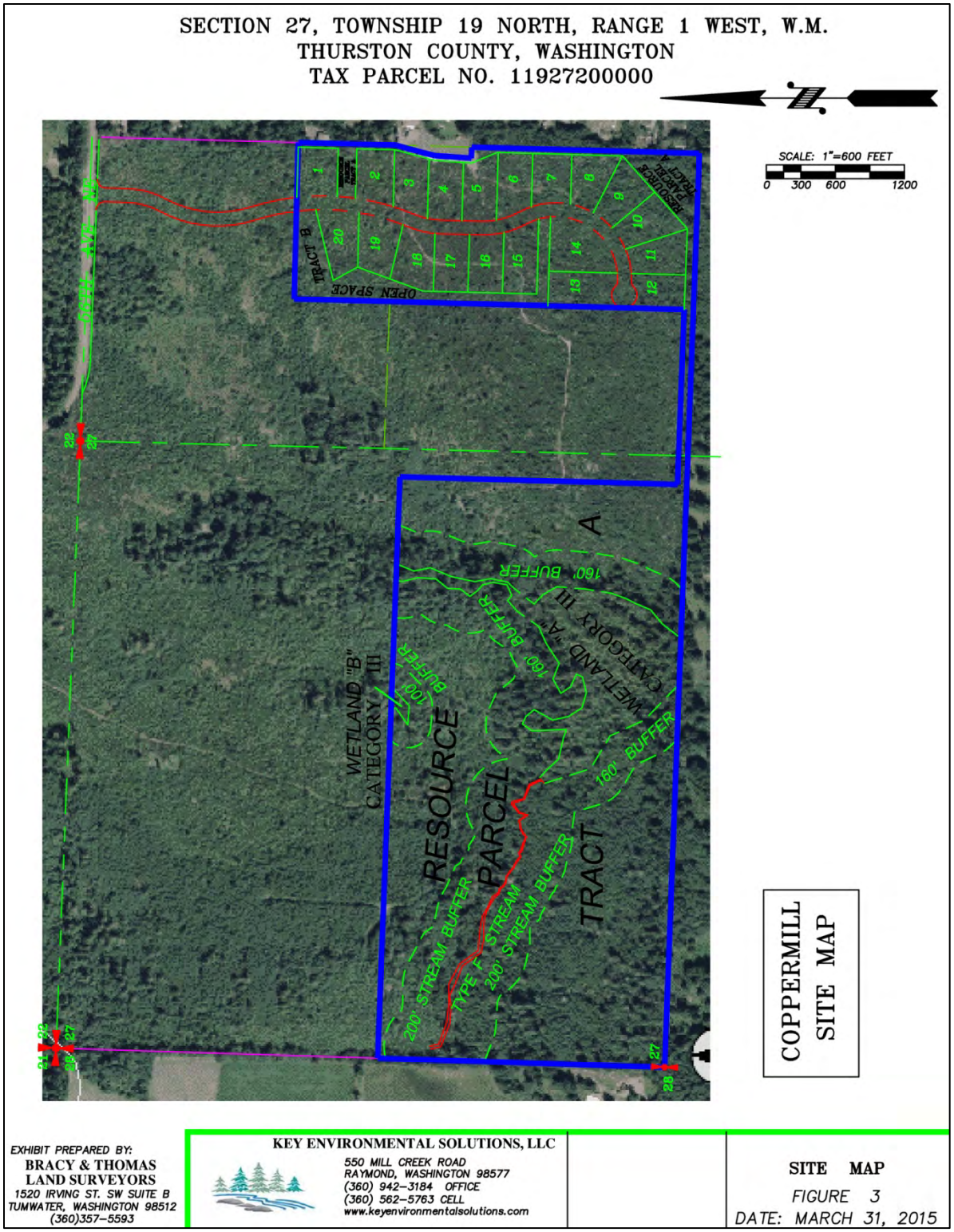

Figure 2. Project plans, showing development of 20 one-acre-lots in the surveyed portion of the project area and wetland boundaries in the remainder of the project area.

