

Environmental Management Plan Appendix: Archaeology and Heritage Resources Management Plan for Site Clean-up and Remediation Activities



This Appendix has been formatted to function as a standalone plan in an effort to be an effective resource for Project personnel planning, executing, and monitoring of activities associated with the cleanup and remediation of the historic, industrial Woodfibre site, as well as to facilitate dialogue with applicable external parties.

The information included in this Appendix is derived from Environmental Management Plans (EMPs) to which it is appended. In addition, this Appendix takes into consideration, and will continue to be updated to reflect, key issues of concern, views and information, identified by "Aboriginal Groups" as defined in section 1.1 of Woodfibre LNG's Federal Decision Statement, as amended March 7, 2018.

1.0 Purpose and Intent

The Plan has been derived from Woodfibre LNG's ongoing communication with Aboriginal Groups. It is intended to describe how potential risk, as it relates to both archaeological and heritage resources, has been identified, and to outline the mitigation measures to be implemented.

2.0 Background

The Woodfibre site is historically the Squamish Nation Village of Swiy'a'at. A sawmill was first built on Mill Creek in 1908 and destroyed in a washout in the 1930s. A second mill operated at the north end of the Site under various owners until its decommissioning by Western Forest Products in 2006. Woodfibre LNG took ownership of the site from Western Forest Products on February 6, 2015. Prior to the land transfer in 2015, Western Forest Products received two Certificates of Compliance (CoC, land and water lots) from the BC Ministry of Environment and Climate Change Strategy, which were a condition of the sale agreement.

The Woodfibre property is a fee simple, industrially zoned brownfield site with deep-water marine access and a history of more than 100 years of industrial use. The infrastructure includes an active landfill, a leachate treatment system, a wastewater treatment system, a dam at the outlet of Henriette Lake, an operational small hydro project, and failing infrastructure associated with the pulp and paper mill.

As part of the Environmental Assessment (EA) completed to inform regulatory evaluation and subsequent approval (including that of the Squamish Nation) for the Project, Woodfibre LNG commissioned appropriately qualified professionals to undertake an archaeological assessment of the proposed project area, including an initial Heritage Resources Overview Assessment followed by a field based Archaeological Impact Assessment (AIA).

All archeological sites in the province of British Columbia (BC), both known and unknown, are protected under the *Heritage Conservation Act* (HCA). The Archaeology Branch of the Ministry of Forests, Lands, Natural Resource Operations, and Rural Development (MFLNRORD) requires that Proponents of industrial development projects follow a standard process to evaluate and mitigate the effects to archaeological and heritage resources. Furthermore, the Squamish Nation has established its own regulatory processes, including cultural and environmental reviews of industrial projects in its territory.

3.0 Clean up and Remediation Work

This Plan applies to all activities that occur within the recognized Certified Project Area (CPA) associated with the clean-up and remediation. This includes avoiding subsurface excavation into original ground or the removal of mature timber and all activities described are within the study area of the Archaeology Impact Assessment, where applicable. More specifically these activities include but are not limited to:

- Closure of the existing pulp mill land fill i.e., grading and excavation of landfill material and placing and installation of landfill cover;
- Investigative work e.g., geotechnical testing
- Demolition and removal or onsite remediation of existing terrestrial structure e.g., concrete slab removal and stockpiling on site, creosote pile removal; and
- Ongoing maintenance and upgrades to the existing work or infrastructure to address safety, environment or regulatory compliance e.g., building and facilities work and repair, water management facilities, electrical distribution.

4.0 Archaeology and Heritage Resources

Completion of the AIA field study confirmed the results of the desktop overview assessment in that, while no archaeological sites are known to exist, there remains the potential for undocumented archaeological sites, including subsurface resources, surface lithic scatters, culturally modified trees, intertidal features, and heritage wrecks. In addition, based on comment from Squamish Nation, the following may also be present at locations on the site: fire-cracked rock and boiling stones, architectural features, cultural mounds, cultural depressions, hearths, rock shelters, rock art, petroforms or rock cairns, deposits in waterlogged sediments – basketry, arrow shafts, planks, wedges, rope etc. Attachment 1 of this document offers photographic examples that highlight identifying features of potential artifacts.

Additionally, surface and buried historical features, including building foundations and infrastructures, and associated cultural material may be situated across the site. Finally, although no paleontological resources have been previously recorded at the site the potential remains for the discovery or encounter of undocumented fossils and paleontological sites to exist in select portions of the site. Items that may be uncovered include human bones, stone tools, or other artifacts, all of which are protected under the BC *Heritage Conservation Act*.