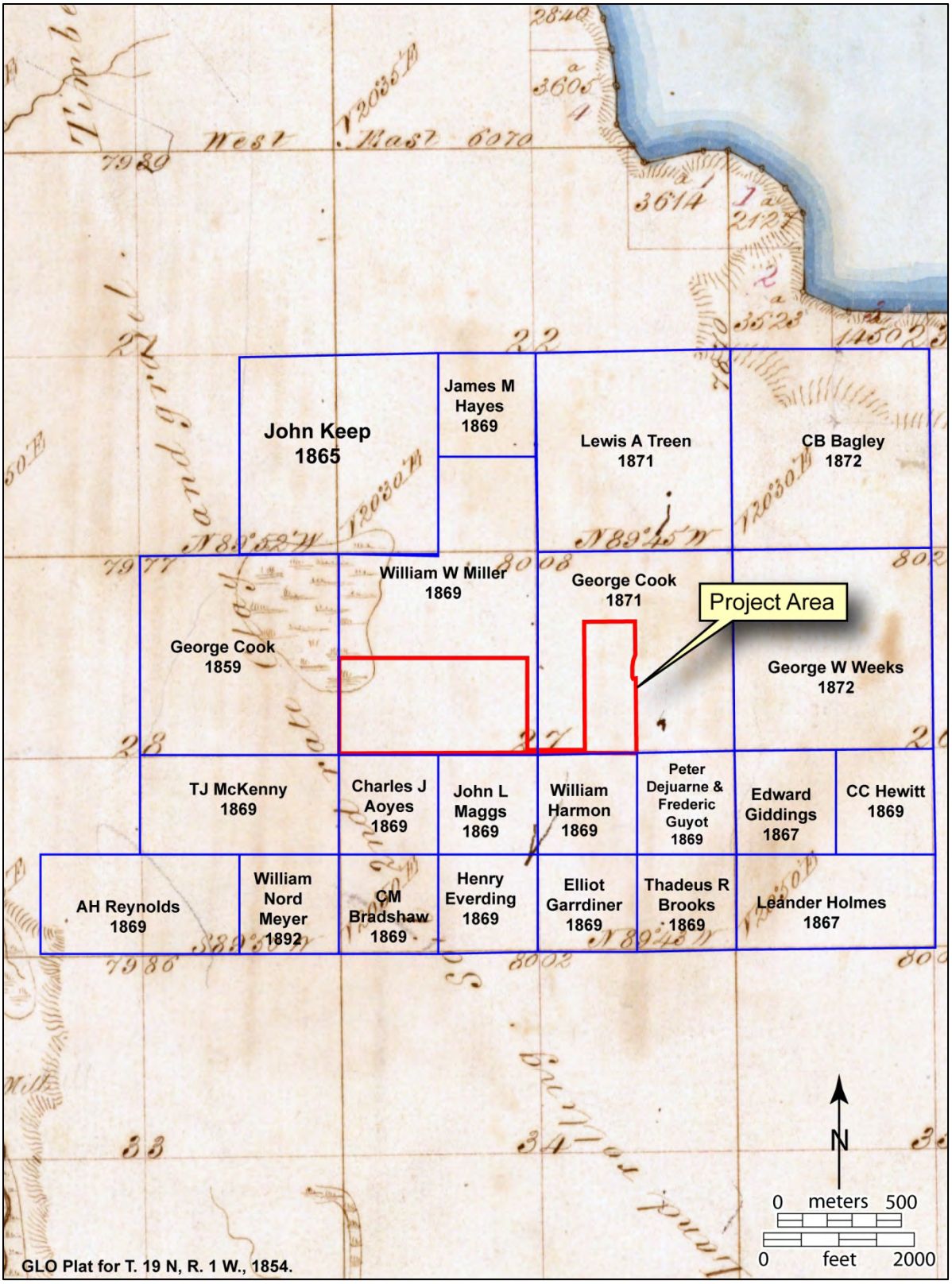

Figure 3. General Land Office map of the project vicinity,1854, showing surveyors notes about the rolling glacial upland, a wetland in the west part of the study area, and land patents in the project vicinity issued between 1859 and 1892.

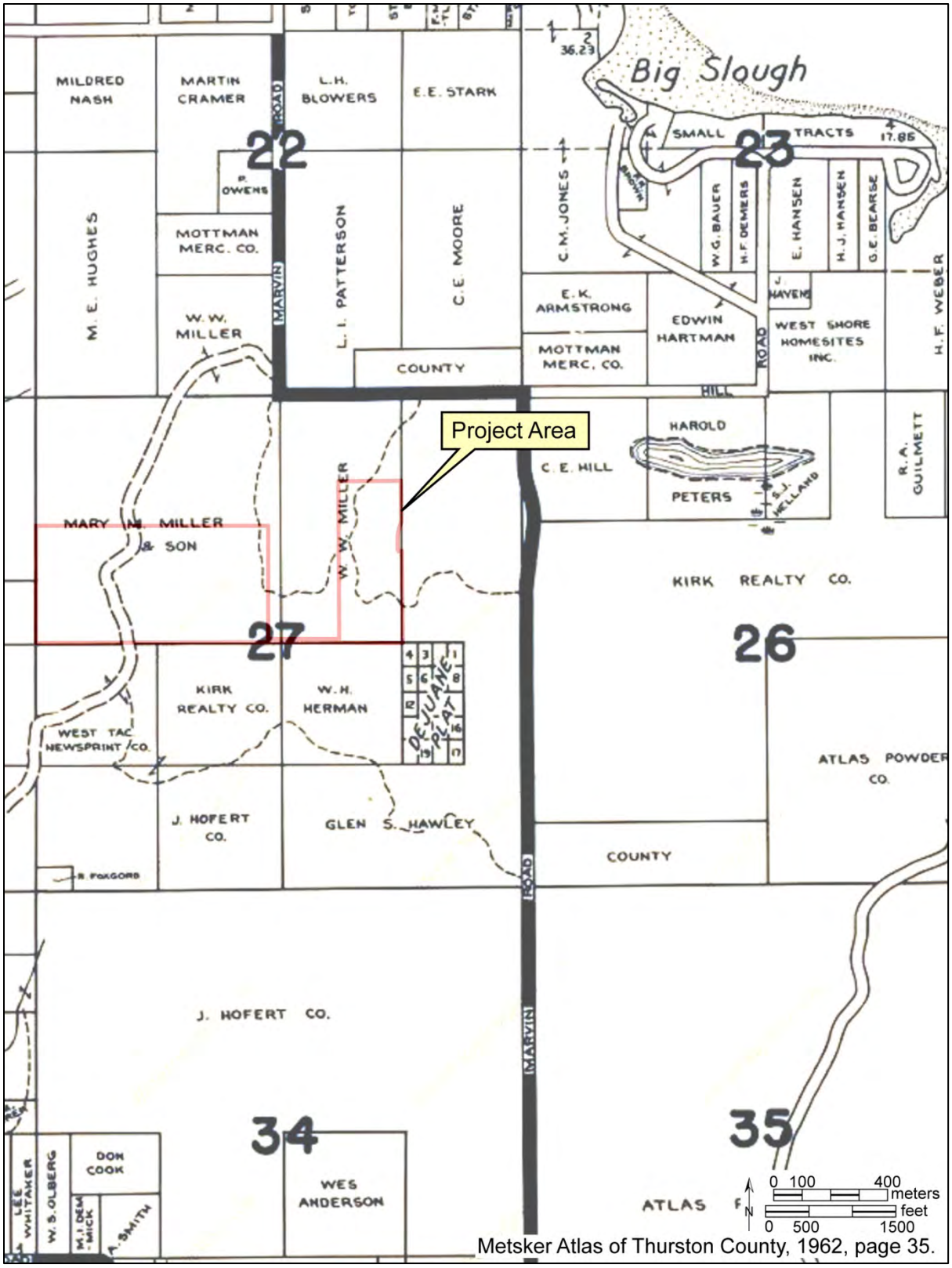

Figure 4. Selection from the 1962 Butterball Cove, Hogum Bay, Sand Point, Big Slough Metsker Map showing the Miller family's property in the project vicinity and a few unimproved roads and trails.

Figure 5. Overview of excavation at SP 46, view northeast.

Figure 6. Bulldozed road for access, view west.

Figure 7. Dense brush near SP 29.

Figure 8. Shovel probe locations within the surveyed portion of the project area.

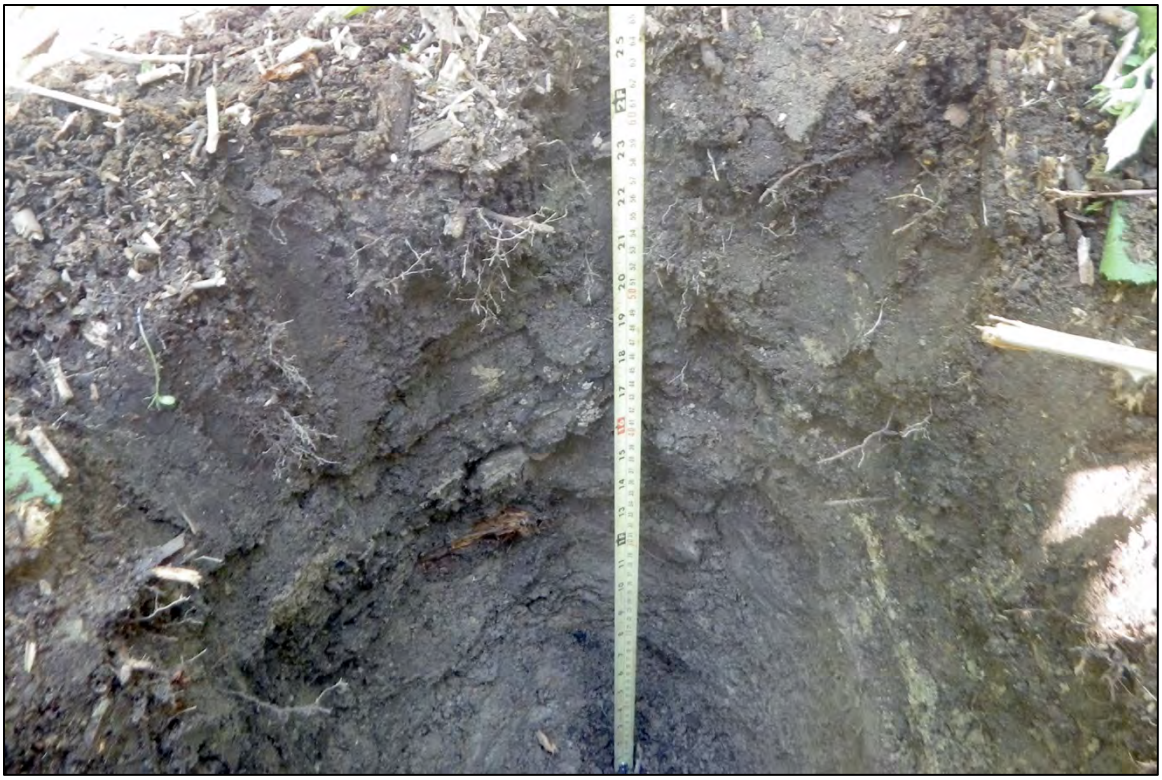

Figure 9. Soil profile at SP 54, shown from 0 to 64 cmbs.

Figure 10. Soil profile at SP 56, shown from 0 to 55 cmbs.

Figure 11. Soil profile at SP 58, shown from 0 to 60 cmbs.

Figure 12. One of many cut stumps identified in the project area; view east.

Figure 13. Car part identified in the woods near SP 63, looking northwest.