5.0 Monitoring

While the initial overview assessment and the subsequent effects assessment concluded that the geographic area is of cultural significance to the Squamish Nation and pre-contact use of the assessed area is certain, substantial industrial disturbance over the last one hundred years has likely eliminated archeological materials from the previous disturbed areas of the site. Given the scope of work covered by this management plan, routine or full time monitoring is not planned.

However, should excavation into original soils or clearing of mature timber be required as part of clean up and remediation, the EMP and this Appendix will need to be updated, along with any monitoring requirements. This will also include, in the event of tree clearing, taking into account British Columbia's Handbook for the Identification and Recording of Culturally Modified Trees.

In acknowledgement of the ethnographic literature which confirms traditional land use throughout the Project footprint and in recognition of the Aboriginal interests in the assessed area, Project activities will be subject to chance find protocols.

6.0 Procedure for Chance Find of Archaeological and Cultural Heritage Resources

Implementation of a chance find protocol may lead to the discovery of cultural and/or heritage resources, such as those described above, that were not identified in previous archeological site investigation(s). All contractors and subcontractors working on the site will have a responsibility to confirm that their employees and subcontractors are familiar with the contents of Environmental Management Plans, and Appendix as they applies to their work.

In the event of what is suspected to be a possible archaeological or cultural heritage resource, the following protocol will be followed:

- all activities at that location, or with the potential to impact the suspected resources, will be halted as safety to so or when safe to do so;
- the area will be secured, marked and reported to the work supervisor and Woodfibre LNG site manager;
- Woodfibre LNG will notify relevant agencies and Aboriginal Groups and should suspected human remains be discovered, local law enforcement (RCMP) shall also be informed;
- based on the finding and based on key concerns, views and information from relevant Aboriginal Groups appropriate mitigation will be developed, which may include confirmation of the find and removal of the structure, site or thing identified; and
- no further disturbance to the area until approved by an appropriately qualified professional.

7.0 Updates to the Plan

Management of archeological and heritage resources is a living process and the EMPs and this plan will be updated, as required, based on concerns, views and information expressed by Aboriginal Groups, plan performance, permitting requirements and as appropriate for the scope of work being undertaken at the site. Project personnel will be informed of relevant changes to EMPs and this plan as those changes occur.

Attachment 1; Examples of Heritage and Archaeological Resources

Shell Midden - Cultural accumulations of shells, stratified in white and grey layers, mixed with streaks of charcoal, ash, and other debris. Shell middens were also commonly used as human burial sites. Look for: accumulations of layered, crushed, and whole shell possibly mixed with charcoal, black soil, and other food remains (i.e., fish bone).



Photo 1 Shell Midden

Photo source: <http://www.akarenga-h.jp/en/archives/library/468/>



Photo 2 Salmon and Herring Bone

Photo source: <http://www.sliammonfirstnation.com/archaeology/fishing.html>

Artifact or Artifact Scatter - Portable object(s) manufactured or modified by human beings. These items may include chipped or ground stone objects or implements made from bone and antler. Look for: obviously formed stone objects or pieces of stone that have been chipped and/or ground in a non-natural way. Bone and antler artifacts will exhibit obvious modification (i.e., cutting, shaping, incision, etc.).



Photo 3 Chipped Stone Tools

Photo Source: <https://archaeologyblog.treetimeservices.ca/tag/lithics/page/2/>



Photo 4 Chipped Stone Tools

Photo source: <http://montecristomagazine.com/magazine/summer-2015/the-city-before-the-city>

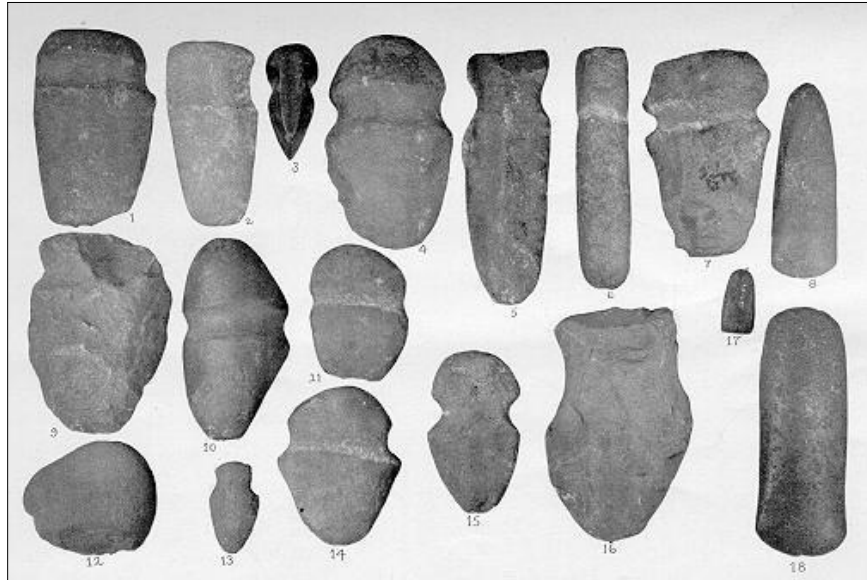


Photo 5 Hand Mauls (Hammer Stones)

Photo Source: <http://www.adsny.com/nyindian/roughstonearticles.html>



Photo 6 Fish Net Sinker Stone

Photo source: <https://oregonhistoryproject.org/articles/historical-records/sinker-stone-columbia-river/#.WVKgbOmQyUk>



Photo 7 Deer bone and antler tools

Photo source :<http://www.arrowheadology.com/forums/arrowheads-and-indian-artifacts/29293-need-some-help-deer-bone-antler-tools-photos-needed-2.html>

Waterlogged Deposits or Wet Sites - Locations containing organic artifacts (i.e., wood, bark, or plant fibre), that are preserved due to their presence in an anaerobic (oxygen free) environment. Look for: fragmentary baskets, rope, carved wood implements (e.g., wedges), and similar objects eroding from intertidal silts and/or clay deposits.



Photo 8 Gill net made of spruce

Photo source: <https://ecologicalprocesses.springeropen.com/articles/10.1186/2192-1709-2-12>



Photo 9 Stone tools, preserved bone artifacts and fauna

Photo Source: <http://newswarp.info/2013/01/kilgii-gwaay%E2%80%9410700-year-old-wet-site-revisited-on-the-southern-haida-gwaii-b-c-canada/>



Photo 10 Waterlogged basket

Photo Source: http://www.sliammonfirstnation.com/archaeology/poster_archsites.html

Fish Weir and Traps: Fish weirs are typically comprised of linear arrangements of wooden stakes interwoven with brush or mats to trap fish on the falling tide. Look for: short stubs of small diameter branches in linear arrangements in the inter-tidal zone.



Photo 11 Intertidal Fish Trap

Photo Source: <https://ecologicalprocesses.springeropen.com/articles/10.1186/2192-1709-2-12>



Photo 12 Intertidal Fish Weir

Photo source: <https://ecologicalprocesses.springeropen.com/articles/10.1186/2192-1709-2-12>

Fire Broken Rock and Hearths: Fire-broken rock (FBR) results from the use of fire during cooking, heating and processing activities. FBR is often associated with other features including hearths and cultural depressions but can also be thinly scattered in concentrations away from the features with which they were first associated. When looking for FBR, note concentrations of roughly fractured rock from rapid heating and cooling, rock showing signs of burning or oxidation and/or reddening or blackening of surrounding matrix. A distinctive squared or “castellate” fracture pattern is characteristic of precontact culturally fired rock.

A hearth feature is evidence of a fire pit or other fireplace feature of any period. Hearths were used for cooking, heating, and processing of some stone, wood, faunal, and floral resources and may be either lined with a wide range of materials like stone or left unlined. Occasionally site formation processes (e.g., farming or excavation) deform or disperse hearth features, making them difficult to identify without careful study. What to look for:

- reddening or blackening of the associated soil/sediment
- charcoal
- layering of FBR and charcoal, and
- depressions in the earth associated with FBR, reddened or blackened matrix and charcoal.



Photo 13 Fire cracked rock

Photo source: <http://twipa.blogspot.com/2011/04/f-is-for-forts-feature-flint-fridayand.html>



Photo 14 Example of a hearth uncovered along the wall of an excavation unit. Note the distinctive fracture pattern.

Cultural Depressions: Any depression seen on the ground surface that appears to have been excavated by a human can be a cultural depression and have archaeological significance. These “pits” were dug for a variety of reasons such as for food storage, cooking or as a base for a dwelling. They can range in size from 1m across to 7-10m across and are usually found associated with other artifacts such as FBR and lithic scatters. Look for:

- Subtle to deep scours on the ground surface that are circular to rectilinear in shape
- A raised rim along the edge of a depression
- Depressions associated with artifacts and FBR
- Depressions associated with fire reddening and blackening of the matrix

Cultural Mounds: Any raised or mounded surface feature that appears to have been created by a human, unnatural to the surrounding landscape. These mounds were used as burial locations and fortification sites. Look for subtle to obvious slopes and mounds in the landscape, often in an area with multiple mound features.