ATTACHMENT A: Shovel Probe Summary

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
1	5217238	516148	**0-6**: Dark grayish brown, silty, fine sandy, sub-rounded to rounded, small to large pebbles; diffuse, irregular lower boundary; O horizon. **6-20**: Dark brown, clayey, silty, fine to coarse sandy, sub-rounded to rounded, very small to medium pebbles; abrupt lower boundary; A/B horizon. **20-60**: Yellowish brown, clayey, silty, fine to coarse sandy, sub-rounded to rounded, small pebbles to cobbles. *Probe terminated in sterile glacial sediments.	None.
2	5217267	516151	**0-8**: Dark brown, gravelly, fine to medium sandy silt; gravels are common, sub-rounded, small to medium pebbles; many small to medium roots; clear, straight lower boundary; A horizon. **8-53**: Yellowish brown, fine to medium sandy, silty, rounded, large pebbles; many fine roots; clear, wavy lower boundary; B horizon. **53-80**: Light grayish brown, gravelly, silty, fine sand; gravels are many, sub-rounded to rounded, small to large pebbles; few medium roots; abrupt, straight boundary. *Probe terminated in sterile glacial sediments.	None.
3	5217297	516155	**0-10**: Dark brown, gravelly, silty, sand; gravels are common, sub-angular to sub-rounded, small to medium pebbles; few small charcoal fragments smooth lower boundary. **10-38**: Light reddish brown, gravelly, silty sand; gravels are many, sub-angular to sub-rounded, small to medium pebbles; few small charcoal fragments; gradual, wavy lower boundary; B horizon. **38-60**: Yellowish gray, gravelly, silty sand; gravels are many, sub-rounded to rounded, small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
4	5217323	516164	**0-14**: Dark brown, gravelly, sandy silt; gravels are common, sub-angular to sub-rounded, very small to large pebbles; many roots and some bark fragments; clear, smooth lower boundary; A horizon. **14-57**: Reddish brown, gravelly, silty, medium to coarse sand; gravels are many, sub-angular to rounded, very small to large pebbles; many roots; gradual, wavy lower boundary; B horizon. **57-79**: Dark grayish brown, gravelly, silty, medium to coarse sand; gravels are many, sub-angular to rounded, very small to large pebbles; few fine roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
5	5217331	516127	**0-20**: Very dark brown, gravelly, sandy silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; many roots; few bark fragments; few small charcoal fragments; clear, smooth lower boundary; top soil; A horizon. **20-54**: Light reddish brown, gravelly, silty, medium to coarse sand; gravels are many, sub-angular to rounded, small pebbles to cobbles; few small charcoal fragments; compact; gradual, wavy lower boundary; B horizon. **54-73**: Light grayish brown, sub-angular to rounded, small pebbles to cobbles; few fine roots; C horizon. *Probe terminated in sterile glacial sediments.	20-40: Few FMR fragments from burning for tree clearing.
6	5217293	516130	**0-12**: Dark brown, gravelly, silty, fine sand; gravels are few, sub-rounded, small to medium pebbles; common fine roots; clear, wavy lower boundary; A horizon. **12-57**: Light brown, gravelly, fine sand; gravels are common, sub-rounded to rounded, small to medium pebbles; few fine roots; gradual, smooth lower boundary; B horizon. **57-68**: Light brown, sub-angular to sub-rounded, small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
7	5217262	516128	**0-40**: Dark brown to brown, gravelly, silty, fine to medium sand; gravels are few to many (increasing with depth), sub-rounded to rounded, small to large pebbles; fine to medium roots; abrupt, lower boundary; A/B horizon with moderately strong, sub-angular blocky soil structure. **40-60**: Light grayish brown, gravelly, silty fine sand; gravels are common, sub-angular to sub-rounded, large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
8	5217240	516125	**0-12**: Light grayish brown, woody, rounded pebbles; gradual lower boundary; weakly developed A horizon. **12-70**: Light yellowish brown, silty, sandy, sub-rounded to rounded small pebbles and cobbles; few fine roots. *Probe terminated in sterile glacial sediments.	None.
9	5217210	516101	**0-10**: Mottled gray and brown, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; disturbed; abrupt, irregular lower boundary; A horizon. **10-40**: Brown, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles. *Probe terminated in sterile glacial sediments.	None.
10	5217199	516079	**0-40**: Grayish brown, fine to coarse sandy pebbles and cobbles; many fine roots; mixed and disturbed; clear, irregular lower boundary; A horizon. **40-48**: Grayish brown, fine to very coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; abrupt, irregular and wavy lower boundary; loose; weakly developed B horizon. **48-52**: Pebbles. *Probe terminated in sterile glacial sediments.	None.
11	5217228	516083	**0-12**: Mottled gray and brown, silty, fine to coarse sandy, pebbles with organic humus, rotten wood, and many fine to medium roots; mixed and disturbed; abrupt, irregular lower boundary; O horizon. **12-40**: Brown, silty, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; abrupt, irregular lower boundary; weakly developed A horizon. **40-48**: Brown, fine to coarse sandy, sub-rounded to rounded, medium pebbles to cobbles. *Probe terminated in sterile glacial sediments.	None.
12	5217257	516091	**0-20**: Dark reddish brown, gravelly, fine to medium sandy, silt; gravels are common, sub-rounded to rounded, small to large pebbles; many fine to medium roots; gradual, wavy lower boundary; strong, sub-angular blocky soil structure; A horizon. **20-45**: Reddish brown, gravelly, fine to medium sandy, silt; gravels are common, sub-rounded to sub-angular, small to large pebbles; many fine to medium roots; clear, wavy lower boundary; B horizon. **45-70**: Brown, silty, fine sandy, sub-angular to sub-rounded, small pebbles with few fine roots. *Probe terminated in sterile glacial sediments.	None.
13	5217278	516091	**0-11**: Dark brown, silty, gravelly, fine sand; gravels are few, sub-rounded, small to medium pebbles with many medium roots; clear, wavy lower boundary; A horizon. **11-57**: Light brown, silty, gravelly, fine sand; gravels are common, sub-angular to sub-rounded, small to large pebbles; common fine roots; gradual, wavy lower boundary; B horizon. **57-78**: Light yellowish gray, gravelly, silty, fine sand; gravels are many, sub-angular to rounded, small to medium pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
14	5217311	516098	**0-16**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, very small to large pebbles; many roots; gradual, wavy lower boundary; topsoil; A horizon. **16-50**: Light brown, gravelly, silty sand; gravels are many, sub-angular to rounded, very small pebbles to small cobbles; with common roots; gradual, wavy lower boundary; B horizon. **50-73**: Light yellowish brown, gravelly, silty, medium to coarse sand; gravels are many, sub-angular to rounded, very small pebbles to cobbles; few rootlets, C horizon. *Probe terminated in sterile glacial sediments.	None.
15	5217324	516080	**0-24**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, very small to large pebbles; common roots; abrupt, smooth lower boundary; topsoil; A horizon. **24-43**: Light yellowish brown, gravelly, silty, fine to coarse sand; gravels are many, sub-angular to rounded, small pebbles to small cobbles; few rootlets; clear, wavy lower boundary; B horizon. **43-64**: Light grayish brown, gravelly, silty, medium to very coarse sand; gravels are small pebbles to small cobbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
16	5217308	516059	**0-15**: Dark brown, gravelly, silty, fine sand; gravels are few, sub-rounded to sub-angular, small pebbles; many roots; clear, wavy lower boundary; A horizon. **15-43**: Light yellowish brown, gravelly, silty, fine sand; gravels are few, sub-rounded to sub-angular pebbles; common fine roots; compact; gradual, smooth lower boundary; B horizon. **43-64**: Yellowish gray, silty, gravelly, fine to medium sand; gravels are many, sub-angular to sub-rounded, small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
17	5217285	516048	**0-10**: Dark brown, gravelly, fine to medium sandy silt; gravels are few, sub-angular to sub-rounded, small to medium pebbles; common, fine to medium roots; abrupt, wavy lower boundary; weakly developed A horizon. **10-43**: Yellowish brown, gravelly, fine to medium sandy, silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; common fine to medium roots; clear, wavy lower boundary; B horizon. **43-72**: Yellowish to grayish brown, gravelly, silty, fine sand; gravels are few, sub-rounded to rounded, large pebbles to small cobbles; few medium roots; bioturbated, especially at 50 cmbs; C horizon. *Probe terminated in sterile glacial sediments.	20-40: one FMR fragment form tree burning.
18	5217259	516061	**0-20**: Dark brown, gravelly, fine to medium sandy, silt; gravels are few, sub-angular to sub-rounded, small to medium pebbles; common fine to medium roots; abrupt, straight lower boundary; A horizon. **20-58**: Yellowish brown, gravelly, fine to medium sandy, silt; gravels are many, sub-angular to sub-rounded, small to large pebbles; few fine roots; clear, wavy lower boundary; B horizon. **58-75**: Grayish brown, silty, fine sand; common, sub-angular to sub-rounded; small to large pebbles; few fine roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
19	5217242	516035	**0-14**: Dark brown, fine to medium sandy silt; gravels are few, sub-angular to sub-rounded, small to medium pebbles; common fine to medium roots; clear, straight lower boundary; A horizon. **14-37**: Yellowish brown, gravelly, silty, fine to medium sand; gravels are many, sub0-angular to sub-rounded, small to large pebbles; common small to large roots; bioturbated 20 to 60 cmbs; gradual, wavy lower boundary; B horizon. **37-60**: Yellowish to grayish brown, gravelly, silty, fine sand; gravels are common, sub-angular to sub-rounded, very small to medium pebbles; few small to large roots; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
20	5217162	516088	**0-12**: Dark grayish brown, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; humic layer, clear, irregular lower boundary; weakly developed A horizon. **12-38**: Dark yellowish brown, silty, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; loose; clear, irregular lower boundary; B horizon. **38-48**: Dark yellowish brown, silty, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; few bark fragments; disturbed; abrupt, irregular lower boundary; B horizon. **48-53**: Yellowish gray, fine to coarse sandy, sub-angular to rounded, small to medium pebbles; loose; relatively well-sorted; C horizon. *Probe terminated in sterile glacial sediments.	None.
21	5217171	516139	**0-49**: Dark brown to reddish brown, silty, gravelly, sand; gravels are few to common, sub-angular to sub-rounded, small to large pebbles; few small roots; mossy above 6 cmbs; compact; diffuse, wavy lower boundary, A/B horizons. **49-71**: Light yellowish gray, medium to coarse sandy, sub-rounded to rounded, small to very large pebbles; few small roots; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
22	5217195	516147	**0-18**: Dark brown, gravelly, sandy silt; gravels are many, angular to rounded, small pebbles to small cobbles; many roots; few small charcoal fragments; many small roots; clear, wavy lower boundary; topsoil; A horizon. **18-81**: Light reddish brown, silty, fine to coarse sandy, angular to rounded, small pebbles to small cobbles; few roots and burned roots; disturbed; B horizon. *Probe terminated in sterile glacial sediments.	None.
23	5217210	516132	**0-13**: Very dark grayish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to large cobbles; many fine roots; clear, irregular lower boundary; A horizon. **13-40**: Yellowish brown, fine to coarse sandy, sub-rounded to rounded, small pebbles to small cobbles; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.
24	5217186	516181	**0-5**: Dark brown, silty, gravelly, sand; gravels are few, sub-angular to sub-rounded, small to medium pebbles; clear, smooth lower boundary; A horizon. **5-28**: Reddish brown, silty, gravelly, fine sand; gravels are many, sub-angular to sub-rounded, small to very large pebbles; common small roots; charcoal flecks; compact; clear, wavy lower boundary; B horizon. **28-54**: Light yellowish gray, coarse sandy, sub-angular to sub-rounded, very small to medium pebbles; few small roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
25	5217211	516173	**0-12**: Dark brown, gravelly, sandy, silt; gravels are common, angular to sub-rounded, small to large pebbles; many small roots; diffuse lower boundary; topsoil; A horizon. **12-35**: Reddish brown, gravelly, sandy, silt; gravels are many, angular to sub-rounded, small to large pebbles; few small roots; clear lower boundary; B horizon **35-67**: Yellowish brown, silty, medium to coarse sandy, angular to rounded, small pebbles to small cobbles; C horizon. *Probe terminated in sterile glacial sediments.	0-60: Few FMR fragments from forest burning.
26	5217238	516183	**0-53**: Brown to reddish brown, silty, gravelly, sand; gravels are common to many, sub-angular to sub-rounded, small to large pebbles; common small roots; charcoal staining around pebbles; compact; diffuse lower boundary; B horizon. **53-72**: Light gray, coarse sandy, sub-angular to sub-rounded, very small to medium pebbles; very few fine roots; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
27	5217269	516182	**0-12**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; many roots; few charcoal flecks; gradual, wavy lower boundary; A horizon. **12-41**: Reddish brown, gravelly, fine sandy, silt; gravels are many, sub-angular to rounded, small to large pebbles; common roots; clear, smooth lower boundary; B horizon. **41-65**: Light brown, silty, gravelly, sand; gravels are many, sub-angular to rounded, small to large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
28	5217292	516181	**0-7**: Dark brown, silty, gravelly, fine sand; gravels are common, sub-angular to sub-rounded, small to medium pebbles; common fine roots; clear, wavy lower boundary; A horizon. **7-33**: Reddish brown, silty, fine sandy, sub-angular to sub-rounded, small to very large pebbles; common fine roots; compact, diffuse lower boundary; B horizon. **33-59**: Light yellowish gray, coarse sandy, sub-angular to rounded, small to medium pebbles; few roots; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