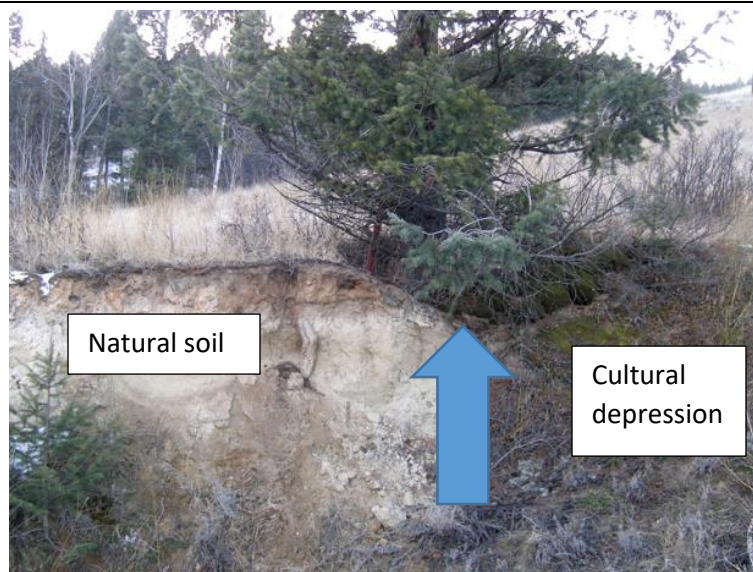


Photo 15 Cultural depression in cut bank



Photo 16 Cultural depression in natural setting



Photos 16 & 17 Examples of cultural/ancestral mounds

Photo source : <http://digitalsqwelts.ca/sqwelqwel/archaeology-archeologie/index-eng.php>

Rock Cairns or Ancestral Burial Cairns: Rock and boulders placed in circles or mounds, often represent precontact burials, essentially consisting of rock and soil structures built on the ground surface. Look for intentional looking piles or rock, not natural to the landscape.



Photo 18 Rock Cairn or Ancestral Burial Cairn

Photo Source: <http://digitalsqewlets.ca/sqwelqwel/archaeology-archeologie/index-eng.php>

Memoirs Am. Mus Nat. Hist., Vol. IV.

Plate II.



FIG. 1.

Photo 19 Rock Cairn or Ancestral Burial Cairn

Photo source: <https://qmackie.com/tag/cairns/>

Rock Art: Includes pictographs (paintings) and petroglyphs (carvings), often found on rock faces, not always in obvious locations – may be obscured by vegetation or rock overhangs.



Photo 17 Petroglyphs

Photo Source: <http://www.sfu.ca/archaeology-old/museum/rockart/index.html>



Photo 18 Pictograph

Photo source: <http://interiorpicto.com/wp-content/uploads/2013/10/pierre-john11.png>

Soil Stratigraphy and Horizons: Soil layers which are distinct from each other and are formed over time due to natural weather, erosion or deposition, vegetation growth and decay as well as human and animal activity.

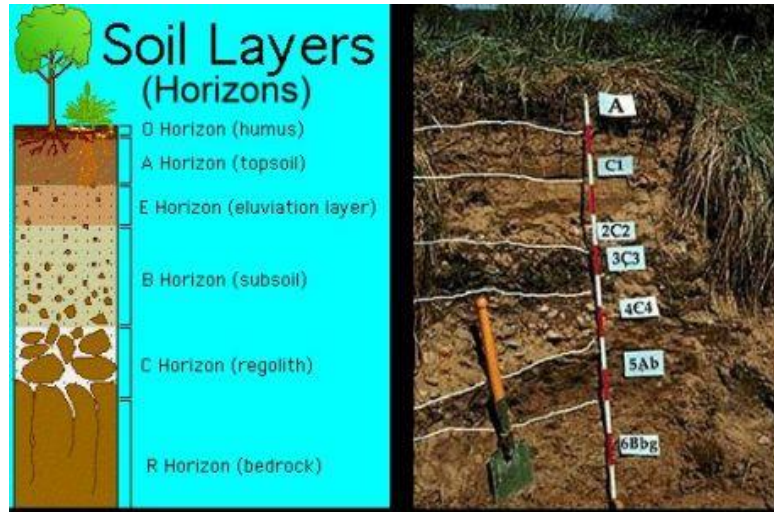


Photo 19 Soil layers / horizons

Photo source: <https://geopoliticraticus.wordpress.com/2015/09/13/horizons-of-spacefaring-civilizations/>



Photo 20 Stratification layers indicating cultural activity and or organic materials

Photo source: <https://www.sfu.ca/archaeology/museum/exhibits/virtual-exhibits/Stratigraphy.html>