29	5217307	516185	**0-13**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; many roots; clear, wavy lower boundary; topsoil; A horizon. **13-41**: Light brown, gravelly, sandy, silt; gravels are common, sub-angular to rounded, small to large pebbles; few charcoal fragments; diffuse, lower boundary; B horizon. **41-71**: Light yellowish brown, gravelly, silty, fine to medium sand; gravels are few, sub-angular to sub-rounded, small to large pebbles; few charcoal fragments; C horizon. *Probe terminated in sterile glacial sediments.	None.
30	5217326	516184	**0-47**: Brown to reddish brown, silty, gravelly, fine to coarse sand; gravels are common to many, sub-angular to rounded, small to large pebbles; many fine roots; compact; diffuse lower boundary; A/B horizon. **47-70**: Gray, coarse sandy, small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
31	5217121	516056	**0-17**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; common small roots; clear, smooth lower boundary; topsoil; A horizon. **17-55**: Reddish brown, gravelly, sandy, silt; gravels are common, sub-angular to rounded, small pebbles to small cobbles; common rootlets; gradual, wavy lower boundary; B horizon. **55-72**: Grayish brown, silty, sandy, angular to rounded, small pebbles to small cobbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
32	5217112	516112	**0-31**: Dark brown to reddish brown, silty, gravelly, sand; gravels are common, sub-angular to sub-rounded, small to large pebbles; few small roots; diffuse lower boundary; A/B horizons. **31-54**: Light gray, coarse sandy sub-angular to sub-rounded, very small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
33	5217121	516166	**0-12**: Very dark grayish brown, silty, fine to coarse sandy, sub-angular to rounded, small pebbles to small cobbles; clear, irregular lower boundary; disturbed A horizon. **12-46**: Light yellowish brown, silty, sandy, sub-angular to rounded, small pebbles to small cobbles; few large roots; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
34	5217117	516195	**0-7**: Dark grayish brown, silty, gravelly, fine to coarse sand; gravels are many, sub-rounded to rounded, small to medium pebbles; clear, wavy lower boundary; O/A horizon. **7-47**: Light yellowish brown, silty, sandy, sub-rounded to rounded, small to large pebbles; relatively well-sorted; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.
35	5217086	516064	**0-15**: Dark brown, silty, gravelly, fine sand; gravels are few, sub-angular to sub-rounded, small to medium pebbles; common small roots; clear, smooth lower boundary; A horizon. **15-70**: Reddish brown, silty, gravelly, fine to medium sand; gravels are many, sub-angular to sub-rounded, small to very large pebbles; common small roots; gradual, wavy lower boundary; B horizon. **70-77**: Light gray, silty, sandy, sub-rounded to rounded, small to medium pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
36	5217088	516135	**0-17**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; common small roots; clear, wavy lower boundary; top soil; A horizon. **17-88**: Light yellowish brown, silty, gravelly, sand; gravels are many, sub-angular to rounded, very small to very large pebbles; compact. *Probe terminated due to wall sloughing.	None.
37	5217080	516181	**0-8**: Light grayish brown, silty, fine to coarse sandy, sub-angular to rounded, very small pebbles to large cobbles; many small roots; gradual, irregular lower boundary; weakly developed A horizon. **8-45**: Light yellowish brown, silty, sandy, sub-angular to rounded, very small pebbles to large cobbles; coarsens with depth; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.
38	5217087	516206	**0-11**: Dark yellowish brown, sub-angular to rounded, very small pebbles to cobbles; few rotten wood fragments; diffuse, irregular lower boundaries; weakly developed A horizon. **11-44**: Light yellowish brown, silty, fine to coarse sandy, sub-angular to rounded, very small pebbles to large cobbles; few rotten wood fragments; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.
39	5217048	516074	**0-13**: Dark brown, silty, gravelly, fine sand; gravels are few, sub-angular to sub-rounded, small to medium pebbles; common small roots; gradual, smooth lower boundary; A horizon. **13-60**: Reddish brown, silty, fine sandy, sub-rounded to rounded, small to large pebbles; few small roots; compact; diffuse, smooth lower boundary; B horizon. **60-68**: Light yellowish gray, silty, medium to coarse, sub-rounded to rounded, small to medium pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.
40	5217042	516110	**0-16**: Dark brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; many roots; wavy lower boundary; top soil; A horizon. **16-56**: Reddish brown, gravelly, sandy silt; gravels are common, sub-angular to sub-rounded; very small to very large pebbles; common roots; clear, smooth lower boundary; B horizon. **56-77**: Yellowish brown, silty, gravelly sand; gravels are many, sub-angular to sub-rounded, very small to very large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
41	5217042	516156	**0-16**: Dark brown, silty, gravelly, fine sand; gravels are common, sub-angular to sub-rounded, small to large pebbles; common small roots; gradual, wavy lower boundary; A horizon. **16-59**: Reddish brown, silty, gravelly, medium sand; gravels are many, sub-rounded to rounded, small to very large pebbles; common small roots and few charcoal-stained small pebbles; compact; gradual, smooth lower boundary; B horizon. **59-82**: Light yellowish gray, coarse sandy gravel; gravels are sub-rounded to rounded, very small to medium pebbles; few charcoal-stained small pebbles at upper boundary; C horizon. *Probe terminated in sterile glacial sediments.	None.
42	5217048	516193	**0-18**: Dark grayish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to large cobbles; many fie roots; gradual lower boundary; weakly developed A horizon. **18-75**: Yellowish brown, clayey, silty, sandy, sub-rounded to rounded, very small pebbles to large cobbles; coarsens with depth; weakly developed B horizon. *Probe terminated in sterile glacial sediments.	None.
43	5216998	516188	**0-12**: Dark brown, gravelly, fine to medium sandy, silt; gravels are sub-angular to sub-rounded, small to large pebbles; many small to large roots; clear, wavy lower boundary; A horizon. **12-49**: Yellowish brown, gravelly, fine sandy silt; gravels are common, sub-angular to sub-rounded; small pebbles to small cobbles; common small to medium roots; clear, straight lower boundary; B horizon. **49-63**: Grayish brown, silty, gravelly, fine to medium sand; gravels are many, sub-angular to sub-rounded, very small to medium pebbles; few fine roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
44	5217006	516147	**0-15**: Brown, sandy, silty, sub-angular to sub-rounded, very small pebbles to cobbles; many small roots; diffuse, irregular lower boundary; weakly developed A/B horizon. **15-44**: Yellowish brown, silty, fine to coarse sandy, sub-angular to rounded, very small pebbles to large cobbles; coarsens with depth; C horizon. *Probe terminated in sterile glacial sediments.	None.
45	5217019	516114	**0-13**: Dark brown, silty, gravelly, fine sand; gravels are common, sub-rounded to rounded, small to large pebbles; common small to medium roots; bioturbated with a rodent bone at 12 cmbs; gradual, smooth lower boundary; A horizon. **13-59**: Reddish brown, silty, gravelly, fine sand; gravels are many, sub-angular to sub-rounded, small to large pebbles; many small to medium roots; diffuse, smooth lower boundary; B horizon. **59-70**: Light yellowish gray, fine to medium sandy, sub-rounded to rounded, very small to medium pebbles; very few small roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
46	5217151	516151	**0-12**: Dark brown, gravelly, silty, fine sand; gravels are common, sub-angular to sub-angular; small to large pebbles; common small roots; gradual, smooth lower boundary; A horizon. **12-69**: Reddish brown, silty, gravelly, fine sand; gravels are many, sub-angular to sub-rounded, small to large pebbles; few fine roots; diffuse, wavy lower boundary; B horizon. **69-80**: Light yellowish gray, silty, gravelly, fine to medium sand; gravels are many, sub-rounded, small to very large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
47	5217021	516081	**0-12**: Dark grayish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to cobbles; many fine roots; diffuse, wavy lower boundary; A horizon. **12-50**: Light yellowish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to small cobbles; becomes clayey with depth; gravels coarsen with depth; B horizon. *Probe terminated in sterile glacial sediments.	None.
48	5216961	516174	**0-8**: Dark brown, gravelly, fine to medium sandy silt; gravels are few, sub-angular to sub-rounded, small to medium pebbles; many small to medium roots; clear, straight lower boundary; A horizon. **8-39**: Yellowish brown, gravelly, fine sandy silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; clear, straight lower boundary; B horizon. **39-62**: Grayish brown, gravelly, silty, fine to medium sand; gravels are common, sub-angular to sub-rounded, very small to medium pebbles; few small roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
49	5216947	516129	**0-14**: Dark brown, gravelly, few, sub-angular to sub-rounded, small pebbles to small cobbles; many small to large roots; clear, straight lower boundary; A horizon. **14-55**: Yellowish brown gravelly, silty, fine to medium sand; gravels are common, sub-angular to sub-rounded, small to very large pebbles; common small to medium roots; clear, wavy lower boundary; B horizon. **55-74**: Grayish brown, silty, gravelly, fine sand; gravels are many, very small to large pebbles; few small roots; C horizon. *Probe terminated in sterile glacial sediments.	0-20: eight fragments of FMR due to tree burning.
50	5216943	516095	**0-11**: Dark brown, gravelly, sandy silt; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; many small roots; clear, wavy lower boundary; topsoil; A horizon. **11-54**: Yellowish brown, gravelly, silty sand; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; common small roots; gradual, wavy lower boundary; B horizon. **54-69**: Light yellowish brown, gravelly, silty, fine to coarse sand; gravels are common, sub-angular to rounded, very small to very large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
51	5216959	516067	**0-10**: Very dark grayish brown, silty, fine to coarse sandy, sub-angular to rounded, very small pebbles to large cobbles; humic layer; clear, wavy lower boundary; A horizon. **10-27**: Yellowish brown, slightly clayey, silty, fine to medium sandy; sub-angular to rounded, very small pebbles to large cobbles; B horizon. **27-50**: Yellowish brown, medium to coarse sandy, sub-angular to rounded, very small pebbles to large cobbles; B/C horizon. *Probe terminated in sterile glacial sediments.	None.
52	5216896	516059	**0-5**: Dark brown, gravelly, silty, fine sand; gravels are few, sub-angular to rounded, small to very large pebbles; common medium roots; clear, smooth lower boundary; O/A horizon. **5-62**: Yellowish brown, gravelly, silty, fine to medium sand; gravels are few, sub-rounded to rounded, very small and small pebbles; few small roots; compact; gradual, wavy lower boundary; weakly developed A/B horizon. **62-80**: Light gray, gravelly, silty, fine sand; gravels are few, rounded, very small pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
53	5216899	516106	**0-66**: Dark brown to reddish brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; common roots; common small charcoal flecks and fragments; gradual lower boundary; topsoil to 9 cmbs and weakly developed A/B horizon 9 to 66 cmbs. **66-80**: Light yellowish brown, gravelly, silty, sand; gravels are few, sub-angular to sub-rounded, very small pebbles to small cobbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
54	5216911	516139	**0-32**: Dark brown, sandy, gravelly, silt; gravels are common, sub-angular to rounded, very small to large pebbles; few small roots; clear, wavy lower boundary; topsoil; A horizon. **32-64**: Mottled gray and reddish brown, sandy, gravelly, clay; gravels are few, very small pebbles to small cobbles; compact at depth; C horizon (possible glacial marine). *Probe terminated in sterile glacial sediments.	None.
55	5216898	516180	**0-14**: Dark grayish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small to very large pebbles; humic layer; diffuse, but irregular lower boundary; O/A horizon. **14-26**: Dark yellowish brown, silty, gravelly, fine to coarse sand; gravels are many, sub-rounded to rounded, very small to very large pebbles; diffuse, irregular lower boundary; weakly developed A horizon. **26-50**: Light reddish brown, slightly clayey, silty, gravelly, sand; gravels are many, sub-rounded to rounded pebbles; B horizon. **50-60**: Light yellowish brown, clayey, silty, gravelly, sand; gravels are common, angular to rounded, very small pebbles to small cobbles; C horizon. *Probe terminated in sterile glacial sediments.	None.
56	5216867	516047	**0-14**: Dark brown, gravelly, fine sandy silt; gravels are very few, sub-angular to sub-rounded, small to medium pebbles; many fine to coarse roots; abrupt, straight lower boundary; A horizon. **14-43**: Yellowish brown, gravelly, silty, fine sand; gravels are very few, sub-angular to sub-rounded, very small to small pebbles; few small to medium roots; clear way lower boundary; B horizon. **43-55**: Grayish brown, gravelly, silty, medium sand; gravels are very few, sub-angular to sub-rounded, very small to small pebbles; few small roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
57	5216851	516087	**0-13**: Dark brown, gravelly, silty, fine sand; gravels are few, angular to sub-rounded, small to large pebbles; common small roots; gradual, wavy lower boundary; A horizon. **13-80**: Reddish brown, gravelly, silty, fine sand; gravels are few, sub-angular to sub-rounded, small to large pebbles and two large cobbles; common small roots; few small fragments of charcoal; gradual, wavy lower boundary; B horizon. **80-87**: Light gray, silty, gravelly, fine sand; gravels are many, sub-rounded to rounded, very small to medium pebbles; very few small roots; C horizon. *Probe terminated in sterile glacial sediments.	None.
58	5216849	516120	**0-11**: Dark brown, silty, gravelly, fine sand; gravels are common, angular to sub-rounded, very small to large pebbles; common medium roots; gradual, wavy lower boundary; A horizon. **11-60**: Yellowish brown, silty, gravelly, fine sand; gravels are common, angular to rounded, small pebbles to very large cobbles; common, small roots; B horizon. *Probe terminated in sterile glacial sediments.	None.

Table A-1. Shovel Probe Summary.

PROBE NO.	UTM (Zone 10N, NAD83) NORTHING	EASTING	DEPTH	CULTURAL MATERIALS
59	5216865	516157	**0-17**: Brown, gravelly, sandy, silt; gravels are few, sub-angular to sub-rounded, small to large pebbles; gradual, wavy lower boundary; topsoil, A horizon. **17-62**: Yellowish brown, gravelly, silty sand; gravels are common, small to large pebbles; few small roots; clear, smooth lower boundary; B horizon. **62-81**: Yellowish gray, silty, gravelly, fine to medium sand; gravels are few, sub-angular to sub-rounded, very small to large pebbles; compact at depth; C horizon. *Probe terminated in sterile glacial sediments.	None.
60	5217153	516209	**0-4**: Dark brown, fine sandy silt with very few sub-angular to sub-rounded, small to large pebbles; many small to medium roots; gradual, smooth lower boundary; O horizon. **4-76**: Brown, silty, fine to medium sandy, sub-rounded to rounded, large pebbles to cobbles; many small to medium roots; fill. *Probe terminated in compact fill.	None.
61	5217245	516208	**0-20**: Dark grayish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to small cobbles; many small roots; clear, smooth lower boundary; weakly developed A horizon. **20-60**: Yellowish brown, silty, fine to coarse sandy, sub-rounded to rounded, very small pebbles to small cobbles; B horizon. *Probe terminated in sterile glacial sediments.	None.
62	5217197	516102	**0-11**: Brown, gravelly, sandy, silt; gravels are common, sub-angular to sub-rounded, small to large pebbles; many small roots; gradual, wavy lower boundary; A horizon; disturbed. **11-54**: Reddish brown, gravelly, silty, sand; gravels are common, sub-angular to sub-rounded, very small to very large pebbles; common small roots; clear, wavy lower boundary; B horizon. **54-72**: Light yellowish brown, silty, fine to coarse sandy; angular to rounded, very small to large pebbles; loose; C horizon. *Probe terminated in sterile glacial sediments.	0-20: metal nut.
63	5217196	516033	**0-19**: Brown, gravelly, sandy, silt; gravels are many, angular to rounded, very small to large pebbles; many small roots; clear, smooth lower boundary; topsoil; A horizon. **19-68**: Yellowish brown, gravelly, silty, fine to medium sand; gravels are many, sub-angular to rounded, very small to very large pebbles; common small roots; root burn; clear, smooth lower boundary; B horizon. **68-86**: Grayish brown, gravelly, silty, fine to coarse sand; gravels are many, sub-angular to rounded, very small to very large pebbles; C horizon. *Probe terminated in sterile glacial sediments.	20-40: few FMR related to tree burning during clearing.